Wiard 300 tips and tricks

De Modules Notes

Wiard 300 Tips and Tricks

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Ed Note: this is a collection of tips and tricks for the Wiard 300 series
modules, culled from the Yahoo group archives. They are presented in
randomorder; the file is updated at the TOP as I discover new material.

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Grant: Mixolator as switch:

One request I frequently get is a switch module. The Mixolator will
already behave like the ARP 2600 switch. Just drive the Z input with a 0
or 10 volt signal and use X and Y as your inputs. It just doesn't have the
horrendous thumping of the ARP 2600 version.

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A patch from Liquidcolor (Michael Ford)

The Classic VCO is in low mode and acting as the main clock. The noise out
goes to 1/2 of the Envelator (whacking fc1 and qmod on the filter) and
also to the stage select input of the sequantizer. Sequantizer out goes
into 1v on WFC and seq 10v goes out to WFC wave envelope in. Waveform city
is set to bank 2, the input to the non-linear generator is the WGC sine.

The second half of the envelator is being clocked from the freq divided
VCO pulse, and the env out is sent to FC2 on the filter, the mixolator
(vca) #1 and fc2 on the WFC. The sqr out of envelope #2 is sent to gate in
on the WFC.

All in all, there's 27 patch cords in total, but I think that's the main
guts of the thing.

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Norman Fay - Sequantizer and Borg 1 complete synth voice.

The other week, I was amazed to discover something which is probably
obvious to a lot of you. Patching the Sequantiser and the dual borg
together to get a basic, but complete sequencer/synth combination! Only a
few patchcords too:

VCLFO1 square out -> Sequantizer Clock
VCLFO1 Saw out -> cutoff mod on *both* filters
VCLFO2 saw or square out -> filter 1 in
filter 1 out -> filter 2 in
filter 2 out -> mixer
sequantize out -> VCLFO2 1v/oct in
VCLFO1 = 3D low range
VCLFO2 = 3D high range

Right? VCLFO1's square wave is yr sequencer clock pulse, whilst its
saw wave acts like a preset approx. gen for borg filter 1 (set up as VCF to
your taste) and borg filter 2, which you set up as a VCA - IE full mod
depth, LP mode, no resonance. VCLFO 2 acts as yr audio oscillator, with
its pitch controlled by the sequantiser. So much fun & functionality
from 2 modules! Who else's gear can do this?

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Grant Richter: Spatial Positioning in multi-chanel systems

The Mixolator module can be used as two simultaneous pan units. These can
feed the left and right channels (for front and rear) in a 4 channel
quadraphonic setup or 5.1 system.

Another Mixolator panner can be used to pan between front and rear.

The combination of the two modules allows quadraphonic panning under
voltage control. Route the Joystick X axis to both Mixolator ZMOD inputs
for left and right positioning front and rear. Route the Joystick Y axis
to ZMOD input on the mixolator panning between the front and rear LR
panners.

The VCA mode in the Borg filter is a 6 dB/octave filter/attenuator that
mimics the acoustic effect of approaching and receding sound sources
(Thanks to Don Buchla of course). Using a sumer and the triangle wave
function in the Waveform City, you can make a "dome generator" which will
automatically fade in the sound as it approaches the center and fade out
the sound towards the corner joystick positions.

Use some of the "dome" signal to shift the pitch of the oscillator to
mimic doppler shifting (pitch shift up approaching, pitch shift down
receding). You can also use the "dome" signal with the remaining Mixolator
section to control the amount of reverberation, distant sound sources have
more reverberation than nearby sound sources, so crossfade to the
reverberated signal towards the joystick corners.

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mrboningen: a compressor patch based on the Borg 2

* 10v p/p sound source to be compressed into a multiple
* multiple out to a) borg2 audio input b) serge/bananalogue vcs input
* vcs out to inverter (i use a serge 3p)
* inverter out to borg2 cv input
* borg out to amp/mixer/speaker

notes:

1) the sound source needs to be 10v p/p or it won't "kick" the
compressor enough, so you will need a preamp after the sound source if
it is low level (i first used a bass guitar into the blacet i/o module)

2) the borg2 needs to be set to vca/low pass gate mode, freq. at max
and cv in at max (the inverted envelope pulls DOWN the low pass gate)

3) the vcs is acting as an envelope follower, but the beauty of this
module is that you have separate control of the attack and release
time (which go from microseconds to minutes!), and they are both
voltage controllable! i set the attack at minimum first, the decay
at maximum, then slowly bring the decay down until I hear the
pumping/breathing/obvious compression characteristic i want, then
slowly increase the attack until i get the right mix of naturalness
and compressed sound. the second beautiful thing is that you can
individually set the attack and decay to be linear, logarithmic or
exponential for a very wide variety of compression characteristics.

interesting variation: turn the borg2 filter response pot from lp to
hp for crazy high pass frequency compression!

i have come across some AMAZING sounds with this patch this evening. i
could get great bass guitar compression and heavenly acid lines. i
will try it on drums at a later stage.

other things to try:
1) use a wiard boogie or another type of low pass gate for a different
sound
2) incorporate some kind of voltage controlled feedback or feedforward
(would need more mults and mixers)

final note:
i first attempted it with a "normal" linear vca instead of the borg 2,
and the blacet i/o envelope follower instead of the vcs, but it wasn't
nearly as versatile or nice sounding!

