Shuttle Control

operated by

Endorphin.es

CARGO

Lunch menu for firmware version code name Cargo 3

First things first

RTFM – be so kind and read the manual. It will provide you with the information you need to fully indulge in the module you just purchased – for which we like to thank you.

Enjoy your sound experiences, dear sonic traveller.

Beginning from the product's purchase date a 1-year warranty is guaranteed for each product in case of any manufacturing errors or other functional deficiencies during runtime.

The warranty dœs not apply in case of:

- damage caused by misuse
- mechanical damage arising from careless treatment (dropping, vigorous shaking, mishandling, etc.)
- damage caused by liquids or powders penetrating the device
- heat damage caused by overexposure to sunlight or heating
- electric damage caused by improper connecting

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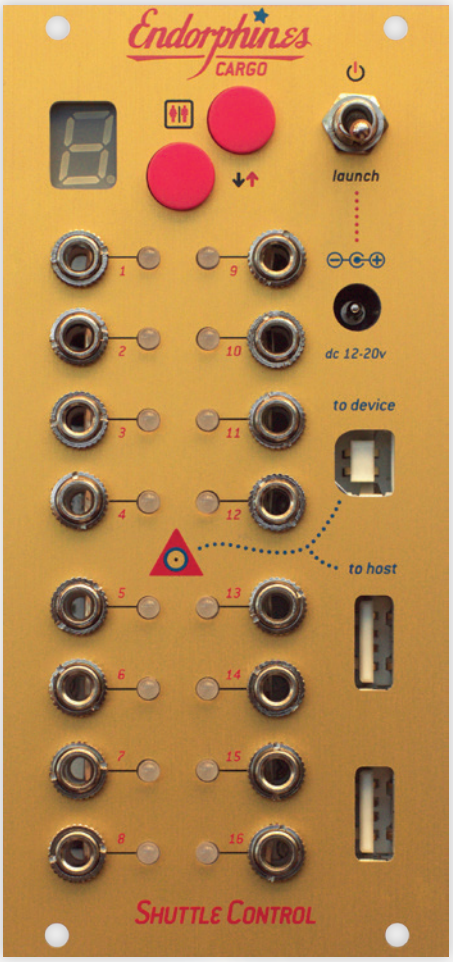
SHUTTLE CONTROL by Endorphin.es Cargo



WE LOVE THE SIMPLE THINGS:

- 12 HP/TE width, up to 35mm (<1.5") in depth (super slim & therefore shuttle friendly)
- 12 bit USB-to-MIDI-to-CV converter module with 16 arbitrary assignable channels
- simultaneous USB on-the-go device and host modes using 120 MHz 32-bit ARM Cortex™-M3 CPU
- internal PSU capable of working from cigarette lighter receptacle, rechargeable battery or 12-20V AC-DC power adapter
- no drivers are required for a direct connection to your MAC/PC or iOS devices
- up to 8 voices of polyphony, polyphonic key aftertouch, no steps in CC voltages, MIDI clock, tap clock/LFO, envelope, random voltage and noise generators, probability triggers, bi-directional USB-MIDI transfer and many more MIDI events can be translated into CV

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1. SHUTTLE CONTROL has a 30 Watt switched mode PSU inside.

It accepts ***12-20V DC*** voltage input via 2.5 mm outside diameter (0.098") DC IN connector. SHUTTLE CONTROLs after S/N 247 support universal 2.1 or 2.5mm DC connector barrel. The center pin corresponds to positive (+) and the shield corresponds to ground (–). Toggling the 'launch' switch when a DC adapter is connected will power the module on.

An internal circuit creates regulated +12V (1A), -12V (0.7A) and +5V (1A) that supply:

- USB-to-MIDI-to-CV converter
- USB MIDI devices connected via USB such as an iPad, USB MIDI keyboards, MIDI controllers and USB goose-neck lamps
- +5V power rail at Doepfer A-100 bus 16-pin IDC-connector via flying ribbon cables or connecting third-party bus-boards (when '+5 to bus' jumper on the backside of the module is ON). Taking into account the PSU has general efficiency at round-about 87-90% (differs on different rails and the DC voltage applied), to obtain the required output currents one should power the module with at least 4 and more Amperes from 12 to 20V DC power adapter. HINT: The power supply is not included in the package with SHUTTLE CONTROL.

The PSU is designed to supply one full row of Endorphin.es modules (Furthrrrr Generator, Grand Terminal, GaterwayT_XP, Cockpit)—with a reserve of current.

The SHUTTLE CONTROL is capable of supplying power for more modules, however keep in mind their overall power consumption. Powering too many modules will increase the temperature of SHUTTLE CONTROL's backside board. There are short-circuit, reversed DC jack pin-out and thermal overheating protections.

SHUTTLE CONTROL can be powered from almost any 12-20V multimedia power adapter that can be bought in any country in most consumer electronic supermarkets for a decent price of 15-25 EUR. Universal laptop power adapter also fits fine – just assure you are using the proper barrel plug with center positive DC barrel (5 Amperes recommended, 12-20 Volts DC). 12-15V are the most common and 12V seems to be the most optimal ones. See addendum to that manual with the advices and links how to choose a proper PSU for your SHUTTLE CONTROL.

TIPP: *We advise you to use a wall-wart power adapter that has a built-in short-circuit protection. I.e., when there is shorting at one of its rails to ground it should shut off immediately. If you use a wall-wart power adapter with reversed polarity—i.e. ground allocated at center pin and positive at shield, then the connected power adapter will not work.*

HINT: *Normal working temperature of the backside of the module is around 30-50°C. Plugging in more modules will make the module warmer but usually will not heat up to more than 70 to 80°C.* ***Powering more modules at that stage is not recommended.*** *The built-in thermal shutdown turns off the power when the circuit inside the PSU goes above 150°C. Only when the temperature falls below 120°C the PSU will start working again.* ***Do not touch the rear side, as the module might be hot!***

On the backside you may notice a 16-pin Doepfer A-100 bus IDC-connector. It is used:

- ***for powering modules when using AC-DC power adapter.*** With the power adapter physically plugged into DC jack at the faceplate the internal PSU will send the power to the bus board, so you may power other modules with SHUTTLE CONTROL via a flying bus board (included with module) or connect it into another bus board via another ribbon cable.
- ***for powering the SHUTTLE CONTROL from a bus board.*** In case you already have a powered bus and don't plan to use SHUTTLE CONTROL as power source. You may connect it into the powered bus board directly using the supplied flying board or any other 16-pin ribbon cable. Before doing so, you must unplug the supplied AC-DC adapter from the SHUTTLE CONTROL's jack on the faceplate (even if it is not delivering any power).

When powering the SHUTTLE CONTROL from an external powered bus board, the power consumption of SHUTTLE CONTROL is the following: max. 200 mA from positive +12V rail and max. 100mA from negative -12V rail, max 300mA in total—depending on how bright the LEDs are at the moment and excluding powering of external USB gear that is usually around extra 500mA max..

There are 3 jumpers on the backside of the SHUTTLE CONTROL:

CV1 to Bus CV / CV9 to Bus Gate jumpers create normalled connections from CV1 output jack into Bus CV (13 & 14 pair of pins) and CV9 output jack into Bus Gate (15 & 16 pair of pins) at Doepfer A-100 16-pin IDC-connector. It is convenient to assign CV1 to pitch CV and CV9 to gate CV in case you use A-100 System Bus signals.

SHUTTLE CONTROL delivers +5V to the busboard when the ***'+5V to bus' jumper*** installed. ***Do not install the '+5V to bus' jumper when you power the Shuttle from external busboard that already has a +5v adapter installed***.

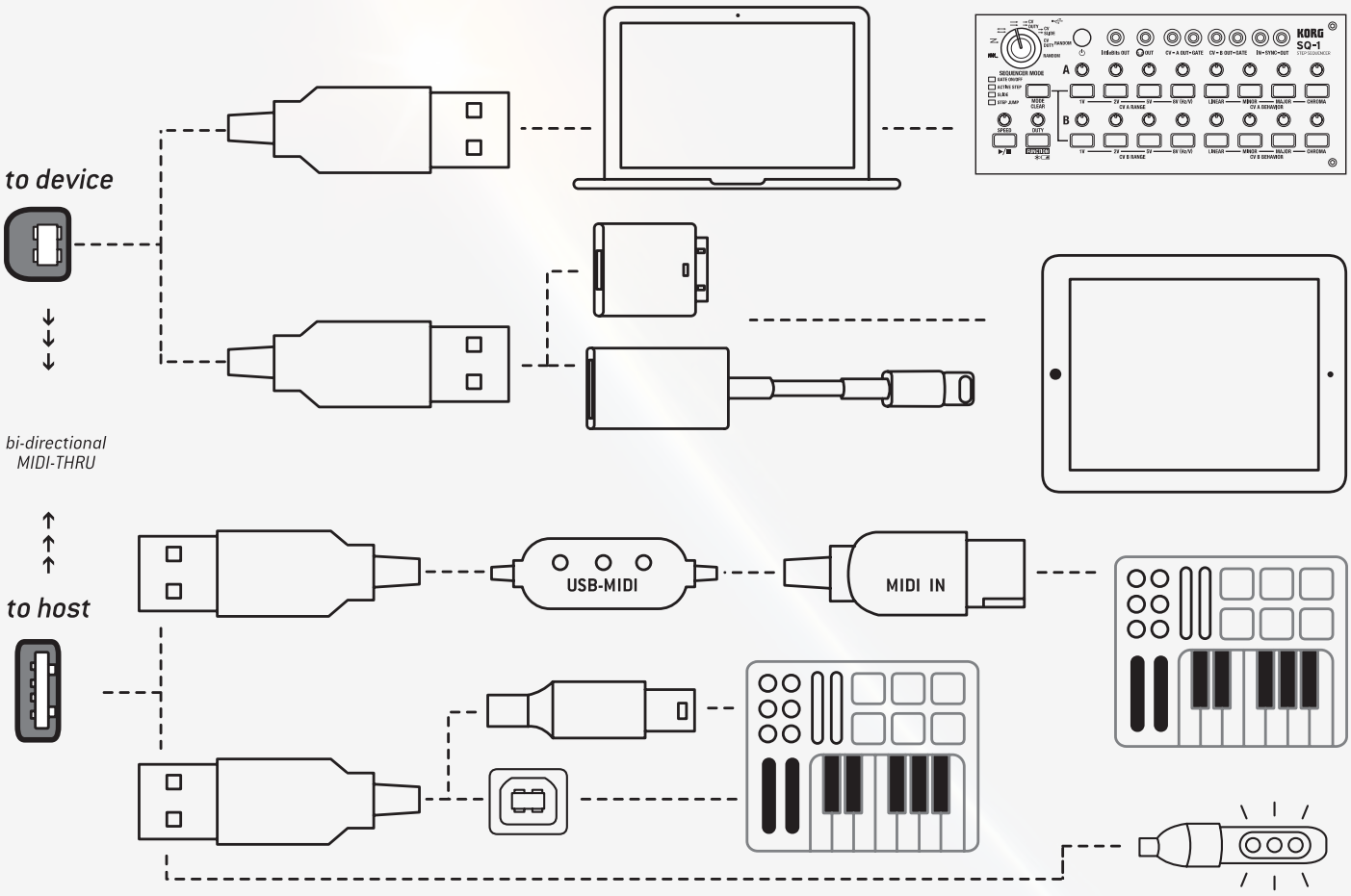
2. USB-to-MIDI-to-CV converter

SHUTTLE CONTROL features two 12 bit digital-to-analog converters. Each DAC is multiplexed afterwards into 8 channels at 10 kHz sampling rate per channel. Each of the CV outputs can be assigned to almost any useful MIDI message, which are converted afterwards into equivalent analog voltages or pulse sequences.

The relative brightness of LEDs near each of the CV outputs show current amplitude and helps to monitor the output voltage polarity: ***RED*** when the voltage goes below 0 volts and ***GREEN*** when the output goes higher than 0 volts. The maximal amplitude at every CV output never exceeds lower -5V or upper +5V (10V pp). On module's power up in case appropriate CV output isn't assigned to a some function generator or no command MIDI messages were sent, that output is set to zero (and the corresponding LED is dimmed).

It is expected, that devices connected via USB are themselves USB-MIDI class-compliant generic devices that do not require specific drivers to run. Those are most of USB-to-MIDI adapters, USB MIDI keyboards and controllers that work as plug-and-play. Refer to the manual of a certain hardware. By itself, SHUTTLE CONTROL acts also as a generic device when is connected to MAC/PC or iPad, that means no drivers are required and it will immediately appear in the list for your MIDI (or Core MIDI) hardware.

