

# Spatialisateur

spat5 reference pages

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Release Version : 5.3.x  
Updated : March 26, 2025

# Table of content

	Page
spat5.abs2rel	Conversion from absolute to relative coordinates . . . . . 3
spat5.adm.extractxml	Extract aXML chunk for a BWF-ADM file . . . . . 4
spat5.adm.mute	Allow interaction with ADM entities . . . . . 6
spat5.adm.mute.embedded	Allow interaction with ADM entities . . . . . 8
spat5.adm.play~	Play ADM file and deliver metadata stream . . . . . 10
spat5.adm.record	GUI for spat5.adm.record~ . . . . . 12
spat5.adm.record~	Record ADM file and associated metadata stream . . . . . 14
spat5.adm.renderer~	Render ADM file . . . . . 16
spat5.adm.room~	Simplified room module . . . . . 18
spat5.air~	Simulates air absorption filtering . . . . . 20
spat5.align~	Speaker delay and gain alignment . . . . . 22
spat5.allpass~	Multichannel feedback allpass section . . . . . 25
spat5.barycenter	Barycenter calculation . . . . . 28
spat5.binaural~	Binaural panning . . . . . 30
spat5.boids	Flock simulator . . . . . 34
spat5.calibrate.delay~	Measurement of propagation delays . . . . . 35
spat5.calibrate.gain~	Measurement of propagation delays . . . . . 37
spat5.cascade.inverse	Inverse a cascade filter . . . . . 39
spat5.cascade.resample	Cascade resampling . . . . . 41
spat5.cascade~	Multichannel cascade~ . . . . . 43
spat5.clip~	Limit signal amplitude . . . . . 46
spat5.cluster~	Second stage of the Spat room module. Generates diffuse reflections . . . . . 48
spat5.colormap	Utility functions for color manipulations . . . . . 51
spat5.comb~	Multichannel Comb filter . . . . . 53
spat5.complementarybank~	Complementary N-Band IIR Filterbank . . . . . 56
spat5.compressor	Control interface for spat5.compressor~ . . . . . 58
spat5.compressor.embedded	Control interface for spat5.compressor~ . . . . . 60
spat5.compressor~	Multichannel Compressor/Expander . . . . . 62
spat5.constraint	Geometrical constraints . . . . . 64
spat5.converb~	Convolution reverb with filtering . . . . . 65
spat5.converter	Coordinate format conversion . . . . . 68
spat5.converter~	Signal-rate coordinate format conversion . . . . . 70
spat5.conv~	Realtime convolution . . . . . 72
spat5.cpu	Report CPU and RAM usage . . . . . 75
spat5.cross3~	3-band crossover filtering . . . . . 76
spat5.ctc~	Crosstalk-canceller . . . . . 79
spat5.dcfilter~	Multichannel DC removal filter . . . . . 82
spat5.decoder~	Generic decoder/transcoder module . . . . . 84
spat5.decorrelate~	Multichannel decorrelation . . . . . 87
spat5.delay~	Multichannel variable delay line . . . . . 89
spat5.delgen	Delay distribution generator . . . . . 91
spat5.deltaclip~	Limit changes in signal amplitude . . . . . 93
spat5.delta~	Signal of sample differences . . . . . 95
spat5.diagmatrix~	Diagonal signal matrix . . . . . 97
spat5.distance	Distance and angle between sources and speakers . . . . . 99
spat5.doppler~	Doppler simulation . . . . . 101
spat5.dsptime~	Report milliseconds of audio processed . . . . . 103
spat5.early~	First stage of the Spat room module. Generates early reflections . . . . . 105
spat5.ebur128~	Loudness metering according to EBU R128 . . . . . 108
spat5.edc	Schroeder estimation of reverberation time . . . . . 110
spat5.eq	Parametric equalizer . . . . . 111
spat5.eq.embedded	Parametric equalizer . . . . . 114
spat5.equalizer	Parametric equalizer . . . . . 116
spat5.equalizer.embedded	Parametric equalizer . . . . . 119
spat5.elliptique~	Directional reverberation processor . . . . . 121
spat5.espro.brir	Renders Espro speaker feeds to binaural . . . . . 124
spat5.evert	Accelerated beam tracing algorithm . . . . . 126
spat5.evert~	Evert auralization engine . . . . . 128
spat5.evert.fdn~	FDN reverberation . . . . . 131

spat5.fact2crit	Conversion between perceptual factors and acoustical criteria . . . . .	134
spat5.file.infos	File information . . . . .	136
spat5.filterdesign	Filter design . . . . .	138
spat5.filterdesign.embedded	Filter design . . . . .	141
spat5.fir~	Multichannel FIR filter . . . . .	143
spat5.fixnan~	Filters out NaN or Inf . . . . .	146
spat5.folder.infos	List folder content . . . . .	148
spat5.frequencyresponse	Plot frequency response . . . . .	150
spat5.frequencyresponse.embedded	Plot frequency response . . . . .	153
spat5.gammatone	Gammatone filter design . . . . .	155
spat5.gate~	Route a signal to one of several outlets . . . . .	157
spat5.gopro.decode	Decode GoPro VR Player packets . . . . .	159
spat5.graphiceq	Graphic equalizer . . . . .	161
spat5.graphiceq.embedded	Graphic equalizer . . . . .	164
spat5.graphiceq2	Graphic equalizer . . . . .	166
spat5.graphiceq3	Graphic equalizer . . . . .	168
spat5.graphiceq~	Graphic equalizer . . . . .	170
spat5.granulator~	Multichannel granular synthesis . . . . .	173
spat5.grids	Grids generator . . . . .	176
spat5.headphoneeq~	Headphone equalization . . . . .	178
spat5.hilbert~	Phase quadrature filter . . . . .	180
spat5.hlsshelf	Control interface for spat5.hlsshelf~ . . . . .	182
spat5.hlsshelf.embedded	Control interface for spat5.hlsshelf~ . . . . .	185
spat5.hlsshelf~	Parametric shelving filter . . . . .	187
spat5.hoa.aformat~	Ambisonic A-format to B-format conversion . . . . .	190
spat5.hoa.binaural~	Transcode HOA stream to binaural . . . . .	192
spat5.hoa.beam~	HOA beamforming . . . . .	194
spat5.hoa.beam	Beamforming in the HOA domain . . . . .	197
spat5.hoa.beam.embedded	Beamforming in the HOA domain . . . . .	200
spat5.hoa.beamix	Control interface for spat5.hoa.beamix~ . . . . .	202
spat5.hoa.beamix.embedded	Control interface for spat5.hoa.beamix~ . . . . .	205
spat5.hoa.beamix~	HOA filter bank with spatial effects . . . . .	207
spat5.hoa.blur~	Blur effect in the HOA domain . . . . .	210
spat5.hoa.conv~	Ambisonic convolution . . . . .	213
spat5.hoa.converter~	Ambisonic normalization converter . . . . .	216
spat5.hoa.decoder~	Ambisonic decoder . . . . .	219
spat5.hoa.directivity	HOA Directivity patterns . . . . .	223
spat5.hoa.directivityshaper	Design cardioid-like, fractional-order, spherical beampatterns . . . . .	225
spat5.hoa.directivityshaper.embedded	Design cardioid-like, fractional-order, spherical beampatterns . . . . .	228
spat5.hoa.display	Spherical harmonics visualization . . . . .	230
spat5.hoa.display.embedded	Spherical harmonics visualization . . . . .	233
spat5.hoa.dominance~	Ambisonic dominance effect . . . . .	235
spat5.hoa.downscale~	Downscale 3D HOA to 2D . . . . .	238
spat5.hoa.em32~	Eigenmike em32 encoding . . . . .	240
spat5.hoa.em64~	Eigenmike em64 encoding . . . . .	243
spat5.hoa.encoder~	HOA encoder . . . . .	246
spat5.hoa.equivalentorder	HOA Equivalent Order . . . . .	249
spat5.hoa.focus	Virtual beamforming in the HOA domain . . . . .	251
spat5.hoa.focus~	Virtual beamforming in the HOA domain . . . . .	253
spat5.hoa.intensity~	HOA intensity and diffuseness estimation . . . . .	256
spat5.hoa.map	Spherical harmonics visualization . . . . .	259
spat5.hoa.mirror~	Ambisonic mirroring . . . . .	261
spat5.hoa.optim~	Ambisonic optimization . . . . .	264
spat5.hoa.plot	Spherical harmonics plot . . . . .	267
spat5.hoa.reduce~	Ambisonic order reduction . . . . .	269
spat5.hoa.rotate~	Ambisonic rotations . . . . .	271
spat5.hoa.shelving	Ambisonic band-splitting filters (phase-matched) . . . . .	274
spat5.hoa.slaconv~	Convolver for spherical loudspeaker array (SLA) . . . . .	276
spat5.hoa.sorting~	Ambisonic channel sorting method converter . . . . .	279
spat5.hoa.triangle	Spherical harmonics display . . . . .	281
spat5.hoa.triangle.embedded	Spherical harmonics display . . . . .	283
spat5.hoa.warp~	Warping in the HOA domain . . . . .	285
spat5.hoa.weighting~	Apply per-order gain to an HOA stream . . . . .	288
spat5.hoa.zm1~	Zylia ZM-1 encoding . . . . .	291
spat5.hostinfos	Host information . . . . .	294
spat5.hrtf.infos	Report information about HRTF-SOFA files . . . . .	296
spat5.hrtf.normalize	Apply normalization procedure to HRTF-SOFA files . . . . .	298
spat5.hybrid~	Hybrid reverberation engine . . . . .	300
spat5.hull	Convex hull . . . . .	302
spat5.ircamverb	Low-level control interface for spat5.ircamverb~ . . . . .	304
spat5.ircamverb.embedded	Low-level control interface for spat5.ircamverb~ . . . . .	307
spat5.ircamverb~	Artificial room reverberator . . . . .	310
spat5.irma2hoa~	Encode Ircam microphone array to HOA . . . . .	314
spat5.ir.analysis	EDR analysis of Room Impulse Response (RIR) . . . . .	316

spat5.ir.infos	Report information about Room Impulse Response (RIR)	318
spat5.isnan~	Detect NaN or Inf values	320
spat5.jitter	Deviate and randomize coordinate messages	322
spat5.knn	K-nearest neighbors search	324
spat5.leslie~	Leslie cabinet simulation	326
spat5.limiter~	Peak limiter	328
spat5.lms~	Least mean squares filter	330
spat5.ltc.decode~	Time code decoder	333
spat5.ltc.easydecode~	Simplified time code decoder	335
spat5.ltc.encode~	Time code generator	337
spat5.ltc.fromms	Converts milliseconds to LTC/SMPTE Time code	339
spat5.ltc.toms	Converts LTC/SMPTE Time code to milliseconds	341
spat5.ltc.trigger~	Time code decoder	343
spat5.matrix	Matrix controller	345
spat5.matrix.embedded	Matrix controller	348
spat5.meter~	Multichannel signal metering interface	350
spat5.minmax~	Compute minimum/maximum signal values	352
spat5.mirror	Mirror coordinate messages	354
spat5.mscohere~	Magnitude-squared coherence estimation using Welch's averaged periodogram method	355
spat5.multispeakerbrir~	Read and render SOFA files with the MultiSpeakerBRIR convention	357
spat5.multiverb~	Multiband feedback delay network	359
spat5.noisegate~	Multichannel noise gate	362
spat5.noise~	Generate white noise	365
spat5.normalize	Normalize coordinate messages	367
spat5.octavebank~	Octave filter bank	368
spat5.oper	Perceptual control interface (for spat5.spat~)	370
spat5.oper.embedded	Perceptual control interface (for spat5.spat~)	377
spat5.oper_	Convert high-level (perceptual) messages to low-level	382
spat5.osc.append	Append arguments to the end of the OSC address	384
spat5.osc.change	Filter out repetitions of OSC messages	386
spat5.osc.chunk	Split an OSC bundle into smaller chunks.	388
spat5.osc.collect	Collects OSC messages to be bundled together	390
spat5.osc.flip	Flip OSC patterns	392
spat5.osc.fromdict	Convert dictionary to OSC messages or bundles	394
spat5.osc.ignore	Route OSC messages or bundles	396
spat5.osc.interpolate	Interpolate between OSC bundles/messages	398
spat5.osc.iter	Iterate over each each messages of an OSC bundle	400
spat5.osc.pack	Concatenate OSC packets together	402
spat5.osc.pak	Concatenate OSC packets together	404
spat5.osc.play~	Playback time-stamped OSC messages	406
spat5.osc.prepend	Add arguments in front of the OSC address	408
spat5.osc.print	Print OSC messages or bundle	410
spat5.osc.queue	FIFO OSC queue	412
spat5.osc.record~	Record time-stamped OSC messages	414
spat5.osc.replace	Replace OSC address	416
spat5.osc.route	Route OSC messages or bundles	418
spat5.osc.routepass	Route OSC messages or bundles	420
spat5.osc.size	Report the size of an OSC message or bundle	422
spat5.osc.slashify	Convert Max messages to OSC	424
spat5.osc.speedlim	Limit the speed of OSC messages throughput	426
spat5.osc.split	Split OSC messages	428
spat5.osc.tcpreceive	Receive OSC messages or bundles from TCP	430
spat5.osc.tcpsend	Transmit OSC messages or bundles over TCP	432
spat5.osc.todict	Convert OSC messages or bundles to dictionary	434
spat5.osc.trim	Trim OSC patterns	436
spat5.osc.udpreceive	Receive OSC messages or bundles from UDP	438
spat5.osc.udpsend	Transmit OSC messages or bundles over UDP	440
spat5.osc.unique	Remove duplicated address pattern in OSC bundle	442
spat5.osc.unslashify	Split OSC address pattern	444
spat5.osc.var	Store OSC messages or bundles	446
spat5.pan	Control-rate amplitude panning	467
spat5.panoramix	3D mixing and post-production workstation	452
spat5.panoramix~	3D mixing and post-production workstation	458
spat5.pansig~	Signal-rate amplitude panning	461
spat5.pan~	Generic panner module	463
spat5.pan	Control-rate amplitude panning	467
spat5.panner.metrics	Panner metrics	471
spat5.panner.metrics.embedded	Panner metrics	474
spat5.patrr	Store and recall presets	477
spat5.periactes	Periactes control	479
spat5.ping	Ping utility	481
spat5.pink~	Generate pink noise	483
spat5.plot	Generic plot component	485
spat5.plus~	Multichannel plus~	487

spat5.printbytes	Print FullPacket	489
spat5.project	Geometrical projection	491
spat5.quat.fromeuler	Euler angles to quaternion	493
spat5.quat.frommatrix	Converts 3x3 rotation matrix to quaternion	495
spat5.quat.fromvectors	Quaternions from two vectors in 3D	497
spat5.quat.interpolate	Interpolation between two quaternions	499
spat5.quat.inverse	Inverse quaternion	501
spat5.quat.multiply	Quaternions multiplication	503
spat5.quat.normalize	Normalize quaternion	505
spat5.quat.toeuler	Quaternion to Euler angles	507
spat5.quat.tomatrix	Converts quaternion to 3x3 rotation matrix	509
spat5.quat.transform	Apply quaternion rotation	511
spat5.rake~	FFT bins mapping	513
spat5.reverb.timeview	Impulse response visualization	515
spat5.reverb~	Late reverberation	517
spat5.rms~	Multichannel RMS metering	520
spat5.roomsize	Delay distribution generator	522
spat5.room~	Reverberation module	524
spat5.rotate	Rotate coordinate messages	527
spat5.routing	Routing matrix	528
spat5.routing.embedded	Routing matrix	531
spat5.routing~	Routing matrix	532
spat5.scale	Scale coordinate messages	534
spat5.screencapture	Capture screenshots	535
spat5.selector~	Assign one of several inputs to an outlet	537
spat5.sfplay~	Play audio file from disk	539
spat5.sfplaylist~	Play audio file(s) from disk	542
spat5.sfreord~	Record to audio file on disk	545
spat5.sf.list	List of audio files	548
spat5.sf.list.embedded	List of audio files	550
spat5.sf.merge	Audio file merger	552
spat5.sf.resample	Audio file Resampler	554
spat5.sf.trim	Audio file trim	556
spat5.sf.split	Audio file splitter	558
spat5.shell	Execute shell commands	560
spat5.shuffle~	Random recombination of channels	562
spat5.sig~	Convert numbers into audio signals	564
spat5.simone	Simulation of MOTioN	566
spat5.simone.embedded	Simulation of MOTioN	569
spat5.simone.generator	Vector field generator	571
spat5.simulate.em32~	Simulate Eigenmike recording	572
spat5.singlroomdrir	Read SOFA files with the SingleRoomDRIR convention	574
spat5.slide~	Filter a signal logarithmically	575
spat5.smk~	Sweep Measurement Kit	577
spat5.snapshot~	Multichannel conversion of signal values to numbers	580
spat5.sofa.infos	Report information about SOFA files	582
spat5.sofa.loader	SOFA files manager	584
spat5.sofa.loader.embedded	SOFA files manager	586
spat5.softclipping~	Soft clipping	588
spat5.source~	Source pre-processing	590
spat5.spat~	LE Spatialisateur	592
spat5.speaker.config	Speaker layout editor	597
spat5.speaker.config.embedded	Speaker layout editor	599
spat5.speaker.layout	Pre-defined loudspeaker setups	601
spat5.spectroscope~	Signal spectrogram	603
spat5.sprintf	String formatting	605
spat5.svgpath	Convert SVG image file to trajectory	607
spat5.sweep~	Sweep generator	608
spat5.tanh~	Signal hyperbolic tangent function	610
spat5.tapout~	Multichannel tapout from a delayline	612
spat5.tfestimate~	Transfer Function estimation using Welch's averaged periodogram method	614
spat5.times~	Multichannel times~	616
spat5.trajectories	Trajectories generator	618
spat5.transform	Geometrical transformations	620
spat5.translate	Translate coordinate messages	621
spat5.transpan.downmixer~	5.1 downmix to headphones or stereo 2.0 loudspeakers	622
spat5.transpan.enlarger~	Stereo image enlarger	625
spat5.transpan~	5.1 Mixer with double transaural layer	628
spat5.turntable	B&K TurnTable control	631
spat5.velvet~	Velvet noise filtering	633
spat5.verdi	Control interface for spat5.verdi~	635
spat5.verdi~	Directional reverberation	638
spat5.verdi.embedded	Control interface for spat5.verdi~	641
spat5.viewer	Sources and speakers visualization and manipulation	643

spat5.viewer.embedded	Sources and speakers visualization and manipulation . . . . .	648
spat5.virtualspeakers~	Virtual speakers for headphones monitoring . . . . .	653
spat5.vrpnclient	VRPN client . . . . .	656
spat5.waveform	Audio waveform display component . . . . .	658
spat5.waveform.embedded	Audio waveform display component . . . . .	661
spat5.wav.extractxml	Audio file aXML extractor . . . . .	663
spat5.wav.generatexml	aXML generator . . . . .	665
spat5.wav.insertxml	Audio file aXML inserter . . . . .	667
spat5.weightingfilter	Loudness weighting filters . . . . .	669
spat5.wfs	Wavefield synthesis . . . . .	671
spat5.wfs.config	Wavefield synthesis setup . . . . .	674
spat5.wfs.grid	Wavefield synthesis setup . . . . .	676
spat5.wfs~	Wavefield synthesis . . . . .	678
spat5.whichthread	Report which thread a message is passed through . . . . .	681
spat5.yin~	Multichannel Yin . . . . .	683
spat5.zplane	Plot filter poles and zeros on the z-plane . . . . .	685
spat5.zplane.embedded	Plot filter poles and zeros on the z-plane . . . . .	687

## spat5.abs2rel Conversion from absolute to relative coordinates

### description

**spat5.abs2rel** converts coordinates messages from absolute coordinates to relative coordinates (relative to the listener's position).

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```
/listener/xyz [number][number][number] : set the position of the listener using cartesian coordinates
/listener/aed [number][number][number] : set the position of the listener using navigation coordinates (azimuth/elevation/distance)
/listener/orientation [number][number][number][number] : set listener orientation from quaternion (xyzw)
/listener/yaw [number] : set listener yaw angle (in deg), using Euler zyx convention
/listener/pitch [number] : set listener pitch angle (in deg), using Euler zyx convention
/listener/roll [number] : set listener roll angle (in deg), using Euler zyx convention
/clear : reset state
```

### see also

- spat5.viewer
- spat5.converter
- spat5.distance
- spat5.binaural~
- spat5.transform
- spat5.oper
- spat5.quat.fromeuler
- spat5.quat.toeuler
- spat5.quat.transform
- spat5.trajectories
- spat5.boids



## spat5.adm.extractxml

## Extract aXML chunk for a BWF-ADM file

### description

**spat5.adm.extractxml** extracts aXML chunk for a BWF-ADM file (mostly for debug purpose).

Reference(s) :

M. Geier, T. Carpentier, M. Noisternig, and O. Warusfel. Software tools for object-based audio production using the audio definition model. In Proc. of the 4th International Conference on Spatial Audio (ICSA), Graz, Austria, Sept 2017.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

```

/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.adm.renderer~
- spat5.adm.record~
- spat5.adm.record
- spat5.adm.play~
- spat5.adm.mute

## spat5.adm.mute

## Allow interaction with ADM entities

### description

**spat5.adm.mute**, when used in cooperation with **spat5.adm.renderer~**, allows to interact (e.g. mute/solo) with ADM entities.

Reference(s) :

M. Geier, T. Carpentier, M. Noisternig, and O. Warusfel. Software tools for object-based audio production using the audio definition model. In Proc. of the 4th International Conference on Spatial Audio (ICSA), Graz, Austria, Sept 2017.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot

```

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizableability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.adm.renderer~
- spat5.adm.record~
- spat5.adm.record
- spat5.adm.extractxml
- spat5.adm.play~

## spat5.adm.mute.embedded

## Allow interaction with ADM entities

### description

spat5.adm.mute, when used in cooperation with spat5.adm.renderer~, allows to interact (e.g. mute/solo) with ADM entities.

#### Reference(s) :

M. Geier, T. Carpentier, M. Noisternig, and O. Warusfel. Software tools for object-based audio production using the audio definition model. In Proc. of the 4th International Conference on Spatial Audio (ICSA), Graz, Austria, Sept 2017.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

`/post/version` : print the version in the Max Console  
`/post/version [details]` : print detailed version in the Max Console  
`/post/doc` : print the help documentation in the Max Console  
`/post/state` : print the OSC status in the Max Console  
`/preset/load [string]` : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
`/preset/load` : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.  
`/preset/export [string]` : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.  
`/status` : open the status window and bring it to front  
`/status/open` : open the status window and bring it to front  
`/status/close` : close the status window  
`/status/openorclose` : open the status window if it was closed; close it if it was opened  
`/status/font/size [number]` : set the font size of the status window  
`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)  
`/help` : open the help window and bring it to front  
`/help/open` : open the help window and bring it to front  
`/help/close` : close the help window  
`/help/openorclose` : open the help window if it was closed; close it if it was opened  
`/help/font/size [number]` : set the font size of the help window  
`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)  
`/snapshot` : open the snapshot window and bring it to front  
`/snapshot/open` : open the snapshot window and bring it to front  
`/snapshot/close` : close the snapshot window  
`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened  
`/snapshot/font/size [number]` : set the font size of the snapshot window  
`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)  
`/status/copytoclipboard` : copy the status to (the OS) clipboard  
`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.  
`/snapshot/deleteall` : delete all the snapshots currently in memory  
`/snapshot/add` : create a new snapshot with the current state  
`/snapshot/add [string]` : create a new snapshot with the current state, and set its name  
`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)  
`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.adm.renderer~
- spat5.adm.record~
- spat5.adm.record
- spat5.adm.extractxml
- spat5.adm.play~

## spat5.adm.play~

## Play ADM file and deliver metadata stream

### description

**spat5.adm.play~** plays BWF-ADM file, and delivers associated metadata stream.

Reference(s) :

M. Geier, T. Carpentier, M. Noisternig, and O. Warusfel. Software tools for object-based audio production using the audio definition model. In Proc. of the 4th International Conference on Spatial Audio (ICSA), Graz, Austria, Sept 2017.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @outlets [int]

The **outlets** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/open [string]** : open new ADM file for playing  
**/start** : start playing  
**/seek [number]** : jump to a given time (in milliseconds)  
**/stop** : stop playing  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.



`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.adm.renderer~`
- `spat5.adm.record~`
- `spat5.adm.record`
- `spat5.adm.extractxml`
- `spat5.adm.mute`
- `spat5.multi.connect`



## spat5.adm.record

## GUI for spat5.adm.record~

### description

**spat5.adm.record** is a control interface for **spat5.adm.record~**.

Reference(s) :

M. Geier, T. Carpentier, M. Noisternig, and O. Warusfel. Software tools for object-based audio production using the audio definition model. In Proc. of the 4th International Conference on Spatial Audio (ICSA), Graz, Austria, Sept 2017.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @inlets [int]

The **inlets** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
```

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string] [string] [number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

/window/title [string] : set the window title (in the window titlebar)

/window/visible [boolean] : set the window visibility

/window/moveable [boolean] : set the window movability

/window/resizable [boolean] : set the window resizability

/window/enable [boolean] : enable/disable the window

/window/background/color [color] : set the window background color

/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency)

/window/fullscreen [boolean] : enable/disable fullscreen mode

/window/minimise [boolean] : minimize the window

/window/open : open the window (and bring it to front)

/window/close : close the window

/window/openorclose : open the window if it was closed; close it if it was opened

/window/size [number] [number] : set the window size (width, height) (in pixels)

/window/width [number] : set the window width (in pixels)

/window/height [number] : set the window height (in pixels)

/window/bounds [number] [number] [number] [number] : set the window bounds (top left position, width, height) (in pixels)

/window/topleft [number] [number] : set the window top left position (in pixels)

/window/centre : open the window, centering it on the screen

/window/rendering/engine [string] : set the graphical rendering engine of the window

/window/fps/visible [boolean] : display the FPS performances of the window

/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)

/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)

/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)

/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)

/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)

/window/export/image [string] : export the window as an image file (png or jpeg)

## see also

- spat5.adm.renderer~
- spat5.adm.record~
- spat5.adm.record~
- spat5.adm.play~
- spat5.adm.mute

## spat5.adm.record~

## Record ADM file and associated metadata stream

### description

**spat5.adm.record~** records BWF-ADM file and associated metadata stream.

Reference(s) :

M. Geier, T. Carpentier, M. Noisternig, and O. Warusfel. Software tools for object-based audio production using the audio definition model. In Proc. of the 4th International Conference on Spatial Audio (ICSA), Graz, Austria, Sept 2017.

### attributes

**@initwith [string]**

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@inlets [int]**

The **inlets** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

**@mc [int]**

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

**@parameter\_enable [boolean]**

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/open [string]** : open new ADM file for recording  
**/start** : start recording  
**/stop** : stop recording  
**/audioProgramme/name [string]** : specify the programme name  
**/audioContent/name [string]** : specify the content name  
**/track/number [int]** : specify the number of tracks to record  
**/track/[index]/name [string]** : specify channel name  
**/track/[index]/aed [number][number][number]** : set position (azimuth, elevation, distance)  
**/track/[index]/xyz [number][number][number]** : set cartesian position (x, y, z) of the i-th track  
**/track/[index]/gain [number]** : set gain (linear)  
**/overwrite [boolean]** : set overwrite flag  
**/bitdepth [int]** : set file bit depth  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramp**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramp [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramp**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramp [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console

```

/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.adm.renderer~
- spat5.adm.play~
- spat5.adm.record
- spat5.adm.extractxml
- spat5.adm.mute
- spat5.multi.connect

# spat5.adm.renderer~

# Render ADM file

## description

**spat5.adm.renderer~** render BWF-ADM file and associated metadata. It is meant to work in collaboration with **spat5.adm.play~**.

Reference(s) :

M. Geier, T. Carpentier, M. Noisternig, and O. Warusfel. Software tools for object-based audio production using the audio definition model. In Proc. of the 4th International Conference on Spatial Audio (ICSA), Graz, Austria, Sept 2017.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @inlets [int]

The **inlets** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @outlets [int]

The **outlets** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the `i`-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the `i`-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the `i`-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the `i`-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the `i`-th and `j`-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the `i`-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the `i`-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the `i`-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the `i`-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the `i`-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the `i`-th snapshot

`/snapshot/jump [int]` : immediately recall the `i`-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.adm.play~`
- `spat5.adm.record~`
- `spat5.adm.record`
- `spat5.adm.extractxml`
- `spat5.adm.mute`
- `spat5.multi.connect`



## spat5.adm.room~

## Simplified room module

### description

**spat5.adm.room~** is a simplified room module. It can e.g. be used to generated reverberation signals for use with ADM.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @internals [int]

The **internals** attribute represents the number of internal channels of the artificial reverberator.

Spat uses a Feedback Delay Network (FDN) reverberator engine.

Basically this can be seen as an array of delay lines which are fed back into a mixing matrix. The **internals** attributes represents the size of the feedback matrix.

Choosing the size of this matrix is a trade-off between CPU consumption and the echo density.

Increasing the size of the matrix will generate a densier reverb tail at the expense of a higher CPU load.

A typical value of 8 is a good compromise between CPU load and natural sounding reverb. A value of 16 may be useful especially when dealing with a very long reverberation time or with very percussive sound (where a smaller FDN might sometimes sounds too poor).

Increasing the **internals** attribute may also be helpful when using a large number of loudspeakers, to ensure a proper decorrelation of the reproduced late reverberation signals.

It is recommended not to use a value below 6.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @sources [int]

The **sources** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the *i*-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the *i*-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the *i*-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the *i*-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the *i*-th and *j*-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the *i*-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the *i*-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the *i*-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the *i*-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the *i*-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the *i*-th snapshot

`/snapshot/jump [int]` : immediately recall the *i*-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.adm.renderer~`
- `spat5.adm.record`
- `spat5.adm.record~`
- `spat5.multi.connect`



# spat5.air~ Simulates air absorption filtering

## description

**spat5.air~** processes incoming signal and treats it with a filter simulating air absorption.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/channel/number [int]** : set the number of channels  
**/channel/[index]/distance [number]** : set distance (m) for the i-th channel  
**/channel/[index]/rolloff [number]** : set rolloff (Hz) for the i-th channel  
**/channel/[index]/mute [boolean]** : mute the i-th channel  
**/channel/[index]/bypass [boolean]** : bypass the i-th channel  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.doppler~
- spat5.source~
- spat5.spat~
- spat5.panoramix~
- spat5.viewer
- spat5.multi.connect

# spat5.align~ Speaker delay and gain alignment

## description

In general you want to time align your speaker setup so that all speakers are in phase according to a given reference position (usually in the middle of the room). This means you have to compensate for variations in propagation delays between speakers.

**spat5.align~** compensates time delay and gain for a given speaker layout based on geometric coordinates.

Default reference position is  $(x,y,z) = (0,0,0)$ .

In cases of unknown or possibly unreliable information about the speaker placement, see **spat5.calibrate.delay~**.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @speakers [int]

The **speakers** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

## methods

```
/correction/delay [boolean] : enable delay correction
/correction/gain [boolean] : enable gain correction
/speakers/aed [nnnn...] : set the list of speaker coordinates (with aed format)
/speakers/xyz [nnnn...] : set the list of speaker coordinates (with xyz format)
/speakers/ade [nnnn...] : set the list of speaker coordinates (with ade format)
/speakers/xy [nnnn...] : set the list of speaker coordinates (with xy format)
/speakers/ae [nnnn...] : set the list of speaker coordinates (with ae format)
/speaker/[index]/aed [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)
/speaker/[index]/ade [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)
/speaker/[index]/xyz [number][number][number] : set the position of the i-th loudspeaker using cartesian coordinates
/speaker/[index]/xy [number][number] : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)
/speaker/[index]/ae [number][number] : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1)
/speaker/[index]/az [number] : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)
/reference/xyz [number][number][number] : set the position of the reference point (xyz)
/reference/aed [number][number][number] : set the position of the reference point (aed)
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically
```

whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

`/dump/dsp/latency` : send the processor latency (in samples) through the dump outlet

`/verbose [string]` : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

`/post/version` : print the version in the Max Console

`/post/version [details]` : print detailed version in the Max Console

`/post/doc` : print the help documentation in the Max Console

`/post/state` : print the OSC status in the Max Console

`/preset/load [string]` : load a preset from file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format. If the file extension is not provided, `.txt` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.delay~`
- `spat5.calibrate.delay~`
- `spat5.calibrate.gain~`

- spat5.oper
- spat5.spat~
- spat5.viewer
- spat5.speaker.config
- spat5.diagmatrix~
- spat5.decoder~
- spat5.pan~
- spat5.virtualspeakers~
- spat5.multi.connect

## spat5.allpass~

## Multichannel feedback allpass section

### description

**spat5.allpass~** is a multichannel Schroeder all-pass section with feedback gain.

Reference(s) :

M. R. Schroeder and B. Logan. Colorless artificial reverberation. Journal of the Audio Engineering Society, 9(3), 1961.

T. I. Laakso, V. Välimäki, M. Karjalainen, and U. K. Laine. Splitting the unit delay. IEEE Signal Processing Magazine, 13(1):30 – 60, January 1996.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/channel/number [int]** : set the number of channels  
**/delays [number][number][number]...** : set the list of delays (in msec)  
**/gains [number][number][number]...** : set the list of gains (linear)  
**/interpolation/mode [string]** : set the interpolation mode (for all channels). Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade  
**/interpolation/time [number]** : set the interpolation time (in msec) (for all channels)  
**/length [number]** : set the allocated delay length (in msec)  
**/channel/[index]/delay [number]** : set the delay (in msec) for the i-th channel  
**/channel/[index]/gain [number]** : set the feedback gain (linear) for the i-th channel  
**/channel/[index]/gain/db [number]** : set the feedback gain (in dB) for the i-th channel  
**/channel/[index]/interpolation/mode [string]** : set the interpolation mode for the i-th channel. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade  
**/channel/[index]/interpolation/time [number]** : set the interpolation time (in msec) for the i-th channel  
**/channel/[index]/length [number]** : set the allocation length (in msec) for the i-th channel  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up



/dump/dsp/latency : send the processor latency (in samples) through the dump outlet

/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.comb~
- comb~
- allpass~
- spat5.delay~

- spat5.tapout~
- spat5.reverb~
- spat5.roomsize
- spat5.multi.connect



## h2&gt;spat5.barycenter

## h2&gt;Barycenter calculation

## h3&gt;description

**spat5.barycenter** computes barycenter of a set of points.

## h3&gt;attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## h3&gt;methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.viewer
- spat5.knn
- spat5.scale
- spat5.transform
- spat5.rotate
- spat5.translate
- spat5.normalize
- spat5.converter
- spat5.converter~
- spat5.abs2rel
- spat5.distance
- spat5.trajectories
- spat5.boids

# spat5.binaural~ Binaural panning

## description

**spat5.binaural~** synthesizes binaural (HRTF-based) signals for 3D headphones panning. The object filters the incoming signal(s) with the loaded set of HRTF. Depending on the source position(s), it selects the closest pair of HRTF filters. The object does not perform any spatial interpolation; therefore the HRTF set should be dense enough for smooth trajectories. When the source moves, the object commutes from one filter to another with a short crossfade to prevent audio artifacts. The object does not account for the source distance: it does not apply any delay or attenuation based on the source distance(s).

Custom HRTF can be loaded from SOFA files (see **spat5.sofa.loader** for details). Supported SOFA conventions are: SimpleFreeFieldHRIR and SimpleFreeFieldHRSOS.

**spat5.binaural~** can further simulate rotations of the listener's head, e.g. for head-tracked binaural experiment. Listener's orientation can be specified either with Euler angles (yaw, pitch, roll) or with quaternion.

**spat5.binaural~** is similar to **spat5.pan~** operating with `/panning/type binaural`.

Further information (adapted from "T. Carpentier. Binaural synthesis with the Web Audio API. In Proc. of the 1st Web Audio Conference, Paris, France, Jan 2015.") :

The term "binaural hearing" refers to being able to integrate information that the auditory system and the brain receive from the two ears. Indeed our auditory percepts are essentially built on the basis of two inputs, namely the sound-pressure signals captured at our two eardrums. One remarkable property of humans' binaural hearing is its ability to localize sound in three-dimensional space to an accuracy of a few degrees. It is the direction-dependent characteristics of the sound signals reaching our two ears which enable us to localize the sound sources. Psychophysical studies have shown that various mechanisms are involved in the human auditory system for sound localization. For sounds located in the horizontal plane, the angular direction is predominantly determined from interaural time differences (ITD) and interaural level differences (ILD), whereas sound elevation mainly depends on direction-dependent spectral cues generated by the obstruction of an incoming sound wave by the listener (diffraction and scattering effects of the pinna, head, and torso).

These acoustic interactions of an incoming sound with the listener's anatomy can be described by spatial filters called head-related transfer functions (HRTFs) or equivalently head-related impulse responses (HRIRs). HRTFs completely and uniquely capture all linear properties of the sound transmission and they contain all proposed descriptors of localization cues.

As a consequence, any sound source can be virtually simulated anywhere in the 3D auditory space by filtering an audio signal with the HRTFs corresponding to the desired location and presenting the resulting binaural signals over headphones. Such audio processing is denoted "binaural synthesis".

Since they depend on anatomic features such as the size and shape of head and ears, the cues for sound localization (especially the spectral cues) are idiosyncratic and HRTFs differ considerably among individuals. Measuring the HRTFs of a listener is a tedious task and it is yet restricted to a few laboratories (the measurements are often made in anechoic conditions). However databases of HRTFs for several hundreds of human subjects are available and can be used in a binaural synthesizer. .

Reference(s) :

V. Larcher. Techniques de spatialisation des sons pour la realite virtuelle. PhD thesis, Universite de Paris VI, 2001.

J.-M. Jot, V. Larcher, and O. Warusfel. Digital signal processing issues in the context of binaural and transaural stereophony. In Proc. of the 98th Convention of the Audio Engineering Society (AES), Paris, France, Feb. 1995.

D. Romblo and B. Cook. Near-field compensation for hrtf processing. In Proc. of the 125th Convention of the Audio Engineering Society (AES), San Francisco, CA, USA, 2008.

R. O. Duda and W. L. Martens. Range dependence of the response of a spherical head model. Journal of the Acoustical Society of America, 104(5):3048 – 3058, 1998.

## attributes

**@initwith [string]**

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@mc [int]**

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

## @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## @sources [int]

The `sources` attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

## methods

```
/hrtf [string] : load hrtf from file or url (sofa format)
/hrtf : open a dialog for choosing hrtf file (sofa format)
/source/[index]/mute [boolean] : mute/unmute the i-th source
/itd/scaling [number] : set ITD scaling factor (in /itd/type [string] : set ITD type. Possible values: basic, woodworth, larcherjot, savioja, miller, measurement, none
/itd/latencymode [string] : set ITD processing mode. Possible values: fixed latency, no latency
/interpolation/mode [string] : set interpolation mode for fractional delay. Possible values: nearest, linear, lagrange3, allpass, hermite3, watter3, bspline3, parabolic, allpass2, allpass3, nearestxfade
/interpolation/time [number] : set interpolation duration for fractional delay (in msec)
/crossfade/duration [number] : set filter crossfade duration (in msec)
/crossfade/type [string] : set type of filter crossfade. Possible values: linear, cosine, squarecosine
/listener/orientation [number][number][number][number] : set listener orientation from quaternion (xyzw)
/listener/ypr [number][number][number] : set listener yaw, pitch and roll (in deg), using Euler zyx convention
/listener/yaw [number] : set listener yaw angle (in deg), using Euler zyx convention
/listener/pitch [number] : set listener pitch angle (in deg), using Euler zyx convention
/listener/roll [number] : set listener roll angle (in deg), using Euler zyx convention
/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates
/source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)
/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)
/source/[index]/xy_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged
/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged
/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged
/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged
/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)
/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)
/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)
/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)
/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged
/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged
/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged
/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged
/source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged
/sources/aed [nnnn...] : set the list of source coordinates (with aed format)
/sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)
/sources/ade [nnnn...] : set the list of source coordinates (with ade format)
/sources/xy [nnnn...] : set the list of source coordinates (with xy format)
/sources/ae [nnnn...] : set the list of source coordinates (with ae format)
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
```

or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.pan~`
- `spat5.viewer`
- `spat5.sofa.loader`
- `spat5.sofa.infos`
- `spat5.hrtf.infos`
- `spat5.headphoneeq~`
- `spat5.virtualspeakers~`
- `spat5.ctc~`
- `spat5.trajectories`
- `spat5.transpan~`
- `spat5.spat~`
- `spat5.hoa.binaural~`

- `spat5.hrtf.normalize`
- `spat5.multi.connect`

# spat5.boids      Flock simulator

## description

**spat5.boids** is a bird flight and animal flock simulator. It is adapted from the legacy **boids3d** object.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/move** : move the boids and output their now position  
**/point/number** [int] : set the number of boids  
**/neighbors/number** [int] : set the number of neighbors each boid consults when flocking  
**/maxspeed** [number] : set the maximum speed of speed range  
**/minspeed** [number] : set the minimum speed of speed range  
**/center** [number] : set the strength of centering instinct  
**/attract** [number] : set the strength of attraction to point  
**/match** [number] : set the strength of neighbor speed matching instinct  
**/avoid** [number] : set the strength of neighbor avoidance instinct  
**/repel** [number] : set the strength of wall avoidance instinct  
**/edgedist** [number] : set the distance of vision for avoiding wall edges  
**/speed** [number] : set the overall speed  
**/inertia** [number] : set the willingness to change speed and direction  
**/accel** [number] : set the speed of acceleration  
**/prefdist** [number] : set the preferred distance from neighbors  
**/flyrect** [number] [number] [number] [number] [number] [number] : set the bounding box (walls) in which to fly (xmin/xmax/ymin/ymax/zmin/zmax)  
**/attract/xyz** [number] [number] [number] : set the point to which boids are attracted  
**/reset** : reset boids randomly inside the flyrect  
**/point/[index]/speed** [number] : set speed for the i-th boid  
**/point/[index]/speed/inverse** : inverse speed for the i-th boid  
**/point/[index]/direction/xyz** [number] [number] [number] : set direction for the i-th boid  
**/point/[index]/position/xyz** [number] [number] [number] : set position for the i-th boid

## see also

- spat5.viewer
- spat5.converter
- spat5.trajectories
- boids3d
- spat5.simone
- spat5.simone.generator
- spat5.transform
- spat5.converter
- spat5.grids
- spat5.rotate
- spat5.scale
- spat5.translate
- spat5.mirror
- spat5.jitter
- spat5.oper
- spat5.constraint
- spat5.barycenter



## spat5.calibrate.delay~

## Measurement of propagation delays

### description

In general you want to time align your speaker setup so that all speakers are in phase according to a given reference position (usually in the middle of the room).

This means you have to compensate for variations in propagation delays between speakers. To do so, you could either rely on geometrical coordinates (see `spat5.align~`), or measure the actual propagation delays in the reference position.

In this case, you can use `spat5.calibrate.delay` to measure and calculate the appropriate delays. Basic protocol for measuring delays with `spat5.calibrate.delay~` involves placing a omni-directional microphone in the desired reference position; `spat5.calibrate.delay~` will emit a test signal sequentially on each speaker and measure the propagation delay based on the received signals on the microphone.

When the measurement is done, the object outputs the estimated correction delays that must be used to re-align the speaker signals. All speakers will be aligned according to the maximum delay detected; i.e. the speaker with the longest delay becomes the reference delay. All other speakers are offset by the channel with the largest latency.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`. Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box. Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @mc [int]

The `mc` attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the `mc` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box. Have a look at the `spat5.tuto-mc.maxpat` or `spat5.tuto-mc-2.maxpat` examples for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @speakers [int]

The `speakers` attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### methods

`/sweep/order [int]` : set sweep order (the sweep will be  $\text{pow}(2, \text{order})$  samples long)  
`/start` : start a new calibration  
`/dump/results` : dump the last results  
`/dsp/mute [boolean]` : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see `/dsp/mute/ramptime`).  
`/dsp/mute [boolean] [number]` : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
`/dsp/mute/ramptime [number]` : set ramp time (in msec) for mute/unmute  
`/dsp/bypass [boolean]` : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see `/dsp/bypass/ramptime`).  
`/dsp/bypass [boolean] [number]` : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
`/dsp/bypass/ramptime [number]` : set ramp time (in msec) for bypass  
`/dsp/automute [boolean]` : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
`/dsp/automute/attack [number]` : set the duration (in seconds) before auto-muting  
`/dsp/post` : post various information to the Max console (audio should be turned on)  
`/dsp/clear` : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
`/dump/dsp/latency` : send the processor latency (in samples) through the dump outlet  
`/verbose [string]` : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
`/post/version` : print the version in the Max Console  
`/post/version [details]` : print detailed version in the Max Console



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/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.align~
- spat5.calibrate.gain~
- spat5.smk~
- spat5.tfestimate~
- spat5.pan~
- spat5.multi.connect

## spat5.calibrate.gain~

## Measurement of propagation delays

### description

Generally you want to calibrate the gains of your speaker setup so that all speakers are at equal-power measured at a given reference position (usually in the middle of the room).

This means you have to compensate for variations in gains between speakers.

To do so, you could either rely on geometrical coordinates (see `spat5.align~`), or measure the actual power in the reference position.

In this case, you can use `spat5.calibrate.gain~` to measure and calculate the appropriate gains. Basic protocol for measuring gains with `spat5.calibrate.gain~` involves placing a omni-directional microphone in the desired reference position;

`spat5.calibrate.gain~` emits a test signal (white noise) sequentially on each speaker and measures the received RMS levels. It then determines the calibration gains that must be applied to each speaker in order to obtain constant power at the measurement position.

When the measurement is done, the object outputs the estimated correction gains that must be used to re-align the speaker signals.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @mc [int]

The `mc` attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the `mc` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-mc.maxpat` or `spat5.tuto-mc-2.maxpat` examples for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @speakers [int]

The `speakers` attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### methods

`/length [int]` : set length of the test signal (in milliseconds)

`/start` : start a new calibration

`/stop` : interrupt the calibration

`/type [string]` : set noise type. Possible values: white, pink

`/dump/results` : dump the last results

`/dsp/mute [boolean]` : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see `/dsp/mute/ramptime`).

`/dsp/mute [boolean][number]` : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

`/dsp/mute/ramptime [number]` : set ramp time (in msec) for mute/unmute

`/dsp/bypass [boolean]` : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see `/dsp/bypass/ramptime`).

`/dsp/bypass [boolean][number]` : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

`/dsp/bypass/ramptime [number]` : set ramp time (in msec) for bypass

`/dsp/automute [boolean]` : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

`/dsp/automute/attack [number]` : set the duration (in seconds) before auto-muting

`/dsp/post` : post various information to the Max console (audio should be turned on)

`/dsp/clear` : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

`/dump/dsp/latency` : send the processor latency (in samples) through the dump outlet

`/verbose [string]` : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

`/post/version` : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console  
/post/doc : print the help documentation in the Max Console  
/post/state : print the OSC status in the Max Console  
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
/status : open the status window and bring it to front  
/status/open : open the status window and bring it to front  
/status/close : close the status window  
/status/openorclose : open the status window if it was closed; close it if it was opened  
/status/font/size [number] : set the font size of the status window  
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
/help : open the help window and bring it to front  
/help/open : open the help window and bring it to front  
/help/close : close the help window  
/help/openorclose : open the help window if it was closed; close it if it was opened  
/help/font/size [number] : set the font size of the help window  
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
/snapshot : open the snapshot window and bring it to front  
/snapshot/open : open the snapshot window and bring it to front  
/snapshot/close : close the snapshot window  
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
/snapshot/font/size [number] : set the font size of the snapshot window  
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
/status/copytoclipboard : copy the status to (the OS) clipboard  
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
/snapshot/deleteall : delete all the snapshots currently in memory  
/snapshot/add : create a new snapshot with the current state  
/snapshot/add [string] : create a new snapshot with the current state, and set its name  
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
/snapshot/[index]/recall : recall the current state from the i-th snapshot  
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
/snapshot/[index]/name [string] : set the name of the i-th snapshot  
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
/snapshot/[index]/delete : delete the i-th snapshot  
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/snapshot/[index]/export [string] : export the i-th snapshot to file  
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
/snapshot/export [string] : export all snapshots to file  
/snapshot/import [string] : import all snapshots from file  
/snapshot/recall/next : recall the next snapshot  
/snapshot/recall/previous : recall the previous snapshot  
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
/snapshot/recall [int] : recall the i-th snapshot  
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
/snapshot/recall/bytitle [string] : recall a snapshot by title/name  
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
/snapshot/lock [boolean] : lock edition of the snapshots  
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.align~
- spat5.calibrate.delay~
- spat5.smk~
- spat5.tfestimate~
- spat5.pan~
- spat5.multi.connect

## spat5.cascade.inverse

## Inverse a cascade filter

### description

**spat5.cascade.inverse** computes the inverse coefficients of an IIR cascade filter.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.cascade~
- cascade~
- biquad~
- filtergraph~
- spat5.frequencyresponse
- spat5.equalizer
- spat5.filterdesign
- spat5.hlshelf~
- spat5.hlshelf
- spat5.zplane
- spat5.graphiceq~
- spat5.graphiceq
- spat5.cross3~
- spat5.cascade.resample
- spat5.octavebank~
- spat5.complementarybank~
- spat5.gammatone
- spat5.multi.connect

# spat5.cascade.resample

# Cascade resampling

## description

**spat5.cascade.resample** resamples biquad/cascade coefficients.

## attributes

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```

/sampleRate/input [number] : input sampleRate (Hz)
/sampleRate/output [number] : output sampleRate (Hz)
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

```



```

/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.cascade~
- cascade~
- biquad~
- filtergraph~
- spat5.frequencyresponse
- spat5.equalizer
- spat5.filterdesign
- spat5.hlshelf~
- spat5.hlshelf
- spat5.zplane
- spat5.graphiceq~
- spat5.graphiceq
- spat5.cross3~
- spat5.cascade.inverse
- spat5.multi.connect



## spat5.cascade~

## Multichannel cascade~

### description

**spat5.cascade~** is similar to Max/MSP **cascade~** but can perform several channels in parallel. Each channel has its own set of filter coefficients.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/channel/number [int]** : set the number of channels  
**/channel/[index]/cascade [number][number][number]...** : set the filter coefficients for the i-th channel  
**/channel/[index]/mute [boolean]** : mute/unmute the DSP rendering for the i-th channel  
**/channel/[index]/bypass [boolean]** : bypass the DSP rendering for the i-th channel  
**/crossfade/duration [number]** : set filter crossfade duration (in msec) (applied to all channels)  
**/crossfade/type [string]** : set type of filter crossfade (applied to all channels)  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,

'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- cascade~
- biquad~
- filtergraph~
- spat5.frequencyresponse
- spat5.equalizer
- spat5.filterdesign
- spat5.hlshelf~
- spat5.hlshelf
- spat5.octavebank~
- spat5.zplane
- spat5.graphiceq~
- spat5.graphiceq
- spat5.cross3~
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.octavebank~
- spat5.eq

- spat5.multi.connect

# spat5.clip~ Limit signal amplitude

## description

**spat5.clip~** is similar to Max/MSP **clip~** but can perform several channels in parallel. **spat5.clip~** constrains input signals between two specified values.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/channel/number [int] : set the number of channels
/min [number] : set minimum value for all channels
/max [number] : set maximum value for all channels
/range [number][number] : set minimum and maximum values for all channels
/channel/[index]/min [number] : set minimum value for the i-th channel
/channel/[index]/max [number] : set maximum value for the i-th channel
/channel/[index]/range [number][number] : set minimum and maximum values for the i-th channel
/channel/[index]/mute [boolean] : mute the i-th channel
/channel/[index]/bypass [boolean] : bypass the i-th channel
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
```

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `clip~`
- `spat5.delta~`
- `spat5.deltaclip~`
- `delta~`
- `deltaclip~`
- `trunc~`
- `spat5.multi.connect`

## spat5.cluster~      Second stage of the Spat room module. Generates diffuse reflections

### description

**spat5.cluster~** corresponds to the second processing stage in the spat room module. It generates a diffuse set of reflections from the incoming early reflection stage.

When using **spat5.cluster~** inside a reverberator engine, the number of delayed channels (**channels** attribute) corresponds to the number of "internal channels" ( **internals** attribute of **spat5.spat~** object).

Reference(s) :

J.-M. Jot and A. Chaigne. Digital delay networks for designing artificial reverberators. In Proc. of the 90th Convention of the Audio Engineering Society (AES), Paris, France, Feb 1991.

T. I. Laakso, V. Välimäki, M. Karjalainen, and U. K. Laine. Splitting the unit delay. IEEE Signal Processing Magazine, 13(1):30 – 60, January 1996.

### attributes

**@channels [int]**

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

**@initwith [string]**

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@mc [int]**

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

**@parameter\_enable [boolean]**

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```
/channel/number [int] : set the number of channels
/delays [number][number][number]... : set the list of delays (in msec)
/delays/samples [number][number][number]... : set the list of delays (in samples)
/interpolation/mode [string] : set the interpolation mode. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade
/interpolation/time [number] : set the interpolation time (in msec)
/channel/[index]/delay [number] : set the delay (in msec) for the i-th channel
/channel/[index]/delay/samples [number] : set the delay (in samples) for the i-th channel
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically
```



whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

`/dump/dsp/latency` : send the processor latency (in samples) through the dump outlet

`/verbose [string]` : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

`/post/version` : print the version in the Max Console

`/post/version [details]` : print detailed version in the Max Console

`/post/doc` : print the help documentation in the Max Console

`/post/state` : print the OSC status in the Max Console

`/preset/load [string]` : load a preset from file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format. If the file extension is not provided, `.txt` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `','`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `','`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.source~`
- `spat5.early~`
- `spat5.reverb~`



- spat5.spat~
- spat5.ircamverb~
- spat5.delgen
- spat5.roomsize
- spat5.room~
- spat5.shuffle~
- spat5.delay~
- spat5.tapout~
- delay~
- tapout~
- spat5.comb~
- spat5.allpass~
- spat5.reverb.timeview
- spat5.multi.connect

## spat5.colormap

## Utility functions for color manipulations

### description

**spat5.colormap** provides utility functions for color manipulations.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- swatch
- colorpicker

# spat5.comb~ Multichannel Comb filter

## description

spat5.comb~ is a multichannel feedback comb filter.

Reference(s) :

M. R. Schroeder and B. Logan. Colorless artificial reverberation. Journal of the Audio Engineering Society, 9(3), 1961.

T. I. Laakso, V. Välimäki, M. Karjalainen, and U. K. Laine. Splitting the unit delay. IEEE Signal Processing Magazine, 13(1):30 – 60, January 1996.

## attributes

### @channels [int]

The `channels` attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @mc [int]

The `mc` attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the `mc` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-mc.maxpat` or `spat5.tuto-mc-2.maxpat` examples for further details.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/channel/number [int] : set the number of channels
/delays [number][number][number]... : set the list of delays (in msec)
/gains [number][number][number]... : set the list of gains (linear)
/interpolation/mode [string] : set the interpolation mode (for all channels). Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade
/interpolation/time [number] : set the interpolation time (in msec) (for all channels)
/length [number] : set the allocated delay length (in msec)
/channel/[index]/delay [number] : set the delay (in msec) for the i-th channel
/channel/[index]/gain [number] : set the feedback gain (linear) for the i-th channel
/channel/[index]/gain/db [number] : set the feedback gain (in dB) for the i-th channel
/channel/[index]/lowpass [boolean] : enables lowpass filtering the i-th channel
/channel/[index]/lowpass/freq [number] : set frequency of lowpass filtering the i-th channel (in Hz)
/channel/[index]/interpolation/mode [string] : set the interpolation mode for the i-th channel. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade
/channel/[index]/interpolation/time [number] : set the interpolation time (in msec) for the i-th channel
/channel/[index]/length [number] : set the allocation length (in msec) for the i-th channel
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
```

`/dsp/clear` : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
`/dump/dsp/latency` : send the processor latency (in samples) through the dump outlet  
`/verbose [string]` : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
`/post/version` : print the version in the Max Console  
`/post/version [details]` : print detailed version in the Max Console  
`/post/doc` : print the help documentation in the Max Console  
`/post/state` : print the OSC status in the Max Console  
`/preset/load [string]` : load a preset from file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.  
`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)  
`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.  
`/status` : open the status window and bring it to front  
`/status/open` : open the status window and bring it to front  
`/status/close` : close the status window  
`/status/openorclose` : open the status window if it was closed; close it if it was opened  
`/status/font/size [number]` : set the font size of the status window  
`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)  
`/help` : open the help window and bring it to front  
`/help/open` : open the help window and bring it to front  
`/help/close` : close the help window  
`/help/openorclose` : open the help window if it was closed; close it if it was opened  
`/help/font/size [number]` : set the font size of the help window  
`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)  
`/snapshot` : open the snapshot window and bring it to front  
`/snapshot/open` : open the snapshot window and bring it to front  
`/snapshot/close` : close the snapshot window  
`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened  
`/snapshot/font/size [number]` : set the font size of the snapshot window  
`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)  
`/status/copytoclipboard` : copy the status to (the OS) clipboard  
`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)  
`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.  
`/snapshot/deleteall` : delete all the snapshots currently in memory  
`/snapshot/add` : create a new snapshot with the current state  
`/snapshot/add [string]` : create a new snapshot with the current state, and set its name  
`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)  
`/snapshot/[index]/recall` : recall the current state from the i-th snapshot  
`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)  
`/snapshot/[index]/name [string]` : set the name of the i-th snapshot  
`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots  
`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names  
`/snapshot/[index]/delete` : delete the i-th snapshot  
`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard  
`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)  
`/snapshot/[index]/export [string]` : export the i-th snapshot to file  
`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file  
`/snapshot/export [string]` : export all snapshots to file  
`/snapshot/import [string]` : import all snapshots from file  
`/snapshot/recall/next` : recall the next snapshot  
`/snapshot/recall/previous` : recall the previous snapshot  
`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)  
`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)  
`/snapshot/recall [int]` : recall the i-th snapshot  
`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)  
`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name  
`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.allpass~`
- `comb~`

- allpass~
- spat5.delay~
- spat5.tapout~
- spat5.reverb~
- spat5.roomsize
- spat5.multi.connect

## spat5.complementarybank~

## Complementary N-Band IIR Filterbank

### description

**spat5.complementarybank~** is a N-band complementary filterbank using IIR filters.

Reference(s) :

A. Favrot and C. Faller. Complementary N-Band IIR Filterbank Based on 2-Band Complementary Filters. In Proc. of the International Workshop on Acoustic Echo and Noise Control (IWAENC), Tel- Aviv, Israel, Sept 2010.

### attributes

**@bands** [int]

The **bands** attribute represents the number frequency bands. It can not be changed dynamically (via message or attrui or inspector).

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, attrui or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@mc** [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, attrui or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

**@parameter\_enable** [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/band/number** [int] : set the number of frequency bands

**/order** [int] : set the filter order

**/freq/limits** [number][number][number]... : set frequency limits (in Hz) for the bands. The length of the list should be (number of bands - 1)

**/freq/center** [number][number][number]... : set center frequencies (in Hz) for the bands. The length of the list should be = (number of bands)

**/dsp/mute** [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramp**).

**/dsp/mute** [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramp** [number] : set ramp time (in msec) for mute/unmute

**/dsp/bypass** [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramp**).

**/dsp/bypass** [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramp** [number] : set ramp time (in msec) for bypass

**/dsp/automute** [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack** [number] : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose** [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load** [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

**/preset/export** [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,



'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.octavebank~
- spat5.hlsself
- biquad~
- spat5.gammatone
- spat5.equalizer
- spat5.cascade~
- spat5.frequencyresponse
- spat5.filterdesign
- cascade~
- filtergraph~
- spat5.oper
- spat5.ircamverb~
- spat5.graphiceq~
- spat5.graphiceq
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.multi.connect

# spat5.compressor

# Control interface for spat5.compressor~

## description

**spat5.compressor** is a GUI for **spat5.compressor~**.

## attributes

### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name

```

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.compressor~
- spat5.equalizer
- spat5.limiter~
- spat5.noisegate~
- spat5.clip~
- spat5.softclipping~
- spat5.delta~
- spat5.deltaclip~
- spat5.tanh~
- spat5.fixnan~
- spat5.rms~
- spat5.ebur128~

## spat5.compressor.embedded

## Control interface for spat5.compressor~

### description

spat5.compressor is a GUI for spat5.compressor~.

### attributes

#### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or `inspector`; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name

```

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.compressor~
- spat5.equalizer
- spat5.limiter~
- spat5.noisegate~
- spat5.clip~
- spat5.softclipping~
- spat5.delta~
- spat5.deltaclip~
- spat5.tanh~
- spat5.fixnan~
- spat5.rms~
- spat5.ebur128~

# spat5.compressor~

# Multichannel Compressor/Expander

## description

**spat5.compressor~** is a multichannel compressor/expander.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window



```

/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.limiter~
- spat5.noisegate~
- spat5.clip~
- omx.peaklim~
- omx.comp~
- spat5.multi.connect



# spat5.constraint Geometrical constraints

## description

**spat5.constraint** applies geometrical constraints to source, speaker or listener coordinate messages.

## attributes

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or `inspector`; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/x/min/constaint [boolean] : enable constraint for x min
/x/max/constaint [boolean] : enable constraint for x max
/x/min [number] : bound for x min (in meters)
/x/max [number] : bound for x max (in meters)
/y/min/constaint [boolean] : enable constraint for y min
/y/max/constaint [boolean] : enable constraint for y max
/y/min [number] : bound for y min (in meters)
/y/max [number] : bound for y max (in meters)
/z/min/constaint [boolean] : enable constraint for z min
/z/max/constaint [boolean] : enable constraint for z max
/z/min [number] : bound for z min (in meters)
/z/max [number] : bound for z max (in meters)
/dist/min/constaint [boolean] : enable constraint for dist min
/dist/max/constaint [boolean] : enable constraint for dist max
/dist/min [number] : bound for dist min (in meters)
/dist/max [number] : bound for dist max (in meters)
```

## see also

- spat5.scale
- spat5.rotate
- spat5.translate
- spat5.normalize
- spat5.mirror
- spat5.jitter
- spat5.viewer
- spat5.converter
- spat5.converter~
- spat5.abs2rel
- spat5.distance
- spat5.trajectories
- spat5.boids

## spat5.converb~

## Convolution reverb with filtering

### description

**spat5.converb~** is a convolution reverb with additional parametric filtering of the different temporal sections of the impulse response (direct sound, early reflections, cluster and late reverb).

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @outputmode []

#### @outputs [int]

The **outputs** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```
/load [string] : load IR from audio file
/predelay [number] : set pre-delay (in msec)
/poweroftwo [boolean] : round all section length to the nearest power of 2 (in samples). More efficient
/discardbeforetod [boolean] : discard the samples before the TOD (replaced by pure delay). More efficient
/direct/length [number] : set length for direct sound (in msec)
/early/length [number] : set length for early section (in msec)
/cluster/length [number] : set length for cluster section (in msec)
/direct/G0 [number] : set the global gain (in dB) for direct section
/direct/Gl [number] : set the gain (in dB) for low frequencies for direct section
/direct/Gm [number] : set the gain (in dB) for medium frequencies for direct section
/direct/Gh [number] : set the gain (in dB) for high frequencies for direct section
/direct/fl [number] : set the low/med crossover frequency (in Hz) for direct section
/direct/fh [number] : set the med/high crossover frequency (in Hz) for direct section
/direct/params [number] [number] [number] [number] [number] [number] : set the filter parameters (G0,Gl,Gm,Gh,fl,fh) for direct section
/direct/params [number] [number] [number] [number] [number] : set the filter parameters (G0,Gl,Gm,Gh,fl) for direct section
/direct/params [number] [number] [number] [number] : set the filter parameters (G0,Gl,Gm,Gh) for direct section
/early/G0 [number] : set the global gain (in dB) for early section
/early/Gl [number] : set the gain (in dB) for low frequencies for early section
/early/Gm [number] : set the gain (in dB) for medium frequencies for early section
/early/Gh [number] : set the gain (in dB) for high frequencies for early section
/early/fl [number] : set the low/med crossover frequency (in Hz) for early section
/early/fh [number] : set the med/high crossover frequency (in Hz) for early section
/early/params [number] [number] [number] [number] [number] [number] : set the filter parameters (G0,Gl,Gm,Gh,fl,fh) for early section
/early/params [number] [number] [number] [number] [number] : set the filter parameters (G0,Gl,Gm,Gh,fl) for early section
/early/params [number] [number] [number] [number] : set the filter parameters (G0,Gl,Gm,Gh) for early section
/cluster/G0 [number] : set the global gain (in dB) for cluster section
/cluster/Gl [number] : set the gain (in dB) for low frequencies for cluster section
/cluster/Gm [number] : set the gain (in dB) for medium frequencies for cluster section
/cluster/Gh [number] : set the gain (in dB) for high frequencies for cluster section
/cluster/fl [number] : set the low/med crossover frequency (in Hz) for cluster section
```

/cluster/fh [number] : set the med/high crossover frequency (in Hz) for cluster section  
 /cluster/params [number][number][number][number][number][number] : set the filter parameters (G0,G1,Gm,Gh,f,fh) for cluster section  
 /cluster/params [number][number][number][number][number] : set the filter parameters (G0,G1,Gm,Gh,f) for cluster section  
 /cluster/params [number][number][number][number] : set the filter parameters (G0,G1,Gm,Gh) for cluster section  
 /reverb/G0 [number] : set the global gain (in dB) for reverb section  
 /reverb/G1 [number] : set the gain (in dB) for low frequencies for reverb section  
 /reverb/Gm [number] : set the gain (in dB) for medium frequencies for reverb section  
 /reverb/Gh [number] : set the gain (in dB) for high frequencies for reverb section  
 /reverb/fl [number] : set the low/med crossover frequency (in Hz) for reverb section  
 /reverb/fh [number] : set the med/high crossover frequency (in Hz) for reverb section  
 /reverb/params [number][number][number][number][number][number] : set the filter parameters (G0,G1,Gm,Gh,f,fh) for reverb section  
 /reverb/params [number][number][number][number][number] : set the filter parameters (G0,G1,Gm,Gh,f) for reverb section  
 /reverb/params [number][number][number][number] : set the filter parameters (G0,G1,Gm,Gh) for reverb section  
 /omni/G0 [number] : set the global gain (in dB) for omni  
 /omni/G1 [number] : set the gain (in dB) for low frequencies for omni  
 /omni/Gm [number] : set the gain (in dB) for medium frequencies for omni  
 /omni/Gh [number] : set the gain (in dB) for high frequencies for omni  
 /omni/fl [number] : set the low/med crossover frequency (in Hz) for omni  
 /omni/fh [number] : set the med/high crossover frequency (in Hz) for omni  
 /omni/params [number][number][number][number][number][number] : set the filter parameters (G0,G1,Gm,Gh,f,fh) for omni  
 /omni/params [number][number][number][number][number] : set the filter parameters (G0,G1,Gm,Gh,f) for omni  
 /omni/params [number][number][number][number] : set the filter parameters (G0,G1,Gm,Gh) for omni  
 /dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).  
 /dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
 /dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute  
 /dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).  
 /dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
 /dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass  
 /dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
 /dsp/automute/attack [number] : set the duration (in seconds) before auto-muting  
 /dsp/post : post various information to the Max console (audio should be turned on)  
 /dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
 /dump/dsp/latency : send the processor latency (in samples) through the dump outlet  
 /verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
 /post/version : print the version in the Max Console  
 /post/version [details] : print detailed version in the Max Console  
 /post/doc : print the help documentation in the Max Console  
 /post/state : print the OSC status in the Max Console  
 /preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
 /preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
 /preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

```

/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.conv~
- spat5.oper\_\_
- spat5.hlsshelf
- spat5.hlsshelf~
- spat5.multi.connect

## spat5.converter

## Coordinate format conversion

## description

**spat5.converter** allows easy conversion between different coordinate formats. **spat5.converter** can also function as a routing utility, with its unmatched outlet (rightmost).