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Grant: Wogglebug clocking tips

The sample and hold (stepped) output can be clocked by an external clock.

The LFO rate only vaguely relates to the smooth output, so synch would not
mean anything.

The “Disturb Voltage” inputs allow you to trigger a single “Woogle” event,
in time with a keyboard or sequencer (with internal LFO set to longest
missed). The "Woggle Time" control will control the decay time of the event.

The internal LFO rate can be controlled by an external control voltage.

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Grant: More Wogglebug tips

The "Woggle CV" output jack can produce audio rate tones when the "Woggle
Time" setting is small or zero.

At small settings of "Woggle Time", the Woggle CV ouput produces a
decaying sinusoid in the audible range. If you lowpass filter it, you can
get the plucked bass tones heard in the original Woggle Bug demo.

At zero settings, the Woggle CV will oscillate strangely and produce harshne
tones which vary with the settings of the other controls.

So the Woggle CV outputs at some settings can be used as the 9th and 10th
audio outputs from the module.

The correspondence between the Model 265 Source of Uncertainty functions
and the identical Woggle Bug functions:

265 SOU label Woggle Bug label

Random Voltage Outputs Smooth CVs
Probable Rate of Change controls LFO Rate controls
Pob. Rate of Change Ext. jack Rate input jack
Stored Random Voltage Outputs Step CVs
Pulse Inputs Step CV Clock inputs
Correlation Controls Clustering controls

The original Model 265 Source of Uncertainty functions are all present and
identical in the Woggle Bug but have been enhanced by the addition of:

Smooth Range
Woggle Range
Woggle Time
Out 1 and 2
Disturb CV 1 and 2
Child Tones 3 and 4
LFO outputs
Smooth tone outputs
Woggled Tone outputs
Woggled CV outputs

More info on the original Model 265 Source of Uncertainty module is at:

http://www.musicsynthesizer.com/Buchla/source_of_uncertainty.htm

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Norman Fay: Favorite Wogglebug patch

There's something weirdly compelling about woggle bug noises. My
favorite patch is to feed the primary output into a borg filter set to
lowpass mode, clock an envelope from the clock out of one of them, set it
for the short transient response, and use it to control the cutoff freq of
the filter. I then take one of the CV outs from the woggle bug, mitigate
it somewhat, and use it to control the envelope decay time. Then finally,
take the smooth CV out of Wbug ch1, and plug it into the rate in of ch2.
And of course, ch2 smooth CV out to CH1 rate in. You have to attenuate
these, as the thing goes completely nuts otherwise. I then record the
result twice, pan them wide and add loads of echo. I could listen to it
for hours.

A good trick with the wogglebug woggled noise, which can be somewhat
overpowering, is to feed it through a high pass filter before low pass
filtering it. Turning the resonance of the HP filter up and then
controlling its cutoff freq with a smooth CV out makes some pretty cool
noises as well.

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Plord: clocked Wogglebugs (audio file Wogno 1.mp3 posted to the files
section)

1. Tempo was controlled by using joystick 1 to adjust Wog2-R's rate.
2. All 8 audio outputs of Wog2 sent through a Metalbox Sequential Switch,
which is clocked by the LFO out of Wog2-R, through a Borg 1 filter and
shaped by a Bananalogue VCS.
3. LFO out of Wog2-R to a pulse divider also, /2 division to VCS trigger
above.
4. Joystick 2 controls the rate of Wog2-L, which actually ends up whacking
5 of the 8 tones being switched: Wog2-L main/smooth/woggled outs and both
child tones.
5. The high hat noise is just Wog1-L, clocked from a mix of the /2 pulse
division and some burst gen output, steeply high pass filtered with a Borg
II, no CV control at all.
6. The kick is Wog1-R, clocked off the /4 pulse division of the primary
clock, through the other half of the Borg 1, strongly shaped by another
VCS, resonance up.

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Grant: More Sequantizer tips (collected from 3 emails September 2007)

1. A slight voltage offset is normal at the Sequantizer quantizer output
jack. Just plug the
Sequantizer quantizer output into the VCO 1v/oct.
input and use the Sequantizer
transpose input like you would the VCO
1v/oct. input. The allows the Sequantizer to be used as a transpose unit
with a Keyboard. Tune the VCO after plugging into the Sequantizer.

2. One of the original ideas behind the Sequantizer is that you can leave it
permanently wired to the 1v/oct input of one or more VCOs. The keyboard or
other quantized source then plugs into the transpose input of the
Sequantizer. This is the same setup used by the ARP 1130(?) sequencer. You
can then transpose the keyboard or other source by an octave down, octave
up or into any key using a setting on the knobs.

For example, leave position one as "normal" with knob set to 0 volts and
no patch cords from Gate 1. For position 2 set the knob to zero and run a
patch cord from Gate 2 to the Oct + input. On position 3 set the knob to
zero and run a patchcord from Gate 3 to the Oct - input. We position 4 set
the knob to transpose a fifth. Then use the Select control knob or jack
to change transpositions. Position 2 moves the keyboard or sequence up an
octave, position 3 moves the keyboard or sequence down an octave and
position 4 transposes the keyboard or sequence up to a fifth.