There are following combinations of possible connections you may integrate SHUTTLE CONTROL with your USB MIDI devices as well as into your DAW environment:



To device means that a USB connection to the USB device part of SHUTTLE CONTROL is expected—SHUTTLE CONTROL now acts as a device to MAC/PC/iPad. It is a USB female connector usually found on printers or USB-sound cards. It accepts a ***USB type B*** (or micro USB in early module's versions) plug which comes with the module. So far, it is capable of connecting to ***PC/MAC*** directly, as well as to an ***iPad*** (via a Camera Connection Kit or a Lightning to USB Camera Adapter) and other Tablet computers that support the ***USB OTG*** mode and ***MIDI devices***. SHUTTLE CONTROL does not require a powered USB hub in order to be connected to an iPad. For deeper iPad integration, see further information.

To host means that a connection to the USB host part of SHUTTLE CONTROL is expected—it now acts as a host for connected hardware. It is a powered USB female connector, that accepts ordinary ***USB type A*** plug. Usually it comes from USB-MIDI keyboards or MIDI controllers, USB-MIDI adapters (for direct physical MIDI input), connecting a USB-powered gooseneck lamp (lamp is not included within the SHUTTLE CONTROL). The A USB cable is not included as it usually comes already supplied with your USB MIDI hardware.

Attention: *USB 'to host' connectors output +5V with approximately less than 1000mA current (shared between both sockets and shared with ARM-processor as well). This is sufficient in order to connect lamps or other equipment that require a powered USB port.* ***It is possible but not recommended to charge other devices like cell phones.*** *Typical mobile charger requires 1200-2000mA for optimal (fast) charge, so charging external devices from SHUTTLE CONTROL may increase the temperature of the backside of the module. An iPad requires at least 1200mA current to show an active charging process. Since the output of SHUTTLE CONTROL current from USB socket is less than that the iPad requires it still WILL charge it, however it may require more time than it takes with original iPad charger and will show 'NOT CHARGING' on the screen (but there's a new version of the iPad Camera Connection Kit that lets you connect a charger simultaneously to the connection to the SHUTTLE CONTROL). In general, charging operation requires a high current even for a small cell phone, so it is recommended to use original or external chargers and use the powered USB output for USB-MIDI devices or USB LED lamps.*

There are two female type A USB 'to host' connectors, and only one can be used for USB data transfer—in case you connect two MIDI controllers, only the one that has been connected first will work (if you need to connect more—check our SHUTTLE MATE module).

Both 'to device' and 'to host' modes work simultaneously. That means you may play MIDI notes and send CC messages from your MIDI keyboard connected 'to host' USB socket, and play other sequences and send MIDI clock from your DAW connected 'to device' USB socket at the same time. Bi-directional MIDI routing (set for every preset separately) enables either 'device to host' or vice versa or 'host loopback' USB-MIDI routing.

MIDI signals send from your USB-MIDI hardware or DAW are translated into equivalent analog control voltages or pulses. Signal types, configurations and their analog interpretation described in the third chapter of this manual.

Nearly any MIDI event may be assigned to any of the 16 CV output jacks.

There are 16 editable presets you can navigate through with the UP and DOWN buttons (or by Program Change message, but more of this later).

The preset names are ***0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F.*** The current preset name appears on the 7-segment display.

When powering up the module, preset '1' is always loaded by default (keep that in mind before performing). Each preset contains MIDI mapping for all 16 CV outputs including device/host bi-directional MIDI transfer and polyphonic notes allocation. For editing the presets, refer to the third chapter of that manual.

When the SHUTTLE CONTROL connects to a Mac/PC as a device (via 'to device' connection), a small ***'d'*** appears for 1 second, informing that the connection to the device is initialized and your device (SHUTTLE CONTROL) is ready.

After connecting it to your Mac/PC you will see SHUTTLE CONTROL in the list of your MIDI devices:

- *Start > Control Panel > System > Device Manager > Sound, video and game controllers in Windows*
- *Finder > Applications > Utilities > Audio MIDI Setup > MIDI Devices tab in Mac OS X*
- *at MIDI settings of your DAW or App (as Core MIDI device in Mac OS X or iOS)*

When a USB-MIDI device is connected to the SHUTTLE CONTROL performing as a host (via 'to host' connection), a small ***'h'*** symbol appears for 1 second informing you that the host connection is initialized and that the host (SHUTTLE CONTROL) is ready.

The SHUTTLE CONTROL can interpret a wide range of MIDI events. When an appropriate MIDI event—e.g. 'note on' or 'control change' translates into control voltages—you will notice a small dot blinking in the lower right corner of the display. That indicates the activity of the MIDI data being processed.

Tipp: *In case the connection between the USB devices or PC is lost, you may press and hold the DOWN button for about 2.5 seconds. There is no need to reboot (turn off and on) whole system. That will result in SHUTTLE CONTROL's soft reset (Shuttle will again reboot and load preset '1') and will reinitialize all devices connected to the USB ports.*

3. Web-based editor for presets.

By developing new firmwares for the SHUTTLE CONTROL over years, we added more and more new features.

The current and most up to date version of the firmware called ***Cargo 3*** and is available via the following URL address:

https://www.endorphin.es/cargo3

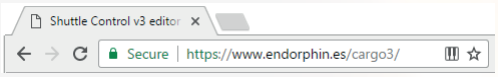
We strongly recommend you to update to the latest firmware to obtain all features described in that manual.

The interface of the editor has a responsive interface and runs also on tablet computers.

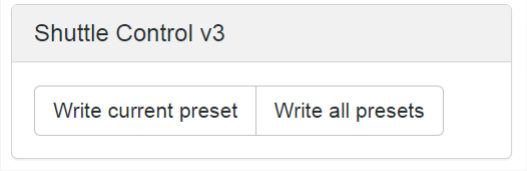
1. Don't use editor at all and rely on SHUTTLE CONTROL's already pre-programmed 16 factory presets (check addendum 1 of that manual).
2. Recommended way: using a browser that supports Web MIDI API. For PC/Mac that are Opera and Chrome. For iOS there is a free Web MIDI Browser and for Android it might be Chromium of version 53 or Chrome for Android of version 55 and higher.

Currently you need to have internet access to be able to generate or edit existing SHUTTLE CONTROL configurations.

After you navigated the web-editor at ***https://www.endorphin.es/cargo3*** (it is mandatory to access the URL of the editor with secured HTTPS protocol), you have to allow all browsers access to a certain (SHUTTLE CONTROL v3) MIDI interface to be able to load/flash the presets:



After changing a certain preset in the editor, you may upload it as single preset, or as full bank of 16 presets by pressing either the 'write current preset' button, or the 'write all preset's button. That buttons appear after you allow access to your SHUTTLE CONTROL MIDI device and if a SHUTTLE CONTROL with firmware 3 is connected:

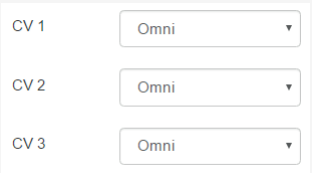


Managing presets

You will see a list of presets from 0 to F to choose/edit on the top of the editor:

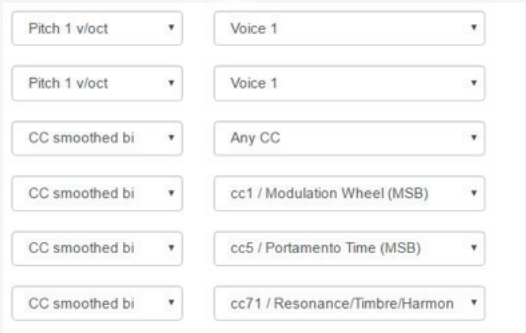
Currently chosen preset is marked by grey colour.

Below that, there's a list of dropdown menus. Each row of dropdown menus from CV1 to CV16 represents the appropriate output jack on the faceplate of the SHUTTLE CONTROL.



The first column of dropdown menus defines the MIDI channel whichs MIDI events are received and interpreted to voltages. By default, it is set to 'Omni', which means MIDI events from any channel are received. Using different MIDI channels may be useful when working with a DAW or multi-track/voice performance. For example, when you play different melodies on different tracks assigned to different MIDI channels.

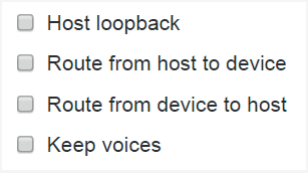
The second column of dropdown menus is a list of MIDI event functions (we call them 'generators') assigned to a certain CV output jack.



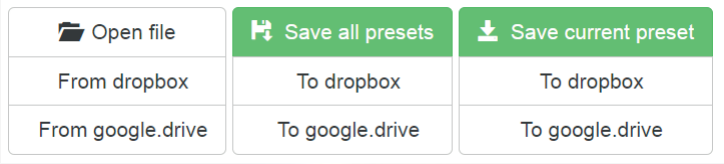
Depending on the type of generator a third column appears with additional parameters.

Below the list of dropdown menus, there is a set of checkboxes.

They correspond to bi-directional USB-MIDI routing from device/host or host loopback (refer to addendum 2 to that manual). The 'Keep voices' checkbox corresponds to polyphonic voices allocation and will be explained further below.



3. Finally there is a option to store and upload the presets – saving them on your hard-drive or clouds and uploading them into SHUTTLE CONTROL by playing the MIDI File (with *mid file extension) with an appropriate software (explained below). A set of buttons allows to save/open MIDI files (as single preset or full bank of presets):



So you may either

- save current midi mapping (one preset) into *mid file
- save the whole bank of all 16 mappings into *mid file, or
- load *mid file with either one mapping (into current preset) or load whole bank.

SHUTTLE CONTROL uses System Exclusive (SysEx) data to store and edit presets into a standard MIDI File (*mid) format.

TIPP: *Saved *mid file extension may be renamed into *syx and loaded in same way in case you prefer using your favorite SysEx managers that support *syx files only.*

All you need to load custom mappings into SHUTTLE CONTROL is to play that midi file in any midi player choosing SHUTTLE CONTROL as midi output device.

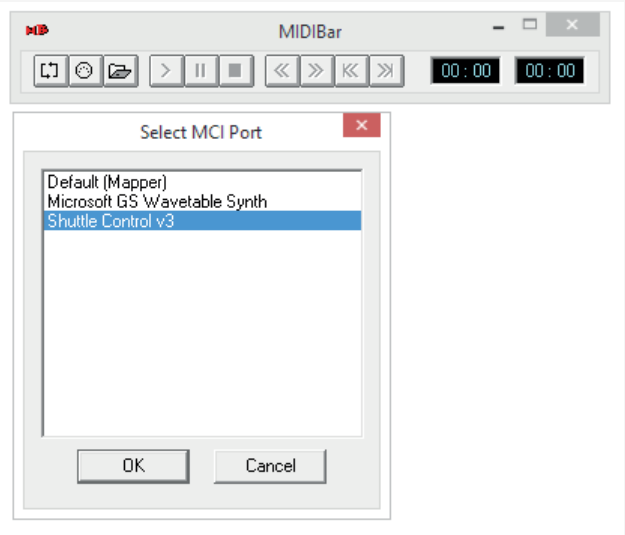
The easiest way is to put (drag-n-drop) that *mid file to a new MIDI track in your DAW (except Ableton Live as it doesn't support SysEx), choose the output of that MIDI track to your SHUTTLE CONTROL MIDI interface and press play. During playback you will see a small dot that indicates MIDI activity blinking as well as 'p' symbol will appear on SHUTTLE CONTROL's 7-segment display, that means the preset (or the whole bank) is uploaded.

ATTENTION: *some DAW or MIDI players filter SysEx by default or even don't transmit SysEx messages at all—Ableton Live version 9 for example. Refer to the manual of the software you are using to enable SysEx transmit over MIDI or use any of the other SysEx/midi managers suggested later in that manual. In case you upload one single mapping preset into SHUTTLE CONTROL, it will be uploaded into the currently selected preset number (cell).*

In iOS it's impossible to save *mid files directly onto your iOS device. That's why there is 'save to' and 'load from' Google Drive or Dropbox options enabling you to save and load *mid files directly from/to that cloud services and afterwards import them using MIDI player apps that support importing files from clouds. To be able to save/load to clouds services you should be registered in one of the online services supported and prompt/give permissions of the SHUTTLE CONTROL editor to save/load MIDI files within your cloud account.

Some mobile browsers may have issues when using save/load to clouds functions. For example, mobile iOS Safari browser supports both Dropbox and Google Drive savers/loaders. Dropbox saver isn't supported by mobile Google Chrome for iOS, however Google Drive—curiously enough—works fine in mobile Chrome.