## attributes

## @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or `inspector`; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
```

```
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
```

## see also

- spat5.converter~
- spat5.viewer
- spat5.abs2rel
- poltocar
- cartopol
- spat5.transform
- spat5.scale
- spat5.rotate
- spat5.translate
- spat5.normalize

## spat5.converter~

## Signal-rate coordinate format conversion

### description

**spat5.converter~** converts coordinate formats at signal-rate.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @input []

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @output []

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```
/format/input [string] : set input coordinate format
/format/output [string] : set output coordinate format
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
```



```

/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.converter
- spat5.viewer
- spat5.abs2rel
- poltocar
- cartopol
- spat5.transform
- spat5.scale
- spat5.rotate
- spat5.translate
- spat5.normalize

# spat5.conv~ Realtime convolution

## description

**spat5.conv~** is a new implementation of the **spat.rtconv~**. It is a real-time convolver using an overlap-save block partition fft-based convolution algorithm.

Unlike **spat.rtconv~**, the object uses a dynamic load-balancing algorithm and has a multithreaded implementation. The overall CPU cost is higher than **rtconv~**, but most of the processing is deferred in a background thread.

Like **rtconv~**, the object has a 'blocksize' attribute which allows to set a trade-off between latency and CPU cost.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @inputs [int]

The **inputs** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/blocksize [int]** : set block-size. blocksize is a parameter of the algorithm. The larger it is, the greater the input/output delay is and the less CPU time is used. It has to be a power of two greater than the signal vector size of Max. The input/output delay is = ( max( blocksize, 32 ) - vectorsize )

**/load [string]** : load an impulse response from file (e.g. WAV or AIFF)

**/open [string]** : similar to /load

**/open** : open a dialog box for choosing an impulse response file

**/buffer [string]** : load impulse response from a Max buffer~

**/mubu [string][string][int]** : load impulse response from a MuBu

**/info** : post various information to the Max console

**/clear** : clear impulse response (all channels)

**/ir/[index]/channel/[index]/clear** : clear impulse response for the i-th channel

**/ir/[index]/channel/[index]/reverse** : reverse impulse response for the i-th channel

**/ir/[index]/channel/[index]/normalize [boolean]** : normalize impulse response for the i-th channel

**/ir/[index]/channel/[index]/crop [boolean]** : crop impulse response for the i-th channel (removes leading zeros)

**/ir/[index]/channel/[index]/mute [boolean]** : mute the i-th channel of the impulse response

**/ir/[index]/channel/[index]/fir [nnnnnn...]** : set impulse response for the i-th channel

**/ir/[index]/normalize [boolean]** : normalize impulse response (normalize each channel independently)

**/ir/[index]/reverse [boolean]** : reverse impulse response (reverse each channel independently)

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).

/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass

/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting

/dsp/post : post various information to the Max console (audio should be turned on)

/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

/dump/dsp/latency : send the processor latency (in samples) through the dump outlet

/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.converb~`
- `spat5.hoa.conv~`
- `buffir~`
- `buffer~`
- `spat5.smk~`
- `spat5.hybrid~`
- `spat5.ir.infos`
- `spat5.ir.analysis`

## spat5.cpu Report CPU and RAM usage

### description

**spat5.cpu** reports CPU and RAM usage.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/rate** [number] : set reporting rate (in msec). NB: same rate for all spat5.cpu instances

### see also

- **adstatus**
- **dspstate~**
- **spat5.hostinfos**

## spat5.cross3~ 3-band crossover filtering

### description

**spat5.cross3~** performs 3-band crossover filtering using Linkwitz-Riley topology. It uses cascades of biquad filters with low-pass and high-pass Butterworth design.

Reference(s) :

S. H. Linkwitz. Active crossover networks for noncoincident drivers. Journal of the Audio Engineering Society, 24(1):2 – 8, Feb 1976.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/fl [number]** : set low crossover frequency (in Hz)  
**/fh [number]** : set high crossover frequency (in Hz)  
**/crossover [number][number]** : set crossover frequencies (in Hz)  
**/order [number]** : set filter order  
**/band/[index]/mute [boolean]** : mute the i-th frequency band  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

```

/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- cross~
- spat5.filterdesign
- spat5.graphiceq~
- spat5.graphiceq
- cascade~
- spat5.cascade~
- biquad~
- spat5.limiter~
- spat5.clip~
- spat5.softclipping~
- spat5.delta~
- spat5.deltacip~
- spat5.tanh~
- spat5.rms~
- spat5.ebur128~
- spat5.zplane
- filtergraph~
- spat5.compressor~
- spat5.compressor
- spat5.cascade.inverse



- spat5.cascade.resample
- spat5.eq
- spat5.octavebank~
- spat5.complementarybank~

## spat5.ctc~

## Crosstalk-canceller

## description

**spat5.ctc~** is a crosstalk-cancellation (CTC) processor. It can transcode a binaural stream into a stereo compatible stream (2.0 loudspeaker setup). **spat5.ctc~** implements a transaural decoder, using the feedforward general symmetric topology. The determinant filter of the CTC (actually the inverse of the determinant) is computed on the fly i.e. upon loading binaural hrtf data. The determinant filter can have an arbitrary length; it is processed with a real-time convolver.

Further information, adapted from "J.-M. Jot, V. Larcher, and O. Warusfel. Digital signal processing issues in the context of binaural and transaural stereophony. In Proc. of the 98th Convention of the Audio Engineering Society (AES), Paris, France, Feb. 1995." :

Binaural signals (either recorded or synthesized) can be reproduced over headphones or further converted into loudspeaker-compatible signals, by means of a "cross-talk cancelling" process assuming that the listener will be placed at a particular position with respect to the loudspeaker pair. This loudspeaker reproduction technique, initially invented by Schroeder and Atal was further optimized by Cooper and Bauck, who coined the term "transaural" for this reproduction mode. Due to the fact that spatial cues are conveyed by reproducing the signals at the listener's ears rather than recreating a sound field in an extended listening space, binaural techniques are, in essence, individual reproduction techniques: they are not intended for addressing a large audience with a loudspeaker system.

The major challenges to binaural or transaural reproduction include:

- out-of-head localization of virtual sound sources in headphone simulation,
- minimization of front-back reversals and faithful reproduction of source elevation,
- accurate and natural-sounding reproduction of the room effect.

The major factors which influence the success of the simulation include:

- the techniques used for measuring and modeling the HRTFs,
- headphone equalization and reproductibility of headphone donning,
- variations of the HRTFs between individuals,
- the listener's free-field localization performance,
- the possibility of tracking listener movements during reproduction,
- interference of non-auditory (e.g. visual) information or cognitive cues, - the presence of a synthetic room effect in the simulation,
- the techniques used for synthesizing the room effect.

Reference(s) :

J.-M. Lyzwa and A. Baskind. Use of binaural and transaural spatialization techniques in multichannel 5.1 production: technical and aesthetic principles, from recording to post-production. In Proc. of the 7th Conference of Audio Engineering Society (AES) Brazil, Sao Paulo, Brazil, 2009.

A. Baskind, T. Carpentier, J.-M. Lyzwa, and O. Warusfel. Surround and 3D-Audio Production on Two-Channel and 2D-Multichannel Loudspeaker Setups. In Proc. of the 3rd International Conference on Spatial Audio (ICSA), Graz, Austria, Sept 2015.

A. Baskind, T. Carpentier, M. Noisternig, O. Warusfel, and J.-M. Lyzwa. Binaural and transaural spatialization techniques in multichannel 5.1 production. In Proc. of the 27th Tonmeistertagung - VDT International Convention, Koln, Germany, November 2012.

J.-M. Jot, V. Larcher, and O. Warusfel. Digital signal processing issues in the context of binaural and transaural stereophony. In Proc. of the 98th Convention of the Audio Engineering Society (AES), Paris, France, Feb. 1995.

## attributes

## @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

## @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

`/method [string]` : set method used for computing the CTC EQ filter. Possible values: single, singlesmooth, equalweighting, sidesweighting  
`/highpass [boolean]` : enable high-pass filtering  
`/highpass/cutoff [number]` : set cutoff frequency (in Hz) for high-pass filtering  
`/highpass/order [int]` : set order for high-pass filter  
`/fftsize [int]` : set fft size for computing the CTC EQ filter  
`/blur [number]` : set blur factor (in `/determinant/bypass [boolean]` : bypass the determinant equalizer in the CTC  
`/hrtf [string]` : load hrtf from file or url (sofa format)  
`/load [string]` : similar to `/hrtf`  
`/speakers/aed [nnnn...]` : set the list of speaker coordinates (with aed format)  
`/speakers/xyz [nnnn...]` : set the list of speaker coordinates (with xyz format)  
`/speakers/ade [nnnn...]` : set the list of speaker coordinates (with ade format)  
`/speakers/xy [nnnn...]` : set the list of speaker coordinates (with xy format)  
`/speakers/ae [nnnn...]` : set the list of speaker coordinates (with ae format)  
`/speaker/[index]/aed [number][number][number]` : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)  
`/speaker/[index]/ade [number][number][number]` : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)  
`/speaker/[index]/xyz [number][number][number]` : set the position of the i-th loudspeaker using cartesian coordinates  
`/speaker/[index]/xy [number][number]` : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)  
`/speaker/[index]/az [number][number]` : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1) and elevation (=0)  
`/speaker/[index]/az [number]` : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)  
`/dsp/mute [boolean]` : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see `/dsp/mute/ramptime`).  
`/dsp/mute [boolean][number]` : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
`/dsp/mute/ramptime [number]` : set ramp time (in msec) for mute/unmute  
`/dsp/bypass [boolean]` : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see `/dsp/bypass/ramptime`).  
`/dsp/bypass [boolean][number]` : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
`/dsp/bypass/ramptime [number]` : set ramp time (in msec) for bypass  
`/dsp/automute [boolean]` : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
`/dsp/automute/attack [number]` : set the duration (in seconds) before auto-muting  
`/dsp/post` : post various information to the Max console (audio should be turned on)  
`/dsp/clear` : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
`/dump/dsp/latency` : send the processor latency (in samples) through the dump outlet  
`/verbose [string]` : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
`/post/version` : print the version in the Max Console  
`/post/version [details]` : print detailed version in the Max Console  
`/post/doc` : print the help documentation in the Max Console  
`/post/state` : print the OSC status in the Max Console  
`/preset/load [string]` : load a preset from file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.  
`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)  
`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.  
`/status` : open the status window and bring it to front  
`/status/open` : open the status window and bring it to front  
`/status/close` : close the status window  
`/status/openorclose` : open the status window if it was closed; close it if it was opened  
`/status/font/size [number]` : set the font size of the status window  
`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)  
`/help` : open the help window and bring it to front  
`/help/open` : open the help window and bring it to front  
`/help/close` : close the help window  
`/help/openorclose` : open the help window if it was closed; close it if it was opened  
`/help/font/size [number]` : set the font size of the help window  
`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)  
`/snapshot` : open the snapshot window and bring it to front  
`/snapshot/open` : open the snapshot window and bring it to front  
`/snapshot/close` : close the snapshot window  
`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened  
`/snapshot/font/size [number]` : set the font size of the snapshot window  
`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)  
`/status/copytoclipboard` : copy the status to (the OS) clipboard  
`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)  
`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.  
`/snapshot/deleteall` : delete all the snapshots currently in memory

```

/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.binaural~
- spat5.decoder~
- spat5.pan~
- spat5.transpan~
- spat5.transpan.downmixer~
- spat5.transpan.enlarger~
- spat5.virtualspeakers~
- spat5.sofa.loader
- spat5.hrtf.infos
- spat5.multi.connect

## spat5.dcfilter~

## Multichannel DC removal filter

### description

**spat5.dcfilter~** filters the DC component.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/cutoff [number]** : set cutoff frequency (in Hz)  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front

```

/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- cascade~
- biquad~
- filtergraph~
- spat5.frequencyresponse
- spat5.equalizer
- spat5.filterdesign
- spat5.hlshelf~
- spat5.hlshelf
- spat5.filterdesign
- spat5.octavebank~
- spat5.zplane
- spat5.graphiceq~
- spat5.graphiceq
- spat5.cross3~
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.multi.connect

## spat5.decoder~

## Generic decoder/transcoder module

### description

**spat5.decoder~** is the primary object for the spat decoding/transcoding module.

It functions to convert from one spatial encoding to another. Depending on the panning law, this module may not be necessary.

Examples of typical usage would be :

- decoding ambisonic streams for a given speaker layout,
- decoding MS (mid/side) microphone stream to stereo speakers,
- transcoding a binaural stream to speaker signals (also known as transaural),
- etc.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @inputs [int]

The **inputs** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @outputs [int]

The **outputs** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console



`/preset/load [string]` : load a preset from file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.pan~`
- `spat5.pansig~`
- `spat5.hoa.decoder~`
- `spat5.virtualspeakers~`
- `spat5.spat~`
- `spat5.align~`
- `spat5.ctc~`
- `spat5.hoa.binaural~`
- `spat5.panner.metrics`
- `spat5.hoa.equivalentorder`

- spat5.multi.connect

## spat5.decorrelate~

## Multichannel decorrelation

### description

**spat5.decorrelate~** generates uncorrelated versions of the incoming signal.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/seed [int]** : generate a new set of decorrelation filters using a given random seed  
**/seed** : generate a new set of decorrelation filters with an arbitrary random seed  
**/export** : export decorrelation filters to audio files  
**/truncate [boolean]** : truncate decorrelation filters (might save some cpu)  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary

encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.delay~
- spat5.reverb~
- spat5.pan~
- spat5.shuffle~
- spat5.multi.connect

# spat5.delay~ Multichannel variable delay line

## description

**spat5.delay~** is quite similar to Max/MSP **delay~**. It however allows to process several delay lines in parallel. **spat5.delay~** uses a continuously interpolated fractional delay for smooth variations. Delays are specified either in milliseconds or samples.

Reference(s) :

T. I. Laakso, V. Välimäki, M. Karjalainen, and U. K. Laine. Splitting the unit delay. IEEE Signal Processing Magazine, 13(1):30 – 60, January 1996.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary encoded OSC file, **'coll'** for human-readable Max coll file (compatible with the **coll** object). **'txt'** is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary encoded OSC file, **'coll'** for human-readable Max coll file (compatible with the **coll** object). **'txt'** is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary encoded OSC file, **'coll'** for human-readable Max coll file (compatible with the **coll** object). **'txt'** is the default file format. If the file extension is not provided, **'txt'** will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary

encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- delay~
- spat5.tapout~
- spat5.delgen
- tapin~
- tapout~
- spat5.comb~
- spat5.allpass~
- spat5.early~
- spat5.cluster~
- spat5.reverb~
- spat5.roomsize
- spat5.multi.connect



# spat5.delgen Delay distribution generator

## description

**spat5.delgen** generates a distribution of delays that can be used by **spat5.early~**, **spat5.cluster~** or **spat5.reverb~**. It is based on algorithms that attempt to maximize the decorrelation between delayed signals for perceptually smoothed reverberation.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/min [number] : set minimum delay (in msec)
/max [number] : set maximum delay (in msec)
/distr [number] : set delay distribution
/sum [number] : set sum of delays (in msec)
/minmax [number][number][number] : set minimum, maximum, and distribution of delays (in msec)
/minmax [number][number] : set minimum and maximum of delays (in msec)
/minsum [number][number][number] : set minimum, sum, and distribution of delays (in msec)
/minsum [number][number] : set minimum and sum of delays (in msec)
/delay/number [int] : set number of delays
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
```



/snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- delay~
- spat5.delay~
- spat5.roomsize
- spat5.early~
- spat5.cluster~
- spat5.reverb~
- spat5.room~
- tapin~
- tapout~
- spat5.reverb.timeview

## spat5.deltaclip~

## Limit changes in signal amplitude

### description

**spat5.deltaclip~** is similar to Max/MSP **deltaclip~** but can process several channels in parallel. **spat5.deltaclip~** limits the change between samples in an incoming signal. It is similar to the **spat5.clip~** object, but it limits amplitude changes with respect to slope rather than amplitude.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```
/min [number] : set minimum slope value
/max [number] : set maximum slope value
/minmax [number][number] : set minimum and maximum slope values
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
```

encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.clip~
- spat5.delta~
- clip~
- delta~
- deltaclip~

# spat5.delta~ Signal of sample differences

## description

**spat5.delta~** is similar to Max/MSP **delta~** but can process several channels in parallel. **spat5.delta~** outputs a signal which represents the differences between each incoming sample value in the input signal.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front

```

/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.clip~
- spat5.deltaclick~
- clip~
- delta~
- deltaclick~

# spat5.diagmatrix~ Diagonal signal matrix

## description

**spat5.diagmatrix~** is similar to **matrix~** but restricted to diagonal matrix (for efficiency).

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/channel/number [int] : set the number of channels
/gains [number] [number] [number] ... : set the list of gains (linear)
/gains/db [number] [number] [number] ... : set the list of gains (in dB)
/channel/[index]/gain [number] : set gain (linear) for the i-th channel
/channel/[index]/gain/db [number] : set gain (in dB) for the i-th channel
/channel/[index]/gain/add/db [number] : add gain offset (in dB) for the i-th channel
/ramp/time [number] : set ramp time (in msec)
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
```



file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.times~
- \*~
- mc.\*~
- matrix~
- matrixctrl
- spat5.routing~
- spat5.matrix
- spat5.matrix~
- spat5.multi.connect



## spat5.distance

## Distance and angle between sources and speakers

### description

**spat5.distance** computes distances and relative angles between the sources and loudspeakers.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```

/source/number [int] : set the number of sources
/speaker/number [int] : set the number of speakers
/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates
/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)
/speaker/[index]/aed [number][number][number] : set the position of the i-th speaker using navigation coordinates (azimuth/elevation/distance)
/speaker/[index]/xyz [number][number][number] : set the position of the i-th speaker using cartesian coordinates
/speaker/[index]/xy [number][number] : set the xy-coordinate of the i-th speaker, and use default z (=0)
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

```

```

/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.viewer
- spat5.abs2rel
- spat5.constraint
- spat5.scale
- spat5.rotate
- spat5.translate
- spat5.normalize
- spat5.mirror
- spat5.converter
- spat5.converter~
- spat5.knn

# spat5.doppler~ Doppler simulation

## description

**spat5.doppler~** simulates Doppler effect for a moving source.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/channel/number [int]** : set the number of channels  
**/channel/[index]/delay [number]** : set delay (in msec) for the i-th channel  
**/channel/[index]/distance [number]** : set distance (in meters) for the i-th channel  
**/channel/[index]/mute [boolean]** : mute the i-th channel  
**/channel/[index]/bypass [boolean]** : bypass the i-th channel  
**/soundvelocity [number]** : set the speed of sound (m/sec)  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,

'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.delay~
- spat5.air~
- spat5.source~
- spat5.leslie~
- spat5.spat~
- spat5.panoramix~
- spat5.viewer
- spat5.multi.connect

## spat5.dsptime~

## Report milliseconds of audio processed

### description

**spat5.dsptime~** reports the number of milliseconds of audio processed since audio was turned on. It also sends a bang at the beginning of each audio tick.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front

/help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- dsptime~
- count~



# spat5.early~ First stage of the Spat room module. Generates early reflections

## description

**spat5.early~** corresponds to the first processing stage in the spat room module. It generates first order discrete echoes.

When using **spat5.early~** inside a reverberator engine, the number of delayed channels (**channels** attribute) corresponds to the number of "internal channels" ( **internals** attribute of **spat5.spat~** object).

Reference(s) :

J.-M. Jot and A. Chaigne. Digital delay networks for designing artificial reverberators. In Proc. of the 90th Convention of the Audio Engineering Society (AES), Paris, France, Feb 1991.

T. I. Laakso, V. Välimäki, M. Karjalainen, and U. K. Laine. Splitting the unit delay. IEEE Signal Processing Magazine, 13(1):30 – 60, January 1996.

## attributes

**@channels** [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@inputs** [int]

The **inputs** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

**@mc** [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

**@parameter\_enable** [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/channel/number [int] : set the number of channels
/delays [number][number][number]... : set the list of delays (in msec)
/delays/samples [number][number][number]... : set the list of delays (in samples)
/interpolation/mode [string] : set the interpolation mode. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade
/interpolation/time [number] : set the interpolation time (in msec)
/channel/[index]/delay [number] : set the delay (in msec) for the i-th channel
/channel/[index]/delay/samples [number] : set the delay (in samples) for the i-th channel
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the
```



second argument specifies the length (in msec) of the ramp.

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass  
 /dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
 /dsp/automute/attack [number] : set the duration (in seconds) before auto-muting  
 /dsp/post : post various information to the Max console (audio should be turned on)  
 /dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
 /dump/dsp/latency : send the processor latency (in samples) through the dump outlet  
 /verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
 /post/version : print the version in the Max Console  
 /post/version [details] : print detailed version in the Max Console  
 /post/doc : print the help documentation in the Max Console  
 /post/state : print the OSC status in the Max Console  
 /preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
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 /preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
 /preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.source~
- spat5.cluster~
- spat5.reverb~
- spat5.spat~
- spat5.ircamverb~
- spat5.delgen
- spat5.roomsize
- spat5.shuffle~
- spat5.delay~
- spat5.tapout~
- delay~
- tapout~
- spat5.comb~
- spat5.allpass~
- spat5.reverb.timeview
- spat5.multi.connect

## spat5.ebur128~

## Loudness metering according to EBU R128

### description

**spat5.ebur128~** measures the loudness levels according to EBU R128 recommendations (ITU-R BS.1770-4). According to the recommendation, the object can operate on mono, stereo, 5.0 or 5.1 signals.

Reference(s) :

EBU R128 - Loudness normalization and permitted maximum level of audio signals. Technical report, EBU, 2010.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```
/rate [number] : set report rate (in msec)
/clear : clears history
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
```

'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.meter~
- meter~
- live.gain~
- spat5.snapshot~
- spat5.minmax~
- mc.live.gain~
- spat5.weightingfilter
- spat5.multi.connect

## spat5.edc Schroeder estimation of reverberation time

### description

**spat5.edc** computes Schroeder decay curve.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/load** [string] : load IR from audio file, and analyze the first channel

**/load** [string][int] : load IR from audio file, and analyze the i-th channel

**/channel** [int] : analyze the i-th channel of the IR

### see also

- spat5.smk~
- spat5.edc
- spat5.ir.analysis
- spat5.ir.infos
- spat5.hybrid~

# spat5.eq Parametric equalizer

## description

**spat5.eq** is a parametric equalizer. It computes coefficients of second-order filters (cascade~)  
Like the `filtergraph~` object, it does not process audio signals by itself, but it does react internally to the current MSP sampling rate.

## attributes

### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.  
Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.  
Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.  
Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).  
Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
```

/snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)  
 /window/title [string] : set the window title (in the window titlebar)  
 /window/visible [boolean] : set the window visibility  
 /window/moveable [boolean] : set the window movability  
 /window/resizable [boolean] : set the window resizability  
 /window/enable [boolean] : enable/disable the window  
 /window/background/color [color] : set the window background color  
 /window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency)  
 /window/fullscreen [boolean] : enable/disable fullscreen mode  
 /window/minimise [boolean] : minimize the window  
 /window/open : open the window (and bring it to front)  
 /window/close : close the window  
 /window/openorclose : open the window if it was closed; close it if it was opened  
 /window/size [number][number] : set the window size (width, height) (in pixels)  
 /window/width [number] : set the window width (in pixels)  
 /window/height [number] : set the window height (in pixels)  
 /window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)  
 /window/topleft [number][number] : set the window top left position (in pixels)  
 /window/centre : open the window, centering it on the screen  
 /window/rendering/engine [string] : set the graphical rendering engine of the window  
 /window/fps/visible [boolean] : display the FPS performances of the window  
 /window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)  
 /window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)  
 /window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)  
 /window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)  
 /window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)  
 /window/export/image [string] : export the window as an image file (png or jpeg)

## see also

- cascade~
- spat5.cascade~
- spat5.equalizer
- biquad~
- filtergraph~
- spat5.filterdesign
- spat5.frequencyresponse
- spat5.compressor
- spat5.limiter~
- spat5.noisegate~
- spat5.clip~
- spat5.softclipping~
- spat5.delta~
- spat5.deltacip~
- spat5.tanh~
- spat5.fixnan~
- spat5.rms~



- spat5.ebur128~
- spat5.zplane
- zplane~
- spat5.gammatone
- spat5.octavebank~
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.complementarybank~
- spat5.graphiceq
- spat5.graphiceq~
- spat5.cross3~
- spat5.graphiceq2
- spat5.graphiceq3

# spat5.eq.embedded Parametric equalizer

## description

spat5.eq is a parametric equalizer. It computes coefficients of second-order filters (cascade~)  
Like the `filtergraph~` object, it does not process audio signals by itself, but it does react internally to the current MSP sampling rate.

## attributes

### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.  
Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.  
Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.  
Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).  
Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
```

/snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- cascade~
- spat5.cascade~
- spat5.equalizer
- biquad~
- filtergraph~
- spat5.filterdesign
- spat5.frequencyresponse
- spat5.compressor
- spat5.limiter~
- spat5.noisegate~
- spat5.clip~
- spat5.softclipping~
- spat5.delta~
- spat5.deltacclip~
- spat5.tanh~
- spat5.fixnan~
- spat5.rms~
- spat5.ebur128~
- spat5.zplane
- zplane~
- spat5.gammatone
- spat5.octavebank~
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.complementarybank~
- spat5.graphiceq
- spat5.graphiceq~
- spat5.cross3~
- spat5.graphiceq2
- spat5.graphiceq3

# spat5.equalizer      Parametric equalizer

## description

**spat5.equalizer** is a parametric equalizer. It computes coefficients of second-order filters (cascade~)

Like the `filtergraph~` object, it does not process audio signals by itself, but it does react internally to the current MSP sampling rate.

## attributes

### @channels [int]

The `channels` attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored. Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`. Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box. Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

`/post/version` : print the version in the Max Console  
`/post/version [details]` : print detailed version in the Max Console  
`/post/doc` : print the help documentation in the Max Console  
`/post/state` : print the OSC status in the Max Console  
`/preset/load [string]` : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
`/preset/load` : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.  
`/preset/export [string]` : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.  
`/status` : open the status window and bring it to front  
`/status/open` : open the status window and bring it to front  
`/status/close` : close the status window  
`/status/openorclose` : open the status window if it was closed; close it if it was opened  
`/status/font/size [number]` : set the font size of the status window  
`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)  
`/help` : open the help window and bring it to front  
`/help/open` : open the help window and bring it to front  
`/help/close` : close the help window  
`/help/openorclose` : open the help window if it was closed; close it if it was opened  
`/help/font/size [number]` : set the font size of the help window  
`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)  
`/snapshot` : open the snapshot window and bring it to front  
`/snapshot/open` : open the snapshot window and bring it to front  
`/snapshot/close` : close the snapshot window  
`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened  
`/snapshot/font/size [number]` : set the font size of the snapshot window  
`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

```

/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizableability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repainting efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- cascade~
- spat5.cascade~
- spat5.eq
- biquad~
- filtergraph~
- spat5.filterdesign
- spat5.frequencyresponse
- spat5.compressor
- spat5.limiter~
- spat5.noisegate~
- spat5.clip~

- spat5.softclipping~
- spat5.delta~
- spat5.deltacclip~
- spat5.tanh~
- spat5.fixnan~
- spat5.rms~
- spat5.ebur128~
- spat5.zplane
- zplane~
- spat5.gammatone
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.octavebank~
- spat5.complementarybank~

## spat5.equalizer.embedded

## Parametric equalizer

### description

spat5.equalizer is a parametric equalizer. It computes coefficients of second-order filters (cascade~)

Like the `filtergraph~` object, it does not process audio signals by itself, but it does react internally to the current MSP sampling rate.

### attributes

#### @channels [int]

The `channels` attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored. Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`. Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box. Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
```



/status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- cascade~
- spat5.cascade~
- spat5.eq
- biquad~
- filtergraph~
- spat5.filterdesign
- spat5.frequencyresponse
- spat5.compressor
- spat5.limiter~
- spat5.noisegate~
- spat5.clip~
- spat5.softclipping~
- spat5.delta~
- spat5.deltacclip~
- spat5.tanh~
- spat5.fixnan~
- spat5.rms~
- spat5.ebur128~
- spat5.zplane
- zplane~
- spat5.gammatone
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.octavebank~
- spat5.complementarybank~

## spat5.elliptique~

## Directional reverberation processor

### description

**spat5.elliptique~** is a multichannel reverberator capable of producing decorrelated output for large loudspeaker arrays, as well as, multiple spatially-oriented decay characteristics.

Reference(s) :

B. Alary, A. Politis, S. J. Schlecht, and V. Välimäki. Directional feedback delay network. Journal of the Audio Engineering Society, 67(10):752 – 762, October 2019.

B. Alary and A. Politis Frequency-Dependent Directional Feedback Delay Network. In Proc. of the IEEE ICASSP-2020, May 4–8, Barcelona, Spain, pp. 176–180.

B. Alary. and V. Välimäki. A Method for Capturing and Reproducing Directional Reverberation in Six Degrees of Freedom. In Proc. of the International Conference on Immersive and 3D Audio: From Architecture to Automotive (I3DA), Bologna, Italy, 8–10 September 2021; pp. 1–8.

B. Alary. Analysis and Synthesis of Directional Reverberation. PhD thesis, Aalto University, Espoo, Finland, September 2021.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @sources [int]

The **sources** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### methods

```
/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates
/source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)
/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)
/source/[index]/xy_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged
/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged
/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged
/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged
/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)
/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)
/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)
/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)
/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged
/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged
/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged
```

/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged  
 /source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged  
 /sources/aed [nnnn...] : set the list of source coordinates (with aed format)  
 /sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)  
 /sources/ade [nnnn...] : set the list of source coordinates (with ade format)  
 /sources/xy [nnnn...] : set the list of source coordinates (with xy format)  
 /sources/ae [nnnn...] : set the list of source coordinates (with ae format)  
 /speakers/aed [nnnn...] : set the list of speaker coordinates (with aed format)  
 /speakers/xyz [nnnn...] : set the list of speaker coordinates (with xyz format)  
 /speakers/ade [nnnn...] : set the list of speaker coordinates (with ade format)  
 /speakers/xy [nnnn...] : set the list of speaker coordinates (with xy format)  
 /speakers/ae [nnnn...] : set the list of speaker coordinates (with ae format)  
 /speaker/[index]/aed [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)  
 /speaker/[index]/ade [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)  
 /speaker/[index]/xyz [number][number][number] : set the position of the i-th loudspeaker using cartesian coordinates  
 /speaker/[index]/xy [number][number] : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)  
 /speaker/[index]/ae [number][number] : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1)  
 /speaker/[index]/az [number] : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)  
 /direct/gain [number] : Linear gain of the direct sound  
 /direct/gain/db [number] : Gain (dB) of the direct sound  
 /gain [number] : Gain (linear) for the reverberator  
 /gain/db [number] : Gain (dB) for the reverberator  
 /processing [boolean] : Enable/Disable dsp processing  
 /source/[index]/gain [number] : Linear gain for this direction  
 /source/[index]/gain/db [number] : Gain for this direction  
 /source/[index]/density [int] : Reverberator density  
 /source/[index]/spread [int] : Spread of the direction  
 /source/[index]/lowshelf/cutoff [int] : Low shelf cut frequency  
 /source/[index]/highshelf/cutoff [int] : High shelf cut frequency  
 /source/[index]/rt60/low [int] : Low frequency, reverberation time  
 /source/[index]/rt60/mid [int] : Mid frequency, reverberation time  
 /source/[index]/rt60/high [int] : High frequency, reverberation time  
 /dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).  
 /dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
 /dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute  
 /dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).  
 /dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
 /dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass  
 /dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
 /dsp/automute/attack [number] : set the duration (in seconds) before auto-muting  
 /dsp/post : post various information to the Max console (audio should be turned on)  
 /dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
 /dump/dsp/latency : send the processor latency (in samples) through the dump outlet  
 /verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
 /post/version : print the version in the Max Console  
 /post/version [details] : print detailed version in the Max Console  
 /post/doc : print the help documentation in the Max Console  
 /post/state : print the OSC status in the Max Console  
 /preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
 /preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
 /preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

```

/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.evert
- spat5.evert~

# spat5.espro.brir

# Renders Espro speaker feeds to binaural

## description

**spat5.espro.brir** renders Espro speaker feeds to binaural.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.conv~
- spat5.smk~
- spat5.virtualspeakers~
- spat5.sofa.infos
- spat5.align~

## spat5.evert

## Accelerated beam tracing algorithm

### description

**spat5.evert** performs beam tracing simulation.

Reference(s) :

M. Noisternig, B. F. G. Katz, S. Siltanen, and L. Savioja. Framework for real-time auralization in architectural acoustics. *Acta Acustica united with Acustica*, 99:1000 – 1015, Sept 2008.

S. Laine, S. Siltanen, T. Lokki, and L. Savioja. Accelerated beam tracing algorithm. *Applied Acoustics*, 70:172 – 181, 2009.

L. Savioja and U. P. Svensson. Overview of geometrical room acoustic modeling techniques. *Journal of the Acoustical Society of America*, 138(2):708 – 730, Aug. 2015.

D. Poirier-Quinot, B. Katz, and M. Noisternig. Evertims: Open source framework for real-time auralization in architectural acoustics and virtual reality. In *Proc. of the 20th International Conference on Digital Audio Effects (DAFx-17)*, Edinburgh, UK, Sept. 2017.

D. Poirier-Quinot, B. F. Katz, and M. Noisternig. Evertims: Open source framework for real-time auralization in VR. In *Proc. of the 12th International Audio Mostly Conference on Augmented and Participatory Sound and Music Experiences*, London, UK, Aug 2017.

M. Noisternig, L. Savioja, and B. F. Katz. Real-time auralization system based on beam-tracing and mixed-order ambisonics. *Journal of the Acoustical Society of America*, 123(5):3935 – 3935, 2008.

### attributes

**@bands** [int]

The **bands** attribute represents the number frequency bands. It can not be changed dynamically (via message or **attrui** or inspector).

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```

/soundvelocity [number] : set the speed of sound (m/sec)
/band/number [int] : set the number of frequency bands
/freq/center [number][number]... : set center frequency for each band (in Hz)
/freq/limits [number][number]... : set edge frequency for each band (in Hz)
/room/number [int] : set the number of rooms
/source/number [int] : set the number of sources
/listener/number [int] : set the number of listeners
/hoa/order [int] : set HOA order (for directivity simulation)
/air [boolean] : enable/disable air absorption (in the simulated paths)
/order [int] : set maximum order for the simulation of image sources
/export/matlab : export all the solutions as matlab script(s), in the home folder
/export/matlab [string] : export all the solutions as matlab script(s), in the designated folder
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window

```



```

/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.evert~
- spat5.viewer
- spat5.hoa.directivity
- spat5.multi.connect

# spat5.evert~ Evert auralization engine

## description

Evert auralization engine.

## attributes

### @bands [int]

The **bands** attribute represents the number frequency bands. It can not be changed dynamically (via message or **attrui** or inspector).

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @mode [string]

The **mode** attribute is used to specify the "input type" of each source. **spat5.spat~** supports mono and stereo input sources.

Note that the **mode** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Possible syntax:

@mode "mono" : all sources are mono (default)

@mode "stereo" : all sources are stereo

@mode "mono mono stereo" : a list of modes for each of the 3 sources

You can also use the shorthand notation : @mode "m m s"

@mode "mono 2 stereo 1" : 2 mono sources, followed by 1 stereo source

You can also use the shorthand notation : @mode "m 2 s 1"

### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is (2 x order + 1).

For 3D Ambisonic, the number of components is (order+1) x (order+1).

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @sources [int]

The **sources** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

## methods

/soundvelocity [number] : set the speed of sound (m/sec)

/crossfade/duration [number] : set (absorption) filter crossfade duration (in msec)

/crossfade/type [string] : set type of (absorption) filter crossfade. Possible values: linear, cosine, squarecosine

/interpolation/mode [string] : set interpolation mode for fractional delay. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade

/interpolation/time [number] : set interpolation duration for fractional delay (in msec)

/norm [string] : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized

/paths/maximum [int] : set maximum number of paths to render (per source)

/paths/maxlength [number] : set maximum path length. Paths with a longer length wont be rendered

/paths/polarity [string] : set phase polarity for paths

/fdn/enable [boolean] : enable/disable FDN(s) rendering (applies to all solutions)(for debug purpose only)

/direct/enable [boolean] : enable/disable direct sound rendering (applies to all solutions)(for debug purpose only)

/fdn/mute [boolean] : mute FDN(s) (applies to all solutions)

/direct/mute [boolean] : mute direct sound (applies to all solutions)

/fdn/[name]/mute [boolean] : mute the corresponding FDN (applies to all solutions connected to this FDN)

/fdn/[name]/tr0 [number] : set global reverberation time (in seconds)

/fdn/[name]/decay/times [number][number][number]... : set relative decay times for each frequency band

/fdn/[name]/early/delays [number][number]... : set early delays (in msec)

/fdn/[name]/cluster/delays [number][number]... : set cluster delays (in msec)

/fdn/[name]/reverb/delays [number][number]... : set reverb delays (in msec)

/fdn/[name]/antiphase [boolean] : enable/disable antiphase filter for the corresponding FDN

/source/[index]/mute [boolean] : mute/unmute the i-th source

/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).

/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute

/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).

/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass

/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting

/dsp/post : post various information to the Max console (audio should be turned on)

/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

/dump/dsp/latency : send the processor latency (in samples) through the dump outlet

/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.evert
- spat5.viewer
- spat5.hoa.directivity

## spat5.evert.fdn~

## FDN reverberation

### description

**spat5.evert.fdn~** generates reverberation with a feedback delay network. It includes early, cluster, reverb, and optional cancelling of the beginning of the FDN (so-called 'antiphase' filter).

Reference(s) :

J.-M. Jot and A. Chaigne. Digital delay networks for designing artificial reverberators. In Proc. of the 90th Convention of the Audio Engineering Society (AES), Paris, France, Feb 1991.

T. I. Laakso, V. Välimäki, M. Karjalainen, and U. K. Laine. Splitting the unit delay. IEEE Signal Processing Magazine, 13(1):30 – 60, January 1996.

### attributes

#### @bands [int]

The **bands** attribute represents the number frequency bands. It can not be changed dynamically (via message or **attrui** or inspector).

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```
/channel/number [int] : set the number of feedback channels
/band/number [int] : set the number of frequency bands
/cascade/number [int] : set the number of SOS filters for decay rendering
/tr0 [number] : set global reverberation time (in seconds)
/decay/times [number][number][number]... : set relative decay times for each frequency band
/freq/center [number][number]... : set center frequency for each band (in Hz)
/freq/limits [number][number]... : set edge frequency for each band (in Hz)
/early/delays [number][number]... : set early delays (in msec)
/cluster/delays [number][number]... : set cluster delays (in msec)
/reverb/delays [number][number]... : set reverb delays (in msec)
/early/delays/samples [number][number]... : set early delays (in samples)
/cluster/delays/samples [number][number]... : set cluster delays (in samples)
/reverb/delays/samples [number][number]... : set reverb delays (in samples)
/antiphase [boolean] : enable/disable antiphase filter
/antiphase/length [int] : set length of the antiphase filter (in msec)
/cluster/enable [boolean] : enable/disable cluster stage
/air [boolean] : enable/disable air absorption in the FDN
/air/freq [number] : set air absorption rolloff frequency (in Hz) in the FDN
/interpolation/mode [string] : set interpolation mode for fractional delay. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade
/interpolation/time [number] : set interpolation duration for fractional delay (in msec)
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
```

/dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute

/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).

/dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass

/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting

/dsp/post : post various information to the Max console (audio should be turned on)

/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

/dump/dsp/latency : send the processor latency (in samples) through the dump outlet

/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

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/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

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/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string] [string] [number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.early~
- spat5.cluster~
- spat5.reverb~
- spat5.spat~
- spat5.room~
- spat5.ircamverb~
- spat5.delgen
- spat5.multiverb~
- spat5.roomsize
- spat5.shuffle~
- spat5.multiverb~
- spat5.conv~
- spat5.converb~
- spat5.tapout~
- delay~
- tapout~
- spat5.comb~
- spat5.allpass~
- spat5.reverb.timeview
- spat5.multi.connect



## spat5.fact2crit criteria

## Conversion between perceptual factors and acoustical

### description

**spat5.fact2crit** converts between perceptual factors and acoustical criteria.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`. Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box. Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string] [string] [number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
```

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.oper
- spat5.spat~
- spat5.oper\_\_

## spat5.file.infos

## File information

### description

**spat5.file.infos** retrieves various information about file on disk.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.folder.infos
- spat5.hostinfos
- opendialog
- conformpath
- dropfile
- date
- filedate
- filepath
- strippath
- savedialog
- folder

# spat5.filterdesign Filter design

## description

**spat5.filterdesign** generates filter coefficients with various topologies.

Like the `filtergraph~` object, it does not process audio signals by itself, but it does react internally to the current MSP sampling rate.

The Butterworth filter is a type of signal processing filter designed to have a frequency response as flat as possible in the passband. It is also referred to as a maximally flat magnitude filter.

Properties of the Butterworth filter are:

- Monotonic amplitude response in both passband and stopband
- Quick roll-off around the cutoff frequency, which improves with increasing order
- Considerable overshoot and ringing in step response, which worsens with increasing order
- Slightly non-linear phase response
- Group delay largely frequency-dependent

Chebyshev filters are digital filters having a steeper roll-off than Butterworth filters, and have passband ripple (type I) or stopband ripple (type II). Chebyshev filters have the property that they minimize the error between the idealized and the actual filter characteristic over the range of the filter but with ripples in the passband. Chebyshev filters are sharper than the Butterworth filter; they are not as sharp as the elliptic one, but they show fewer ripples over the bandwidth.

An elliptic filter (also known as a Cauer filter or as a Zolotarev filter) is a signal processing filter with equalized ripple (equiripple) behavior in both the passband and the stopband. The amount of ripple in each band is independently adjustable, and no other filter of equal order can have a faster transition in gain between the passband and the stopband, for the given values of ripple.

Bessel filter is a type of analog linear filter with a maximally flat group/phase delay (maximally linear phase response), which preserves the wave shape of filtered signals in the passband. Bessel filters are often used in audio crossover systems.

## attributes

### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

`/post/version` : print the version in the Max Console

`/post/version [details]` : print detailed version in the Max Console

`/post/doc` : print the help documentation in the Max Console

`/post/state` : print the OSC status in the Max Console

`/preset/load [string]` : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

```

/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- cascade~
- spat5.cascade~
- biquad~
- filtergraph~
- filterdesign
- spat5.zplane
- spat5.equalizer
- spat5.hlsshelf
- spat5.hlsshelf~
- spat5.frequencyresponse
- spat5.gammatone
- spat5.octavebank~
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.complementarybank~
- spat5.graphiceq
- spat5.graphiceq~
- spat5.cross3~
- spat5.graphiceq2
- spat5.graphiceq3
- spat5.weightingfilterspat5.eq



# spat5.filterdesign.embedded Filter design

## description

spat5.filterdesign generates filter coefficients with various topologies.

Like the `filtergraph~` object, it does not process audio signals by itself, but it does react internally to the current MSP sampling rate.

The Butterworth filter is a type of signal processing filter designed to have a frequency response as flat as possible in the passband. It is also referred to as a maximally flat magnitude filter.

Properties of the Butterworth filter are:

- Monotonic amplitude response in both passband and stopband
- Quick roll-off around the cutoff frequency, which improves with increasing order
- Considerable overshoot and ringing in step response, which worsens with increasing order
- Slightly non-linear phase response
- Group delay largely frequency-dependent

Chebyshev filters are digital filters having a steeper roll-off than Butterworth filters, and have passband ripple (type I) or stopband ripple (type II). Chebyshev filters have the property that they minimize the error between the idealized and the actual filter characteristic over the range of the filter but with ripples in the passband. Chebyshev filters are sharper than the Butterworth filter; they are not as sharp as the elliptic one, but they show fewer ripples over the bandwidth.

An elliptic filter (also known as a Cauer filter or as a Zolotarev filter) is a signal processing filter with equalized ripple (equiripple) behavior in both the passband and the stopband. The amount of ripple in each band is independently adjustable, and no other filter of equal order can have a faster transition in gain between the passband and the stopband, for the given values of ripple.

Bessel filter is a type of analog linear filter with a maximally flat group/phase delay (maximally linear phase response), which preserves the wave shape of filtered signals in the passband. Bessel filters are often used in audio crossover systems.

## attributes

### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

`/post/version` : print the version in the Max Console

`/post/version [details]` : print detailed version in the Max Console

`/post/doc` : print the help documentation in the Max Console

`/post/state` : print the OSC status in the Max Console

`/preset/load [string]` : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- cascade~
- spat5.cascade~
- biquad~
- filtergraph~
- filterdesign
- spat5.zplane
- spat5.equalizer
- spat5.hlshef
- spat5.hlshef~
- spat5.frequencyresponse
- spat5.gammatone
- spat5.octavebank~
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.complementarybank~
- spat5.graphiceq
- spat5.graphiceq~
- spat5.cross3~
- spat5.graphiceq2
- spat5.graphiceq3
- spat5.weightingfilterspat5.eq

# spat5.fir~ Multichannel FIR filter

## description

**spat5.fir~** is similar to Max/MSP **buffir~** but can perform several channels in parallel. Each channel has its own set of filter coefficients.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/channel/number [int] : set the number of channels
/channel/[index]/fir [number][number][number]... : set the filter coefficients for the i-th channel
/channel/[index]/fir/clear : clear filter coefficients for the i-th channel
/channel/[index]/mute [boolean] : mute/unmute the DSP rendering for the i-th channel
/channel/[index]/bypass [boolean] : bypass the DSP rendering for the i-th channel
/crossfade/duration [number] : set filter crossfade duration (in msec) (applied to all channels)
/crossfade/type [string] : set type of filter crossfade (applied to all channels)
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
```

file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- buffir~
- spat5.cascade~
- spat5.conv~
- cascade~
- biquad~
- filtergraph~
- spat5.frequencyresponse
- spat5.equalizer
- spat5.filterdesign
- spat5.hlshelf~
- spat5.hlshelf
- spat5.octavebank~
- spat5.zplane
- spat5.graphiceq~
- spat5.graphiceq
- spat5.cross3~

- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.octavebank~
- spat5.eq
- spat5.multi.connect

## spat5.fixnan~ Filters out NaN or Inf

### description

**spat5.fixnan~** replaces NaN or Inf values in a signal.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/mode [string]** : set the processing mode  
**/replacement [number]** : set the replacement value (for 'givenvalue' mode only)  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front

```

/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.fixnan
- spat5.isnan~
- spat5.noisegate~
- spat5.clip~
- spat5.delta~
- spat5.deltaclip~
- spat5.tanh~
- spat5.softclipping~
- spat5.compressor~
- spat5.limiter~
- spat5.multi.connect



# spat5.folder.infos List folder content

## description

**spat5.folder.infos** can list the content of a folder.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.file.infos
- spat5.hostinfos
- opendialog
- conformpath
- dropfile
- date
- filedate
- filepath
- strippath
- savedialog
- folder

## spat5.frequencyresponse

## Plot frequency response

### description

**spat5.frequencyresponse** displays the frequency response of FIR or IIR filters.

Like the `filtergraph~` object, it does not process audio signals by itself, but it does react internally to the current MSP sampling rate.

### attributes

#### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

`/post/version` : print the version in the Max Console  
`/post/version [details]` : print detailed version in the Max Console  
`/post/doc` : print the help documentation in the Max Console  
`/post/state` : print the OSC status in the Max Console  
`/preset/load [string]` : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
`/preset/load` : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.  
`/preset/export [string]` : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.  
`/status` : open the status window and bring it to front  
`/status/open` : open the status window and bring it to front  
`/status/close` : close the status window  
`/status/openorclose` : open the status window if it was closed; close it if it was opened  
`/status/font/size [number]` : set the font size of the status window  
`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)  
`/help` : open the help window and bring it to front  
`/help/open` : open the help window and bring it to front  
`/help/close` : close the help window  
`/help/openorclose` : open the help window if it was closed; close it if it was opened  
`/help/font/size [number]` : set the font size of the help window  
`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)  
`/snapshot` : open the snapshot window and bring it to front  
`/snapshot/open` : open the snapshot window and bring it to front  
`/snapshot/close` : close the snapshot window  
`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened  
`/snapshot/font/size [number]` : set the font size of the snapshot window  
`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)  
`/status/copytoclipboard` : copy the status to (the OS) clipboard  
`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.  
`/snapshot/deleteall` : delete all the snapshots currently in memory  
`/snapshot/add` : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)  
 /window/title [string] : set the window title (in the window titlebar)  
 /window/visible [boolean] : set the window visibility  
 /window/moveable [boolean] : set the window movability  
 /window/resizable [boolean] : set the window resizability  
 /window/enable [boolean] : enable/disable the window  
 /window/background/color [color] : set the window background color  
 /window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency)  
 /window/fullscreen [boolean] : enable/disable fullscreen mode  
 /window/minimise [boolean] : minimize the window  
 /window/open : open the window (and bring it to front)  
 /window/close : close the window  
 /window/openorclose : open the window if it was closed; close it if it was opened  
 /window/size [number][number] : set the window size (width, height) (in pixels)  
 /window/width [number] : set the window width (in pixels)  
 /window/height [number] : set the window height (in pixels)  
 /window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)  
 /window/topleft [number][number] : set the window top left position (in pixels)  
 /window/centre : open the window, centering it on the screen  
 /window/rendering/engine [string] : set the graphical rendering engine of the window  
 /window/fps/visible [boolean] : display the FPS performances of the window  
 /window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)  
 /window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)  
 /window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)  
 /window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)  
 /window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)  
 /window/export/image [string] : export the window as an image file (png or jpeg)

## see also

- biquad~
- cascade~
- spat5.hlsshelf
- spat5.hlsshelf~
- spat5.equalizer
- spat5.cascade~
- spat5.filterdesign
- filtergraph~
- spat5.graphiceq~
- spat5.graphiceq
- spat5.eq
- spat5.zplane
- zplane~
- spat5.gammatone
- spat5.octavebank~
- spat5.gammatone
- spat5.cascade.inverse

- spat5.cascade.resample
- spat5.complementarybank~
- spat5.cross3~
- spat5.graphiceq2
- spat5.graphiceq3

## spat5.frequencyresponse.embedded

## Plot frequency response

### description

spat5.frequencyresponse displays the frequency response of FIR or IIR filters.

Like the `filtergraph~` object, it does not process audio signals by itself, but it does react internally to the current MSP sampling rate.

### attributes

#### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
```

/snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- biquad~
- cascade~
- spat5.hlshelf
- spat5.hlshelf~
- spat5.equalizer
- spat5.cascade~
- spat5.filterdesign
- filtergraph~
- spat5.graphiceq~
- spat5.graphiceq
- spat5.eq
- spat5.zplane
- zplane~
- spat5.gammatone
- spat5.octavebank~
- spat5.gammatone
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.complementarybank~
- spat5.cross3~
- spat5.graphiceq2
- spat5.graphiceq3



## h2&gt;spat5.gammatone

## h2&gt;Gammatone filter design

## h3&gt;description

**spat5.gammatone** generates a gammatone filter bank, using IIR filters.

## h3&gt;attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## h3&gt;methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- cascade~
- biquad~
- filtergraph~
- spat5.frequencyresponse
- spat5.equalizer
- spat5.filterdesign
- spat5.hlshelf~
- spat5.hlshelf
- spat5.zplane
- spat5.graphiceq~
- spat5.graphiceq
- spat5.cross3~
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.octavebank~

# spat5.gate~      Route a signal to one of several outlets

## description

**spat5.gate~** is similar to Max/MSP **gate~**.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @outputs [int]

The **outputs** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/output [int]** : set index of open outlet  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front

```

/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- gate~
- selector~
- matrix~
- spat5.selector~
- spat5.routing~
- spat5.routing
- spat5.diagmatrix~
- spat5.multi.connect

## spat5.gopro.decode

## Decode GoPro VR Player packets

## description

spat5.gopro receives JSON packet from Kolor GoPro VR Player, and transcodes it to OSC bundles.

## attributes

## methods

/post/version : print the version in the Max Console  
 /post/version [details] : print detailed version in the Max Console  
 /post/doc : print the help documentation in the Max Console  
 /post/state : print the OSC status in the Max Console  
 /preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
 /preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
 /preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.view`
- `spat5.osc.display`
- `spat5.osc.print`
- `udpsend`
- `udpreceive`

# spat5.graphiceq Graphic equalizer

## description

**spat5.graphiceq** is a control interface for **spat5.graphiceq~**, a graphic EQ.

Reference(s) :

M. Holters and U. Zölzer. Parametric higher-order shelving filters. In Proc. of the 14th European Signal Processing Conference, 2006.

## attributes

### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.



```

/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizableability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.graphiceq~
- spat5.graphiceq2
- spat5.graphiceq3
- spat5.equalizer
- spat5.filterdesign
- cascade~
- spat5.cascade~
- spat5.hlshelf
- spat5.hlshelf~
- spat5.frequencyresponse
- spat5.gammatone
- spat5.octavebank~
- spat5.complementarybank~
- spat5.cross3~
- spat5.eq

- spat5.cascade.inverse
- spat5.cascade.resample
- filtergraph~
- cascade~
- biquad~

# spat5.graphiceq.embedded

# Graphic equalizer

## description

spat5.graphiceq is a control interface for spat5.graphiceq~, a graphic EQ.

Reference(s) :

M. Holters and U. Zölzer. Parametric higher-order shelving filters. In Proc. of the 14th European Signal Processing Conference, 2006.

## attributes

### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the spat5.tuto-initwith.maxpat example for further details.

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or `inspector`; it must be typed directly within the object box.

Have a look at the spat5.tuto-initwith.maxpat example for further details.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the spat5.tuto-initwith.maxpat example for further details.

## methods

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

```

/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.graphiceq~
- spat5.graphiceq2
- spat5.graphiceq3
- spat5.equalizer
- spat5.filterdesign
- cascade~
- spat5.cascade~
- spat5.hlsshelf
- spat5.hlsshelf~
- spat5.frequencyresponse
- spat5.gammatone
- spat5.octavebank~
- spat5.complementarybank~
- spat5.cross3~
- spat5.eq
- spat5.cascade.inverse
- spat5.cascade.resample
- filtergraph~
- cascade~
- biquad~

## spat5.graphiceq2

## Graphic equalizer

### description

**spat5.graphiceq2** is a graphic EQ. It uses a set of 2nd order IIR peaking filters in order to approximate the desired magnitude spectrum at the control frequencies. The number of used 2nd order sections is equal to the number of frequency bands (plus optional high/low shelf filters for extremal bands). The update of the filter coefficients is rather efficient, and be can used in real-time context.

Reference(s) :

R. J. Oliver and J.-M. Jot. Efficient Multi-Band Digital Audio Graphic Equalizer with Accurate Frequency Response Control. In Proc. of the 139th AES Convention, New York, NY, USA, Oct 2015.

### attributes

@initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```
/band/number [int] : set number of frequency bands
/lowshelf [boolean] : enable low-shelf filter for 1st frequency band
/highshelf [boolean] : enable high-shelf filter for last frequency band
/gain/db [number] : set global gain (in dB)
/band/[index]/gain/db [number] : set gain (in dB) for the i-th frequency band
/gains/db [number][number][number]... : set gains (in dB) for each band
/freq/center [number][number][number]... : set center frequencies (in Hz) for the bands. The length of the list should be = (number of bands)
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
```

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.graphiceq
- spat5.graphiceq3
- spat5.equalizer
- spat5.filterdesign
- cascade~
- spat5.cascade~
- filtergraph~
- cascade~
- biquad~
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.eq
- spat5.multi.connect

## spat5.graphiceq3

## Graphic equalizer

### description

**spat5.graphiceq3** is a graphic EQ. It uses a set of 2nd order IIR filters in order to approximate the desired magnitude spectrum at the control frequencies. The number of used 2nd order sections adjustable, allowing for a trade-off between spectral accuracy and cpu cost for rendering. The update of the filter coefficients is cpu intensive, and should be discouraged in real-time context.

Reference(s) :

K. Steiglitz, and L. E. McBride. A Technique for the Identification of Linear Systems. IEEE Transactions on Automatic Control. Vol. AC-10, 1965, pp. 461–464

B. Friedlander, and B. Porat. The Modified Yule-Walker Method of ARMA Spectral Estimation. IEEE Transactions on Aerospace Electronic Systems. Vol. AES-20, Number 2, 1984, pp. 158–173.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```

/band/number [int] : set number of frequency bands
/order [int] : set the filter order (the number of 2nd order section is half the filter order)
/fftsize [int] : set the fft size used for the filter design
/gain/db [number] : set global gain (in dB)
/band/[index]/gain/db [number] : set gain (in dB) for the i-th frequency band
/gains/db [number][number][number]... : set gains (in dB) for each band
/freq/center [number][number][number]... : set center frequencies (in Hz) for the bands. The length of the list should be = (number of bands)
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

```



```

/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.graphiceq
- spat5.graphiceq2
- spat5.equalizer
- spat5.filterdesign
- cascade~
- spat5.cascade~
- filtergraph~
- cascade~
- biquad~
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.eq
- spat5.multi.connect

# spat5.graphiceq~ Graphic equalizer

## description

**spat5.graphiceq~** is a graphic EQ. It can be controlled with **spat5.graphiceq**.

Reference(s) :

M. Holters and U. Zölzer. Parametric higher-order shelving filters. In Proc. of the 14th European Signal Processing Conference, 2006.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/band/number [int] : set number of frequency bands
/cascade/number [int] : set number of 2nd order cascades used in the bandpass bands
/gain/db [number] : set global gain (in dB)
/band/[index]/gain/db [number] : set gain (in dB) for the i-th frequency band
/gains/db [number][number][number]... : set gains (in dB) for each band
/gains [number][number][number]... : set linear gains for each band
/freq/limits [number][number][number]... : set frequency limits (in Hz) for the bands. The length of the list should be (number of bands - 1)
/freq/center [number][number][number]... : set center frequencies (in Hz) for the bands. The length of the list should be = (number of bands)
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
```

or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.graphiceq`
- `spat5.graphiceq2`
- `spat5.graphiceq3`
- `spat5.equalizer`
- `spat5.filterdesign`
- `cascade~`
- `spat5.cascade~`
- `filtergraph~`
- `cascade~`
- `biquad~`
- `spat5.cascade.inverse`
- `spat5.cascade.resample`

- spat5.eq
- spat5.multi.connect

## spat5.granulator~

## Multichannel granular synthesis

### description

**spat5.granulator~** is a multichannel granular synthesis processor.

Reference(s) :

B. Truax. Real-time granular synthesis with a digital signal processor. Computer Music Journal, 12(2):14 – 26, Summer 1988.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @outputs [int]

The **outputs** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/delay/length [number]** : set length of the ring buffer (in msec)  
**/grains/number [int]** : set the maximum number of overlapping grains  
**/grains/gain [number]** : set gain of the grains (linear scale)  
**/grains/gain/db [number]** : set gain of the grains (dB scale)  
**/grains/gain/variation [number]** : set amount of random variation (in **/grains/gain/range [number][number]** : set range of random values for the gain of the grains  
**/grains/gain/min [number]** : set range of random values for the gain of the grains  
**/grains/gain/max [number]** : set range of random values for the gain of the grains  
**/grains/gain/enum** : set enumeration of random values for the gain of the grains  
**/grains/gain/mode [string]** : set randomness mode for the gain of the grains. Possible values: constant, random-variation, random-range, random-enum  
**/grains/speed [number]** : set playback speed of the grains (in **/grains/speed/variation [number]** : set amount of (random) variation (in **/grains/speed/range [number][number]** : set range of random values for the playback speed of the grains  
**/grains/speed/min [number]** : set range of random values for the playback speed of the grains  
**/grains/speed/max [number]** : set range of random values for the playback speed of the grains  
**/grains/speed/enum** : set enumeration of random values for the playback speed of the grains  
**/grains/speed/mode [string]** : set randomness mode for the playback speed of the grains. Possible values: constant, random-variation, random-range, random-enum  
**/grains/position [number]** : set playback position of the grains (in **/grains/duration [number]** : set duration of the grains (in msec)  
**/grains/duration/variation [number]** : set amount of (random) variation (in **/grains/duration/range [number][number]** : set range of random values for the duration of the grains  
**/grains/duration/min [number]** : set range of random values for the duration of the grains  
**/grains/duration/max [number]** : set range of random values for the duration of the grains  
**/grains/duration/enum** : set enumeration of random values for the duration of the grains  
**/grains/duration/mode [string]** : set randomness mode for the duration of the grains. Possible values: constant, random-variation, random-range, random-enum  
**/grains/period [number]** : set time between consecutive grains (in msec)  
**/grains/period/variation [number]** : set amount of (random) variation for time between consecutive grains (in **/grains/attack [number]** : set attack time of the grains (in **/grains/release [number]** : set release time of the grains (in **/grains/direction [string]** : set playback direction of the grains  
**/grains/destination [string]** : set output channel of the grains

/grains/filter/type [string] : set filter type for grains. Possible values: none, random, random-enum, low pass, high pass, band pass, band pass peak, notch, all pass, peaking eq, low shelf, high shelf

/grains/filter/freq [number] : set frequency (in Hz) for grains filtering

/grains/filter/freq/variation [number] : set amount of (random) variation (in /grains/filter/freq/range [number][number] : set range of random values for frequency for grains filtering

/grains/filter/freq/min [number] : set range of random values for frequency for grains filtering

/grains/filter/freq/max [number] : set range of random values for frequency for grains filtering

/grains/filter/freq/enum : set enumeration of random values for frequency for grains filtering

/grains/filter/freq/mode [string] : set randomness mode for frequency for grains filtering. Possible values: constant, random-variation, random-range, random-enum

/grains/filter/q [number] : set resonance for grains filtering

/grains/filter/q/variation [number] : set amount of (random) variation (in /grains/filter/q/range [number][number] : set range of random values for Q for grains filtering

/grains/filter/q/min [number] : set range of random values for Q for grains filtering

/grains/filter/q/max [number] : set range of random values for Q for grains filtering

/grains/filter/q/enum : set enumeration of random values for Q for grains filtering

/grains/filter/q/mode [string] : set randomness mode for Q for grains filtering. Possible values: constant, random-variation, random-range, random-enum

/grains/filter/gain [number] : set gain (in dB) for grains filtering

/grains/filter/gain/variation [number] : set amount of (random) variation (in /grains/filter/gain/range [number][number] : set range of random values for gain for grains filtering

/grains/filter/gain/min [number] : set range of random values for gain for grains filtering

/grains/filter/gain/max [number] : set range of random values for gain for grains filtering

/grains/filter/gain/enum : set enumeration of random values for gain for grains filtering

/grains/filter/gain/mode [string] : set randomness mode for gain for grains filtering. Possible values: constant, random-variation, random-range, random-enum

/delay/clear : brutally clear the ring buffer

/stop : brutally stop all grains currently playing

/freeze [boolean] : freeze the ring buffer i.e. stop recording the incoming samples

/gain/compensation [boolean] : apply an output gain compensation, taken into account the number of overlapping grains

/seed : change the seed for random number generators

/seed [int] : set the seed for random number generators

/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).

/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute

/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).

/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass

/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting

/dsp/post : post various information to the Max console (audio should be turned on)

/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

/dump/dsp/latency : send the processor latency (in samples) through the dump outlet

/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

```

/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- mubu.granular~
- spat5.tapout~
- spat5.delay~
- spat5.multi.connect



# spat5.grids      Grids generator

## description

**spat5.grids** generates a list of positions, for a set of pre-defined grids.

Reference(s) :

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R. S. Womersley. Efficient Spherical Designs with Good Geometric Properties. In: Dick J., Kuo F., Wozniakowski H. (eds) Contemporary Computational Mathematics - A Celebration of the 80th Birthday of Ian Sloan, pp 1243 - 1285. Springer.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/type [string]** : set type of grid  
**/project/tocube [boolean]** : project the grid onto a cube or square  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window

```

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.viewer
- spat5.transform
- spat5.scale
- spat5.translate
- spat5.rotate
- spat5.converter
- spat5.abs2rel
- spat5.converter~
- spat5.speaker.config
- spat5.speaker.layout

## spat5.headphoneeq~

## Headphone equalization

### description

**spat5.headphoneeq~** applies headphone equalization filters.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/type [string]** : set headphone type. Possible values: **akg k1000 closed**, **akg k1000 open**, **akg k141mk2**, **akg k240df**, **akg k240mk2**, **akg k271mk2**, **akg k271studio**, **akg k601**, **akg k701**, **akg k702**, **audiotechnica ath m50**, **beyerdynamic dt250**, **beyerdynamic dt770pro 250ohms**, **beyerdynamic dt880**, **beyerdynamic dt990pro**, **presonus hd7**, **sennheiser hd430**, **sennheiser hd480**, **sennheiser hd560ovationii**, **sennheiser hd565ovation**, **sennheiser hd600**, **sennheiser hd650**, **shure srh940**, **none**

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: **silent**, **minimal**, **normal**, **detailed**

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary encoded OSC file, **'coll'** for human-readable Max coll file (compatible with the **coll** object). **'txt'** is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary encoded OSC file, **'coll'** for human-readable Max coll file (compatible with the **coll** object). **'txt'** is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary encoded OSC file, **'coll'** for human-readable Max coll file (compatible with the **coll** object). **'txt'** is the default file format. If the file extension is not provided, **'txt'** will be used by default. If the destination folder is not provided, the file will be saved in your home folder (**/Users/yourlogin**)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary encoded OSC file, **'coll'** for human-readable Max coll file (compatible with the **coll** object). **'txt'** is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window

**/status/openorclose** : open the status window if it was closed; close it if it was opened

**/status/font/size [number]** : set the font size of the status window

```

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.binaural~
- spat5.hoa.binaural~
- spat5.virtualspeakers~
- spat5.cascade~
- spat5.frequencyresponse
- spat5.frequencyresponse.embedded
- spat5.hoa.binaural~

# spat5.hilbert~ Phase quadrature filter

## description

**spat5.hilbert~** is similar to Max/MSP **hilbert~**.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window

**/status/openorclose** : open the status window if it was closed; close it if it was opened

**/status/font/size [number]** : set the font size of the status window

**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)

**/help** : open the help window and bring it to front

**/help/open** : open the help window and bring it to front

**/help/close** : close the help window

```

/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- [hilbert~](#)
- [spat5.multi.connect](#)



# spat5.hlsshelf Control interface for spat5.hlsshelf~

## description

**spat5.hlsshelf** is a control interface for **spat5.hlsshelf~**, a three band parametric shelving filter with multiple inputs / multiple outputs.

## attributes

### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/G0 [number] : set the global gain (in dB)
/G1 [number] : set the gain (in dB) for low frequencies
/Gm [number] : set the gain (in dB) for medium frequencies
/Gh [number] : set the gain (in dB) for high frequencies
/fl [number] : set the low/med crossover frequency (in Hz)
/fh [number] : set the med/high crossover frequency (in Hz)
/params [number][number][number][number][number][number] : set the filter parameters (G0,G1,Gm,Gh,fl,fh)
/params [number][number][number][number][number] : set the filter parameters (G0,G1,Gm,Gh,fl)
/params [number][number][number][number] : set the filter parameters (G0,G1,Gm,Gh)
/bypass [boolean] : bypass the filter
/mute [boolean] : mute the filter
/title [string] : set title
/title/visible [boolean] : set visibility for the title
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizable
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
```



/window/export/image [string] : export the window as an image file (png or jpeg)  
/post/version : print the version in the Max Console  
/post/version [details] : print detailed version in the Max Console  
/post/doc : print the help documentation in the Max Console  
/post/state : print the OSC status in the Max Console  
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
/status : open the status window and bring it to front  
/status/open : open the status window and bring it to front  
/status/close : close the status window  
/status/openorclose : open the status window if it was closed; close it if it was opened  
/status/font/size [number] : set the font size of the status window  
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
/help : open the help window and bring it to front  
/help/open : open the help window and bring it to front  
/help/close : close the help window  
/help/openorclose : open the help window if it was closed; close it if it was opened  
/help/font/size [number] : set the font size of the help window  
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
/snapshot : open the snapshot window and bring it to front  
/snapshot/open : open the snapshot window and bring it to front  
/snapshot/close : close the snapshot window  
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
/snapshot/font/size [number] : set the font size of the snapshot window  
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
/status/copytoclipboard : copy the status to (the OS) clipboard  
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
/snapshot/deleteall : delete all the snapshots currently in memory  
/snapshot/add : create a new snapshot with the current state  
/snapshot/add [string] : create a new snapshot with the current state, and set its name  
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
/snapshot/[index]/recall : recall the current state from the i-th snapshot  
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
/snapshot/[index]/name [string] : set the name of the i-th snapshot  
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
/snapshot/[index]/delete : delete the i-th snapshot  
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/snapshot/[index]/export [string] : export the i-th snapshot to file  
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
/snapshot/export [string] : export all snapshots to file  
/snapshot/import [string] : import all snapshots from file  
/snapshot/recall/next : recall the next snapshot  
/snapshot/recall/previous : recall the previous snapshot  
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
/snapshot/recall [int] : recall the i-th snapshot  
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
/snapshot/recall/bytitle [string] : recall a snapshot by title/name  
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
/snapshot/lock [boolean] : lock edition of the snapshots  
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.hlshef~
- spat5.hlshef.embedded
- biquad~
- spat5.equalizer
- spat5.cascade~

- spat5.frequencyresponse
- spat5.frequencyresponse.embedded
- spat5.ircamverb
- spat5.oper
- spat5.filterdesign
- filtergraph~
- cascade~
- spat5.zplane
- zplane~
- spat5.gammatone
- spat5.eq
- spat5.octavebank~
- spat5.gammatone
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.complementarybank~
- spat5.cross3~
- spat5.eq

## spat5.hlsshelf.embedded

## Control interface for spat5.hlsshelf~

### description

spat5.hlsshelf is a control interface for `spat5.hlsshelf~`, a three band parametric shelving filter with multiple inputs / multiple outputs.

### attributes

#### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```
/G0 [number] : set the global gain (in dB)
/G1 [number] : set the gain (in dB) for low frequencies
/Gm [number] : set the gain (in dB) for medium frequencies
/Gh [number] : set the gain (in dB) for high frequencies
/f1 [number] : set the low/med crossover frequency (in Hz)
/fh [number] : set the med/high crossover frequency (in Hz)
/params [number] [number] [number] [number] [number] [number] : set the filter parameters (G0,G1,Gm,Gh,f1,fh)
/params [number] [number] [number] [number] [number] : set the filter parameters (G0,G1,Gm,Gh,f)
/params [number] [number] [number] [number] : set the filter parameters (G0,G1,Gm,Gh)
/bypass [boolean] : bypass the filter
/mute [boolean] : mute the filter
/title [string] : set title
/title/visible [boolean] : set visibility for the title
```

### see also

- `spat5.hlsshelf~`
- `spat5.hlsshelf.embedded`
- `biquad~`
- `spat5.equalizer`
- `spat5.cascade~`
- `spat5.frequencyresponse`
- `spat5.frequencyresponse.embedded`
- `spat5.ircamverb`
- `spat5.oper`
- `spat5.filterdesign`
- `filtergraph~`
- `cascade~`
- `spat5.zplane`
- `zplane~`
- `spat5.gammatone`
- `spat5.eq`
- `spat5.octavebank~`
- `spat5.gammatone`
- `spat5.cascade.inverse`
- `spat5.cascade.resample`
- `spat5.complementarybank~`

- spat5.cross3~
- spat5.eq

# spat5.hlsshelf~ Parametric shelving filter

## description

**spat5.hlsshelf~** is a three band parametric shelving filter with multiple inputs / multiple outputs (all channels have the same filters parameters).