The Gate controls can also change patches. You can have one patch
controlled by a keyboard or sequencer, and another patch controlled by the
same keyboard or sequencer. The Gate outputs can be used to switch which
patch goes to the output monitors. Using a crossfader, only a single gate
is needed to switch between the two patches. The Gates can also be used
for simple changes like switching from a slow attack to a fast one.

3. Using the transpose input of the Sequantizer will also allow you to add
portamento to keyboards which don't have it. Like some MIDI/CV converters.

Using a keyboard which DOES have portamento and sending it through a
quantizer like Bank 15 of the Waveform City or Mini-Wave, you can convert
a portamento to a glissando. The sliding control voltage will be quantized
along with the key control voltage steps. You may need to use a mixer
processor type module to add a 40 millivolt offset to the keyboard
voltages so they fall into the "middle" of the 83 millivolts "windows"
that the quantizer input has. This should minimize "dithering" when the
keyboard voltage is closed to a transition voltage.

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Doug Pearson: Explosions
1) On a Wogglebug, set:
The clock/LFO all the way up to the maximum rate.
Wogglebug main out -> Omni Filter in.

2) On one envelator, set:
AD response.
Attack very short (or minimum).
First +out to AMOD for exponential curve (turn the AMOD knob all the way up)
Second +out -> Omni Filter FC1.
Set release knob to taste for length of explosion.

3) On the Omni Filter, set:
LP mode.
Cutoff all the way down.
Resonance below self-oscillating, to taste.
Adjust FC1 knob to taste for "intensity" of explosion.
Using the 12dB out vs. the "main" outs will also give different explosive
flavors.

4) Gate the envelope with the button on your joystick controller.

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Mayce: Drum loop mangler
Try this, take a drum loop (you'll need to preamp it to an appropriate
level) and send it into the stage select in on the sequantizer.???Use the
output from 10v out on the sequantizer as your audio signal.?? Play around
with the various voltage levels of steps 1 through 8.?? Leads to something
chunky results. You can also try putting an audio source into the step in
to get weird modulation effects (thanks to Grant for this suggestion)

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Gino Robair: Wogglebug Solo!
Taking Grant's advice I patched Out1 and Out2 to separate channels, panned
hard left and right, sending both to a "tape delay" through Aux 1 (in this
case, the delay is a Hughes and Kettner Replex pedal, which BTW does a nice
job of emulating tape delay). Yup - instant sci-fi soundtrack.

For the first hour, I didn't even use a patch cord. The first "patch" setup
involved dial settings only. The result was a groovy sort of walking bass
sound with high crust on top. It took a bit of fidgeting with the settings
below to recreate the original sound, so bear with me if you don't get the
same results:
LFO Rate: 11:30
Smooth Range: 4:30-ish
Woggle Range: 5:00
Woggle Time: 8:30
Clustering: 2:00

Play with the Woggle Time control to find the bass timbre. One side of the
Bug was set up this way, while the other was taking the lead.

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Dr. Mabuce: Borg Filter self-running percussion
Patch cords:
1v/oct1 to mult
key fol1 to mult
mod1 to tri2
in1 to out2
tri1 to 1v/oct2
saw1 to mod2
sqr1 to in2
out1 to (amplifier)
key fol2 to sqr2
saw2 to mult

Switches:
Osc1 LOW
Osc2 LOW

Knobs: (positions given as clock hour-hand)
FREQ1 9:00
FREQ2 9:00
PEAK1 3:00
PEAK2 3:30
TYPE1 LP (7:00)
TYPE2 BP (12:00)
MOD1 5:00
MOD2 5:00
OSC1 2:00
OSC2 2:30

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Gino Robair: Borg self-running percussion
Semisporadic, quasi-unpredictable percussive sounds
For solo Borg module

Right Saw -> Left 1v/Oct
Right Tri -> Left Key Fol
Left Square -> Left In
Left Sort -> Right In
Left Saw -> Right 1V/Oct

Both Mod pots at full CCW
Both filter types HP
Adjust Freq, Peak, and Osc 1/2 tuning to taste as you play the patch.

****

Grant: Random Rhythmic Clock
The Oct+ and Oct- outputs [Ed note: Inputs? See patch below] from the
Sequantizer can be used to modulate the Classic VCO in fixed rhythm
intervals of half time and double time.

Classic VCO in low range (LFO).
Patch the Random output of the Classic VCO to the VCA IN1. Patch the
quantized output of the Sequantizer to the 1V/Oct input of the Classic VCO.
Reset the Sequntizer and set stage 1 to 0. The Sequantizer is not clocked
for this example, we are using just the transpose function. Take the VCA
output to either the Oct+ or Oct- input of the Sequantizer.

Advance the VCA gain, the VCO will start randomly alternating clock pulse
with exact half or double time pulses. The probability of the pulse is set
by the VCA gain. The input threshold of the Oct+ and Oct- inputs is around
1.5 volts, so not much gain is needed.

Another experiment:
Route the random output to a Mixolator X input and route the X and Y output
the Oct+ and Oct- inputs. Another signal can be used to control the Z input.
This will produce a mixture of normal, half and double time pulses as the
random voltage is broken between Oct+ and Oct-.