List of SysEx Tools



MIDI OX is a free program for Windows that is able to play *mid/*syx files and upload them into SHUTTLE CONTROL. First connect your SHUTTLE CONTROL to your PC via 'to device' connector (type B or micro USB to USB type A cable). ***Do not launch MIDI OX, but the MIDIBAR.EXE utility app***—it's a MIDI player that is located in the same folder where MIDI OX is installed. Press the 'devices' button (with MIDI DIN picture) and choose 'SHUTTLE CONTROL' as current MCI Port. Then press open button (with Folder pic) and choose the preset you wish to upload to your SHUTTLE CONTROL. Press the PLAY (button with > icon) and the preset will be uploaded.

WINAMP is a popular free MP3 and other media files player for Windows. Connect your SHUTTLE CONTROL to your PC via 'to host' connector (type B or micro USB to USB type A cable), launch Winamp. In the preferences (Ctrl+P) go to ***Plug-ins > Input > Nullsoft MIDI player [in_midi.dll]***. Double click on it and choose 'SHUTTLE CONTROL' from the device list. Afterwards play saved *mid file in the Winamp as ordinary media file and your presets will be uploaded.

SYSEX LIBRARIAN is a free app for MAC that is able to play *mid/*syx files and upload them into SHUTTLE CONTROL. Connect your SHUTTLE CONTROL to your MAC via 'to host' connector (type B or micro USB to USB type A cable) and launch SysEx Librarian app. Choose 'SHUTTLE CONTROL v3' among the available MIDI-interfaces list in the drop-down menu of the program, press ***'Add ...'***, choose your saved *mid file from SHUTTLE CONTROL editor and press the 'play' icon to proceed with uploading—the process will take less than a second.

For sure, there are lots of other utilities capable of these actions. But they may not be free of charge.

FACTORY PRESETS

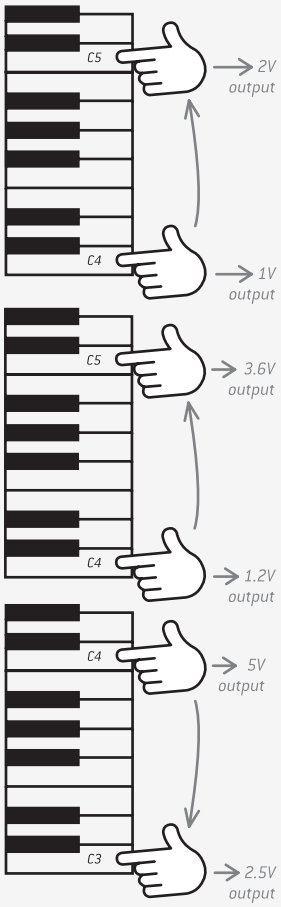
SHUTTLE CONTROL comes with pre-installed factory presets so you may start exploring it out-of-the-box. The presets (from our point of view) cover the most frequently used/common/popular functions and are made for instant tryout—however keep in mind that is only the start point so you may want to edit any configuration to fit your personal workflow and software/hardware environment. ***You may see the list of factory presets in the addendum at the end of that manual.***

4. MIDI TO CV GENERATORS

In SHUTTLE CONTROL MIDI events assigned to any of 16 CV outputs, correspond to a certain equivalent of analog voltages or pulses. MIDI notes are converted into stepped voltages to control the pitch of an oscillator for instance. Note on/off messages usually are interpreted as triggers/gates. Think of them also as clocks, for random generators, tap LFOs, or triggers to launch envelopes. Every generator has up to 3 parameters—for example MIDI channel > pitch CV > voice number. Random or envelope CV generators usually use velocity as main parameter, however also understand some reserved CC values (see below).

LEGEND: *A small hint/description for all generators is located in the bottom of the web editor so you can look up its description quickly, rather than finding it in the manual. As soon as you got acquainted with the principles of assigning generators to CV outputs, you may create own presets fitting your needs flawlessly.*

PITCH 1V/OCT, PITCH 1.2V/OCT AND HZ/V are control voltage outputs that correspond to pitch.



- ***PITCH 1 V/OCT*** is the 1 volt per octave output that translates 120 MIDI notes from C-2 to C8 into -5V ... +5V range, or exactly 10 octaves (10 volts) altogether. That means that the lowest recognizable MIDI note is C of -2nd octave (MIDI note #0)—its output voltage corresponds to -5V. The highest note is C of 8th octave (MIDI note #120) with the corresponding output voltage of +5V. ***C3 is the central note that returns exact 0 volts.*** It is important to notice that the range of output voltages for any CV output is limited to -5V ... +5V. Some other events may be positive only—or unipolar—you will understand that further below..
- ***PITCH 1.2 V/OCT*** is the 1.2 volt per octave output used in Buchla synthesizers. The center note C3 gives exact 0 volts. Next one C4 will output 1.2 volts, C5 – 2.4V, C6 – 3.6V, C7 – 4.8V with the measure step of 0.1V per semitone. So far, the highest note will be D7 that will output +5 volts. Although Buchla uses only positive voltages for control voltages, C2 note will return -1.2V at the output, C1: -2.4V, C0: -3.6V and so on down to C-1 with -4.8V and A#-2 giving -5V (a bit more than 8 octaves altogether)..
- Unlike V/oct scales, ***PITCH HZ/V*** provides a linear scale of pitch output for synthesizers without exponential converters prior to their oscillators—for example the vintage Korg MS-10/20 or Yamaha CS-15 analog synthesizers. That type of control over pitch has some disadvantages (you will understand later why), so to obtain the maximal useful output of Hertz per volt range (positive only) SHUTTLE CONTROL outputs +5V at C4 note (the highest voltage SHUTTLE CONTROL can transmit). Then 1 octave lower C3 will return +2.5V, C2: 1.25V, C1: 0.625V, C0: 0,313V, C-1: 0.156V and the last one C-2: 0.078125V (with pretty bad resolution however). As you may see, the accuracy in the lower octaves is bad and on the edge of SHUTTLE CONTROL's CV resolution possibilities. That is why the useful range for controlling such type of synthesizers is roundabout 3 to 4 octaves.

In the third column of dropdown menus, that will appear after we choose a pitch scale output, we need to define, if we want to build a monophonic or a polyphonic setup.

If there is only one 'voice 1' on a certain MIDI channel or 'Omni' MIDI channels, it is called monophonic mode. In that mode, control change CC#5 is always reserved for portamento time. Of course, it's possible to assign CC#5 to output voltage from other CV outputs, however it'll always left reserved for portamento as well. Portamento defines the speed when one note's voltage changes to the upcoming note. By default, at startup or when no values were sent over CC#5, or if CC#5 is 0, portamento time is literally instant. Increasing the CC#5 value from 0 to 127 will increase the time of voltage slide to the new note in the range from 0 to approximately a few seconds.

Choosing 'voice 2', 'voice 3' in addition to 'voice 1'—or even more values per MIDI channel—will enable polyphonic mode with two or more voices for that MIDI channel. After choosing that option, the second, third and so on pressed notes/gates are routed to that CV output. You may or may not output some individual voices, or output their duplicated values in same or other pitch scales.

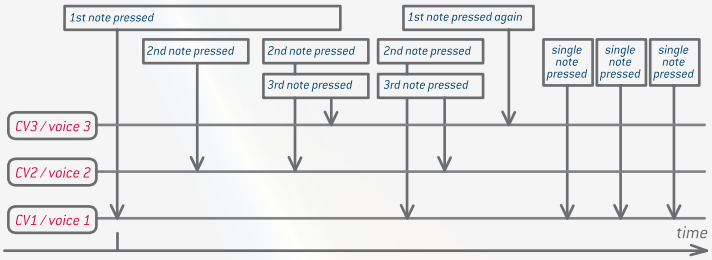
For example, choosing Voice 1 for CV1, Voice 2 for CV2 will create a duo-phonic setup. In the same way: Choosing Voice1 for CV1 and Voice1 for CV2 (both on MIDI Channel 1 for example) will be assigned to output the same voltage—for the note you first pressed, which you may use as precise buffered multiple to feed the pitch to two different oscillators to obtain an unison-alike effect.

- ***Choosing only voice 1 for a certain MIDI channel will enable monophonic mode only.***
- ***Choosing up to the maximum of 8 voices per MIDI channel will enable the polyphonic mode.***

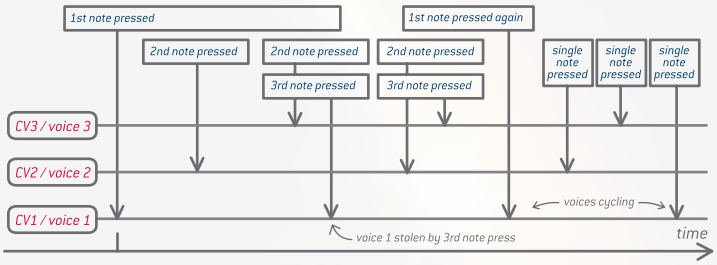
Using different pitch scales for different voices in polyphonic modes is also possible – you may create a whole polyphonic setup with different oscillators you have wherein some oscillators may be scaled to 1V/oct, and other 1.2V/oct, or Hz/Volt.

POLYPHONIC SETUPS—There are two modes of note allocation.

order mode [+] keep voices



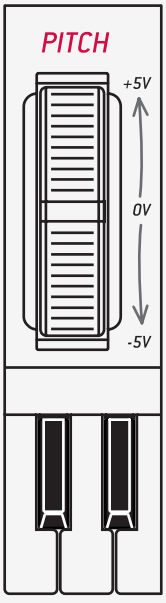
cycling (voice stealing) mode, [ ] keep voices



First mode is to allocate voices is in the ***order they are pressed in the chord***. That means after pressing another MIDI note during already having pressed one, the new voltage of a new note will be generated at this specific cv output. ***You can obtain that polyphonic notes allocation by checking the 'Keep voices' checkbox*** in the bottom of the preset: ☑ Keep voices

Another way to handle polyphony is ***cycling mode***—in the manner, it was introduced in the first Oberheim and Sequential Circuits polyphonic synthesizers to avoid voices to overlap and giving them a natural polyphonic response. When new notes are upcoming—in case all voices are busy (on)—the place for this voice is taken (stolen) instead of the first note pressed and so on. ***You can obtain that polyphonic notes allocation by un-checking the 'Keep voices'*** checkbox in the bottom of the preset: ☐ Keep voices

The polyphonic note allocation applies to all polyphonic setups within a certain preset. That means you cannot simultaneously have different polyphonic voice allocations in on preset. For example a 2- and 3-voice polyphonic setup from different MIDI channels in one preset will both be either in 'first note' or in 'cycling mode'.



PITCHBEND (a.k.a. pitch wheel, pitch stick) outputs the pitch wheel data send from a MIDI channel. The output range is selectable either from -5V ... +5V. Its most left/lower position (14-bit value '0') pitchbend provides the lowest negative voltage of -5V and the most right/upper position (14-bit value '16383') provides the highest voltage +5V. To obtain the highest resolution, it's recommended to choose +/-5V (10Vpp) pitch bend resolution and then decrease it with an attenuator afterwards. Choosing smaller ranges will lower the resolution of the pitchbend from 12 bit (+/-5V) down to 11 bit (+/-2.5V) or to ~9.7bit (+/-1V) or to ~8.7 bit (+/-0.5V). In the middle position of the pitchbend the value is 0 volts (14-bit value '8192').

UNI/BI

Be aware: In the following passages you will recognize that most of the explanations of the 'generators' contain 'UNI' or 'BI' suffixes.

It doesn't matter which generator is explained (trigger, envelope or whatever), ***UNI*** means it will output only in ***positive 0 ... +5V range***. ***BI*** means certain generator will output in ***full bi-polar 5V ... +5V range***. In case of a ***clock***, its ***bi-polar range*** will be ***-5V at OFF*** and ***+5V at ON*** states.

TRIGGER

Is a short 1ms +5V pulse signal which appears, when a 'note on' event comes from the MIDI device or the DAW. For polyphonic mode, you may allocate a desired voice for the trigger signal or choose ***'Trigger Note'*** that will send a trigger for a certain note or any note from the chosen MIDI channel. In calm the current returns to 0 volts (in uni-polar version) or -5V (in bi-polar version). When trigged, the signal goes up to +5V (uni/bi same way).

GATE

Same as trigger: goes high up to +5V when 'note on' event arrives, however stays high at +5V until the 'note off' message arrives. Similarly, ***'Gate Note'*** sends a gate when a certain (or any) note is 'on' at certain MIDI channel. Use this setup, when you want to create a polyphonic setup with only one single envelope generator/VCA/VCF chain.

S-TRIG

Switched Triggers are used in old Korg and Yamaha synthesizers. It's the same as a gate but inverted—i.e., returns positive +5V when in calm and goes to 0V when 'note on' message arrives and returns back to +5V at the following 'note off'.