The filter characteristics can e.g. be controlled by **spat5.hlsshelf**.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/G0 [number]** : set the global gain (in dB)  
**/G1 [number]** : set the gain (in dB) for low frequencies  
**/Gm [number]** : set the gain (in dB) for medium frequencies  
**/Gh [number]** : set the gain (in dB) for high frequencies  
**/f1 [number]** : set the low/med crossover frequency (in Hz)  
**/fh [number]** : set the med/high crossover frequency (in Hz)  
**/params [number] [number] [number] [number] [number] [number]** : set the filter parameters (G0,G1,Gm,Gh,f1,fh)  
**/params [number] [number] [number] [number] [number]** : set the filter parameters (G0,G1,Gm,Gh,f)  
**/params [number] [number] [number] [number]** : set the filter parameters (G0,G1,Gm,Gh)  
**/crossfade/duration [number]** : set crossfade duration (in msec)  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramp**).  
**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramp [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramp**).  
**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramp [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console

`/preset/load [string]` : load a preset from file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.hlsshelf`
- `biquad~`
- `spat5.equalizer`
- `spat5.cascade~`
- `spat5.frequencyresponse`
- `spat5.filterdesign`
- `cascade~`
- `filtergraph~`
- `spat5.eq`
- `spat5.filterdesign`

- spat5.oper
- spat5.ircamverb~
- spat5.graphiceq~
- spat5.graphiceq
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.octavebank~
- spat5.multi.connect



## spat5.hoa.aformat~

## Ambisonic A-format to B-format conversion

### description

**spat5.hoa.aformat~** transcodes A-format ambisonic signals to B-format signals. A-format represents the 4 signals coming from the capsules of a Soundfield-like microphone (e.g. Soundfield ST-250, Soundfield STS-200, DPA-4, Core Sound TetraMic, Sennheiser Ambeo). These 4 signals must be processed to be converted into a B-format Ambisonic stream conveying the W,X,Y, and Z ambisonic components. The processing involves 1) signal matrixing and 2) components filtering.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/type [string]** : set microphone type  
**/radius [number]** : set distance of each capsule from the center of the tetrahedron (in millimeters)  
**/filtering [boolean]** : enable/disable the filters  
**/highcut [boolean]** : enable/disable the highcut filter  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front

```

/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.decoder~
- spat5.hoa.em32~
- spat5.hoa.em64~
- spat5.hoa.zml~
- spat5.pan~
- spat5.hoa.decoder~
- spat5.hoa.converter~
- spat5.hoa.sorting~
- spat5.hoa.intensity~
- spat5.multi.connect

# spat5.hoa.binaural~

## Transcode HOA stream to binaural

### description

**spat5.hoa.binaural~** transcodes HOA stream to binaural.

### attributes

#### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the *i*-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the *i*-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the *i*-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the *i*-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the *i*-th and *j*-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the *i*-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the *i*-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the *i*-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the *i*-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the *i*-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the *i*-th snapshot

`/snapshot/jump [int]` : immediately recall the *i*-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.hoa.encoder~`
- `spat5.hoa.decoder~`
- `spat5.binaural~`
- `spat5.headphoneeq~`
- `spat5.virtualspeakers~`
- `spat5.pan~`
- `spat5.sofa.loader`
- `spat5.sofa.infos`
- `spat5.multi.connect`

## spat5.hoa.beam~ HOA beamforming

### description

**spat5.hoa.beam~** creates virtual beams steering in various directions, and with adjustable pattern (simple weight-and-sum beamformer). Unlike **spat5.hoa.focus~**, the output of **spat5.hoa.beam~** is a monophonic signal (for each beam).

**spat5.hoa.beam~** can be controlled with **spat5.hoa.beam**.

### attributes

#### @beams [int]

The **beams** attribute represents the number of beamforming voices.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/beam/number [int]** : set the number of beams

**/order [int]** : set HOA order

**/dimension [int]** : set HOA dimension. Possible values: 2, 3

**/norm [string]** : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized

**/beam/[index]/az [number]** : set steering direction for the i-th beam

**/beam/[index]/ae [number][number]** : set steering direction for the i-th beam

**/beam/[index]/pattern [string]** : set directivity pattern for the i-th beam

**/beam/[index]/selectivity [number]** : set selectivity factor (in **/beam/[index]/mute [boolean]** : mute the i-th beam

**/ramp/time [number]** : set ramping time (msec)

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

/dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass

/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting

/dsp/post : post various information to the Max console (audio should be turned on)

/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

/dump/dsp/latency : send the processor latency (in samples) through the dump outlet

/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string] [string] [number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)



## see also

- spat5.hoa.beam
- spat5.hoa.beam.embedded
- spat5.hoa.focus~
- spat5.hoa.focus
- spat5.hoa.encoder~
- spat5.hoa.scope~
- spat5.hoa.warp~
- spat5.hoa.dominance~
- spat5.hoa.mirror~
- spat5.hoa.blur
- spat5.hoa.intensity~
- spat5.hoa.directivity
- spat5.multi.connect



## spat5.hoa.beam

## Beamforming in the HOA domain

## description

**spat5.hoa.beam** is a control interface for **spat5.hoa.beam~**.

## attributes

**@dimension [int]**

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

**@embed [boolean]**

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@initwith [string]**

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@order [int]**

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

**@parameter\_enable [boolean]**

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window

**/status/openorclose** : open the status window if it was closed; close it if it was opened

**/status/font/size [number]** : set the font size of the status window

**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)

**/help** : open the help window and bring it to front

**/help/open** : open the help window and bring it to front

**/help/close** : close the help window

**/help/openorclose** : open the help window if it was closed; close it if it was opened

**/help/font/size [number]** : set the font size of the help window

```

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/zoom [number] : set display zoom (in /zoom/lock [boolean] : enable/disable zooming with the mouse wheel
/radial/scale [string] : set radial scale
/legend/visible [boolean] : set the visibility of the legend
/background/color [color] : set background color
/grid/visible [boolean] : set the visibility of the grid
/grid/color [color] : set grid color
/grid/angulardivisions/number [number] : set the number of angular divisions
/grid/angulardivisions/visible [boolean] : set the visibility of angular divisions
/grid/thickness [number] : set grid thickness
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizable
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- `spat5.hoa.beam~`
- `spat5.hoa.focus~`
- `spat5.hoa.focus`
- `spat5.hoa.focus.embedded`
- `spat5.hoa.encoder~`
- `spat5.hoa.decoder~`
- `spat5.hoa.rotate~`
- `spat5.hoa.optim~`
- `spat5.hoa.blur~`
- `spat5.hoa.directivity`
- `spat5.hoa.directivityshaper`
- `spat5.hoa.display`
- `spat5.hoa.display.embedded`
- `spat5.hoa.plot`

# spat5.hoa.beam.embedded

# Beamforming in the HOA domain

## description

spat5.hoa.beam is a control interface for spat5.hoa.beam~.

## attributes

### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or attrui or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the spat5.tuto-initwith.maxpat example for further details.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via loadbang or loadmess.

Note that the **initwith** attribute cannot be set via message, attrui or inspector; it must be typed directly within the object box.

Have a look at the spat5.tuto-initwith.maxpat example for further details.

### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or attrui or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the spat5.tuto-initwith.maxpat example for further details.

## methods

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

```

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/zoom [number] : set display zoom (in /zoom/lock [boolean] : enable/disable zooming with the mouse wheel)
/radial/scale [string] : set radial scale
/legend/visible [boolean] : set the visibility of the legend
/background/color [color] : set background color
/grid/visible [boolean] : set the visibility of the grid
/grid/color [color] : set grid color
/grid/angulardivisions/number [number] : set the number of angular divisions
/grid/angulardivisions/visible [boolean] : set the visibility of angular divisions
/grid/thickness [number] : set grid thickness

```

## see also

- spat5.hoa.beam~
- spat5.hoa.focus~
- spat5.hoa.focus
- spat5.hoa.focus.embedded
- spat5.hoa.encoder~
- spat5.hoa.decoder~
- spat5.hoa.rotate~
- spat5.hoa.optim~
- spat5.hoa.blur~
- spat5.hoa.directivity
- spat5.hoa.directivityshaper
- spat5.hoa.display
- spat5.hoa.display.embedded
- spat5.hoa.plot

# spat5.hoa.beamix

# Control interface for spat5.hoa.beamix~

## description

**spat5.hoa.beamix** is a GUI for **spat5.hoa.beamix~**.

## attributes

### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```

/order [int] : set HOA order
/dimension [int] : set HOA dimension. Possible values: 2, 3
/bypass [boolean] : global bypass
/mute [boolean] : global mute
/norm [string] : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized
/beam/[index]/mute [boolean] : mute the i-th beam
/beam/[index]/bypass [boolean] : bypass the i-th beam
/beam/[index]/gain/db [number] : set gain for the i-th beam
/beam/[index]/delay [number] : set delay for the i-th beam
/beam/[index]/color [color] : set color for the i-th beam
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)

```



```

/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

```



/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.hoa.beamix~
- spat5.hoa.beam~
- spat5.hoa.beam
- spat5.hoa.beam.embedded
- spat5.hoa.focus~
- spat5.hoa.focus
- spat5.hoa.encoder~
- spat5.hoa.scope~
- spat5.hoa.warp~
- spat5.hoa.dominance~
- spat5.hoa.mirror~
- spat5.hoa.blur
- spat5.hoa.intensity~
- spat5.hoa.directivity
- spat5.equalizer
- spat5.compressor
- spat5.compressor~

## spat5.hoa.beamix.embedded

## Control interface for spat5.hoa.beamix~

### description

spat5.hoa.beamix is a GUI for spat5.hoa.beamix~.

### attributes

#### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or attrui or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the spat5.tuto-initwith.maxpat example for further details.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via loadbang or loadmess.

Note that the **initwith** attribute cannot be set via message, attrui or inspector; it must be typed directly within the object box.

Have a look at the spat5.tuto-initwith.maxpat example for further details.

#### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order} + 1) \times (\text{order} + 1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or attrui or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the spat5.tuto-initwith.maxpat example for further details.

### methods

```
/order [int] : set HOA order
/dimension [int] : set HOA dimension. Possible values: 2, 3
/bypass [boolean] : global bypass
/mute [boolean] : global mute
/norm [string] : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized
/beam/[index]/mute [boolean] : mute the i-th beam
/beam/[index]/bypass [boolean] : bypass the i-th beam
/beam/[index]/gain/db [number] : set gain for the i-th beam
/beam/[index]/delay [number] : set delay for the i-th beam
/beam/[index]/color [color] : set color for the i-th beam
```

### see also

- spat5.hoa.beamix~
- spat5.hoa.beam~
- spat5.hoa.beam
- spat5.hoa.beam.embedded
- spat5.hoa.focus~
- spat5.hoa.focus
- spat5.hoa.encoder~
- spat5.hoa.scope~
- spat5.hoa.warp~

- spat5.hoa.dominance~
- spat5.hoa.mirror~
- spat5.hoa.blur
- spat5.hoa.intensity~
- spat5.hoa.directivity
- spat5.equalizer
- spat5.compressor
- spat5.compressor~

# spat5.hoa.beamix~

# HOA filter bank with spatial effects

## description

**spat5.hoa.beamix~** creates virtual beams steering in various directions, and apply effects to each direction.

## attributes

### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary encoded OSC file, **'coll'** for human-readable Max coll file (compatible with the **coll** object). **'txt'** is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary encoded OSC file, **'coll'** for human-readable Max coll file (compatible with the **coll** object). **'txt'** is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.hoa.beamix`
- `spat5.hoa.beamix.embedded`
- `spat5.hoa.beam~`
- `spat5.hoa.beam`
- `spat5.hoa.beam.embedded`
- `spat5.hoa.focus~`
- `spat5.hoa.focus`
- `spat5.hoa.encoder~`
- `spat5.hoa.scope~`
- `spat5.hoa.warp~`
- `spat5.hoa.dominance~`
- `spat5.hoa.mirror~`
- `spat5.hoa.blur`
- `spat5.hoa.intensity~`
- `spat5.hoa.directivity`

- spat5.equalizer
- spat5.compressor
- spat5.compressor~
- spat5.multi.connect

## spat5.hoa.blur~

## Blur effect in the HOA domain

### description

**spat5.hoa.blur~** implements a technique for controlling the spatial resolution of an Ambisonic sound field while preserving its overall energy. The proposed method allows to transform a stream encoded in N-order Ambisonic to a lower order resolution. The transformation can be continuously operated, indeed simulating fractional order representation of the Ambisonic stream and varying the 'bluriness' of the spatial image.

Reference(s) :

T. Carpentier. Ambisonic spatial blur. In Proc. of the 142nd Convention of the Audio Engineering Society (AES), Berlin, Germany, May 2017.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

### attributes

**@dimension [int]**

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

**@initwith [string]**

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@mc [int]**

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

**@order [int]**

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

**@parameter\_enable [boolean]**

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```
/blur [number] : set blur factor (/tau [number] : set tau factor
/order [int] : set HOA order
/dimension [int] : set HOA dimension. Possible values: 2, 3
/ramp/time [number] : set ramping time (msec)
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically
```



whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

`/dump/dsp/latency` : send the processor latency (in samples) through the dump outlet

`/verbose [string]` : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

`/post/version` : print the version in the Max Console

`/post/version [details]` : print detailed version in the Max Console

`/post/doc` : print the help documentation in the Max Console

`/post/state` : print the OSC status in the Max Console

`/preset/load [string]` : load a preset from file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format. If the file extension is not provided, `.txt` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.hoa.focus~`
- `spat5.hoa.focus`
- `spat5.hoa.focus.embedded`

- spat5.hoa.reduce~
- spat5.hoa.encoder~
- spat5.hoa.decoder~
- spat5.hoa.warp~
- spat5.hoa.dominance~
- spat5.hoa.beam~
- spat5.hoa.beam
- spat5.hoa.optim~
- spat5.hoa.rotate~
- spat5.hoa.scope~
- spat5.hoa.display
- spat5.hoa.display.embedded
- spat5.hoa.intensity~
- spat5.hoa.directivity
- spat5.multi.connect

## spat5.hoa.conv~

## Ambisonic convolution

### description

**spat5.hoa.conv~** performs convolution in the HOA domain.

When spread is 100%, a mono signal is convolved with the HOA-encoded DRIR. This is similar to **spat5.conv~** with a mono input and an HOA-encoded DRIR.

If the input stream is HOA, only its W component is actually used (so, the spatial dimension of the input stream is lost). When spread is 0%, each channel of the input HOA stream is convolved with the W-channel of the DRIR in a 'multi-mono' fashion (so, all spatial effect is lost).

Reference(s) :

J. Daniel. Representation de champs acoustiques, application a la transmission et a la reproduction de scenes sonores complexes dans un contexte multimedia. PhD thesis, Universite de Paris VI, 2001.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

### attributes

**@dimension [int]**

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

**@initwith [string]**

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@mc [int]**

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

**@order [int]**

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order} + 1) \times (\text{order} + 1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

**@parameter\_enable [boolean]**

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/order [int]** : set HOA order

**/dimension [int]** : set HOA dimension. Possible values: 2, 3

**/clear** : clear impulse response (all channels)

**/info** : post various information to the Max console

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass

/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting

/dsp/post : post various information to the Max console (audio should be turned on)

/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

/dump/dsp/latency : send the processor latency (in samples) through the dump outlet

/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.conv~
- spat5.hoa.decoder~
- spat5.hoa.focus~
- spat5.hoa.focus
- spat5.hoa.encoder~
- spat5.hoa.decoder~
- spat5.hoa.rotate~
- spat5.hoa.optim~
- spat5.hoa.blur~
- spat5.hoa.display
- spat5.hoa.display.embedded
- spat5.hoa.scope~
- spat5.hoa.reduce~
- spat5.hoa.intensity~
- spat5.multi.connect

## spat5.hoa.converter~

## Ambisonic normalization converter

### description

Higher-Order Ambisonic (HOA) is not standardized, and various conventions exist for the scaling of ambisonic components. Popular normalization schemes are SN3D, N3D, FuMa, etc.

**spat5.hoa.converter~** allows to convert between HOA normalizations.

This is especially useful if you need to import/export data from/to spat and another ambisonic system.

Reference(s) :

T. Carpentier. Normalization schemes in Ambisonic: does it matter? In Proc. of the 142nd Convention of the Audio Engineering Society (AES), Berlin, Germany, May 2017.

J. Daniel. Representation de champs acoustiques, application a la transmission et a la reproduction de scenes sonores complexes dans un contexte multimedia. PhD thesis, Université de Paris VI, 2001.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

### attributes

#### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is (2 x order + 1).

For 3D Ambisonic, the number of components is (order+1) x (order+1).

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/norm/input [string]** : set input normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized

**/norm/output [string]** : set output normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized

**/order [int]** : set HOA order

**/dimension [int]** : set HOA dimension. Possible values: 2, 3

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the

second argument specifies the length (in msec) of the ramp.

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass  
 /dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
 /dsp/automute/attack [number] : set the duration (in seconds) before auto-muting  
 /dsp/post : post various information to the Max console (audio should be turned on)  
 /dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
 /dump/dsp/latency : send the processor latency (in samples) through the dump outlet  
 /verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
 /post/version : print the version in the Max Console  
 /post/version [details] : print detailed version in the Max Console  
 /post/doc : print the help documentation in the Max Console  
 /post/state : print the OSC status in the Max Console  
 /preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
 /preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
 /preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)



## see also

- `spat5.hoa.sorting~`
- `spat5.pan~`
- `spat5.decoder~`
- `spat5.hoa.encoder~`
- `spat5.hoa.decoder~`
- `spat5.hoa.aformat~`
- `spat5.hoa.downscale~`
- `spat5.multi.connect`

# spat5.hoa.decoder~ Ambisonic decoder

## description

**spat5.hoa.decoder~** decodes an Ambisonic (HOA) stream for a given loudspeaker array.

Various decoding methods are proposed:

- Direct-Sampling decoder, also referred to as the Sampling Ambisonic Decoder (SAD)
- Energy-Preserving Ambisonic decoder (EPAD), which is the default in Spat
- Mode-Matching Ambisonic decoder (MMAD)
- All-Round Ambisonic decoder (AllRAD)
- Improved All-Round Ambisonic decoder (AllRAD+)
- All-Round alternative for panning-invariant loudness (AllRAD2)
- Constant angular Spread Ambisonic decoder (CSAD)
- Most VBAP-like Ambisonic decoder (MVLAD)
- Regularized Mode-Matching Ambisonic decoder (RMMAD), aka Energy-Limited Mode-Matching Ambisonic decoder

Please note that HOA components in **spat5.hoa.decoder~** are ordered with the ACN sorting scheme (cf **spat5.hoa.sorting~** for further information)

The 'sampling ambisonic decoding' (SAD) is the simplest decoding. It samples the virtual panning function at the loudspeaker directions. SAD is optimal for loudspeakers arranged as t-design layouts, with  $t \geq (2N+1)$  ( $N$  being the Ambisonic order). Typically, the SAD should only be used for 2D loudspeaker layouts, i.e. arranged regularly in a circle. Avoids this decoder for 3D setups.

The 'mode-matching decoder' (MMAD) is suitable for both 2D and 3D. It is based on a pseudo-inverse of the re-encoding matrix. MMAD is well-behaved for regular loudspeaker arrangements. It can also give good results with slightly irregular setups. However it can become unstable with strongly irregular setups, i.e. it can completely blow up the speaker feeds. So, be careful. With the '/info' message, you obtain the conditioning number of MMAD. This number gives you an estimate of how well-balanced the system is. A conditioning number close to 0 dB is excellent. Values less than 10 dB are usually quite acceptable. With values higher than 20 dB, the decoding can become problematic (or dangerous).

The 'regularized-mode-matching decoder' (RMMAD) is somehow similar to MMAD, however it uses a regularization factor for stabilization of the pseudo-inverse. This regularization factor (alpha) varies from 0% to 100%. A value of 0% provides results similar to MMAD. A value of 100% generates even energy distribution, i.e. results similar to EPAD. Intermediate values of alpha allow to 'blend' MMAD and EPAD.

EPAD and AllRAD are other HOA decoding methods suitable for 2D and 3D HOA, and they can cope with any kind of loudspeaker arrangement. These decoding methods always work, as soon as there are enough loudspeakers; they are always feasible and by nature numerically stable.

EPAD uses a regularized matrix inversion such that the decoded energy is preserved even with non-uniformly arranged arrays (and even for directions with only sparse loudspeaker coverage). EPAD is the default method in spat5 (and the one we usually recommend).

'All-round Ambisonic decoding' (AllRAD) is designed in two steps. First, an optimal virtual loudspeaker layout using t-design arrangement is considered (for which the SAD is optimal); Secondly, the signals of these virtual loudspeakers are mapped to the real loudspeakers via VBAP.

'Improved All-Round Ambisonic Decoding' (AllRAD+) combines AllRAD and SAD. Constant energy that is achieved for the idealized virtual loudspeaker setup in AllRAD is corrupted by the VBAP stage as, per loudspeaker pair, all virtual sources are superimposed linearly instead of energetically. The prevailing linear superposition increases the energy wherever the loudspeaker spacing is large. Roughly, at such directions AllRAD doubles the energy, whereas it is halved at directions with dense loudspeaker spacing. Conversely, SAD might lose all energy where the loudspeaker spacing is large and roughly doubles it where the loudspeaker spacing is dense. AllRAD+ tries to solve this issue by combining (i.e. mixing) SAD and AllRAD. The loudness variation of AllRAD+ is competitive with EPAD and its angular mapping resembles AllRAD.

The 'Constant angular Spread Ambisonic decoder' (CSAD) calculates an ambisonic decoding matrix providing a nearly constant angular spread across source directions while maintaining a constant energy and very low energy-vector direction mismatch. The computed HOA decoding matrix optimally fits the MDIP (Multiple-Direction Intensity Panning) gains corresponding to several virtual source directions. This typically provides energy vectors that point in the desired direction while having a constant norm.

The 'Most VBAP-like decoder (MVLAD)' was proposed by Epain. MVLAD minimizes the squared deviation to gains calculated with VBAP. It essentially uses the same approach as AllRAD but using MMAD (instead of SAD) for mapping the virtual speakers. With t-design virtual speakers, the MMAD is well-behaved, and Zotter et al. have shown that MVLAD is equivalent to AllRAD.

### Reference(s) :

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F. Zotter, M. Frank, and H. Pomberger. Comparison of energy-preserving and all-round Ambisonic decoders. In Proc. the Fortschritte der Akustik, AIA-DAGA, March 2013.

J. Daniel. Representation de champs acoustiques, application a la transmission et a la reproduction de scenes sonores complexes dans un contexte multimedia. PhD thesis, Université de Paris VI, 2001.

F. Zotter and M. Frank. All-round ambisonic panning and decoding. Journal of the Audio Engineering Society, 60(10):807 – 820, 2012.

N. Epain, C. Jin, and F. Zotter. Ambisonic decoding with constant angular spread. *Acta Acustica united with Acustica*, 100:928 – 936, 2014.

F. Zotter, M. Frank. *Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality*. Springer, 2019.

F. Zotter, H. Pomberger, and M. Noisternig. Ambisonic decoding with and without mode-matching: A case study using the hemisphere. In *Proc. of the 2nd International Symposium on Ambisonics and Spherical Acoustics*, Paris, France, May 2010.

F. Zotter, M. Frank, and A. Sontacchi. The virtual t-design ambisonics-rig using VBAP. In *Proc. of the 1st EAA-EuoRegio 2010 Congress on Sound and Vibration*, Ljubljana, Slovenia, Sept 2010.

F. Zotter, M. Frank. Ambisonic decoding with panning-invariant loudness on small layouts (AllRAD2). In *Proc. of the AES 144th Convention*, Milan, Italy, May 2018.

A. J. Heller, R. Lee, and E. M. Benjamin. Is My Decoder Ambisonic? In *Proc. of the 125th Convention of Audio Engineering Society (AES)*, San Francisco, CA, USA, Oct 2008.

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A. J. Heller, R. Lee, and E. M. Benjamin. A Toolkit for the Design of Ambisonic Decoders. In *Proc. of the Linux Audio Conference (LAC)*, Stanford, California, USA, April 2012.

D. Scaini and D. Arteaga. Decoding of Higher Order Ambisonics to Irregular Periphonic Loudspeaker Arrays. In *Proc. of the 55th AES Conference*, Helsinki, Finland, Aug 2014.

D. Arteaga. An Ambisonics Decoder for Irregular 3-D Loudspeaker Arrays. In *Proc. of the 134th AES Convention*, Rome, Italy, May 2013.

H. Pomberger and F. Zotter. Ambisonic panning with constant energy constraint. In *Proc of the 38th German Annual Conference on Acoustics (DAGA)*, Darmstadt, Germany, March 2012.

J.-M. Batke and F. Keiler. Using VBAP-Derived Panning Functions for 3D Ambisonics Decoding. In *Proc. of the 2nd International Symposium on Ambisonics and Spherical Acoustics*, Paris, France, May 2010.

## attributes

### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @outputs [int]

The **outputs** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

@parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/decoding/type [string] : set the decoding type
/speakers/number [int] : set the number of loudspeakers
/speakers/aed [nnnn...] : set the list of speaker coordinates (with aed format)
/speakers/xyz [nnnn...] : set the list of speaker coordinates (with xyz format)
/speakers/ade [nnnn...] : set the list of speaker coordinates (with ade format)
/speakers/xy [nnnn...] : set the list of speaker coordinates (with xy format)
/speakers/ae [nnnn...] : set the list of speaker coordinates (with ae format)
/speaker/[index]/aed [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)
/speaker/[index]/ade [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)
/speaker/[index]/xyz [number][number][number] : set the position of the i-th loudspeaker using cartesian coordinates
/speaker/[index]/xy [number][number] : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)
/speaker/[index]/ae [number][number] : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1)
/speaker/[index]/az [number] : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)
/norm [string] : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized
/order [int] : set HOA order
/dimension [int] : set HOA dimension. Possible values: 2, 3
/method [string] : set HOA decoder method. Possible values: direct-sampling, mode-matching, regularized-mode-matching, energy-preserving, all-rad, all-rad2, all-radknn, allrad+, mvlad, csad, no decoding
/type [string] : set HOA optimization type. Possible values: basic, in-phase, maxre, basic-maxre, maxre-inphase, inphase-maxre
/crossover [number] : set HOA crossover frequency (Hz) for dual band decoding
/powercompensation [boolean] : enable power compensation i.e. diffuse field energy normalization (for HOA decoder)
/phantom/zenith [boolean] : insert a phantom loudspeaker at the zenith (for HOA decoder)
/phantom/nadir [boolean] : insert a phantom loudspeaker at the nadir (for HOA decoder)
/format [string] : set coordinate format used in the status window
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
```

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.hoa.encoder~
- spat5.decoder~
- spat5.pan~
- spat5.hoa.converter~
- spat5.hoa.sorting~
- spat5.hoa.optim~
- spat5.hoa.rotate~
- spat5.hoa.focus
- spat5.hoa.focus~
- spat5.hoa.blur~
- spat5.panner.metrics
- spat5.hoa.reduce~
- spat5.hoa.shelving
- spat5.hoa.warp~
- spat5.hoa.dominance~
- spat5.hoa.beam~
- spat5.virtualspeakers~
- spat5.hoa.binaural~
- spat5.hoa.aformat~
- spat5.hoa.scope~
- spat5.hoa.intensity~
- spat5.hoa.downscale~
- spat5.hoa.directivity
- spat5.hoa.equivalentorder
- spat5.multi.connect

# spat5.hoa.directivity

# HOA Directivity patterns

## description

**spat5.hoa.directivity** synthesizes directivity patterns in the HOA domain.

Reference(s) :

B. Rafaely. Fundamentals of Spherical Array Processing - Second edition. Springer, 2019.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

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T. Carpentier, O. Warusfel, and J.-M. Jot. Software Tools for Flexible Control of Radiation Synthesis. In Proc. of the 2nd International Conference on Immersive and 3D Audio (I3DA), Bologna, Italy, September 2023.

## attributes

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```

/order [int] : set HOA order
/dimension [int] : set HOA dimension. Possible values: 2, 3
/pattern [string] : set directivity pattern
/selectivity [number] : set selectivity factor (in /direction/az [number] : set steering direction
/query/az [number] : query the resulting (linear) gain in a given direction
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

```

`/status/copytoclipboard` : copy the status to (the OS) clipboard  
`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.  
`/snapshot/deleteall` : delete all the snapshots currently in memory  
`/snapshot/add` : create a new snapshot with the current state  
`/snapshot/add [string]` : create a new snapshot with the current state, and set its name  
`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)  
`/snapshot/[index]/recall` : recall the current state from the i-th snapshot  
`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)  
`/snapshot/[index]/name [string]` : set the name of the i-th snapshot  
`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots  
`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names  
`/snapshot/[index]/delete` : delete the i-th snapshot  
`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard  
`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
`/snapshot/[index]/export [string]` : export the i-th snapshot to file  
`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file  
`/snapshot/export [string]` : export all snapshots to file  
`/snapshot/import [string]` : import all snapshots from file  
`/snapshot/recall/next` : recall the next snapshot  
`/snapshot/recall/previous` : recall the previous snapshot  
`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)  
`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)  
`/snapshot/recall [int]` : recall the i-th snapshot  
`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)  
`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name  
`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.hoa.focus`
- `spat5.hoa.warp~`
- `spat5.hoa.dominance~`
- `spat5.hoa.encoder~`
- `spat5.hoa.decoder~`
- `spat5.hoa.rotate~`
- `spat5.hoa.beam`
- `spat5.hoa.beam~`
- `spat5.hoa.optim~`
- `spat5.hoa.blur~`
- `spat5.hoa.display`
- `spat5.hoa.display.embedded`
- `spat5.hoa.reduce~`
- `spat5.hoa.intensity~`
- `spat5.hoa.directivity`
- `spat5.multi.connect`



# spat5.hoa.directivityshaper spherical beampatterns

## Design cardioid-like, fractional-order,

### description

**spat5.hoa.directivityshaper** generates cardioid-like, fractional-order, spherical beampatterns.

Reference(s) :

T. Carpentier. Spherical beampatterns with fractional orders. In Proc. of the Forum Acusticum, 10th Convention of the European Acoustics Association (EAA), Torino, Italy, September 2023.

T. Carpentier, O. Warusfel, and J.-M. Jot. Software Tools for Flexible Control of Radiation Synthesis. In Proc. of the 2nd International Conference on Immersive and 3D Audio (I3DA), Bologna, Italy, September 2023.

### attributes

#### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order} + 1) \times (\text{order} + 1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

`/order [int]` : set HOA order

`/dimension [int]` : set HOA dimension. Possible values: 2, 3

`/norm [string]` : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized

`/beam/number [int]` : set number of beams

`/beam/[index]/shape/ad [number][number]` : set shape of the i-th beam

`/beam/[index]/direction/ad [number][number]` : set steering direction of the i-th beam

`/post/version` : print the version in the Max Console

`/post/version [details]` : print detailed version in the Max Console

`/post/doc` : print the help documentation in the Max Console

`/post/state` : print the OSC status in the Max Console

`/preset/load [string]` : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

/window/title [string] : set the window title (in the window titlebar)

/window/visible [boolean] : set the window visibility

/window/moveable [boolean] : set the window movability

/window/resizable [boolean] : set the window resizability

/window/enable [boolean] : enable/disable the window

/window/background/color [color] : set the window background color

/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency))

/window/fullscreen [boolean] : enable/disable fullscreen mode

/window/minimise [boolean] : minimize the window

/window/open : open the window (and bring it to front)

/window/close : close the window

/window/openorclose : open the window if it was closed; close it if it was opened

/window/size [number][number] : set the window size (width, height) (in pixels)

/window/width [number] : set the window width (in pixels)

/window/height [number] : set the window height (in pixels)

/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)

/window/topleft [number][number] : set the window top left position (in pixels)

/window/centre : open the window, centering it on the screen

/window/rendering/engine [string] : set the graphical rendering engine of the window

/window/fps/visible [boolean] : display the FPS performances of the window  
 /window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)  
 /window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)  
 /window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)  
 /window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)  
 /window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)  
 /window/export/image [string] : export the window as an image file (png or jpeg)

## see also

- spat5.hoa.directivity
- spat5.hoa.focus~
- spat5.hoa.encoder~
- spat5.hoa.decoder~
- spat5.hoa.rotate~
- spat5.hoa.optim~
- spat5.hoa.blur~
- spat5.hoa.beam
- spat5.hoa.beam~
- spat5.hoa.directivity
- spat5.hoa.display
- spat5.hoa.display.embedded

# spat5.hoa.directivityshaper.embedded order, spherical beampatterns

## Design cardioid-like, fractional-

### description

spat5.hoa.directivityshaper generates cardioid-like, fractional-order, spherical beampatterns.

#### Reference(s) :

T. Carpentier. Spherical beampatterns with fractional orders. In Proc. of the Forum Acusticum, 10th Convention of the European Acoustics Association (EAA), Torino, Italy, September 2023.

T. Carpentier, O. Warusfel, and J.-M. Jot. Software Tools for Flexible Control of Radiation Synthesis. In Proc. of the 2nd International Conference on Immersive and 3D Audio (I3DA), Bologna, Italy, September 2023.

### attributes

#### @dimension [int]

The `dimension` attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or `attrui` or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @order [int]

The `order` attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order} + 1) \times (\text{order} + 1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or `attrui` or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

/order [int] : set HOA order

/dimension [int] : set HOA dimension. Possible values: 2, 3

/norm [string] : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized

/beam/number [int] : set number of beams

/beam/[index]/shape/ad [number][number] : set shape of the i-th beam

/beam/[index]/direction/ad [number][number] : set steering direction of the i-th beam

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the *i*-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the *i*-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the *i*-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the *i*-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the *i*-th and *j*-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the *i*-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the *i*-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the *i*-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the *i*-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the *i*-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the *i*-th snapshot

`/snapshot/jump [int]` : immediately recall the *i*-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.hoa.directivity`
- `spat5.hoa.focus~`
- `spat5.hoa.encoder~`
- `spat5.hoa.decoder~`
- `spat5.hoa.rotate~`
- `spat5.hoa.optim~`
- `spat5.hoa.blur~`
- `spat5.hoa.beam`
- `spat5.hoa.beam~`
- `spat5.hoa.directivity`
- `spat5.hoa.display`
- `spat5.hoa.display.embedded`

## spat5.hoa.display

## Spherical harmonics visualization

### description

**spat5.hoa.display** displays a 2D representation of a linear combination of spherical harmonics.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or `inspector`; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```

/dimension [int] : set HOA dimension
/order [int] : set HOA order
/norm [string] : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized
/pattern/color [color] : set pattern color
/pattern/color2 [color] : set pattern color
/pattern/fill [boolean] : fill pattern
/pattern/stroke/color [color] : set pattern stroke color
/pattern/stroke/color2 [color] : set pattern stroke color
/pattern/stroke/thickness [number] : set pattern stroke thickness
/zoom [number] : set display zoom (in /zoom/lock [boolean] : enable/disable zooming with the mouse wheel
/radial/scale [string] : set radial scale
/legend/visible [boolean] : set the visibility of the legend
/background/color [color] : set background color
/grid/visible [boolean] : set the visibility of the grid
/grid/color [color] : set grid color
/grid/angulardivisions/number [number] : set the number of angular divisions
/grid/angulardivisions/visible [boolean] : set the visibility of angular divisions
/grid/thickness [number] : set grid thickness
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front

```



```

/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.hoa.directivity
- spat5.hoa.directivityshaper
- spat5.hoa.focus
- spat5.hoa.focus~
- spat5.hoa.encoder~
- spat5.hoa.decoder~



- spat5.hoa.rotate~
- spat5.hoa.optim~
- spat5.hoa.blur~
- spat5.hoa.rotate
- spat5.hoa.plot
- spat5.hoa.beam
- spat5.hoa.beam~

# spat5.hoa.display.embedded

# Spherical harmonics visualization

## description

spat5.hoa.display displays a 2D representation of a linear combination of spherical harmonics.

## attributes

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```

/dimension [int] : set HOA dimension
/order [int] : set HOA order
/norm [string] : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized
/pattern/color [color] : set pattern color
/pattern/color2 [color] : set pattern color
/pattern/fill [boolean] : fill pattern
/pattern/stroke/color [color] : set pattern stroke color
/pattern/stroke/color2 [color] : set pattern stroke color
/pattern/stroke/thickness [number] : set pattern stroke thickness
/zoom [number] : set display zoom (in /zoom/lock [boolean] : enable/disable zooming with the mouse wheel
/radial/scale [string] : set radial scale
/legend/visible [boolean] : set the visibility of the legend
/background/color [color] : set background color
/grid/visible [boolean] : set the visibility of the grid
/grid/color [color] : set grid color
/grid/angulardivisions/number [number] : set the number of angular divisions
/grid/angulardivisions/visible [boolean] : set the visibility of angular divisions
/grid/thickness [number] : set grid thickness
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front

```

```

/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.hoa.directivity
- spat5.hoa.directivityshaper
- spat5.hoa.focus
- spat5.hoa.focus~
- spat5.hoa.encoder~
- spat5.hoa.decoder~
- spat5.hoa.rotate~
- spat5.hoa.optim~
- spat5.hoa.blur~
- spat5.hoa.rotate
- spat5.hoa.plot
- spat5.hoa.beam
- spat5.hoa.beam~

## spat5.hoa.dominance~

## Ambisonic dominance effect

### description

**spat5.hoa.dominance~** applies a dominance effect to a 1st order Ambisonic stream.

Reference(s) :

J. Daniel. Representation de champs acoustiques, application a la transmission et a la reproduction de scenes sonores complexes dans un contexte multimedia. PhD thesis, Université de Paris VI, 2001.

M. A. Gerzon, and G. J. Barton. Ambisonic Decoders for HDTV. In Proc. of the 92nd Convention of Audio Engineering Society (AES), Vienna, Austria, March 1992.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

### attributes

**@dimension [int]**

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

**@initwith [string]**

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@mc [int]**

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

**@parameter\_enable [boolean]**

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/norm [string]** : set normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized

**/order [int]** : set HOA order

**/dimension [int]** : set HOA dimension. Possible values: 2, 3

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

`/preset/load [string]` : load a preset from file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.hoa.warp~`
- `spat5.hoa.focus~`
- `spat5.hoa.blur~`
- `spat5.decoder~`
- `spat5.hoa.encoder~`
- `spat5.hoa.decoder~`
- `spat5.hoa.aformat~`
- `spat5.hoa.scope~`
- `spat5.hoa.beam~`
- `spat5.hoa.intensity~`

- spat5.hoa.directivity
- spat5.multi.connect

## spat5.hoa.downscale~

## Downscale 3D HOA to 2D

### description

**spat5.hoa.downscale~** downscales 3D HOA stream to 2D HOA.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most **spat5** DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/order [int]** : set HOA order

**/norm [string]** : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary



encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.hoa.reduce~
- spat5.hoa.encoder~
- spat5.hoa.warp~
- spat5.hoa.decoder~
- spat5.hoa.focus~
- spat5.hoa.focus
- spat5.hoa.blur~
- spat5.hoa.display
- spat5.hoa.display.embedded
- spat5.hoa.scope~
- spat5.hoa.beam~
- spat5.hoa.beam
- spat5.hoa.directivity
- spat5.multi.connect

## spat5.hoa.em32~

## Eigenmike em32 encoding

### description

**spat5.hoa.em32~** encodes signals from an Eigenmike microphone (MH acoustics) to the HOA domain.

Reference(s) :

J. Daniel and S. Moreau. Further Study of Sound Field Coding with Higher Order Ambisonics. In Proc. of the 116th Convention of the Audio Engineering Society (AES), Berlin, Germany, May 2004.

J. Daniel. Spherical arrays for capturing 3D sound fields: Prototype measurements versus analytical models. In Proc. of the 19th International Congress on Acoustics (ICA), Madrid, 2007.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is (2 x order + 1).

For 3D Ambisonic, the number of components is (order+1) x (order+1).

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/norm [string]** : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized

**/mode [string]** : set encoding mode

**/regularization/type [string]** : set type of regularization for filters

**/regularization/type [number]** : set regularization factor (dB) for filters

**/filtering [boolean]** : enable/disable encoding filter

**/highcut [number]** : cutoff frequency for high-cut filter (Hz)

**/export/filters [string]** : export filters to audio file

**/export/filters** : export filters to audio file (in the home directory)

**/export/matrix [string]** : export encoding matrix

**/export/matrix** : export encoding matrix (in the home directory)

**/compensation [boolean]** : apply energy compensation (so that the different methods are somehow comparable)

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting  
 /dsp/post : post various information to the Max console (audio should be turned on)  
 /dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
 /dump/dsp/latency : send the processor latency (in samples) through the dump outlet  
 /verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
 /post/version : print the version in the Max Console  
 /post/version [details] : print detailed version in the Max Console  
 /post/doc : print the help documentation in the Max Console  
 /post/state : print the OSC status in the Max Console  
 /preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
 /preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
 /preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- [spat5.hoa.em64~](#)
- [spat5.hoa.encoder~](#)
- [spat5.hoa.decoder~](#)
- [spat5.hoa.aformat~](#)
- [spat5.hoa.sorting~](#)
- [spat5.hoa.converter~](#)
- [spat5.hoa.binaural~](#)
- [spat5.hoa.zm1~](#)
- [spat5.hoa.scope~](#)
- [spat5.hoa.beam~](#)
- [spat5.hoa.intensity~](#)
- [spat5.hoa.directivity](#)
- [spat5.multi.connect](#)

## spat5.hoa.em64~

## Eigenmike em64 encoding

### description

**spat5.hoa.em64~** encodes signals from an Eigenmike em64 microphone (MH acoustics) to the HOA domain.

Reference(s) :

J. Daniel and S. Moreau. Further Study of Sound Field Coding with Higher Order Ambisonics. In Proc. of the 116th Convention of the Audio Engineering Society (AES), Berlin, Germany, May 2004.

J. Daniel. Spherical arrays for capturing 3D sound fields: Prototype measurements versus analytical models. In Proc. of the 19th International Congress on Acoustics (ICA), Madrid, 2007.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is (2 x order + 1).

For 3D Ambisonic, the number of components is (order+1) x (order+1).

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/norm [string]** : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized  
**/mode [string]** : set encoding mode  
**/regularization/type [string]** : set type of regularization for filters  
**/regularization/type [string]** : set regularization factor (dB) for filters  
**/filtering [boolean]** : enable/disable encoding filter  
**/highcut [number]** : cutoff frequency for high-cut filter (Hz)  
**/export/filters [string]** : export filters to audio file  
**/export/filters** : export filters to audio file (in the home directory)  
**/export/matrix [string]** : export encoding matrix  
**/export/matrix** : export encoding matrix (in the home directory)  
**/compensation [boolean]** : apply energy compensation (so that the different methods are somehow comparable)  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting  
 /dsp/post : post various information to the Max console (audio should be turned on)  
 /dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
 /dump/dsp/latency : send the processor latency (in samples) through the dump outlet  
 /verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
 /post/version : print the version in the Max Console  
 /post/version [details] : print detailed version in the Max Console  
 /post/doc : print the help documentation in the Max Console  
 /post/state : print the OSC status in the Max Console  
 /preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
 /preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
 /preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- [spat5.hoa.em32~](#)
- [spat5.hoa.encoder~](#)
- [spat5.hoa.decoder~](#)
- [spat5.hoa.aformat~](#)
- [spat5.hoa.sorting~](#)
- [spat5.hoa.converter~](#)
- [spat5.hoa.binaural~](#)
- [spat5.hoa.zm1~](#)
- [spat5.hoa.scope~](#)
- [spat5.hoa.beam~](#)
- [spat5.hoa.intensity~](#)
- [spat5.hoa.directivity](#)
- [spat5.multi.connect](#)



# spat5.hoa.encoder~ HOA encoder

## description

**spat5.hoa.encoder~** generates Higher-Order Ambisonic (HOA) encoded signals.

HOA signals cannot be directly played-back; they need to be decoded e.g. with **spat5.hoa.decoder~**.

Please note that HOA components in **spat5.hoa.encoder~** are ordered with the ACN sorting scheme (cf **spat5.hoa.sorting~** for further information).

**spat5.hoa.encoder~** is similar to **spat5.pan~** operating with `/panning/type hoa2d` or `/panning/type hoa3d`.

## attributes

### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @inputs [int]

The **inputs** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```

/source/[index]/mute [boolean] : mute the i-th source
/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates
/source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)
/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)
/source/[index]/xy_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged
/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged
/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged
/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged
/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)
/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)
/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)

```

```

/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)
/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged
/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged
/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged
/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged
/source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged
/sources/aed [nnnn...] : set the list of source coordinates (with aed format)
/sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)
/sources/ade [nnnn...] : set the list of source coordinates (with ade format)
/sources/xy [nnnn...] : set the list of source coordinates (with xy format)
/sources/ae [nnnn...] : set the list of source coordinates (with ae format)
/norm [string] : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized
/order [int] : set HOA order
/dimension [int] : set HOA dimension. Possible values: 2, 3
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second
argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see
/dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the
second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically
whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

```

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.pan~
- spat5.viewer
- spat5.hoa.decoder~
- spat5.decoder~
- spat5.hoa.sorting~
- spat5.hoa.converter~
- spat5.hoa.rotate~
- spat5.hoa.focus
- spat5.hoa.focus~
- spat5.hoa.blur~
- spat5.hoa.reduce~
- spat5.hoa.warp~
- spat5.hoa.dominance~
- spat5.hoa.sorting~
- spat5.hoa.converter~
- spat5.hoa.display
- spat5.hoa.display.embedded
- spat5.hoa.scope~
- spat5.hoa.aformat~
- spat5.hoa.binaural~
- spat5.panner.metrics
- spat5.hoa.map
- spat5.hoa.em32~
- spat5.hoa.em64~
- spat5.hoa.zm1~
- spat5.hoa.intensity~
- spat5.trajectories
- spat5.hoa.equivalentorder
- spat5.multi.connect

# spat5.hoa.equivalentorder

# HOA Equivalent Order

## description

**spat5.hoa.equivalentorder** estimates the equivalent order of a loudspeaker setup.

Reference(s) :

F. Zotter and M. Frank. All-round ambisonic panning and decoding. Journal of the Audio Engineering Society, 60(10):807 – 820, 2012.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

## attributes

@initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot

```

```

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.hoa.decoder~
- spat5.multi.connect

## spat5.hoa.focus

## Virtual beamforming in the HOA domain

### description

**spat5.hoa.focus** is a control interface for **spat5.hoa.focus~**.

### attributes

#### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name



```

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.hoa.focus~
- spat5.hoa.encoder~
- spat5.hoa.decoder~
- spat5.hoa.rotate~
- spat5.hoa.optim~
- spat5.hoa.blur~
- spat5.hoa.beam
- spat5.hoa.beam~
- spat5.hoa.directivity
- spat5.hoa.directivityshaper
- spat5.hoa.display
- spat5.hoa.display.embedded
- spat5.hoa.plot



## spat5.hoa.focus~

## Virtual beamforming in the HOA domain

### description

**spat5.hoa.focus~** creates virtual beams steering in various directions, and with adjustable selectivity pattern. This allows to emphasize certain area of the sound field.

**spat5.hoa.focus~** can be controlled with **spat5.hoa.focus**.

Reference(s) :

M. Kronlachner and F. Zotter. Warping and Directional Loudness Manipulation Tools for Ambisonics. In Proc. of the EAA Symposium on Auralization and Ambisonics, Berlin, Germany, April 2014.

M. Kronlachner and F. Zotter. Spatial transformations for the enhancement of Ambisonic recordings. In Proc. of the 2nd International Conference on Spatial Audio (ICSA), Erlangen, Germany, February 2014.

M. Kronlachner. Spatial transformations for the alteration of ambisonic recordings. Master's thesis, Institute of Electronic Music and Acoustics, Graz, June 2014.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

### attributes

#### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting

/dsp/post : post various information to the Max console (audio should be turned on)

/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

/dump/dsp/latency : send the processor latency (in samples) through the dump outlet

/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.hoa.focus`
- `spat5.hoa.warp~`
- `spat5.hoa.dominance~`
- `spat5.hoa.encoder~`
- `spat5.hoa.decoder~`
- `spat5.hoa.rotate~`
- `spat5.hoa.beam`
- `spat5.hoa.beam~`
- `spat5.hoa.optim~`
- `spat5.hoa.blur~`
- `spat5.hoa.display`
- `spat5.hoa.display.embedded`
- `spat5.hoa.reduce~`
- `spat5.hoa.intensity~`
- `spat5.hoa.directivity`
- `spat5.multi.connect`

## spat5.hoa.intensity~

## HOA intensity and diffuseness estimation

### description

**spat5.hoa.intensity~** estimates the active acoustical intensity (energy density of the sound field).

Reference(s) :

J. Daniel. Representation de champs acoustiques, application a la transmission et a la reproduction de scenes sonores complexes dans un contexte multimedia. PhD thesis, Université de Paris VI, 2001.

J. Merimaa and V. Pulkki. Spatial Impulse Response Rendering (Part I): Analysis and Synthesis. Journal of the Audio Engineering Society, 53(12):1115 – 1127, Dec 2005.

J. Merimaa and V. Pulkki. Spatial Impulse Response Rendering. In Proc. of the 7th Int. Conference on Digital Audio Effects (DAFx'04), pages 139 – 144, Naples, Italy, 2004.

### attributes

**@dimension [int]**

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

**@initwith [string]**

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@mc [int]**

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

**@order [int]**

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is (2 x order + 1).

For 3D Ambisonic, the number of components is (order+1) x (order+1).

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

**@parameter\_enable [boolean]**

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/norm [string]** : set normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized

**/order [int]** : set HOA order

**/dimension [int]** : set HOA dimension. Possible values: 2, 3

**/format [string]** : set output format. Possible values: xyz, aed

**/fftsize [int]** : set FFT size

**/window/size [int]** : set FFT window size

**/averaging/time [number]** : set averaging time (in msec)

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

```

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically
whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- [spat5.hoa.encoder~](#)
- [spat5.hoa.decoder~](#)
- [spat5.hoa.rotate~](#)
- [spat5.hoa.focus~](#)
- [spat5.hoa.focus](#)
- [spat5.hoa.blur~](#)
- [spat5.hoa.optim~](#)
- [spat5.hoa.blur~](#)
- [spat5.hoa.display](#)
- [spat5.hoa.display.embedded](#)
- [spat5.hoa.scope~](#)
- [spat5.hoa.reduce~](#)
- [spat5.multi.connect](#)

## spat5.hoa.map

## Spherical harmonics visualization

## description

spat5.hoa.map.

## attributes

## @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

`/post/version` : print the version in the Max Console

`/post/version [details]` : print detailed version in the Max Console

`/post/doc` : print the help documentation in the Max Console

`/post/state` : print the OSC status in the Max Console

`/preset/load [string]` : load a preset from file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name



```

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.hoa.directivity
- spat5.hoa.directivityshape
- spat5.hoa.encoder~
- spat5.hoa.plot
- spat5.hoa.rotate~
- spat5.hoa.display
- spat5.hoa.display.embedded
- spat5.hoa.scope~
- spat5.hoa.triangle
- spat5.hoa.beam
- spat5.hoa.beam~

# spat5.hoa.mirror~

# Ambisonic mirroring

## description

**spat5.hoa.mirror~** applies mirroring along the x,y or z axis.

## attributes

### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```

/type [string] : set mirroring type
/order [int] : set HOA order
/dimension [int] : set HOA dimension. Possible values: 2, 3
/ramp/time [number] : set ramping time (msec)
/dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC

```

file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.hoa.rotate~
- spat5.hoa.focus
- spat5.hoa.focus~
- spat5.hoa.encoder~
- spat5.hoa.decoder~
- spat5.hoa.sorting~
- spat5.hoa.converter~
- spat5.hoa.warp~
- spat5.hoa.dominance~
- spat5.hoa.blur~
- spat5.hoa.beam~

- spat5.hoa.scope~
- spat5.hoa.directivity
- spat5.multi.connect

# spat5.hoa.optim~ Ambisonic optimization

## description

**spat5.hoa.optim~** applies max-Re or in-phase optimization gains to HOA stream.

## attributes

### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/type [string]** : set optimization type. Possible values: basic, in-phase, maxre, basic-maxre, maxre-inphase, inphase-maxre  
**/order [int]** : set HOA order  
**/dimension [int]** : set HOA dimension. Possible values: 2, 3  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,

or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.hoa.encoder~
- spat5.hoa.decoder~
- spat5.hoa.rotate~
- spat5.hoa.focus
- spat5.hoa.focus~
- spat5.hoa.sorting~
- spat5.hoa.converter~
- spat5.hoa.scope~
- spat5.hoa.display
- spat5.hoa.display.embedded
- spat5.hoa.mirror~
- spat5.hoa.warp~

- spat5.hoa.dominance~
- spat5.hoa.blur~
- spat5.hoa.beam~
- spat5.panner.metrics
- spat5.hoa.intensity~
- spat5.hoa.directivity
- spat5.hoa.equivalentorder
- spat5.multi.connect



# spat5.hoa.plot

# Spherical harmonics plot

## description

**spat5.hoa.plot** plot real-value spherical harmonics.

## attributes

### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name

```

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.hoa.encoder~
- spat5.hoa.map
- spat5.hoa.display
- spat5.hoa.display.embedded
- spat5.hoa.scope~
- spat5.hoa.triangle

## spat5.hoa.reduce~

## Ambisonic order reduction

### description

**spat5.hoa.reduce~** 'downgrades' a HOA stream to a lower order.

Reference(s) :

T. Carpentier. Ambisonic spatial blur. In Proc. of the 142nd Convention of the Audio Engineering Society (AES), Berlin, Germany, May 2017.

### attributes

#### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```
/order/output [int] : set output HOA order
/order/input [int] : set input HOA order
/mode [string] : set downgrading mode. Possible values: discard, diffuse-field compensation
/dimension [int] : set HOA dimension. Possible values: 2, 3
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramp).
/dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramp [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramp).
/dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramp [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
```

/post/doc : print the help documentation in the Max Console  
 /post/state : print the OSC status in the Max Console  
 /preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
 /preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
 /preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.hoa.sorting~
- spat5.hoa.converter~
- spat5.hoa.blur~
- spat5.hoa.decoder~
- spat5.hoa.scope~
- spat5.hoa.beam~
- spat5.hoa.directivity
- spat5.multi.connect

# spat5.hoa.rotate~ Ambisonic rotations

## description

**spat5.hoa.rotate~** applies rotations HOA stream.

## attributes

### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```

/quat [number][number][number][number] : set quaternion rotation (xyzw)
/yaw [number] : set yaw rotation angle (in deg) using Euler zyx convention
/pitch [number] : set pitch rotation angle (in deg) using Euler zyx convention
/roll [number] : set roll rotation angle (in deg) using Euler zyx convention
/ypr [number][number][number] : set yaw, pitch, and roll (in deg) using Euler zyx convention
/order [int] : set HOA order
/dimension [int] : set HOA dimension. Possible values: 2, 3
/ramp/time [number] : set ramping time (in msec)
/norm [string] : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

```

/post/version : print the version in the Max Console  
/post/version [details] : print detailed version in the Max Console  
/post/doc : print the help documentation in the Max Console  
/post/state : print the OSC status in the Max Console  
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
/status : open the status window and bring it to front  
/status/open : open the status window and bring it to front  
/status/close : close the status window  
/status/openorclose : open the status window if it was closed; close it if it was opened  
/status/font/size [number] : set the font size of the status window  
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
/help : open the help window and bring it to front  
/help/open : open the help window and bring it to front  
/help/close : close the help window  
/help/openorclose : open the help window if it was closed; close it if it was opened  
/help/font/size [number] : set the font size of the help window  
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
/snapshot : open the snapshot window and bring it to front  
/snapshot/open : open the snapshot window and bring it to front  
/snapshot/close : close the snapshot window  
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
/snapshot/font/size [number] : set the font size of the snapshot window  
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
/status/copytoclipboard : copy the status to (the OS) clipboard  
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
/snapshot/deleteall : delete all the snapshots currently in memory  
/snapshot/add : create a new snapshot with the current state  
/snapshot/add [string] : create a new snapshot with the current state, and set its name  
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
/snapshot/[index]/recall : recall the current state from the i-th snapshot  
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
/snapshot/[index]/name [string] : set the name of the i-th snapshot  
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
/snapshot/[index]/delete : delete the i-th snapshot  
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/snapshot/[index]/export [string] : export the i-th snapshot to file  
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
/snapshot/export [string] : export all snapshots to file  
/snapshot/import [string] : import all snapshots from file  
/snapshot/recall/next : recall the next snapshot  
/snapshot/recall/previous : recall the previous snapshot  
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
/snapshot/recall [int] : recall the i-th snapshot  
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
/snapshot/recall/bytitle [string] : recall a snapshot by title/name  
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
/snapshot/lock [boolean] : lock edition of the snapshots  
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.hoa.encoder~
- spat5.hoa.decoder~
- spat5.hoa.mirror~
- spat5.hoa.focus
- spat5.hoa.focus~
- spat5.hoa.warp~



- spat5.hoa.dominance~
- spat5.hoa.blur~
- spat5.hoa.beam~
- spat5.hoa.sorting~
- spat5.hoa.converter~
- spat5.hoa.aformat~
- spat5.multi.connect



# spat5.hoa.shelving Ambisonic band-splitting filters (phase-matched)

## description

**spat5.hoa.shelving** computes phase-matched, band-splitting shelving filters for Ambisonic decoder.

Reference(s) :

A. J. Heller, R. Lee, and E. M. Benjamin. Is My Decoder Ambisonic? In Proc. of the 125th Convention of Audio Engineering Society (AES), San Francisco, CA, USA, Oct 2008.

A. J. Heller, and E. M. Benjamin. Design and implementation of filters for Ambisonic decoders In Proc. of the 1st International Faust Conference (IFC), Mainz, Germany, July 2018.

J. Daniel. Representation de champs acoustiques, application a la transmission et a la reproduction de scenes sonores complexes dans un contexte multimedia. PhD thesis, Université de Paris VI, 2001.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/crossover** [number] : set crossover frequency (in Hz)

**/dsp/mute** [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute** [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime** [number] : set ramp time (in msec) for mute/unmute

**/dsp/bypass** [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass** [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime** [number] : set ramp time (in msec) for bypass

**/dsp/automute** [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack** [number] : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose** [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version** [details] : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load** [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/preset/export** [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window

**/status/openorclose** : open the status window if it was closed; close it if it was opened

**/status/font/size** [number] : set the font size of the status window

**/status/floating** [boolean] : make the status window 'floating' (i.e. always on top of other windows)

**/help** : open the help window and bring it to front

**/help/open** : open the help window and bring it to front

```

/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.hoa.decoder~
- spat5.hoa.scope~
- spat5.multi.connect

## spat5.hoa.slaconv~

## Convolver for spherical loudspeaker array (SLA)

### description

**spat5.hoa.slaconv~** is a real-time convolver for spherical loudspeaker array. It can load pre-computed filters for decoding HOA-stream to spherical loudspeaker array such as IKO.

Reference(s) :

F. Zotter Analysis and synthesis of sound-radiation with spherical arrays. PhD. Thesis, University of Music and Performing Arts, Graz, 2009.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @speakers [int]

The **speakers** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### methods

**/speaker/[index]/acn/[index]/load [string]** : load filter for the i-th speaker and j-th ACN channel

**/speaker/[index]/acn/[index]/clear** : clear filter for the i-th speaker and j-th ACN channel

**/blocksize [int]** : set block-size. blocksize is a parameter of the algorithm. The larger it is, the greater the input/output delay is and the less CPU time is used. It has to be a power of two greater than the signal vector size of Max. The input/output delay is  $= (\max(\text{blocksize}, 32) - \text{vectorsize})$ .

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

/dump/dsp/latency : send the processor latency (in samples) through the dump outlet

/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.conv~
- spat5.hoa.em32~
- spat5.hoa.em64~
- spat5.hoa.encoder~

- spat5.hoa.scope~
- spat5.hoa.beam~
- spat5.hoa.beam
- spat5.hoa.intensity~
- spat5.hoa.directivity
- spat5.hoa.directivityshaper
- spat5.hoa.beamix~
- spat5.hoa.beamix
- spat5.hoa.decoder~
- spat5.hoa.aformat~
- spat5.hoa.sorting~
- spat5.hoa.converter~
- spat5.hoa.binaural~
- spat5.hoa.zm1~
- spat5.multi.connect

## spat5.hoa.sorting~

## Ambisonic channel sorting method converter

### description

There are three main conventions for the ordering of the ambisonic channels: ACN, SID and FMH. Spat has adopted the "ACN" convention. This is the convention used in all spat5.\* objects. **spat5.hoa.sorting~** allows you to easily convert to/from other conventions.

### attributes

#### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D. In most spat5 DSP objects, this attribute can not be changed dynamically (via message or attrui or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, attrui or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, attrui or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @order [int]

The **order** attribute represents the Ambisonic order of the stream. For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ . For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ . In most spat5 DSP objects, this attribute can not be changed dynamically (via message or attrui or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```
/sorting/input [string] : set input sorting. Possible values: acn, sid, fmh
/sorting/output [string] : set output sorting. Possible values: acn, sid, fmh
/order [int] : set HOA order
/dimension [int] : set HOA dimension. Possible values: 2, 3
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
```



/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.hoa.converter~
- spat5.pan~
- spat5.decoder~
- spat5.hoa.encoder~
- spat5.hoa.decoder~
- spat5.hoa.aformat~
- spat5.hoa.downscale~
- spat5.multi.connect



# spat5.hoa.triangle

# Spherical harmonics display

## description

**spat5.hoa.triangle** displays spherical harmonics components.

## attributes

### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name

```

```

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.hoa.encoder~
- spat5.hoa.map
- spat5.hoa.plot
- spat5.hoa.display
- spat5.hoa.display.embedded
- spat5.hoa.scope~

# spat5.hoa.triangle.embedded

# Spherical harmonics display

## description

spat5.hoa.triangle displays spherical harmonics components.

## attributes

### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name

```

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.hoa.encoder~
- spat5.hoa.map
- spat5.hoa.plot
- spat5.hoa.display
- spat5.hoa.display.embedded
- spat5.hoa.scope~

## spat5.hoa.warp~

## Warping in the HOA domain

## description

**spat5.hoa.warp~** distorts the HOA sound field, stretching a certain region of the surround image.

towards pole :

warp = 0% : neutral

warp is positive : warp towards the north pole

warp is negative : warp towards the south pole

stretch equator (preserving the elevation of the equator) :

warp = 0% : neutral

warp is positive : pushes surround sound content away from the equator

warp is negative : pulls it towards the equator

front :

warp = 0% : neutral

warp is positive : warp towards the front direction (+Y axis)

warp is negative : warp towards the back direction (-Y axis)

.

Reference(s) :

M. Kronlachner and F. Zotter. Warping and Directional Loudness Manipulation Tools for Ambisonics. In Proc. of the EAA Symposium on Auralization and Ambisonics, Berlin, Germany, April 2014.

M. Kronlachner and F. Zotter. Spatial transformations for the enhancement of Ambisonic recordings. In Proc. of the 2nd International Conference on Spatial Audio (ICSA), Erlangen, Germany, February 2014.

M. Kronlachner. Spatial transformations for the alteration of ambisonic recordings. Master's thesis, Institute of Electronic Music and Acoustics, Graz, June 2014.

F. Zotter and H. Pomberger. Warping of the Recording Angle in Ambisonics. In Proc. of the 1st International Conference on Spatial Audio, Detmold, Germany, Nov 2011.

H. Pomberger and F. Zotter. Warping of 3D ambisonic recordings. In Proc. of the Ambisonics Symposium, Lexington, KY, USA, June 2011.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

## attributes

## @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or attrui or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

## @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, attrui or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, attrui or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

## @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is (2 x order + 1).

For 3D Ambisonic, the number of components is (order+1) x (order+1).

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or attrui or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

## @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/order [int] : set HOA order
/dimension [int] : set HOA dimension. Possible values: 2, 3
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots
```

/snapshot/interpolate [string] [string] [number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.hoa.dominance~
- spat5.hoa.focus~
- spat5.hoa.focus
- spat5.hoa.encoder~
- spat5.hoa.decoder~
- spat5.hoa.rotate~
- spat5.hoa.optim~
- spat5.hoa.blur~
- spat5.hoa.display
- spat5.hoa.display.embedded
- spat5.hoa.scope~
- spat5.hoa.reduce~
- spat5.hoa.intensity~
- spat5.multi.connect



## spat5.hoa.weighting~

## Apply per-order gain to an HOA stream

### description

**spat5.hoa.weighting~** applies per-order gain to an HOA stream.

### attributes

#### @dimension [int]

The **dimension** attribute represents the dimension of the Ambisonic stream: either 2D or 3D.

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @order [int]

The **order** attribute represents the Ambisonic order of the stream.

For 2D Ambisonic, the number of components is  $(2 \times \text{order} + 1)$ .

For 3D Ambisonic, the number of components is  $(\text{order}+1) \times (\text{order}+1)$ .

In most spat5 DSP objects, this attribute can not be changed dynamically (via message or **attrui** or inspector), because the number of signal inlets or outlets shall be known when instantiating the object.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary encoded OSC file, **'coll'** for human-readable Max coll file (compatible with the **coll** object). **'txt'** is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary encoded OSC file, **'coll'** for human-readable Max coll file (compatible with the **coll** object). **'txt'** is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.diagmatrix~`
- `spat5.hoa.blur~`
- `spat5.hoa.focus~`
- `spat5.hoa.focus`
- `spat5.hoa.focus.embedded`
- `spat5.hoa.reduce~`
- `spat5.hoa.encoder~`
- `spat5.hoa.decoder~`
- `spat5.hoa.warp~`
- `spat5.hoa.dominance~`
- `spat5.hoa.beam~`
- `spat5.hoa.beam`
- `spat5.hoa.optim~`
- `spat5.hoa.rotate~`
- `spat5.hoa.scope~`

- spat5.hoa.display
- spat5.hoa.display.embedded
- spat5.hoa.intensity~
- spat5.hoa.directivity
- spat5.multi.connect

# spat5.hoa.zm1~ Zylia ZM-1 encoding

## description

**spat5.hoa.zm1~** encodes signals from a Zylia ZM-1 microphone to the HOA domain.

Reference(s) :

J. Daniel and S. Moreau. Further Study of Sound Field Coding with Higher Order Ambisonics. In Proc. of the 116th Convention of the Audio Engineering Society (AES), Berlin, Germany, May 2004.

J. Daniel. Spherical arrays for capturing 3D sound fields: Prototype measurements versus analytical models. In Proc. of the 19th International Congress on Acoustics (ICA), Madrid, 2007.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@mc** [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

**@parameter\_enable** [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/norm** [string] : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized  
**/regularization/type** [string] : set type of regularization for filters  
**/regularization** [number] : set regularization factor (dB) for filters  
**/filtering** [boolean] : enable/disable encoding filter  
**/highcut** [number] : cutoff frequency for high-cut filter (Hz)  
**/export/filters** [string] : export filters to audio file  
**/export/filters** : export filters to audio file (in the home directory)  
**/export/matrix** [string] : export encoding matrix  
**/export/matrix** : export encoding matrix (in the home directory)  
**/compensation** [boolean] : apply energy compensation  
**/dsp/mute** [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute** [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime** [number] : set ramp time (in msec) for mute/unmute  
**/dsp/bypass** [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass** [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime** [number] : set ramp time (in msec) for bypass  
**/dsp/automute** [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack** [number] : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose** [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version** [details] : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.hoa.em32~
- spat5.hoa.em64~
- spat5.hoa.encoder~
- spat5.hoa.decoder~
- spat5.hoa.aformat~
- spat5.hoa.sorting~
- spat5.hoa.converter~
- spat5.hoa.scope~
- spat5.hoa.binaural~

- spat5.hoa.beam~
- spat5.hoa.intensity~
- spat5.hoa.directivity
- spat5.multi.connect

## spat5.hostinfos Host information

### description

**spat5.hostinfos** retrieves various information about the host computer.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```



/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- gestalt
- spat5.file.infos
- spat5.folder.infos
- adstatus
- thispatcher
- dspstate~
- spat5.cpu
- folder
- filepath
- screensize
- date
- spat5.screencapture
- spat5.ping

## spat5.hrtf.infos

## Report information about HRTF-SOFA files

### description

**spat5.hrtf.infos** reports information about HRTF-SOFA files.

Reference(s) :

P. Majdak, Y. Iwaya, T. Carpentier, R. Nicol, M. Parmentier, A. Roginska, Y. Suzuki, K. Watanabe, H. Wierstorf, H. Ziegelwanger, and M. Noisternig. Spatially Oriented Format for Acoustics: A Data Exchange Format Representing Head-Related Transfer Functions. In Proc. of the 134th Convention of the Audio Engineering Society (AES), Roma, Italy, May 4-7 2013.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.sofa.loader
- spat5.binaural~
- spat5.headphoneeq~
- spat5.hrtf.normalize
- spat5.spat~
- spat5.ctc~
- spat5.sofa.infos
- spat5.conv~
- spat5.cascade~
- spat5.virtualspeakers~
- spat5.hoa.binaural~
- spat5.viewer

## spat5.hrtf.normalize files

## Apply normalization procedure to HRTF-SOFA

### description

spat5.hrtf.normalization applies normalization procedure to HRTF-SOFA files.