The clock pulses can be used to trigger an Envelator controlling the
Waveform City VCA. The random voltage can be used to control WaveCity pitch
and produce a random sequence with fixed rhythmic intervals.

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Grant: Noise Ring as external processor
1. Make sure the "Change" pot is all the way up (LED full on).
2. Input a VCO 10 volt peak to peak triangle or sawtooth wave into "Chance
jack.
3. Adjust "Chance" control so some LED signal is seen.
4. Monitor main output and play with VCO frequency and "Rate" setting.

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Chris: Sequantizer as Envelope Follower
drum loop into Borg filter in out to mixer
drum loop into Sequantizer step select
set the 8 steps on the sequantizer to slowly rise from 0 to 10 v.

Quantized output to borg filter mod in
(since slide only works off of the quantized output)

10v Seq output to Seq transpose input to transpose the quantized
output to the 10v range instead of a 1 oct range.

A little bit of slide to get rid of noticeable stepping.

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Mike Fisher: Vectrone
Classic VCO
Sine output to X2 of Mixolator #1
Pulse output to Y of Mixolator #2
Saw output to Y of Mixolator #1
PWM set all the way up; Pulse set at about 12o'clock

Sequantizer
10v output (non-quantized) to ENV input of WC
Steps 1-8 tuned to trigger different table points on WC

Dual Envelator
+Out of Envelope 1 to Zmod of Mixolator #1
--Out of Envelope 1 to multiple: to FC1 of Omni Filter, to PWM of Classic VC(
SQR out of Envelope 1 to Gate input of WC
END out of Envelope 1 to Multiple: to Sequantizer step input, to Gate of
Envelope 2
+Out of Envelope 2 to Zmod of Mixolator #2
Attack and Decay of Envelope 1 set about 10o'clock
Envelope 1 mode = cycle
Attack of Envelope 2 is set to full clockwise position
Decay of Envelope 2 is set to approximately 8o'clock
Envelope 2 mode = AD

Waveform City
VCA output to X1 of Mixolator 1
Wave knob set to full counter-clockwise position
ENV knob set to full clockwise position
Attack set to approximately 1 o'clock
Release set to approx 2o'clock
Synch set to approximately 1 o'clock
Bank 8 selected

Omni Filter
12db output to X1 of Mixolator 2
Coarse knob set to approx 1o'clock
FC1 set to approximately 3 o'clock
Mode = AP (All-pass)
Q set to approximately 1 o'clock
Add switch set to "On"

Dual Mixolator
X+ output from Mixolator 1 to IN1 of Omni Filter
X-output from Mixolator 2 to WC Synch input
X+ output from Mixolator 2 to amplifier, speaker, etc.
(this is the main output)

X1 of Mixolator 1 is set to approximately 12o'clock
X2 of Mixolator 1 is set to approximately 3o'clock
Y of Mixolator 1 is set to approximately 10o'clock
Z of Mixolator 1 is set to 12o'clock
Lin/Log of Mixolator 1 is set full counterclockwise (Linear mode)

X1 of Mixolator 2 is set to approximately 1o'clock
Y of Mixolator 2 is set to approximately 10o'clock
Z of Mixolator 2 is set to 12o'clock
Lin/Log of Mixolator 2 is set full counterclockwise (Linear mode)

Notes:
If voltage control of pitch is desired, 1v/Oct goes to Classic VCO and
Waveform City. Bank 8 is used for this example but any bank will produce
interesting results. The speed of the vectoring (such that it is) is set by
A and D knobs of Envelope 1. Sequantizer is "tuned" manually so as to
trigger different waveforms in the WC. Oscillators were set to "high" pitch
mode for the example, but would probably also produce interesting results in
"low" mode.

****

wiardmodular@?: Omni Filter as VC Slew
Discovered a neat trick today with the omni filter. Run a CV into it, set it
to low pass. Run a voltage into the FC2 and adjust to invert it so you can
lower the frequency of the filter way below minimum. This will give you
noticeable slew times. Otherwise the frequency of the filter is too high to
have a noticeable slew. Run the output to the cv in on something like your
oscillator. The filter will slew between changes on the cv in.

This allows you to have a voltage controlled Slew in the wiard 300 system.
You can also do interesting cv filtering on lfos etc with this patch.

****

Gary Chang and Grant: Other Slew sources
Gary writes (but see below): I often use the VCA circuit on the Waveform
City as slews - there is a jumper on the pc board that switches the vca to a
slew, allowing the output to track the voltage at the gate input, with the
attack and decay controls adjusting the positive and negative sides of the
slew...

Grant replies; Of course you meant the little envelope generator inside the
Classic VCO and not the VCA. The Classic VCO has three separate modules in
the one box, VCO, VCA and AR envelope/envelope follower. You can also feed
audio into the "Gate" input and the envelope output will follow the positive
peaks at the rate set by the Attack and Release knobs.

****

Stefan Bonnet: Filter tricks
Running two borgs in parallel produces astonishing stereo images, from
natural spacializing to gentle resonant phasing effect when animated...

It's also possible to create some really beautiful and precise
harmonic/formant structures when mixing the boogie's and the two borg's
outputs in parallel and setting one of them to track the keyboard. (btw my
borgs sound a bit different, the last one I received distorts more easily,
but with a more crunchy sound, and allows to highlight specific harmonics
more precisely, with an even more "woody" sound than the other (!))