VELOCITY

Corresponds to the note's velocity that is 0v (or -5V) at startup (or preset chosen), and then changes and remains constant with every 'note on' message. Velocity corresponds to a certain voice and 'Velocity Note' corresponds to a certain note. That means, if you would like to have 4-voice polyphonic setup and you would like to use velocity within this patch, you should allocate 4 CV outputs to transmit velocity for each of the 4 voices.

CONTROL CHANGE (CC)

Corresponds to a Control Change value. Same as with velocity, it can be unipolar: from 0 to +5V, or bipolar from -5V to +5V.

As the SHUTTLE CONTROL has a 12 bit digital-to-analog converter, all the voltage values at every CV output contain 4 thousand values (4096 steps) for the full -5V ... +5V range. Pitchbend messages by MIDI specifications are 14 bit (over 16 thousand of values) and sending (squeezing) them thru 12 bit DAC doesn't feel that crucial for ears. In opposite, Control Change messages themselves are naturally 7 bit (127 values) and thus result in audible 1 semitone 'steps' when controlling analog parameters via CV—like the pitch sweep of a VCO whatever high resolution DAC you may have.

To fix that injustice we invented the ***No Damn Steps In CC (NDSICC™)*** algorithm (patents pending). That means you may interpret ordinary MIDI CC values into CV and all the changes will be smooth enough without audible steps ***('CC smoothed')***. At the same time is possible to make fast instant changes with no portamento-alike effect.

Same as with pitchbend messages, choosing unipolar range for CC instead of bipolar will lower the resolution at that CV output from 12 to 11 bit. Finally, if you want to output raw 7-bit CC values you choose ***'CC stepped'***.

AFTERTOUCH

Stands for MIDI channel pressure and corresponds to a ***certain MIDI channel.***

KEY PRESSURE

Stands for MIDI key pressure, or so called polyphonic aftertouch. Because of complex technical implementations, this parameter is mostly found in hi-end MIDI controllers. Same as with velocity, ***it corresponds to a specific voice***.

LFO: square/spike/triangle/sine/saw rising/saw falling

Are built-in primitive wave generators to be used as utility or sub-modules. The output range of the square, spike (1ms duty cycle pulse), triangle, sine, rising and falling sawtooth waves is -5 ... +5V. You may notice that by watching the blinking LEDs near the corresponding CV output. Those waves don't have any complex waveshapes, anti-aliasing or synchronization except their frequency responds to a Control Change number you may choose from the drop-down menu in the 3rd column. The frequency starts from 300 Hz (the highest CC value of 127) to 1 minute (with a CC value of 0). By default at power-up, or when no certain CC value is sent, the frequency is set to minimal—i.e. CC value is 0 then the frequency is 1 minute.

Hint: Adding a few LFO waveforms to a different CV outputs controlled with the same CC number will not guarantee that generators to be in sync with each other—they are free running oscillators.

TIPP: *For synchronized LFO options read below about the 'Tap LFO'*

LFO S&H

Same as the generators above, but these generate random sample and hold waves that samples values from a built-in white noise generator at a frequency controlled by a selected CC number. The output voltages range is -5 ... +5V. Adding more S&H generators to other CV outputs even if they are controlled with same CC number, will all supply random voltages to all defined CV outputs. I.e., those generators will not duplicate each other or be in sync.

LFO FLUCTUATING

Same as the Sample and Hold waveform however this one has a linear interpolation between the randomly sampled voltages—this results in continuous randomly fluctuating generators similar as found in Buchla's 'Source of Uncertainty' model No. 265, 266, 266e and even 276e. Herewith, the probable rate of change is defined by a chosen CC value with the range from 300 Hz at the highest CC value (aurally listened as ordinary white noise with flat distribution) and 1 minute at the lowest CC value. The probable output voltages range is -5 ... +5V

WHITE / PINK / BROWN / 808 CYMBAL / 808 COWBELL NOISE

Will output different types of audio noise (modular level, +/-5V range). ***White noise*** has a flat frequency spectrum and its signal has equal power in any band of a given bandwidth (usually called as f noise). ***Pink noise'***s spectral power density decreases by 3 dB per octave (density proportional to $1/f$) and Brown (Brownian) noise spectral power density decreases by 6 dB per octave (density proportional to $1/f^2$). The sample rate of that noise sources is still limited by 10kHz however their spectrum is pretty flat (or well distributed) that makes them good for sample and hold or filtering sources.

There are two additional noise sources inspired by the classic Roland TR-808 drum-machine—***Crash Cymbal noise*** (6 fixed square wave oscillators) and ***Cowbell noise*** (2 fixed oscillators that create a perfect 5^{th}).

All the above mentioned noise types are constant flow noise sources and are not adjustable/syncable, however they are raw material for atonal synthesis of a drums, like snares, high-hats, crash cymbals etc. Just pass the noise sources into a VCA or VCF and apply a short envelope.

FLIP FLOP NOTE

Same as gate but after going high (+5V) at the 'note on', it remains high after the 'note off' command. Not before the next 'note on' arrives it turns the voltage low (0v) again—and so on. Corresponds to a certain note of certain MIDI channel.

Tipp: It is useful, for example, to assign that voltages to the CV inputs of a voltage controlled mixer or VCA to create some sort of a MUTE function.

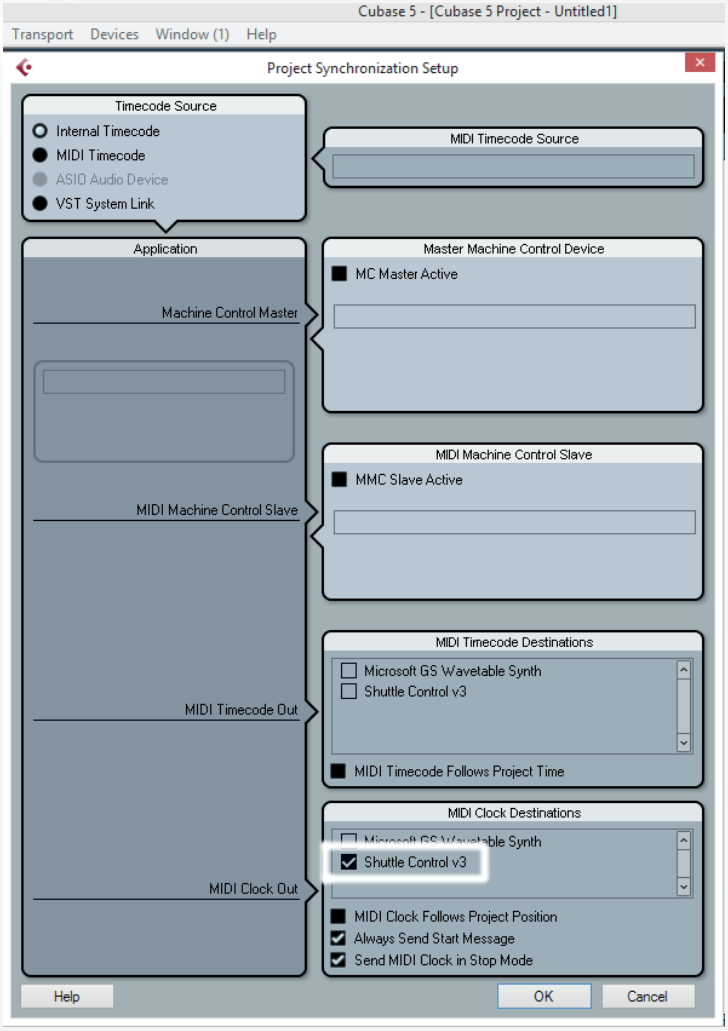
SYNCHRONIZATION

Is the way to translate MIDI clock (MIDI timing clock) signals into modular clock signals, sequencer play/stop/continue actions as well as translating those messages into DIN Sync (a.k.a. Sync24) signals. First, you need enable the MIDI clock as well as the transport key output/transmission via MIDI in the MIDI configuration of your DAW or sequencer.

Refer to your DAW/Sequencer manual how to do that.

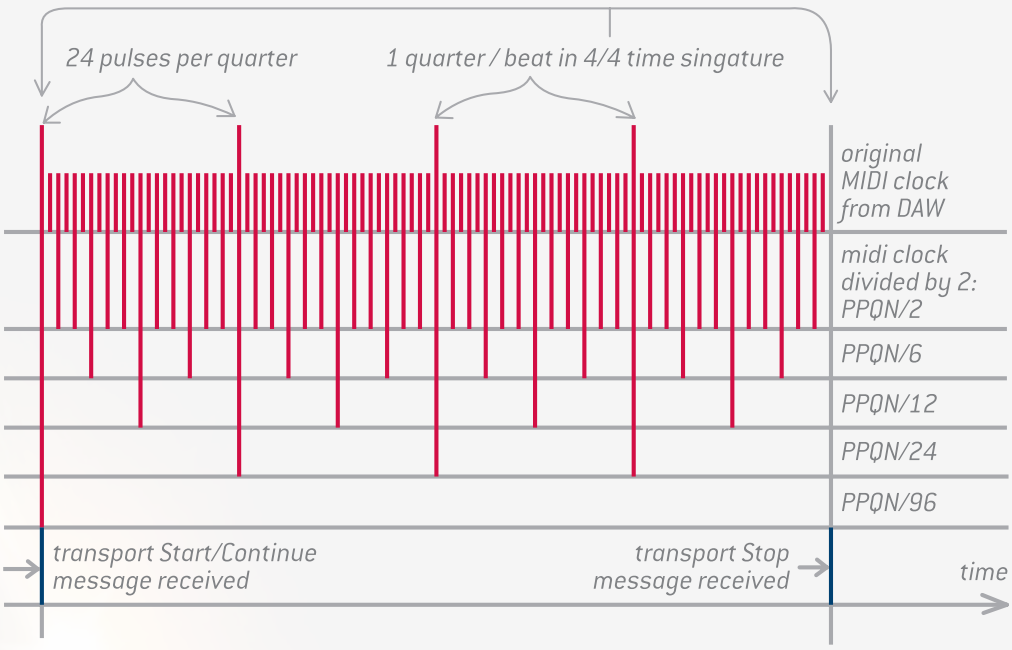
For example in Cubase/Nuendo it is the following procedure—upper menu:

Transport > Project Synchronization setup ... > MIDI Clock Out > [+] SHUTTLE CONTROL v3



Usually DAWs or sequencers send MIDI clock events at a rate of 24 PPQN (pulses per quarter note):

That means every musical beat (e.g. at 4/4 time signature) consists of 24 pulses (ticks) or 96 ticks per whole bar (4 beats). That pulses are continuously sent from a DAW (when MIDI clock is enabled), however only after receiving a 'Start' (decimal 250, hex 0xFA) or 'Continue' (decimal 251, hex 0xFB) MIDI transport messages, the SHUTTLE CONTROL will translate the MIDI clock into analog pulses within a previously set division assigned to a certain CV output.



ATTENTION: *without sending transport Start/Continue message, SHUTTLE CONTROL will not output the clock. You have to send Start/Continue messages to enable, and transport 'Stop' message (decimal 252, hex 0xFC) to disable to the clock to be put out from certain CV jack. Usually enabling transport messages in any DAW or sequencer automatically does that.*

As a simple example from the illustration above, setting the original PPQN to a certain CV output will give a very 'fast' clock exactly derived from your DAW/sequencer. Interesting is, that by dividing that clock we can obtain other 'slower' clocks (divisions), fully synchronized with the original one, that will match in time with rhythmical musical events.

The original PPQN (24 pulses/ticks per quarter) clock may be used to synchronize your vintage drum machines via DIN Sync (Sync24) just applying that direct pulses into your analog drum machine's appropriate input (i.e., to pin 5 of Din sync cable, the cable isn't included with the SHUTTLE CONTROL), will enable your drum machine playing at same tempo as the set up in your DAW.

Here are a few examples of simple MIDI clock divisions, in relation to a basic electronic drum pattern.

- ***PPQN/6*** and ***PPQN/12*** will follow your hi-hats that play every 16 th and 8th rhythmic patterns.
- ***PPQN/24*** represents the ***exact BPM of your MIDI DAW*** and will follow your bass drum playing a four-to-the-floor pattern.
- Finally, ***PPQN/96*** will follow the crash cymbal that plays at the beginning of every 4/4 bar.
- ***CC#48*** is reserved for shuffling the MIDI clock incl. all its dividers—***excluding PPQN*2***.
- ***CC#48*** value 0 (or when no value is sent on module's power-up) corresponds to zero shuffle. CC#48 value of 127 corresponds to maximum shuffle, when one 16/8th note almost starts overlapping the next one.

The small dot in the lower corner of the 7-segment display indicates the MIDI activity. When the MIDI clock is sent from your DAW, that small dot will blink according to the BPM (literally same as it would be from PPQN/24 assigned to any CV output) no matter if you set that clock up to be put out from one of CV outputs.