#### Reference(s) :

P. Majdak, Y. Iwaya, T. Carpentier, R. Nicol, M. Parmentier, A. Roginska, Y. Suzuki, K. Watanabe, H. Wierstorf, H. Ziegelwanger, and M. Noisternig. Spatially Oriented Format for Acoustics: A Data Exchange Format Representing Head-Related Transfer Functions. In Proc. of the 134th Convention of the Audio Engineering Society (AES), Roma, Italy, May 4-7 2013.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

```

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names  
`/snapshot/[index]/delete` : delete the i-th snapshot  
`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard  
`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
`/snapshot/[index]/export [string]` : export the i-th snapshot to file  
`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file  
`/snapshot/export [string]` : export all snapshots to file  
`/snapshot/import [string]` : import all snapshots from file  
`/snapshot/recall/next` : recall the next snapshot  
`/snapshot/recall/previous` : recall the previous snapshot  
`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)  
`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)  
`/snapshot/recall [int]` : recall the i-th snapshot  
`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)  
`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name  
`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.sofa.loader`
- `spat5.binaural~`
- `spat5.headphoneeq~`
- `spat5.spat~`
- `spat5.hoa.binaural~`

# spat5.hybrid~ Hybrid reverberation engine

## description

**spat5.hybrid~** creates a hybrid reverberation effect, combining convolution for the early part and FDN for the late reverb.

Reference(s) :

T. Carpentier, M. Noisternig, and O. Warusfel. Hybrid Reverberation Processor with Perceptual Control. In Proc. of the 17th International Conference on Digital Audio Effects (DAFx-14), pages 93 – 100, Erlangen, Germany, Sept. 2014.

J.-M. Jot, L. Cerveau, and O. Warusfel. Analysis and synthesis of room reverberation based on a statistical time-frequency model. In Proc. of the 103rd Convention of the Audio Engineering Society (AES), New York, NY, USA, 1997.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/open [string]** : load impulse response from file  
**/load [string]** : load impulse response from file  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

/status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.reverb~
- spat5.conv~
- spat5.converb~
- spat5.multiverb~
- spat5.ir.infos
- spat5.multi.connect



# spat5.hull Convex hull

## description

**spat5.hull** computes the convex hull, delaunay triangulation, or voronoi diagram of a set of positions.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.viewer
- spat5.transform
- spat5.scale
- spat5.translate
- spat5.rotate
- spat5.converter
- spat5.abs2rel
- spat5.converter~
- spat5.speaker.config
- spat5.speaker.layout
- spat5.grids

## spat5.ircamverb

## Low-level control interface for spat5.ircamverb~

### description

**spat5.ircamverb** is a control interface for **spat5.ircamverb~**.

### attributes

#### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```
/direct/filter/params [number][number]... : set direct filter parameters
/direct/filter/mute [boolean] : mute direct filter
/direct/filter/bypass [boolean] : bypass direct filter
/room/filter/params [number][number]... : set room filter parameters
/room/filter/mute [boolean] : mute room filter
/room/filter/bypass [boolean] : bypass room filter
/early/filter/params [number][number]... : set early filter parameters
/early/filter/mute [boolean] : mute early filter
/early/filter/bypass [boolean] : bypass early filter
/cluster/filter/params [number][number]... : set cluster filter parameters
/cluster/filter/mute [boolean] : mute cluster filter
/cluster/filter/bypass [boolean] : bypass cluster filter
/early/min [number] : set the early start (in msec)
/early/max [number] : set the early end (in msec)
/early/distr [number] : set the early distribution
/early/width [number] : set the early width angle (in deg)
/early/shape [number] : set the early shape (in /cluster/min [number] : set the cluster start (in msec)
/cluster/max [number] : set the cluster end (in msec)
/cluster/distr [number] : set the cluster distribution
/reverb/min [number] : set the reverb start (in msec)
/reverb/density [number] : set the reverb modal density
/reverb/air [boolean] : enable air absorption
/reverb/air/freq [number] : set air absorption frequency
/reverb/tr0 [number] : set global reverberation time (in seconds)
/reverb/trl [number] : set relative decay time in low frequencies
/reverb/trm [number] : set relative decay time in mid frequencies
/reverb/trh [number] : set relative decay time in high frequencies
/reverb/fl [number] : set reverb low/mid crossover frequency (in Hz)
/reverb/fh [number] : set reverb mid/high crossover frequency (in Hz)
/reverb/gain [number] : set reverb gain (in dB)
/reverb/roomoffset [number] : set room offset (in msec)
/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates
/source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)
/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)
/source/[index]/xy_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged
/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged
/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged
/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged
/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)
```

```

/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)
/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)
/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)
/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged
/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged
/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged
/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged
/source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged
/sources/aed [nnnn...] : set the list of source coordinates (with aed format)
/sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)
/sources/ade [nnnn...] : set the list of source coordinates (with ade format)
/sources/xy [nnnn...] : set the list of source coordinates (with xy format)
/sources/ae [nnnn...] : set the list of source coordinates (with ae format)
/speakers/aed [nnnn...] : set the list of speaker coordinates (with aed format)
/speakers/xyz [nnnn...] : set the list of speaker coordinates (with xyz format)
/speakers/ade [nnnn...] : set the list of speaker coordinates (with ade format)
/speakers/xy [nnnn...] : set the list of speaker coordinates (with xy format)
/speakers/ae [nnnn...] : set the list of speaker coordinates (with ae format)
/speaker/[index]/aed [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)
/speaker/[index]/ade [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)
/speaker/[index]/xyz [number][number][number] : set the position of the i-th loudspeaker using cartesian coordinates
/speaker/[index]/xy [number][number] : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)
/speaker/[index]/ae [number][number] : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1)
/speaker/[index]/az [number] : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

```

```

/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.ircamverb~
- spat5.spat~
- spat5.oper
- spat5.reverb~
- spat5.early~
- spat5.cluster~
- spat5.hlsshelf~
- spat5.hlsshelf
- spat5.panoramix
- spat5.panoramix~
- spat5.roomsize
- spat5.reverb.timeview
- spat5.delgen
- spat5.trajectories

## spat5.ircamverb.embedded

## Low-level control interface for spat5.ircamverb~

### description

spat5.ircamverb is a control interface for spat5.ircamverb~.

### attributes

#### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the spat5.tuto-initwith.maxpat example for further details.

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or `inspector`; it must be typed directly within the object box.

Have a look at the spat5.tuto-initwith.maxpat example for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the spat5.tuto-initwith.maxpat example for further details.

### methods

```
/direct/filter/params [number][number]... : set direct filter parameters
/direct/filter/mute [boolean] : mute direct filter
/direct/filter/bypass [boolean] : bypass direct filter
/room/filter/params [number][number]... : set room filter parameters
/room/filter/mute [boolean] : mute room filter
/room/filter/bypass [boolean] : bypass room filter
/early/filter/params [number][number]... : set early filter parameters
/early/filter/mute [boolean] : mute early filter
/early/filter/bypass [boolean] : bypass early filter
/cluster/filter/params [number][number]... : set cluster filter parameters
/cluster/filter/mute [boolean] : mute cluster filter
/cluster/filter/bypass [boolean] : bypass cluster filter
/early/min [number] : set the early start (in msec)
/early/max [number] : set the early end (in msec)
/early/distr [number] : set the early distribution
/early/width [number] : set the early width angle (in deg)
/early/shape [number] : set the early shape (in /cluster/min [number] : set the cluster start (in msec)
/cluster/max [number] : set the cluster end (in msec)
/cluster/distr [number] : set the cluster distribution
/reverb/min [number] : set the reverb start (in msec)
/reverb/density [number] : set the reverb modal density
/reverb/air [boolean] : enable air absorption
/reverb/air/freq [number] : set air absorption frequency
/reverb/tr0 [number] : set global reverberation time (in seconds)
/reverb/trl [number] : set relative decay time in low frequencies
/reverb/trm [number] : set relative decay time in mid frequencies
/reverb/trh [number] : set relative decay time in high frequencies
/reverb/fl [number] : set reverb low/mid crossover frequency (in Hz)
/reverb/fh [number] : set reverb mid/high crossover frequency (in Hz)
/reverb/gain [number] : set reverb gain (in dB)
/reverb/roomoffset [number] : set room offset (in msec)
/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates
/source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)
/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)
/source/[index]/xy_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged
/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged
/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged
/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged
/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)
```



```

/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)
/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)
/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)
/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged
/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged
/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged
/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged
/source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged
/sources/aed [nnnn...] : set the list of source coordinates (with aed format)
/sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)
/sources/ade [nnnn...] : set the list of source coordinates (with ade format)
/sources/xy [nnnn...] : set the list of source coordinates (with xy format)
/sources/ae [nnnn...] : set the list of source coordinates (with ae format)
/speakers/aed [nnnn...] : set the list of speaker coordinates (with aed format)
/speakers/xyz [nnnn...] : set the list of speaker coordinates (with xyz format)
/speakers/ade [nnnn...] : set the list of speaker coordinates (with ade format)
/speakers/xy [nnnn...] : set the list of speaker coordinates (with xy format)
/speakers/ae [nnnn...] : set the list of speaker coordinates (with ae format)
/speaker/[index]/aed [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)
/speaker/[index]/ade [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)
/speaker/[index]/xyz [number][number][number] : set the position of the i-th loudspeaker using cartesian coordinates
/speaker/[index]/xy [number][number] : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)
/speaker/[index]/ae [number][number] : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1)
/speaker/[index]/az [number] : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

```



/snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.ircamverb~
- spat5.spat~
- spat5.oper
- spat5.reverb~
- spat5.early~
- spat5.cluster~
- spat5.hlshelf~
- spat5.hlshelf
- spat5.panoramix
- spat5.panoramix~
- spat5.roomsize
- spat5.reverb.timeview
- spat5.delgen
- spat5.trajectories

## spat5.ircamverb~

## Artificial room reverberator

### description

**spat5.ircamverb~** is a room reverberator with a 'low level' control interface.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @internals [int]

The **internals** attribute represents the number of internal channels of the artificial reverberator.

Spat uses a Feedback Delay Network (FDN) reverberator engine.

Basically this can be seen as an array of delay lines which are fed back into a mixing matrix. The **internals** attributes represents the size of the feedback matrix.

Choosing the size of this matrix is a trade-off between CPU consumption and the echo density.

Increasing the size of the matrix will generate a densier reverb tail at the expense of a higher CPU load.

A typical value of 8 is a good compromise between CPU load and natural sounding reverb. A value of 16 may be useful especially when dealing with a very long reverberation time or with very percussive sound (where a smaller FDN might sometimes sounds too poor).

Increasing the **internals** attribute may also be helpful when using a large number of loudspeakers, to ensure a proper decorrelation of the reproduced late reverberation signals.

It is recommended not to use a value below 6.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @sources [int]

The **sources** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @speakers [int]

The **speakers** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### methods

```
/direct/filter/params [number][number]... : set direct filter parameters
/direct/filter/mute [boolean] : mute direct filter
/direct/filter/bypass [boolean] : bypass direct filter
/room/filter/params [number][number]... : set room filter parameters
/room/filter/mute [boolean] : mute room filter
/room/filter/bypass [boolean] : bypass room filter
/early/filter/params [number][number]... : set early filter parameters
/early/filter/mute [boolean] : mute early filter
/early/filter/bypass [boolean] : bypass early filter
/cluster/filter/params [number][number]... : set cluster filter parameters
/cluster/filter/mute [boolean] : mute cluster filter
/cluster/filter/bypass [boolean] : bypass cluster filter
```

/early/min [number] : set the early start (in msec)  
 /early/max [number] : set the early end (in msec)  
 /early/distr [number] : set the early distribution  
 /early/interpolation/mode [string] : set the interpolation mode. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade  
 /early/interpolation/time [number] : set the interpolation time (in msec)  
 /cluster/min [number] : set the cluster start (in msec)  
 /cluster/max [number] : set the cluster end (in msec)  
 /cluster/distr [number] : set the cluster distribution  
 /cluster/interpolation/mode [string] : set the interpolation mode. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade  
 /cluster/interpolation/time [number] : set the interpolation time (in msec)  
 /early/width [number] : set the early width angle (in deg)  
 /early/shape [number] : set the early shape (in /reverb/min [number] : set the reverb start (in msec)  
 /reverb/density [number] : set the reverb modal density  
 /reverb/air [boolean] : enable air absorption  
 /reverb/air/freq [number] : set air absorption frequency  
 /reverb/tr0 [number] : set global reverberation time (in seconds)  
 /reverb/trl [number] : set relative decay time in low frequencies  
 /reverb/trm [number] : set relative decay time in mid frequencies  
 /reverb/trh [number] : set relative decay time in high frequencies  
 /reverb/fl [number] : set reverb low/mid crossover frequency (in Hz)  
 /reverb/fh [number] : set reverb mid/high crossover frequency (in Hz)  
 /reverb/gain [number] : set reverb gain (in dB)  
 /reverb/interpolation/mode [string] : set the interpolation mode. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade  
 /reverb/interpolation/time [number] : set the interpolation time (in msec)  
 /source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates  
 /source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)  
 /source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)  
 /source/[index]/xy\_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged  
 /source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged  
 /source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged  
 /source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged  
 /source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)  
 /source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)  
 /source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)  
 /source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)  
 /source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged  
 /source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged  
 /source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged  
 /source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged  
 /source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged  
 /sources/aed [nnnn...] : set the list of source coordinates (with aed format)  
 /sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)  
 /sources/ade [nnnn...] : set the list of source coordinates (with ade format)  
 /sources/xy [nnnn...] : set the list of source coordinates (with xy format)  
 /sources/ae [nnnn...] : set the list of source coordinates (with ae format)  
 /speakers/aed [nnnn...] : set the list of speaker coordinates (with aed format)  
 /speakers/xyz [nnnn...] : set the list of speaker coordinates (with xyz format)  
 /speakers/ade [nnnn...] : set the list of speaker coordinates (with ade format)  
 /speakers/xy [nnnn...] : set the list of speaker coordinates (with xy format)  
 /speakers/ae [nnnn...] : set the list of speaker coordinates (with ae format)  
 /speaker/[index]/aed [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)  
 /speaker/[index]/ade [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)  
 /speaker/[index]/xyz [number][number][number] : set the position of the i-th loudspeaker using cartesian coordinates  
 /speaker/[index]/xy [number][number] : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)  
 /speaker/[index]/ae [number][number] : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1)  
 /speaker/[index]/az [number] : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)  
 /dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
 /dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute  
 /dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).  
 /dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
 /dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass  
 /dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
 /dsp/automute/attack [number] : set the duration (in seconds) before auto-muting  
 /dsp/post : post various information to the Max console (audio should be turned on)  
 /dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
 /dump/dsp/latency : send the processor latency (in samples) through the dump outlet

`/verbose [string]` : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

`/post/version` : print the version in the Max Console

`/post/version [details]` : print detailed version in the Max Console

`/post/doc` : print the help documentation in the Max Console

`/post/state` : print the OSC status in the Max Console

`/preset/load [string]` : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.ircamverb`
- `spat5.spat~`
- `spat5.oper`
- `spat5.reverb~`
- `spat5.early~`

- spat5.cluster~
- spat5.room~
- spat5.hlshelf~
- spat5.hlshelf
- spat5.panoramix
- spat5.panoramix~
- spat5.pan~
- spat5.roomsize
- spat5.reverb.timeview
- spat5.viewer
- spat5.trajectories
- spat5.multi.connect

## spat5.irma2hoa~

## Encode Ircam microphone array to HOA

### description

**spat5.irma2hoa~** encodes signals from the Ircam microphone array to the HOA domain.

Reference(s) :

J. Daniel and S. Moreau. Further Study of Sound Field Coding with Higher Order Ambisonics. In Proc. of the 116th Convention of the Audio Engineering Society (AES), Berlin, Germany, May 2004.

J. Daniel. Spherical arrays for capturing 3D sound fields: Prototype measurements versus analytical models. In Proc. of the 19th International Congress on Acoustics (ICA), Madrid, 2007.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@mc** [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

**@parameter\_enable** [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/norm** [string] : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized  
**/regularization** [number] : set regularization factor (dB) for filters  
**/order** [int] : set HOA order  
**/dsp/mute** [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute** [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime** [number] : set ramp time (in msec) for mute/unmute  
**/dsp/bypass** [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass** [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime** [number] : set ramp time (in msec) for bypass  
**/dsp/automute** [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack** [number] : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose** [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load** [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export** [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC

file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.hoa.em64~
- spat5.hoa.em32~
- spat5.hoa.encoder~
- spat5.hoa.decoder~
- spat5.hoa.aformat~
- spat5.hoa.sorting~
- spat5.hoa.converter~
- spat5.hoa.intensity~
- spat5.multi.connect



## spat5.ir.analysis

## EDR analysis of Room Impulse Response (RIR)

### description

**spat5.ir.analysis** computes and analyzes the Energy Decay Relief of a RIR.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.edc
- spat5.smk~
- spat5.ir.infos
- spat5.hybrid~

## spat5.ir.infos (RIR)

## Report information about Room Impulse Response

### description

**spat5.ir.infos** reports basic information about a RIR.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`. Note that the `initwith` attribute cannot be set via message, `attrui` or `inspector`; it must be typed directly within the object box. Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

`/post/version` : print the version in the Max Console  
`/post/version [details]` : print detailed version in the Max Console  
`/post/doc` : print the help documentation in the Max Console  
`/post/state` : print the OSC status in the Max Console  
`/preset/load [string]` : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
`/preset/load` : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.  
`/preset/export [string]` : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.  
`/status` : open the status window and bring it to front  
`/status/open` : open the status window and bring it to front  
`/status/close` : close the status window  
`/status/openorclose` : open the status window if it was closed; close it if it was opened  
`/status/font/size [number]` : set the font size of the status window  
`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)  
`/help` : open the help window and bring it to front  
`/help/open` : open the help window and bring it to front  
`/help/close` : close the help window  
`/help/openorclose` : open the help window if it was closed; close it if it was opened  
`/help/font/size [number]` : set the font size of the help window  
`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)  
`/snapshot` : open the snapshot window and bring it to front  
`/snapshot/open` : open the snapshot window and bring it to front  
`/snapshot/close` : close the snapshot window  
`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened  
`/snapshot/font/size [number]` : set the font size of the snapshot window  
`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)  
`/status/copytoclipboard` : copy the status to (the OS) clipboard  
`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.  
`/snapshot/deleteall` : delete all the snapshots currently in memory  
`/snapshot/add` : create a new snapshot with the current state  
`/snapshot/add [string]` : create a new snapshot with the current state, and set its name  
`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)  
`/snapshot/[index]/recall` : recall the current state from the i-th snapshot  
`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)  
`/snapshot/[index]/name [string]` : set the name of the i-th snapshot  
`/snapshot/interpolate [int] [int] [number]` : interpolate between the i-th and j-th snapshots  
`/snapshot/interpolate [string] [string] [number]` : interpolate between two snapshots, given their names  
`/snapshot/[index]/delete` : delete the i-th snapshot  
`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard  
`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
`/snapshot/[index]/export [string]` : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.edc
- spat5.smk~
- spat5.ir.analysis
- spat5.plot
- spat5.sweep~

# spat5.isnan~ Detect NaN or Inf values

## description

**spat5.isnan~** detects NaN or Inf values.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window

```

/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.fixnan~

# spat5.jitter

# Deviate and randomize coordinate messages

## description

**spat5.jitter** applies jitter to the incoming coordinate messages.

## attributes

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or `inspector`; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/jitter/x [number] : set jitter factor along the x-axis (in /jitter/y [number] : set jitter factor along the y-axis (in /jitter/z [number] : set jitter factor along the z-axis (in /jitter/x/step [number] : set jitter step along the x-axis (in /jitter/y/step [number] : set jitter step along the y-axis (in /jitter/z/step [number] : set jitter step along the z-axis (in /seed [int] : set seed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string] [string] [number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
```



```

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.transform
- spat5.scale
- spat5.rotate
- spat5.translate
- spat5.normalize
- spat5.mirror
- spat5.viewer
- spat5.converter
- spat5.converter~
- spat5.abs2rel
- spat5.distance
- spat5.trajectories
- spat5.boids

# spat5.knn K-nearest neighbors search

## description

**spat5.knn** allows fast nearest neighbors search.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.viewer
- spat5.scale
- spat5.transform
- spat5.rotate
- spat5.translate
- spat5.normalize
- spat5.converter
- spat5.converter~
- spat5.abs2rel
- spat5.distance
- spat5.barycenter

# spat5.leslie~ Leslie cabinet simulation

## description

**spat5.leslie~** simulates a Leslie cabinet.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @speakers [int]

The **speakers** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

## methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window

```

/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.doppler~
- spat5.source~
- spat5.delay~
- spat5.binaural~
- spat5.pan~
- spat5.air~
- spat5.pan~
- spat5.multi.connect

# spat5.limiter~ Peak limiter

## description

**spat5.limiter~** is a multichannel peak limiter.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/channel/number [int] : set the number of channels
/channel/[index]/attack [number] : set attack time (in msec) for the i-th channel
/channel/[index]/release [number] : set release time (in msec) for the i-th channel
/channel/[index]/lookahead [number] : set lookahead time (in msec) for the i-th channel
/channel/[index]/threshold [number] : set threshold (in dB) for the i-th channel
/channel/[index]/mute [boolean] : mute the i-th channel
/channel/[index]/bypass [boolean] : bypass the i-th channel
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
```

file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.compressor~
- spat5.noisegate~
- spat5.clip~
- spat5.softclipping~
- spat5.delta~
- spat5.deltaclick~
- spat5.tanh~
- spat5.fixnan~
- spat5.rms~
- spat5.ebur128~
- spat5.tanh~
- spat5.multi.connect



# spat5.lms~ Least mean squares filter

## description

**spat5.lms~** implements an adaptive filter used to mimic a desired filter by finding the filter coefficients that relate to producing the least mean square of the error signal (difference between the desired and the actual signal).

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/order [int] : set the filter order
/step [number] : set the learn-rate : setting this step size value to 1. provides the fastest convergence
/regularization [number] : set regularization factor
/downsampling [number] : set downsampling factor
/leakage [number] : set leakage factor
/coefficients/constraint [string] : set type of coefficients constraint
/coefficients/constraint/energy [number] : set coefficients energy constraint
/coefficients/constraint/min [nnnnnn...] : set coefficients min constraint
/coefficients/constraint/max [nnnnnn...] : set coefficients max constraint
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
```

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.hlsshelf`
- `biquad~`
- `spat5.equalizer`
- `spat5.cascade~`
- `spat5.frequencyresponse`
- `spat5.filterdesign`
- `cascade~`
- `filtergraph~`
- `spat5.eq`
- `spat5.filterdesign`
- `spat5.oper`
- `spat5.ircamverb~`
- `spat5.graphiceq~`

- spat5.graphiceq
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.octavebank~
- spat5.multi.connect

# spat5.ltc.decode~ Time code decoder

## description

**spat5.ltc.decode~** decodes a SMPTE time code.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/fps [number]** : set initial guess for the decoder FPS. The actual FPS will be automatically estimated after a few frames

**/fps/auto [boolean]** : automatically estimate FPS. If set to false, the **/fps** must be used to set the imposed FPS value

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window

**/status/openorclose** : open the status window if it was closed; close it if it was opened

**/status/font/size [number]** : set the font size of the status window

**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)

**/help** : open the help window and bring it to front

/help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.ltc.easydecode~
- spat5.ltc.encode~
- spat5.ltc.trigger~
- spat5.snapshot~
- spat5.ltc.toms
- spat5.ltc.fromms
- spat5.multi.connect

## spat5.ltc.easydecode~

## Simplified time code decoder

### description

**spat5.ltc.easydecode~** decodes a SMPTE time code. It is a simplified version of **spat5.ltc.decode~**.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/fps [number]** : set initial guess for the decoder FPS. The actual FPS will be automatically estimated after a few frames

**/fps/auto [boolean]** : automatically estimate FPS. If set to false, the **/fps** must be used to set the imposed FPS value

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window

**/status/openorclose** : open the status window if it was closed; close it if it was opened

**/status/font/size [number]** : set the font size of the status window

**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)

**/help** : open the help window and bring it to front

/help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.ltc.decode~
- spat5.ltc.encode~
- spat5.ltc.trigger~
- spat5.snapshot~
- spat5.ltc.toms
- spat5.ltc.fromms
- spat5.multi.connect



# spat5.ltc.encode~ Time code generator

## description

**spat5.ltc.encode~** generates a SMPTE time code.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/fps [number] : set FPS
/time [number] : jump to a given time (expressed in milliseconds)
/time [string] : jump to a given time (expressed in hh:mm:ss:ff format)
/speed [number] : set speed factor
/pause : pause
/resume : resume after a pause
/switch : switch between pause and resume
/forward [number] : increase time by a given amount (expressed in milliseconds)
/forward [string] : increase time by a given amount (expressed in hh:mm:ss:ff format)
/backward [number] : decrease time by a given amount (expressed in milliseconds)
/backward [string] : decrease time by a given amount (expressed in hh:mm:ss:ff format)
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
```

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.ltc.decode~`
- `spat5.ltc.easydecode~`
- `spat5.ltc.trigger~`
- `spat5.snapshot~`
- `spat5.ltc.toms`
- `spat5.ltc.fromms`
- `spat5.multi.connect`

## spat5.ltc.fromms

## Converts milliseconds to LTC/SMPTE Time code

### description

**spat5.ltc.fromms** converts milliseconds to time code (expressed in hh:mm:ss:ff format).

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`. Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
```

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.ltc.encode~
- spat5.ltc.decode~
- spat5.ltc.easydecode~
- spat5.ltc.trigger~
- spat5.ltc.toms

## spat5.ltc.toms

## Converts LTC/SMPTE Time code to milliseconds

### description

**spat5.ltc.toms** converts time code (expressed in hh:mm:ss:ff format) to milliseconds.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`. Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
```

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.ltc.encode~
- spat5.ltc.decode~
- spat5.ltc.easydecode~
- spat5.ltc.trigger~
- spat5.ltc.fromms

# spat5.ltc.trigger~ Time code decoder

## description

**spat5.ltc.trigger~** holds a list of cues (with a time stamp), and triggers notification whenever the time code reaches one of the cues.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window

**/status/openorclose** : open the status window if it was closed; close it if it was opened

**/status/font/size [number]** : set the font size of the status window

**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)

**/help** : open the help window and bring it to front

**/help/open** : open the help window and bring it to front

**/help/close** : close the help window



/help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.ltc.encode~
- spat5.ltc.decode~
- spat5.ltc.easydecode~
- spat5.snapshot~
- spat5.multi.connect

# spat5.matrix      Matrix controller

## description

**spat5.matrix** is a matrix control interface.

## attributes

### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the **initwith** attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @inputs [int]

The **inputs** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @outputs [int]

The **outputs** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/row/number [int] : set the number of rows
/col/number [int] : set the number of columns
/row/[index]/col/[index] [number] : set (linear) value of the i-th row and j-th column
/row/[index]/col/[index]/value [number] : set (linear) value of the i-th row and j-th column
/row/[index]/col/[index]/db [number] : set (dB) value of the i-th row and j-th column
/row/[index]/col/[index]/add/db [number] : add offset (in dB) of the i-th row and j-th column
/row/[index]/col/[index]/visible [boolean] : show the i-th row and j-th column
/row/[index]/col/[index]/phase/visible [boolean] : show phase for the i-th row and j-th column
/row/[index]/col/[index]/slider/color [number][number][number][number] : set slider color for the i-th row and j-th column
/row/[index]/col/[index]/background/color [number][number][number][number] : set background color for the i-th row and j-th column
/row/[index]/col/[index]/editable [boolean] : enable the i-th row and j-th column
/col/[index]/row/[index] [number] : set (linear) value of the i-th row and j-th column
/col/[index]/row/[index]/value [number] : set (linear) value of the i-th row and j-th column
/col/[index]/row/[index]/db [number] : set (dB) value of the i-th row and j-th column
/col/[index]/row/[index]/add/db [number] : add offset (in dB) of the i-th row and j-th column
/fill [number] : fill the whole matrix
/fill/db [number] : fill the whole matrix (in dB)
/diag [number] : fill the diagonal
/diag/db [number] : fill the diagonal (in dB)
/export/coll : export matrix as coll file
/export/coll [string] : export matrix as coll file
/export/mat : export matrix as matlab file
/export/mat [string] : export matrix as matlab file
/clear : clear matrix
/reset : reset matrix
/cursor/visible [boolean] : highlight the selected row/column
/cursor/color [number][number][number][number] : set highlight color
```

/editable [boolean] : enable/disable the matrix  
/post/version : print the version in the Max Console  
/post/version [details] : print detailed version in the Max Console  
/post/doc : print the help documentation in the Max Console  
/post/state : print the OSC status in the Max Console  
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
/status : open the status window and bring it to front  
/status/open : open the status window and bring it to front  
/status/close : close the status window  
/status/openorclose : open the status window if it was closed; close it if it was opened  
/status/font/size [number] : set the font size of the status window  
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
/help : open the help window and bring it to front  
/help/open : open the help window and bring it to front  
/help/close : close the help window  
/help/openorclose : open the help window if it was closed; close it if it was opened  
/help/font/size [number] : set the font size of the help window  
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
/snapshot : open the snapshot window and bring it to front  
/snapshot/open : open the snapshot window and bring it to front  
/snapshot/close : close the snapshot window  
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
/snapshot/font/size [number] : set the font size of the snapshot window  
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
/status/copytoclipboard : copy the status to (the OS) clipboard  
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
/snapshot/deleteall : delete all the snapshots currently in memory  
/snapshot/add : create a new snapshot with the current state  
/snapshot/add [string] : create a new snapshot with the current state, and set its name  
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
/snapshot/[index]/recall : recall the current state from the i-th snapshot  
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
/snapshot/[index]/name [string] : set the name of the i-th snapshot  
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
/snapshot/[index]/delete : delete the i-th snapshot  
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/snapshot/[index]/export [string] : export the i-th snapshot to file  
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
/snapshot/export [string] : export all snapshots to file  
/snapshot/import [string] : import all snapshots from file  
/snapshot/recall/next : recall the next snapshot  
/snapshot/recall/previous : recall the previous snapshot  
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
/snapshot/recall [int] : recall the i-th snapshot  
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
/snapshot/recall/bytitle [string] : recall a snapshot by title/name  
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
/snapshot/lock [boolean] : lock edition of the snapshots  
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
/snapshot/sort : sort the snapshots alphabetically (based on their titles)  
/window/title [string] : set the window title (in the window titlebar)  
/window/visible [boolean] : set the window visibility  
/window/moveable [boolean] : set the window movability  
/window/resizable [boolean] : set the window resizability  
/window/enable [boolean] : enable/disable the window  
/window/background/color [color] : set the window background color  
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency)  
/window/fullscreen [boolean] : enable/disable fullscreen mode  
/window/minimise [boolean] : minimize the window

/window/open : open the window (and bring it to front)  
 /window/close : close the window  
 /window/openorclose : open the window if it was closed; close it if it was opened  
 /window/size [number] [number] : set the window size (width, height) (in pixels)  
 /window/width [number] : set the window width (in pixels)  
 /window/height [number] : set the window height (in pixels)  
 /window/bounds [number] [number] [number] [number] : set the window bounds (top left position, width, height) (in pixels)  
 /window/topleft [number] [number] : set the window top left position (in pixels)  
 /window/centre : open the window, centering it on the screen  
 /window/rendering/engine [string] : set the graphical rendering engine of the window  
 /window/fps/visible [boolean] : display the FPS performances of the window  
 /window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)  
 /window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)  
 /window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)  
 /window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)  
 /window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)  
 /window/export/image [string] : export the window as an image file (png or jpeg)

## see also

- spat5.routing
- spat5.routing~
- matrix~

# spat5.matrix.embedded

# Matrix controller

## description

spat5.matrix is a matrix control interface.

## attributes

### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @inputs [int]

The `inputs` attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @outputs [int]

The `outputs` attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/row/number [int] : set the number of rows
/col/number [int] : set the number of columns
/row/[index]/col/[index] [number] : set (linear) value of the i-th row and j-th column
/row/[index]/col/[index]/value [number] : set (linear) value of the i-th row and j-th column
/row/[index]/col/[index]/db [number] : set (dB) value of the i-th row and j-th column
/row/[index]/col/[index]/add/db [number] : add offset (in dB) of the i-th row and j-th column
/row/[index]/col/[index]/visible [boolean] : show the i-th row and j-th column
/row/[index]/col/[index]/phase/visible [boolean] : show phase for the i-th row and j-th column
/row/[index]/col/[index]/slider/color [number][number][number][number] : set slider color for the i-th row and j-th column
/row/[index]/col/[index]/background/color [number][number][number][number] : set background color for the i-th row and j-th column
/row/[index]/col/[index]/editable [boolean] : enable the i-th row and j-th column
/col/[index]/row/[index] [number] : set (linear) value of the i-th row and j-th column
/col/[index]/row/[index]/value [number] : set (linear) value of the i-th row and j-th column
/col/[index]/row/[index]/db [number] : set (dB) value of the i-th row and j-th column
/col/[index]/row/[index]/add/db [number] : add offset (in dB) of the i-th row and j-th column
/fill [number] : fill the whole matrix
/fill/db [number] : fill the whole matrix (in dB)
/diag [number] : fill the diagonal
/diag/db [number] : fill the diagonal (in dB)
/export/coll : export matrix as coll file
/export/coll [string] : export matrix as coll file
/export/mat : export matrix as matlab file
/export/mat [string] : export matrix as matlab file
/clear : clear matrix
/reset : reset matrix
/cursor/visible [boolean] : highlight the selected row/column
/cursor/color [number][number][number][number] : set highlight color
```

```

/editable [boolean] : enable/disable the matrix
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.routing
- spat5.routing~
- matrix~



## spat5.meter~

## Multichannel signal metering interface

### description

**spat5.meter~** is a multichannel signal metering interface.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard



/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

/window/title [string] : set the window title (in the window titlebar)

/window/visible [boolean] : set the window visibility

/window/moveable [boolean] : set the window movability

/window/resizable [boolean] : set the window resizableability

/window/enable [boolean] : enable/disable the window

/window/background/color [color] : set the window background color

/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency)

/window/fullscreen [boolean] : enable/disable fullscreen mode

/window/minimise [boolean] : minimize the window

/window/open : open the window (and bring it to front)

/window/close : close the window

/window/openorclose : open the window if it was closed; close it if it was opened

/window/size [number][number] : set the window size (width, height) (in pixels)

/window/width [number] : set the window width (in pixels)

/window/height [number] : set the window height (in pixels)

/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)

/window/topleft [number][number] : set the window top left position (in pixels)

/window/centre : open the window, centering it on the screen

/window/rendering/engine [string] : set the graphical rendering engine of the window

/window/fps/visible [boolean] : display the FPS performances of the window

/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)

/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)

/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)

/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)

/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)

/window/export/image [string] : export the window as an image file (png or jpeg)

## see also

- spat5.rms~
- meter~
- live.gain~
- spat5.times~
- mc.live.gain~
- spat5.spectroscope~
- spat5.ebur128~
- spat5.snapshot~
- gain~
- spat5.multi.connect

## spat5.minmax~

## Compute minimum/maximum signal values

### description

**spat5.minmax~** computes minimum/maximum signal values. It is similar to Max/MSP **minmax~**, but can process multiple channels in parallel.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/mode [string]** : set mode. Possible values: maximum minimum peak  
**/reset** : reset the current minimum and maximum values to the default (0)  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front

```

/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- minmax~
- meter~
- snapshot~
- spat5.meter~
- spat5.snapshot~
- spat5.multi.connect

## spat5.mirror Mirror coordinate messages

### description

**spat5.mirror** applies mirroring to coordinate messages.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/mirror/x** [boolean] : mirror along the x-axis

**/mirror/y** [boolean] : mirror along the y-axis

**/mirror/z** [boolean] : mirror along the z-axis

### see also

- spat5.scale
- spat5.transform
- spat5.rotate
- spat5.translate
- spat5.normalize
- spat5.jitter
- spat5.viewer
- spat5.converter
- spat5.converter~
- spat5.abs2rel
- spat5.distance
- spat5.trajectories
- spat5.boids

# spat5.mscohere~ Magnitude-squared coherence estimation using Welch's averaged periodogram method

## description

**spat5.mscohere~** uses Welch's averaged periodogram method.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front

/help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.smk~
- spat5.sweep~
- spat5.ir.analysis
- spat5.ir.infos
- spat5.calibrate.gain~
- spat5.calibrate.delay~
- spat5.tfestimate~



# spat5.multispeakerbrir~ SpeakerBRIR convention

## Read and render SOFA files with the Multi-

### description

**spat5.multispeakerbrir~** reads and renders SOFA files with the MultiSpeakerBRIR convention.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @inputs [int]

The **inputs** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/open [string]** : load SOFA file  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramp**).  
**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramp [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramp**).  
**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramp [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.



/status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
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 /status/openorclose : open the status window if it was closed; close it if it was opened  
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 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
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 /status/copytoclipboard : copy the status to (the OS) clipboard  
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 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
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 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
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 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.sofa.infos
- spat5.sofa.loader
- spat5.singleroomdrir
- spat5.hrtf.infos
- spat5.hrtf.normalize

## spat5.multiverb~

## Multiband feedback delay network

### description

**spat5.multiverb~** generates late reverberation from an echo bus using a feedback delay network.

The decay profile can be controlled over an arbitrary number of frequency bands.

**spat5.multiverb~** is very similar to **spat5.reverb~**; the difference being that **spat5.reverb~** uses 3-band shelving filters to control the decay, while

**spat5.multiverb~** can control the decay profile over an arbitrary number of frequency bands.

Of course, increasing the number of frequency bands will impact the CPU load.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```

/channel/number [int] : set the number of feedback channels
/band/number [int] : set the number of frequency bands
/cascade/number [int] : set the number cascades used for the reverberant filters
/freq/limits [number][number][number]... : set the frequency limits of each band (in Hz)
/tr0 [number] : set global reverberation time (in seconds)
/decay/times [number][number][number]... : set the relative decay times for each band
/infinite [boolean] : enable/disable infinite reverb
/air [boolean] : enable/disable air absorption in the FDN
/air/freq [number] : set air absorption rolloff frequency (in Hz) in the FDN
/delays [number][number][number]... : set the list of delays (in msec)
/delays/samples [number][number][number]... : set the list of delays (in samples)
/interpolation/mode [string] : set the interpolation mode. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade
/interpolation/time [number] : set the interpolation time (in msec)
/channel/[index]/delay [number] : set the delay (in msec) for the i-th channel
/channel/[index]/delay/samples [number] : set the delay (in samples) for the i-th channel
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically

```

whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

`/dump/dsp/latency` : send the processor latency (in samples) through the dump outlet

`/verbose [string]` : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

`/post/version` : print the version in the Max Console

`/post/version [details]` : print detailed version in the Max Console

`/post/doc` : print the help documentation in the Max Console

`/post/state` : print the OSC status in the Max Console

`/preset/load [string]` : load a preset from file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format. If the file extension is not provided, `.txt` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.reverb~`
- `spat5.early~`
- `spat5.cluster~`

- spat5.spat~
- spat5.room~
- spat5.ircamverb~
- spat5.delgen
- spat5.multiverb~
- spat5.roomsize
- spat5.shuffle~
- spat5.conv~
- spat5.converb~
- spat5.tapout~
- delay~
- tapout~
- spat5.comb~
- spat5.allpass~
- spat5.reverb.timeview
- spat5.multi.connect

# spat5.noisegate~ Multichannel noise gate

## description

**spat5.noisegate~** is a multichannel noise gate.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/channel/number [int] : set the number of channels
/channel/[index]/attack [number] : set attack time (in msec) for the i-th channel
/channel/[index]/release [number] : set release time (in msec) for the i-th channel
/channel/[index]/lookahead [number] : set lookahead time (in msec) for the i-th channel
/channel/[index]/threshold [number] : set threshold (in dB) for the i-th channel
/channel/[index]/reduction [number] : set reduction (in dB) for the i-th channel
/channel/[index]/mute [boolean] : mute the i-th channel
/channel/[index]/bypass [boolean] : bypass the i-th channel
/reset : reset to default values (all channels)
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
```

OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.compressor~
- spat5.compressor
- cascade~
- spat5.cascade~
- biquad~
- spat5.compressor
- spat5.limiter~
- spat5.clip~
- spat5.softclipping~
- spat5.delta~
- spat5.deltacip~
- spat5.tanh~
- spat5.fixnan~
- spat5.rms~

- spat5.ebur128~
- spat5.zplane
- filtergraph~
- spat5.multi.connect



# spat5.noise~      Generate white noise

## description

**spat5.noise~** is similar to Max/MSP **noise~** but can process several channels in parallel. It generates a signal consisting of uniformly distributed random white-noise with values between -1.0 and 1.0. All channels are independent.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front

```

/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- noise~
- pink~
- spat5.pink~
- mc.noise~
- spat5.multi.connect

## spat5.normalize Normalize coordinate messages

### description

**spat5.normalize** normalizes coordinate messages to unit distance.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

### see also

- spat5.scale
- spat5.transform
- spat5.rotate
- spat5.translate
- spat5.mirror
- spat5.jitter
- spat5.viewer
- spat5.converter
- spat5.converter~
- spat5.abs2rel
- spat5.distance
- spat5.trajectories
- spat5.boids

# spat5.octavebank~ Octave filter bank

## description

**spat5.octavebank~** is an octave filter bank using IIR filters.

## attributes

### @bands [int]

The **bands** attribute represents the number frequency bands. It can not be changed dynamically (via message or **attrui** or inspector).

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/band/number [int] : set the number of frequency bands
/order [int] : set the filter order
/fraction [int] : set the octave fraction
/band/[index]/frequency [number] : set the center frequency for the i-th band
/freq/center [number][number][number]... : set center frequencies (in Hz) for the bands. The length of the list should be = (number of bands)
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
```

/status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.complementarybank~
- spat5.hlsshelf
- biquad~
- spat5.gammatone
- spat5.equalizer
- spat5.cascade~
- spat5.frequencyresponse
- spat5.filterdesign
- cascade~
- filtergraph~
- spat5.oper
- spat5.ircamverb~
- spat5.graphiceq~
- spat5.graphiceq
- spat5.cascade.inverse
- spat5.cascade.resample
- spat5.eq
- spat5.multi.connect

# spat5.oper Perceptual control interface (for spat5.spat~)

## description

**spat5.oper** is the main control interface for **spat5.spat~**.

The core of **spat5.oper** is a perceptual control module based on research carried out in the Ircam room acoustics team on the objective and perceptual characterization of room acoustic quality. This control interface can be set to imitate the interaction between source(s) and the acoustics of an existing room and it allows to interpolate or extrapolate naturally between different acoustic qualities.

The graphical user-interface in **spat5.oper** is divided into tabs:

- Source tabs provide controls for the perceptual description of the source's acoustic quality, virtual localization, orientation and directivity,
- Reverb tabs provide controls for the perceptual description of the virtual room's acoustic quality.

## attributes

### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @internals [int]

The **internals** attribute represents the number of internal channels of the artificial reverberator.

Spat uses a Feedback Delay Network (FDN) reverberator engine.

Basically this can be seen as an array of delay lines which are fed back into a mixing matrix. The **internals** attributes represents the size of the feedback matrix.

Choosing the size of this matrix is a trade-off between CPU consumption and the echo density.

Increasing the size of the matrix will generate a densier reverb tail at the expense of a higher CPU load.

A typical value of 8 is a good compromise between CPU load and natural sounding reverb. A value of 16 may be useful especially when dealing with a very long reverberation time or with very percussive sound (where a smaller FDN might sometimes sounds too poor).

Increasing the **internals** attribute may also be helpful when using a large number of loudspeakers, to ensure a proper decorrelation of the reproduced late reverberation signals.

It is recommended not to use a value below 6.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/source/number [int]** : set the number of sources

**/room/number [int]** : set the number of rooms

**/source/[index]/pres [number]** : set the (source) presence for the i-th source. The "source presence" factor defines the early sound (energy of direct sound and early room effect). A variation of the "source presence" creates a convincing effect of proximity or remoteness of the sound source.

**/source/[index]/warm [number]** : set the warmth for the i-th source. The "source warmth" factor defines the variation of early sound at high frequencies

**/source/[index]/bril [number]** : set the brilliance for the i-th source. The "source brilliance" factor defines the variation of early sound at low frequencies

**/source/[index]/prer [number]** : set the (room) presence for the i-th source. The "room presence" factor defines the energy of later reflections and reverberation (late sound)

**/source/[index]/revp [number]** : set the running reverberance for the i-th source. The "running reverberance" factor defines the early decay time. The term "reverberance" refers to the sensation that sounds are prolonged by the room reverberation. Late reverberance differs from "running reverberance" by the fact that it is essentially perceived during interruptions of the message radiated by the source. Running reverberance, on the contrary, remains perceived during continuous music.

**/source/[index]/env [number]** : set the envelopment for the i-th source. The "envelopment" factor defines the energy of early room effect relative to direct sound

**/source/[index]/air [boolean]** : enable air absorption for the i-th source



/source/[index]/doppler [boolean] : enable doppler effect for the i-th source  
 /source/[index]/drop [number] : set the drop factor (in dB) for the i-th source  
 /source/[index]/drop/mode [string] : set the drop mode for the i-th source. Possible values: linear, log2  
 /source/[index]/radius [number] : set the radius (in meters) for the i-th source. The "radius" parameter defines the radius of a virtual sphere surrounding the listener. When a sound source comes closer to the listener, its energy progressively increases. When the source reaches the "radius sphere", its energy no longer increases. It is clipped. The "radius" parameter hence represents the minimum radius under which the sound level is limited. This provides a "safety area" around the listener in order to avoid over-amplified sounds for nearby sources.

The "radius" parameter is also associated to another phenomenon for 3D panning techniques (such as VBAP, 3D-Ambisonic, and binaural or transaural) : When sound sources comes close enough to reach the "radius sphere", they will smoothly slide over the sphere surface (and thus pass over the listener head). This guarantees a smooth sound trajectory for sources that "crosses" the sphere.

/source/[index]/room/destination [int] : set the destination room for the i-th source  
 /source/[index]/axis/G0 [number] : set the global gain (in dB) for the axis filter of the i-th source  
 /source/[index]/axis/Gl [number] : set the gain (in dB) for low frequencies for the axis filter of the i-th source  
 /source/[index]/axis/Gm [number] : set the gain (in dB) for medium frequencies for the axis filter of the i-th source  
 /source/[index]/axis/Gh [number] : set the gain (in dB) for high frequencies for the axis filter of the i-th source  
 /source/[index]/axis/fl [number] : set the low/med crossover frequency (in Hz) for the axis filter of the i-th source  
 /source/[index]/axis/fh [number] : set the med/high crossover frequency (in Hz) for the axis filter of the i-th source  
 /source/[index]/axis/params [number][number][number][number][number][number] : set the filter parameters (G0,Gl,Gm,Gh,fl,fh) for the axis filter of the i-th source  
 /source/[index]/axis/params [number][number][number][number][number][number] : set the filter parameters (G0,Gl,Gm,Gh,fl) for the axis filter of the i-th source  
 /source/[index]/axis/params [number][number][number][number][number] : set the filter parameters (G0,Gl,Gm,Gh) for the axis filter of the i-th source  
 /source/[index]/axis/mute [boolean] : mute the axis filter of the i-th source  
 /source/[index]/axis/bypass [boolean] : bypass the axis filter of the i-th source  
 /source/[index]/axis/reset : reset the axis filter of the i-th source  
 /source/[index]/omni/G0 [number] : set the global gain (in dB) for the omni filter of the i-th source  
 /source/[index]/omni/Gl [number] : set the gain (in dB) for low frequencies for the omni filter of the i-th source  
 /source/[index]/omni/Gm [number] : set the gain (in dB) for medium frequencies for the omni filter of the i-th source  
 /source/[index]/omni/Gh [number] : set the gain (in dB) for high frequencies for the omni filter of the i-th source  
 /source/[index]/omni/fl [number] : set the low/med crossover frequency (in Hz) for the omni filter of the i-th source  
 /source/[index]/omni/fh [number] : set the med/high crossover frequency (in Hz) for the omni filter of the i-th source  
 /source/[index]/omni/params [number][number][number][number][number][number] : set the filter parameters (G0,Gl,Gm,Gh,fl,fh) for the omni filter of the i-th source  
 /source/[index]/omni/params [number][number][number][number][number] : set the filter parameters (G0,Gl,Gm,Gh,fl) for the omni filter of the i-th source  
 /source/[index]/omni/params [number][number][number][number] : set the filter parameters (G0,Gl,Gm,Gh) for the omni filter of the i-th source  
 /source/[index]/omni/mute [boolean] : mute the omni filter of the i-th source  
 /source/[index]/omni/bypass [boolean] : bypass the omni filter of the i-th source  
 /source/[index]/omni/reset : reset the omni filter of the i-th source  
 /source/[index]/direct/mute [boolean] : mute direct sound for the i-th source  
 /source/[index]/early/mute [boolean] : mute early for the i-th source  
 /source/[index]/cluster/mute [boolean] : mute cluster for the i-th source  
 /source/[index]/reverb/mute [boolean] : mute late reverb for the i-th source  
 /source/[index]/reset : reset the i-th source to default values  
 /source/[index]/early/width [number] : set the early width angle (in deg) for the i-th source. In Spat, early reflections (discrete echoes) are panned as a "stereo pair" spatially surrounding the direct sound. The "early with" parameter specifies the width of this stereo pair.  
 /source/[index]/early/shape [number] : set the early shape (in The "early shape" parameter characterizes the amplitude distribution of the early echoes. By default, all early reflections (discrete echoes) have the same amplitude. This corresponds to early shape = 50 /source/[index]/panrev [number] : set the panrev factor (in By default, the late reflections (a.k.a "cluster" in spat dialect) and the late reverb (tail) are fully diffuse (coming from all spatial directions). When you increase the "pan rev" parameter, some of the cluster reflections will be panned (similarly to the early reflections), making the reverberation effect more directional (less diffuse).  
 /source/[index]/lock [boolean] : lock the i-th source  
 /room/[index]/reverberance [number] : set the reverberance for the i-th room. The "reverberance" factor defines the mid-frequency decay time. The term "reverberance" refers to the sensation that sounds are prolonged by the room reverberation. Late reverberance differs from "running reverberance" by the fact that it is essentially perceived during interruptions of the message radiated by the source. Running reverberance, on the contrary, remains perceived during continuous music.  
 /room/[index]/heaviness [number] : set the heaviness for the i-th room. The "heaviness" factor defines the relative decay time at low frequencies  
 /room/[index]/liveness [number] : set the liveness for the i-th room. The "liveness" factor defines the relative decay time at high frequencies  
 /room/[index]/reverb/roomsize [number] : set the room size for the i-th room  
 /room/[index]/early/min [number] : set the early start (in msec) for the i-th room  
 /room/[index]/early/max [number] : set the early end (in msec) for the i-th room  
 /room/[index]/early/distr [number] : set the early distribution for the i-th room  
 /room/[index]/cluster/min [number] : set the cluster start (in msec) for the i-th room  
 /room/[index]/cluster/max [number] : set the cluster end (in msec) for the i-th room  
 /room/[index]/cluster/distr [number] : set the cluster distribution for the i-th room  
 /room/[index]/reverb/min [number] : set the reverb start (in msec) for the i-th room  
 /room/[index]/reverb/density [number] : set the modal density for the i-th room  
 /room/[index]/air [boolean] : enable air absorption for the i-th room  
 /room/[index]/air/freq [number] : set air absorption frequency for the i-th room  
 /room/[index]/infinite [boolean] : enables infinite reverb for the i-th room  
 /room/[index]/mute [boolean] : mute the i-th room  
 /room/[index]/reset : reset the i-th room to default values  
 /tab [string] : open a given tab of the interface  
 /internals [int] : set the number of internal channels for FDN reverb



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/viewer/visible [boolean] : set visibility of the scene viewer
/viewer/only [boolean] : display only the scene viewer
/source/number [int] : set the number of sources
/source/[index]/visible [boolean] : set the visibility of the i-th source
/source/[index]/editable [boolean] : set the editability of the i-th source
/source/[index]/select [boolean] : select the i-th source
/source/[index]/mute [boolean] : mute the i-th source
/source/[index]/color [color] : set the color of the i-th source
/source/[index]/color/alpha [number] : change alpha for the color of the i-th source
/source/[index]/color/alpha/add [number] : increase/decrease alpha for the color of the i-th source
/source/[index]/proportion [number] : set the proportion the i-th source
/source/[index]/proportion/add [number] : increase/decrease the proportion the i-th source by a certain amount
/source/[index]/constraint/circular [boolean] : set the circular constraints for the i-th source
/source/[index]/label [string] : set the label for the i-th source
/source/[index]/label/visible [boolean] : set the visibility for the label for the i-th source
/source/[index]/label/color [color] : set the color for the label for the i-th source
/source/[index]/label/justification [string] : set the text justification for the label for the i-th source
/source/[index]/vumeter/visible [boolean] : set the visibility for the vumeter for the i-th source
/source/[index]/level [number] : set the vumeter level (in dB) for the i-th source
/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates
/source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)
/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)
/source/[index]/xy_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged
/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged
/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged
/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged
/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)
/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)
/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)
/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)
/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged
/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged
/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged
/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged
/source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged
/sources/aed [nnnn...] : set the list of source coordinates (with aed format)
/sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)
/sources/ade [nnnn...] : set the list of source coordinates (with ade format)
/sources/xy [nnnn...] : set the list of source coordinates (with xy format)
/sources/ae [nnnn...] : set the list of source coordinates (with ae format)
/source/[index]/aperture [number] : set the aperture of the i-th source
/source/[index]/aperture/visible [boolean] : set the visibility for the aperture of the i-th source
/source/[index]/aperture/color [color] : set the color for the aperture of the i-th source
/source/[index]/yaw/mode [string] : set the yaw mode of the i-th source
/source/[index]/yaw [number] : set the yaw angle (in deg) of the i-th source, using Euler zyx convention
/source/[index]/pitch [number] : set the pitch angle (in deg) of the i-th source, using Euler zyx convention
/source/[index]/roll [number] : set the roll angle (in deg) of the i-th source, using Euler zyx convention
/source/[index]/orientation [number][number][number][number] : set the orientation quaternion (xyzw) of the i-th source
/source/[index]/history/visible [boolean] : set the visibility for the history of the i-th source
/source/[index]/history/color [color] : set the color for the history of the i-th source
/source/[index]/history/thickness [number] : set the line thickness for the history of the i-th source
/source/[index]/history/size [int] : set the (past) size for the history of the i-th source
/source/[index]/history/clear : clear the history of the i-th source
/source/[index]/tofront : bring the i-th source to the front of its siblings
/source/[index]/toback : bring the i-th source to the back of its siblings
/source/[index]/tofront [boolean] : bring the i-th source to the front or back of its siblings
/source/[index]/image [string] : set the image file (svg, jpg, png, etc.) to use for the i-th source
/source/[index]/image/clear : use the default image for the i-th source
/sources/level [nnnn...] : set the vumeter levels (in dB) for all sources
/sources/visible [bbbb...] : set the visibility for all sources
/speaker/number [int] : set the number of speakers
/speaker/[index]/visible [boolean] : set the visibility of the i-th speaker
/speaker/[index]/editable [boolean] : set the editability of the i-th speaker
/speaker/[index]/select [boolean] : select the i-th speaker
/speaker/[index]/color [color] : set the color of the i-th speaker
/speaker/[index]/proportion [number] : set the proportion the i-th speaker
/speaker/[index]/constraint/circular [boolean] : set the circular constraints for the i-th speaker
/speaker/[index]/label [string] : set the label for the i-th speaker
/speaker/[index]/label/visible [boolean] : set the visibility for the label for the i-th speaker
/speaker/[index]/label/color [color] : set the color for the label for the i-th speaker
/speaker/[index]/label/justification [string] : set the text justification for the label for the i-th speaker
/speaker/[index]/vumeter/visible [boolean] : set the visibility for the vumeter for the i-th speaker
/speaker/[index]/level [number] : set the vumeter level (in dB) for the i-th speaker
/speakers/aed [nnnn...] : set the list of speaker coordinates (with aed format)

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/speakers/xyz [nnnn...] : set the list of speaker coordinates (with xyz format)
/speakers/ade [nnnn...] : set the list of speaker coordinates (with ade format)
/speakers/xy [nnnn...] : set the list of speaker coordinates (with xy format)
/speakers/ae [nnnn...] : set the list of speaker coordinates (with ae format)
/speaker/[index]/aed [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)
/speaker/[index]/ade [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)
/speaker/[index]/xyz [number][number][number] : set the position of the i-th loudspeaker using cartesian coordinates
/speaker/[index]/xy [number][number] : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)
/speaker/[index]/ae [number][number] : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1)
/speaker/[index]/az [number] : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)
/speaker/[index]/tofront : bring the i-th speaker to the front of its siblings
/speaker/[index]/toback : bring the i-th speaker to the back of its siblings
/speaker/[index]/tofront [boolean] : bring the i-th speaker to the front or back of its siblings
/speaker/[index]/image [string] : set the image file (svg, jpg, png, etc.) to use for the i-th speaker
/speaker/[index]/image/clear : use the default image for the i-th speaker
/speakers/level [nnnn...] : set the vumeter levels (in dB) for all speakers
/speakers/visible [bbbb...] : set the visibility for all speakers
/stereo/number [int] : set the number of stereo pairs
/stereo/[index]/visible [boolean] : set the visibility of the i-th stereo pair
/stereo/[index]/editable [boolean] : set the editability of the i-th stereo pair
/stereo/[index]/select [boolean] : select the i-th stereo pair
/stereo/[index]/color [color] : set the color of the i-th stereo pair
/stereo/[index]/proportion [number] : set the proportion the i-th stereo pair
/stereo/[index]/constraint/circular [boolean] : set the circular constraints for the i-th stereo pair
/stereo/[index]/label [string] : set the label for the i-th stereo pair
/stereo/[index]/label/visible [boolean] : set the visibility for the label for the i-th stereo pair
/stereo/[index]/label/color [color] : set the color for the label for the i-th stereo pair
/stereo/[index]/label/justification [string] : set the text justification for the label for the i-th stereo pair
/stereo/[index]/vumeter/visible [boolean] : set the visibility for the vumeter for the i-th stereo pair
/stereo/[index]/level [number] : set the vumeter level (in dB) for the i-th stereo pair
/stereo/[index]/xyz [number][number][number] : set the position of the i-th stereo pair
/stereo/[index]/xy [number][number] : set the position of the i-th stereo pair
/stereo/[index]/x [number] : set the position of the i-th stereo pair
/stereo/[index]/y [number] : set the position of the i-th stereo pair
/stereo/[index]/z [number] : set the position of the i-th stereo pair
/stereo/[index]/aed [number][number][number] : set the position of the i-th stereo pair
/stereo/[index]/ade [number][number][number] : set the position of the i-th stereo pair
/stereo/[index]/ae [number][number] : set the position of the i-th stereo pair
/stereo/[index]/ad [number][number][number] : set the position of the i-th stereo pair
/stereo/[index]/az [number] : set the position of the i-th stereo pair
/stereo/[index]/azim [number] : set the position of the i-th stereo pair
/stereo/[index]/elev [number] : set the position of the i-th stereo pair
/stereo/[index]/dist [number] : set the position of the i-th stereo pair
/stereo/[index]/azim++ [number] : set the position of the i-th stereo pair
/stereo/[index]/elev++ [number] : set the position of the i-th stereo pair
/stereo/[index]/dist++ [number] : set the position of the i-th stereo pair
/stereo/[index]/dist*= [number] : set the position of the i-th stereo pair
/stereo/[index]/aperture [number] : set the aperture of the i-th stereo pair
/stereo/[index]/aperture/visible [boolean] : set the visibility for the aperture of the i-th stereo pair
/stereo/[index]/aperture/color [color] : set the color for the aperture of the i-th stereo pair
/stereo/[index]/yaw/mode [string] : set the yaw mode of the i-th stereo pair
/stereo/[index]/yaw [number] : set the yaw angle (in deg) of the i-th stereo pair, using Euler zyx convention
/stereo/[index]/pitch [number] : set the pitch angle (in deg) of the i-th stereo pair, using Euler zyx convention
/stereo/[index]/roll [number] : set the roll angle (in deg) of the i-th stereo pair, using Euler zyx convention
/stereo/[index]/orientation [number][number][number][number] : set the orientation quaternion (xyzw) of the i-th stereo pair
/stereos/level [nnnn...] : set the vumeter levels (in dB) for all stereo pairs
/listener/visible [boolean] : set the visibility of the listener
/listener/editable [boolean] : set the listener editable
/listener/headphones/visible [boolean] : set the visibility of the headphones
/listener/orientation/visible [boolean] : set the visibility of the orientation
/listener/orientation [quaternion] : set the orientation of the listener
/listener/proportion [number] : set the display proportion of the listener
/listener/select [boolean] : select/unselect the listener
/listener/aed [number][number][number] : set the listener position (azimuth/elevation/distance)
/hoa/number [int] : set the number of HOA fields
/hoa/[index]/yaw [number] : set the yaw angle of the i-th HOA field
/background/color [color] : set the window background color
/background/transparency [number] : set the window transparency (in /backgroundimage/file [string] : set the background image (png, jpg, etc.)
/backgroundimage/visible [boolean] : set the visibility of the background image
/backgroundimage/opacity [number] : set the opacity of the background image
/backgroundimage/scale [number] : set the scale factor of the background image
/backgroundimage/angle [number] : set the rotation angle (in deg) of the background image
/backgroundimage/offset/x [number] : set the x translation offset of the background image
/backgroundimage/offset/y [number] : set the y translation offset of the background image