I've also been able to find a very convincing cello sound with the boogie as
a control source: use the boogie to shape white noise (find the right mix
of its four outputs), control its frequency with an eg (I used the very nice
bananalogue vcs for this, too sad it's output isn't normalized to the "both"
input...), and crank up its resonance. Then patch the mixer's output to the
control input of a borg, the vactrols will do the rest! (adjusting the
boogie's parameters allow for a lot of funny effects, like when the borg's
vactrols won't be able to track anymore, but there's a sweet spot where the
attack is a cello one!) (the other borg is used as tone/body shaper, and
the sound source is the sine output of a fixed frequency vco, fm'd and
sync'd by a tracking vco/miniwave).

As for the noise ring, it conducts bird singing very convincingly,
especially when the miniwave is used as a transfer function device in order
to get different probabilities' distribution...But I like it mostly as
control source modifier/exciter and tone source (in which case I patch has
note-on pulse to the ext change input, to get that ever phased-out sound
without clicks)...(It would be great to have a jumper on its back, allowing
to use the clock output as a clock input (?))

****

Grant (via Gary): WFC as a Voltmeter
The other day, Grant told me of a very useful patch with a Waveform City
that helped me to troubleshoot a patch involving wandering ghost triggering
when the last gate out of a Sequantizer was used to step a second
Sequantizer.

Setting the Waveform City to Bank 0 and Wave 0, and turning the ENV to
maximum, it will act as a voltmeter, measuring the voltage from the WAVE ENV
input.

From this, I could see that the gate out was performing properly. Grant
surmised that ghost triggering must be tiny glitches that were triggering
the very sensitive gate inputs of the Wiard. By passing the trigger through
a vca found on the oscillator (which is actually a bidirectional slew), the
problem was solved.

I now use this "Voltmeter" patch all the time.

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Grant: West Coast techniques and tips
1. VCO(sine) - VCA - LINFMVCO(sine) - Borg in lowpass gate mode (VCA)
You use the first VCA to dynamically control the depth of linear FM.
Envelopes are routed to the FM depth VCA and to the Borg tone shaper. Tea
use of sine waves produces "nice" sounding FM along with the soft Borg
envelope. With the first VCO set to about 7 Hz and the linear FM control of
the second VCO barely open, you have dynamic and natural sounding vibrato.

2. VCO(sine) - LINFMVCO(sine) - VCA - Mini-wave(+/- 5v) - Borg in lowpass
gate mode (VCA)
This is a fixed depth FM patch going to a dynamic depth wave multiplier.
Envelopes are routed to the first VCA and to the Borg. The VCA before the
Mini-Wave needs to have controls to set initial volume and control the
amount of envelope (like an ARP 2600 VCA has). You want to adjust the VCA so
it is about 20% on with no envelope. Then adjust the amount of envelope
sweep to your taste. You can play with any bank or wave in the Mini-wave but
Bank 13 is designed just for this use.

3. Banks 0 to 7 of the "Socket Rocket" chip are designed to process audio
input. In this case the VCA is set 100% on. Bank 6 "Bit Descimation" can
really make a drum track gnarly when set to 4 bits or less.

4. Since all the output are protected by 1K resistors, you can use simple
multiple to mix module outputs together. For example, to place Borg 1
ouptus in parallel, just run the same signal to both inputs and connect both
ouputs to the multiple at the bottom of the patch bay. Since every module
input and output is fault protected, this means you can connect the modules
without fear to any other type of module. It should be impossible for the
Wiard to do any damage to any other kind of module, and likewise the other
modules cannot damage the Wiard modules. So, it is safe to patch the Wiard
300 or 1200 modules to modules from other manufacturers.

5. The Korg MS-20 added some diodes to the feedback amp used to give
resonance. The effect is to have the resonance vary with the amplitude of
the INPUT signal. So the resonance is self limiting, and you can max it out
and it will "squelch" with input amplitude. This feature is controlled by
the red option jumper on the back of the Borg 2 modules.

With the jumper in place, you will probably get better results with the
filter AFTER the VCA (assuming a subtractive patch). This way the little
circuit will crank the resonance up and down for you automatically, kind of
like gain riding.

With the jumper moved to a single pin, it will offer all the time
"rip-your-head-off" resonance like the Borg 1. Because the Borg 2 IS a Borg
1 with much faster Vactrols and the one added tweak.

****

Grant on using the Boogie as a Low Pass Gate
It's a unique mode to photo-electric filters. Any other transconductor
(transistor, diode, OTA) can not run to zero control current without making
bad things happen to the DC bias and producing 15 volt thumps. Aim
photo-electric filters go completely off (0 Hz). This allows you to use the
filter as a combined VCF and VCA.

In the West Coast model, the complex timbres are generated before the filter
via complex oscillators, non-linear waveshapers, FM or additive synthesis.
The "gate" is then used for final amplitude and spectral shaping.

The Boogie supports both modes, either straight subtractive with a following
VCA, like the East Coast instruments, or gating and spectral shaping without
a following VCA, like the West Coast instruments.