HINT: *The only thing that may be altered is the shuffle of that clock and just as with the MIDI synchronization, or that purpose CC#48 is reserved. CC#48 value 0 corresponds to zero shuffle, CC#48 value 127 corresponds to maximum shuffle.*

START/STOP

Refers to DIN Sync specification, pressing 'Start/Play' or 'Continue' buttons on your DAW will send a +5V gate voltage at the assigned CV output. Pressing 'Stop' or 'Pause' or when no 'Play' was pressed when loading the project, it will send 0 volts at the assigned CV output. Wiring that signal to your analog drum machine's appropriate input (i.e. to pin 1 of Din sync cable) will enable your drum machine start and stop playback at the same time when you press start/stop buttons at your DAW.

START / CONTINUE / STOP TRIGGERS

SHUTTLE CONTROL outputs separate 1 ms triggers when it receives transport 'start', 'continue' or 'stop' messages (e.g., when you start and stop your sequencer/DAW).

TAP

Stands for tap-tempo clock generator that receives 'taps' from a defined (or any) MIDI note and generates a stable continuous 1 ms +5V clock of that rate. ***Three consequent taps are enough to lock the clock to the new tempo*** (for example when you want to adjust to the tempo of a drummer having a live performance or to generate your own clock). Different divisions and multiplications are possible. For example you may use the multiplied by 24 TAP clock to define the tempo of your analog drum machine and use flipflop notes to send start/stop functions for it—and that's only the tip of the iceberg.

After a few manual taps have set the clock's frequency, you may even disconnect your USB-MIDI device while leaving the whole system powered and the clock signal will remain constant until new taps will arrive. Same is applied to all built-in generators or CC/velocity/note voltages—after host USB MIDI device's disconnection, they will continue to generate the last defined frequency/voltage until the SHUTTLE CONTROL will be turned off, or receive new data.

TAP LFO *(square/spike/triangle/sine/saw rising/saw falling)*

Is a mixture of 'Tap' clock and 'LFO'—instead of generating a clock, SHUTTLE CONTROL generates an LFO of a certain waveform in the rate, which is set by a three (or more) consequent taps. For your convenience these taps may be assigned to a certain or any MIDI note.

TAP FIBONACCI

Is the same as the 'Tap' clock generator (without any divider or multiplier). This algorythm only puts out the triggers with the numbers of the Fibonacci series (1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144 etc.).

TAP ODD/EVEN

Is same as the 'Tap' clock generator (without any divider or multiplier), and it only puts out odd or even taps (a clock that is divided by two). When using odd and even in combination, you may obtain interesting results.

FIXED CLOCK

Is just a fixed 1 ms clock output in BPM. Simply select the desired BPM in the 3rd dropdown menu. There are two options: either 47-172 BPM or 173-300 BPM. Now an independent generator serves a clock which rate cannot be modulated. You can use that fixed clock as a standard BPM if you don't plan to change it throughout your performance.

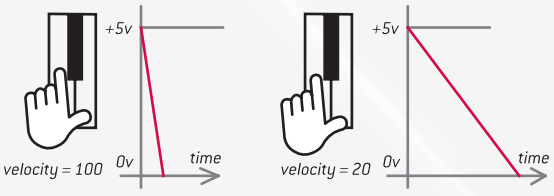
The only thing that may be altered is the shuffle of that clock and just as with the MIDI synchronization, for that purpose CC#48 is reserved. CC#48 value 0 corresponds to zero shuffle, CC#48 value 127 corresponds to maximum shuffle.

NOTE VOLTAGE

Is a fixed precise constant voltage that is continuously assigned to a certain CV output with a resolution of 1/12V (~0.083V per semitone). The list in the 3rd dropdown menu shows all 120 notes that can be derived from the 1V/Oct scale. All 'C' notes are round voltages values -5, -4, -3, -2, -1, 0, +1,+ 2, +3, +4 and +5V. You can use those voltages as precision scales, for example to tune or to offset your oscillator to a multiple of octaves/semitones.

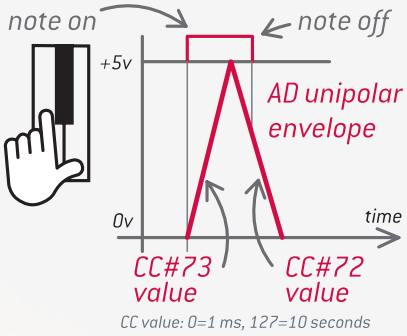
PULSER

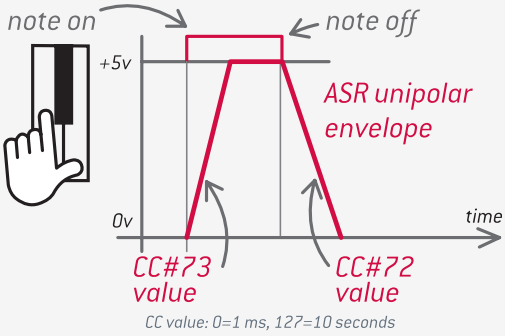
Is a Buchla model 208 Music Easel inspired simple ramp (envelope) generator with instant attack. When no note is played, the CV output is zero. After receiving a certain (or any) properly assigned MIDI note, the voltage jumps from 0V to +5V (instant attack) and then descends to 0V again. The velocity of the note controls the decay time of the Pulser envelope. The higher the velocity is, the shorter the decay and vice-versa (logarithmic velocity response). The decay time range starts from 1 ms and goes up to 10 seconds.



ENVELOPES

Are simple linear contour CV generators with adjustable attack and decay. Certain (standard General MIDI) CCs are reserved to control attack and decay time.





CC#73 is reserved for the envelope's attack and CC#72 reserved for the envelope's release/decay. The lower CC#72/#73 values are, the shorter the slope time is (logarithmic CC response).

'ENVELOPE ASR' stands for three stage Attack-Sustain-Release (ASR) generator. When a 'note on' is sent (by pressing a key of playing a MIDI file containing notes) and the attack phase reached the maximum of +5V, the envelope will be hold at the level of +5V until the 'note off' message arrives. Then the envelope starts the release stage and descends down to zero volts.

'ENVELOPE AD' represents for a two stage Attack-Decay generator model. Whenever a 'note on' message is sent, the slope starts rising. After the envelope reached its maximum of +5V it immediately starts to descend to zero volts again.

HINT: *The attack/release/decay time range starts from 1 ms and goes up to 10 seconds.*

PROBABILITY TRIGGER/GATE

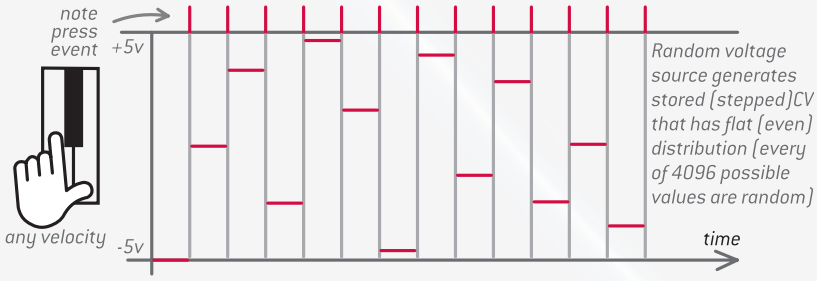
Are same as TRIGGER or GATE, just the probability of outputting a trigger/gate event is defined by velocity. That is useful to bring some randomness into launching certain notes. The higher velocity is – the higher the probability of that note event to happen. With zero velocity, no trigger/gate is generated. With velocity value of 127, the trigger/gate is always generated. With a velocity value of 63, the trigger/gate is generated in 50/50 percent of the cases. You may think of that type of generators as a single CC-controlled Bernoulli Gate (Branches module by Mutable Instruments).

VELOCITY TRIGGER/GATE

Are same as 'Trigger Note' or 'Gate Note': They just output triggers/gates of a certain (or any) MIDI note with the amplitude controlled by the velocity. At zero velocity there is no output (no trigger/gate). At velocity value 63, the amplitude is half of the trigger height (i.e. 2.5V in the unipolar version/0V in the bipolar version). At velocity value 127 the amplitude is 100% (+5V in both versions). That type of generator is useful for controlling devices that have electronic drum pad inputs such as Nord Drum (2) and work with 'stroke strength' triggers.

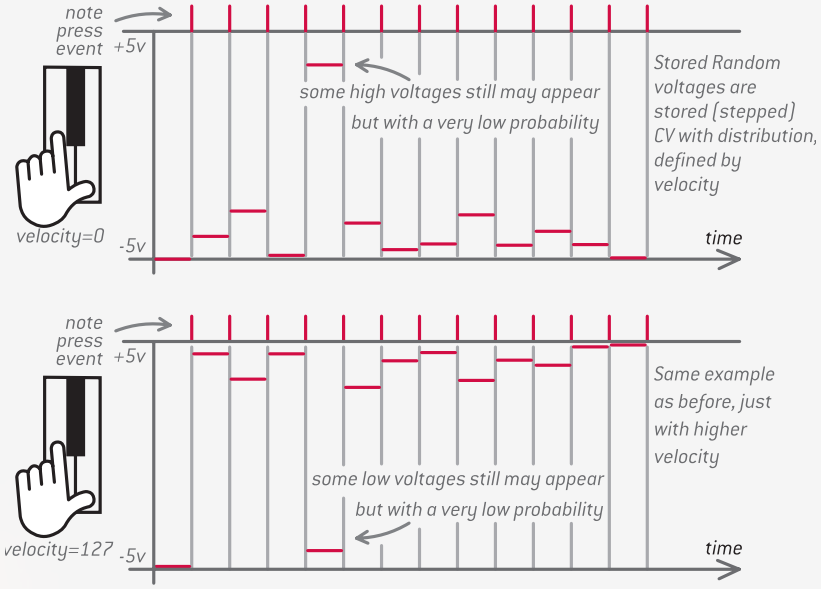
RANDOM VOLTAGE SOURCE

Provides stored, non-quantized random voltages with a flat distribution under a certain (or any) MIDI note event (no velocity control). Flat distribution means, that all states are equally likely, so high voltages are just as likely as low ones and everything inbetween. This type of generator is inspired by Buchla's model 165, 266 (flat stored distribution), as well as of the model 208 Music Easel random generator.



STORED RANDOM VOLTAGE

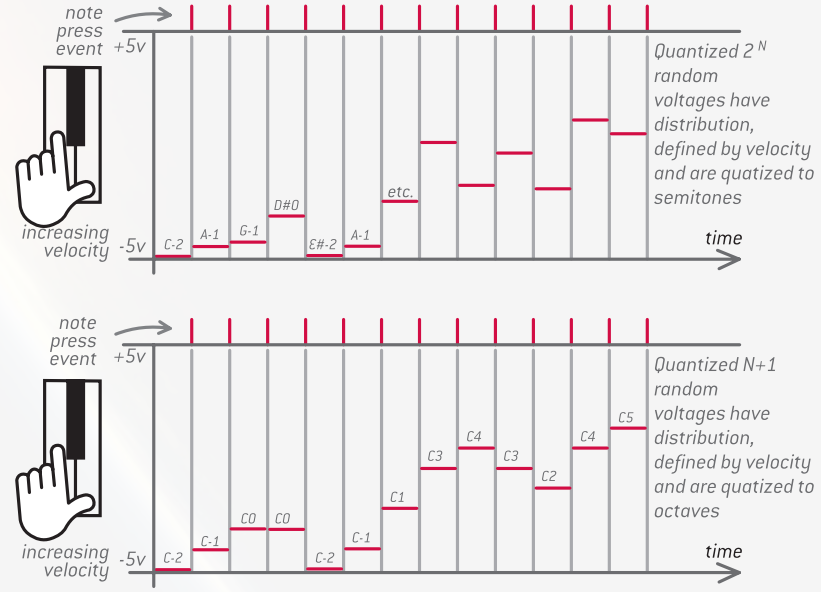
Provides stepped, non-quantized random voltages, the distribution of which is controlled by a certain (or any) MIDI note's velocity. This generator is inspired by Buchla's early model 265, as well as the later models 266 and 266e. With low velocity, most of the random voltages will appear with low magnitude (but even medium and high magnitude voltages may appear but with a much lower probability). The higher the velocity, the further the distribution moves through medium to high magnitude voltage probabilities.



QUANTIZED RANDOM VOLTAGES

Provide stepped voltage outputs based on a certain (or any) MIDI note and inspired by a Buchla model 266/266e Quantized Random Voltages. Those voltages are quantized: N+1 means it is quantized to octave intervals and 2^n to semitone intervals.

Velocity sets the number of possible random states: the higher the velocity, the more possible states may be sent from the assigned CV output.