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/backgroundimage/offset/xy [number][number] : set the x/y translation offset of the background image  
 /backgroundimage/quality [string] : set the resampling quality of the background image (low, medium, high)  
 /display/zoom [number] : set the display zoom factor (/display/offset/x [number] : set the display x translation offset (in pixels)  
 /display/offset/y [number] : set the display y translation offset (in pixels)  
 /display/offset/z [number] : set the display z translation offset (in pixels)  
 /display/offset/xy [number][number] : set the display x/y translation offsets (in pixels)  
 /display/offset/xyz [number][number][number] : set the display x/y/z translation offsets (in pixels)  
 /display/zoom/lock [boolean] : enable/disable zooming with the mouse wheel  
 /axis/visible [boolean] : set the visibility of the axis  
 /axis/color [color] : set the axis color  
 /axis/label/visible [boolean] : set the visibility of the axis label  
 /axis/origin/visible [boolean] : set the visibility of the axis origin  
 /axis/thickness [number] : set line thickness  
 /grid/visible [boolean] : set the visibility of the grid  
 /grid/mode [string] : set the grid mode. Possible values: none, circular, cartesian  
 /grid/spacing [number] : set the spacing between grid lines (in meters)  
 /grid/line/number [number] : set the number of grid lines  
 /grid/angulardivisions/number [number] : set the number of angular divisions  
 /grid/angulardivisions/visible [boolean] : set the visibility of angular divisions  
 /grid/dashed [boolean] : set the line style  
 /grid/color [color] : set the line color  
 /grid/thickness [number] : set line thickness  
 /grid/unitcircle/visible [boolean] : set the visibility of the unit circle  
 /grid/unitcircle/color [color] : set the color of the unit circle  
 /grid/unitcircle/radius [number] : set the radius of the unit circle  
 /legend/visible [boolean] : set the visibility of the legend  
 /legend/color [color] : set the legend color  
 /legend/unit [string] : set distance unit  
 /emphasis/source [boolean] : emphasize sources when mouse in proximity  
 /emphasis/stereo [boolean] : emphasize stereos when mouse in proximity  
 /emphasis/speaker [boolean] : emphasize speakers when mouse in proximity  
 /emphasis/microphone [boolean] : emphasize microphones when mouse in proximity  
 /ruler/visible [boolean] : set the visibility of the ruler  
 /ruler/color [color] : set the ruler color  
 /ruler/unit [string] : set the unit of the ruler  
 /area/number [int] : set the number of areas  
 /area/[index]/vertex/number [int] : set the number of vertex for the i-th area  
 /area/[index]/vertex/[index]/xy [number][number] : set position of the j-th vertex of the i-th area  
 /area/[index]/vertex/[index]/xyz [number][number][number] : set position of the j-th vertex of the i-th area  
 /area/[index]/vertex/[index]/aed [number][number][number] : set position of the j-th vertex of the i-th area  
 /area/[index]/visible [boolean] : set visibility for the i-th area  
 /area/[index]/color [color] : set color for the i-th area  
 /area/[index]/name [string] : set name for the i-th area  
 /path/number [int] : set the number of paths  
 /path/[index]/vertex/number [int] : set the number of vertex for the i-th path  
 /path/[index]/vertex/[index]/xy [number][number] : set position of the j-th vertex of the i-th path  
 /path/[index]/vertex/[index]/xyz [number][number][number] : set position of the j-th vertex of the i-th path  
 /path/[index]/vertex/[index]/aed [number][number][number] : set position of the j-th vertex of the i-th path  
 /path/[index]/visible [boolean] : set visibility for the i-th path  
 /path/[index]/color [color] : set color for the i-th path  
 /speakerhull/color [color] : set the hull color  
 /speakerhull/visible [boolean] : set the visibility of the hull  
 /speakerhull/fill/color [color] : set the hull interior color  
 /speakerhull/fill [boolean] : fill the hull  
 /layout [string] : set the window layout. Possible values: single, leftright, toptottom, automatic  
 /window/title [string] : set the window title (in the window titlebar)  
 /window/visible [boolean] : set the window visibility  
 /window/moveable [boolean] : set the window movability  
 /window/resizable [boolean] : set the window resizableability  
 /window/enable [boolean] : enable/disable the window  
 /window/background/color [color] : set the window background color  
 /window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency)  
 /window/fullscreen [boolean] : enable/disable fullscreen mode  
 /window/minimise [boolean] : minimize the window  
 /window/open : open the window (and bring it to front)  
 /window/close : close the window  
 /window/openorclose : open the window if it was closed; close it if it was opened  
 /window/size [number][number] : set the window size (width, height) (in pixels)  
 /window/width [number] : set the window width (in pixels)  
 /window/height [number] : set the window height (in pixels)  
 /window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)  
 /window/topleft [number][number] : set the window top left position (in pixels)  
 /window/centre : open the window, centering it on the screen

```

/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- `spat5.spat~`
- `spat5.viewer`
- `spat5.ircamverb`
- `spat5.hlsshelf`
- `spat5.oper__`
- `spat5.ircamverb`
- `spat5.panoramix`
- `spat5.trajectories`



## spat5.oper.embedded

## Perceptual control interface (for spat5.spat~)

### description

spat5.oper is the main control interface for spat5.spat~.

The core of spat5.oper is a perceptual control module based on research carried out in the Ircam room acoustics team on the objective and perceptual characterization of room acoustic quality. This control interface can be set to imitate the interaction between source(s) and the acoustics of an existing room and it allows to interpolate or extrapolate naturally between different acoustic qualities.

The graphical user-interface in spat5.oper is divided into tabs:

- Source tabs provide controls for the perceptual description of the source's acoustic quality, virtual localization, orientation and directivity,
- Reverb tabs provide controls for the perceptual description of the virtual room's acoustic quality.

### attributes

#### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored. Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`. Note that the `initwith` attribute cannot be set via message, `attrui` or `inspector`; it must be typed directly within the object box. Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @internals [int]

The `internals` attribute represents the number of internal channels of the artificial reverberator.

Spat uses a Feedback Delay Network (FDN) reverberator engine.

Basically this can be seen as an array of delay lines which are fed back into a mixing matrix. The `internals` attributes represents the size of the feedback matrix.

Choosing the size of this matrix is a trade-off between CPU consumption and the echo density.

Increasing the size of the matrix will generate a densier reverb tail at the expense of a higher CPU load.

A typical value of 8 is a good compromise between CPU load and natural sounding reverb. A value of 16 may be useful especially when dealing with a very long reverberation time or with very percussive sound (where a smaller FDN might sometimes sounds too poor).

Increasing the `internals` attribute may also be helpful when using a large number of loudspeakers, to ensure a proper decorrelation of the reproduced late reverberation signals.

It is recommended not to use a value below 6.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

`/source/number [int]` : set the number of sources

`/room/number [int]` : set the number of rooms

`/source/[index]/pres [number]` : set the (source) presence for the i-th source. The "source presence" factor defines the early sound (energy of direct sound and early room effect). A variation of the "source presence" creates a convincing effect of proximity or remoteness of the sound source.

`/source/[index]/warm [number]` : set the warmth for the i-th source. The "source warmth" factor defines the variation of early sound at high frequencies

`/source/[index]/bril [number]` : set the brilliance for the i-th source. The "source brilliance" factor defines the variation of early sound at low frequencies

`/source/[index]/prer [number]` : set the (room) presence for the i-th source. The "room presence" factor defines the energy of later reflections and reverberation (late sound)

`/source/[index]/revp [number]` : set the running reverberance for the i-th source. The "running reverberance" factor defines the early decay time. The term "reverberance" refers to the sensation that sounds are prolonged by the room reverberation. Late reverberance differs from "running reverberance" by the fact that it is essentially perceived during interruptions of the message radiated by the source. Running reverberance, on the contrary, remains perceived during continuous music.

`/source/[index]/env [number]` : set the envelopment for the i-th source. The "envelopment" factor defines the energy of early room effect relative to direct sound

`/source/[index]/air [boolean]` : enable air absorption for the i-th source

/source/[index]/doppler [boolean] : enable doppler effect for the i-th source  
 /source/[index]/drop [number] : set the drop factor (in dB) for the i-th source  
 /source/[index]/drop/mode [string] : set the drop mode for the i-th source. Possible values: linear, log2  
 /source/[index]/radius [number] : set the radius (in meters) for the i-th source. The "radius" parameter defines the radius of a virtual sphere surrounding the listener. When a sound source comes closer to the listener, its energy progressively increases. When the source reaches the "radius sphere", its energy no longer increases. It is clipped. The "radius" parameter hence represents the minimum radius under which the sound level is limited. This provides a "safety area" around the listener in order to avoid over-amplified sounds for nearby sources.

The "radius" parameter is also associated to another phenomenon for 3D panning techniques (such as VBAP, 3D-Ambisonic, and binaural or transaural) : When sound sources comes close enough to reach the "radius sphere", they will smoothly slide over the sphere surface (and thus pass over the listener head). This guarantees a smooth sound trajectory for sources that "crosses" the sphere.

/source/[index]/room/destination [int] : set the destination room for the i-th source  
 /source/[index]/axis/G0 [number] : set the global gain (in dB) for the axis filter of the i-th source  
 /source/[index]/axis/Gl [number] : set the gain (in dB) for low frequencies for the axis filter of the i-th source  
 /source/[index]/axis/Gm [number] : set the gain (in dB) for medium frequencies for the axis filter of the i-th source  
 /source/[index]/axis/Gh [number] : set the gain (in dB) for high frequencies for the axis filter of the i-th source  
 /source/[index]/axis/fl [number] : set the low/med crossover frequency (in Hz) for the axis filter of the i-th source  
 /source/[index]/axis/fh [number] : set the med/high crossover frequency (in Hz) for the axis filter of the i-th source  
 /source/[index]/axis/params [number][number][number][number][number][number] : set the filter parameters (G0,Gl,Gm,Gh,fl,fh) for the axis filter of the i-th source  
 /source/[index]/axis/params [number][number][number][number][number] : set the filter parameters (G0,Gl,Gm,Gh,fl) for the axis filter of the i-th source  
 /source/[index]/axis/params [number][number][number][number] : set the filter parameters (G0,Gl,Gm,Gh) for the axis filter of the i-th source  
 /source/[index]/axis/mute [boolean] : mute the axis filter of the i-th source  
 /source/[index]/axis/bypass [boolean] : bypass the axis filter of the i-th source  
 /source/[index]/axis/reset : reset the axis filter of the i-th source  
 /source/[index]/omni/G0 [number] : set the global gain (in dB) for the omni filter of the i-th source  
 /source/[index]/omni/Gl [number] : set the gain (in dB) for low frequencies for the omni filter of the i-th source  
 /source/[index]/omni/Gm [number] : set the gain (in dB) for medium frequencies for the omni filter of the i-th source  
 /source/[index]/omni/Gh [number] : set the gain (in dB) for high frequencies for the omni filter of the i-th source  
 /source/[index]/omni/fl [number] : set the low/med crossover frequency (in Hz) for the omni filter of the i-th source  
 /source/[index]/omni/fh [number] : set the med/high crossover frequency (in Hz) for the omni filter of the i-th source  
 /source/[index]/omni/params [number][number][number][number][number][number] : set the filter parameters (G0,Gl,Gm,Gh,fl,fh) for the omni filter of the i-th source  
 /source/[index]/omni/params [number][number][number][number][number] : set the filter parameters (G0,Gl,Gm,Gh,fl) for the omni filter of the i-th source  
 /source/[index]/omni/params [number][number][number][number] : set the filter parameters (G0,Gl,Gm,Gh) for the omni filter of the i-th source  
 /source/[index]/omni/mute [boolean] : mute the omni filter of the i-th source  
 /source/[index]/omni/bypass [boolean] : bypass the omni filter of the i-th source  
 /source/[index]/omni/reset : reset the omni filter of the i-th source  
 /source/[index]/direct/mute [boolean] : mute direct sound for the i-th source  
 /source/[index]/early/mute [boolean] : mute early for the i-th source  
 /source/[index]/cluster/mute [boolean] : mute cluster for the i-th source  
 /source/[index]/reverb/mute [boolean] : mute late reverb for the i-th source  
 /source/[index]/reset : reset the i-th source to default values  
 /source/[index]/early/width [number] : set the early width angle (in deg) for the i-th source. In Spat, early reflections (discrete echoes) are panned as a "stereo pair" spatially surrounding the direct sound. The "early with" parameter specifies the width of this stereo pair.  
 /source/[index]/early/shape [number] : set the early shape (in The "early shape" parameter characterizes the amplitude distribution of the early echoes. By default, all early reflections (discrete echoes) have the same amplitude. This corresponds to early shape = 50 /source/[index]/panrev [number] : set the panrev factor (in By default, the late reflections (a.k.a "cluster" in spat dialect) and the late reverb (tail) are fully diffuse (coming from all spatial directions). When you increase the "pan rev" parameter, some of the cluster reflections will be panned (similarly to the early reflections), making the reverberation effect more directional (less diffuse).  
 /source/[index]/lock [boolean] : lock the i-th source  
 /room/[index]/reverberance [number] : set the reverberance for the i-th room. The "reverberance" factor defines the mid-frequency decay time. The term "reverberance" refers to the sensation that sounds are prolonged by the room reverberation. Late reverberance differs from "running reverberance" by the fact that it is essentially perceived during interruptions of the message radiated by the source. Running reverberance, on the contrary, remains perceived during continuous music.  
 /room/[index]/heaviness [number] : set the heaviness for the i-th room. The "heaviness" factor defines the relative decay time at low frequencies  
 /room/[index]/liveness [number] : set the liveness for the i-th room. The "liveness" factor defines the relative decay time at high frequencies  
 /room/[index]/reverb/roomsize [number] : set the room size for the i-th room  
 /room/[index]/early/min [number] : set the early start (in msec) for the i-th room  
 /room/[index]/early/max [number] : set the early end (in msec) for the i-th room  
 /room/[index]/early/distr [number] : set the early distribution for the i-th room  
 /room/[index]/cluster/min [number] : set the cluster start (in msec) for the i-th room  
 /room/[index]/cluster/max [number] : set the cluster end (in msec) for the i-th room  
 /room/[index]/cluster/distr [number] : set the cluster distribution for the i-th room  
 /room/[index]/reverb/min [number] : set the reverb start (in msec) for the i-th room  
 /room/[index]/reverb/density [number] : set the modal density for the i-th room  
 /room/[index]/air [boolean] : enable air absorption for the i-th room  
 /room/[index]/air/freq [number] : set air absorption frequency for the i-th room  
 /room/[index]/infinite [boolean] : enables infinite reverb for the i-th room  
 /room/[index]/mute [boolean] : mute the i-th room  
 /room/[index]/reset : reset the i-th room to default values  
 /tab [string] : open a given tab of the interface  
 /internals [int] : set the number of internal channels for FDN reverb



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/viewer/visible [boolean] : set visibility of the scene viewer
/viewer/only [boolean] : display only the scene viewer
/source/number [int] : set the number of sources
/source/[index]/visible [boolean] : set the visibility of the i-th source
/source/[index]/editable [boolean] : set the editability of the i-th source
/source/[index]/select [boolean] : select the i-th source
/source/[index]/mute [boolean] : mute the i-th source
/source/[index]/color [color] : set the color of the i-th source
/source/[index]/color/alpha [number] : change alpha for the color of the i-th source
/source/[index]/color/alpha/add [number] : increase/decrease alpha for the color of the i-th source
/source/[index]/proportion [number] : set the proportion the i-th source
/source/[index]/proportion/add [number] : increase/decrease the proportion the i-th source by a certain amount
/source/[index]/constraint/circular [boolean] : set the circular constraints for the i-th source
/source/[index]/label [string] : set the label for the i-th source
/source/[index]/label/visible [boolean] : set the visibility for the label for the i-th source
/source/[index]/label/color [color] : set the color for the label for the i-th source
/source/[index]/label/justification [string] : set the text justification for the label for the i-th source
/source/[index]/vumeter/visible [boolean] : set the visibility for the vumeter for the i-th source
/source/[index]/level [number] : set the vumeter level (in dB) for the i-th source
/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates
/source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)
/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)
/source/[index]/xy_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged
/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged
/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged
/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged
/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)
/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)
/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)
/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)
/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged
/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged
/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged
/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged
/source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged
/sources/aed [nnnn...] : set the list of source coordinates (with aed format)
/sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)
/sources/ade [nnnn...] : set the list of source coordinates (with ade format)
/sources/xy [nnnn...] : set the list of source coordinates (with xy format)
/sources/ae [nnnn...] : set the list of source coordinates (with ae format)
/source/[index]/aperture [number] : set the aperture of the i-th source
/source/[index]/aperture/visible [boolean] : set the visibility for the aperture of the i-th source
/source/[index]/aperture/color [color] : set the color for the aperture of the i-th source
/source/[index]/yaw/mode [string] : set the yaw mode of the i-th source
/source/[index]/yaw [number] : set the yaw angle (in deg) of the i-th source, using Euler zyx convention
/source/[index]/pitch [number] : set the pitch angle (in deg) of the i-th source, using Euler zyx convention
/source/[index]/roll [number] : set the roll angle (in deg) of the i-th source, using Euler zyx convention
/source/[index]/orientation [number][number][number][number] : set the orientation quaternion (xyzw) of the i-th source
/source/[index]/history/visible [boolean] : set the visibility for the history of the i-th source
/source/[index]/history/color [color] : set the color for the history of the i-th source
/source/[index]/history/thickness [number] : set the line thickness for the history of the i-th source
/source/[index]/history/size [int] : set the (past) size for the history of the i-th source
/source/[index]/history/clear : clear the history of the i-th source
/source/[index]/tofront : bring the i-th source to the front of its siblings
/source/[index]/toback : bring the i-th source to the back of its siblings
/source/[index]/tofront [boolean] : bring the i-th source to the front or back of its siblings
/source/[index]/image [string] : set the image file (svg, jpg, png, etc.) to use for the i-th source
/source/[index]/image/clear : use the default image for the i-th source
/sources/level [nnnn...] : set the vumeter levels (in dB) for all sources
/sources/visible [bbbb...] : set the visibility for all sources
/speaker/number [int] : set the number of speakers
/speaker/[index]/visible [boolean] : set the visibility of the i-th speaker
/speaker/[index]/editable [boolean] : set the editability of the i-th speaker
/speaker/[index]/select [boolean] : select the i-th speaker
/speaker/[index]/color [color] : set the color of the i-th speaker
/speaker/[index]/proportion [number] : set the proportion the i-th speaker
/speaker/[index]/constraint/circular [boolean] : set the circular constraints for the i-th speaker
/speaker/[index]/label [string] : set the label for the i-th speaker
/speaker/[index]/label/visible [boolean] : set the visibility for the label for the i-th speaker
/speaker/[index]/label/color [color] : set the color for the label for the i-th speaker
/speaker/[index]/label/justification [string] : set the text justification for the label for the i-th speaker
/speaker/[index]/vumeter/visible [boolean] : set the visibility for the vumeter for the i-th speaker
/speaker/[index]/level [number] : set the vumeter level (in dB) for the i-th speaker
/speakers/aed [nnnn...] : set the list of speaker coordinates (with aed format)

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/speakers/xyz [nnnn...] : set the list of speaker coordinates (with xyz format)
/speakers/ade [nnnn...] : set the list of speaker coordinates (with ade format)
/speakers/xy [nnnn...] : set the list of speaker coordinates (with xy format)
/speakers/ae [nnnn...] : set the list of speaker coordinates (with ae format)
/speaker/[index]/aed [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)
/speaker/[index]/ade [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)
/speaker/[index]/xyz [number][number][number] : set the position of the i-th loudspeaker using cartesian coordinates
/speaker/[index]/xy [number][number] : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)
/speaker/[index]/ae [number][number] : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1)
/speaker/[index]/az [number] : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)
/speaker/[index]/tofront : bring the i-th speaker to the front of its siblings
/speaker/[index]/toback : bring the i-th speaker to the back of its siblings
/speaker/[index]/tofront [boolean] : bring the i-th speaker to the front or back of its siblings
/speaker/[index]/image [string] : set the image file (svg, jpg, png, etc.) to use for the i-th speaker
/speaker/[index]/image/clear : use the default image for the i-th speaker
/speakers/level [nnnn...] : set the vumeter levels (in dB) for all speakers
/speakers/visible [bbbb...] : set the visibility for all speakers
/stereo/number [int] : set the number of stereo pairs
/stereo/[index]/visible [boolean] : set the visibility of the i-th stereo pair
/stereo/[index]/editable [boolean] : set the editability of the i-th stereo pair
/stereo/[index]/select [boolean] : select the i-th stereo pair
/stereo/[index]/color [color] : set the color of the i-th stereo pair
/stereo/[index]/proportion [number] : set the proportion the i-th stereo pair
/stereo/[index]/constraint/circular [boolean] : set the circular constraints for the i-th stereo pair
/stereo/[index]/label [string] : set the label for the i-th stereo pair
/stereo/[index]/label/visible [boolean] : set the visibility for the label for the i-th stereo pair
/stereo/[index]/label/color [color] : set the color for the label for the i-th stereo pair
/stereo/[index]/label/justification [string] : set the text justification for the label for the i-th stereo pair
/stereo/[index]/vumeter/visible [boolean] : set the visibility for the vumeter for the i-th stereo pair
/stereo/[index]/level [number] : set the vumeter level (in dB) for the i-th stereo pair
/stereo/[index]/xyz [number][number][number] : set the position of the i-th stereo pair
/stereo/[index]/xy [number][number] : set the position of the i-th stereo pair
/stereo/[index]/x [number] : set the position of the i-th stereo pair
/stereo/[index]/y [number] : set the position of the i-th stereo pair
/stereo/[index]/z [number] : set the position of the i-th stereo pair
/stereo/[index]/aed [number][number][number] : set the position of the i-th stereo pair
/stereo/[index]/ade [number][number][number] : set the position of the i-th stereo pair
/stereo/[index]/ae [number][number] : set the position of the i-th stereo pair
/stereo/[index]/ad [number][number][number] : set the position of the i-th stereo pair
/stereo/[index]/az [number] : set the position of the i-th stereo pair
/stereo/[index]/azim [number] : set the position of the i-th stereo pair
/stereo/[index]/elev [number] : set the position of the i-th stereo pair
/stereo/[index]/dist [number] : set the position of the i-th stereo pair
/stereo/[index]/azim++ [number] : set the position of the i-th stereo pair
/stereo/[index]/elev++ [number] : set the position of the i-th stereo pair
/stereo/[index]/dist++ [number] : set the position of the i-th stereo pair
/stereo/[index]/dist*= [number] : set the position of the i-th stereo pair
/stereo/[index]/aperture [number] : set the aperture of the i-th stereo pair
/stereo/[index]/aperture/visible [boolean] : set the visibility for the aperture of the i-th stereo pair
/stereo/[index]/aperture/color [color] : set the color for the aperture of the i-th stereo pair
/stereo/[index]/yaw/mode [string] : set the yaw mode of the i-th stereo pair
/stereo/[index]/yaw [number] : set the yaw angle (in deg) of the i-th stereo pair, using Euler zyx convention
/stereo/[index]/pitch [number] : set the pitch angle (in deg) of the i-th stereo pair, using Euler zyx convention
/stereo/[index]/roll [number] : set the roll angle (in deg) of the i-th stereo pair, using Euler zyx convention
/stereo/[index]/orientation [number][number][number][number] : set the orientation quaternion (xyzw) of the i-th stereo pair
/stereos/level [nnnn...] : set the vumeter levels (in dB) for all stereo pairs
/listener/visible [boolean] : set the visibility of the listener
/listener/editable [boolean] : set the listener editable
/listener/headphones/visible [boolean] : set the visibility of the headphones
/listener/orientation/visible [boolean] : set the visibility of the orientation
/listener/orientation [quaternion] : set the orientation of the listener
/listener/proportion [number] : set the display proportion of the listener
/listener/select [boolean] : select/unselect the listener
/listener/aed [number][number][number] : set the listener position (azimuth/elevation/distance)
/hoa/number [int] : set the number of HOA fields
/hoa/[index]/yaw [number] : set the yaw angle of the i-th HOA field
/background/color [color] : set the window background color
/background/transparency [number] : set the window transparency (in /backgroundimage/file [string] : set the background image (png, jpg, etc.)
/backgroundimage/visible [boolean] : set the visibility of the background image
/backgroundimage/opacity [number] : set the opacity of the background image
/backgroundimage/scale [number] : set the scale factor of the background image
/backgroundimage/angle [number] : set the rotation angle (in deg) of the background image
/backgroundimage/offset/x [number] : set the x translation offset of the background image
/backgroundimage/offset/y [number] : set the y translation offset of the background image

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/backgroundimage/offset/xy [number][number] : set the x/y translation offset of the background image  
 /backgroundimage/quality [string] : set the resampling quality of the background image (low, medium, high)  
 /display/zoom [number] : set the display zoom factor (/display/offset/x [number] : set the display x translation offset (in pixels)  
 /display/offset/y [number] : set the display y translation offset (in pixels)  
 /display/offset/z [number] : set the display z translation offset (in pixels)  
 /display/offset/xy [number][number] : set the display x/y translation offsets (in pixels)  
 /display/offset/xyz [number][number][number] : set the display x/y/z translation offsets (in pixels)  
 /display/zoom/lock [boolean] : enable/disable zooming with the mouse wheel  
 /axis/visible [boolean] : set the visibility of the axis  
 /axis/color [color] : set the axis color  
 /axis/label/visible [boolean] : set the visibility of the axis label  
 /axis/origin/visible [boolean] : set the visibility of the axis origin  
 /axis/thickness [number] : set line thickness  
 /grid/visible [boolean] : set the visibility of the grid  
 /grid/mode [string] : set the grid mode. Possible values: none, circular, cartesian  
 /grid/spacing [number] : set the spacing between grid lines (in meters)  
 /grid/line/number [number] : set the number of grid lines  
 /grid/angulardivisions/number [number] : set the number of angular divisions  
 /grid/angulardivisions/visible [boolean] : set the visibility of angular divisions  
 /grid/dashed [boolean] : set the line style  
 /grid/color [color] : set the line color  
 /grid/thickness [number] : set line thickness  
 /grid/unitcircle/visible [boolean] : set the visibility of the unit circle  
 /grid/unitcircle/color [color] : set the color of the unit circle  
 /grid/unitcircle/radius [number] : set the radius of the unit circle  
 /legend/visible [boolean] : set the visibility of the legend  
 /legend/color [color] : set the legend color  
 /legend/unit [string] : set distance unit  
 /emphasis/source [boolean] : emphasize sources when mouse in proximity  
 /emphasis/stereo [boolean] : emphasize stereos when mouse in proximity  
 /emphasis/speaker [boolean] : emphasize speakers when mouse in proximity  
 /emphasis/microphone [boolean] : emphasize microphones when mouse in proximity  
 /ruler/visible [boolean] : set the visibility of the ruler  
 /ruler/color [color] : set the ruler color  
 /ruler/unit [string] : set the unit of the ruler  
 /area/number [int] : set the number of areas  
 /area/[index]/vertex/number [int] : set the number of vertex for the i-th area  
 /area/[index]/vertex/[index]/xy [number][number] : set position of the j-th vertex of the i-th area  
 /area/[index]/vertex/[index]/xyz [number][number][number] : set position of the j-th vertex of the i-th area  
 /area/[index]/vertex/[index]/aed [number][number][number] : set position of the j-th vertex of the i-th area  
 /area/[index]/visible [boolean] : set visibility for the i-th area  
 /area/[index]/color [color] : set color for the i-th area  
 /area/[index]/name [string] : set name for the i-th area  
 /path/number [int] : set the number of paths  
 /path/[index]/vertex/number [int] : set the number of vertex for the i-th path  
 /path/[index]/vertex/[index]/xy [number][number] : set position of the j-th vertex of the i-th path  
 /path/[index]/vertex/[index]/xyz [number][number][number] : set position of the j-th vertex of the i-th path  
 /path/[index]/vertex/[index]/aed [number][number][number] : set position of the j-th vertex of the i-th path  
 /path/[index]/visible [boolean] : set visibility for the i-th path  
 /path/[index]/color [color] : set color for the i-th path  
 /speakerhull/color [color] : set the hull color  
 /speakerhull/visible [boolean] : set the visibility of the hull  
 /speakerhull/fill/color [color] : set the hull interior color  
 /speakerhull/fill [boolean] : fill the hull  
 /layout [string] : set the window layout. Possible values: single, leftright, topbottom, automatic

## see also

- spat5.spat~
- spat5.viewer
- spat5.ircamverb
- spat5.hlsshelf
- spat5.oper\_
- spat5.ircamverb
- spat5.panoramix
- spat5.trajectories

## spat5.oper\_\_ Convert high-level (perceptual) messages to low-level description

**spat5.oper\_\_** converts high-level (perceptual) messages from **spat5.oper** to low-level (DSP) messages. This is similar to **spat5.oper** left-most outlet.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @internals [int]

The **internals** attribute represents the number of internal channels of the artificial reverberator.

Spat uses a Feedback Delay Network (FDN) reverberator engine.

Basically this can be seen as an array of delay lines which are fed back into a mixing matrix. The **internals** attributes represents the size of the feedback matrix.

Choosing the size of this matrix is a trade-off between CPU consumption and the echo density.

Increasing the size of the matrix will generate a denser reverb tail at the expense of a higher CPU load.

A typical value of 8 is a good compromise between CPU load and natural sounding reverb. A value of 16 may be useful especially when dealing with a very long reverberation time or with very percussive sound (where a smaller FDN might sometimes sounds too poor).

Increasing the **internals** attribute may also be helpful when using a large number of loudspeakers, to ensure a proper decorrelation of the reproduced late reverberation signals.

It is recommended not to use a value below 6.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window

**/status/openorclose** : open the status window if it was closed; close it if it was opened

**/status/font/size [number]** : set the font size of the status window

**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)

**/help** : open the help window and bring it to front

**/help/open** : open the help window and bring it to front

**/help/close** : close the help window

**/help/openorclose** : open the help window if it was closed; close it if it was opened

**/help/font/size [number]** : set the font size of the help window

**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)

**/snapshot** : open the snapshot window and bring it to front

**/snapshot/open** : open the snapshot window and bring it to front

**/snapshot/close** : close the snapshot window

**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened

**/snapshot/font/size [number]** : set the font size of the snapshot window

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/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.oper
- spat5.spat~



## spat5.osc.append

## Append arguments to the end of the OSC address

### description

**spat5.osc.append** appends arguments to the end of the OSC address.

### attributes

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.prepend`
- `spat5.osc.route`
- `spat5.osc.routepass`
- `prepend`
- `append`
- `spat5.osc.split`
- `spat5.osc.unslashify`
- `spat5.osc.trim`
- `spat5.osc.ignore`
- `route`
- `routepass`
- `spat5.osc.print`



## spat5.osc.change

## Filter out repetitions of OSC messages

### description

**spat5.osc.change** is similar to Max **change** object; it operates on the incoming OSC messages.

### attributes

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.route`
- `spat5.osc.routepass`
- `spat5.osc.prepend`
- `spat5.osc.append`
- `spat5.osc.flip`
- `spat5.osc.unslashify`
- `spat5.osc.trim`
- `route`
- `routepass`
- `spat5.osc.view`
- `spat5.osc.print`
- `spat5.osc.iter`

## spat5.osc.chunk

## Split an OSC bundle into smaller chunks.

### description

**spat5.osc.chunk** splits an OSC bundle into smaller chunks, with a given max size (in bytes). Can be useful for UDP transmission.

### attributes

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name

```

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.iter`
- `spat5.osc.size`
- `spat5.osc.collect`
- `spat5.osc.view`
- `spat5.osc.todict`
- `spat5.osc.fromdict`
- `spat5.osc.split`
- `spat5.osc.route`
- `spat5.osc.routepass`
- `spat5.osc.prepend`
- `spat5.osc.append`
- `spat5.osc.unslashify`
- `spat5.osc.flip`
- `spat5.osc.ignore`
- `route`
- `routepass`
- `spat5.osc.print`

## spat5.osc.collect

## Collects OSC messages to be bundled together

### description

**spat5.osc.collect** collects OSC messages to be bundled together.

### attributes

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.osc.view
- spat5.osc.iter
- spat5.osc.todict
- spat5.osc.fromdict
- dict
- dict.view
- spat5.osc.var
- spat5.osc.split
- spat5.osc.route
- spat5.osc.routepass
- spat5.osc.prepend
- spat5.osc.append
- spat5.osc.unslashify
- spat5.osc.flip
- spat5.osc.ignore
- route
- routepass
- spat5.osc.speedlim
- spat5.osc.queue

# spat5.osc.flip Flip OSC patterns

## description

**spat5.osc.flip** flips the OSC pattern of incoming messages or bundles.

## attributes

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name



`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.split`
- `spat5.osc.route`
- `spat5.osc.routeypass`
- `spat5.osc.prepend`
- `spat5.osc.append`
- `spat5.osc.unslashify`
- `spat5.osc.trim`
- `spat5.osc.ignore`
- `route`
- `routeypass`
- `spat5.osc.print`

## spat5.osc.fromdict

## Convert dictionary to OSC messages or bundles

### description

**spat5.osc.fromdict** dictionary to OSC messages or bundles.

### attributes

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.todict`
- `dict`
- `dict.view`
- `spat5.osc.view`
- `spat5.osc.collect`
- `spat5.osc.var`
- `spat5.osc.split`
- `spat5.osc.route`
- `spat5.osc.routepass`
- `spat5.osc.prepend`
- `spat5.osc.append`
- `spat5.osc.unslashify`
- `spat5.osc.flip`
- `spat5.osc.ignore`
- `route`
- `routepass`

## spat5.osc.ignore

## Route OSC messages or bundles

## description

**spat5.osc.ignore** filters out OSC messages that match an OSC address pattern. It is somehow the opposite of **spat5.osc.route**.

## attributes

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.routepass`
- `spat5.osc.route`
- `route`
- `routepass`
- `spat5.osc.append`
- `prepend`
- `append`
- `spat5.osc.split`
- `spat5.osc.unslashify`
- `spat5.osc.trim`
- `spat5.osc.print`

## spat5.osc.interpolate

## Interpolate between OSC bundles/messages

### description

**spat5.osc.interpolate** performs linear interpolation between two OSC bundles.messages.

### attributes

@filterout []

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
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/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot

```

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.osc.collect
- spat5.osc.queue
- spat5.osc.route
- spat5.osc.routepass
- spat5.osc.prepend
- spat5.osc.append
- spat5.osc.flip
- spat5.osc.unslashify
- spat5.osc.trim
- route
- routepass
- spat5.osc.view
- spat5.osc.print
- spat5.osc.iter



## spat5.osc.iter

## Iterate over each each messages of an OSC bundle

### description

**spat5.osc.iter** iterates over each each messages of an OSC bundle.

### attributes

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.collect`
- `spat5.osc.view`
- `spat5.osc.todict`
- `spat5.osc.fromdict`
- `spat5.osc.split`
- `spat5.osc.route`
- `spat5.osc.routepass`
- `spat5.osc.prepend`
- `spat5.osc.append`
- `spat5.osc.unslashify`
- `spat5.osc.flip`
- `spat5.osc.ignore`
- `route`
- `routepass`
- `spat5.osc.print`

## spat5.osc.pack

## Concatenate OSC packets together

## description

spat5.osc.pak is similar to pack for OSC packets (messages or bundles).

## attributes

## methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name

```

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.pak`
- `spat5.osc.view`
- `spat5.osc.var`
- `spat5.osc.split`
- `spat5.osc.route`
- `spat5.osc.routepass`
- `spat5.osc.prepend`
- `spat5.osc.append`

## spat5.osc.pak

## Concatenate OSC packets together

### description

**spat5.osc.pak** is similar to pak for OSC packets (messages or bundles).

### attributes

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
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'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
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/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name

```

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.pack`
- `spat5.osc.view`
- `spat5.osc.var`
- `spat5.osc.split`
- `spat5.osc.route`
- `spat5.osc.routepass`
- `spat5.osc.prepend`
- `spat5.osc.append`

## spat5.osc.play~

## Playback time-stamped OSC messages

### description

**spat5.osc.play~** delivers time-stamped OSC messages.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window

**/status/openorclose** : open the status window if it was closed; close it if it was opened

**/status/font/size [number]** : set the font size of the status window

**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)

**/help** : open the help window and bring it to front

**/help/open** : open the help window and bring it to front

**/help/close** : close the help window



```

/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.osc.record~
- spat5.osc.view

## spat5.osc.prepend

## Add arguments in front of the OSC address

### description

**spat5.osc.prepend** adds arguments in front of the OSC address.

### attributes

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.append`
- `spat5.osc.route`
- `spat5.osc.routepass`
- `prepend`
- `append`
- `spat5.osc.split`
- `spat5.osc.unslashify`
- `spat5.osc.trim`
- `spat5.osc.ignore`
- `route`
- `routepass`
- `spat5.osc.print`

# spat5.osc.print      Print OSC messages or bundle

## description

**spat5.osc.print** prints OSC messages or bundles in the Max console.

## attributes

@timetag []

## methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
```

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- print
- spat5.osc.collect
- spat5.osc.view
- spat5.osc.todict
- spat5.osc.fromdict
- spat5.osc.split
- spat5.osc.route
- spat5.osc.routepass
- spat5.osc.prepend
- spat5.osc.append
- spat5.osc.unslashify
- spat5.osc.flip
- spat5.osc.ignore
- route
- routepass

# spat5.osc.queue FIFO OSC queue

## description

**spat5.osc.queue** acts as a FIFO (first-in first-out) queue of OSC messages or bundles.

## attributes

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`. Note that the `initwith` attribute cannot be set via message, `attrui` or `inspector`; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.osc.var
- spat5.osc.collect
- spat5.osc.view
- spat5.osc.speedlim
- spat5.osc.todict
- spat5.osc.fromdict
- spat5.osc.split
- spat5.osc.route
- spat5.osc.routepass
- spat5.osc.prepend
- spat5.osc.append
- spat5.osc.unslashify
- spat5.osc.flip
- spat5.osc.ignore
- route
- routepass
- spat5.osc.print



## spat5.osc.record~

## Record time-stamped OSC messages

### description

**spat5.osc.record~** records time-stamped OSC messages.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window

**/status/openorclose** : open the status window if it was closed; close it if it was opened

**/status/font/size [number]** : set the font size of the status window

**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)

**/help** : open the help window and bring it to front

**/help/open** : open the help window and bring it to front

**/help/close** : close the help window

```

/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.osc.play~
- spat5.osc.view

## spat5.osc.replace

## Replace OSC address

### description

**spat5.osc.replace** is similar to **spat5.osc.route** followed by **spat5.osc.prepend**.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @tautological []

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string] [string] [number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

```

```

/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.osc.route
- spat5.osc.routeypass
- spat5.osc.prepend
- spat5.osc.append
- spat5.osc.flip
- spat5.osc.unslashify
- spat5.osc.trim
- route
- routeypass
- spat5.osc.view
- spat5.osc.print
- spat5.osc.iter

## spat5.osc.route

## Route OSC messages or bundles

### description

**spat5.osc.route** tries to match an OSC address pattern, and accordingly dispatches to the proper outlet. It is quite similar to CNMAT **OSC-Route** object.

### attributes

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.osc.routepass
- route
- routepass
- spat5.osc.ignore
- spat5.osc.append
- prepend
- append
- spat5.osc.split
- spat5.osc.unslashify
- spat5.osc.trim
- spat5.osc.print

## spat5.osc.routepass

## Route OSC messages or bundles

## description

**spat5.osc.routepass** tries to match an OSC address pattern, and accordingly dispatches to the proper outlet. It is quite similar to CNMAT OSC-Route object.

## attributes

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)



/snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.osc.route
- route
- routepass
- spat5.osc.ignore
- spat5.osc.append
- prepend
- append
- spat5.osc.split
- spat5.osc.unslashify
- spat5.osc.trim
- spat5.osc.print

# spat5.osc.size Report the size of an OSC message or bundle

## description

**spat5.osc.size** reports the size of an OSC message or bundle.

## attributes

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.osc.collect
- spat5.osc.iter
- spat5.osc.view
- spat5.osc.todict
- spat5.osc.fromdict
- spat5.osc.split
- spat5.osc.route
- spat5.osc.routepass
- spat5.osc.prepend
- spat5.osc.append
- spat5.osc.unslashify
- spat5.osc.flip
- spat5.osc.ignore
- route
- routepass
- spat5.osc.print

## spat5.osc.slashify

## Convert Max messages to OSC

## description

**spat5.osc.slashify** tries to convert standard Max message into OSC message.

## attributes

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.unslashify`
- `print`
- `spat5.osc.collect`
- `spat5.osc.view`
- `spat5.osc.todict`
- `spat5.osc.fromdict`
- `spat5.osc.split`
- `spat5.osc.route`
- `spat5.osc.routepass`
- `spat5.osc.prepend`
- `spat5.osc.append`
- `spat5.osc.flip`
- `spat5.osc.ignore`
- `route`
- `routepass`

## spat5.osc.speedlim

## Limit the speed of OSC messages throughput

### description

**spat5.osc.speedlim** is similar to Max **speedlim**; it limits the speed OSC messages throughput.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @rate []

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

```

```

/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.osc.collect
- spat5.osc.queue
- spat5.osc.route
- spat5.osc.routepass
- spat5.osc.prepend
- spat5.osc.append
- spat5.osc.flip
- spat5.osc.unslashify
- spat5.osc.trim
- route
- routepass
- spat5.osc.view
- spat5.osc.print
- spat5.osc.iter



## spat5.osc.split

## Split OSC messages

### description

**spat5.osc.split** splits OSC messages into lists.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```

`/snapshot/recall/next` : recall the next snapshot  
`/snapshot/recall/previous` : recall the previous snapshot  
`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)  
`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)  
`/snapshot/recall [int]` : recall the i-th snapshot  
`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)  
`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name  
`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.iter`
- `spat5.osc.view`
- `spat5.osc.route`
- `spat5.osc.routeypass`
- `spat5.osc.prepend`
- `spat5.osc.append`
- `spat5.osc.flip`
- `spat5.osc.unslashify`
- `spat5.osc.trim`
- `route`
- `routeypass`
- `spat5.osc.print`

## spat5.osc.tcpreceive

## Receive OSC messages or bundles from TCP

### description

**spat5.osc.tcpreceive** receives OSC messages or bundles over TCP. NB: you should not use multiple instances of the object with the same port number. Note also that, at the moment, the object supports only one incoming connection (i.e. one TCP sender); simultaneous connections are not supported.

### attributes

**@ip** [string]

IP address.

**@port** [int]

Port number.

**@quiet** []

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
`/snapshot/[index]/export [string]` : export the i-th snapshot to file  
`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file  
`/snapshot/export [string]` : export all snapshots to file  
`/snapshot/import [string]` : import all snapshots from file  
`/snapshot/recall/next` : recall the next snapshot  
`/snapshot/recall/previous` : recall the previous snapshot  
`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)  
`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)  
`/snapshot/recall [int]` : recall the i-th snapshot  
`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)  
`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name  
`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.tcpsend`
- `spat5.osc.udpsend`
- `spat5.osc.udpreceive`
- `spat5.osc.fromdict`
- `dict`
- `dict.view`
- `spat5.osc.collect`
- `spat5.osc.var`
- `spat5.osc.split`
- `spat5.osc.route`
- `spat5.osc.routepass`
- `spat5.osc.prepend`
- `spat5.osc.append`
- `spat5.osc.unslashify`
- `spat5.osc.flip`
- `spat5.osc.ignore`
- `route`
- `routepass`

## spat5.osc.tcpsend

## Transmit OSC messages or bundles over TCP

### description

spat5.osc.udpsend transmits OSC messages or bundles over TCP. **spat5.osc.tcpsend** is quite similar to the spat5.osc.udpsend object; however it transmits OSC messages or bundles (FullPacket) over TCP.

### attributes

**@ip** [string]

IP address.

**@port** [int]

Port number.

**@quiet** []

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.osc.tcpreceive
- udpsend
- udpreceive
- spat5.osc.udpsend
- spat5.osc.udpreceive
- spat5.osc.fromdict
- dict
- dict.view
- spat5.osc.collect
- spat5.osc.var
- spat5.osc.split
- spat5.osc.route
- spat5.osc.routeypass
- spat5.osc.prepend
- spat5.osc.append
- spat5.osc.unslashify
- spat5.osc.flip
- spat5.osc.ignore
- route
- routeypass

## spat5.osc.todict

## Convert OSC messages or bundles to dictionary

## description

**spat5.osc.todict** converts OSC messages or bundles to dictionary.

## attributes

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name



`/snapshot/jump/bytitle` [string] : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock` [boolean] : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.fromdict`
- `dict`
- `dict.view`
- `spat5.osc.collect`
- `spat5.osc.var`
- `spat5.osc.split`
- `spat5.osc.route`
- `spat5.osc.routepass`
- `spat5.osc.prepend`
- `spat5.osc.append`
- `spat5.osc.unslashify`
- `spat5.osc.flip`
- `spat5.osc.ignore`
- `route`
- `routepass`

## spat5.osc.trim

## Trim OSC patterns

## description

**spat5.osc.trim** trims the first (or last) patterns of the OSC address of incoming messages or bundles.

## attributes

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
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**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.osc.split
- spat5.osc.route
- spat5.osc.routeypass
- spat5.osc.prepend
- spat5.osc.append
- spat5.osc.unslashify
- spat5.osc.flip
- spat5.osc.ignore
- route
- routeypass
- spat5.osc.print

## spat5.osc.udpreceive

## Receive OSC messages or bundles from UDP

### description

**spat5.osc.udpreceive** receives OSC messages or bundles over UDP. **spat5.osc.udpreceive** is quite similar to the **udpreceive** object; however it only receives OSC messages or bundles (FullPacket). NB: you should not use multiple instances of the object with the same port number.

### attributes

**@port** [int]

Port number.

**@quiet** []

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- udpsend
- udpreceive
- spat5.osc.udpsend
- spat5.osc.tcpsend
- spat5.osc.tcpreceive
- spat5.osc.fromdict
- dict
- dict.view
- spat5.osc.collect
- spat5.osc.var
- spat5.osc.split
- spat5.osc.route
- spat5.osc.routepass
- spat5.osc.prepend
- spat5.osc.append
- spat5.osc.unslashify
- spat5.osc.flip
- spat5.osc.ignore
- route
- routepass

## spat5.osc.udpsend

## Transmit OSC messages or bundles over UDP

### description

**spat5.osc.udpsend** transmits OSC messages or bundles over UDP. **spat5.osc.udpsend** is quite similar to the **udpsend** object; however it only transmits OSC messages or bundles (FullPacket).

### attributes

**@ip** [string]

IP address.

**@port** [int]

Port number.

**@quiet** []

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- udpsend
- udpreceive
- spat5.osc.udpreceive
- spat5.osc.tcpsend
- spat5.osc.tcpreceive
- spat5.osc.fromdict
- dict
- dict.view
- spat5.osc.collect
- spat5.osc.var
- spat5.osc.split
- spat5.osc.route
- spat5.osc.routepass
- spat5.osc.prepend
- spat5.osc.append
- spat5.osc.unslashify
- spat5.osc.flip
- spat5.osc.ignore
- route
- routepass



# spat5.osc.unique Remove duplicated address pattern in OSC bundle

## description

**spat5.osc.unique** makes sure address pattern are uniquely represented inside an OSC bundle.

## attributes

### @mode [string]

The `mode` attribute is used to specify the "input type" of each source. **spat5.spat~** supports mono and stereo input sources.

Note that the `mode` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Possible syntax:

@mode "mono" : all sources are mono (default)

@mode "stereo" : all sources are stereo

@mode "mono mono stereo" : a list of modes for each of the 3 sources

You can also use the shorthand notation : @mode "m m s"

@mode "mono 2 stereo 1" : 2 mono sources, followed by 1 stereo source

You can also use the shorthand notation : @mode "m 2 s 1"

## methods

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

```

/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.osc.collect
- spat5.pak
- spat5.pack
- spat5.osc.split
- spat5.osc.route
- spat5.osc.routepass
- spat5.osc.prepend
- spat5.osc.append
- spat5.osc.unslashify
- spat5.osc.flip
- spat5.osc.ignore
- route
- routepass
- spat5.osc.print

## spat5.osc.unslashify

## Split OSC address pattern

### description

**spat5.osc.unslashify** converts OSC messages or bundles into traditional Max messages.

### attributes

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.slashify`
- `print`
- `spat5.osc.collect`
- `spat5.osc.view`
- `spat5.osc.todict`
- `spat5.osc.fromdict`
- `spat5.osc.split`
- `spat5.osc.route`
- `spat5.osc.routepass`
- `spat5.osc.prepend`
- `spat5.osc.append`
- `spat5.osc.flip`
- `spat5.osc.ignore`
- `route`
- `routepass`

## spat5.osc.var

## Store OSC messages or bundles

### description

**spat5.osc.var** copies an OSC packet and stores it for later use. The content can further be stored in the patcher, with the `embed` attribute.

### attributes

**@embed** [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
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/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
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/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
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/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot

```

/snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.osc.view
- spat5.osc.todict
- spat5.osc.fromdict
- dict
- dict.view
- spat5.osc.collect
- spat5.osc.split
- spat5.osc.route
- spat5.osc.routeypass
- spat5.osc.prepend
- spat5.osc.append
- spat5.osc.unslashify
- spat5.osc.flip
- spat5.osc.ignore
- route
- routeypass

# spat5.pan Control-rate amplitude panning

## description

**spat5.pan** computes and outputs a list of loudspeaker gains (linear gains) based on a given source position. It only works for amplitude panning laws (as opposed to time-difference methods such as AB stereo, binaural, etc.).

### Reference(s) :

V. Pulkki. Virtual Sound Source Positioning Using Vector Base Amplitude Panning. Journal of the Audio Engineering Society, 45(6):456 – 466, June 1997.

T. Lossius, P. Balthazar, and T. de la Hogue. DBAP - Distance-Based Amplitude Panning. In Proc. of the International Computer Music Conference (ICMC), Montreal, Canada, 2009.

R. Sadek and C. Kyriakakis. A novel multichannel panning method for standard and arbitrary loudspeaker configurations. In Proc. of the 117th Convention of the Audio Engineering Society (AES), San Francisco, CA, USA, 2004.

J.-M. Pernaux, P. Boussard, and J.-M. Jot. Virtual Sound Source Positioning and Mixing in 5.1 Implementation on the Real-Time System Genesis. In Proc. of the Int Conference on Digital Audio Effects (DAFx), Barcelona, Spain, Nov 19-21, 1998.

J. Daniel. Representation de champs acoustiques, application a la transmission et a la reproduction de scenes sonores complexes dans un contexte multimedia. PhD thesis, Université de Paris VI, 2001.

J. Daniel. Spatial Sound Encoding Including Near Field Effect: Introducing Distance Coding Filters and a Viable, New Ambisonic Format. In Proc of the AES 23rd International Conference, Copenhagen, Denmark, May 2003.

M. Neukom and J. C. Schacher. Ambisonics Equivalent Panning. In Proc. of the International Computer Music Conference (ICMC), Belfast, Ireland, 2008.

M. Neukom. Ambisonics Panning. In Proc. of the 123rd AES Convention, New York, NY, USA, Oct 2007.

J.-M. Jot, V. Larcher, and J.-M. Pernaux. A comparative study of 3-d audio encoding and rendering techniques. In Proc. of the 16th Audio Engineering Society International Conference on Spatial Sound Reproduction, Rovaniemi, Finland, 1999.

I. I. Bukvic. 3D time-based aural data representation using D4 library's layer based amplitude panning algorithm. Proc. of the 22nd International Conference on Auditory Display (ICAD), Canberra, Australia, July 2016.

M. A. Gerzon. General metatheory of auditory localization. In Proc. of the 92nd Convention of Audio Engineering Society (AES), Vienna, Austria, March 1992.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @inputs [int]

The **inputs** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @outputs [int]

The **outputs** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

## methods

**/panning/type [string]** : set panning type i.e. the type of algorithm used for rendering. A wide variety of panning methods are available, but there may be constraints depending on the number of inputs and/or outputs channels.

- "binaural" : binaural synthesis using HRTF (Head-Related Transfer Functions) filtering, for headphones only.
- "xy" : simulates the recording of the sound scene by a coincident XY couple of microphones (intensity panning), for stereo only.



- "ms" : simulates the recording of the sound scene by a mid-side microphone; this generates the M-S signals, and further requires decoding for L-R compatibility.
- "ab" : simulates the recording of the sound scene by an AB couple of microphones (ORTF) i.e. it simulates a pair of spaced cardioid microphones, pointing laterally at azimuths  $\pm 55$  degrees (elevation 0), with a distance of 17 cm between the two capsules; for stereo only.
- "stereopan" : stereo panpot (intensity panning) with various panning laws, for stereo only.
- "angular" : angular panning (intensity panning) for 2-D (horizontal only) loudspeaker setups. "angular" panning is essentially the same as "vbap2d", the main difference is how the panning gains evolve when moving the source from one speaker to another.
- "abap2d" : angle-based amplitude panning : pairwise amplitude panning for 2-D (horizontal only) loudspeaker setups. Provides linear panning vs target azimuth angle.
- "abip2d" : angle-based intensity panning : pairwise intensity panning for 2-D (horizontal only) loudspeaker setups. "abip2d" panning is essentially the same as "vbip2d", the main difference is how the panning gains evolve when moving the source from one speaker to another.
- "vbap2d" : vector base amplitude panning : pairwise amplitude panning for 2-D (horizontal only) loudspeaker setups, with power normalization of the gains.
- "vbap3d" : vector base amplitude panning : amplitude panning for 3-D loudspeaker setups. The underlying algorithm creates a triangulation of the loudspeaker array, and depending on the position of the virtual source, it selects the appropriate loudspeaker triplet.
- "vbip2d" : vector base intensity panning : pairwise intensity panning for 2-D (horizontal only) loudspeaker setups. The geometrical algorithm is similar to "vbap2d", however the speaker signals are normalized with constant intensity (rather than with constant power).
- "vbip3d" : vector base intensity panning : pairwise intensity panning for 3-D loudspeaker setups. The geometrical algorithm is similar to "vbap3d", however the speaker signals are normalized with constant intensity (rather than with constant power).
- "vbap" : vector base amplitude panning : will switch automatically between "vbap3d" or "vbap2d", depending on the loudspeaker setup.
- "vbip" : vector base intensity panning : will switch automatically between "vbip3d" or "vbip2d", depending on the loudspeaker setup.
- "dualbandvbp" : vector base panning : uses vbap for low frequencies and vbip for high frequencies. (either 2-D or 3-D speaker setup)
- "lbap" : layer based amplitude panning : this creates several vertical layers of loudspeakers, and operates each layer as a "vbap2d" setup. If the loudspeaker layout is planar, "lbap" is just the same as "vbap2d".
- "sphericalheadmodel" : binaural synthesis using an approximate spherical head model (Rayleigh) for both ILD and ITD. Elevation is not taken into account.
- "snowmanmodel" : binaural synthesis using an approximate snow-man model for head-and-torso (two spherical models).
- "nearfieldbinaural" : binaural synthesis using HRTF (Head-Related Transfer Functions) filtering, and with compensation (ITD and ILD) of nearfield effects.
- "hoa2d" : 2-D (horizontal only) higher order ambisonic (HOA) encoder.
- "hoa3d" : 3-D higher order ambisonic (HOA) encoder.
- "aep2d" : ambisonic equivalent panning in 2-D (horizontal only) .
- "aep3d" : ambisonic equivalent panning in 3-D.
- "spcap" : speaker-placement correction amplitude panning.
- "nfchoa2d" : 2-D (horizontal only) higher order ambisonic (HOA) encoder with Nearfield Compensation Filters (NFC).
- "nfchoa3d" : 3-D higher order ambisonic (HOA) encoder with Nearfield Compensation Filters (NFC).
- "knn" : K-nearest neighbors panning : applies amplitude panning on the K-nearest loudspeakers to the source. The (maximum) number K of contributing speakers can be specified with the "/source/[index]/neighbors [int]" message. This kind of panning is compatible with arbitrary loudspeaker setup (either 2D or 3D).
- "surround" : LRS or LCRS encoder. Deprecated, don't use it.
- "panr" : legacy panning law from spat v3.x. Deprecated, don't use it. Pair-wise panning over a regular arrangement of loudspeakers on a plane (2-D only).
- "dbap2d" : distance-based amplitude panning on a 2-D (horizontal only) speaker setup (after Trond lossius).
- "dbap3d" : .
- "subwoofers" : combines a lowpass filter and a "vbap2d" panner.
- "wfs" : wavefield synthesis for linear array of loudspeakers.
- "bformat" : legacy Ambisonic B-format amplitude panning. Deprecated, don't use it anymore; use "hoa2d" or "hoa3d" instead.
- "laap" : amplitude/intensity panning on a linear array of loudspeakers. Experimental prototype, don't use it.

. Possible values: binaural, xy, ms, ab, stereopan, surround, panr, angular, abap2d, abip2d, dbap3d, dbap2d, vbap, vbip, vbap3d, vbip3d, vbap2d, vbap2damp, hybrid-vbap, vbip2d, dualbandvbp, bformat, hoa2d, hoa3d, nfchoa3d, nfchoa2d, spcap, csp, knn, aep2d, aep3d, subwoofers, wfs, lbap, laap, sphericalheadmodel, snowmanmodel, nearfieldbinaural

/panning/subtype [string] : set panning subtype.

/source/[index]/mute [boolean] : mute/unmute the i-th source

/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates

/source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)

/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)

/source/[index]/xy\_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged

/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged

/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged

/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged

/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)

/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)

/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)

/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)

/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged

/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged

/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged

/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged

/source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged

/sources/aed [nnnn...] : set the list of source coordinates (with aed format)

/sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)

/sources/ade [nnnn...] : set the list of source coordinates (with ade format)

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/sources/xy [nnnn...] : set the list of source coordinates (with xy format)
/sources/ae [nnnn...] : set the list of source coordinates (with ae format)
/source/[index]/spread/omni [number] : set omni spread (in /source/[index]/spread/law [string] : set spread law for the i-th source
/source/[index]/spread/mode [number] : set spread mode for the i-th source
/source/[index]/divergence [boolean] : enable/disable divergence for the i-th source
/source/[index]/divergence/radius [number] : set minimum radius (in meters) for divergence for the i-th source
/ramp/time [number] : set ramp time (in msec) for gain smoothing
/format [string] : set coordinate format used in the status window
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- `spat5.pan~`
- `spat5.pansig~`
- `spat5.spat~`
- `matrix~`
- `spat5.viewer`
- `spat5.trajectories`
- `spat5.panner.metrics`

## spat5.panoramix

## 3D mixing and post-production workstation

### description

**spat5.panoramix** is a control interface for **spat5.panoramix~**. Designed as a virtual console, it provides a comprehensive environment for combining channel-, scene-, and object-based audio. The incoming streams are mixed in a flexible bus architecture which tightly couples sound spatialization with reverberation effects. The application supports a broad range of rendering techniques (VBAP, HOA, binaural, etc.) and it is remotely controllable via the Open Sound Control (OSC) protocol.

Reference(s) :

T. Carpentier and C. Cornuau. panoramix: station de mixage et post-production 3D. In Proc. of Journées d'Informatique Musicale (JIM), pages 162 – 169, Albi, France, April 2016.

T. Carpentier. Panoramix: 3D mixing and post-production workstation. In Proc. of the 42nd International Computer Music Conference (ICMC), pages 122 – 127, Utrecht, Netherlands, Sept 2016.

T. Carpentier. A versatile workstation for the diffusion, mixing, and post-production of spatial audio. In Proc. of the Linux Audio Conference (LAC), Saint-Etienne, France, May 2017.

T. Carpentier. Spat: a comprehensive toolbox for sound spatialization in Max. In Ideas Sonicas, Vol 13(24), pages 12 – 23, June 2021.

### attributes

#### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @inlets [int]

The **inlets** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @internals [int]

The **internals** attribute represents the number of internal channels of the artificial reverberator.

Spat uses a Feedback Delay Network (FDN) reverberator engine.

Basically this can be seen as an array of delay lines which are fed back into a mixing matrix. The **internals** attributes represents the size of the feedback matrix.

Choosing the size of this matrix is a trade-off between CPU consumption and the echo density.

Increasing the size of the matrix will generate a densier reverb tail at the expense of a higher CPU load.

A typical value of 8 is a good compromise between CPU load and natural sounding reverb. A value of 16 may be useful especially when dealing with a very long reverberation time or with very percussive sound (where a smaller FDN might sometimes sounds too poor).

Increasing the **internals** attribute may also be helpful when using a large number of loudspeakers, to ensure a proper decorrelation of the reproduced late reverberation signals.

It is recommended not to use a value below 6.

#### @outlets [int]

The **outlets** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

`/post/version` : print the version in the Max Console  
`/post/version [details]` : print detailed version in the Max Console  
`/post/doc` : print the help documentation in the Max Console  
`/post/state` : print the OSC status in the Max Console  
`/preset/load [string]` : load a preset from file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.  
`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)  
`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.  
`/status` : open the status window and bring it to front  
`/status/open` : open the status window and bring it to front  
`/status/close` : close the status window  
`/status/openorclose` : open the status window if it was closed; close it if it was opened  
`/status/font/size [number]` : set the font size of the status window  
`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)  
`/help` : open the help window and bring it to front  
`/help/open` : open the help window and bring it to front  
`/help/close` : close the help window  
`/help/openorclose` : open the help window if it was closed; close it if it was opened  
`/help/font/size [number]` : set the font size of the help window  
`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)  
`/snapshot` : open the snapshot window and bring it to front  
`/snapshot/open` : open the snapshot window and bring it to front  
`/snapshot/close` : close the snapshot window  
`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened  
`/snapshot/font/size [number]` : set the font size of the snapshot window  
`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)  
`/status/copytoclipboard` : copy the status to (the OS) clipboard  
`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)  
`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.  
`/snapshot/deleteall` : delete all the snapshots currently in memory  
`/snapshot/add` : create a new snapshot with the current state  
`/snapshot/add [string]` : create a new snapshot with the current state, and set its name  
`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)  
`/snapshot/[index]/recall` : recall the current state from the i-th snapshot  
`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)  
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`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard  
`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)  
`/snapshot/[index]/export [string]` : export the i-th snapshot to file  
`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file  
`/snapshot/export [string]` : export all snapshots to file  
`/snapshot/import [string]` : import all snapshots from file  
`/snapshot/recall/next` : recall the next snapshot  
`/snapshot/recall/previous` : recall the previous snapshot  
`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)  
`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)  
`/snapshot/recall [int]` : recall the i-th snapshot  
`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)  
`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name  
`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)  
`/master/name [string]` : set the name of the strip  
`/master/color [color]` : set the color of the strip  
`/master/numinputs [int]` : set the number of input channels of the strip  
`/master/numoutputs [int]` : set the number of output channels of the strip  
`/master/visible [boolean]` : set the visibility of the strip  
`/master/lock [boolean]` : lock/unlock the strip  
`/master/trim [number]` : set the input trim of the strip (in dB)  
`/master/gain [number]` : set the output gain of the strip (in dB)  
`/master/gain/ramptime [number]` : set the ramp time (in msec) for output gain

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/master/levels/input/visible [boolean] : show/hide the input vu-meters
/master/levels/input/post [boolean] : set input vu-meters pre/post fader
/master/levels/output/visible [boolean] : show/hide the output vu-meters
/master/levels/input/post [boolean] : set output vu-meters pre/post fader
/master/mute [boolean] : mute/unmute the strip
/master/annotation [string] : set annotation of the strip
/master/output/mode [string] : set output mode
/master/dim [boolean] : dim the master strip (-20 dB)
/master/dynamics/attack [number] : set attack time (in msec) for compressor/expander
/master/dynamics/release [number] : set release time (in msec) for compressor/expander
/master/dynamics/lookahead [number] : set lookahead time (in msec) for compressor/expander
/master/dynamics/compressor/threshold [number] : set threshold (in dB) for compressor
/master/dynamics/compressor/ratio [number] : set ratio for compressor
/master/dynamics/expander/threshold [number] : set threshold (in dB) for expander
/master/dynamics/expander/ratio [number] : set ratio for expander
/master/dynamics/makeup [number] : set makeup gain (in dB) for compressor/expander
/master/dynamics/link [boolean] : link all channels for compressor/expander
/master/dynamics/bypass [boolean] : bypass compressor/expander
/master/equalizer/bypass [boolean] : bypass the equalizer
/master/equalizer/gain [number] : set the global gain (in dB) of the equalizer
/master/equalizer/filter/[index]/freq [number] : set the frequency (in Hz) of the i-th section
/master/equalizer/filter/[index]/q [number] : set the resonance of the i-th section
/master/equalizer/filter/[index]/gain [number] : set the gain (in dB) of the i-th section
/master/equalizer/filter/[index]/order [int] : set the filter's order of the i-th section
/master/equalizer/filter/[index]/active [boolean] : enable/disable the i-th section
/monitoring/name [string] : set the name of the strip
/monitoring/color [color] : set the color of the strip
/monitoring/numinputs [int] : set the number of input channels of the strip
/monitoring/numoutputs [int] : set the number of output channels of the strip
/monitoring/visible [boolean] : set the visibility of the strip
/monitoring/lock [boolean] : lock/unlock the strip
/monitoring/trim [number] : set the input trim of the strip (in dB)
/monitoring/gain [number] : set the output gain of the strip (in dB)
/monitoring/gain/ramp [number] : set the ramp time (in msec) for output gain
/monitoring/levels/input/visible [boolean] : show/hide the input vu-meters
/monitoring/levels/input/post [boolean] : set input vu-meters pre/post fader
/monitoring/levels/output/visible [boolean] : show/hide the output vu-meters
/monitoring/levels/input/post [boolean] : set output vu-meters pre/post fader
/monitoring/mute [boolean] : mute/unmute the strip
/monitoring/annotation [string] : set annotation of the strip
/monitoring/dim [boolean] : dim the master strip (-20 dB)
/monitoring/dynamics/attack [number] : set attack time (in msec) for compressor/expander
/monitoring/dynamics/release [number] : set release time (in msec) for compressor/expander
/monitoring/dynamics/lookahead [number] : set lookahead time (in msec) for compressor/expander
/monitoring/dynamics/compressor/threshold [number] : set threshold (in dB) for compressor
/monitoring/dynamics/compressor/ratio [number] : set ratio for compressor
/monitoring/dynamics/expander/threshold [number] : set threshold (in dB) for expander
/monitoring/dynamics/expander/ratio [number] : set ratio for expander
/monitoring/dynamics/makeup [number] : set makeup gain (in dB) for compressor/expander
/monitoring/dynamics/link [boolean] : link all channels for compressor/expander
/monitoring/dynamics/bypass [boolean] : bypass compressor/expander
/monitoring/equalizer/bypass [boolean] : bypass the equalizer
/monitoring/equalizer/gain [number] : set the global gain (in dB) of the equalizer
/monitoring/equalizer/filter/[index]/freq [number] : set the frequency (in Hz) of the i-th section
/monitoring/equalizer/filter/[index]/q [number] : set the resonance of the i-th section
/monitoring/equalizer/filter/[index]/gain [number] : set the gain (in dB) of the i-th section
/monitoring/equalizer/filter/[index]/order [int] : set the filter's order of the i-th section
/monitoring/equalizer/filter/[index]/active [boolean] : enable/disable the i-th section
/monitoring/hrtf [string] : load hrtf from file or url (sofa format)
/monitoring/itd/scaling [number] : set ITD scaling factor (in /monitoring/listener/orientation [number] [number] [number] [number] : set listener
orientation from quaternion (xyzw)
/monitoring/listener/yaw [number] : set listener yaw angle (in deg), using Euler zyx convention
/monitoring/listener/pitch [number] : set listener pitch angle (in deg), using Euler zyx convention
/monitoring/listener/roll [number] : set listener roll angle (in deg), using Euler zyx convention
/monitoring/listener/ypz [number] [number] [number] : set listener orientation (yaw, pitch, roll in deg), using Euler zyx convention
/monitoring/headphoneeq/type [string] : set headphone type. Possible values: ak4100 closed, ak4100 open, ak4141mk2, ak4240df, ak4240mk2, ak4271mk2, ak4271studio, ak4601, ak4701, ak4702, audiotechnica ath m50, beyerdynamic dt250, beyerdynamic dt770pro 250ohms,
beyerdynamic dt880, beyerdynamic dt990pro, presonus hd7, sennheiser hd430, sennheiser hd480, sennheiser hd560ovationii, sennheiser hd565ovation,
sennheiser hd600, sennheiser hd650, shure srh940, none
/bus/number [number] : set the total number of busses
/bus/[index]/format [string] : set the format of the i-th bus ('Binaural', 'HOA', 'HOA2D', 'KNN', 'VBAP', 'VBAP2D', 'VBIP', 'VBIP2D',
'Angular2D', 'WFS', 'LBAP', etc.)
/bus/[index]/name [string] : set the name of the i-th bus
/bus/[index]/color [color] : set the color of the i-th bus

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/bus/[index]/numinputs [int] : set the number of input channels of the i-th bus
/bus/[index]/numoutputs [int] : set the number of output channels of the i-th bus
/bus/[index]/visible [boolean] : set the visibility of the strip
/bus/[index]/annotation [string] : set the annotation for the i-th bus
/bus/[index]/lock [boolean] : lock/unlock the strip
/bus/[index]/trim [number] : set the input trim of the strip (in dB)
/bus/[index]/gain [number] : set the output gain of the strip (in dB)
/bus/[index]/gain/ramptime [number] : set the ramp time (in msec) for output gain
/bus/[index]/mute [boolean] : mute/unmute the strip
/bus/[index]/levels/input/visible [boolean] : show/hide the input vu-meters
/bus/[index]/levels/input/post [boolean] : set input vu-meters pre/post fader
/bus/[index]/levels/output/visible [boolean] : show/hide the output vu-meters
/bus/[index]/levels/input/post [boolean] : set output vu-meters pre/post fader
/bus/[index]/delay [number] : set the delay (in msec) of the i-th bus (not applicable to all busses)
/bus/[index]/routing/output/[outputindex]/master [number] : route the j-th output of the i-th bus a given master channel
/bus/[index]/speakers/aed [number][number][number]... : set the list of speaker coordinates (aed) for the i-th bus (not applicable to all busses)
/bus/[index]/speakers/xyz [number][number][number]... : set the list of speaker coordinates (xyz) for the i-th bus (not applicable to all busses)
/bus/[index]/speaker/[index]/aed [number][number][number] : set the position of the j-th loudspeaker for the i-th bus (not applicable to all busses)
/bus/[index]/speaker/[index]/xyz [number][number][number] : set the position of the j-th loudspeaker for the i-th bus (not applicable to all busses)
/bus/[index]/speakers/correction/delay [string] : set delay correction ('on', 'off', 'auto') for the i-th bus (not applicable to all busses)
/bus/[index]/speakers/correction/gain [string] : set delay correction ('on', 'off', 'auto') for the i-th bus (not applicable to all busses)
/bus/[index]/speaker/[index]/delay [number] : set delay for the j-th speaker for the i-th bus (not applicable to all busses)
/bus/[index]/speaker/[index]/gain/db [number] : set gain (in dB) for the j-th speaker for the i-th bus (not applicable to all busses)
/bus/[index]/speakers/visible [boolean] : show/hide speakers of the i-th bus (not applicable to all busses)
/bus/[index]/speakers/editor/window/open : open the speakers editor for the i-th bus (not applicable to all busses)
/bus/[index]/speakers/editor/window/title [string] : set window title for the speakers editor for the i-th bus (not applicable to all busses)
/bus/[index]/monitor [boolean] : enable binaural monitoring for the i-th bus (not applicable to all busses)
/bus/[index]/spread [number] : set spread factor (in /bus/[index]/phantom/zenith [boolean] : insert a phantom speaker at the zenith (for vector-
base panning)
/bus/[index]/phantom/nadir [boolean] : insert a phantom speaker at the nadir (for vector-base panning)
/track/indices [iii...] : set the indices of Mono tracks
/stereo/indices [iii...] : set the indices of Stereo tracks
/multi/indices [iii...] : set the indices of Multi tracks
/hoastream/indices [iii...] : set the indices of HoaStream tracks
/hoadrir/indices [iii...] : set the indices of HoaDrir tracks
/em32/indices [iii...] : set the indices of EigenMike32 tracks
/em64/indices [iii...] : set the indices of EigenMike64 tracks
/tree/indices [iii...] : set the indices of Tree tracks
/zylia/indices [iii...] : set the indices of Zylia tracks
/bformat/indices [iii...] : set the indices of B-format tracks
/aformat/indices [iii...] : set the indices of A-format tracks
/d2m/indices [iii...] : set the indices of DirectToMaster tracks
/d2b/indices [iii...] : set the indices of DirectToBus tracks
/track/[index]/name [string] : set the name of the i-th track
/track/[index]/color [color] : set the color of the i-th track
/track/[index]/numinputs [int] : set the number of input channels of the i-th track
/track/[index]/visible [boolean] : set the visibility of the track
/track/[index]/gain [number] : set the output gain of the track (in dB)
/track/[index]/gain/ramptime [number] : set the ramp time (in msec) for output gain of the track
/track/[index]/mute [boolean] : mute/unmute the track
/track/[index]/annotation [string] : set the annotation for the track
/track/[index]/lock [boolean] : lock/unlock the track
/track/[index]/trim [number] : set the input trim of the track (in dB)
/track/[index]/delay [number] : set the delay of the i-th track (not applicable to all tracks)
/track/[index]/levels/input/visible [boolean] : show/hide the input vu-meters
/track/[index]/levels/input/post [boolean] : set input vu-meters pre/post fader
/track/[index]/levels/output/visible [boolean] : show/hide the output vu-meters
/track/[index]/levels/input/post [boolean] : set output vu-meters pre/post fader
/track/[index]/solo [boolean] : solo the track
/track/[index]/tofront : bring the i-th track to the front of its siblings
/track/[index]/toback : bring the i-th track to the back of its siblings
/track/[index]/tofront [boolean] : bring the i-th track to the front or back of its siblings
/track/[index]/xyz [number][number][number] : set the position of the i-th track using cartesian coordinates
/track/[index]/aed [number][number][number] : set the position of the i-th track using navigation coordinates (azimuth/elevation/distance)
/track/[index]/xy [number][number] : set the xy-coordinate of the i-th track, and use default z (=0)
/track/[index]/az [number] : set the azimuth of the i-th track, using default distance (=1) and elevation (=0)
/track/[index]/x [number][number] : set the x-coordinate of the i-th track, and keep y and z unchanged
/track/[index]/y [number][number] : set the y-coordinate of the i-th track, and keep x and z unchanged
/track/[index]/z [number][number] : set the z-coordinate of the i-th track, and keep x and y unchanged
/track/[index]/ade [number][number][number] : set the position of the i-th track using navigation coordinates (azimuth/distance/elevation)
/track/[index]/ae [number][number] : set the azimuth/elevation of the i-th track, using default distance (=1)
/track/[index]/ad [number][number] : set the azimuth/distance of the i-th track, using default elevation (=0)
/track/[index]/azim [number] : set the azimuth of the i-th track. Elevation and distance remain unchanged
/track/[index]/elev [number] : set the elevation of the i-th track. Azimuth and distance remain unchanged

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/track/[index]/dist [number] : set the distance of the i-th track. Azimuth and elevation remain unchanged
/track/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th track. Distance remains unchanged
/track/[index]/azimdist [number][number] : set the azimuth and distance of the i-th track. Elevation remains unchanged
/track/[index]/bus/A/destination [string] : set destination for bus send A
/track/[index]/bus/A/mute [boolean] : mute bus send A
/track/[index]/bus/A/gain [number] : set gain (in dB) for bus send A
/track/[index]/bus/B/destination [string] : set destination for bus send B
/track/[index]/bus/B/mute [boolean] : mute bus send B
/track/[index]/bus/B/gain [number] : set gain (in dB) for bus send B
/track/[index]/bus/C/destination [string] : set destination for bus send C
/track/[index]/bus/C/mute [boolean] : mute bus send C
/track/[index]/bus/C/gain [number] : set gain (in dB) for bus send C
/track/[index]/bus/D/destination [string] : set destination for bus send D
/track/[index]/bus/D/mute [boolean] : mute bus send D
/track/[index]/bus/D/gain [number] : set gain (in dB) for bus send D
/track/[index]/bus/E/destination [string] : set destination for bus send E
/track/[index]/bus/E/mute [boolean] : mute bus send E
/track/[index]/bus/E/gain [number] : set gain (in dB) for bus send E
/track/[index]/bus/F/destination [string] : set destination for bus send F
/track/[index]/bus/F/mute [boolean] : mute bus send F
/track/[index]/bus/F/gain [number] : set gain (in dB) for bus send F
/track/[index]/bus/G/destination [string] : set destination for bus send G
/track/[index]/bus/G/mute [boolean] : mute bus send G
/track/[index]/bus/G/gain [number] : set gain (in dB) for bus send G
/track/[index]/bus/H/destination [string] : set destination for bus send H
/track/[index]/bus/H/mute [boolean] : mute bus send H
/track/[index]/bus/H/gain [number] : set gain (in dB) for bus send H
/track/[index]/bus/send/display [string] : set which bus is displayed in the vu-meters
/track/[index]/bus/visible [string] : set which bus send(s) are visible
/track/[index]/lfe/send [string] : set LFE send gain (in dB)
/track/[index]/lfe/mute [boolean] : mute LFE send
/group/number [number] : set the number of groups
/group/[index]/name [number] : set name of the i-th group
/group/[index]/affects/mute [boolean] : enable mute in the i-th group
/group/[index]/affects/solo [boolean] : enable solo in the i-th group
/group/[index]/affects/send [boolean] : enable send in the i-th group
/group/[index]/active [boolean] : enable the i-th group
/group/add : add a new group
/group/add [string] : add a new group with the given name
/group/delete/bytitle [string] : delete the group with the given name
/group/delete/bypattern [string] : delete the group with the given OSC address
/session/delete/bytitle [string] : delete a track or bus, given its title
/session/delete/byaddress [string] : delete a track or bus, given its OSC address
/session/add/track [string][int][string][int] : create new track(s): [format][number of channels][title][number of tracks]
/session/add/track [string][int][string] : create one new track: [format][number of channels][title]
/session/add/track [string][int] : create one new track: [format][number of channels]
/session/add/bus [string][int][int] : create one new bus: [format][number of inputs][number of outputs]
/session/add/bus [string][int][int][int][int] : create new bus(es): [format][number of inputs][number of outputs][number of busses]
/options/lock [boolean] : lock/unlock the options strip
/options/color [color] : set the color of the options strip
/options/annotation [string] : set the annotation for the options strip
/options/vumeters/rate [number] : set the vu-meters refresh rate (msec)
/options/vumeters/input/visible [boolean] : set visibility for the input vumeters
/options/vumeters/output/visible [boolean] : set visibility for the output vumeters
/options/vumeters/visible [boolean] : set visibility for all vumeters
/options/clearsolo : clear all solo
/options/clearsolo/tracks : clear all tracks solo
/options/clearsolo/bus : clear all busses solo
/options/clearsolo/busses : clear all busses solo
/options/dock : dock or undock the spat viewer window
/options/dock/viewer : dock or undock the spat viewer window
/options/dock/equalizer : dock or undock the equalizer/compressor window
/options/dock/viewer/window/title [string] : set window title for spat viewer window
/options/dock/equalizer/window/title [string] : set window title for equalizer/compressor window
/options/parallel/bus [boolean] : enable multi-threading for bus
/options/parallel/tracks [boolean] : enable multi-threading for tracks
/grid/visible [boolean] : set the visibility of the grid
/grid/mode [string] : set the grid mode. Possible values: none, circular, cartesian
/grid/spacing [number] : set the spacing between grid lines (in meters)
/grid/line/number [number] : set the number of grid lines
/grid/angulardivisions/number [number] : set the number of angular divisions
/grid/angulardivisions/visible [boolean] : set the visibility of angular divisions
/grid/dashed [boolean] : set the line style
/grid/color [color] : set the line color

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/layout [string] : set the window layout. Possible values: single, leftright, topbottom  
 /display/zoom [number] : set the display zoom factor  
 /display/offsetx [number] : set the display x translation offset (in pixels)  
 /display/offsety [number] : set the display y translation offset (in pixels)  
 /display/offsetz [number] : set the display z translation offset (in pixels)  
 /display/zoom/lock [boolean] : enable/disable zooming with the mouse wheel  
 /axis/visible [boolean] : set the visibility of the axis  
 /axis/color [color] : set the axis color  
 /axis/label/visible [boolean] : set the visibility of the axis label  
 /axis/origin/visible [boolean] : set the visibility of the axis origin  
 /background/color [color] : set the window background color  
 /legend/visible [boolean] : set the visibility of the legend  
 /legend/color [color] : set the legend color  
 /emphasis/source [boolean] : emphasize sources when mouse in proximity  
 /emphasis/speaker [boolean] : emphasize speakers when mouse in proximity  
 /emphasis/microphone [boolean] : emphasize microphones when mouse in proximity  
 /area/number [int] : set the number of areas  
 /area/[index]/vertex/number [int] : set the number of vertex for the i-th area  
 /area/[index]/vertex/[index]/xy [number][number] : set position of the j-th vertex of the i-th area  
 /area/[index]/vertex/[index]/xyz [number][number][number] : set position of the j-th vertex of the i-th area  
 /area/[index]/vertex/[index]/aed [number][number][number] : set position of the j-th vertex of the i-th area  
 /area/[index]/visible [boolean] : set visibility for the i-th area  
 /area/[index]/color [color] : set color for the i-th area  
 /area/[index]/name [string] : set name for the i-th area  
 /window/title [string] : set the window title (in the window titlebar)  
 /window/visible [boolean] : set the window visibility  
 /window/moveable [boolean] : set the window movability  
 /window/resizable [boolean] : set the window resizability  
 /window/enable [boolean] : enable/disable the window  
 /window/background/color [color] : set the window background color  
 /window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency)  
 /window/fullscreen [boolean] : enable/disable fullscreen mode  
 /window/minimise [boolean] : minimize the window  
 /window/open : open the window (and bring it to front)  
 /window/close : close the window  
 /window/openorclose : open the window if it was closed; close it if it was opened  
 /window/size [number][number] : set the window size (width, height) (in pixels)  
 /window/width [number] : set the window width (in pixels)  
 /window/height [number] : set the window height (in pixels)  
 /window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)  
 /window/topleft [number][number] : set the window top left position (in pixels)  
 /window/centre : open the window, centering it on the screen  
 /window/rendering/engine [string] : set the graphical rendering engine of the window  
 /window/fps/visible [boolean] : display the FPS performances of the window  
 /window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)  
 /window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)  
 /window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)  
 /window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)  
 /window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)  
 /window/export/image [string] : export the window as an image file (png or jpeg)

## see also

- spat5.panoramix~
- spat5.spat~
- spat5.early~
- spat5.cluter~
- spat5.reverb~
- spat5.ircamverb~
- spat5.delgen
- spat5.shuffle~
- spat5.pan~
- spat5.decoder~
- spat5.osc.route
- spat5.osc.routeypass
- spat5.viewer

## spat5.panoramix~

## 3D mixing and post-production workstation

### description

**spat5.panoramix~** is a versatile workstation for the diffusion, mixing, and post-production of spatial sound. Designed as a virtual console, it provides a comprehensive environment for combining channel-, scene-, and object-based audio. The incoming streams are mixed in a flexible bus architecture which tightly couples sound spatialization with reverberation effects. The application supports a broad range of rendering techniques (VBAP, HOA, binaural, etc.) and it is remotely controllable via the Open Sound Control protocol. **spat5.panoramix~** is controlled by the **spat5.panoramix** user interface.