The main frequency control covers 20 octaves, 0 to 20 Hz, which is 10
octaves, and 20 Hz to 20 kHz, which is another 10 octaves.

To "gate" with the Boogie, set initial frequency to zero and control range
to max. Resonance is set to zero. A 10 volt signal into "Control In" will
then sweep the filter from 0 Hz to 20 kHz. The 6 dB output is approx.
equivalent to the Buchla 292 "combo" mode, and the 12 dB output is approx.
equivalent to the 292 "filter" mode. But the Hamamatsu opto-couplers decay
in 20 ms., rather than the 200 ms. decay of the VTL5C3/2 used in the Buchla
292C.

[And, on the use of the two Boogie jumpers] One jumper is for the 24 dB
output and the other for the 12 dB output. Move both to top position if you
mixing with the Blacet Mixer Processor. Leave both at bottom position if you
are mixing with the Blacet Quad VCA.

****

Matthew Ritenburg: Sequantizer as a graphic VCO

1. Noise ring out -> 1v/oct VCO in.
2. VCO set to audio range in 9:00 position
3. Triangle out of VCO into stage select of sequantizer
4. Sequantizer stage select set to 12:00
5. Sequantizer 10v output to mixer.

If you have a scope you can change the speed of the VCO and change
the voltage stage settings of the sequantizer to view the changes in
the wave form. Using the sine, saw, or pulse from the VCO produce
different stamps. I prefer the triangle.

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Olivier: JAG Monster patch

With one JAG, a Joystick, two modulation-mixers(in my case Blacet
Mixer-Processors), 2 LFO's 2 Envelopes into that, 10 Outputs of the JAG
modulates 10 CV's. The JAG controls a Vector-Engine as Vector-Synthesis is
very easy to control, as I am not a fan, if the JAG controls the Pitch-CV. 2
VCO's/Mini-Wave/Frequency-Divider and one half of the superb Cynthia Saw
Animator ar going into 4VCAs), everything is run by 2 VCO's. The output of
the 4 VCA's are going into a Mixer, then 2 parallel/serial Filters and two
Vca's. That is also kind of CS-30 alike (2Filters/2VCA's).

I tried it with my Wiard/Blacet-Rack: It sounds incredible. The JAG brings
the modules to life: With the Joystick you tell the main Direction, every
millimeter changes the whole character, so I work with a stereo-delay behind
everything. The two modulations-mixers (one JAG) a bringing incredible
movement into everything >>(Filters, VCA's, ..), subtle or gigantic. What I
like the most is that it is an extremely fast way to program new sounds, and
they are still vanilla enough to be useful. Of course the Vector-VCA's are
8, 6,4,2. The rest (Cutoffs, Speed of LFO's, one controlling the first
output-VCA, balance/Pan of the two parallel filters...) will be controlled
of the other JAG-Outputs. At the moment, I am testing which one to which
output is best. The Egde and the Dome-Outputs of the JAG are perfect for
some CV's. It can get pretty wild in a Vector-Patch, if the Edge-Out
controls the Q of the main filters, but I haven't decided yet which output
controls what in the end (or if I build in switches)

****

Grant: Ring Modulation in the Wiard (two posts, "Balanced Modulation" and
"Mixolator as Ring Modulator")

Envelator:
1. Env1 Out + is normalled to Mix module Mix 1 input.
2. Patch Env1 O- (Out minus) to mix module Mix 2 input
3. Set Env1 to "Cycle" with A and D set short
4. Listen to the Mix module output
5. As you advance the Mix control, the signal will be null when the two out
phase versions have equal amplitude and cancel.
6. Now take an audio VCO sine ouput into the MixMod input and advance the
MixMod control. You will hear the "Klang" (sum and difference) tones fade
up.

Mixolator version one:
The same technique should work with the Mixolators using the X+ and X-
outputs of one to feed the X and Y inputs of the second. Signal modulation
to X1 input of the first with Z at max. Feed the carrier signal to ZMOD of
the second, and null the modulation signal with the second Z control.

This is essentialy what the Ring switch does on the Mixolator, but this
technique is more adjustable with better linearity.

Mixolator version 2:
The technique goes like this:

Monitor the X+ output

1. Set X1 control fully on
2. Switch VCA/Ring switch to "Ring"
3. Patch an audio sine oscillator (carrier) to the X1 input
4. Adjust the Z control for the best null of the carrier signal
(somewhere around the 1 o'clock position)
5. Patch another sine wave signal to the ZMOD input.

At this point you should be hearing two sine tones which are the sum and
difference frequencies between the two sine wave oscillators. Sweep the
oscillator frequencies as an experiment. Any audio signal can be used
instead of sine waves, but they are best for demonstrating the sound.