PROGRAM CHANGE

Program Change numbers from 1 to 16 from any MIDI channel immediately change the preset on SHUTTLE CONTROL from 0 to F (according to 1-16). Program Change numbers 17 to 33 immediately change the preset from 0 to F (according 1-16) but at the same time retrieve a SysEx dump of that specific preset (sending it to both device & host USB-MIDI outputs).

BI-DIRECTIONAL USB-MIDI ROUTING

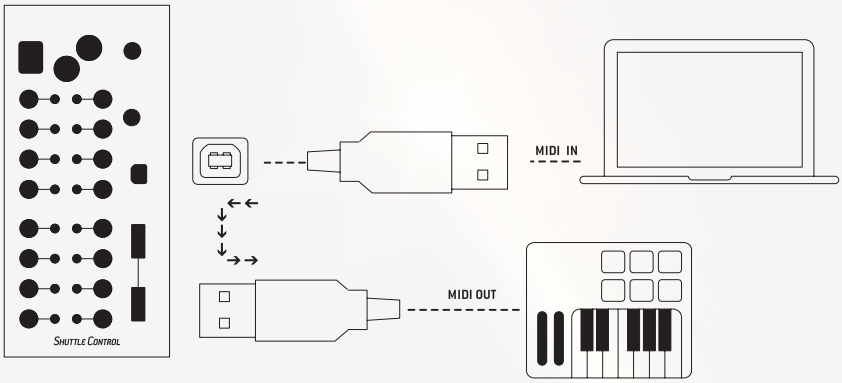
Is a host-to-device, device-to-host and host-in-to-host-out (host loopback) MIDI data transfer (including MIDI sync). All three modes can be turned on simultaneously or every independently, or none at all—just mind there is no MIDI feedback occurring.

You may play notes from USB-MIDI keyboard and besides outputting CV you may send all MIDI signals (or sync) into your DAW (PC/MAC/iOS) or vice versa. You may also return all sent MIDI signals from your MIDI keyboard to the same MIDI output that acts as a MIDI-THRU to chain to other MIDI devices. The SHUTTLE CONTROL module may become a bit warmer than before using that feature.

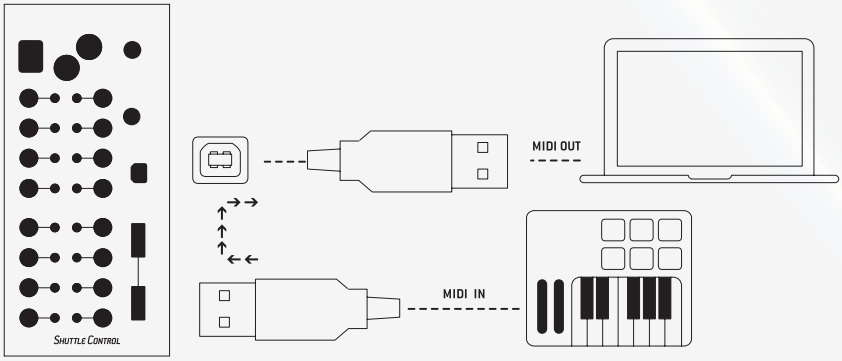
Having that flexible USB-MIDI routing, you can even stack or daisy-chain a few SHUTTLE CONTROLs to distribute MIDI signals and clocks* to a few modular systems.

* You have to enable appropriate checkbox (device>to-host or host>to-device in the Shuttle editor) for that configuration. However there might be a MIDI related issue: If you make a serial connection of a MIDI signal from one device to another and the chain of devices is too compex/long, then you may experience some instability of the MIDI clock—just as with any other MIDI gear because of the MIDI protocol. That's why we don't recomment to make long chains of devices in where each device receives clock and sends it to another device, but instead make a 'star'-alike routing of MIDI clock (onne device distributes to all others at the same time) so every device will receive a proper clock without any delay.

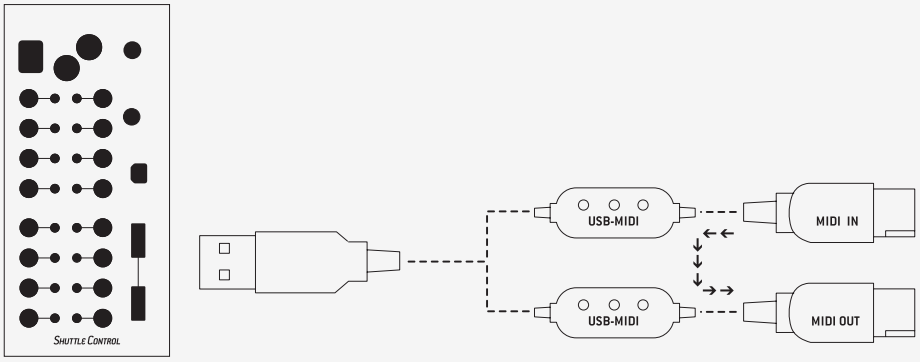
Route from device to host:



Route from host to device:



Route host loopback:

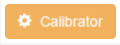


5. CALIBRATOR

Sometimes pitch CV voltages may deviate a few cents from their proper values. There is a built-in calibrator to enable SHUTTLE CONTROL's DAC correction.

You will need a voltmeter to read the values from all SHUTTLE CONTROL's jacks in case you feel its output pitch CV isn't linear enough (all C notes should correspond to all whole integer voltage amount: e.g., -3V, +4V, 0V etc).

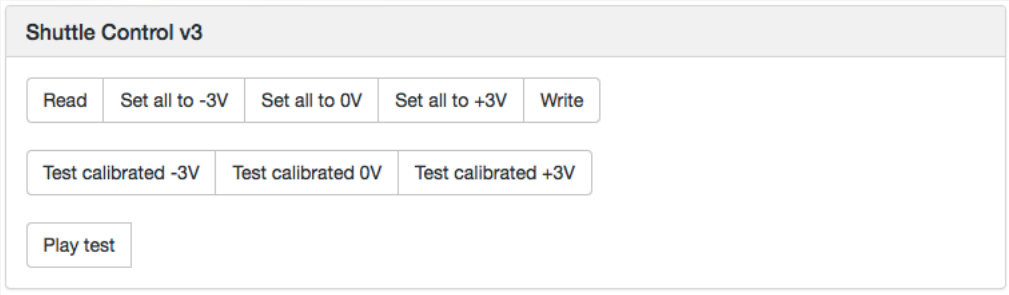
Tuning applies to all pitch CV outputs incl. 1, 1.2 v/oct, Hz/v as well as quantized random outputs. Almost any consumer voltmeter that can measure two decimals (i.e. 3.***00***V when putting the voltmeter in the 20V DC range) does the job.

The calibrator is accessible by pressing its button in the web editor. 

After you clicked the button, you will be redirected to another website/URL:

https://www.endorphin.es/cargo3/calibration.php

A set of buttons is used to—read, set, write and test—every CV output of the SHUTTLE CONTROL:



READ: *When you are using the calibration for the SHUTTLE CONTROL for the first time, there is no certain values to be read. If you calibrate SHUTTLE CONTROL after you already calibrated it in the past, press 'Read' and all adjusted CV values are shown in the tables below the button.*

Now press ***'Set all to -3V/0V/+3V'*** one by one, and each time measure the CV outputs value with the voltmeter and enter it into the table (this will be a total of 3 x 16 measurements).

All values should be entered in millivolts (three decimals after integer but without decimal point).

- at ***-3V*** if multi-meter reads -2.99V, then enter '-2990'.

- at ***0V*** if multi-meter reads -0.01V, then enter '-0010' or if it shows 0.02V, then enter '0020'

- at ***+3V*** if multi-meter reads 3.01V, then enter '3010',

Afterwards press the ***'Write'*** button to record the adjusted values. You will see a 'C' symbol on the display for 1 second—that means the calibrated values are saved.

Afterwards you may press the ***'Test calibrated -3V, 0V, +3V'*** buttons to see if the calibrated values show exactly what you expect (-3V, 0V, +3V) by checking them with the voltmeter.

If the desired values deviate only a bit from what you expect (e.g., +2.99V and not +3.00V), then you write a smaller value (decrease for '0001') in the specific cell of the calibrator table, press 'Write' again, and then press 'Text calibrated +3V' again.

Measure it again, and it should be your exact value. When every 'Test calibrated -3V, 0V, +3V' values match your measurements exactly, you can exit the calibrator and change one preset on the SHUTTLE CONTROL to another by using the 'up' or 'down' buttons on the module. The calibration is permanently stored—also while power is off and when restarted, uploading new presets also don't alter the calibration.

However the calibration is erased during firmware updates and therefore needs to be repeated after updating.

PLAY TEST NOTES – SET UP THE SPREAD OF OSCILLATOR

Switch to a normal preset first to use the test note player after the calibration procedure—make sure you have at least one pitch signal assigned to a CV output.

By pressing the 'Play test' button, the SHUTTLE CONTROL continuously plays a sequence of 5 upcoming 'C' notes (quantized to octaves whole integer voltages) so you can tune the spread of your oscillator to a proper 1V/Oct scale. Simply connect a tuner to one of the outputs of your oscillator—preferably sine/triangle/saw output.

6. MIDI IMPLEMENTATION CHART

Model: Endorphin.es SHUTTLE CONTROL v3

Most recent firmware update 13/02/2017

Function	Rx	Tx	Remarks
MIDI channel	1-16, OMNI	X	
Bank select	0	0	
Note numbers	notes #0 ... #120		120 midi notes, 10 octaves in total with 1V/Oct scale
Program Change	X	X	Program numbers 1 to 16 from any MIDI channel immediately change the preset on SHUTTLE CONTROL from 0 to F (according 1-16). Program numbers 17 to 33 immediately change the preset from 0 to F (according 1-16) but also retrieve a SysEx dump of that preset at the same time (to both device & host USB-MIDI outputs)
Velocity: Note On	X		Controls multiple generator's parameters
Note Off	X		Zero note on message recognized same as note off
All notes off	X		
Channel aftertouch	X, 1-16, OMNI		
Key (poly) aftertouch	X, notes #0 ... #120		
Pitch bend	X, 1-16, OMNI		12 bit data
Control Change	CC #0 ... #127		CC#5 reserved for modulating 'portamento time' in monophonic mode
CC#48 reserved for the shuffle of fixed clock and MIDI clocks.	X		Presets dumps upload only
CC#49 reserved for the shuffle of all TAP generated clocks	0		
CC#64 reserved for sustain (pedal) of certain Gate outputs: 0 to 63 = Off, 64 to 127 = On	X		with defined division/ multiplication of ppqn
CC#73 reserved for envelope's attack and CC#72 is reserved for the envelope's release/decay in envelope ASR/AD generators.	X		Start/continue are defined as Gate On, and stop is defined as Gate off
Manufacturer System Exclusive	X	X	Presets dumps upload and retrieve (see program change)
NRPN/RPN	0	0	
MIDI Clock	X	X	defined division/ multiplication of PPQN
Start/Continue/Stop	X		Start/Continue defined as Gate On, and Stop is defined as Gate off. Separate Start, Continue, Stop triggers.

X: yes 0: no

All the rest unstated parameters may refer to no

7. FIRMWARE UPDATE

We at Endorphin.es do our best to present the devices to our customers fully tested and without any bugs. As the SHUTTLE CONTROL is such a multi-functional device it may obtain some new features in later firmware revisions as well as stability improvement or fixed bugs. You may update to the latest firmware via USB yourself. Check all the details and the latest update links/manuals at: ***http://firmware.endorphin.es***

In case such update will be required or be available—we will get you notified via our FB channel and our website with detailed instructions.

8. SHUTTLE CONTROL PSU CHOICE HELPER

Here is an approximate list of PSUs you may power up your SHUTTLE CONTROL with.

Approximate means that the SHUTTLE CONTROL will work with literally any AC–DC adapter, that delivers 12-20V with 4A or more current, equivalent to ff50 Watt (60-70W of power is recommended). The more is better. Less isn't good for powering a whole row of modules, or even more—also keep in mind, that the power consumption of modules a quite different and therefore '5 modules to be powered' may mean totally different power consumptions depending on what modules you put in your rack.