Reference(s) :

T. Carpentier and C. Cornuau. panoramix: station de mixage et post-production 3D. In Proc. of Journées d'Informatique Musicale (JIM), pages 162 – 169, Albi, France, April 2016.

T. Carpentier. Panoramix: 3D mixing and post-production workstation. In Proc. of the 42nd International Computer Music Conference (ICMC), pages 122 – 127, Utrecht, Netherlands, Sept 2016.

T. Carpentier. A versatile workstation for the diffusion, mixing, and post-production of spatial audio. In Proc. of the Linux Audio Conference (LAC), Saint-Etienne, France, May 2017.

T. Carpentier. Spat: a comprehensive toolbox for sound spatialization in Max. In Ideas Sonicas, Vol 13(24), pages 12 – 23, June 2021.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @inlets [int]

The **inlets** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @internals [int]

The **internals** attribute represents the number of internal channels of the artificial reverberator.

Spat uses a Feedback Delay Network (FDN) reverberator engine.

Basically this can be seen as an array of delay lines which are fed back into a mixing matrix. The **internals** attributes represents the size of the feedback matrix.

Choosing the size of this matrix is a trade-off between CPU consumption and the echo density.

Increasing the size of the matrix will generate a denser reverb tail at the expense of a higher CPU load.

A typical value of 8 is a good compromise between CPU load and natural sounding reverb. A value of 16 may be useful especially when dealing with a very long reverberation time or with very percussive sound (where a smaller FDN might sometimes sounds too poor).

Increasing the **internals** attribute may also be helpful when using a large number of loudspeakers, to ensure a proper decorrelation of the reproduced late reverberation signals.

It is recommended not to use a value below 6.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @outlets [int]

The **outlets** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

/master/numinputs [int] : set the number of input channels  
 /master/numoutputs [int] : set the number of output channels  
 /master/gain [number] : set the output gain [dB] of the strip  
 /master/mute [boolean] : mute the strip  
 /master/gain/ramptime [number] : set the ramp time [msec] for output gain of the strip  
 /master/levels/input/post [boolean] : set input vu-meter pre/post fader  
 /master/levels/output/post [boolean] : set output vu-meter pre/post fader  
 /master/levels/input/mode [string] : set input vu-meter mode. Possible values: peak rms  
 /master/levels/output/mode [string] : set output vu-meter mode. Possible values: peak rms  
 /master/trim [number] : set the input trim (in dB) of the strip  
 /master/equalizer/samplerate [number] : set the sampling rate (in Hz)  
 /master/equalizer/bypass [boolean] : bypass the equalizer  
 /master/equalizer/gain [number] : set the global gain (in dB) of the equalizer  
 /master/equalizer/filter/[index]/freq [number] : set the frequency (in Hz) of the i-th section  
 /master/equalizer/filter/[index]/q [number] : set the resonance of the i-th section  
 /master/equalizer/filter/[index]/gain [number] : set the gain (in dB) of the i-th section  
 /master/equalizer/filter/[index]/order [int] : set the filter's order of the i-th section  
 /master/equalizer/filter/[index]/active [boolean] : enable/disable the i-th section  
 /master/equalizer/filter/[index]/params [boolean] [number] [number] [number] : set the parameters (active, freq, gain, q) of the i-th section  
 /master/equalizer/filters/params [boolean] [number] [int] [boolean] [number] [number] [number] [boolean] [number] [number] [number] [boolean] [number] [number] [number] [boolean] [number] [number] [number] : set the parameters for all sections, in a serialized fashion  
 /monitoring/numinputs [int] : set the number of input channels  
 /monitoring/numoutputs [int] : set the number of output channels  
 /monitoring/gain [number] : set the output gain [dB] of the strip  
 /monitoring/mute [boolean] : mute the strip  
 /monitoring/gain/ramptime [number] : set the ramp time [msec] for output gain of the strip  
 /monitoring/levels/input/post [boolean] : set input vu-meter pre/post fader  
 /monitoring/levels/output/post [boolean] : set output vu-meter pre/post fader  
 /monitoring/levels/input/mode [string] : set input vu-meter mode. Possible values: peak rms  
 /monitoring/levels/output/mode [string] : set output vu-meter mode. Possible values: peak rms  
 /monitoring/trim [number] : set the input trim (in dB) of the strip  
 /monitoring/equalizer/samplerate [number] : set the sampling rate (in Hz)  
 /monitoring/equalizer/bypass [boolean] : bypass the equalizer  
 /monitoring/equalizer/gain [number] : set the global gain (in dB) of the equalizer  
 /monitoring/equalizer/filter/[index]/freq [number] : set the frequency (in Hz) of the i-th section  
 /monitoring/equalizer/filter/[index]/q [number] : set the resonance of the i-th section  
 /monitoring/equalizer/filter/[index]/gain [number] : set the gain (in dB) of the i-th section  
 /monitoring/equalizer/filter/[index]/order [int] : set the filter's order of the i-th section  
 /monitoring/equalizer/filter/[index]/active [boolean] : enable/disable the i-th section  
 /monitoring/equalizer/filter/[index]/params [boolean] [number] [number] [number] : set the parameters (active, freq, gain, q) of the i-th section  
 /monitoring/equalizer/filters/params [boolean] [number] [int] [boolean] [number] [number] [number] [boolean] [number] [number] [number] [boolean] [number] [number] [number] [boolean] [number] [number] [number] : set the parameters for all sections, in a serialized fashion  
 /dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).  
 /dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
 /dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute  
 /dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).  
 /dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
 /dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass  
 /dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
 /dsp/automute/attack [number] : set the duration (in seconds) before auto-muting  
 /dsp/post : post various information to the Max console (audio should be turned on)  
 /dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
 /dump/dsp/latency : send the processor latency (in samples) through the dump outlet  
 /verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
 /post/version : print the version in the Max Console  
 /post/version [details] : print detailed version in the Max Console  
 /post/doc : print the help documentation in the Max Console  
 /post/state : print the OSC status in the Max Console  
 /preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
 /preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
 /preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.panoramix
- spat5.spat~
- spat5.early~
- spat5.cluter~
- spat5.reverb~
- spat5.room~
- spat5.ircamverb~
- spat5.delgen
- spat5.shuffle~
- spat5.pan~
- spat5.decoder~
- spat5.osc.route
- spat5.osc.routepass
- spat5.virtualspeakers~
- spat5.multi.connect



## spat5.pansig~

## Signal-rate amplitude panning

### description

**spat5.pansig~** produces signal-rate amplitude panning. Similar to **spat5.pan**, it can pan sound source in space using amplitude panning (gain only); however the source position is controlled at signal-rate (i.e. with audio signals).

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @outputs [int]

The **outputs** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/format [string]** : set input coordinate format. Possible values: aed, xyz  
**/type [string]** : set panning type. Possible values: xy, ms, stereopan, surround, panr, angular, abap2d, abip2d, dbap2d, vbap, vbip, vbap3d, vbip3d, vbap2d, vbap2damp, hybrid-vbap, vbip2d, bformat, hoa2d, hoa3d, spcap, csp, knn, aep2d, aep3d, lbap, laap  
**/speakers/aed [nnnn...]** : set the list of speaker coordinates (with aed format)  
**/speakers/xyz [nnnn...]** : set the list of speaker coordinates (with xyz format)  
**/speakers/ade [nnnn...]** : set the list of speaker coordinates (with ade format)  
**/speakers/xy [nnnn...]** : set the list of speaker coordinates (with xy format)  
**/speakers/ae [nnnn...]** : set the list of speaker coordinates (with ae format)  
**/speaker/[index]/aed [number][number][number]** : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)  
**/speaker/[index]/ade [number][number][number]** : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)  
**/speaker/[index]/xyz [number][number][number]** : set the position of the i-th loudspeaker using cartesian coordinates  
**/speaker/[index]/xy [number][number]** : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)  
**/speaker/[index]/ae [number][number]** : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1)  
**/speaker/[index]/az [number]** : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console  
/post/state : print the OSC status in the Max Console  
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
/status : open the status window and bring it to front  
/status/open : open the status window and bring it to front  
/status/close : close the status window  
/status/openorclose : open the status window if it was closed; close it if it was opened  
/status/font/size [number] : set the font size of the status window  
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
/help : open the help window and bring it to front  
/help/open : open the help window and bring it to front  
/help/close : close the help window  
/help/openorclose : open the help window if it was closed; close it if it was opened  
/help/font/size [number] : set the font size of the help window  
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
/snapshot : open the snapshot window and bring it to front  
/snapshot/open : open the snapshot window and bring it to front  
/snapshot/close : close the snapshot window  
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
/snapshot/font/size [number] : set the font size of the snapshot window  
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
/status/copytoclipboard : copy the status to (the OS) clipboard  
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
/snapshot/deleteall : delete all the snapshots currently in memory  
/snapshot/add : create a new snapshot with the current state  
/snapshot/add [string] : create a new snapshot with the current state, and set its name  
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
/snapshot/[index]/recall : recall the current state from the i-th snapshot  
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
/snapshot/[index]/name [string] : set the name of the i-th snapshot  
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
/snapshot/[index]/delete : delete the i-th snapshot  
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/snapshot/[index]/export [string] : export the i-th snapshot to file  
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
/snapshot/export [string] : export all snapshots to file  
/snapshot/import [string] : import all snapshots from file  
/snapshot/recall/next : recall the next snapshot  
/snapshot/recall/previous : recall the previous snapshot  
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
/snapshot/recall [int] : recall the i-th snapshot  
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
/snapshot/recall/bytitle [string] : recall a snapshot by title/name  
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
/snapshot/lock [boolean] : lock edition of the snapshots  
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.pan
- spat5.pan~
- spat5.viewer
- spat5.trajectories
- spat5.virtualspeakers~
- spat5.converter~
- spat5.multi.connect



## spat5.pan~ Generic panner module

### description

**spat5.pan~** is a generic panner with a wide variety of panning methods. Depending on the selected panning type, there may be constraints to the number of inputs and/or outputs channels (for instance, binaural panning requires 2 output channels).

For a detailed description of supported panning methods, see the `/panning/type` message in the reference page.

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M. A. Gerzon. General metatheory of auditory localization. In *Proc. of the 92nd Convention of Audio Engineering Society (AES)*, Vienna, Austria, March 1992.

### attributes

#### `@initwith [string]`

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character `"`). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### `@inputs [int]`

The `inputs` attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

## @mc [int]

The `mc` attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the `mc` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-mc.maxpat` or `spat5.tuto-mc-2.maxpat` examples for further details.

## @outputs [int]

The `outputs` attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

## @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

`/panning/type [string]` : set panning type i.e. the type of algorithm used for rendering. A wide variety of panning methods are available, but there may be constraints depending on the number of inputs and/or outputs channels.

- "binaural" : binaural synthesis using HRTF (Head-Related Transfer Functions) filtering, for headphones only.
- "xy" : simulates the recording of the sound scene by a coincident XY couple of microphones (intensity panning), for stereo only.
- "ms" : simulates the recording of the sound scene by a mid-side microphone; this generates the M-S signals, and further requires decoding for L-R compatibility.
- "ab" : simulates the recording of the sound scene by an AB couple of microphones (ORTF) i.e. it simulates a pair of spaced cardioid microphones, pointing laterally at azimuths +/- 55 degrees (elevation 0), with a distance of 17 cm between the two capsules; for stereo only.
- "stereopan" : stereo panpot (intensity panning) with various panning laws, for stereo only.
- "angular" : angular panning (intensity panning) for 2-D (horizontal only) loudspeaker setups. "angular" panning is essentially the same as "vbap2d", the main difference is how the panning gains evolve when moving the source from one speaker to another.
- "abap2d" : angle-based amplitude panning : pairwise amplitude panning for 2-D (horizontal only) loudspeaker setups. Provides linear panning vs target azimuth angle.
- "abip2d" : angle-based intensity panning : pairwise intensity panning for 2-D (horizontal only) loudspeaker setups. "abip2d" panning is essentially the same as "vbip2d", the main difference is how the panning gains evolve when moving the source from one speaker to another.
- "vbap2d" : vector base amplitude panning : pairwise amplitude panning for 2-D (horizontal only) loudspeaker setups, with power normalization of the gains.
- "vbap3d" : vector base amplitude panning : amplitude panning for 3-D loudspeaker setups. The underlying algorithm creates a triangulation of the loudspeaker array, and depending on the position of the virtual source, it selects the appropriate loudspeaker triplet.
- "vbip2d" : vector base intensity panning : pairwise intensity panning for 2-D (horizontal only) loudspeaker setups. The geometrical algorithm is similar to "vbap2d", however the speaker signals are normalized with constant intensity (rather than with constant power).
- "vbip3d" : vector base intensity panning : pairwise intensity panning for 3-D loudspeaker setups. The geometrical algorithm is similar to "vbap3d", however the speaker signals are normalized with constant intensity (rather than with constant power).
- "vbap" : vector base amplitude panning : will switch automatically between "vbap3d" or "vbap2d", depending on the loudspeaker setup.
- "vbip" : vector base intensity panning : will switch automatically between "vbip3d" or "vbip2d", depending on the loudspeaker setup.
- "dualbandvbp" : vector base panning : uses vbap for low frequencies and vbip for high frequencies. (either 2-D or 3-D speaker setup)
- "lbap" : layer based amplitude panning : this creates several vertical layers of loudspeakers, and operates each layer as a "vbap2d" setup. If the loudspeaker layout is planar, "lbap" is just the same as "vbap2d".
- "sphericalheadmodel" : binaural synthesis using an approximate spherical head model (Rayleigh) for both ILD and ITD. Elevation is not taken into account.
- "snowmanmodel" : binaural synthesis using an approximate snow-man model for head-and-torso (two spherical models).
- "nearfieldbinaural" : binaural synthesis using HRTF (Head-Related Transfer Functions) filtering, and with compensation (ITD and ILD) of nearfield effects.
- "hoa2d" : 2-D (horizontal only) higher order ambisonic (HOA) encoder.
- "hoa3d" : 3-D higher order ambisonic (HOA) encoder.
- "aep2d" : ambisonic equivalent panning in 2-D (horizontal only) .
- "aep3d" : ambisonic equivalent panning in 3-D.
- "spcap" : speaker-placement correction amplitude panning.
- "nfhoa2d" : 2-D (horizontal only) higher order ambisonic (HOA) encoder with Nearfield Compensation Filters (NFC).
- "nfhoa3d" : 3-D higher order ambisonic (HOA) encoder with Nearfield Compensation Filters (NFC).
- "knn" : K-nearest neighbors panning : applies amplitude panning on the K-nearest loudspeakers to the source. The (maximum) number K of contributing speakers can be specified with the `/source/[index]/neighbors [int]` message. This kind of panning is compatible with arbitrary loudspeaker setup (either 2D or 3D).
- "surround" : LRS or LCRS encoder. Deprecated, don't use it.
- "panr" : legacy panning law from spat v3.x. Deprecated, don't use it. Pair-wise panning over a regular arrangement of loudspeakers on a plane (2-D only).
- "dbap2d" : distance-based amplitude panning on a 2-D (horizontal only) speaker setup (after Trond lossius).
- "dbap3d" : .
- "subwoofers" : combines a lowpass filter and a "vbap2d" panner.
- "wfs" : wavefield synthesis for linear array of loudspeakers.
- "bformat" : legacy Ambisonic B-format amplitude panning. Deprecated, don't use it anymore; use "hoa2d" or "hoa3d" instead.
- "laap" : amplitude/intensity panning on a linear array of loudspeakers. Experimental prototype, don't use it.

. Possible values: binaural, xy, ms, ab, stereopan, surround, panr, angular, abap2d, abip2d, dbap3d, dbap2d, vbap, vbip, vbap3d, vbip3d, vbap2d, vbap2damp, hybrid-vbap, vbip2d, dualbandvbp, bformat, hoa2d, hoa3d, nfhoa3d, nfhoa2d, spcap, csp, knn, aep2d, aep3d, subwoofers, wfs, lbap, laap, sphericalheadmodel, snowmanmodel, nearfieldbinaural

/panning/subtype [string] : set panning subtype.

/source/[index]/mute [boolean] : mute/unmute the i-th source

/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates

/source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)

/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)

/source/[index]/xy\_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged

/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged

/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged

/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged

/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)

/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)

/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)

/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)

/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged

/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged

/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged

/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged

/source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged

/sources/aed [nnnn...] : set the list of source coordinates (with aed format)

/sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)

/sources/ade [nnnn...] : set the list of source coordinates (with ade format)

/sources/xy [nnnn...] : set the list of source coordinates (with xy format)

/sources/ae [nnnn...] : set the list of source coordinates (with ae format)

/source/[index]/spread/omni [number] : set omni spread (in /source/[index]/spread/law [string] : set spread law for the i-th source

/source/[index]/spread/mode [number] : set spread mode for the i-th source

/source/[index]/divergence [boolean] : enable/disable divergence for the i-th source

/source/[index]/divergence/radius [number] : set minimum radius (in meters) for divergence for the i-th source

/ramp/time [number] : set ramp time (in msec) for gain smoothing

/format [string] : set coordinate format used in the status window

/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).

/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute

/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).

/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass

/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting

/dsp/post : post various information to the Max console (audio should be turned on)

/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

/dump/dsp/latency : send the processor latency (in samples) through the dump outlet

/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.viewer
- spat5.pan
- spat5.pansig~
- spat5.hoa.encoder~
- spat5.binaural~
- spat5.virtualspeakers~
- spat5.spat~
- spat5.align~
- spat5.panoramix~
- spat5.panoramix
- spat5.speaker.config
- spat5.speaker.layout
- spat5.decoder~
- spat5.headphoneeq~
- spat5.panner.metrics
- spat5.trajectories
- spat5.multi.connect

# spat5.pan Control-rate amplitude panning

## description

**spat5.pan** computes and outputs a list of loudspeaker gains (linear gains) based on a given source position. It only works for amplitude panning laws (as opposed to time-difference methods such as AB stereo, binaural, etc.).

Reference(s) :

V. Pulkki. Virtual Sound Source Positioning Using Vector Base Amplitude Panning. Journal of the Audio Engineering Society, 45(6):456 – 466, June 1997.

T. Lossius, P. Balthazar, and T. de la Hogue. DBAP - Distance-Based Amplitude Panning. In Proc. of the International Computer Music Conference (ICMC), Montreal, Canada, 2009.

R. Sadek and C. Kyriakakis. A novel multichannel panning method for standard and arbitrary loudspeaker configurations. In Proc. of the 117th Convention of the Audio Engineering Society (AES), San Francisco, CA, USA, 2004.

J.-M. Pernaux, P. Boussard, and J.-M. Jot. Virtual Sound Source Positioning and Mixing in 5.1 Implementation on the Real-Time System Genesis. In Proc. of the Int Conference on Digital Audio Effects (DAFx), Barcelona, Spain, Nov 19-21, 1998.

J. Daniel. Representation de champs acoustiques, application a la transmission et a la reproduction de scenes sonores complexes dans un contexte multimedia. PhD thesis, Université de Paris VI, 2001.

J. Daniel. Spatial Sound Encoding Including Near Field Effect: Introducing Distance Coding Filters and a Viable, New Ambisonic Format. In Proc of the AES 23rd International Conference, Copenhagen, Denmark, May 2003.

M. Neukom and J. C. Schacher. Ambisonics Equivalent Panning. In Proc. of the International Computer Music Conference (ICMC), Belfast, Ireland, 2008.

M. Neukom. Ambisonics Panning. In Proc. of the 123rd AES Convention, New York, NY, USA, Oct 2007.

J.-M. Jot, V. Larcher, and J.-M. Pernaux. A comparative study of 3-d audio encoding and rendering techniques. In Proc. of the 16th Audio Engineering Society International Conference on Spatial Sound Reproduction, Rovaniemi, Finland, 1999.

I. I. Bukvic. 3D time-based aural data representation using D4 library's layer based amplitude panning algorithm. Proc. of the 22nd International Conference on Auditory Display (ICAD), Canberra, Australia, July 2016.

M. A. Gerzon. General metatheory of auditory localization. In Proc. of the 92nd Convention of Audio Engineering Society (AES), Vienna, Austria, March 1992.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @inputs [int]

The **inputs** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @outputs [int]

The **outputs** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

## methods

**/panning/type [string]** : set panning type i.e. the type of algorithm used for rendering. A wide variety of panning methods are available, but there may be constraints depending on the number of inputs and/or outputs channels.

- "binaural" : binaural synthesis using HRTF (Head-Related Transfer Functions) filtering, for headphones only.
- "xy" : simulates the recording of the sound scene by a coincident XY couple of microphones (intensity panning), for stereo only.

- "ms" : simulates the recording of the sound scene by a mid-side microphone; this generates the M-S signals, and further requires decoding for L-R compatibility.
- "ab" : simulates the recording of the sound scene by an AB couple of microphones (ORTF) i.e. it simulates a pair of spaced cardioid microphones, pointing laterally at azimuths  $\pm 55$  degrees (elevation 0), with a distance of 17 cm between the two capsules; for stereo only.
- "stereopan" : stereo panpot (intensity panning) with various panning laws, for stereo only.
- "angular" : angular panning (intensity panning) for 2-D (horizontal only) loudspeaker setups. "angular" panning is essentially the same as "vbap2d", the main difference is how the panning gains evolve when moving the source from one speaker to another.
- "abap2d" : angle-based amplitude panning : pairwise amplitude panning for 2-D (horizontal only) loudspeaker setups. Provides linear panning vs target azimuth angle.
- "abip2d" : angle-based intensity panning : pairwise intensity panning for 2-D (horizontal only) loudspeaker setups. "abip2d" panning is essentially the same as "vbip2d", the main difference is how the panning gains evolve when moving the source from one speaker to another.
- "vbap2d" : vector base amplitude panning : pairwise amplitude panning for 2-D (horizontal only) loudspeaker setups, with power normalization of the gains.
- "vbap3d" : vector base amplitude panning : amplitude panning for 3-D loudspeaker setups. The underlying algorithm creates a triangulation of the loudspeaker array, and depending on the position of the virtual source, it selects the appropriate loudspeaker triplet.
- "vbip2d" : vector base intensity panning : pairwise intensity panning for 2-D (horizontal only) loudspeaker setups. The geometrical algorithm is similar to "vbap2d", however the speaker signals are normalized with constant intensity (rather than with constant power).
- "vbip3d" : vector base intensity panning : pairwise intensity panning for 3-D loudspeaker setups. The geometrical algorithm is similar to "vbap3d", however the speaker signals are normalized with constant intensity (rather than with constant power).
- "vbap" : vector base amplitude panning : will switch automatically between "vbap3d" or "vbap2d", depending on the loudspeaker setup.
- "vbip" : vector base intensity panning : will switch automatically between "vbip3d" or "vbip2d", depending on the loudspeaker setup.
- "dualbandvbp" : vector base panning : uses vbap for low frequencies and vbip for high frequencies. (either 2-D or 3-D speaker setup)
- "lbap" : layer based amplitude panning : this creates several vertical layers of loudspeakers, and operates each layer as a "vbap2d" setup. If the loudspeaker layout is planar, "lbap" is just the same as "vbap2d".
- "sphericalheadmodel" : binaural synthesis using an approximate spherical head model (Rayleigh) for both ILD and ITD. Elevation is not taken into account.
- "snowmanmodel" : binaural synthesis using an approximate snow-man model for head-and-torso (two spherical models).
- "nearfieldbinaural" : binaural synthesis using HRTF (Head-Related Transfer Functions) filtering, and with compensation (ITD and ILD) of nearfield effects.
- "hoa2d" : 2-D (horizontal only) higher order ambisonic (HOA) encoder.
- "hoa3d" : 3-D higher order ambisonic (HOA) encoder.
- "aep2d" : ambisonic equivalent panning in 2-D (horizontal only) .
- "aep3d" : ambisonic equivalent panning in 3-D.
- "spcap" : speaker-placement correction amplitude panning.
- "nfchoa2d" : 2-D (horizontal only) higher order ambisonic (HOA) encoder with Nearfield Compensation Filters (NFC).
- "nfchoa3d" : 3-D higher order ambisonic (HOA) encoder with Nearfield Compensation Filters (NFC).
- "knn" : K-nearest neighbors panning : applies amplitude panning on the K-nearest loudspeakers to the source. The (maximum) number K of contributing speakers can be specified with the "/source/[index]/neighbors [int]" message. This kind of panning is compatible with arbitrary loudspeaker setup (either 2D or 3D).
- "surround" : LRS or LCRS encoder. Deprecated, don't use it.
- "panr" : legacy panning law from spat v3.x. Deprecated, don't use it. Pair-wise panning over a regular arrangement of loudspeakers on a plane (2-D only).
- "dbap2d" : distance-based amplitude panning on a 2-D (horizontal only) speaker setup (after Trond lossius).
- "dbap3d" : .
- "subwoofers" : combines a lowpass filter and a "vbap2d" panner.
- "wfs" : wavefield synthesis for linear array of loudspeakers.
- "bformat" : legacy Ambisonic B-format amplitude panning. Deprecated, don't use it anymore; use "hoa2d" or "hoa3d" instead.
- "laap" : amplitude/intensity panning on a linear array of loudspeakers. Experimental prototype, don't use it.

. Possible values: binaural, xy, ms, ab, stereopan, surround, panr, angular, abap2d, abip2d, dbap3d, dbap2d, vbap, vbip, vbap3d, vbip3d, vbap2d, vbap2damp, hybrid-vbap, vbip2d, dualbandvbp, bformat, hoa2d, hoa3d, nfchoa3d, nfchoa2d, spcap, csp, knn, aep2d, aep3d, subwoofers, wfs, lbap, laap, sphericalheadmodel, snowmanmodel, nearfieldbinaural

/panning/subtype [string] : set panning subtype.

/source/[index]/mute [boolean] : mute/unmute the i-th source

/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates

/source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)

/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)

/source/[index]/xy\_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged

/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged

/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged

/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged

/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)

/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)

/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)

/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)

/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged

/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged

/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged

/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged

/source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged

/sources/aed [nnnn...] : set the list of source coordinates (with aed format)

/sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)

/sources/ade [nnnn...] : set the list of source coordinates (with ade format)



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/sources/xy [nnnn...] : set the list of source coordinates (with xy format)
/sources/ae [nnnn...] : set the list of source coordinates (with ae format)
/source/[index]/spread/omni [number] : set omni spread (in /source/[index]/spread/law [string] : set spread law for the i-th source
/source/[index]/spread/mode [number] : set spread mode for the i-th source
/source/[index]/divergence [boolean] : enable/disable divergence for the i-th source
/source/[index]/divergence/radius [number] : set minimum radius (in meters) for divergence for the i-th source
/ramp/time [number] : set ramp time (in msec) for gain smoothing
/format [string] : set coordinate format used in the status window
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```



## see also

- `spat5.pan~`
- `spat5.pansig~`
- `spat5.spat~`
- `matrix~`
- `spat5.viewer`
- `spat5.trajectories`
- `spat5.panner.metrics`

## spat5.panner.metrics

## Panner metrics

## description

**spat5.panner.metrics** computes and displays several quality criteria for amplitude panners (and HOA decoders).

Reference(s) :

M. A. Gerzon. General metatheory of auditory localization. In Proc. of the 92nd Convention of Audio Engineering Society (AES), Vienna, Austria, March 1992.

J. Daniel. Representation de champs acoustiques, application a la transmission et a la reproduction de scenes sonores complexes dans un contexte multimedia. PhD thesis, Université de Paris VI, 2001.

N. Epain, C. Jin, and F. Zotter. Ambisonic decoding with constant angular spread. Acta Acustica united with Acustica, 100:928 – 936, 2014.

F. Zotter, H. Pomberger, and M. Noisternig. Energy-preserving ambisonic decoding. Acta Acustica united with Acustica, 98:37 – 47, 2012.

F. Zotter, M. Frank, and H. Pomberger. Comparison of energy-preserving and all-round Ambisonic decoders. In Proc. the Fortschritte der Akustik, AIA-DAGA, March 2013.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

## attributes

## @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the **initwith** attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/speakers/number [int] : set the number of loudspeakers
/speakers/aed [nnnn...] : set the list of speaker coordinates (with aed format)
/speakers/xyz [nnnn...] : set the list of speaker coordinates (with xyz format)
/speakers/ade [nnnn...] : set the list of speaker coordinates (with ade format)
/speakers/xy [nnnn...] : set the list of speaker coordinates (with xy format)
/speakers/ae [nnnn...] : set the list of speaker coordinates (with ae format)
/speaker/[index]/aed [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)
/speaker/[index]/ade [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)
/speaker/[index]/xyz [number][number][number] : set the position of the i-th loudspeaker using cartesian coordinates
/speaker/[index]/xy [number][number] : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)
/speaker/[index]/ae [number][number] : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1)
/speaker/[index]/az [number] : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)
/display/mode [string] : set display mode. Possible values: energy, re, rv, energy vector angular error, velocity vector angular error, angular spread, spreaddaniel, spreadfrank, re vs rv direction difference, re directions, rv directions
/display/range [number][number] : set display range
/colormap [string] : set type of colormap. Possible values: jet, hsv, gray, hot, summer, winter, spring, autumn, cool, parula, bone, copper, pink, lines, colorcube, prism, flag, magma, inferno, plasma, viridis, cividis, moreland, yellowred, turbo, twilight, blues, amber, dusk, tree, emerald, ghostlight, neutral, seasons, swamp, redshift, bubblegum, watermelon, rainforest, sepia, cosmic, toxic, freeze, gem, viola, horizon, gothic, flamingo, neon, sapphire, sunburst, torch, pepper, lilac, nuclear, prinsenvlag, lavender, guppy, jungle, savanna, wildfire, emergency, voltage, ember, chroma, apple, holly, tropical, fusion, infinity, arctic, seaweed, pride, eclipse, fall, ocean, iceburn, waterlily, amethyst
/cursor/visible [boolean] : set cursor visibility
/speakers/label/color [color] : set speaker labels color
```

/speakers/label/visible [boolean] : display speaker labels  
/post/version : print the version in the Max Console  
/post/version [details] : print detailed version in the Max Console  
/post/doc : print the help documentation in the Max Console  
/post/state : print the OSC status in the Max Console  
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
/status : open the status window and bring it to front  
/status/open : open the status window and bring it to front  
/status/close : close the status window  
/status/openorclose : open the status window if it was closed; close it if it was opened  
/status/font/size [number] : set the font size of the status window  
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
/help : open the help window and bring it to front  
/help/open : open the help window and bring it to front  
/help/close : close the help window  
/help/openorclose : open the help window if it was closed; close it if it was opened  
/help/font/size [number] : set the font size of the help window  
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
/snapshot : open the snapshot window and bring it to front  
/snapshot/open : open the snapshot window and bring it to front  
/snapshot/close : close the snapshot window  
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
/snapshot/font/size [number] : set the font size of the snapshot window  
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
/status/copytoclipboard : copy the status to (the OS) clipboard  
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
/snapshot/deleteall : delete all the snapshots currently in memory  
/snapshot/add : create a new snapshot with the current state  
/snapshot/add [string] : create a new snapshot with the current state, and set its name  
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
/snapshot/[index]/recall : recall the current state from the i-th snapshot  
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
/snapshot/[index]/name [string] : set the name of the i-th snapshot  
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
/snapshot/[index]/delete : delete the i-th snapshot  
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/snapshot/[index]/export [string] : export the i-th snapshot to file  
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
/snapshot/export [string] : export all snapshots to file  
/snapshot/import [string] : import all snapshots from file  
/snapshot/recall/next : recall the next snapshot  
/snapshot/recall/previous : recall the previous snapshot  
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
/snapshot/recall [int] : recall the i-th snapshot  
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
/snapshot/recall/bytitle [string] : recall a snapshot by title/name  
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
/snapshot/lock [boolean] : lock edition of the snapshots  
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
/snapshot/sort : sort the snapshots alphabetically (based on their titles)  
/window/title [string] : set the window title (in the window titlebar)  
/window/visible [boolean] : set the window visibility  
/window/moveable [boolean] : set the window movability  
/window/resizable [boolean] : set the window resizability  
/window/enable [boolean] : enable/disable the window  
/window/background/color [color] : set the window background color  
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency)  
/window/fullscreen [boolean] : enable/disable fullscreen mode  
/window/minimise [boolean] : minimize the window

/window/open : open the window (and bring it to front)  
 /window/close : close the window  
 /window/openorclose : open the window if it was closed; close it if it was opened  
 /window/size [number] [number] : set the window size (width, height) (in pixels)  
 /window/width [number] : set the window width (in pixels)  
 /window/height [number] : set the window height (in pixels)  
 /window/bounds [number] [number] [number] [number] : set the window bounds (top left position, width, height) (in pixels)  
 /window/topleft [number] [number] : set the window top left position (in pixels)  
 /window/centre : open the window, centering it on the screen  
 /window/rendering/engine [string] : set the graphical rendering engine of the window  
 /window/fps/visible [boolean] : display the FPS performances of the window  
 /window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)  
 /window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)  
 /window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)  
 /window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)  
 /window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)  
 /window/export/image [string] : export the window as an image file (png or jpeg)

## see also

- spat5.hoa.decoder~
- spat5.pan
- spat5.pan~
- spat5.viewer
- spat5.grids
- spat5.speaker.layout
- spat5.multi.connect

# spat5.panner.metrics.embedded

## Panner metrics

### description

spat5.panner.metrics computes and displays several quality criteria for amplitude panners (and HOA decoders).

Reference(s) :

M. A. Gerzon. General metatheory of auditory localization. In Proc. of the 92nd Convention of Audio Engineering Society (AES), Vienna, Austria, March 1992.

J. Daniel. Representation de champs acoustiques, application a la transmission et a la reproduction de scenes sonores complexes dans un contexte multimedia. PhD thesis, Université de Paris VI, 2001.

N. Epain, C. Jin, and F. Zotter. Ambisonic decoding with constant angular spread. Acta Acustica united with Acustica, 100:928 – 936, 2014.

F. Zotter, H. Pomberger, and M. Noisternig. Energy-preserving ambisonic decoding. Acta Acustica united with Acustica, 98:37 – 47, 2012.

F. Zotter, M. Frank, and H. Pomberger. Comparison of energy-preserving and all-round Ambisonic decoders. In Proc. the Fortschritte der Akustik, AIA-DAGA, March 2013.

F. Zotter, M. Frank. Ambisonics: A Practical 3D Audio Theory for Recording, Studio Production, Sound Reinforcement, and Virtual Reality. Springer, 2019.

### attributes

#### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or `inspector`; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```

/speakers/number [int] : set the number of loudspeakers
/speakers/aed [nnnn...] : set the list of speaker coordinates (with aed format)
/speakers/xyz [nnnn...] : set the list of speaker coordinates (with xyz format)
/speakers/ade [nnnn...] : set the list of speaker coordinates (with ade format)
/speakers/xy [nnnn...] : set the list of speaker coordinates (with xy format)
/speakers/ae [nnnn...] : set the list of speaker coordinates (with ae format)
/speaker/[index]/aed [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)
/speaker/[index]/ade [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)
/speaker/[index]/xyz [number][number][number] : set the position of the i-th loudspeaker using cartesian coordinates
/speaker/[index]/xy [number][number] : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)
/speaker/[index]/ae [number][number] : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1)
/speaker/[index]/az [number] : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)
/display/mode [string] : set display mode. Possible values: energy, re, rv, energy vector angular error, velocity vector angular error, angular spread, spreaddaniel, spreadfrank, re vs rv direction difference, re directions, rv directions
/display/range [number][number] : set display range
/colormap [string] : set type of colormap. Possible values: jet, hsv, gray, hot, summer, winter, spring, autumn, cool, parula, bone, copper, pink, lines, colorcube, prism, flag, magma, inferno, plasma, viridis, cividis, moreland, yellowred, turbo, twilight, blues, amber, dusk, tree, emerald, ghostlight, neutral, seasons, swamp, redshift, bubblegum, watermelon, rainforest, sepia, cosmic, toxic, freeze, gem, viola, horizon, gothic, flamingo, neon, sapphire, sunburst, torch, pepper, lilac, nuclear, prinsenvlag, lavender, guppy, jungle, savanna, wildfire, emergency, voltage, ember, chroma, apple, holly, tropical, fusion, infinity, arctic, seaweed, pride, eclipse, fall, ocean, iceburn, waterlily, amethyst
/cursor/visible [boolean] : set cursor visibility
/speakers/label/color [color] : set speaker labels color

```

/speakers/label/visible [boolean] : display speaker labels  
/post/version : print the version in the Max Console  
/post/version [details] : print detailed version in the Max Console  
/post/doc : print the help documentation in the Max Console  
/post/state : print the OSC status in the Max Console  
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
/status : open the status window and bring it to front  
/status/open : open the status window and bring it to front  
/status/close : close the status window  
/status/openorclose : open the status window if it was closed; close it if it was opened  
/status/font/size [number] : set the font size of the status window  
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
/help : open the help window and bring it to front  
/help/open : open the help window and bring it to front  
/help/close : close the help window  
/help/openorclose : open the help window if it was closed; close it if it was opened  
/help/font/size [number] : set the font size of the help window  
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
/snapshot : open the snapshot window and bring it to front  
/snapshot/open : open the snapshot window and bring it to front  
/snapshot/close : close the snapshot window  
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
/snapshot/font/size [number] : set the font size of the snapshot window  
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
/status/copytoclipboard : copy the status to (the OS) clipboard  
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
/snapshot/deleteall : delete all the snapshots currently in memory  
/snapshot/add : create a new snapshot with the current state  
/snapshot/add [string] : create a new snapshot with the current state, and set its name  
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
/snapshot/[index]/recall : recall the current state from the i-th snapshot  
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
/snapshot/[index]/name [string] : set the name of the i-th snapshot  
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
/snapshot/[index]/delete : delete the i-th snapshot  
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/snapshot/[index]/export [string] : export the i-th snapshot to file  
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
/snapshot/export [string] : export all snapshots to file  
/snapshot/import [string] : import all snapshots from file  
/snapshot/recall/next : recall the next snapshot  
/snapshot/recall/previous : recall the previous snapshot  
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
/snapshot/recall [int] : recall the i-th snapshot  
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
/snapshot/recall/bytitle [string] : recall a snapshot by title/name  
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
/snapshot/lock [boolean] : lock edition of the snapshots  
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.hoa.decoder~
- spat5.pan
- spat5.pan~
- spat5.viewer
- spat5.grids

- spat5.speaker.layout
- spat5.multi.connect



# spat5.pattr

## Store and recall presets

### description

**spat5.pattr** stores and recall presets for spat5 objects.

### attributes

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
/snapshot/lock [boolean] : lock edition of the snapshots  
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- pattr

# spat5.periactes      Periactes control

## description

**spat5.periactes** allows remote control of the Espro periactes.

## attributes

### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the **initwith** attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC
file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded
OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC
file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. If the file extension is not provided,
'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary
encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name

```

```

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.viewer

# spat5.ping Ping utility

## description

**spat5.ping** sends a ping message to a given destination. This can test the reachability of a host on an Internet Protocol (IP) network.

## attributes

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
```

`/snapshot/recall/next` : recall the next snapshot  
`/snapshot/recall/previous` : recall the previous snapshot  
`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)  
`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)  
`/snapshot/recall [int]` : recall the i-th snapshot  
`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)  
`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name  
`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `udpsend`
- `udpreceive`
- `spat5.osc.udpsend`
- `spat5.osc.udpreceive`
- `spat5.hostinfos`

# spat5.pink~ Generate pink noise

## description

**spat5.pink~** is similar to Max/MSP **pink~** but can process several channels in parallel. All channels are independent.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window



```

/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- noise~
- pink~
- spat5.noise~
- mc.pink~
- spat5.multi.connect

# spat5.plot Generic plot component

## description

**spat5.plot** visualizes two-dimensional data. It is vaguely similar to Matlab plot function.

## attributes

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```

/title [string] : set title
/title/visible [boolean] : set visibility for title
/title/color [color] : set color for the title
/title/justification [string] : set justification for the title
/title/font/size [number] : set font size for the title
/xlabel [string] : set xlabel
/xlabel/visible [boolean] : set visibility for xlabel
/xlabel/color [color] : set color for the xlabel
/xlabel/justification [string] : set justification for the xlabel
/xlabel/font/size [number] : set font size for the xlabel
/ylabel [string] : set ylabel
/ylabel/visible [boolean] : set visibility for ylabel
/ylabel/color [color] : set color for the ylabel
/ylabel/justification [string] : set justification for the ylabel
/ylabel/font/size [number] : set font size for the ylabel
/xtick [string] : set xtick
/xtick/visible [boolean] : set visibility for xtick
/xtick/color [color] : set color for the xtick
/ytick [string] : set ytick
/ytick/visible [boolean] : set visibility for ytick
/ytick/color [color] : set color for the ytick
/grid/visible [boolean] : set visibility for the grid
/grid/color [color] : set color for the grid
/curve/number [int] : set the number of curves
/curve/[index]/color [color] : set color for the i-th curve
/curve/[index]/visible [boolean] : set visibility for the i-th curve
/curve/[index]/thickness [number] : set thickness for the i-th curve
/curve/[index]/style [string] : set style for the i-th curve
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window

```

```

/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- plot~
- spat5.waveform
- spat5.waveform.embedded

# spat5.plus~ Multichannel plus~

## description

**spat5.plus~** is similar to Max/MSP **plus~** (aka **+~**) but it can process several channels in parallel. All the input signals are offsetted by the rightmost value (float or signal).

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots
```

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- times~
- \*~
- spat5.times~
- gain~
- spat5.meter~
- spat5.diagmatrix~
- matrix~
- mc.+~

## spat5.printbytes

## Print FullPacket

### description

**spat5.printbytes** prints raw packets to the Max window, as a sequence of bytes.

### attributes

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.osc.view`
- `spat5.osc.display`
- `spat5.osc.print`
- `udpsend`
- `udpreceive`



# spat5.project Geometrical projection

## description

**spat5.projection** computes geometrical projections.

## attributes

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```

/code [string] : set projection mode. Possible values: to aabb
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file

```

```

/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.viewer
- spat5.abs2rel
- spat5.constraint
- spat5.scale
- spat5.rotate
- spat5.translate
- spat5.normalize
- spat5.mirror
- spat5.converter
- spat5.converter~
- spat5.knn
- spat5.distance

# spat5.quat.fromeuler

# Euler angles to quaternion

## description

**spat5.quat.fromeuler** converts Euler angles to quaternion.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.quat.toeuler
- spat5.quat.transform
- spat5.quat.normalize
- spat5.quat.inverse
- spat5.quat.tomatrix
- spat5.quat.fromvectors
- spat5.viewer
- spat5.binaural~
- jit.euler2quat

# spat5.quat.frommatrix

# Converts 3x3 rotation matrix to quarternion

## description

**spat5.quat.frommatrix** converts 3x3 rotation matrix to quarternion.

## attributes

## methods

/post/version : print the version in the Max Console  
 /post/version [details] : print detailed version in the Max Console  
 /post/doc : print the help documentation in the Max Console  
 /post/state : print the OSC status in the Max Console  
 /preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
 /preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
 /preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.quat.tomatrix`
- `spat5.quat.toeuler`
- `spat5.quat.fromeuler`
- `spat5.quat.transform`
- `spat5.quat.inverse`
- `spat5.quat.normalize`
- `spat5.quat.fromvectors`
- `spat5.transform`
- `spat5.viewer`
- `spat5.binaural~`
- `jit.euler2quat`

## spat5.quat.fromvectors

## Quaternions from two vectors in 3D

### description

**spat5.quat.fromvectors** creates a quaternion representing the rotation between two 3D vectors.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```



/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.quat.toeuler
- spat5.quat.fromeuler
- spat5.quat.transform
- spat5.quat.normalize
- spat5.transform
- spat5.viewer
- spat5.quat.frommatrix
- spat5.binaural~
- jit.euler2quat

# spat5.quat.interpolate

# Interpolation between two quaternions

## description

**spat5.quat.interpolate** performs linear interpolation between two quaternions.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.quat.toeuler
- spat5.quat.transform
- spat5.quat.normalize
- spat5.quat.inverse
- spat5.quat.tomatrix
- spat5.quat.fromvectors
- spat5.viewer
- spat5.binaural~
- jit.euler2quat

## spat5.quat.inverse

## Inverse quaternion

### description

**spat5.quat.inverse** computes the inverse of the input quaternion.

### attributes

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
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**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.quat.toeuler`
- `spat5.quat.fromeuler`
- `spat5.quat.transform`
- `spat5.quat.normalize`
- `spat5.quat.fromvectors`
- `spat5.quat.frommatrix`
- `spat5.transform`
- `spat5.viewer`
- `spat5.binaural~`
- `jit.euler2quat`

# spat5.quat.multiply

# Quaternions multiplication

## description

**spat5.quat.multiply** performs multiplication of two quaternions. The product  $q_1 * q_2$  returns a quaternion that concatenates the two orientation rotations.

## attributes

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
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**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
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**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name  
`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.quat.tomatrix`
- `spat5.quat.toeuler`
- `spat5.quat.fromeuler`
- `spat5.quat.transform`
- `spat5.quat.inverse`
- `spat5.quat.normalize`
- `spat5.quat.fromvectors`
- `spat5.transform`
- `spat5.viewer`
- `spat5.binaural~`
- `jit.euler2quat`



## spat5.quat.normalize

## Normalize quaternion

## description

**spat5.quat.normalize** normalizes of the input quaternion.

## attributes

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
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**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
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**/snapshot** : open the snapshot window and bring it to front  
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**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
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**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
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**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
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**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
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**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.quat.toeuler`
- `spat5.quat.fromeuler`
- `spat5.quat.transform`
- `spat5.quat.inverse`
- `spat5.quat.fromvectors`
- `spat5.transform`
- `spat5.viewer`
- `spat5.binaural~`
- `jit.euler2quat`

# spat5.quat.toeuler

# Quaternion to Euler angles

## description

**spat5.quat.toeuler** converts quaternion to Euler angles.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the **coll** object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
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**/help/open** : open the help window and bring it to front  
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**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
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**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
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**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file

/snapshot/recall/next : recall the next snapshot  
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 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
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## see also

- spat5.quat.fromeuler
- spat5.quat.transform
- spat5.quat.normalize
- spat5.quat.inverse
- spat5.quat.tomatrix
- spat5.quat.fromvectors
- spat5.viewer
- spat5.binaural~
- jit.euler2quat

## spat5.quat.tomatrix

## Converts quaternion to 3x3 rotation matrix

### description

**spat5.quat.tomatrix** converts quaternion to 3x3 rotation matrix.

### attributes

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
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**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file  
**/snapshot/recall/next** : recall the next snapshot  
**/snapshot/recall/previous** : recall the previous snapshot  
**/snapshot/jump/next** : immediately recall the next snapshot (ignoring recall time)  
**/snapshot/jump/previous** : immediately recall the previous snapshot (ignoring recall time)  
**/snapshot/recall [int]** : recall the i-th snapshot  
**/snapshot/jump [int]** : immediately recall the i-th snapshot (ignoring recall time)  
**/snapshot/recall/bytitle [string]** : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.quat.frommatrix`
- `spat5.quat.toeuler`
- `spat5.quat.fromeuler`
- `spat5.quat.transform`
- `spat5.quat.inverse`
- `spat5.quat.normalize`
- `spat5.quat.fromvectors`
- `spat5.transform`
- `spat5.viewer`
- `spat5.binaural~`
- `jit.euler2quat`

# spat5.quat.transform

# Apply quaternion rotation

## description

**spat5.quat.transform** transforms sources position by the current quaternion.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file



/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.quat.fromeuler
- spat5.quat.toeuler
- spat5.quat.normalize
- spat5.quat.inverse
- spat5.quat.fromvectors
- spat5.transform
- spat5.viewer
- spat5.binaural~
- jit.euler2quat

# spat5.rake~ FFT bins mapping

## description

**spat5.rake~** perform a FFT of the incoming audio stream, and then makes it possible to map the FFT bins to any number of individual outputs. **rake~** was originally implemented by Andrew Gerzso.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @outputs [int]

The **outputs** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/fftsize [int] : set fft size; must be a power of 2
/overlap [int] : set the overlap factor
/windowing/type [string] : set the window type for overlap-add
/output/[index]/bin/range [int][int] : set bin range for the i-th output
/output/[index]/freq/range [number][number] : set frequency range (in Hz) for the i-th output
/output/[index]/centerfreq [number][number] : set center frequency (in Hz) and bandwidth (in Hz) for the i-th output
/output/[index]/centernote [number][number] : set center frequency (in Hz) and bandwidth (in half steps) for the i-th output
/output/[index]/centermidi [number][number] : set center frequency (in MIDI note) and bandwidth (in half steps) for the i-th output
/output/[index]/erb [number][number] : set center frequency (in ERB index) and bandwidth (in ERB bandwidth) for the i-th output
/output/[index]/bark [number][number] : set center frequency (in Bark index) and bandwidth (in Bark bandwidth) for the i-th output
/output/[index]/bin/list [number][number][number]... : set the discrete list of frequency bins for the i-th output
/output/[index]/bin/freq [number][number][number]... : set the discrete list of frequencies (in Hz) for the i-th output
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
```

`/preset/load [string]` : load a preset from file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `fftin~`
- `fftout~`
- `pfft~`
- `ifft~`
- `spat5.fton`
- `spat5.ntof`
- `spat5.multi.connect`

## spat5.reverb.timeview

## Impulse response visualization

### description

**spat5.reverb.timeview** displays a schematic temporal view of the impulse response.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string] [string] [number] : interpolate between two snapshots, given their names

```

/snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.reverb~
- spat5.ircamverb~
- spat5.ircamverb
- spat5.oper
- spat5.delgen
- spat5.early~
- spat5.cluster~
- spat5.roomsize

# spat5.reverb~ Late reverberation

## description

**spat5.reverb~** generates late reverberation from an echo bus using a feedback delay network.

When using **spat5.reverb~** inside a reverberator engine, the number of delayed channels (**channels** attribute) corresponds to the number of "internal channels" ( **internals** attribute of **spat5.spat~** object).

Reference(s) :

J.-M. Jot and A. Chaigne. Digital delay networks for designing artificial reverberators. In Proc. of the 90th Convention of the Audio Engineering Society (AES), Paris, France, Feb 1991.

T. I. Laakso, V. Välimäki, M. Karjalainen, and U. K. Laine. Splitting the unit delay. IEEE Signal Processing Magazine, 13(1):30 – 60, January 1996.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/channel/number [int]** : set the number of feedback channels  
**/tr0 [number]** : set global reverberation time (in seconds)  
**/trl [number]** : set relative decay time in low frequencies  
**/trm [number]** : set relative decay time in mid frequencies  
**/trh [number]** : set relative decay time in high frequencies  
**/fl [number]** : set reverb low/mid crossover frequency (in Hz)  
**/fh [number]** : set reverb mid/high crossover frequency (in Hz)  
**/infinite [boolean]** : enable/disable infinite reverb  
**/air [boolean]** : enable/disable air absorption in the FDN  
**/air/freq [number]** : set air absorption rolloff frequency (in Hz) in the FDN  
**/delays [number][number][number]...** : set the list of delays (in msec)  
**/delays/samples [number][number][number]...** : set the list of delays (in samples)  
**/interpolation/mode [string]** : set the interpolation mode. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade  
**/interpolation/time [number]** : set the interpolation time (in msec)  
**/channel/[index]/delay [number]** : set the delay (in msec) for the i-th channel  
**/channel/[index]/delay/samples [number]** : set the delay (in samples) for the i-th channel  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramp**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramp [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramp**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

```

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically
whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```



## see also

- spat5.early~
- spat5.cluster~
- spat5.spat~
- spat5.room~
- spat5.ircamverb~
- spat5.delgen
- spat5.multiverb~
- spat5.roomsize
- spat5.shuffle~
- spat5.multiverb~
- spat5.conv~
- spat5.converb~
- spat5.tapout~
- delay~
- tapout~
- spat5.comb~
- spat5.allpass~
- spat5.reverb.timeview
- spat5.multi.connect

# spat5.rms~ Multichannel RMS metering

## description

**spat5.rms~** performs multichannel RMS metering.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/mode [string]** : set processing mode  
**/rate [number]** : set report rate (in msec)  
**/rounding [int]** : number of decimal places for rounding dB values (-1 means no rounding)  
**/clear** : clear history  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary

encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- average~
- spat5.meter~
- live.gain~
- spat5.ebur128~
- spat5.snapshot~
- snapshot~
- gain~
- spat5.minmax~
- spat5.multi.connect

## spat5.roomsize

## Delay distribution generator

### description

**spat5.roomsize** generates a distribution of delays based on a room-size meta parameter.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```

/delay/number [int] : set number of delays
/tr0 [number] : set reverberation time (in sec)
/roomsize [number] : set room size (in cubic meters)
/roomoffset [number] : set room offset (in msec)
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

```

```

/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- delay~
- spat5.delay~
- spat5.delgen
- spat5.reverb.timeview
- spat5.early~
- spat5.cluster~
- spat5.reverb~
- spat5.room~
- tapin~
- tapout~

## spat5.room~ Reverberation module

### description

**spat5.room~** is the reverberation module of the Spat framework. It combines **spat5.source~** pre-processing, **spat5.early~**, **spat5.cluster~**, and **spat5.reverb~**, to generate early reflections, late reflections and reverb tail. Each stage is associated with a 3-band filtering (**spat5.hlshelf~**).

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @internals [int]

The **internals** attribute represents the number of internal channels of the artificial reverberator.

Spat uses a Feedback Delay Network (FDN) reverberator engine.

Basically this can be seen as an array of delay lines which are fed back into a mixing matrix. The **internals** attributes represents the size of the feedback matrix.

Choosing the size of this matrix is a trade-off between CPU consumption and the echo density.

Increasing the size of the matrix will generate a densier reverb tail at the expense of a higher CPU load.

A typical value of 8 is a good compromise between CPU load and natural sounding reverb. A value of 16 may be useful especially when dealing with a very long reverberation time or with very percussive sound (where a smaller FDN might sometimes sounds too poor).

Increasing the **internals** attribute may also be helpful when using a large number of loudspeakers, to ensure a proper decorrelation of the reproduced late reverberation signals.

It is recommended not to use a value below 6.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @sources [int]

The **sources** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### methods

```
/source/[index]//air [boolean] : enable/disable air absorption (for direct sound)
/source/[index]//air/freq [number] : set air absorption rolloff frequency (in Hz)
/source/[index]//doppler [boolean] : enable/disable doppler effect
/source/[index]//doppler/delay [number] : set delay (in msec) for doppler effect
/source/[index]//direct/params [number][number]... : set direct filter parameters
/source/[index]//room/params [number][number]... : set room filter parameters
/source/[index]//early/params [number][number]... : set early filter parameters
/source/[index]//cluster/params [number][number]... : set cluster filter parameters
/source/[index]//early/delays [number][number]... : set early delays (in msec)
/source/[index]//cluster/delays [number][number]... : set cluster delays (in msec)
/source/[index]//reverb/delays [number][number]... : set reverb delays (in msec)
/source/[index]//reverb/tr0 [number] : set global reverberation time (in seconds)
/source/[index]//reverb/trl [number] : set relative decay time in low frequencies
/source/[index]//reverb/trm [number] : set relative decay time in mid frequencies
/source/[index]//reverb/trh [number] : set relative decay time in high frequencies
/source/[index]//reverb/fl [number] : set reverb low/mid crossover frequency (in Hz)
/source/[index]//reverb/fh [number] : set reverb mid/high crossover frequency (in Hz)
/source/[index]//reverb/gain [number] : set reverb gain (in dB)
```

```

/source/[index]//reverb/infinite [boolean] : enable/disable infinite reverb
/source/[index]//reverb/air [boolean] : enable/disable air absorption in the FDN
/source/[index]//reverb/air/freq [number] : set air absorption rolloff frequency (in Hz) in the FDN
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second
argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see
/dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the
second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically
whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

```



/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.source~
- spat5.early~
- spat5.cluster~
- spat5.reverb~
- spat5.spat~
- spat5.ircamverb~
- spat5.delgen
- spat5.shuffle~
- spat5.doppler~
- spat5.air~
- spat5.delgen
- spat5.reverb.timeview
- spat5.multi.connect

## spat5.rotate Rotate coordinate messages

### description

**spat5.rotate** applies rotation to source, speaker or listener coordinate messages.

**spat5.scale**, **spat5.rotate** and **spat5.translate** are stateless objects i.e. they only react when incoming position messages are received.

On the other hand, **spat5.transform** is statefull: it keeps track of the state of the spatial scene, and will deliver the transformed scene whenever the parameter (yaw, pitch, roll, offset, etc.) is changed.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/yaw [number]** : set yaw rotation angle  
**/pitch [number]** : set pitch rotation angle  
**/roll [number]** : set roll rotation angle  
**/ypr [number][number][number]** : set yaw, pitch and roll rotation angles  
**/orientation [number][number][number][number]** : set rotation angles from quaternion

### see also

- spat5.transform
- spat5.scale
- spat5.translate
- spat5.normalize
- spat5.viewer
- spat5.converter
- spat5.abs2rel
- spat5.jitter
- spat5.trajectories

# spat5.routing Routing matrix

## description

**spat5.routing** is a control interface for **spat5.routing~**.

## attributes

### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @inputs [int]

The **inputs** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @outputs [int]

The **outputs** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/row/number [int] : set number of rows
/col/number [int] : set number of columns
/row/[index]/col/[index] [boolean] : set value for the i-th row and j-th column
/clear : clear the whole matrix
/diag : fill the diagonal of the matrix
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number] [number] [number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number] [number] [number] [number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number] [number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
```

```

/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.routing~

- matrixctrl
- gate~
- selector~
- matrix~
- spat5.gate~
- spat5.diagmatrix~
- spat5.matrix

## spat5.routing.embedded Routing matrix

### description

spat5.routing is a control interface for spat5.routing~.

### attributes

#### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @inputs [int]

The `inputs` attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @outputs [int]

The `outputs` attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

`/row/number [int]` : set number of rows  
`/col/number [int]` : set number of columns  
`/row/[index]/col/[index] [boolean]` : set value for the i-th row and j-th column  
`/clear` : clear the whole matrix  
`/diag` : fill the diagonal of the matrix

### see also

- spat5.routing~
- matrixctrl
- gate~
- selector~
- matrix~
- spat5.gate~
- spat5.diagmatrix~
- spat5.matrix

# spat5.routing~ Routing matrix

## description

**spat5.routing~** is a routing matrix. It can be controlled with **spat5.routing**.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @inputs [int]

The **inputs** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @outputs [int]

The **outputs** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/row/number [int]** : set number of rows  
**/col/number [int]** : set number of columns  
**/row/[index]/col/[index] [boolean]** : set value for the i-th row and j-th column  
**/clear** : clear the whole matrix  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.



`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.routing`
- `gate~`
- `selector~`
- `matrix~`
- `spat5.gate~`
- `spat5.diagmatrix~`
- `spat5.matrix`
- `spat5.multi.connect`

## spat5.scale      Scale coordinate messages

### description

**spat5.scale** applies geometrical scaling to the incoming source, speaker or listener coordinate messages.

**spat5.scale**, **spat5.rotate** and **spat5.translate** are stateless objects i.e. they only react when incoming position messages are received.

On the other hand, **spat5.transform** is statefull: it keeps track of the state of the spatial scene, and will deliver the transformed scene whenever the parameter (yaw, pitch, roll, offset, etc.) is changed.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```
/scaling/x [number] : set scaling factor along the x-axis
/scaling/y [number] : set scaling factor along the y-axis
/scaling/z [number] : set scaling factor along the z-axis
/scaling/azim [number] : set azimuthal scaling factor
/scaling/elev [number] : set elevation scaling factor
/scaling/dist [number] : set radial scaling factor
/scaling/xy [number][number] : set scaling factor along the x and y axis
/scaling/xyz [number][number][number] : set scaling factor along the x, y, and z axis
```

### see also

- spat5.transform
- spat5.rotate
- spat5.translate
- spat5.normalize
- spat5.mirror
- spat5.jitter
- spat5.viewer
- spat5.converter
- spat5.converter~
- spat5.abs2rel
- spat5.distance
- spat5.trajectories
- spat5.boids

## spat5.screencapture

## Capture screenshots

### description

**spat5.screencapture** allows to capture screenshots of windows/screens.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```

/application/name [string] : set name of the application you want to capture (only when in 'window' mode)
/window/title [string] : set title of the window you want to capture (only when in 'window' mode)
/mode [string] : set mode. Possible values: screen, window, current window
/destination [string] : set destination filename
/overwrite [boolean] : set overwrite flag
/clipboard [boolean] : force screen capture to go to the clipboard
/cursor [boolean] : capture the cursor as well as the screen
/shadow [boolean] : capture the shadow of the window
/timer [number] : set delay (in seconds) before taking the picture
/capture : perform the screen capture
/display/index [int] : set index of display to capture (only when in 'screen' mode)
/defaultsettings [boolean] : screen capture will use the default (OS) settings for capture. The /destination argument will be ignored.
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

```

```

/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.hostinfos

## spat5.selector~

## Assign one of several inputs to an outlet

### description

**spat5.selector~** is similar to Max/MSP **selector~**.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @inputs [int]

The **inputs** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/input [int]** : set index of selected inlet

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute

**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass

**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting

**/dsp/post** : post various information to the Max console (audio should be turned on)

**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet

**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

```

/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- gate~
- selector~
- matrix~
- spat5.gate~
- spat5.routing~
- spat5.routing
- spat5.diagmatrix~
- spat5.multi.connect

## spat5.sfplay~ Play audio file from disk

### description

**spat5.sfplay~** plays audio files from disk.

Supported formats include AIFF, WAVE, MP3, M4A (mac only), AAC (mac only), CAF (mac only), AIFC (mac only), etc.

**spat5.sfplay~** is quite similar to Max/MSP **sfplay~**, yet highly optimized for playback of (massively) multichannel files.

Note that, unlike **sfplay~**, **spat5.sfplay~** does not support preload, nor time-stretch.

**spat5.sfplay~** can read WAVE files exceeding the traditional 4 GB limit: it supports RF64 and Sony Wave64 flavors.

For use with non-realtime audio driver, you need to set the **@rendering** attribute accordingly.

### attributes

**@buffersize** []

**@channels** [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@mc** [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

**@parameter\_enable** [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@rendering** [string]

The **rendering** attribute is used to specify the rendering mode : 'realtime' or 'offline'. 'realtime' is the default mode. 'offline', a.k.a. 'non realtime' is to be used with Max NonRealtime audio driver. Most objects can operate in both realtime and non-realtime. However, few objects (e.g. **spat5.sfreload~** and **spat5.sfplay~**) have different implementations for realtime/non-realtime uses. For use with NonRealtime audio driver, it is therefore important to set the **@rendering** attribute accordingly.

### methods

**/open** : open a dialog for choosing audio file

**/open [string]** : open an audio file

**/close** : close the current audio file

**/start** : start playback

**/stop** : stop playback

**/pause** : pause playback

**/resume** : resume from where paused

**/switch** : pause or resume playback

**/loop [boolean]** : enable loop mode

**/seek [number]** : play from this time (in msec) to the end of the file

**/seek [number][number]** : play a given segment of the current file (in msec)

**/info** : post info about the current file to the Max window

**/dump/metadata** : send all metadata (including the list of markers) through the dump outlet

**/dump/axml** : send the aXML chunk (if there is one) through the dump outlet

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.



/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute

/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).

/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass

/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting

/dsp/post : post various information to the Max console (audio should be turned on)

/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

/dump/dsp/latency : send the processor latency (in samples) through the dump outlet

/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `sfplay~`
- `spat5.sfplaylist~`
- `spat5.sfrecord~`
- `sfrecord~`
- `spat5.adm.play~`
- `playlist~`
- `spat5.multi.connect`

## spat5.sfplaylist~ Play audio file(s) from disk

### description

**spat5.sfplaylist~** plays audio files from disk.

It basically integrates several **spat5.sfplay~** (one for each clip), so that each clip can be pre-loaded into memory.

Supported formats include AIFF, WAVE, MP3, M4A (mac only), AAC (mac only), CAF (mac only), AIFC (mac only), etc. For use with non-realtime audio driver, you need to set the **@rendering** attribute accordingly.

### attributes

**@buffersize** []

**@channels** [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@mc** [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

**@parameter\_enable** [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@rendering** [string]

The **rendering** attribute is used to specify the rendering mode : 'realtime' or 'offline'. 'realtime' is the default mode. 'offline', a.k.a. 'non realtime' is to be used with Max NonRealtime audio driver. Most objects can operate in both realtime and non-realtime. However, few objects (e.g. **spat5.sftrecord~** and **spat5.sfplay~**) have different implementations for realtime/non-realtime uses. For use with NonRealtime audio driver, it is therefore important to set the **@rendering** attribute accordingly.

### methods

```
/clip/number [int] : allocate a number of clips
/clip/[index]/open [string] : open an audio file
/clip/[index]/close : close the current audio file
/start : start playback of the current clip
/clip/[index]/start [string] : start playback of the i-th clip
/stop : stop playback of the current clip
/pause : pause playback of the current clip
/resume : resume from where paused
/switch : pause or resume playback
/loop [boolean] : enable loop mode for the current clip
/clip/[index]/loop [boolean] : enable loop mode for the i-th clip
/seek [number] : play from this time (in msec) to the end of the file
/seek [number][number] : play a given segment of the current file (in msec)
/clip/next : start playback of the next clip (if any)
/clip/previous : start playback of the previous clip (if any)
/clip/start [int] : start playback of the i-th clip (if any)
/clip/current [int] : set current clip, but dont start playback
/info : post info about the current file to the Max window
/clip/[index]/info : post info about the i-th clip
/dump/metadata : send all metadata (including the list of markers) through the dump outlet
/dump/axml : send the aXML chunk (if there is one) through the dump outlet
```

/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).

/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute

/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).