****

Dr. Mabuce: Sequantizer tips
The permutation range from the CV controlled 'select' is a powerful stuff.
When the Sequantizer is clocked at audio speeds is becomes a CV waveform
modulator. Hitting the reset with a pulsewave tuned to NEARLY the same
frequency creates a wicked 'ultra-hard-sync'. At slower speeds this can be
used a varying complex envelope. A lot of the features look un-glamorous but
are very musical. I use the octave shift all the time. The step-selectable
glide is another feature that breathes life into sequences without having to
patch-in 4 other modules. One feature that I ho-hummed at, turned out to be
something I use ALL the time. With the sequencer sitting still, (unclocked)
you can use the select knob to step & stop through each step. I know it
doesn't sound like anything of monumental consequence but it makes creating
& testing (creating-testing, creating-testing, & on & on) a sequence SO
CONVENIENT. It just seems to have been designed by someone who had actually
programmed a LOT of sequences on an analog himself

****

Grant: Envelator Mix module logic and quadrature mode
OK, one of the original functions of the SQR output on the Envelator was to
act as mono-stable for making a gated ADSR envelope. That is if you have two
Envelator modules, you can set up one as an ADSR and another as a monstable,
this will give you a fixed gate time and allow you to "loop" an ADSR with
the end pulse.

The polarity is wrong for using it in quadrature mode, SQR goes high and
stays high as long as the Envelator is in the Attack portion of the
envelope. For quadrature, you need the opposite.

You can use the cossfader on the bottom as a logic inverter to get the
correct polarity. Here is how:

1. Put a dummy plug into the Mix2 input (disconnect Env 2 output)
2. Route a +10 volt signal to the Mix 1 input (a joystick all the way up
will work)
3. Route the Env 1 SQR signal to the Mix Mod input (mixture modulation)
4. Set the MixMod control to max and Mix control to min
5. Route the Mix output to the gate input of Env 2

Now Env 2 will start it's attack phase as soon as Env 1 completes it's
attack phase, also called quadrature mode. Route Env 2 END pulse to Env 1
GATE input to make a quadrature LFO.

How does it work? When MixMod is at zero volts, Mix1 is routed to the Mix
ouput, and it is at +10 volts. When MixMod is at +10 volts it is routing
Mix2 to the Mix output, which is at zero volts - hence an inverter.

If you think about it, the Mix section on the Envelator can be used for
logic functions, AND would be MixMod at +10 AND Mix2 at +10, otherwise the
output is zero.

The input thresholds of gate inputs on the system are set to +1.5 volts so
you can interface to +5 volt systems like Kenton and Roland rhythm boxes.
So with the MIX control set to the center, with +10 volts at Mix1 OR Mix2,
+5 volts will be output from the MIX output. Because the gate threshold is
at +1.5 volts, it will behave like an OR gate.

****

Grant: PWM of Sequantizer Gates with Mix module
The gate 1-8 outputs of the Sequantizer module are diode isolated so they
may be "wire or'ed" at a multiple. However the gate signal does not go low
with the clock pulse, this make it difficult to use two successive stages as
a trigger for an envelope.

By using the AND logic mode of the Envelator Mix module, you can PWM the
gates and get a correct trigger pattern for rhythmic trigger patterns from
the gates.

Here's how:

1. Set the Envelator MixMod control to maximum and Mix to minimum
2. Put a dummy plug in "Mix1", disconnecting Env1 (a dummy plug is just a
patch cord with only one end connected, this is used to break a
normalization on a module).
3. Make a pattern of some of Sequantizer "Gates 1-8" at a multiple, then
route a patchcord from the multiple to "Mix2" input.
4. Set the Classic VCO to low speed and route the Pulse signal to
Sequantizer "Step" input and the Mix module "MixMod" input. 5. Route the Mix
output to an Envelator or other envelope generator "Gate" input.

What happens: Since the gates signals are now ANDed with the clock, they
will only go high only for the pulse width of the clock signal. This will
correctly trigger the envelope on consecutive stages. By patching the
Classic VCO "Rand" output to the PWM input, you can have random articulation
(varying gate times) of the rhythm pattern.

****

SDCurtin (?): Envelator chaotic functions
One of my favorites is to use the envelator as a voltage-controlled divider.
If you feed a 5v audio rate square or ramp wave, then change the rise time,
you get subharmonics. Grant also mentions this capability in one of the
online Wiard manuals.

But wait, there's more! Feed the output of this into the classic VCO or
other syncing oscillator, you then get harmonics. The combination of this is
very usable just intonation. For instance, for a frequency ratio of 5/8, you
dial up the 5th harmonic and the 8th subharmonic.

****

Grant: Linear Feedback with Wiard-VCO or Waveform-City
In order to have dynamic depth FM without shifting the basic pitch of the
oscillator, an AC coupled linear FM input is required. This is exactly the
design of the LIN input on the Classic VCO. One of the purposes of the VCA
in the module is to provide dynamic depth control for this FM input. Used
with an external oscillator, the FM modulation can be varied dynamically
with the minimum amount of pitch shift.

The reason that this does not work with an internal waveform is because it
is synchronized. As you feed back the sawtooth signal into the FM input, you
are telling to oscillator to go faster the further along the curve you are.
This is what produces the bending of the line. (The same technique is used
to bend the linear Envelator segments into exponential shapes by feeding
back to the AMOD or DMOD inputs.)

Mathematically, this synchronized "speed up" signal ends up like a constant
offset changing the period (pitch) of the waveform, and is not blocked by
the AC coupling. This is why the pitch changes when the feedback depth is
varied.

You can partially compensate for this by taking a negative going version of
the feedback depth modulation signal, and using it to push the pitch back
down.