You may choose the AC–DC power adapter on your own, just follow the criteria:

1. *Adapter must be AC to DC, i.e. converting AC voltage from the wall outlet (100-240v) into DC voltage (12-20V).*
2. *Output voltage range may be from 12 to 20 volts. 12V is the optimal and the most widespread.*
3. *Output current/power: 36 Watt or 3 Amperes and more. 60-70 Watt (5-6 Amperes is strongly recommended).*
4. *Output DC barrel (DC Output Connector) should be 2.5 mm inside diameter/5.5 mm outside diameter. SHUTTLE CONTROLs with S/N 247 and higher support both/universal 2.1mm or 2.5 mm inside diameter DC connectors. Otherwise, 2.1 mm barrel will fit via an adapter—see the links in the end of the PSU recommendations).*

AMAZON (USA)

https://www.amazon.com/Coming-Data-Adapter-Connector-Certified/dp/B01C6BLDAG/ref=sr_1_1?s=electronics&ie=UTF8&qid=1487199996&sr=1-1-spons&keywords=12v+5a+power+supply+2.5mm&psc=1

https://www.amazon.com/Rosefray-Adapter-S2440Lb-Monitor-Charger/dp/B011HMTS4S/ref=sr_1_2?s=electronics&ie=UTF8&qid=1487199996&sr=1-2-spons&keywords=12v+5a+power+supply+2.5mm&psc=1

https://www.amazon.com/Selectec-12-Volt-Power-Supply/dp/B009ZZY28M/ref=sr_1_2?s=electronics&ie=UTF8&qid=1487200047&sr=1-2&keywords=12v+6a+power+supply+2.5mm

https://www.amazon.com/T-Power-adapter-Turnigy-Accucel-Lipo/dp/B00CJ260SY/ref=sr_1_12?s=electronics&ie=UTF8&qid=1487200047&sr=1-12&keywords=12v+6a+power+supply+2.5mm

RAPID ONLINE (UK)

https://www.rapidonline.com/Electrical-Power/PowerPax-UK-SW3783-Power-Pax-UK-Desktop-Power-Supply-Switch-Mode-PSU-12VDC-5A-85-3080

https://www.rapidonline.com/powerpax-sw4380-c-12vdc-5a-c14-to-2-5mm-85-2919

MOUSER (USA, Worldwide)

http://eu.mouser.com/ProductDetail/Mean-Well/GSM90A-12-P1M/?qs=sGAEpiMZZMs1jjUfAXmXyp%252b6FR1IOHCm6xxQ5IkF2wtGD7KdXzx6DA%3d%3d

http://eu.mouser.com/ProductDetail/Cincon/TRH70A120-12E01-Level-VI/?qs=sGAEpiMZZMs1jjUfAXmXyrFWf%2fJhuYWUTVfcrivTg9RBXkGiW6d1Dw%3d%3d

CONRAD (EU)

https://www.conrad.at/de/notebook-netzteil-akyga-ak-nd-28-72-w-12-v-60-a-1456019.html

TME (EU)

http://www.tme.eu/en/katalog/?art=GS90A12-P1M

http://www.tme.eu/en/katalog/?art=AC%2FDC-CL-DT12%2F7

Apparently, you may use also PSU with 2.1mm DC jack barrel (sometimes easier to find), however you may need an adaptor that accepts 2.1/5.5mm plug and has 2.5/5.5mm output plug:

https://www.amazon.com/Barrel-Converter-2-1mm-5-5mm-2-5mm/dp/B009AZSN14

https://www.amazon.com/5-5mm-2-5mm-2-1mm-Female-Adapter/dp/B00MJU7NF0/ref=sr_1_1?s=pc&ie=UTF8&qid=1448122246&sr=1-1&keywords=2.1+x+5.5+2.5

http://uk.farnell.com/pro-power/jr1833/adaptor-dc-power-2-1mm-2-5mm-plug/dp/2494901

http://www.maplin.co.uk/p/maplin-25mm-plug-to-21mm-socket-dc-power-plug-adapter-l51ay

https://www.rapidonline.com/Cables-Connectors/BKL-072129-Low-Voltage-Adaptor-2-1-5-5mm-Plug-to-2-1-3-5mm-Jack-Socket-Mono-54-5094?sourceRefKey=6u49Bzhsb&filterSearchScope=1

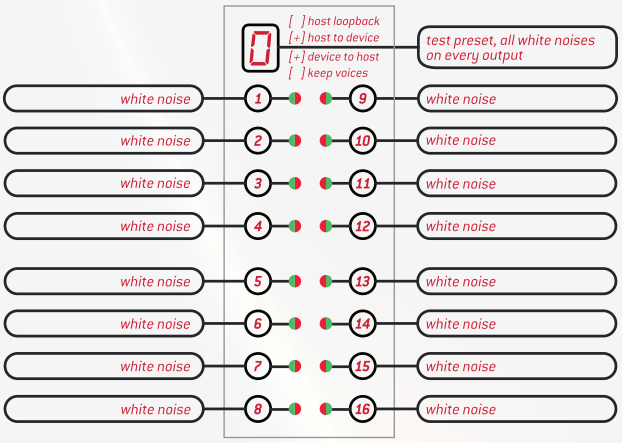
List of confirmed devices that will work (or work under certain conditions or not work at all) with Shuttle Control.

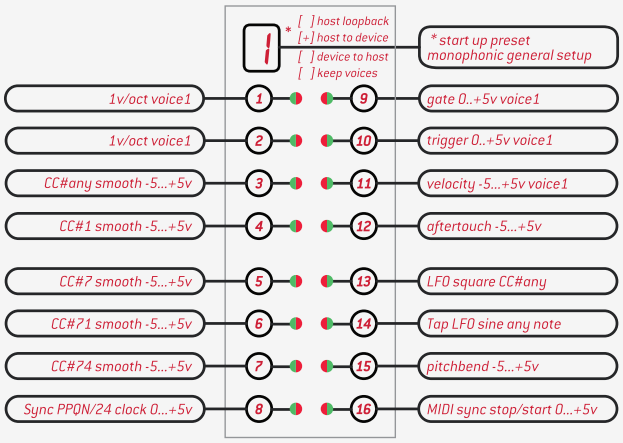
- any chinese generic USB-MIDI adapter from Ebay/Amazon
- Akai MPK/LPK series
- Novation all MIDI keyboards, incl. Bass Station 2 (powering, MIDI, clock)
- Keith McMillen QuNexus (micro USB connecton, not MIDI expander socket)
- Roland A-49 / A-500 Pro series – MIDI + power
- Roli Seaboard all – MIDI + power + key aftertouch
- Teenage Engineering OP-1 – MIDI + power
- Elektron TM-1
- Korg Nano- and Tactile series – all
- M-audio Keystations/Axiom/Oxygen/Code – all
- IK Multimedia Irigs – all
- Alesis Q-series – all

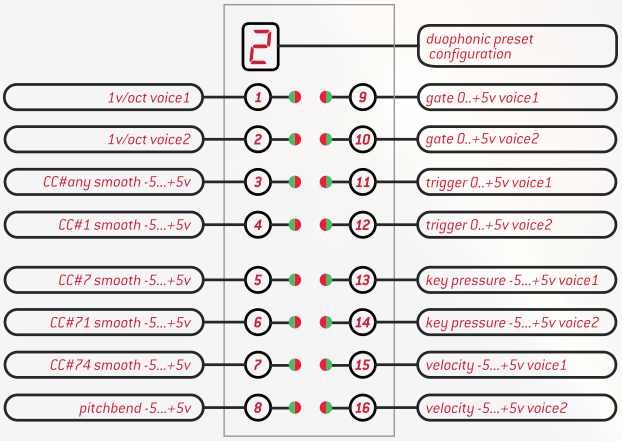
- *Roland A-49 keyboard – works, but has to be switched into USB-MIDI compliant mode: http://cdn.roland.com/assets/media/pdf/A-49_I_iPad_e02_W.pdf*
- *Squarp Pyramid – works if Shuttle control and Pyramid are boot at the same time (via USB). Pyramid needs to be fully booted before the Shuttle Control finishes initializing, then it works fine. If the Pyramid gets unplugged or turned off, it no longer functions (working Pyramid cannot be hot-swapped in or turned on after the Shuttle Control has finished booting).*
- *iConnectMIDI2+/4+ or audio interfaces with USB-MIDI – reported that not work so far.*

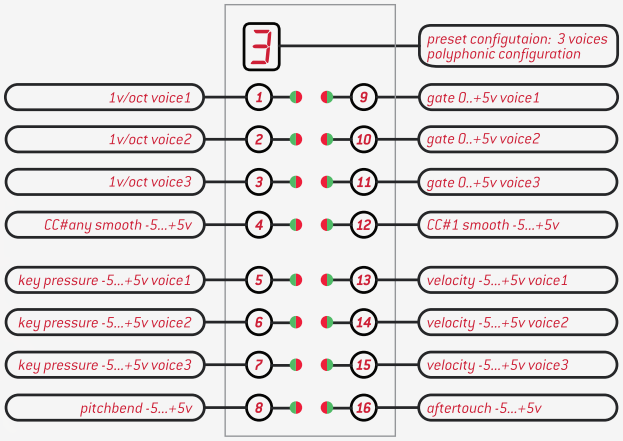
The characteristics of the product described are subject to change without notice.

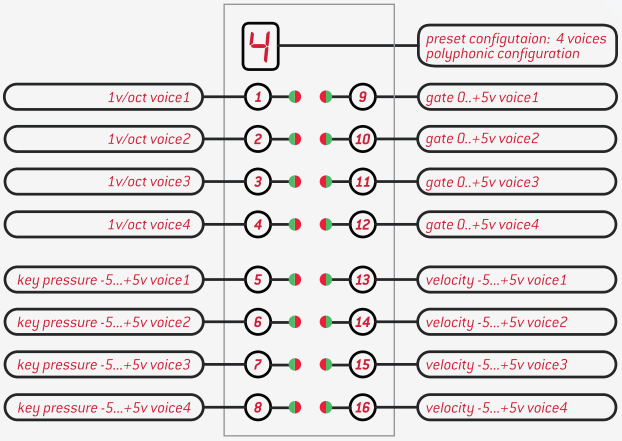
SHUTTLE CONTROL V.3 FACTORY PRESETS 0-7 CHEAT SHEET

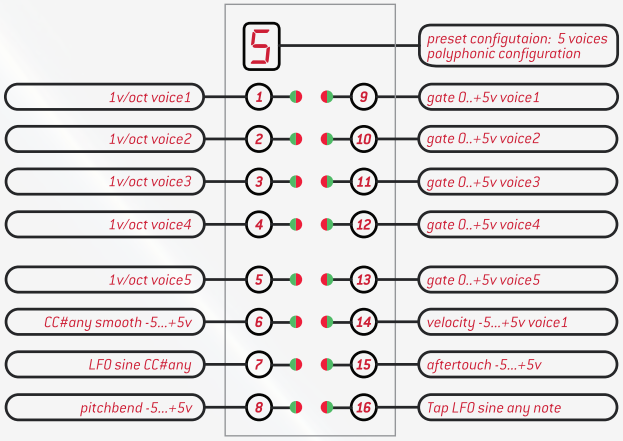


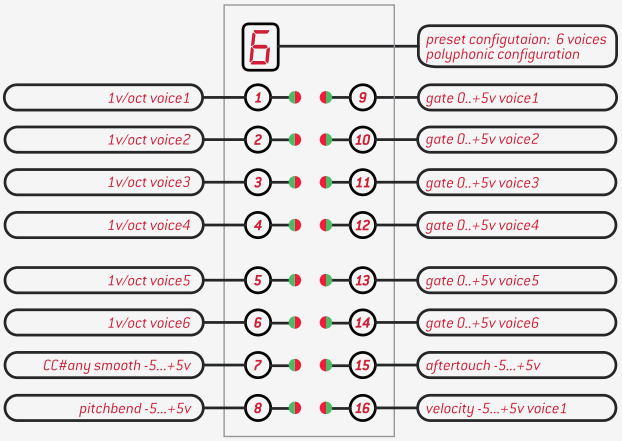


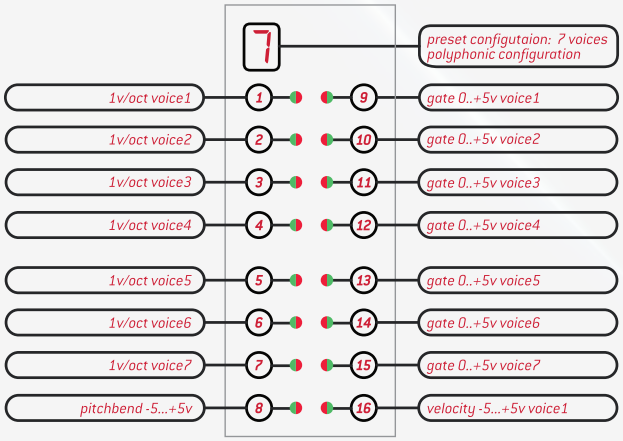












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SHUTTLE CONTROL V.3 FACTORY PRESETS 8-F CHEAT SHEET

8

preset configutaion: 8 voices polyphonic configuration

1v/oct voice1	1	9	gate 0..+5v voice1
1v/oct voice2	2	10	gate 0..+5v voice2
1v/oct voice3	3	11	gate 0..+5v voice3
1v/oct voice4	4	12	gate 0..+5v voice4
1v/oct voice5	5	13	gate 0..+5v voice5
1v/oct voice6	6	14	gate 0..+5v voice6
1v/oct voice7	7	15	gate 0..+5v voice7
1v/oct voice8	8	16	gate 0..+5v voice8