/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass

/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting

/dsp/post : post various information to the Max console (audio should be turned on)

/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

/dump/dsp/latency : send the processor latency (in samples) through the dump outlet

/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name  
`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `sfplay~`
- `spat5.sfplay~`
- `spat5.sfrecored~`
- `sfrecored~`
- `spat5.adm.play~`
- `playlist~`
- `spat5.multi.connect`

## spat5.sfrecord~ Record to audio file on disk

### description

**spat5.sfrecord~** saves an audio file containing 'real world' sound and/or sound created in MSP. Supported formats include AIFF and WAVE.

**spat5.sfrecord~** is quite similar to Max/MSP **sfrecord~**, yet highly optimized for the recording of (massively) multichannel files

When the file exceeds the traditional 4 GB limit, **spat5.sfrecord~** automatically forces the RF64 extension (WAVE format only).

For use with non-realtime audio driver, you need to set the **@rendering** attribute accordingly.

### attributes

**@buffersize** []

**@channels** [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@mc** [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

**@parameter\_enable** [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@rendering** [string]

The **rendering** attribute is used to specify the rendering mode : 'realtime' or 'offline'. 'realtime' is the default mode. 'offline', a.k.a. 'non realtime' is to be used with Max NonRealtime audio driver. Most objects can operate in both realtime and non-realtime. However, few objects (e.g. **spat5.sfrecord~** and **spat5.sfplay~**) have different implementations for realtime/non-realtime uses. For use with NonRealtime audio driver, it is therefore important to set the **@rendering** attribute accordingly.

### methods

**/open** [string] : set file name for recording

**/start** : start recording

**/stop** : stop recording

**/record** [number] : start recording for a fixed amount of time (in msec)

**/record/samples** [int] : start recording for a fixed amount of time (in samples)

**/bitdepth** [int] : specify bit depth

**/overwrite** [boolean] : set overwrite flag

**/forcerrf64** [boolean] : force RF64 format (only for WAVE files) even if the file size is less than 4 GB

**/dsp/mute** [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).

**/dsp/mute** [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/mute/ramptime** [number] : set ramp time (in msec) for mute/unmute

**/dsp/bypass** [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).

**/dsp/bypass** [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

**/dsp/bypass/ramptime** [number] : set ramp time (in msec) for bypass

**/dsp/automute** [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting  
 /dsp/post : post various information to the Max console (audio should be turned on)  
 /dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
 /dump/dsp/latency : send the processor latency (in samples) through the dump outlet  
 /verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
 /post/version : print the version in the Max Console  
 /post/version [details] : print detailed version in the Max Console  
 /post/doc : print the help documentation in the Max Console  
 /post/state : print the OSC status in the Max Console  
 /preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
 /preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
 /preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)



## see also

- `sfplay~`
- `spat5.sfplay~`
- `sfplaylist~`
- `sfrecord~`
- `spat5.adm.record~`
- `spat5.multi.connect`

## spat5.sf.list List of audio files

### description

**spat5.sf.list** displays a list of audio files.

### attributes

#### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. If the file extension is not provided, 'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name

```

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- polybuffer~
- spat5.file.infos

## spat5.sf.list.embedded

## List of audio files

### description

spat5.sf.list displays a list of audio files.

### attributes

#### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
```

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- polybuffer~
- spat5.file.infos

# spat5.sf.merge

# Audio file merger

## description

**spat5.sf.merge** combine multiple audio files into one multichannel file.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.sf.split
- spat5.sf.list
- spat5.sf.list.embedded
- spat5.sf.resample
- spat5.sf.trim



## spat5.sf.resample

## Audio file Resampler

### description

**spat5.sf.resample** resamples audio files.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard  
**/snapshot/[index]/copytoclipboard [string]** : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/snapshot/[index]/export [string]** : export the i-th snapshot to file  
**/snapshot/[index]/export/content [string]** : export the content of the i-th snapshot to file  
**/snapshot/export [string]** : export all snapshots to file  
**/snapshot/import [string]** : import all snapshots from file

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.sf.split
- spat5.sf.list
- spat5.sf.list.embedded
- spat5.sf.merge
- spat5.sf.trim

# spat5.sf.trim      Audio file trim

## description

**spat5.sf.trim** trims samples at the beginning and/or of audio files.

## attributes

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`. Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
```

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.sf.list
- spat5.sf.list.embedded
- spat5.sf.resample
- spat5.sf.split
- spat5.sf.merge

# spat5.sf.split Audio file splitter

## description

**spat5.sf.splitter** splits a multichannel audio file into multiple mono files.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.sf.list
- spat5.sf.list.embedded
- spat5.sf.resample
- spat5.sf.merge
- spat5.sf.trim

# spat5.shell      Execute shell commands

## description

**spat5.shell** allows to execute shell commands or scripts.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```



/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

see also

## spat5.shuffle~

## Random recombination of channels

### description

**spat5.shuffle~** performs a random recombination of input signals in order to reduce correlation.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```
/mode [string] : set shuffling mode
/permutation [boolean] : enable permutation of the channels
/hadamard [string] : set flavor of Hadamard processing
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
```

/status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.early~
- spat5.cluster~
- spat5.reverb~
- spat5.room~
- spat5.spat~
- spat5.reverb.timeview
- spat5.roomsize
- spat5.multi.connect

# spat5.sig~ Convert numbers into audio signals

## description

**spat5.sig~** converts numbers (or list of numbers) into audio signals.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window

```

/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- sig~
- snapshot~
- spat5.snapshot~
- number~
- mc.sig~
- spat5.multi.connect

# spat5.simone      SiMulation of MOtioN

## description

**spat5.simone** simulates the movement of points/particles within a vector field. It is based on the 'xvf' object originally developed by Andrew Gerzso.

Reference(s) :

T. Carpentier and A. Gerzso. Steering Behaviors for Spatial Sound Authoring. Proc. of the 45th International Computer Music Conference (ICMC), New York, NY, USA, June 2019.

## attributes

**@cols** [int]

The **cols** attribute represents the number of columns. It can not be changed dynamically (via message or **attrui** or inspector).

**@embed** [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@parameter\_enable** [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@rows** [int]

The **rows** attribute represents the number of rows. It can not be changed dynamically (via message or **attrui** or inspector).

## methods

**/post/version** : print the version in the Max Console

**/post/version [details]** : print detailed version in the Max Console

**/post/doc** : print the help documentation in the Max Console

**/post/state** : print the OSC status in the Max Console

**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.

**/status** : open the status window and bring it to front

**/status/open** : open the status window and bring it to front

**/status/close** : close the status window

**/status/openorclose** : open the status window if it was closed; close it if it was opened

**/status/font/size [number]** : set the font size of the status window

**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)

**/help** : open the help window and bring it to front

**/help/open** : open the help window and bring it to front

**/help/close** : close the help window

**/help/openorclose** : open the help window if it was closed; close it if it was opened

**/help/font/size [number]** : set the font size of the help window

**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)

**/snapshot** : open the snapshot window and bring it to front

```

/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/row/number [int] : set the number of rows
/col/number [int] : set the number of columns
/point/number [int] : set the number of points
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.viewer
- spat5.simone.generator
- spat5.trajectories



- spat5.oper
- spat5.boids
- spat5.transform

# spat5.simone.embedded

# Simulation of MOtion

## description

spat5.simone simulates the movement of points/particles within a vector field. It is based on the 'xvf' object originally developed by Andrew Gerzso.

Reference(s) :

T. Carpentier and A. Gerzso. Steering Behaviors for Spatial Sound Authoring. Proc. of the 45th International Computer Music Conference (ICMC), New York, NY, USA, June 2019.

## attributes

**@cols** [int]

The `cols` attribute represents the number of columns. It can not be changed dynamically (via message or `attrui` or inspector).

**@embed** [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

**@initwith** [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

**@parameter\_enable** [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

**@rows** [int]

The `rows` attribute represents the number of rows. It can not be changed dynamically (via message or `attrui` or inspector).

## methods

`/post/version` : print the version in the Max Console

`/post/version [details]` : print detailed version in the Max Console

`/post/doc` : print the help documentation in the Max Console

`/post/state` : print the OSC status in the Max Console

`/preset/load [string]` : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the `coll` object). '.txt' is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

```

/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/row/number [int] : set the number of rows
/col/number [int] : set the number of columns
/point/number [int] : set the number of points

```

## see also

- spat5.viewer
- spat5.simone.generator
- spat5.trajectories
- spat5.oper
- spat5.boids
- spat5.transform

## spat5.simone.generator

## Vector field generator

### description

**spat5.simone.generator** generates vector fields for use with **spat5.simone**.

### attributes

#### @cols [int]

The **cols** attribute represents the number of columns. It can not be changed dynamically (via message or **attrui** or inspector).

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @rows [int]

The **rows** attribute represents the number of rows. It can not be changed dynamically (via message or **attrui** or inspector).

### methods

**/row/number [int]** : set the number of rows  
**/col/number [int]** : set the number of columns  
**/type [string]** : set the type of field

### see also

- spat5.simone
- spat5.simone.embedded
- spat5.trajectories
- spat5.viewer
- spat5.oper
- spat5.boids

## spat5.simulate.em32~

## Simulate Eigenmike recording

### description

**spat5.simulate.em32~** simulates the recording of signals with an Eigenmike microphone (MH acoustics).

Reference(s) :

J. Daniel and S. Moreau. Further Study of Sound Field Coding with Higher Order Ambisonics. In Proc. of the 116th Convention of the Audio Engineering Society (AES), Berlin, Germany, May 2004.

J. Daniel. Spherical arrays for capturing 3D sound fields: Prototype measurements versus analytical models. In Proc. of the 19th International Congress on Acoustics (ICA), Madrid, 2007.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @sources [int]

The **sources** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### methods

**/norm [string]** : set HOA normalization. Possible values: sn3d, sn2d, n3d, n2d, fuma, maxn, unnormalized  
**/order [int]** : set HOA order  
**/source/[index]/filter/length [int]** : set filter length for the i-th source  
**/source/[index]/type [string]** : set wave type for the i-th source  
**/source/[index]/order [int]** : set filter order for the i-th source  
**/source/number [int]** : set the number of sources  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console

`/preset/load [string]` : load a preset from file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.hoa.em64~`
- `spat5.hoa.em32~`
- `spat5.hoa.encoder~`
- `spat5.hoa.decoder~`
- `spat5.hoa.aformat~`
- `spat5.hoa.sorting~`
- `spat5.hoa.converter~`
- `spat5.hoa.binaural~`
- `spat5.multi.connect`

## spat5.singleroomdrir convention

## Read SOFA files with the SingleRoomDRIR

### description

**spat5.singleroomdrir** reads SOFA files with the SingleRoomDRIR convention.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`. Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box. Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

`/load [string]` : load SOFA file

### see also

- `spat5.sofa.infos`
- `spat5.sofa.loader`
- `spat5.multispeakerbrir~`
- `spat5.hrtf.infos`
- `spat5.hrtf.normalize`



## spat5.slide~ Filter a signal logarithmically

### description

**spat5.slide~** is similar to Max/MSP **slide~** but it can process several channels in parallel.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```
/channel/number [int] : set the number of channels
/up [number] : set slide up value for all channels
/down [number] : set slide down value for all channels
/channel/[index]/up [number] : set slide up value for the i-th channel
/channel/[index]/down [number] : set slide down value for the i-th channel
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
```

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `slide~`
- `rampsmooth~`
- `spat5.multi.connect`

# spat5.smk~ Sweep Measurement Kit

## description

**spat5.smk~** is used to measure the impulse response (IR) of a linear time-invariant (LTI) system, with the so-called exponential swept-sine method (ESS). **spat5.smk~** handles all the steps from the generation of the sweep, the recording of the incoming signals, and the impulse response deconvolution. It furthermore saves the responses as audio files.

Reference(s) :

A. Farina. Simultaneous measurement of impulse response and distortion with a swept-sine technique. In Proc. of the 108th Convention of the Audio Engineering Society (AES), Paris, France, 2000.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @inlets [int]

The **inlets** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/channel/number [int] : set the number of channel actually used. this must be less (or equal) than the numinlets
/sweep/order [int] : set sweep order
/sweep/f0 [number] : set the sweep frequency (in Hz) at time t=0
/sweep/f1 [number] : set the sweep frequency (in Hz) at time t=t1
/sweep/t1 [number] : set the t1 time (in samples)
/sweep/fadein [int] : set fade in duration (in samples)
/sweep/fadeout [int] : set fade out duration (in samples)
/sweep/gain [number] : set sweep linear gain
/sweep/gain/db [number] : set sweep gain in dB
/sweep/cycles [int] : set the number of (averaged) sweep cycles
/sweep/pause [int] : set the duration of the pause in between repetitions (in samples)
/sweep/phi [number] : set the initial phase (in degrees) of the sweep
/sweep/type [string] : set the type of sweep
/sweep/waveform [string] : set the type of waveform for the sweep
/options/folder [string] : set destination folder
/options/basename [string] : set basename for saving files
/options/naming [string] : set file naming scheme. Possible values: overwrite, tag, increment
/options/bitdepth [int] : set bit depth for exported audio files
/options/deconvolution [boolean] : enable deconvolution (immediately after the measurement)
/options/matlabexport [boolean] : export matlab files for the deconvolved IR
/options/thdanalysis [boolean] : perform THD analysis of the IR (immediately after the deconvolution)
/options/saveirtxt [boolean] : save txt file accompanying the IR audio file
/options/saveraw [boolean] : save raw measurements (prior to deconvolution)
/options/saverawtxt [boolean] : save txt file accompanying the raw measurements (prior to deconvolution)
/options/savesweep [boolean] : save sweep signal to audio file
/options/savesweepinverse [boolean] : save inverse sweep signal to audio file
/options/saveaxml [boolean] : save axml file(s) accompanying the IR audio file
```

```

/options/savelog [boolean] : save a log file (txt) for the session
/options/repeat [int] : set the number of successive repetitions for the measurement
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second
argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see
/dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the
second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically
whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

```

`/snapshot/recall [int]` : recall the i-th snapshot  
`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)  
`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name  
`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.conv~`
- `spat5.tfestimate~`
- `spat5.calibrate.gain~`
- `spat5.calibrate.delay~`
- `spat5.ir.infos`
- `spat5.ir.analysis`
- `spat5.edc`
- `spat5.sweep~`
- `spat5.multi.connect`

## spat5.snapshot~

## Multichannel conversion of signal values to numbers

### description

Use the **spat5.snapshot~** object to convert a signal value into a float message when a bang is received or according to a specified interval. It is similar to Max/MSP **snapshot~**, but can process several channels in parallel.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/rate [number]** : set report rate (in msec)  
**/offset [int]** : change offset in the vector to report  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.



/status : open the status window and bring it to front  
/status/open : open the status window and bring it to front  
/status/close : close the status window  
/status/openorclose : open the status window if it was closed; close it if it was opened  
/status/font/size [number] : set the font size of the status window  
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
/help : open the help window and bring it to front  
/help/open : open the help window and bring it to front  
/help/close : close the help window  
/help/openorclose : open the help window if it was closed; close it if it was opened  
/help/font/size [number] : set the font size of the help window  
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
/snapshot : open the snapshot window and bring it to front  
/snapshot/open : open the snapshot window and bring it to front  
/snapshot/close : close the snapshot window  
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
/snapshot/font/size [number] : set the font size of the snapshot window  
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
/status/copytoclipboard : copy the status to (the OS) clipboard  
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
/snapshot/deleteall : delete all the snapshots currently in memory  
/snapshot/add : create a new snapshot with the current state  
/snapshot/add [string] : create a new snapshot with the current state, and set its name  
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
/snapshot/[index]/recall : recall the current state from the i-th snapshot  
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
/snapshot/[index]/name [string] : set the name of the i-th snapshot  
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
/snapshot/[index]/delete : delete the i-th snapshot  
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
/snapshot/[index]/export [string] : export the i-th snapshot to file  
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
/snapshot/export [string] : export all snapshots to file  
/snapshot/import [string] : import all snapshots from file  
/snapshot/recall/next : recall the next snapshot  
/snapshot/recall/previous : recall the previous snapshot  
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
/snapshot/recall [int] : recall the i-th snapshot  
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
/snapshot/recall/bytitle [string] : recall a snapshot by title/name  
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
/snapshot/lock [boolean] : lock edition of the snapshots  
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- snapshot~
- number~
- sig~
- spat5.sig~
- spat5.rms~
- spat5.meter~
- spat5.minmax~
- mc.snapshot~
- spat5.multi.connect



## spat5.sofa.infos

## Report information about SOFA files

### description

**spat5.sofa.infos** reports information about SOFA files.

Reference(s) :

P. Majdak, Y. Iwaya, T. Carpentier, R. Nicol, M. Parmentier, A. Roginska, Y. Suzuki, K. Watanabe, H. Wierstorf, H. Ziegelwanger, and M. Noisternig. Spatially Oriented Format for Acoustics: A Data Exchange Format Representing Head-Related Transfer Functions. In Proc. of the 134th Convention of the Audio Engineering Society (AES), Roma, Italy, May 4-7 2013.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory  
**/snapshot/add** : create a new snapshot with the current state  
**/snapshot/add [string]** : create a new snapshot with the current state, and set its name  
**/snapshot/[index]/store** : store the current state in the i-th snapshot (in memory)  
**/snapshot/[index]/recall** : recall the current state from the i-th snapshot  
**/snapshot/[index]/jump** : immediately recall the current state from the i-th snapshot (ignoring recall time)  
**/snapshot/[index]/name [string]** : set the name of the i-th snapshot  
**/snapshot/interpolate [int][int][number]** : interpolate between the i-th and j-th snapshots  
**/snapshot/interpolate [string][string][number]** : interpolate between two snapshots, given their names  
**/snapshot/[index]/delete** : delete the i-th snapshot  
**/snapshot/[index]/copytoclipboard** : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.sofa.loader
- spat5.binaural~
- spat5.headphoneeq~
- spat5.spat~
- spat5.ctc~
- spat5.hrtf.infos
- spat5.hrtf.normalize
- spat5.hoa.binaural~

# spat5.sofa.loader SOFA files manager

## description

**spat5.sofa.loader** can be used to manage and load your collection of SOFA files.

The **spat5.sofa.loader** object scans various folders on your hard drive, to search for SOFA files. It is recommended to place your SOFA files in: `/Users/username/Documents/Ircam/sofa` (create the folder if it does not exist yet).

Reference(s) :

P. Majdak, Y. Iwaya, T. Carpentier, R. Nicol, M. Parmentier, A. Roginska, Y. Suzuki, K. Watanabe, H. Wierstorf, H. Ziegelwanger, and M. Noisternig. Spatially Oriented Format for Acoustics: A Data Exchange Format Representing Head-Related Transfer Functions. In Proc. of the 134th Convention of the Audio Engineering Society (AES), Roma, Italy, May 4-7 2013.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@parameter\_enable** [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory

```

/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizableability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.sofa.infos
- spat5.binaural~
- spat5.spat~
- spat5.ctc~
- spat5.hrtf.infos

# spat5.sofa.loader.embedded SOFA files manager

## description

spat5.sofa.loader can be used to manage and load your collection of SOFA files.

The spat5.sofa.loader object scans various folders on your hard drive, to search for SOFA files. It is recommended to place your SOFA files in: /Users/username/Documents/Ircam/sofa (create the folder if it does not exist yet).

Reference(s) :

P. Majdak, Y. Iwaya, T. Carpentier, R. Nicol, M. Parmentier, A. Roginska, Y. Suzuki, K. Watanabe, H. Wierstorf, H. Ziegelwanger, and M. Noisternig. Spatially Oriented Format for Acoustics: A Data Exchange Format Representing Head-Related Transfer Functions. In Proc. of the 134th Convention of the Audio Engineering Society (AES), Roma, Italy, May 4-7 2013.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@parameter\_enable** [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.  
**/snapshot/deleteall** : delete all the snapshots currently in memory

```

/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.sofa.infos
- spat5.binaural~
- spat5.spat~
- spat5.ctc~
- spat5.hrtf.infos

# spat5.softclipping~ Soft clipping

## description

**spat5.softclipping~** is a multichannel soft clipping processor.

Reference(s) :

Sean Enderby and Zlattko Baracska. Harmonic instability of digital soft clipping algorithms. In Proc. of the 15th Int Conference on Digital Audio Effects (DAFx-12), York, UK, September 17-21, 2012.

## attributes

**@channels** [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

**@mc** [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

**@parameter\_enable** [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/type** [string] : set the processing type. Possible values: tanh, tanh5, sin, exp2, exp5, tsq, cubic, reciprocal  
**/dsp/mute** [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute** [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime** [number] : set ramp time (in msec) for mute/unmute  
**/dsp/bypass** [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass** [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime** [number] : set ramp time (in msec) for bypass  
**/dsp/automute** [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack** [number] : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose** [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version** [details] : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load** [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
**/preset/export** [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)



/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.compressor~
- spat5.noisegate~
- spat5.clip~
- spat5.delta~
- spat5.deltaclip~
- spat5.tanh~
- spat5.fixnan~
- spat5.rms~
- spat5.ebur128~
- spat5.tanh~
- spat5.multi.connect

# spat5.source~ Source pre-processing

## description

Air absorption, Doppler filtering and input equalization.

## attributes

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @inputs [int]

The `inputs` attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @mc [int]

The `mc` attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the `mc` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-mc.maxpat` or `spat5.tuto-mc-2.maxpat` examples for further details.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/air [boolean] : enable/disable air absorption (for direct sound)
/air/freq [number] : set air absorption rolloff frequency (in Hz)
/doppler [boolean] : enable/disable doppler effect
/doppler/delay [number] : set delay (in msec) for doppler effect
/distance [number] : set distance (in meters) for doppler effect
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
```

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.early~
- spat5.cluster~
- spat5.reverb~
- spat5.air~
- spat5.doppler~
- spat5.room~
- spat5.hlshef~
- spat5.spat~
- spat5.panoramix~
- spat5.viewer
- spat5.multi.connect

# spat5.spat~ LE Spatialisateur

## description

**spat5.spat~** is a configurable real-time spatial processor integrating the localization of sound events with room acoustic quality. The **spat5.spat~** combines several DSP modules in a flexible framework. This includes a reverberator engine (based on **spat5.early~**, **spat5.cluster~**, **spat5.reverb~**, **spat5.room~**); the reverberated signals are then panned in space (this panning stage is based on the **spat5.pan~** object). Direct sound signal (so-called 'axis') and reverberated signals (so-called 'omni') can be filtered with 3-band shelving filters (based on **spat5.hlshef~**). Additionally, Doppler effect and air absorption filtering can be simulated (they're based on **spat5.source~**, **spat5.air~**, **spat5.doppler~**, etc). Spatial, temporal, and spectral parameters can be controlled by the **spat5.oper** graphical user interface.

### Reference(s) :

J.-M. Jot. Real-time spatial processing of sounds for music, multimedia and interactive human-computer interfaces. ACM Multimedia Systems Journal (Special issue on Audio and Multimedia), 7(1):55 – 69, 1999.

J.-M. Jot and O. Warusfel. A real-time spatial sound processor for music and virtual reality applications. In Proc. of the International Computer Music Conference (ICMC), pages 294 – 295, Banff, 1995.

T. Carpentier, M. Noisternig, and O. Warusfel. Twenty Years of Ircam Spat: Looking Back, Looking Forward. In Proc. of the 41st International Computer Music Conference (ICMC), pages 270 – 277, Denton, TX, USA, Sept. 2015.

T. Carpentier. A new implementation of Spat in Max. In Proc. of the 15th Sound and Music Computing Conference (SMC), pages 184 – 191, Limassol, Cyprus, July 2018.

T. Carpentier. Spat: a comprehensive toolbox for sound spatialization in Max. In Ideas Sonicas, Vol 13(24), pages 12 – 23, June 2021.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @inputs [int]

The **inputs** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @internals [int]

The **internals** attribute represents the number of internal channels of the artificial reverberator.

Spat uses a Feedback Delay Network (FDN) reverberator engine.

Basically this can be seen as an array of delay lines which are fed back into a mixing matrix. The **internals** attributes represents the size of the feedback matrix.

Choosing the size of this matrix is a trade-off between CPU consumption and the echo density.

Increasing the size of the matrix will generate a denser reverb tail at the expense of a higher CPU load.

A typical value of 8 is a good compromise between CPU load and natural sounding reverb. A value of 16 may be useful especially when dealing with a very long reverberation time or with very percussive sound (where a smaller FDN might sometimes sounds too poor).

Increasing the **internals** attribute may also be helpful when using a large number of loudspeakers, to ensure a proper decorrelation of the reproduced late reverberation signals.

It is recommended not to use a value below 6.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @mode [string]

The **mode** attribute is used to specify the "input type" of each source. **spat5.spat~** supports mono and stereo input sources.

Note that the **mode** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

### Possible syntax:

@mode "mono" : all sources are mono (default)

@mode "stereo" : all sources are stereo  
 @mode "mono mono stereo" : a list of modes for each of the 3 sources  
 You can also use the shorthand notation : @mode "m m s"  
 @mode "mono 2 stereo 1" : 2 mono sources, followed by 1 stereo source  
 You can also use the shorthand notation : @mode "m 2 s 1"

#### @outputs [int]

The `outputs` attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or `inspector`), since the number of signal inlets or outlets can not be changed dynamically.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @rooms [int]

The `rooms` attribute represents the number of (shared) late reverbs. It can not be changed dynamically (via message or `attrui` or `inspector`).

## methods

`/panning/type [string]` : set panning type i.e. the type of algorithm used for rendering. A wide variety of panning methods are available, but there may be constraints depending on the number of inputs and/or outputs channels.

- "binaural" : binaural synthesis using HRTF (Head-Related Transfer Functions) filtering, for headphones only.
- "xy" : simulates the recording of the sound scene by a coincident XY couple of microphones (intensity panning), for stereo only.
- "ms" : simulates the recording of the sound scene by a mid-side microphone; this generates the M-S signals, and further requires decoding for L-R compatibility.
- "ab" : simulates the recording of the sound scene by an AB couple of microphones (ORTF) i.e. it simulates a pair of spaced cardioid microphones, pointing laterally at azimuths +/- 55 degrees (elevation 0), with a distance of 17 cm between the two capsules; for stereo only.
- "stereopan" : stereo panpot (intensity panning) with various panning laws, for stereo only.
- "angular" : angular panning (intensity panning) for 2-D (horizontal only) loudspeaker setups. "angular" panning is essentially the same as "vbap2d", the main difference is how the panning gains evolve when moving the source from one speaker to another.
- "abap2d" : angle-based amplitude panning : pairwise amplitude panning for 2-D (horizontal only) loudspeaker setups. Provides linear panning vs target azimuth angle.
- "abip2d" : angle-based intensity panning : pairwise intensity panning for 2-D (horizontal only) loudspeaker setups. "abip2d" panning is essentially the same as "vbip2d", the main difference is how the panning gains evolve when moving the source from one speaker to another.
- "vbap2d" : vector base amplitude panning : pairwise amplitude panning for 2-D (horizontal only) loudspeaker setups, with power normalization of the gains.
- "vbap3d" : vector base amplitude panning : amplitude panning for 3-D loudspeaker setups. The underlying algorithm creates a triangulation of the loudspeaker array, and depending on the position of the virtual source, it selects the appropriate loudspeaker triplet.
- "vbip2d" : vector base intensity panning : pairwise intensity panning for 2-D (horizontal only) loudspeaker setups. The geometrical algorithm is similar to "vbap2d", however the speaker signals are normalized with constant intensity (rather than with constant power).
- "vbip3d" : vector base intensity panning : pairwise intensity panning for 3-D loudspeaker setups. The geometrical algorithm is similar to "vbap3d", however the speaker signals are normalized with constant intensity (rather than with constant power).
- "vbap" : vector base amplitude panning : will switch automatically between "vbap3d" or "vbap2d", depending on the loudspeaker setup.
- "vbip" : vector base intensity panning : will switch automatically between "vbip3d" or "vbip2d", depending on the loudspeaker setup.
- "dualbandvbp" : vector base panning : uses vbap for low frequencies and vbip for high frequencies. (either 2-D or 3-D speaker setup)
- "lbap" : layer based amplitude panning : this creates several vertical layers of loudspeakers, and operates each layer as a "vbap2d" setup. If the loudspeaker layout is planar, "lbap" is just the same as "vbap2d".
- "sphericalheadmodel" : binaural synthesis using an approximate spherical head model (Rayleigh) for both ILD and ITD. Elevation is not taken into account.
- "snowmanmodel" : binaural synthesis using an approximate snow-man model for head-and-torso (two spherical models).
- "nearfieldbinaural" : binaural synthesis using HRTF (Head-Related Transfer Functions) filtering, and with compensation (ITD and ILD) of nearfield effects.
- "hoa2d" : 2-D (horizontal only) higher order ambisonic (HOA) encoder.
- "hoa3d" : 3-D higher order ambisonic (HOA) encoder.
- "aep2d" : ambisonic equivalent panning in 2-D (horizontal only) .
- "aep3d" : ambisonic equivalent panning in 3-D.
- "spcap" : speaker-placement correction amplitude panning.
- "nfchoa2d" : 2-D (horizontal only) higher order ambisonic (HOA) encoder with Nearfield Compensation Filters (NFC).
- "nfchoa3d" : 3-D higher order ambisonic (HOA) encoder with Nearfield Compensation Filters (NFC).
- "knn" : K-nearest neighbors panning : applies amplitude panning on the K-nearest loudspeakers to the source. The (maximum) number K of contributing speakers can be specified with the `/source/[index]/neighbors [int]` message. This kind of panning is compatible with arbitrary loudspeaker setup (either 2D or 3D).
- "surround" : LRS or LCRS encoder. Deprecated, don't use it.
- "panr" : legacy panning law from spat v3.x. Deprecated, don't use it. Pair-wise panning over a regular arrangement of loudspeakers on a plane (2-D only).
- "dbap2d" : distance-based amplitude panning on a 2-D (horizontal only) speaker setup (after Trond lossius).

- "dbap3d" : .
- "subwoofers" : combines a lowpass filter and a "vbap2d" panner.
- "wfs" : wavefield synthesis for linear array of loudspeakers.
- "bformat" : legacy Ambisonic B-format amplitude panning. Deprecated, don't use it anymore; use "hoa2d" or "hoa3d" instead.
- "laap" : amplitude/intensity panning on a linear array of loudspeakers. Experimental prototype, don't use it.

. Possible values: binaural, xy, ms, ab, stereopan, surround, panr, angular, abap2d, abip2d, dbap3d, dbap2d, vbap, vbip, vbap3d, vbip3d, vbap2d, vbap2damp, hybrid-vbap, vbip2d, dualbandvbp, bformat, hoa2d, hoa3d, nfchoa3d, nfchoa2d, spcap, csp, knn, aep2d, aep3d, subwoofers, wfs, lbap, laap, sphericalheadmodel, snowmanmodel, nearfieldbinaural

/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates  
 /source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)  
 /source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)  
 /source/[index]/xy\_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged  
 /source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged  
 /source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged  
 /source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged  
 /source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)  
 /source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)  
 /source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)  
 /source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)  
 /source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged  
 /source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged  
 /source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged  
 /source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged  
 /source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged  
 /sources/aed [nnnn...] : set the list of source coordinates (with aed format)  
 /sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)  
 /sources/ade [nnnn...] : set the list of source coordinates (with ade format)  
 /sources/xy [nnnn...] : set the list of source coordinates (with xy format)  
 /sources/ae [nnnn...] : set the list of source coordinates (with ae format)  
 /source/[index]/axis/G0 [number] : set the global gain (in dB) of axis filter for the i-th source  
 /source/[index]/axis/Gl [number] : set the low gain (in dB) of axis filter for the i-th source  
 /source/[index]/axis/Gm [number] : set the mid gain (in dB) of axis filter for the i-th source  
 /source/[index]/axis/Gh [number] : set the high gain (in dB) of axis filter for the i-th source  
 /source/[index]/axis/fl [number] : set the low/mid crossover frequency (in Hz) of axis filter for the i-th source  
 /source/[index]/axis/fh [number] : set the mid/high crossover frequency (in Hz) of axis filter for the i-th source  
 /source/[index]/axis/params [number][number][number][number][number][number] : set the parameters of axis filter for the i-th source. Parameters are given as a list of [G0 Gl Gm Gh fl fh]  
 /source/[index]/omni/G0 [number] : set the global gain (in dB) of omni filter for the i-th source  
 /source/[index]/omni/Gl [number] : set the low gain (in dB) of omni filter for the i-th source  
 /source/[index]/omni/Gm [number] : set the mid gain (in dB) of omni filter for the i-th source  
 /source/[index]/omni/Gh [number] : set the high gain (in dB) of omni filter for the i-th source  
 /source/[index]/omni/fl [number] : set the low/mid crossover frequency (in Hz) of omni filter for the i-th source  
 /source/[index]/omni/fh [number] : set the mid/high crossover frequency (in Hz) of omni filter for the i-th source  
 /source/[index]/omni/params [number][number][number][number][number][number] : set the parameters of omni filter for the i-th source. Parameters are given as a list of [G0 Gl Gm Gh fl fh]  
 /source/[index]/pres [number] : set the source presence of the i-th source  
 /source/[index]/warmth [number] : set the source warmth of the i-th source  
 /source/[index]/bril [number] : set the source brilliance of the i-th source  
 /source/[index]/prer [number] : set the room presence of the i-th source  
 /source/[index]/revp [number] : set the running reverberance of the i-th source  
 /source/[index]/env [number] : set the envelopment of the i-th source  
 /source/[index]/yaw [number] : set the yaw angle (in deg) of the i-th source  
 /source/[index]/pitch [number] : set the pitch angle (in deg) of the i-th source  
 /source/[index]/aperture [number] : set the aperture angle (in deg) of the i-th source  
 /source/[index]/early/width [number] : set the early width angle (in deg) of the i-th source  
 /source/[index]/early/shape [number] : set the early shape (in /source/[index]/panrev [number] : set the panrev factor (in /source/[index]/drop [number] : set the drop factor (in dB) for the i-th source  
 /source/[index]/drop/mode [string] : set the drop mode for the i-th source. Possible values: linear, log2  
 /source/[index]/radius [number] : set the radius (in meters) for the i-th source  
 /source/[index]/air [boolean] : enable/disable air absorption for the i-th source  
 /source/[index]/air/freq [number] : set cutoff frequency (in Hz) for air absorption of the i-th source  
 /source/[index]/air/distance [number] : set distance (in meters) for air absorption of the i-th source  
 /source/[index]/doppler [boolean] : enable/disable doppler filtering for the i-th source  
 /source/[index]/mute [number] : mute/unmute the i-th source  
 /source/[index]/solo [number] : solo/unsolo the i-th source  
 /source/[index]/spread/mode [string] : set spread mode for the i-th source  
 /source/[index]/spread/law [string] : set spread law for the i-th source  
 /source/[index]/spread/omni [number] : set omni spread (in /room/[index]/reverberance [number] : set the reverberance of the i-th room  
 /room/[index]/heaviness [number] : set the heaviness of the i-th room  
 /room/[index]/liveness [number] : set the liveness of the i-th room  
 /room/[index]/reverb/enable [boolean] : enable/disable the i-th room  
 /room/[index]/reverb/infinite [boolean] : enable/disable infinite reverb in the i-th room



/room/[index]/reverb/fl [number] : set the low/mid crossover frequency (in Hz) for the i-th room  
 /room/[index]/reverb/fh [number] : set the mid/high crossover frequency (in Hz) for the i-th room  
 /room/[index]/reverb/start [number] : set the reverb start (in msec) for the i-th room  
 /room/[index]/reverb/density [number] : set the reverb modal density for the i-th room  
 /room/[index]/air [boolean] : enable/disable air absorption for the i-th room  
 /room/[index]/air/freq [number] : set rolloff frequency (in Hz) for air absorption in the i-th room  
 /parallel [boolean] : enable multithread rendering  
 /dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).  
 /dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
 /dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute  
 /dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).  
 /dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
 /dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass  
 /dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
 /dsp/automute/attack [number] : set the duration (in seconds) before auto-muting  
 /dsp/post : post various information to the Max console (audio should be turned on)  
 /dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
 /dump/dsp/latency : send the processor latency (in samples) through the dump outlet  
 /verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
 /post/version : print the version in the Max Console  
 /post/version [details] : print detailed version in the Max Console  
 /post/doc : print the help documentation in the Max Console  
 /post/state : print the OSC status in the Max Console  
 /preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
 /preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
 /preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string] [string] [number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file



```
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
```

## see also

- spat5.oper
- spat5.viewer
- spat5.early~
- spat5.cluster~
- spat5.reverb~
- spat5.pan~
- spat5.decoder~
- spat5.delgen
- spat5.ircamverb~
- spat5.shuffle~
- spat5.align~
- spat5.panoramix~
- spat5.panoramix
- spat5.virtualspeakers~
- spat5.hlsshelf
- spat5.hlsshelf~
- spat5.oper\_\_
- spat5.source~
- spat5.room~
- spat5.ctc~
- spat5.trajectories
- spat5.reverb.timeview
- spat5.multi.connect

## spat5.speaker.config

## Speaker layout editor

### description

**spat5.speaker.config** is a handy tool for creating loudspeaker setups.

### attributes

#### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the **initwith** attribute cannot be set via message, `attrui` or `inspector`; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

`/post/version` : print the version in the Max Console  
`/post/version [details]` : print detailed version in the Max Console  
`/post/doc` : print the help documentation in the Max Console  
`/post/state` : print the OSC status in the Max Console  
`/preset/load [string]` : load a preset from file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.  
`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)  
`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.  
`/status` : open the status window and bring it to front  
`/status/open` : open the status window and bring it to front  
`/status/close` : close the status window  
`/status/openorclose` : open the status window if it was closed; close it if it was opened  
`/status/font/size [number]` : set the font size of the status window  
`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)  
`/help` : open the help window and bring it to front  
`/help/open` : open the help window and bring it to front  
`/help/close` : close the help window  
`/help/openorclose` : open the help window if it was closed; close it if it was opened  
`/help/font/size [number]` : set the font size of the help window  
`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)  
`/snapshot` : open the snapshot window and bring it to front  
`/snapshot/open` : open the snapshot window and bring it to front  
`/snapshot/close` : close the snapshot window  
`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened  
`/snapshot/font/size [number]` : set the font size of the snapshot window  
`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)  
`/status/copytoclipboard` : copy the status to (the OS) clipboard  
`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)  
`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.  
`/snapshot/deleteall` : delete all the snapshots currently in memory  
`/snapshot/add` : create a new snapshot with the current state  
`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

```

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.viewer
- spat5.oper
- spat5.speaker.layout
- spat5.grids
- spat5.align~

# spat5.speaker.config.embedded

# Speaker layout editor

## description

spat5.speaker.config is a handy tool for creating loudspeaker setups.

## attributes

### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or `inspector`; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
```

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.viewer
- spat5.oper
- spat5.speaker.layout
- spat5.grids
- spat5.align~

## spat5.speaker.layout

## Pre-defined loudspeaker setups

### description

**spat5.speaker.layout** contains a set of pre-defined loudspeaker setups.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```

/type [string] : set speaker layout type
/normalize [boolean] : normalize speaker coordinates (to 1 meter)
/labels [boolean] : include loudspeaker labels
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file

```

```
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
```

## see also

- spat5.speaker.config
- spat5.viewer
- spat5.converterspat5.abs2rel
- spat5.oper
- spat5.grids
- spat5.viewer.control
- poltocar
- cartopol
- spat5.transform
- spat5.scale
- spat5.translate
- spat5.rotate
- spat5.normalize
- spat5.quat.fromeuler
- spat5.quat.toeuler
- spat5.quat.transform
- spat5.distance
- spat5.trajectories



## spat5.spectroscope~

## Signal spectrogram

## description

**spat5.spectroscope~** serves as a visual spectrogram.

## attributes

## @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

## @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

## @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
```

```

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizableability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spectroscope~
- scope~
- meter~
- spat5.frequencyresponse
- spat5.zplane
- spat5.multi.connect

# spat5.sprintf String formatting

## description

**spat5.sprintf** allows the easy formatting of text.

## attributes

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/ms [number] : set time (in milliseconds)
/time/format [string] : set format for time. Possible values: jour_heure_minute_seconde, day_hour_min_sec, j_h_m_s, d_h_m_s, h_min_sec,
hour_min_sec, heure_minute_seconde, h_m_s_ms, h_m_s, m_s, s, sec, seconde
/time/format/shrink [boolean] : set shrink for time values
/time/format/padding [boolean] : set padding for time values
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
```

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- `sprintf`

## spat5.svgpath Convert SVG image file to trajectory

### description

**spat5.svgpath** converts an SVG image file (containing the 'path' tag) to trajectory.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

`/load [string]` : load an SVG file from disk

`/next` : increment time position

`/next [int]` : increment time position with a given offset

`/time [number]` : change time position

`/adjust [boolean]` : automatically center and scale the image (applied when loading the SVG)

`/path/[index]/export/coll [string]` : export the i-th path to coll file

### see also

- `spat5.viewer`
- `spat5.trajectories`
- `spat5.transform`
- `spat5.scale`
- `spat5.translate`
- `spat5.rotate`

# spat5.sweep~ Sweep generator

## description

**spat5.sweep~** generates sweep signals.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/length/samples [int]** : set the sweep length (in samples)  
**/f0 [number]** : set the sweep frequency (in Hz) at time t=0  
**/f1 [number]** : set the sweep frequency (in Hz) at time t=t1  
**/t1 [number]** : set the t1 time (in samples)  
**/fadein/samples [int]** : set fade in duration (in samples)  
**/fadeout/samples [int]** : set fade out duration (in samples)  
**/gain [number]** : set linear gain  
**/gain/db [number]** : set gain in dB  
**/cycles [int]** : set the number of sweep cycles (averaged)  
**/pause/samples [int]** : set the duration of the pause in between repetitions (in samples)  
**/phi [number]** : set the initial phase (in degrees)  
**/type [string]** : set the type of sweep  
**/waveform [string]** : set the type of waveform  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC

file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.calibrate.delay~
- spat5.calibrate.gain~
- spat5.smk~
- spat5.ir.infos
- spat5.multi.connect



## spat5.tanh~

## Signal hyperbolic tangent function

### description

**spat5.tanh~** calculates an output signal that is the hyperbolic tangent function of each sample of the input signal. It is similar to Max/MSP **tanh~** but can run several channels in parallel.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean] [number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
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**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front

```

/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
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/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
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/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
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/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- tanh~
- atan~
- atanh~
- atan2~
- spat5.softclipping~
- spat5.compressor~
- spat5.fixnan~
- spat5.isnan~
- spat5.noisegate~
- spat5.clip~
- spat5.delta~
- spat5.deltacclip~
- mc.tanh~
- spat5.multi.connect

## spat5.tapout~

## Multichannel tapout from a delayline

### description

**spat5.tapout~** is similar to Max/MSP **tapout~**/**tapin~** but it can process several delays in parallel. **spat5.tapout~** uses an interpolated fractional delay for smooth variations. Delays are specified in milliseconds or samples.

Reference(s) :

T. I. Laakso, V. Välimäki, M. Karjalainen, and U. K. Laine. Splitting the unit delay. IEEE Signal Processing Magazine, 13(1):30 – 60, January 1996.

### attributes

#### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary

encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.delay~
- spat5.comb~
- comb~
- allpass~
- tapin~
- tapout~
- delay~
- spat5.allpass~
- spat5.early~
- spat5.cluster~
- spat5.reverb~
- spat5.delgen
- spat5.roomsize
- spat5.multi.connect

# spat5.tfestimate~ Transfer Function estimation using Welch's averaged periodogram method

## description

**spat5.tfestimate~** uses Welch's averaged periodogram method.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front

/help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.smk~
- spat5.sweep~
- spat5.ir.analysis
- spat5.ir.infos
- spat5.calibrate.gain~
- spat5.calibrate.delay~
- spat5.mscohere~



# spat5.times~ Multichannel times~

## description

**spat5.times~** is similar to Max/MSP **times~** (aka **\*~**) but it can process several channels in parallel. All the input signals are multiplied by the rightmost gain (float or signal).

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots
```



/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- times~
- \*~
- spat5.plus~
- gain~
- spat5.meter~
- spat5.diagmatrix~
- matrix~
- live.gain~
- mc.\*~
- mc.live.gain~

## spat5.trajectories

## Trajectories generator

### description

**spat5.trajectories** generates trajectories according to various parametric curves.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```
/start : start delivering messages
/stop : stop delivering messages
/type [string] : set the type of trajectory
/speed [number] : set the trajectory speed
/radius [number] : set the trajectory radius (not valid for all types)
/a [number] : set the 'a' parameter for the trajectory (not valid for all types)
/b [number] : set the 'b' parameter for the trajectory (not valid for all types)
/petals [number] : set the number of petals (only for the 'rose' type)
/format [string] : set format for output messages
/rate [number] : set output rate (in msec)
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
```

```

/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.viewer
- spat5.transform
- spat5.converter
- spat5.grids
- spat5.rotate
- spat5.scale
- spat5.translate
- spat5.mirror
- spat5.jitter
- spat5.oper
- spat5.constraint
- spat5.barycenter
- spat5.simone
- spat5.simone.generator
- spat5.boids

# spat5.transform      Geometrical transformations

## description

**spat5.transform** applies geometrical transformations (translation, rotation, scaling, etc.) to source, speaker or listener coordinate messages. The mathematical operations applied here are dependent on the order of transformations. This order can be specified with the `/sequence` message. **spat5.scale**, **spat5.rotate** and **spat5.translate** are stateless objects i.e. they only react when incoming position messages are received. On the other hand, **spat5.transform** is statefull: it keeps track of the state of the spatial scene, and will deliver the transformed scene whenever the parameter (yaw, pitch, roll, offset, etc.) is changed.

## attributes

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`. Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box. Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```

/sequence [string] : set the sequence of operations
/offset/x [number] : set translation offset along the x-axis (in meters)
/offset/y [number] : set translation offset along the x-axis (in meters)
/offset/z [number] : set translation offset along the x-axis (in meters)
/offset/xy [number][number] : set translation offset along the x and y axis (in meters)
/offset/xyz [number][number][number] : set translation offset along the x, y, and z axis (in meters)
/scaling/x [number] : set scaling factor along the y-axis
/scaling/y [number] : set scaling factor along the y-axis
/scaling/z [number] : set scaling factor along the z-axis
/scaling/azim [number] : set azimuthal scaling factor
/scaling/elev [number] : set elevation scaling factor
/scaling/dist [number] : set radial scaling factor
/scaling/xy [number][number] : set scaling factor along the x and y axis
/scaling/xyz [number][number][number] : set scaling factor along the x, y, and z axis
/scaling/aed [number][number][number] : set scaling factor along the azimuth, elevation, and distance axis
/yaw [number] : set yaw rotation angle (in deg), using Euler zyx convention
/pitch [number] : set pitch rotation angle (in deg), using Euler zyx convention
/roll [number] : set roll rotation angle (in deg), using Euler zyx convention
/ypr [number][number][number] : set yaw, pitch and roll rotation angles (in deg), using Euler zyx convention
/orientation [number][number][number][number] : set rotation angles from quaternion (xyzw)
/reset : reset to default settings
/clear : clear the state of the object

```

## see also

- spat5.scale
- spat5.rotate
- spat5.translate
- spat5.normalize
- spat5.mirror
- spat5.jitter
- spat5.viewer
- spat5.converter
- spat5.converter~
- spat5.abs2rel
- spat5.distance
- spat5.trajectories
- spat5.boids

## spat5.translate      Translate coordinate messages

### description

**spat5.translate** applies translation to source, speaker or listener coordinate messages.

**spat5.scale**, **spat5.rotate** and **spat5.translate** are stateless objects i.e. they only react when incoming position messages are received.

On the other hand, **spat5.transform** is statefull: it keeps track of the state of the spatial scene, and will deliver the transformed scene whenever the parameter (yaw, pitch, roll, offset, etc.) is changed.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/offset/x [number]** : set translation offset along the x-axis (in meters)

**/offset/y [number]** : set translation offset along the y-axis (in meters)

**/offset/z [number]** : set translation offset along the z-axis (in meters)

**/offset/xy [number][number]** : set translation offset along the x and y axis (in meters)

**/offset/xyz [number][number][number]** : set translation offset along the x, y, and z axis (in meters)

### see also

- spat5.transform
- spat5.scale
- spat5.rotate
- spat5.normalize
- spat5.viewer
- spat5.converter
- spat5.abs2rel
- spat5.jitter
- spat5.trajectories

## spat5.transpan.downmixer~ 2.0 loudspeakers

## 5.1 downmix to headphones or stereo

### description

**spat5.transpan.downmixer~** produces 2.0 downmix of a 5.1 (or 5.0) stream.

Reference(s) :

J.-M. Lyzwa and A. Baskind. Use of binaural and transaural spatialization techniques in multichannel 5.1 production: technical and aesthetic principles, from recording to post-production. In Proc. of the 7th Conference of Audio Engineering Society (AES) Brazil, Sao Paolo, Brazil, 2009.

A. Baskind, T. Carpentier, J.-M. Lyzwa, and O. Warusfel. Surround and 3D-Audio Production on Two-Channel and 2D-Multichannel Loudspeaker Setups. In Proc. of the 3rd International Conference on Spatial Audio (ICSA), Graz, Austria, Sept 2015.

A. Baskind, T. Carpentier, M. Noisternig, O. Warusfel, and J.-M. Lyzwa. Binaural and transaural spatialization techniques in multichannel 5.1 production. In Proc. of the 27th Tonmeistertagung - VDT International Convention, Koln, Germany, November 2012.

J.-M. Jot, V. Larcher, and O. Warusfel. Digital signal processing issues in the context of binaural and transaural stereophony. In Proc. of the 98th Convention of the Audio Engineering Society (AES), Paris, France, Feb. 1995.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

**/method [string]** : set method used for computing the CTC EQ filter. Possible values: single, singlesmooth, equalweighting, sidesweighting  
**/blur [number]** : set blur factor (in **/highpass [boolean]** : enable high-pass filter in the CTC processor  
**/load [string]** : load hrtf file (SOFA format)  
**/open [string]** : load hrtf file (SOFA format). similar to **/load**  
**/mode [string]** : set rendering mode  
**/gains [number][number][number][number]** : set downmix gains  
**/rearaz [number]** : set azimuth of the Ls/Rs virtual speakers  
**/elev [number]** : set elevation of the virtual speakers  
**/frontbackdelay [number]** : set the delay (in msec) between front and back layers  
**/directtransdelay [number]** : set the delay (in msec) between dry layer and transaural layer  
**/directtransratio [number]** : set ratio (in **/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically

whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

`/dump/dsp/latency` : send the processor latency (in samples) through the dump outlet

`/verbose [string]` : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

`/post/version` : print the version in the Max Console

`/post/version [details]` : print detailed version in the Max Console

`/post/doc` : print the help documentation in the Max Console

`/post/state` : print the OSC status in the Max Console

`/preset/load [string]` : load a preset from file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format.

`/preset/export [string]` : export a preset to file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format. If the file extension is not provided, `.txt` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `.txt` for human-readable OSC text file, `.osc` for binary encoded OSC file, `.coll` for human-readable Max coll file (compatible with the `coll` object). `.txt` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `','`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `','`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.pan~`
- `spat5.decoder~`
- `spat5.spat~`



- spat5.transpan~
- spat5.transpan.enlarger~
- spat5.virtualspeakers~
- spat5.ctc~
- spat5.multi.connect

## spat5.transpan.enlarger~

## Stereo image enlarger

### description

**spat5.transpan.enlarger~** is a stereo image enlarger based on binaural/transaural processing.

Reference(s) :

J.-M. Lyzwa and A. Baskind. Use of binaural and transaural spatialization techniques in multichannel 5.1 production: technical and aesthetic principles, from recording to post-production. In Proc. of the 7th Conference of Audio Engineering Society (AES) Brazil, Sao Paolo, Brazil, 2009.

A. Baskind, T. Carpentier, J.-M. Lyzwa, and O. Warusfel. Surround and 3D-Audio Production on Two-Channel and 2D-Multichannel Loudspeaker Setups. In Proc. of the 3rd International Conference on Spatial Audio (ICSA), Graz, Austria, Sept 2015.

A. Baskind, T. Carpentier, M. Noisternig, O. Warusfel, and J.-M. Lyzwa. Binaural and transaural spatialization techniques in multichannel 5.1 production. In Proc. of the 27th Tonmeistertagung - VDT International Convention, Koln, Germany, November 2012.

J.-M. Jot, V. Larcher, and O. Warusfel. Digital signal processing issues in the context of binaural and transaural stereophony. In Proc. of the 98th Convention of the Audio Engineering Society (AES), Paris, France, Feb. 1995.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```

/order [int] : set crossover filter order
/fl [number] : set low/mid crossover frequency (in Hz)
/fh [number] : set mid/high crossover frequency (in Hz)
/method [string] : set method used for computing the CTC EQ filter. Possible values: single, singlesmooth, equalweighting, sidesweighting
/blur [number] : set blur factor (in /highpass [boolean] : enable high-pass filter in the CTC processor
/load [string] : load hrtf file (SOFA format)
/open [string] : load hrtf file (SOFA format). similar to /load
/drywet [number] [number] [number] : set dry/wet factor (in /widening [number] [number] [number] : set widening factor (in /muteband [number] [number] [number]
: mute/unmute each of the three bands
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second
argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see
/dsp/bypass/ramptime).
/dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the
second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically
whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console

```

/post/version [details] : print detailed version in the Max Console  
 /post/doc : print the help documentation in the Max Console  
 /post/state : print the OSC status in the Max Console  
 /preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
 /preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
 /preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
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 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.pan~
- spat5.decoder~
- spat5.spat~
- spat5.transpan~
- spat5.transpan.downmixer~
- spat5.virtualspeakers~
- spat5.ctc~

- spat5.multi.connect

## spat5.transpan~

## 5.1 Mixer with double transaural layer

### description

One of the main challenges in the process of mixing music is to provide the listener with a soundscape of the greatest possible clarity.

In this sense, the ITU 5.1 standard represents a considerable enhancement over 2-channel stereophony.

However, its main drawback is that it privileges the frontal region and blurs the side and rear regions of the sound scene.

**spat5.transpan~** aims at overcoming this problem by providing an additional sound spatialization layer to the surround mix (i.e. to surround sound recording techniques using main and spot microphones).

This approach is fully compatible with the ITU-R BS 775 standard for 5.1 surround sound playback.

In the proposed approach, the spatialization of a single sound source relies on the parallel use of three techniques :

- (1) Multichannel microphone arrays, if available, create a first layer with a coherent spatial image directly at the recording;
- (2) power-law panning utilizing spot microphones forms a second layer that plays a major role in balancing the timbral, spatial and amplitude features of the mix;
- (3) a third layer, based on binaural/transaural processing using two loudspeaker pairs (L/R, and Ls/Rs), provides the spatial precision that lacks for the lateral images.

Therefore, this approach combines the advantages of standardized surround panning techniques with the spatial stability of binaural/transaural processing, and compensates for their respective drawbacks. Moreover, this processor can be used to considerably widen the stereophonic space when down-mixing from 5.1 to 2.0.

Reference(s) :

J.-M. Lyzwa and A. Baskind. Use of binaural and transaural spatialization techniques in multichannel 5.1 production: technical and aesthetic principles, from recording to post-production. In Proc. of the 7th Conference of Audio Engineering Society (AES) Brazil, Sao Paolo, Brazil, 2009.

A. Baskind, T. Carpentier, J.-M. Lyzwa, and O. Warusfel. Surround and 3D-Audio Production on Two-Channel and 2D-Multichannel Loudspeaker Setups. In Proc. of the 3rd International Conference on Spatial Audio (ICSA), Graz, Austria, Sept 2015.

A. Baskind, T. Carpentier, M. Noisternig, O. Warusfel, and J.-M. Lyzwa. Binaural and transaural spatialization techniques in multichannel 5.1 production. In Proc. of the 27th Tonmeistertagung - VDT International Convention, Koln, Germany, November 2012.

J.-M. Jot, V. Larcher, and O. Warusfel. Digital signal processing issues in the context of binaural and transaural stereophony. In Proc. of the 98th Convention of the Audio Engineering Society (AES), Paris, France, Feb. 1995.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @sources [int]

The **sources** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### methods

/method [string] : set method used for computing the CTC EQ filter. Possible values: single, singlesmooth, equalweighting, sidesweighting

/mode [string] : set the type of output signals. Possible values: transaural, transpan, panpot, stereo

/highpass [boolean] : enable high-pass filter in the CTC EQ filter

/blur/front [number] : set spatial blur (in /blur/back [number] : set spatial blur (in /source/[index]/trim [number] : set input trim (in dB) for the i-th source

/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates

```

/source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)
/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)
/source/[index]/xy_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged
/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged
/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged
/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged
/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)
/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)
/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)
/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)
/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged
/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged
/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged
/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged
/source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged
/sources/aed [nnnn...] : set the list of source coordinates (with aed format)
/sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)
/sources/ade [nnnn...] : set the list of source coordinates (with ade format)
/sources/xy [nnnn...] : set the list of source coordinates (with xy format)
/sources/ae [nnnn...] : set the list of source coordinates (with ae format)
/source/[index]/inputdelay [number] : set input delay (in msec) for the i-th source
/source/[index]/delay [number] : set delay (in msec) between panpot layer and transaural layer for the i-th source
/source/[index]/drywet [number] : set direct sound versus transaural ratio (in /source/[index]/drywet/auto [boolean] : automatically adjust the
drywet ratio according to the source position, for the i-th source
/source/[index]/frontback [number] : set ratio (in /source/[index]/frontback/auto [boolean] : automatically adjust the frontback ratio according
to the source position, for the i-th source
/source/[index]/azimoffset [number] : set offset (in deg) between the azimuth of the main panpot and the azimuth of the transaural panner, for
the i-th source
/source/[index]/subwoofer/cutoff [number] : set subwoofer cutoff frequency (in Hz) for the i-th source
/source/[index]/subwoofer/gain [number] : set subwoofer gain (in dB) for the i-th source
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second
argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see
/dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the
second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically
whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front

```

```

/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.pan~
- spat5.decoder~
- spat5.spat~
- spat5.transpan.downmixer~
- spat5.transpan.enlarger~
- spat5.virtualspeakers~
- spat5.ctc~
- spat5.panoramix
- spat5.ctc~
- spat5.virtualspeakers~
- spat5.multi.connect



## spat5.turntable

## B&K TurnTable control

### description

**spat5.turntable** offers B&K TurnTable control via Prologix GPIB-Ethernet controller.

### attributes

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @ip [string]

IP address.

#### @port [int]

Port number.

### methods

```
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
```

```

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.smk~

# spat5.velvet~ Velvet noise filtering

## description

**spat5.velvet~** filters signal with a velvet noise sequence.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```
/channel/number [int] : set the number of channels
/seed : generate a new random seed
/seed [int] : generate a new random seed
/channel/[index]/density [number] : set density (in /channel/[index]/rate [number] : set rate (in spikes per second) for the i-th channel
/channel/[index]/length [number] : set length (in msec) of the filter for the i-th channel
/channel/[index]/length/samples [number] : set length (in samples) of the filter for the i-th channel
/channel/[index]/mute [boolean] : mute/unmute the DSP rendering for the i-th channel
/channel/[index]/bypass [boolean] : bypass the DSP rendering for the i-th channel
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
```

`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)

`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.

`/status` : open the status window and bring it to front

`/status/open` : open the status window and bring it to front

`/status/close` : close the status window

`/status/openorclose` : open the status window if it was closed; close it if it was opened

`/status/font/size [number]` : set the font size of the status window

`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)

`/help` : open the help window and bring it to front

`/help/open` : open the help window and bring it to front

`/help/close` : close the help window

`/help/openorclose` : open the help window if it was closed; close it if it was opened

`/help/font/size [number]` : set the font size of the help window

`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)

`/snapshot` : open the snapshot window and bring it to front

`/snapshot/open` : open the snapshot window and bring it to front

`/snapshot/close` : close the snapshot window

`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened

`/snapshot/font/size [number]` : set the font size of the snapshot window

`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)

`/status/copytoclipboard` : copy the status to (the OS) clipboard

`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

`/snapshot/deleteall` : delete all the snapshots currently in memory

`/snapshot/add` : create a new snapshot with the current state

`/snapshot/add [string]` : create a new snapshot with the current state, and set its name

`/snapshot/[index]/store` : store the current state in the i-th snapshot (in memory)

`/snapshot/[index]/recall` : recall the current state from the i-th snapshot

`/snapshot/[index]/jump` : immediately recall the current state from the i-th snapshot (ignoring recall time)

`/snapshot/[index]/name [string]` : set the name of the i-th snapshot

`/snapshot/interpolate [int][int][number]` : interpolate between the i-th and j-th snapshots

`/snapshot/interpolate [string][string][number]` : interpolate between two snapshots, given their names

`/snapshot/[index]/delete` : delete the i-th snapshot

`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard

`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)

`/snapshot/[index]/export [string]` : export the i-th snapshot to file

`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file

`/snapshot/export [string]` : export all snapshots to file

`/snapshot/import [string]` : import all snapshots from file

`/snapshot/recall/next` : recall the next snapshot

`/snapshot/recall/previous` : recall the previous snapshot

`/snapshot/jump/next` : immediately recall the next snapshot (ignoring recall time)

`/snapshot/jump/previous` : immediately recall the previous snapshot (ignoring recall time)

`/snapshot/recall [int]` : recall the i-th snapshot

`/snapshot/jump [int]` : immediately recall the i-th snapshot (ignoring recall time)

`/snapshot/recall/bytitle [string]` : recall a snapshot by title/name

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)

`/snapshot/lock [boolean]` : lock edition of the snapshots

`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position

`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- `spat5.decorrelate~`
- `spat5.allpass~`
- `spat5.noise~`
- `spat5.pink~`
- `spat5.reverb~`
- `spat5.fir~`

# spat5.verdi

## Control interface for spat5.verdi~

### description

**spat5.verdi** is a GUI for **spat5.verdi~**.

### attributes

#### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the **initwith** attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @internals [int]

The **internals** attribute represents the number of internal channels of the artificial reverberator.

Spat uses a Feedback Delay Network (FDN) reverberator engine.

Basically this can be seen as an array of delay lines which are fed back into a mixing matrix. The **internals** attributes represents the size of the feedback matrix.

Choosing the size of this matrix is a trade-off between CPU consumption and the echo density.

Increasing the size of the matrix will generate a densier reverb tail at the expense of a higher CPU load.

A typical value of 8 is a good compromise between CPU load and natural sounding reverb. A value of 16 may be useful especially when dealing with a very long reverberation time or with very percussive sound (where a smaller FDN might sometimes sounds too poor).

Increasing the **internals** attribute may also be helpful when using a large number of loudspeakers, to ensure a proper decorrelation of the reproduced late reverberation signals.

It is recommended not to use a value below 6.

#### @outputs [int]

The **outputs** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @reverbs []

### methods

```
/reverb/number [int] : set the number of reverbs
/speaker/number [int] : set the number of speakers
/internals [int] : set the number of internal channels (same for all reverbs)
/reverb/[index]/tr0 [number] : set global reverberation time (in seconds)
/reverb/[index]/trl [number] : set relative decay time in low frequencies
/reverb/[index]/trm [number] : set relative decay time in mid frequencies
/reverb/[index]/trh [number] : set relative decay time in high frequencies
/reverb/[index]/fl [number] : set reverb low/mid crossover frequency (in Hz)
/reverb/[index]/fh [number] : set reverb mid/high crossover frequency (in Hz)
/reverb/[index]/infinite [boolean] : enable/disable infinite reverb
/reverb/[index]/air [boolean] : enable/disable air absorption in the FDN
/reverb/[index]/air/freq [number] : set air absorption rolloff frequency (in Hz) in the FDN
/reverb/[index]/delays [number][number][number]... : set the list of delays (in msec)
/reverb/[index]/delays/samples [number][number][number]... : set the list of delays (in samples)
/reverb/[index]/interpolation/mode [string] : set the interpolation mode. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade
/reverb/[index]/interpolation/time [number] : set the interpolation time (in msec)
```

```

/verb/[index]/mute [boolean] : mute this verb
/verb/[index]/gain/db [number] : set gain (in dB)
/verb/[index]/spread [number] : set spatial spread (in /verb/[index]/ae [number] [number] : set spatial direction (azimut/elevation)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizable
/window/enabled [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number] [number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number] [number] [number] [number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number] [number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots

```

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.verdi~
- spat5.oper
- spat5.viewer
- spat5.reverb~
- spat5.early~
- spat5.cluster~
- spat5.spat~
- spat5.room~
- spat5.ircamverb~
- spat5.delgen
- spat5.multiverb~
- spat5.roomsize
- spat5.shuffle~
- spat5.multiverb~
- spat5.conv~
- spat5.converb~
- spat5.tapout~
- delay~
- tapout~
- spat5.comb~
- spat5.allpass~
- spat5.reverb.timeview
- spat5.multi.connect



## spat5.verdi~ Directional reverberation

### description

**spat5.verdi~** combines multiple reverberation engines (similar to **spat5.reverb~**), that can be panned and spread in space (somehow similar to **spat5.oper** **pan\_rev** parameter).

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @internals [int]

The **internals** attribute represents the number of internal channels of the artificial reverberator.

Spat uses a Feedback Delay Network (FDN) reverberator engine.

Basically this can be seen as an array of delay lines which are fed back into a mixing matrix. The **internals** attributes represents the size of the feedback matrix.

Choosing the size of this matrix is a trade-off between CPU consumption and the echo density.

Increasing the size of the matrix will generate a denser reverb tail at the expense of a higher CPU load.

A typical value of 8 is a good compromise between CPU load and natural sounding reverb. A value of 16 may be useful especially when dealing with a very long reverberation time or with very percussive sound (where a smaller FDN might sometimes sounds too poor).

Increasing the **internals** attribute may also be helpful when using a large number of loudspeakers, to ensure a proper decorrelation of the reproduced late reverberation signals.

It is recommended not to use a value below 6.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @outputmode []

#### @outputs [int]

The **outputs** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @reverbs []

### methods

```
/reverb/number [int] : set the number of reverbs
/speaker/number [int] : set the number of speakers
/internals [int] : set the number of internal channels (same for all reverbs)
/reverb/[index]/tr0 [number] : set global reverberation time (in seconds)
/reverb/[index]/trl [number] : set relative decay time in low frequencies
/reverb/[index]/trm [number] : set relative decay time in mid frequencies
/reverb/[index]/trh [number] : set relative decay time in high frequencies
/reverb/[index]/f1 [number] : set reverb low/mid crossover frequency (in Hz)
/reverb/[index]/fh [number] : set reverb mid/high crossover frequency (in Hz)
/reverb/[index]/infinite [boolean] : enable/disable infinite reverb
/reverb/[index]/air [boolean] : enable/disable air absorption in the FDN
/reverb/[index]/air/freq [number] : set air absorption rolloff frequency (in Hz) in the FDN
/reverb/[index]/delays [number][number][number]... : set the list of delays (in msec)
/reverb/[index]/delays/samples [number][number][number]... : set the list of delays (in samples)
```

/reverb/[index]/interpolation/mode [string] : set the interpolation mode. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade

/reverb/[index]/interpolation/time [number] : set the interpolation time (in msec)

/reverb/[index]/mute [boolean] : mute this reverb

/reverb/[index]/gain/db [number] : set gain (in dB)

/reverb/[index]/spread [number] : set spatial spread (in /reverb/[index]/ae [number][number] : set spatial direction (azimut/elevation)

/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).

/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute

/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).

/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass

/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting

/dsp/post : post various information to the Max console (audio should be turned on)

/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

/dump/dsp/latency : send the processor latency (in samples) through the dump outlet

/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.verdi
- spat5.reverb~
- spat5.early~
- spat5.cluster~
- spat5.spat~
- spat5.room~
- spat5.ircamverb~
- spat5.delgen
- spat5.multiverb~
- spat5.roomsize
- spat5.shuffle~
- spat5.multiverb~
- spat5.conv~
- spat5.converb~
- spat5.tapout~
- delay~
- tapout~
- spat5.comb~
- spat5.allpass~
- spat5.reverb.timeview
- spat5.multi.connect

# spat5.verdi.embedded

# Control interface for spat5.verdi~

## description

spat5.verdi is a GUI for spat5.verdi~.

## attributes

### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @internals [int]

The `internals` attribute represents the number of internal channels of the artificial reverberator.

Spat uses a Feedback Delay Network (FDN) reverberator engine.

Basically this can be seen as an array of delay lines which are fed back into a mixing matrix. The `internals` attributes represents the size of the feedback matrix.

Choosing the size of this matrix is a trade-off between CPU consumption and the echo density.

Increasing the size of the matrix will generate a densier reverb tail at the expense of a higher CPU load.

A typical value of 8 is a good compromise between CPU load and natural sounding reverb. A value of 16 may be useful especially when dealing with a very long reverberation time or with very percussive sound (where a smaller FDN might sometimes sounds too poor).

Increasing the `internals` attribute may also be helpful when using a large number of loudspeakers, to ensure a proper decorrelation of the reproduced late reverberation signals.

It is recommended not to use a value below 6.

### @outputs [int]

The `outputs` attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or `attrui` or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @reverbs []

## methods

```

/reverb/number [int] : set the number of reverbs
/speaker/number [int] : set the number of speakers
/internals [int] : set the number of internal channels (same for all reverbs)
/reverb/[index]/tr0 [number] : set global reverberation time (in seconds)
/reverb/[index]/trl [number] : set relative decay time in low frequencies
/reverb/[index]/trm [number] : set relative decay time in mid frequencies
/reverb/[index]/trh [number] : set relative decay time in high frequencies
/reverb/[index]/fl [number] : set reverb low/mid crossover frequency (in Hz)
/reverb/[index]/fh [number] : set reverb mid/high crossover frequency (in Hz)
/reverb/[index]/infinite [boolean] : enable/disable infinite reverb
/reverb/[index]/air [boolean] : enable/disable air absorption in the FDN
/reverb/[index]/air/freq [number] : set air absorption rolloff frequency (in Hz) in the FDN
/reverb/[index]/delays [number][number][number]... : set the list of delays (in msec)
/reverb/[index]/delays/samples [number][number][number]... : set the list of delays (in samples)
/reverb/[index]/interpolation/mode [string] : set the interpolation mode. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade
/reverb/[index]/interpolation/time [number] : set the interpolation time (in msec)

```

/reverb/[index]/mute [boolean] : mute this reverb  
 /reverb/[index]/gain/db [number] : set gain (in dB)  
 /reverb/[index]/spread [number] : set spatial spread (in /reverb/[index]/ae [number] [number] : set spatial direction (azimut/elevation)

## see also

- spat5.verdi~
- spat5.oper
- spat5.viewer
- spat5.reverb~
- spat5.early~
- spat5.cluster~
- spat5.spat~
- spat5.room~
- spat5.ircamverb~
- spat5.delgen
- spat5.multiverb~
- spat5.roomsize
- spat5.shuffle~
- spat5.multiverb~
- spat5.conv~
- spat5.converb~
- spat5.tapout~
- delay~
- tapout~
- spat5.comb~
- spat5.allpass~
- spat5.reverb.timeview
- spat5.multi.connect

# spat5.viewer Sources and speakers visualization and manipulation

## description

**spat5.viewer** is a 2D graphical representation of the spatial sound scene.  
**spat5.viewer** allows you to manipulate the sound sources or the speakers positions.