9

preset configutaion: Hz/volt monophonic setup

hz/volt voice1	1	9	s-trig +5...0v voice1
hz/volt voice1	2	10	trigger 0..+5v voice1
CC#any smooth 0...+5v	3	11	gate 0..+5v voice1
CC#1 smooth 0...+5v	4	12	velocity 0...+5v voice1
CC#7 smooth 0...+5v	5	13	aftertouch 0...+5v
CC#71 smooth 0...+5v	6	14	LFO sine CC#any
CC#74 smooth 0...+5v	7	15	pitchbend -5...+5v
Sync PPQN/6 clock 0...+5V	8	16	MIDI sync stop/start 0...+5V

A

Buchla 1.2v/oct configutaion for mono-phonic setup

1.2v/oct voice1	1	9	gate 0..+5v voice1
1.2v/oct voice1	2	10	trigger 0..+5v voice1
CC#any smooth -5...+5v	3	11	velocity 0...+5v voice1
CC#1 smooth -5...+5v	4	12	aftertouch 0...+5v
CC#7 smooth -5...+5v	5	13	LFO square CC#any
CC#71 smooth -5...+5v	6	14	Tap LFO fluctuating any note
CC#74 smooth -5...+5v	7	15	pitchbend -5...+5v
Sync PPQN/6 clock 0...+5v	8	16	MIDI sync stop/start 0...+5V

b

Buchla 1.2v/oct configutaion for duo-phonic setup

1v/oct voice1	1	9	probability gate 0...+5v
1.2v/oct voice1	2	10	probability trigger 0...+5v
CC#any smooth 0...+5v	3	11	velocity 0...+5v voice1
quantized N+1 random 0...+5v	4	12	aftertouch 0...+5v
quantized 2^N random 0...+5v	5	13	LFO fluctuating CC#any
random flat distribut. 0...+5v	6	14	Tap clock Fibonacci Note any
stored random vel. distr 0...+5v	7	15	pitchbend -5...+5v
Sync PPQN/24 clock 0...+5v	8	16	MIDI sync stop/start 0...+5V

C

[ ] host loopback
[+] host to device
[ ] device to host
[ ] keep voices

two channels play preset: from ch1 & ch2

1v/oct voice1 channel 1	1	9	1v/oct voice1 channel 2
gate 0..+5v voice 1 channel 1	2	10	gate 0..+5v voice 1 channel 1
trig 0..+5v voice1 channel 1	3	11	trig 0..+5v voice1 channel 2
velocity -5...+5v voice1 ch1	4	12	velocity -5...+5v voice1 ch2
aftertouch -5...+5v channel 1	5	13	aftertouch -5...+5v channel 2
CC#1 smooth -5...+5v ch 1	6	14	CC#1 smooth -5...+5v ch 2
CC#7 smooth -5...+5v ch 1	7	15	CC#7 smooth -5...+5v ch 2
Sync PPQN/24 clock 0...+5v	8	16	MIDI sync stop/start 0...+5v

d

drum mapping preset: 7 drum triggers with velocity each

trigger note C3 0...+5v	1	9	velocity note C3 -5...+5v
trigger note D3 0...+5v	2	10	velocity note D3 -5...+5v
trigger note E3 0...+5v	3	11	velocity note E3 -5...+5v
trigger note F3 0...+5v	4	12	velocity note F3 -5...+5v
trigger note G3 0...+5v	5	13	velocity note G3 -5...+5v
trigger note A3 0...+5v	6	14	velocity note A3 -5...+5v
trigger note B3 0...+5v	7	15	velocity note B3 -5...+5v
Sync PPQN clock 0...+5v	8	16	MIDI sync stop/start 0...+5v

E

MIDI syncronization possibilities preset

Sync PPQN/128 clock 0...+5V	1	9	Sync PPQN/64 clock 0...+5V
Sync PPQN/48 clock 0...+5V	2	10	Sync PPQN/32 clock 0...+5V
Sync PPQN/24 clock 0...+5V	3	11	Sync PPQN/16 clock 0...+5V
Sync PPQN/12 clock 0...+5V	4	12	Sync PPQN/8 clock 0...+5V
Sync PPQN/6 clock 0...+5V	5	13	Sync PPQN/5 clock 0...+5V
Sync PPQN/4 clock 0...+5V	6	14	Sync PPQN/3 clock 0...+5V
Sync PPQN/2 clock 0...+5V	7	15	Sync PPQN*2 clock 0...+5V
Sync PPQN clock 0...+5V	8	16	MIDI sync stop/start 0...+5V

F

tap madness preset from any MIDI note (3 and more taps)

tap*2 any note 0...+5v	1	9	original tap any note 0...+5v
tap*3 any note 0...+5v	2	10	Tap LFO square any note
tap*4 any note 0...+5v	3	11	Tap LFO sine any note
tap*5 any note 0...+5v	4	12	Tap LFO saw rising any note
tap/2 any note 0...+5v	5	13	Tap LFO saw falling any note
tap/3 any note 0...+5v	6	14	Tap LFO triangle any note
tap/4 any note 0...+5v	7	15	Tap LFO fluctuating any note
tap/5 any note 0...+5v	8	16	Tap LFO S&H any note

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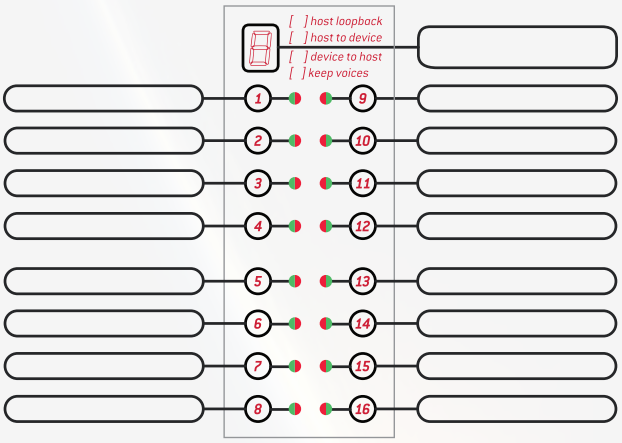
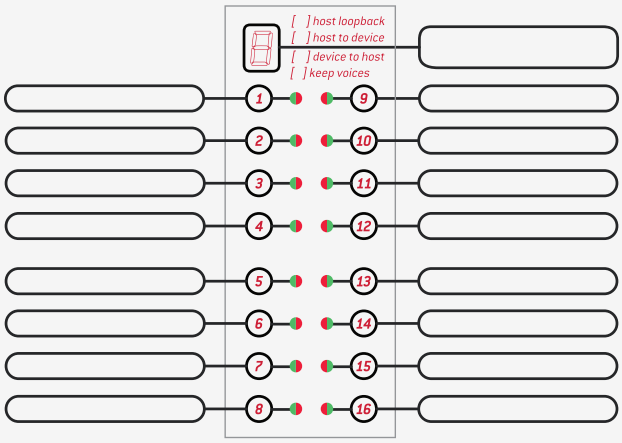
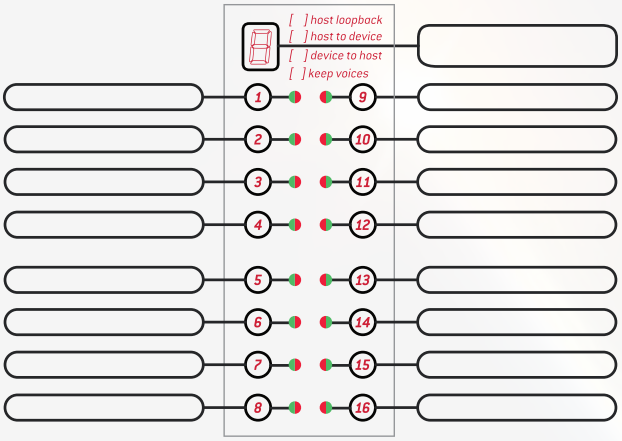
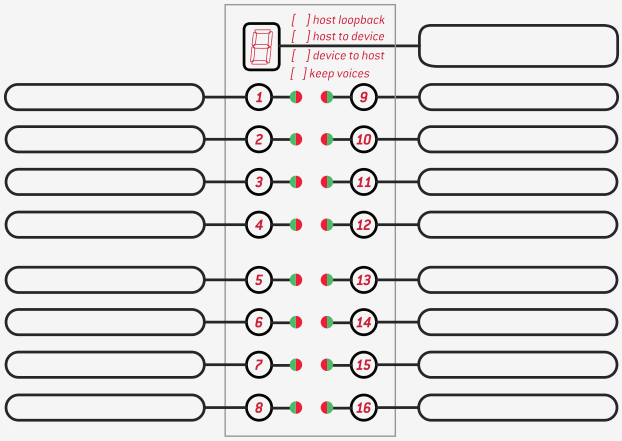
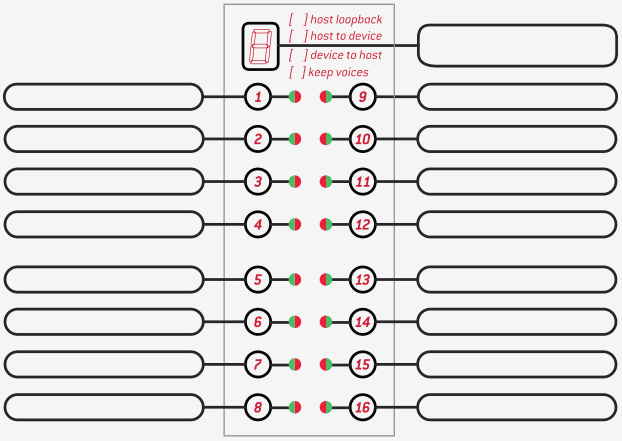
SHUTTLE CONTROL V.3 EMPTY PRESETS CHEAT SHEET

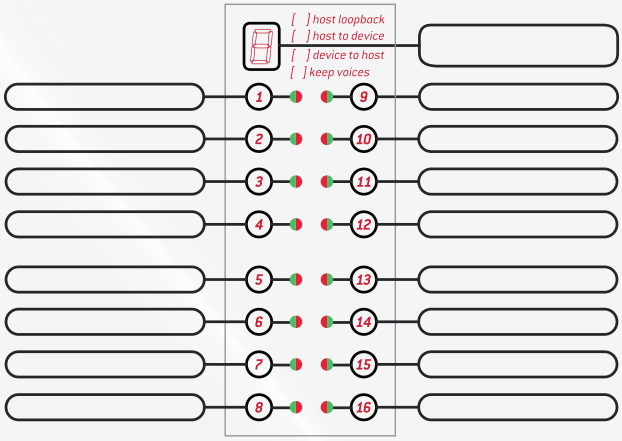


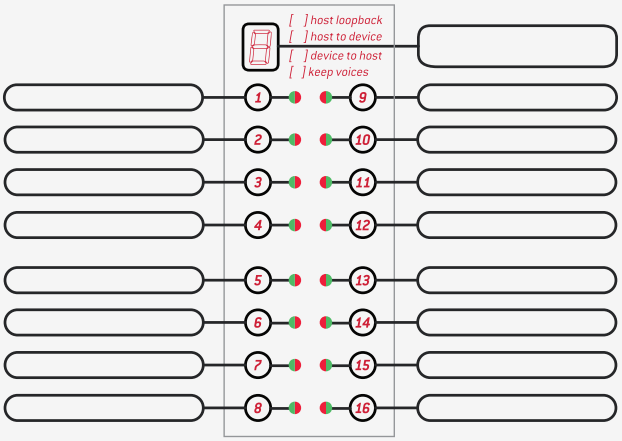


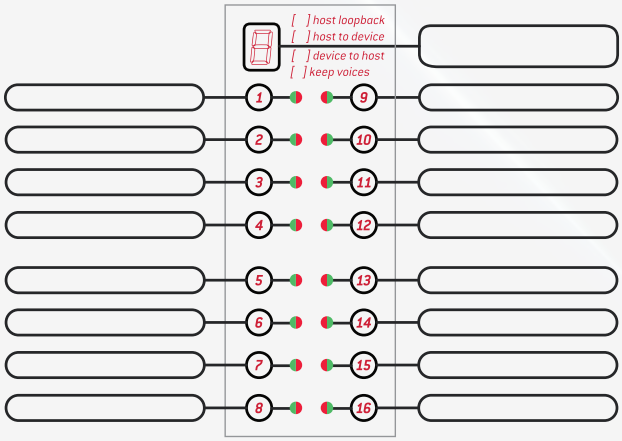












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