## attributes

### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.  
Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.  
Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.  
Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).  
Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```
/source/number [int] : set the number of sources
/source/[index]/visible [boolean] : set the visibility of the i-th source
/source/[index]/editable [boolean] : set the editability of the i-th source
/source/[index]/select [boolean] : select the i-th source
/source/[index]/mute [boolean] : mute the i-th source
/source/[index]/color [color] : set the color of the i-th source
/source/[index]/color/alpha [number] : change alpha for the color of the i-th source
/source/[index]/color/alpha/add [number] : increase/decrease alpha for the color of the i-th source
/source/[index]/proportion [number] : set the proportion the i-th source
/source/[index]/proportion/add [number] : increase/decrease the proportion the i-th source by a certain amount
/source/[index]/constraint/circular [boolean] : set the circular constraints for the i-th source
/source/[index]/label [string] : set the label for the i-th source
/source/[index]/label/visible [boolean] : set the visibility for the label for the i-th source
/source/[index]/label/color [color] : set the color for the label for the i-th source
/source/[index]/label/justification [string] : set the text justification for the label for the i-th source
/source/[index]/vumeter/visible [boolean] : set the visibility for the vumeter for the i-th source
/source/[index]/level [number] : set the vumeter level (in dB) for the i-th source
/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates
/source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)
/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)
/source/[index]/xy_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged
/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged
/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged
/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged
/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)
/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)
/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)
/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)
/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged
/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged
/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged
/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged
/source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged
/sources/aed [nnnn...] : set the list of source coordinates (with aed format)
/sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)
/sources/ade [nnnn...] : set the list of source coordinates (with ade format)
/sources/xy [nnnn...] : set the list of source coordinates (with xy format)
/sources/ae [nnnn...] : set the list of source coordinates (with ae format)
```

```

/source/[index]/aperture [number] : set the aperture of the i-th source
/source/[index]/aperture/visible [boolean] : set the visibility for the aperture of the i-th source
/source/[index]/aperture/color [color] : set the color for the aperture of the i-th source
/source/[index]/yaw/mode [string] : set the yaw mode of the i-th source
/source/[index]/yaw [number] : set the yaw angle (in deg) of the i-th source, using Euler zyx convention
/source/[index]/pitch [number] : set the pitch angle (in deg) of the i-th source, using Euler zyx convention
/source/[index]/roll [number] : set the roll angle (in deg) of the i-th source, using Euler zyx convention
/source/[index]/orientation [number][number][number][number] : set the orientation quaternion (xyzw) of the i-th source
/source/[index]/history/visible [boolean] : set the visibility for the history of the i-th source
/source/[index]/history/color [color] : set the color for the history of the i-th source
/source/[index]/history/thickness [number] : set the line thickness for the history of the i-th source
/source/[index]/history/size [int] : set the (past) size for the history of the i-th source
/source/[index]/history/clear : clear the history of the i-th source
/source/[index]/tofront : bring the i-th source to the front of its siblings
/source/[index]/toback : bring the i-th source to the back of its siblings
/source/[index]/tofront [boolean] : bring the i-th source to the front or back of its siblings
/source/[index]/image [string] : set the image file (svg, jpg, png, etc.) to use for the i-th source
/source/[index]/image/clear : use the default image for the i-th source
/sources/level [nnnn...] : set the vumeter levels (in dB) for all sources
/sources/visible [bbbb...] : set the visibility for all sources
/speaker/number [int] : set the number of speakers
/speaker/[index]/visible [boolean] : set the visibility of the i-th speaker
/speaker/[index]/editable [boolean] : set the editability of the i-th speaker
/speaker/[index]/select [boolean] : select the i-th speaker
/speaker/[index]/color [color] : set the color of the i-th speaker
/speaker/[index]/proportion [number] : set the proportion the i-th speaker
/speaker/[index]/constraint/circular [boolean] : set the circular constraints for the i-th speaker
/speaker/[index]/label [string] : set the label for the i-th speaker
/speaker/[index]/label/visible [boolean] : set the visibility for the label for the i-th speaker
/speaker/[index]/label/color [color] : set the color for the label for the i-th speaker
/speaker/[index]/label/justification [string] : set the text justification for the label for the i-th speaker
/speaker/[index]/vumeter/visible [boolean] : set the visibility for the vumeter for the i-th speaker
/speaker/[index]/level [number] : set the vumeter level (in dB) for the i-th speaker
/speakers/aed [nnnn...] : set the list of speaker coordinates (with aed format)
/speakers/xyz [nnnn...] : set the list of speaker coordinates (with xyz format)
/speakers/ade [nnnn...] : set the list of speaker coordinates (with ade format)
/speakers/xy [nnnn...] : set the list of speaker coordinates (with xy format)
/speakers/ae [nnnn...] : set the list of speaker coordinates (with ae format)
/speaker/[index]/aed [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)
/speaker/[index]/ade [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)
/speaker/[index]/xyz [number][number][number] : set the position of the i-th loudspeaker using cartesian coordinates
/speaker/[index]/xy [number][number] : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)
/speaker/[index]/ae [number][number] : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1)
/speaker/[index]/az [number] : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)
/speaker/[index]/tofront : bring the i-th speaker to the front of its siblings
/speaker/[index]/toback : bring the i-th speaker to the back of its siblings
/speaker/[index]/tofront [boolean] : bring the i-th speaker to the front or back of its siblings
/speaker/[index]/image [string] : set the image file (svg, jpg, png, etc.) to use for the i-th speaker
/speaker/[index]/image/clear : use the default image for the i-th speaker
/speakers/level [nnnn...] : set the vumeter levels (in dB) for all speakers
/speakers/visible [bbbb...] : set the visibility for all speakers
/stereo/number [int] : set the number of stereo pairs
/stereo/[index]/visible [boolean] : set the visibility of the i-th stereo pair
/stereo/[index]/editable [boolean] : set the editability of the i-th stereo pair
/stereo/[index]/select [boolean] : select the i-th stereo pair
/stereo/[index]/color [color] : set the color of the i-th stereo pair
/stereo/[index]/proportion [number] : set the proportion the i-th stereo pair
/stereo/[index]/constraint/circular [boolean] : set the circular constraints for the i-th stereo pair
/stereo/[index]/label [string] : set the label for the i-th stereo pair
/stereo/[index]/label/visible [boolean] : set the visibility for the label for the i-th stereo pair
/stereo/[index]/label/color [color] : set the color for the label for the i-th stereo pair
/stereo/[index]/label/justification [string] : set the text justification for the label for the i-th stereo pair
/stereo/[index]/vumeter/visible [boolean] : set the visibility for the vumeter for the i-th stereo pair
/stereo/[index]/level [number] : set the vumeter level (in dB) for the i-th stereo pair
/stereo/[index]/xyz [number][number][number] : set the position of the i-th stereo pair
/stereo/[index]/xy [number][number] : set the position of the i-th stereo pair
/stereo/[index]/x [number] : set the position of the i-th stereo pair
/stereo/[index]/y [number] : set the position of the i-th stereo pair
/stereo/[index]/z [number] : set the position of the i-th stereo pair
/stereo/[index]/aed [number][number][number] : set the position of the i-th stereo pair
/stereo/[index]/ade [number][number][number] : set the position of the i-th stereo pair
/stereo/[index]/ae [number][number] : set the position of the i-th stereo pair
/stereo/[index]/ad [number][number][number] : set the position of the i-th stereo pair
/stereo/[index]/az [number] : set the position of the i-th stereo pair

```



```

/stereo/[index]/azim [number] : set the position of the i-th stereo pair
/stereo/[index]/elev [number] : set the position of the i-th stereo pair
/stereo/[index]/dist [number] : set the position of the i-th stereo pair
/stereo/[index]/azim++ [number] : set the position of the i-th stereo pair
/stereo/[index]/elev++ [number] : set the position of the i-th stereo pair
/stereo/[index]/dist++ [number] : set the position of the i-th stereo pair
/stereo/[index]/dist*= [number] : set the position of the i-th stereo pair
/stereo/[index]/aperture [number] : set the aperture of the i-th stereo pair
/stereo/[index]/aperture/visible [boolean] : set the visibility for the aperture of the i-th stereo pair
/stereo/[index]/aperture/color [color] : set the color for the aperture of the i-th stereo pair
/stereo/[index]/yaw/mode [string] : set the yaw mode of the i-th stereo pair
/stereo/[index]/yaw [number] : set the yaw angle (in deg) of the i-th stereo pair, using Euler zyx convention
/stereo/[index]/pitch [number] : set the pitch angle (in deg) of the i-th stereo pair, using Euler zyx convention
/stereo/[index]/roll [number] : set the roll angle (in deg) of the i-th stereo pair, using Euler zyx convention
/stereo/[index]/orientation [number][number][number][number] : set the orientation quaternion (xyzw) of the i-th stereo pair
/stereos/level [nnnn...] : set the vumeter levels (in dB) for all stereo pairs
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

```

/snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)  
 /listener/visible [boolean] : set the visibility of the listener  
 /listener/editable [boolean] : set the listener editable  
 /listener/headphones/visible [boolean] : set the visibility of the headphones  
 /listener/orientation/visible [boolean] : set the visibility of the orientation  
 /listener/orientation [quaternion] : set the orientation of the listener  
 /listener/proportion [number] : set the display proportion of the listener  
 /listener/select [boolean] : select/unselect the listener  
 /listener/aed [number][number][number] : set the listener position (azimuth/elevation/distance)  
 /hoa/number [int] : set the number of HOA fields  
 /hoa/[index]/yaw [number] : set the yaw angle of the i-th HOA field  
 /background/color [color] : set the window background color  
 /background/transparency [number] : set the window transparency (in /backgroundimage/file [string] : set the background image (png, jpg, etc.)  
 /backgroundimage/visible [boolean] : set the visibility of the background image  
 /backgroundimage/opacity [number] : set the opacity of the background image  
 /backgroundimage/scale [number] : set the scale factor of the background image  
 /backgroundimage/angle [number] : set the rotation angle (in deg) of the background image  
 /backgroundimage/offset/x [number] : set the x translation offset of the background image  
 /backgroundimage/offset/y [number] : set the y translation offset of the background image  
 /backgroundimage/offset/xy [number][number] : set the x/y translation offset of the background image  
 /backgroundimage/quality [string] : set the resampling quality of the background image (low, medium, high)  
 /display/zoom [number] : set the display zoom factor (/display/offset/x [number] : set the display x translation offset (in pixels)  
 /display/offset/y [number] : set the display y translation offset (in pixels)  
 /display/offset/z [number] : set the display z translation offset (in pixels)  
 /display/offset/xy [number][number] : set the display x/y translation offsets (in pixels)  
 /display/offset/xyz [number][number][number] : set the display x/y/z translation offsets (in pixels)  
 /display/zoom/lock [boolean] : enable/disable zooming with the mouse wheel  
 /axis/visible [boolean] : set the visibility of the axis  
 /axis/color [color] : set the axis color  
 /axis/label/visible [boolean] : set the visibility of the axis label  
 /axis/origin/visible [boolean] : set the visibility of the axis origin  
 /axis/thickness [number] : set line thickness  
 /grid/visible [boolean] : set the visibility of the grid  
 /grid/mode [string] : set the grid mode. Possible values: none, circular, cartesian  
 /grid/spacing [number] : set the spacing between grid lines (in meters)  
 /grid/line/number [number] : set the number of grid lines  
 /grid/angulardivisions/number [number] : set the number of angular divisions  
 /grid/angulardivisions/visible [boolean] : set the visibility of angular divisions  
 /grid/dashed [boolean] : set the line style  
 /grid/color [color] : set the line color  
 /grid/thickness [number] : set line thickness  
 /grid/unitcircle/visible [boolean] : set the visibility of the unit circle  
 /grid/unitcircle/color [color] : set the color of the unit circle  
 /grid/unitcircle/radius [number] : set the radius of the unit circle  
 /legend/visible [boolean] : set the visibility of the legend  
 /legend/color [color] : set the legend color  
 /legend/unit [string] : set distance unit  
 /emphasis/source [boolean] : emphasize sources when mouse in proximity  
 /emphasis/stereo [boolean] : emphasize stereos when mouse in proximity  
 /emphasis/speaker [boolean] : emphasize speakers when mouse in proximity  
 /emphasis/microphone [boolean] : emphasize microphones when mouse in proximity  
 /ruler/visible [boolean] : set the visibility of the ruler  
 /ruler/color [color] : set the ruler color  
 /ruler/unit [string] : set the unit of the ruler  
 /area/number [int] : set the number of areas  
 /area/[index]/vertex/number [int] : set the number of vertex for the i-th area  
 /area/[index]/vertex/[index]/xy [number][number] : set position of the j-th vertex of the i-th area  
 /area/[index]/vertex/[index]/xyz [number][number][number] : set position of the j-th vertex of the i-th area  
 /area/[index]/vertex/[index]/aed [number][number][number] : set position of the j-th vertex of the i-th area  
 /area/[index]/visible [boolean] : set visibility for the i-th area  
 /area/[index]/color [color] : set color for the i-th area  
 /area/[index]/name [string] : set name for the i-th area  
 /path/number [int] : set the number of paths  
 /path/[index]/vertex/number [int] : set the number of vertex for the i-th path  
 /path/[index]/vertex/[index]/xy [number][number] : set position of the j-th vertex of the i-th path  
 /path/[index]/vertex/[index]/xyz [number][number][number] : set position of the j-th vertex of the i-th path  
 /path/[index]/vertex/[index]/aed [number][number][number] : set position of the j-th vertex of the i-th path  
 /path/[index]/visible [boolean] : set visibility for the i-th path  
 /path/[index]/color [color] : set color for the i-th path  
 /speakerhull/color [color] : set the hull color

```

/speakerhull/visible [boolean] : set the visibility of the hull
/speakerhull/fill/color [color] : set the hull interior color
/speakerhull/fill [boolean] : fill the hull
/layout [string] : set the window layout. Possible values: single, leftright, topbottom, automatic
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizableability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.converter
- spat5.abs2rel
- spat5.oper
- spat5.converter~
- spat5.trajectories
- spat5.speaker.config
- spat5.speaker.layout
- spat5.grids
- spat5.viewer.control
- poltocar
- cartopol
- spat5.transform
- spat5.scale
- spat5.translate
- spat5.rotate
- spat5.quat.fromeuler
- spat5.quat.toeuler
- spat5.quat.transform
- spat5.ircamverb

# spat5.viewer.embedded

## nipulation

## Sources and speakers visualization and ma-

### description

spat5.viewer is a 2D graphical representation of the spatial sound scene.  
spat5.viewer allows you to manipulate the sound sources or the speakers positions.

### attributes

#### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.  
Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.  
Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.  
Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).  
Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

```
/source/number [int] : set the number of sources
/source/[index]/visible [boolean] : set the visibility of the i-th source
/source/[index]/editable [boolean] : set the editability of the i-th source
/source/[index]/select [boolean] : select the i-th source
/source/[index]/mute [boolean] : mute the i-th source
/source/[index]/color [color] : set the color of the i-th source
/source/[index]/color/alpha [number] : change alpha for the color of the i-th source
/source/[index]/color/alpha/add [number] : increase/decrease alpha for the color of the i-th source
/source/[index]/proportion [number] : set the proportion the i-th source
/source/[index]/proportion/add [number] : increase/decrease the proportion the i-th source by a certain amount
/source/[index]/constraint/circular [boolean] : set the circular constraints for the i-th source
/source/[index]/label [string] : set the label for the i-th source
/source/[index]/label/visible [boolean] : set the visibility for the label for the i-th source
/source/[index]/label/color [color] : set the color for the label for the i-th source
/source/[index]/label/justification [string] : set the text justification for the label for the i-th source
/source/[index]/vumeter/visible [boolean] : set the visibility for the vumeter for the i-th source
/source/[index]/level [number] : set the vumeter level (in dB) for the i-th source
/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates
/source/[index]/ae [number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)
/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)
/source/[index]/xy_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged
/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged
/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged
/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged
/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)
/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)
/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)
/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)
/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged
/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged
/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged
/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged
/source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged
/sources/aed [nnnn...] : set the list of source coordinates (with aed format)
/sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)
/sources/ade [nnnn...] : set the list of source coordinates (with ade format)
```

/sources/xy [nnnn...] : set the list of source coordinates (with xy format)  
 /sources/ae [nnnn...] : set the list of source coordinates (with ae format)  
 /source/[index]/aperture [number] : set the aperture of the i-th source  
 /source/[index]/aperture/visible [boolean] : set the visibility for the aperture of the i-th source  
 /source/[index]/aperture/color [color] : set the color for the aperture of the i-th source  
 /source/[index]/yaw/mode [string] : set the yaw mode of the i-th source  
 /source/[index]/yaw [number] : set the yaw angle (in deg) of the i-th source, using Euler zyx convention  
 /source/[index]/pitch [number] : set the pitch angle (in deg) of the i-th source, using Euler zyx convention  
 /source/[index]/roll [number] : set the roll angle (in deg) of the i-th source, using Euler zyx convention  
 /source/[index]/orientation [number][number][number][number] : set the orientation quaternion (xyzw) of the i-th source  
 /source/[index]/history/visible [boolean] : set the visibility for the history of the i-th source  
 /source/[index]/history/color [color] : set the color for the history of the i-th source  
 /source/[index]/history/thickness [number] : set the line thickness for the history of the i-th source  
 /source/[index]/history/size [int] : set the (past) size for the history of the i-th source  
 /source/[index]/history/clear : clear the history of the i-th source  
 /source/[index]/tofront : bring the i-th source to the front of its siblings  
 /source/[index]/toback : bring the i-th source to the back of its siblings  
 /source/[index]/tofront [boolean] : bring the i-th source to the front or back of its siblings  
 /source/[index]/image [string] : set the image file (svg, jpg, png, etc.) to use for the i-th source  
 /source/[index]/image/clear : use the default image for the i-th source  
 /sources/level [nnnn...] : set the vumeter levels (in dB) for all sources  
 /sources/visible [bbbb...] : set the visibility for all sources  
 /speaker/number [int] : set the number of speakers  
 /speaker/[index]/visible [boolean] : set the visibility of the i-th speaker  
 /speaker/[index]/editable [boolean] : set the editability of the i-th speaker  
 /speaker/[index]/select [boolean] : select the i-th speaker  
 /speaker/[index]/color [color] : set the color of the i-th speaker  
 /speaker/[index]/proportion [number] : set the proportion the i-th speaker  
 /speaker/[index]/constraint/circular [boolean] : set the circular constraints for the i-th speaker  
 /speaker/[index]/label [string] : set the label for the i-th speaker  
 /speaker/[index]/label/visible [boolean] : set the visibility for the label for the i-th speaker  
 /speaker/[index]/label/color [color] : set the color for the label for the i-th speaker  
 /speaker/[index]/label/justification [string] : set the text justification for the label for the i-th speaker  
 /speaker/[index]/vumeter/visible [boolean] : set the visibility for the vumeter for the i-th speaker  
 /speaker/[index]/level [number] : set the vumeter level (in dB) for the i-th speaker  
 /speakers/aed [nnnn...] : set the list of speaker coordinates (with aed format)  
 /speakers/xyz [nnnn...] : set the list of speaker coordinates (with xyz format)  
 /speakers/ade [nnnn...] : set the list of speaker coordinates (with ade format)  
 /speakers/xy [nnnn...] : set the list of speaker coordinates (with xy format)  
 /speakers/ae [nnnn...] : set the list of speaker coordinates (with ae format)  
 /speaker/[index]/aed [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)  
 /speaker/[index]/ade [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)  
 /speaker/[index]/xyz [number][number][number] : set the position of the i-th loudspeaker using cartesian coordinates  
 /speaker/[index]/xy [number][number] : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)  
 /speaker/[index]/ae [number][number] : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1)  
 /speaker/[index]/az [number] : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)  
 /speaker/[index]/tofront : bring the i-th speaker to the front of its siblings  
 /speaker/[index]/toback : bring the i-th speaker to the back of its siblings  
 /speaker/[index]/tofront [boolean] : bring the i-th speaker to the front or back of its siblings  
 /speaker/[index]/image [string] : set the image file (svg, jpg, png, etc.) to use for the i-th speaker  
 /speaker/[index]/image/clear : use the default image for the i-th speaker  
 /speakers/level [nnnn...] : set the vumeter levels (in dB) for all speakers  
 /speakers/visible [bbbb...] : set the visibility for all speakers  
 /stereo/number [int] : set the number of stereo pairs  
 /stereo/[index]/visible [boolean] : set the visibility of the i-th stereo pair  
 /stereo/[index]/editable [boolean] : set the editability of the i-th stereo pair  
 /stereo/[index]/select [boolean] : select the i-th stereo pair  
 /stereo/[index]/color [color] : set the color of the i-th stereo pair  
 /stereo/[index]/proportion [number] : set the proportion the i-th stereo pair  
 /stereo/[index]/constraint/circular [boolean] : set the circular constraints for the i-th stereo pair  
 /stereo/[index]/label [string] : set the label for the i-th stereo pair  
 /stereo/[index]/label/visible [boolean] : set the visibility for the label for the i-th stereo pair  
 /stereo/[index]/label/color [color] : set the color for the label for the i-th stereo pair  
 /stereo/[index]/label/justification [string] : set the text justification for the label for the i-th stereo pair  
 /stereo/[index]/vumeter/visible [boolean] : set the visibility for the vumeter for the i-th stereo pair  
 /stereo/[index]/level [number] : set the vumeter level (in dB) for the i-th stereo pair  
 /stereo/[index]/xyz [number][number][number] : set the position of the i-th stereo pair  
 /stereo/[index]/xy [number][number] : set the position of the i-th stereo pair  
 /stereo/[index]/x [number] : set the position of the i-th stereo pair  
 /stereo/[index]/y [number] : set the position of the i-th stereo pair  
 /stereo/[index]/z [number] : set the position of the i-th stereo pair  
 /stereo/[index]/aed [number][number][number] : set the position of the i-th stereo pair  
 /stereo/[index]/ade [number][number][number] : set the position of the i-th stereo pair  
 /stereo/[index]/ae [number][number] : set the position of the i-th stereo pair



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/stereo/[index]/ad [number] [number] [number] : set the position of the i-th stereo pair
/stereo/[index]/az [number] : set the position of the i-th stereo pair
/stereo/[index]/azim [number] : set the position of the i-th stereo pair
/stereo/[index]/elev [number] : set the position of the i-th stereo pair
/stereo/[index]/dist [number] : set the position of the i-th stereo pair
/stereo/[index]/azim++ [number] : set the position of the i-th stereo pair
/stereo/[index]/elev++ [number] : set the position of the i-th stereo pair
/stereo/[index]/dist++ [number] : set the position of the i-th stereo pair
/stereo/[index]/dist*= [number] : set the position of the i-th stereo pair
/stereo/[index]/aperture [number] : set the aperture of the i-th stereo pair
/stereo/[index]/aperture/visible [boolean] : set the visibility for the aperture of the i-th stereo pair
/stereo/[index]/aperture/color [color] : set the color for the aperture of the i-th stereo pair
/stereo/[index]/yaw/mode [string] : set the yaw mode of the i-th stereo pair
/stereo/[index]/yaw [number] : set the yaw angle (in deg) of the i-th stereo pair, using Euler zyx convention
/stereo/[index]/pitch [number] : set the pitch angle (in deg) of the i-th stereo pair, using Euler zyx convention
/stereo/[index]/roll [number] : set the roll angle (in deg) of the i-th stereo pair, using Euler zyx convention
/stereo/[index]/orientation [number] [number] [number] [number] : set the orientation quaternion (xyzw) of the i-th stereo pair
/stereos/level [nnnn...] : set the vumeter levels (in dB) for all stereo pairs
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string] [string] [number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

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/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/listener/visible [boolean] : set the visibility of the listener
/listener/editable [boolean] : set the listener editable
/listener/headphones/visible [boolean] : set the visibility of the headphones
/listener/orientation/visible [boolean] : set the visibility of the orientation
/listener/orientation [quaternion] : set the orientation of the listener
/listener/proportion [number] : set the display proportion of the listener
/listener/select [boolean] : select/unselect the listener
/listener/aed [number][number][number] : set the listener position (azimuth/elevation/distance)
/hoa/number [int] : set the number of HOA fields
/hoa/[index]/yaw [number] : set the yaw angle of the i-th HOA field
/background/color [color] : set the window background color
/background/transparency [number] : set the window transparency (in /backgroundimage/file [string] : set the background image (png, jpg, etc.)
/backgroundimage/visible [boolean] : set the visibility of the background image
/backgroundimage/opacity [number] : set the opacity of the background image
/backgroundimage/scale [number] : set the scale factor of the background image
/backgroundimage/angle [number] : set the rotation angle (in deg) of the background image
/backgroundimage/offset/x [number] : set the x translation offset of the background image
/backgroundimage/offset/y [number] : set the y translation offset of the background image
/backgroundimage/offset/xy [number][number] : set the x/y translation offset of the background image
/backgroundimage/quality [string] : set the resampling quality of the background image (low, medium, high)
/display/zoom [number] : set the display zoom factor (/display/offset/x [number] : set the display x translation offset (in pixels)
/display/offset/y [number] : set the display y translation offset (in pixels)
/display/offset/z [number] : set the display z translation offset (in pixels)
/display/offset/xy [number][number] : set the display x/y translation offsets (in pixels)
/display/offset/xyz [number][number][number] : set the display x/y/z translation offsets (in pixels)
/display/zoom/lock [boolean] : enable/disable zooming with the mouse wheel
/axis/visible [boolean] : set the visibility of the axis
/axis/color [color] : set the axis color
/axis/label/visible [boolean] : set the visibility of the axis label
/axis/origin/visible [boolean] : set the visibility of the axis origin
/axis/thickness [number] : set line thickness
/grid/visible [boolean] : set the visibility of the grid
/grid/mode [string] : set the grid mode. Possible values: none, circular, cartesian
/grid/spacing [number] : set the spacing between grid lines (in meters)
/grid/line/number [number] : set the number of grid lines
/grid/angulardivisions/number [number] : set the number of angular divisions
/grid/angulardivisions/visible [boolean] : set the visibility of angular divisions
/grid/dashed [boolean] : set the line style
/grid/color [color] : set the line color
/grid/thickness [number] : set line thickness
/grid/unitcircle/visible [boolean] : set the visibility of the unit circle
/grid/unitcircle/color [color] : set the color of the unit circle
/grid/unitcircle/radius [number] : set the radius of the unit circle
/legend/visible [boolean] : set the visibility of the legend
/legend/color [color] : set the legend color
/legend/unit [string] : set distance unit
/emphasis/source [boolean] : emphasize sources when mouse in proximity
/emphasis/stereo [boolean] : emphasize stereos when mouse in proximity
/emphasis/speaker [boolean] : emphasize speakers when mouse in proximity
/emphasis/microphone [boolean] : emphasize microphones when mouse in proximity
/ruler/visible [boolean] : set the visibility of the ruler
/ruler/color [color] : set the ruler color
/ruler/unit [string] : set the unit of the ruler
/area/number [int] : set the number of areas
/area/[index]/vertex/number [int] : set the number of vertex for the i-th area
/area/[index]/vertex/[index]/xy [number][number] : set position of the j-th vertex of the i-th area
/area/[index]/vertex/[index]/xyz [number][number][number] : set position of the j-th vertex of the i-th area
/area/[index]/vertex/[index]/aed [number][number][number] : set position of the j-th vertex of the i-th area
/area/[index]/visible [boolean] : set visibility for the i-th area
/area/[index]/color [color] : set color for the i-th area
/area/[index]/name [string] : set name for the i-th area
/path/number [int] : set the number of paths
/path/[index]/vertex/number [int] : set the number of vertex for the i-th path
/path/[index]/vertex/[index]/xy [number][number] : set position of the j-th vertex of the i-th path
/path/[index]/vertex/[index]/xyz [number][number][number] : set position of the j-th vertex of the i-th path
/path/[index]/vertex/[index]/aed [number][number][number] : set position of the j-th vertex of the i-th path
/path/[index]/visible [boolean] : set visibility for the i-th path

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/path/[index]/color [color] : set color for the i-th path  
 /speakerhull/color [color] : set the hull color  
 /speakerhull/visible [boolean] : set the visibility of the hull  
 /speakerhull/fill/color [color] : set the hull interior color  
 /speakerhull/fill [boolean] : fill the hull  
 /layout [string] : set the window layout. Possible values: single, leftright, toptobottom, automatic

## see also

- spat5.converter
- spat5.abs2rel
- spat5.oper
- spat5.converter~
- spat5.trajectories
- spat5.speaker.config
- spat5.speaker.layout
- spat5.grids
- spat5.viewer.control
- poltocar
- cartopol
- spat5.transform
- spat5.scale
- spat5.translate
- spat5.rotate
- spat5.quat.fromeuler
- spat5.quat.toeuler
- spat5.quat.transform
- spat5.ircamverb

## spat5.virtualspeakers~

## Virtual speakers for headphones monitoring

### description

**spat5.virtualspeakers~** allows you to transcode a multichannel input file (or stream) into a 2-channel format. It uses the so-called virtual speakers approach to render the multichannel input as a binaural mix: the HRIRs corresponding to the position of each virtual speaker are convolved with that speaker feed and the convolution products for each of the ears are then summed giving the binaural signal for each ear.

To improve externalization you can also add artificial room effect via predefined room presets.

Please note that **spat5.virtualspeakers~** is based on binaural technology; this means that the output signals are meant to be listened over headphones, and not on a stereo speaker setup. The use of HRTF (head-related transfer function) for the binaural rendering may also slightly color the sound.

Reference(s) :

J. Blauert and P. Laws. True simulation of loudspeaker sound reproduction while using headphones. *Acta Acustica united with Acustica*, 29(5):273 – 277, 1973.

A. McKeag and D. S. McGrath. Using auralisation techniques to render 5.1 surround to binaural and transaural playback. In *Proc. of the 102nd Convention of the Audio Engineering Society (AES)*, Munich, Germany, March 1997.

H. Moller. Fundamentals of binaural technology. *Applied Acoustics*, 36:171 – 218, 1992.

F. Richter. BAP: binaural audio processor. In *Proc. of the 92nd Convention of Audio Engineering Society (AES)*, Vienna, Austria, March 1992.

### attributes

#### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @internals [int]

The **internals** attribute represents the number of internal channels of the artificial reverberator.

Spat uses a Feedback Delay Network (FDN) reverberator engine.

Basically this can be seen as an array of delay lines which are fed back into a mixing matrix. The **internals** attributes represents the size of the feedback matrix.

Choosing the size of this matrix is a trade-off between CPU consumption and the echo density.

Increasing the size of the matrix will generate a denser reverb tail at the expense of a higher CPU load.

A typical value of 8 is a good compromise between CPU load and natural sounding reverb. A value of 16 may be useful especially when dealing with a very long reverberation time or with very percussive sound (where a smaller FDN might sometimes sounds too poor).

Increasing the **internals** attribute may also be helpful when using a large number of loudspeakers, to ensure a proper decorrelation of the reproduced late reverberation signals.

It is recommended not to use a value below 6.

#### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

#### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

#### @speakers [int]

The **speakers** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

## methods

/speaker/number [int] : set the number of speakers

/speakers/aed [nnnn...] : set the list of speaker coordinates (with aed format)

/speakers/xyz [nnnn...] : set the list of speaker coordinates (with xyz format)

/speakers/ade [nnnn...] : set the list of speaker coordinates (with ade format)

/speakers/xy [nnnn...] : set the list of speaker coordinates (with xy format)

/speakers/ae [nnnn...] : set the list of speaker coordinates (with ae format)

/speaker/[index]/aed [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/elevation/distance)

/speaker/[index]/ade [number][number][number] : set the position of the i-th loudspeaker using navigation coordinates (azimuth/distance/elevation)

/speaker/[index]/xyz [number][number][number] : set the position of the i-th loudspeaker using cartesian coordinates

/speaker/[index]/xy [number][number] : set the xy-coordinate of the i-th loudspeaker, and use default z (=0)

/speaker/[index]/ae [number][number] : set the azimuth/elevation of the i-th loudspeaker, using default distance (=1)

/speaker/[index]/az [number] : set the azimuth of the i-th loudspeaker, using default distance (=1) and elevation (=0)

/width [number] : set width of the frontal stereo pair (in deg)

/rotation [number] : rotate whole sound scene (offset angle) (in deg)

/itd/scaling [number] : set scaling factor for ITD (in /itd/type [string] : set ITD type. Possible values: basic, woodworth, larcherjot, savioja, miller, measurement, none

/itd/latencymode [string] : set ITD processing mode. Possible values: fixed latency, no latency

/interpolation/mode [string] : set interpolation mode for fractional delay. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade

/distance [number] : set the radius of the virtual speakers (in meters)

/groundreflections/enable [boolean] : simulate reflections on the ground

/groundreflections/elev [number] : set elevation for simulated ground reflections (in deg)

/roompreset [string] : load a room preset (room reverb to increase externalization)

/propagation/delay [boolean] : enable simulation of the propagation delay

/propagation/gain [boolean] : enable simulation of the propagation gain

/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).

/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute

/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).

/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.

/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass

/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)

/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting

/dsp/post : post various information to the Max console (audio should be turned on)

/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up

/dump/dsp/latency : send the processor latency (in samples) through the dump outlet

/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed

/post/version : print the version in the Max Console

/post/version [details] : print detailed version in the Max Console

/post/doc : print the help documentation in the Max Console

/post/state : print the OSC status in the Max Console

/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.

/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string] [string] [number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file  
 /snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file  
 /snapshot/export [string] : export all snapshots to file  
 /snapshot/import [string] : import all snapshots from file  
 /snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.pan~
- spat5.binaural~
- spat5.headphoneeq~
- spat5.align~
- spat5.ctc~
- spat5.sofa.loader
- spat5.sofa.infos
- spat5.hrtf.infos
- spat5.hoa.binaural~
- spat5.hrtf.normalize
- spat5.multi.connect

# spat5.vrpnclient

# VRPN client

## description

**spat5.vrpnclient** receives VRPN (Virtual Reality Peripheral Network) data.

## attributes

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`. Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.osc.udpreceive
- udpreceive

# spat5.waveform Audio waveform display component

## description

**spat5.waveform** plots audio waveform(s).

## attributes

### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the **initwith** attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```

/title [string] : set title
/title/visible [boolean] : set visibility for title
/title/color [color] : set color for the title
/title/justification [string] : set justification for the title
/title/font/size [number] : set font size for the title
/xlabel [string] : set xlabel
/xlabel/visible [boolean] : set visibility for xlabel
/xlabel/color [color] : set color for the xlabel
/xlabel/justification [string] : set justification for the xlabel
/xlabel/font/size [number] : set font size for the xlabel
/ylabel [string] : set ylabel
/ylabel/visible [boolean] : set visibility for ylabel
/ylabel/color [color] : set color for the ylabel
/ylabel/justification [string] : set justification for the ylabel
/ylabel/font/size [number] : set font size for the ylabel
/xtick [string] : set xtick
/xtick/visible [boolean] : set visibility for xtick
/xtick/color [color] : set color for the xtick
/ytick [string] : set ytick
/ytick/visible [boolean] : set visibility for ytick
/ytick/color [color] : set color for the ytick
/grid/visible [boolean] : set visibility for the grid
/grid/color [color] : set color for the grid
/curve/number [int] : set the number of curves
/curve/[index]/color [color] : set color for the i-th curve
/curve/[index]/visible [boolean] : set visibility for the i-th curve
/curve/[index]/thickness [number] : set thickness for the i-th curve
/curve/[index]/normalize [boolean] : set normalization for the i-th curve
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,

```



'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

/window/title [string] : set the window title (in the window titlebar)

/window/visible [boolean] : set the window visibility

/window/moveable [boolean] : set the window movability

/window/resizable [boolean] : set the window resizability

/window/enable [boolean] : enable/disable the window

/window/background/color [color] : set the window background color

/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize repaint efficiency))

/window/fullscreen [boolean] : enable/disable fullscreen mode

/window/minimise [boolean] : minimize the window

/window/open : open the window (and bring it to front)

/window/close : close the window

/window/openorclose : open the window if it was closed; close it if it was opened

/window/size [number][number] : set the window size (width, height) (in pixels)

/window/width [number] : set the window width (in pixels)

/window/height [number] : set the window height (in pixels)

/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)

/window/topleft [number][number] : set the window top left position (in pixels)

/window/centre : open the window, centering it on the screen

/window/rendering/engine [string] : set the graphical rendering engine of the window

/window/fps/visible [boolean] : display the FPS performances of the window

/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top))

`/window/hidesondeactivate` [boolean] : make the window 'hides on deactivate' (when always on top)  
`/window/buttons/close` [boolean] : enable/disable the close button (in the window titlebar)  
`/window/buttons/minimise` [boolean] : enable/disable the minimise button (in the window titlebar)  
`/window/buttons/maximise` [boolean] : enable/disable the maximise button (in the window titlebar)  
`/window/export/image` [string] : export the window as an image file (png or jpeg)

## see also

- `plot~`
- `spat5.plot`

# spat5.waveform.embedded

# Audio waveform display component

## description

spat5.waveform plots audio waveform(s).

## attributes

### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`.

Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box.

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

## methods

```

/title [string] : set title
/title/visible [boolean] : set visibility for title
/title/color [color] : set color for the title
/title/justification [string] : set justification for the title
/title/font/size [number] : set font size for the title
/xlabel [string] : set xlabel
/xlabel/visible [boolean] : set visibility for xlabel
/xlabel/color [color] : set color for the xlabel
/xlabel/justification [string] : set justification for the xlabel
/xlabel/font/size [number] : set font size for the xlabel
/ylabel [string] : set ylabel
/ylabel/visible [boolean] : set visibility for ylabel
/ylabel/color [color] : set color for the ylabel
/ylabel/justification [string] : set justification for the ylabel
/ylabel/font/size [number] : set font size for the ylabel
/xtick [string] : set xtick
/xtick/visible [boolean] : set visibility for xtick
/xtick/color [color] : set color for the xtick
/ytick [string] : set ytick
/ytick/visible [boolean] : set visibility for ytick
/ytick/color [color] : set color for the ytick
/grid/visible [boolean] : set visibility for the grid
/grid/color [color] : set color for the grid
/curve/number [int] : set the number of curves
/curve/[index]/color [color] : set color for the i-th curve
/curve/[index]/visible [boolean] : set visibility for the i-th curve
/curve/[index]/thickness [number] : set thickness for the i-th curve
/curve/[index]/normalize [boolean] : set normalization for the i-th curve
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,

```

'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)

/preset/export : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- plot~
- spat5.plot

## spat5.wav.extractxml

## Audio file aXML extractor

### description

**spat5.wav.extractxml** extracts aXML chunk from WAV file.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.wav.insertxml
- spat5.sf.split
- spat5.sf.list
- spat5.sf.list.embedded
- spat5.sf.resample
- spat5.sf.merge
- spat5.sf.trim

# spat5.wav.generateaxml aXML generator

## description

**spat5.wav.generateaxml** helps creating xml file for aXML chunk (compatible with WAV files).

## attributes

### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC
file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded
OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary encoded OSC
file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format. If the file extension is not provided,
'txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : 'txt' for human-readable OSC text file, 'osc' for binary
encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name

```



```

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
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/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- spat5.wav.extractxml
- spat5.wav.insertxml

# spat5.wav.insertaxml

# Audio file aXML inserter

## description

**spat5.wav.insertaxml** inserts aXML chunk into WAV file.

## attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

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file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
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file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
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/status/openorclose : open the status window if it was closed; close it if it was opened
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/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```

/snapshot/recall/next : recall the next snapshot  
 /snapshot/recall/previous : recall the previous snapshot  
 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.wav.extractxml
- spat5.sf.split
- spat5.sf.list
- spat5.sf.list.embedded
- spat5.sf.resample
- spat5.sf.merge
- spat5.sf.trim

## spat5.weightingfilter

## Loudness weighting filters

### description

**spat5.weightingfilter** computes IIR filter for loudness weighting.

### attributes

**@initwith** [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
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file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
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/status/open : open the status window and bring it to front
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/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
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/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
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/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
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/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. '\n')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```

/snapshot/recall/next : recall the next snapshot  
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 /snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)  
 /snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)  
 /snapshot/recall [int] : recall the i-th snapshot  
 /snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)  
 /snapshot/recall/bytitle [string] : recall a snapshot by title/name  
 /snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)  
 /snapshot/lock [boolean] : lock edition of the snapshots  
 /snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position  
 /snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.filterdesign
- spat5.cascade~
- cascade~
- biquad~

# spat5.wfs Wavefield synthesis

## description

**spat5.wfs**~ performs wavefield synthesis for a loudspeaker array. **spat5.wfs**~ uses a precomputed set of data filters (see **spat5.wfs.grid**).

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @sources [int]

The **sources** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @speakers [int]

The **speakers** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

## methods

```
/source/[index]/ramp/time [number] : set ramp time (in msec) for gain processing
/source/[index]/interpolation/time [number] : set interpolation time (in msec) for delay processing
/source/[index]/interpolation/mode [string] : set interpolation mode for delay processing. Possible values: nearest, linear, lagrange3, allpass, hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade
/source/[index]/delay/mode [string] : set mode for delay processing
/source/[index]/delay/scaling [number] : set scaling factor (in /source/[index]/gain/scaling [number] : set scaling factor (in /source/[index]/mute [boolean] : mute/unmute the i-th source
/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates
/source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)
/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)
/source/[index]/xy_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged
/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged
/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged
/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged
/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)
/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)
/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)
/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)
/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged
/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged
/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged
/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged
/source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged
/sources/aed [nnnn...] : set the list of source coordinates (with aed format)
/sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)
/sources/ade [nnnn...] : set the list of source coordinates (with ade format)
/sources/xy [nnnn...] : set the list of source coordinates (with xy format)
/sources/ae [nnnn...] : set the list of source coordinates (with ae format)
/source/[index]/directivity/enable [boolean] : enable/disable directivity rendering for the i-th source
/source/[index]/crossfade/time [number] : set crossfade time (in msec) for directivity processing
/source/[index]/prefilter [boolean] : enable pre-equalization filter
/source/[index]/window [boolean] : enable spatial window (for loudspeaker activation)
/source/[index]/window/size [number] : set spatial window (in /source/[index]/blend/method [string] : set blend method for virtual sources that are located close to the array, or in the focus area
/dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).
/dsp/mute [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.
/dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute
/dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see
```



```

/dsp/bypass/ramptime).
/dsp/bypass [boolean][number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the
second argument specifies the length (in msec) of the ramp.
/dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass
/dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)
/dsp/automute/attack [number] : set the duration (in seconds) before auto-muting
/dsp/post : post various information to the Max console (audio should be turned on)
/dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically
whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up
/dump/dsp/latency : send the processor latency (in samples) through the dump outlet
/verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```



## see also

- [spat5.wfs](#)
- [spat5.wfs.grid](#)
- [spat5.wfs.config](#)
- [spat5.viewer](#)
- [spat5.multi.connect](#)

## h2&gt;spat5.wfs.config

## h2&gt;Wavefield synthesis setup

## h3&gt;description

**spat5.wfs.config** is used to configure and generate a set of data filters for use with **spat5.wfs~** or **spat5.wfs**.

## h3&gt;attributes

## h4&gt;@initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Have a look at the **spat5.tuto-osc-3.maxpat** example for further details.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

## h4&gt;@parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

## h3&gt;methods

```
/speaker/number [int] : set the number of loudspeakers
/export : compute and export filter (in the home folder)
/export [string] : compute and export filter (in a specified folder)
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/clear : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots
```

`/snapshot/interpolate [string] [string] [number]` : interpolate between two snapshots, given their names  
`/snapshot/[index]/delete` : delete the i-th snapshot  
`/snapshot/[index]/copytoclipboard` : copy the i-th snapshot to (the OS) clipboard  
`/snapshot/[index]/copytoclipboard [string]` : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
`/snapshot/[index]/export [string]` : export the i-th snapshot to file  
`/snapshot/[index]/export/content [string]` : export the content of the i-th snapshot to file  
`/snapshot/export [string]` : export all snapshots to file  
`/snapshot/import [string]` : import all snapshots from file

## see also

- `spat5.wfs~`
- `spat5.wfs`
- `spat5.wfs.grid`
- `spat5.viewer`
- `spat5.multi.connect`

# spat5.wfs.grid Wavefield synthesis setup

## description

**spat5.wfs.grid** is used to configure and generate a set of data filters for use with **spat5.wfs~** or **spat5.wfs**. **spat5.wfs.grid** supersedes and replaces **spat5.wfs.config**.

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Have a look at the **spat5.tuto-osc-3.maxpat** example for further details. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

## methods

```
/speaker/number [int] : set the number of loudspeakers
/speakers/xyz [number][number]... : set the loudspeaker positions
/speakers/directions/xyz [number][number]... : set the loudspeaker directions
/dist/min [number] : set minimum distance to speakers
/dist/max [number] : set maximum distance to speakers
/resolution/x [number] : set sampling grid resolution along the x-axis
/resolution/y [number] : set sampling grid resolution along the y-axis
/resolution/xy [number][number] : set sampling grid resolution along the x- and y-axis
/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/clear : delete all the snapshots currently in memory
```

```

/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file

```

## see also

- spat5.wfs~
- spat5.wfs
- spat5.wfs.config
- spat5.viewer
- spat5.multi.connect

# spat5.wfs~ Wavefield synthesis

## description

**spat5.wfs~** performs wavefield synthesis for a loudspeaker array. **spat5.wfs~** uses a precomputed set of data filters (see **spat5.wfs.grid**).

## attributes

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**.

Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box.

Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector).

Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @sources [int]

The **sources** attribute represents the number of input channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @speakers [int]

The **speakers** attribute represents the number of output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

## methods

```
/source/[index]/ramp/time [number] : set ramp time (in msec) for gain processing
/source/[index]/interpolation/time [number] : set interpolation time (in msec) for delay processing
/source/[index]/interpolation/mode [string] : set interpolation mode for delay processing. Possible values: nearest, linear, lagrange3, allpass,
hermite3, watte3, bspline3, parabolic, allpass2, allpass3, nearestxfade
/source/[index]/delay/mode [string] : set mode for delay processing
/source/[index]/delay/scaling [number] : set scaling factor (in /source/[index]/gain/scaling [number] : set scaling factor (in /source/[index]/mute
[boolean] : mute/unmute the i-th source
/source/[index]/xyz [number][number][number] : set the position of the i-th source using cartesian coordinates
/source/[index]/aed [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/elevation/distance)
/source/[index]/xy [number][number] : set the xy-coordinate of the i-th source, and use default z (=0)
/source/[index]/xy_ [number][number] : set the x and y-coordinate of the i-th source, and keep z unchanged
/source/[index]/x [number] : set the x-coordinate of the i-th source, and keep y and z unchanged
/source/[index]/y [number] : set the y-coordinate of the i-th source, and keep x and z unchanged
/source/[index]/z [number] : set the z-coordinate of the i-th source, and keep x and y unchanged
/source/[index]/az [number] : set the azimuth of the i-th source, using default distance (=1) and elevation (=0)
/source/[index]/ade [number][number][number] : set the position of the i-th source using navigation coordinates (azimuth/distance/elevation)
/source/[index]/ae [number][number] : set the azimuth/elevation of the i-th source, using default distance (=1)
/source/[index]/ad [number][number] : set the azimuth/distance of the i-th source, using default elevation (=0)
/source/[index]/azim [number] : set the azimuth of the i-th source. Elevation and distance remain unchanged
/source/[index]/elev [number] : set the elevation of the i-th source. Azimuth and distance remain unchanged
/source/[index]/dist [number] : set the distance of the i-th source. Azimuth and elevation remain unchanged
/source/[index]/azimelev [number][number] : set the azimuth and elevation of the i-th source. Distance remains unchanged
/source/[index]/azimdist [number][number] : set the azimuth and distance of the i-th source. Elevation remains unchanged
/sources/aed [nnnn...] : set the list of source coordinates (with aed format)
/sources/xyz [nnnn...] : set the list of source coordinates (with xyz format)
/sources/ade [nnnn...] : set the list of source coordinates (with ade format)
```

/sources/xy [nnnn...] : set the list of source coordinates (with xy format)  
 /sources/ae [nnnn...] : set the list of source coordinates (with ae format)  
 /source/[index]/directivity/enable [boolean] : enable/disable directivity rendering for the i-th source  
 /source/[index]/crossfade/time [number] : set crossfade time (in msec) for directivity processing  
 /source/[index]/prefilter [boolean] : enable pre-equalization filter  
 /source/[index]/window [boolean] : enable spatial window (for loudspeaker activation)  
 /source/[index]/window/size [number] : set spatial window (in /source/[index]/blend/method [string] : set blend method for virtual sources that are located close to the array, or in the focus area  
 /parallel [boolean] : enable/disable parallel processing  
 /dsp/mute [boolean] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see /dsp/mute/ramptime).  
 /dsp/mute [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
 /dsp/mute/ramptime [number] : set ramp time (in msec) for mute/unmute  
 /dsp/bypass [boolean] : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see /dsp/bypass/ramptime).  
 /dsp/bypass [boolean] [number] : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
 /dsp/bypass/ramptime [number] : set ramp time (in msec) for bypass  
 /dsp/automute [boolean] : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
 /dsp/automute/attack [number] : set the duration (in seconds) before auto-muting  
 /dsp/post : post various information to the Max console (audio should be turned on)  
 /dsp/clear : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
 /dump/dsp/latency : send the processor latency (in samples) through the dump outlet  
 /verbose [string] : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
 /post/version : print the version in the Max Console  
 /post/version [details] : print detailed version in the Max Console  
 /post/doc : print the help documentation in the Max Console  
 /post/state : print the OSC status in the Max Console  
 /preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
 /preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
 /preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.  
 /status : open the status window and bring it to front  
 /status/open : open the status window and bring it to front  
 /status/close : close the status window  
 /status/openorclose : open the status window if it was closed; close it if it was opened  
 /status/font/size [number] : set the font size of the status window  
 /status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)  
 /help : open the help window and bring it to front  
 /help/open : open the help window and bring it to front  
 /help/close : close the help window  
 /help/openorclose : open the help window if it was closed; close it if it was opened  
 /help/font/size [number] : set the font size of the help window  
 /help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)  
 /snapshot : open the snapshot window and bring it to front  
 /snapshot/open : open the snapshot window and bring it to front  
 /snapshot/close : close the snapshot window  
 /snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened  
 /snapshot/font/size [number] : set the font size of the snapshot window  
 /snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)  
 /status/copytoclipboard : copy the status to (the OS) clipboard  
 /status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
 /dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.  
 /snapshot/deleteall : delete all the snapshots currently in memory  
 /snapshot/add : create a new snapshot with the current state  
 /snapshot/add [string] : create a new snapshot with the current state, and set its name  
 /snapshot/[index]/store : store the current state in the i-th snapshot (in memory)  
 /snapshot/[index]/recall : recall the current state from the i-th snapshot  
 /snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)  
 /snapshot/[index]/name [string] : set the name of the i-th snapshot  
 /snapshot/interpolate [int] [int] [number] : interpolate between the i-th and j-th snapshots  
 /snapshot/interpolate [string] [string] [number] : interpolate between two snapshots, given their names  
 /snapshot/[index]/delete : delete the i-th snapshot  
 /snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard  
 /snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
 /snapshot/[index]/export [string] : export the i-th snapshot to file



```

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- spat5.wfs
- spat5.wfs.grid
- spat5.wfs.config
- spat5.viewer
- spat5.multi.connect

# spat5.whichthread

## Report which thread a message is passed through

### description

**spat5.whichthread** reports which thread a message is passed through (mainly for debug purpose).

### attributes

### methods

```

/post/version : print the version in the Max Console
/post/version [details] : print detailed version in the Max Console
/post/doc : print the help documentation in the Max Console
/post/state : print the OSC status in the Max Console
/preset/load [string] : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. You can specify the fullpath of the file,
or only its filename if the file is inside Max search path.
/preset/load : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded
OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/preset/export [string] : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC
file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format. If the file extension is not provided,
'.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)
/preset/export : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary
encoded OSC file, '.coll' for human-readable Max coll file (compatible with the coll object). '.txt' is the default file format.
/status : open the status window and bring it to front
/status/open : open the status window and bring it to front
/status/close : close the status window
/status/openorclose : open the status window if it was closed; close it if it was opened
/status/font/size [number] : set the font size of the status window
/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)
/help : open the help window and bring it to front
/help/open : open the help window and bring it to front
/help/close : close the help window
/help/openorclose : open the help window if it was closed; close it if it was opened
/help/font/size [number] : set the font size of the help window
/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)
/snapshot : open the snapshot window and bring it to front
/snapshot/open : open the snapshot window and bring it to front
/snapshot/close : close the snapshot window
/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened
/snapshot/font/size [number] : set the font size of the snapshot window
/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)
/status/copytoclipboard : copy the status to (the OS) clipboard
/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)
/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.
/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name

```

`/snapshot/jump/bytitle [string]` : immediately recall a snapshot by title/name (ignoring recall time)  
`/snapshot/lock [boolean]` : lock edition of the snapshots  
`/snapshot/renumber` : renumber the snapshots (their OSC pattern) based on their position  
`/snapshot/sort` : sort the snapshots alphabetically (based on their titles)

## see also

- [defer](#)
- [deferlow](#)

# spat5.yin~ Multichannel Yin

## description

**spat5.yin~** estimates the pitch of incoming audio signals.

## attributes

### @channels [int]

The **channels** attribute represents the number of input and output channels of the object. This attribute must be set in the object box, when the object is instantiated; it can not be later set with a message (or **attrui** or inspector), since the number of signal inlets or outlets can not be changed dynamically.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @mc [int]

The **mc** attribute enables multichannel patch-cord for this object (compatible with Max8 or higher). Note that the **mc** attribute cannot be set via message, **attrui** or inspector; it must be typed directly within the object box. Have a look at the **spat5.tuto-mc.maxpat** or **spat5.tuto-mc-2.maxpat** examples for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/freq/min [number]** : set minimum frequency (in Hz)  
**/downsampling [int]** : set downsampling factor  
**/rate [number]** : set report rate (in msec)  
**/clear** : clear history  
**/dsp/mute [boolean]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied (see **/dsp/mute/ramptime**).  
**/dsp/mute [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/mute/ramptime [number]** : set ramp time (in msec) for mute/unmute  
**/dsp/bypass [boolean]** : bypass the DSP rendering. CPU resources are not used when the DSP is bypassed. A smooth ramp of is applied (see **/dsp/bypass/ramptime**).  
**/dsp/bypass [boolean][number]** : mute the DSP rendering. CPU resources are not used when the DSP is muted. A smooth ramp is applied; the second argument specifies the length (in msec) of the ramp.  
**/dsp/bypass/ramptime [number]** : set ramp time (in msec) for bypass  
**/dsp/automute [boolean]** : enable/disable the auto-mute (i.e. disable audio computation when incoming signals are 0)  
**/dsp/automute/attack [number]** : set the duration (in seconds) before auto-muting  
**/dsp/post** : post various information to the Max console (audio should be turned on)  
**/dsp/clear** : clear the internal state of the audio processor. In general, you don't have to send this message directly. This is done automatically whenever the Max audio settings change. Yet, you might want to use this message to clear the object's sample-memory in case of a blow-up  
**/dump/dsp/latency** : send the processor latency (in samples) through the dump outlet  
**/verbose [string]** : set verbosity i.e. change the way information is posted to the Max console. Possible values: silent, minimal, normal, detailed  
**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary encoded OSC file, **'coll'** for human-readable Max coll file (compatible with the **coll** object). **'txt'** is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary encoded OSC file, **'coll'** for human-readable Max coll file (compatible with the **coll** object). **'txt'** is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary encoded OSC file, **'coll'** for human-readable Max coll file (compatible with the **coll** object). **'txt'** is the default file format. If the file extension is not provided, **'txt'** will be used by default. If the destination folder is not provided, the file will be saved in your home folder (**/Users/yourlogin**)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : **'txt'** for human-readable OSC text file, **'osc'** for binary

encoded OSC file, 'coll' for human-readable Max coll file (compatible with the coll object). 'txt' is the default file format.

/status : open the status window and bring it to front

/status/open : open the status window and bring it to front

/status/close : close the status window

/status/openorclose : open the status window if it was closed; close it if it was opened

/status/font/size [number] : set the font size of the status window

/status/floating [boolean] : make the status window 'floating' (i.e. always on top of other windows)

/help : open the help window and bring it to front

/help/open : open the help window and bring it to front

/help/close : close the help window

/help/openorclose : open the help window if it was closed; close it if it was opened

/help/font/size [number] : set the font size of the help window

/help/floating [boolean] : make the help window 'floating' (i.e. always on top of other windows)

/snapshot : open the snapshot window and bring it to front

/snapshot/open : open the snapshot window and bring it to front

/snapshot/close : close the snapshot window

/snapshot/openorclose : open the snapshot window if it was closed; close it if it was opened

/snapshot/font/size [number] : set the font size of the snapshot window

/snapshot/floating [boolean] : make the snapshot window 'floating' (i.e. always on top of other windows)

/status/copytoclipboard : copy the status to (the OS) clipboard

/status/copytoclipboard [string] : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/dump : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)

/dump [string] : dump a subset of the state of the object over the rightmost outlet. See spat5.tuto-dump-1.maxpat for usage examples.

/snapshot/deleteall : delete all the snapshots currently in memory

/snapshot/add : create a new snapshot with the current state

/snapshot/add [string] : create a new snapshot with the current state, and set its name

/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)

/snapshot/[index]/recall : recall the current state from the i-th snapshot

/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)

/snapshot/[index]/name [string] : set the name of the i-th snapshot

/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots

/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names

/snapshot/[index]/delete : delete the i-th snapshot

/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard

/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')

/snapshot/[index]/export [string] : export the i-th snapshot to file

/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file

/snapshot/export [string] : export all snapshots to file

/snapshot/import [string] : import all snapshots from file

/snapshot/recall/next : recall the next snapshot

/snapshot/recall/previous : recall the previous snapshot

/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)

/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)

/snapshot/recall [int] : recall the i-th snapshot

/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)

/snapshot/recall/bytitle [string] : recall a snapshot by title/name

/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)

/snapshot/lock [boolean] : lock edition of the snapshots

/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position

/snapshot/sort : sort the snapshots alphabetically (based on their titles)

## see also

- spat5.rms~
- spat5.ebur128~
- spat5.multi.connect

# spat5.zplane Plot filter poles and zeros on the z-plane

## description

The **spat5.zplane** object provides a way to graph filter poles and zeros in the z-plane for display. It is similar to Max **zplane~**. Like the **filtergraph~** object, it does not process audio signals by itself, but it does react internally to the current MSP sampling rate. The **spat5.zplane** object is designed to help in digital filter design and visualization for MSP, and to provide a basic pedagogical tool which may be used to help explain digital filter theory. .

## attributes

### @embed [boolean]

The **embed** attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @initwith [string]

The **initwith** attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via **loadbang** or **loadmess**. Note that the **initwith** attribute cannot be set via message, **attrui** or **inspector**; it must be typed directly within the object box. Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

### @parameter\_enable [boolean]

The **parameter\_enable** attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the **spat5.tuto-initwith.maxpat** example for further details.

## methods

**/post/version** : print the version in the Max Console  
**/post/version [details]** : print detailed version in the Max Console  
**/post/doc** : print the help documentation in the Max Console  
**/post/state** : print the OSC status in the Max Console  
**/preset/load [string]** : load a preset from file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
**/preset/load** : open a user dialog to load a preset file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/preset/export [string]** : export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format. If the file extension is not provided, '.txt' will be used by default. If the destination folder is not provided, the file will be saved in your home folder (/Users/yourlogin)  
**/preset/export** : open a user dialog to export a preset to file. Supported file extensions : '.txt' for human-readable OSC text file, '.osc' for binary encoded OSC file, '.coll' for human-readable Max coll file (compatible with the **coll** object). '.txt' is the default file format.  
**/status** : open the status window and bring it to front  
**/status/open** : open the status window and bring it to front  
**/status/close** : close the status window  
**/status/openorclose** : open the status window if it was closed; close it if it was opened  
**/status/font/size [number]** : set the font size of the status window  
**/status/floating [boolean]** : make the status window 'floating' (i.e. always on top of other windows)  
**/help** : open the help window and bring it to front  
**/help/open** : open the help window and bring it to front  
**/help/close** : close the help window  
**/help/openorclose** : open the help window if it was closed; close it if it was opened  
**/help/font/size [number]** : set the font size of the help window  
**/help/floating [boolean]** : make the help window 'floating' (i.e. always on top of other windows)  
**/snapshot** : open the snapshot window and bring it to front  
**/snapshot/open** : open the snapshot window and bring it to front  
**/snapshot/close** : close the snapshot window  
**/snapshot/openorclose** : open the snapshot window if it was closed; close it if it was opened  
**/snapshot/font/size [number]** : set the font size of the snapshot window  
**/snapshot/floating [boolean]** : make the snapshot window 'floating' (i.e. always on top of other windows)  
**/status/copytoclipboard** : copy the status to (the OS) clipboard  
**/status/copytoclipboard [string]** : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. ',')  
**/dump** : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
**/dump [string]** : dump a subset of the state of the object over the rightmost outlet. See **spat5.tuto-dump-1.maxpat** for usage examples.

```

/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)
/window/title [string] : set the window title (in the window titlebar)
/window/visible [boolean] : set the window visibility
/window/moveable [boolean] : set the window movability
/window/resizable [boolean] : set the window resizableability
/window/enable [boolean] : enable/disable the window
/window/background/color [color] : set the window background color
/window/background/transparency [number] : set the window transparency (in /window/opaque [boolean] : set the window opaque flag (optimize
repaint efficiency)
/window/fullscreen [boolean] : enable/disable fullscreen mode
/window/minimise [boolean] : minimize the window
/window/open : open the window (and bring it to front)
/window/close : close the window
/window/openorclose : open the window if it was closed; close it if it was opened
/window/size [number][number] : set the window size (width, height) (in pixels)
/window/width [number] : set the window width (in pixels)
/window/height [number] : set the window height (in pixels)
/window/bounds [number][number][number][number] : set the window bounds (top left position, width, height) (in pixels)
/window/topleft [number][number] : set the window top left position (in pixels)
/window/centre : open the window, centering it on the screen
/window/rendering/engine [string] : set the graphical rendering engine of the window
/window/fps/visible [boolean] : display the FPS performances of the window
/window/scale [number] : set the global scale factor of the window (in /window/floating [boolean] : make the window 'floating' (always on top)
/window/hidesondeactivate [boolean] : make the window 'hides on deactivate' (when always on top)
/window/buttons/close [boolean] : enable/disable the close button (in the window titlebar)
/window/buttons/minimise [boolean] : enable/disable the minimise button (in the window titlebar)
/window/buttons/maximise [boolean] : enable/disable the maximise button (in the window titlebar)
/window/export/image [string] : export the window as an image file (png or jpeg)

```

## see also

- zplane~
- cascade~
- spat5.cascade~
- biquad~
- filtergraph~
- filterdesign
- spat5.zplane
- spat5.equalizer
- spat5.hlsshelf
- spat5.hlsshelf~
- spat5.frequencyresponse
- spat5.octavebank~



## spat5.zplane.embedded

## Plot filter poles and zeros on the z-plane

### description

The `spat5.zplane` object provides a way to graph filter poles and zeros in the z-plane for display. It is similar to Max `zplane~`. Like the `filtergraph~` object, it does not process audio signals by itself, but it does react internally to the current MSP sampling rate. The `spat5.zplane` object is designed to help in digital filter design and visualization for MSP, and to provide a basic pedagogical tool which may be used to help explain digital filter theory. .

### attributes

#### @embed [boolean]

The `embed` attribute allows to store the state of the object within the patcher. The complete state of the object is stored whenever the patcher is saved to disk. Upon loading the patcher or copying the object box, the state is restored. Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @initwith [string]

The `initwith` attribute can be used to specify the initial state of the object. You should provide a list of comma-separated OSC commands. The list of messages should be quoted (with double quote character "). This is similar to sending the list of commands via `loadbang` or `loadmess`. Note that the `initwith` attribute cannot be set via message, `attrui` or inspector; it must be typed directly within the object box. Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

#### @parameter\_enable [boolean]

The `parameter_enable` attribute is used for compatibility with Max snapshots. It can also be used to store the initial state of the object (see 'Initial Enable' in the Max inspector). Have a look at the `spat5.tuto-initwith.maxpat` example for further details.

### methods

`/post/version` : print the version in the Max Console  
`/post/version [details]` : print detailed version in the Max Console  
`/post/doc` : print the help documentation in the Max Console  
`/post/state` : print the OSC status in the Max Console  
`/preset/load [string]` : load a preset from file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. You can specify the fullpath of the file, or only its filename if the file is inside Max search path.  
`/preset/load` : open a user dialog to load a preset file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.  
`/preset/export [string]` : export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format. If the file extension is not provided, `'txt'` will be used by default. If the destination folder is not provided, the file will be saved in your home folder (`/Users/yourlogin`)  
`/preset/export` : open a user dialog to export a preset to file. Supported file extensions : `'txt'` for human-readable OSC text file, `'osc'` for binary encoded OSC file, `'coll'` for human-readable Max coll file (compatible with the `coll` object). `'txt'` is the default file format.  
`/status` : open the status window and bring it to front  
`/status/open` : open the status window and bring it to front  
`/status/close` : close the status window  
`/status/openorclose` : open the status window if it was closed; close it if it was opened  
`/status/font/size [number]` : set the font size of the status window  
`/status/floating [boolean]` : make the status window 'floating' (i.e. always on top of other windows)  
`/help` : open the help window and bring it to front  
`/help/open` : open the help window and bring it to front  
`/help/close` : close the help window  
`/help/openorclose` : open the help window if it was closed; close it if it was opened  
`/help/font/size [number]` : set the font size of the help window  
`/help/floating [boolean]` : make the help window 'floating' (i.e. always on top of other windows)  
`/snapshot` : open the snapshot window and bring it to front  
`/snapshot/open` : open the snapshot window and bring it to front  
`/snapshot/close` : close the snapshot window  
`/snapshot/openorclose` : open the snapshot window if it was closed; close it if it was opened  
`/snapshot/font/size [number]` : set the font size of the snapshot window  
`/snapshot/floating [boolean]` : make the snapshot window 'floating' (i.e. always on top of other windows)  
`/status/copytoclipboard` : copy the status to (the OS) clipboard  
`/status/copytoclipboard [string]` : copy the status to (the OS) clipboard, and specify the end-of-line character (e.g. `'\n'`)  
`/dump` : dump the complete state of the object over the rightmost outlet (a.k.a. dump outlet)  
`/dump [string]` : dump a subset of the state of the object over the rightmost outlet. See `spat5.tuto-dump-1.maxpat` for usage examples.

```

/snapshot/deleteall : delete all the snapshots currently in memory
/snapshot/add : create a new snapshot with the current state
/snapshot/add [string] : create a new snapshot with the current state, and set its name
/snapshot/[index]/store : store the current state in the i-th snapshot (in memory)
/snapshot/[index]/recall : recall the current state from the i-th snapshot
/snapshot/[index]/jump : immediately recall the current state from the i-th snapshot (ignoring recall time)
/snapshot/[index]/name [string] : set the name of the i-th snapshot
/snapshot/interpolate [int][int][number] : interpolate between the i-th and j-th snapshots
/snapshot/interpolate [string][string][number] : interpolate between two snapshots, given their names
/snapshot/[index]/delete : delete the i-th snapshot
/snapshot/[index]/copytoclipboard : copy the i-th snapshot to (the OS) clipboard
/snapshot/[index]/copytoclipboard [string] : copy the i-th snapshot to (the OS) clipboard, and specify the end-of-line character (e.g. ',')
/snapshot/[index]/export [string] : export the i-th snapshot to file
/snapshot/[index]/export/content [string] : export the content of the i-th snapshot to file
/snapshot/export [string] : export all snapshots to file
/snapshot/import [string] : import all snapshots from file
/snapshot/recall/next : recall the next snapshot
/snapshot/recall/previous : recall the previous snapshot
/snapshot/jump/next : immediately recall the next snapshot (ignoring recall time)
/snapshot/jump/previous : immediately recall the previous snapshot (ignoring recall time)
/snapshot/recall [int] : recall the i-th snapshot
/snapshot/jump [int] : immediately recall the i-th snapshot (ignoring recall time)
/snapshot/recall/bytitle [string] : recall a snapshot by title/name
/snapshot/jump/bytitle [string] : immediately recall a snapshot by title/name (ignoring recall time)
/snapshot/lock [boolean] : lock edition of the snapshots
/snapshot/renumber : renumber the snapshots (their OSC pattern) based on their position
/snapshot/sort : sort the snapshots alphabetically (based on their titles)

```

## see also

- zplane~
- cascade~
- spat5.cascade~
- biquad~
- filtergraph~
- filterdesign
- spat5.zplane
- spat5.equalizer
- spat5.hlshelf
- spat5.hlshelf~
- spat5.frequencyresponse
- spat5.octavebank~