Try this patch:
Classic VCO - Sawtooth to VCA IN1, VCA out to LIN (FM) input. Envelator
-OUT+ to VCA ENV input, OUT- to Classic VCO FC1 input. Adjust depth of FC1
control to compensate for pitch shift.

This may or may not produce acceptable pitch compensation for a keyboard
patch type. It can also produce interesting swept sounds if the control
positions are exaggerated.

****

Norman Fay Live Setup: 4 voices

1 - Step-up sequencer:
Binary Zone ->Wave City1 VCO ->freq divider -> omni filter ->Quad mix/VCA

2 Bass sequencer:
Sequantizer -> Wave City2 VCO ->Final Filter ->Wave CityVCA ->Quad mix/VCA

3 Mighty Bass Drone:
Blacet VCO & Borg Filter VCO2 -> Boogie filter
Boogie filter cutoff controlled by Borg VCO1 and W/bug smooth CV

4 space chatter:
W/bug out ->Borg 1 in (HP, high res)->borg 2 in (LP)->quad VCA/mix
Borg 1 cutoff controlled by w/bug woggle CV out, Borg 2 cutoff
controlled by EG1 out. Decay on EG1 controlled by w/bug step CV out.

****

Norman Fay: Another Live Setup (Mixolator detail)
1/the noise ring fed one of the waveform city wave shapers, which was
set to one of the quantizing wavetables. This then ran into the omni
filter, and this went into the x1 input of the LH mixolator. The omni
filter cutoff was controlled by the ar envelope of the waveform city.
The idea was to have a kind of randomly generated sequence.

2/the other waveform city ran into a blacet frequency divider, which
ran into a borg filter, then into the x2 input of the lh mixolator.
The idea here was to have a manually controlled drone, where I could
control the timber of the drone via the borg, and add interesting
subharmonics via the level controls on the frequency divider.

3/a woggle bug output via a borg to the y input of the lh mixolator.
the clock out of the wogglebug triggered a blacet EG1, which
controlled the cutoff of the borg. I took the step cv out of the
other half of the wogglebug, and stuck it into the decay cv of the
EG1. I was kind of hoping for the transmission from outer space thing
the wogglebug can do.

LH mixolator x+ out went to x in of RH mixolator. LH mixolator x-out
went to a blacet time machine. The output from the time machine went
to the y input of the RH mixolator, using the joystick I could control
the balance between the wogglebug and the 2 more, er, "tonal" elements
on the horizontal axis, and the blend between dry sound and delay on
the vertical.

****

Doug Pearson: Live rig patches
I've found that the best 6-piece system for me is the basic one, with
sequantizer replaced by borg ... and maybe classic vco replaced by wogglebug
if I'm in a weirder mood). One (cliched, but it works) control setup I
commonly used:
R joystick X Waveform City Fc
R joystick Y Omni Filter Fc
L joystick X Borg LFO Fc
L joystick Y Waveform City VCA CV (amount of LFO modulation to Waveform City
Fc)
One button wired to EG to VCA and/or VCF (so that either the button or R
joystick Y can turn the sound on)
Maybe the other button wired to EG to Waveform city wave CV...or elsewhere

There's an old digitech RDS delay in the rack box I keep the Wiard in, so I
have 1/4"<->1/8" cords plugged into it ... it's usually inserted between
filter & mixolator.

It's also nice to get a feed (if the amp has an fx loop or line out jack)
from the guitarist to process that signal (as with Eno/Manzanera on "Gun" or
Del Dettmar filtering Dave Brock on "Space Is Deep").

****

Dr. Mabuce: Live Rig and patches
My latest obsession is doing the CV control of the whole shebang with a JAG
and a Joystick. I patch 4 independent voices - all doing radically different
things and put 4 VCA's controlled by points 2 4 6 8 on the JAG, last in the
signal chain before i sum them to a single output (with a DI to the
stagebox) I assigned the other JAG vectors to various other CV paths like
?increase/decrease chance of octave change' or the mode parameter of the
sequantizer (a favorite) or more mundane parameters like Borg cutoff F,
sample/hold clock speed. I map Edge to pitch CVs for final manual control of
all the VCO pitches - I usually give myself a range of a fifth above and
below base pitch. The SNO has on-board MIDI-to-CV and
MIDI-beat-clock-to-trigger pulses. So I merge a simple MIDI beat clock feed
from our drummers keyboard ddrum rig to give him control of the sequantizer
clock tempo and other tempo-dependent parameters like LFO speeds and
envelope triggers. And I use a MIDI pedal keyboard (like a Taurus, and shared
physically with our keyboard player), to control pitch CV's via MIDI. She
and i split the pitch-control duties depending on the complexity of our
parts during the set.

****

Grant: JAG introductory notes
The JAG is a new module design that takes any two input voltages, and makes
all the inversions and combinations available simultaneously. It is a two
input, ten output folder/twister/combiner.

You could also look at it as a kind of Cartesian barberpole generator.

They original X and Y inputs are passed through to be used in the patch. Go
a second unit with X and Y switched will give another 10 functions shifted
by 90 degrees. The output functions can also be used an input to another JAG
for really bizarre shapes.

The most obvious application is for panning. The corner functions supply
control for the 4 VCAs, and the edge function supplies a correction function
for equal power panning. The function is used to boost the output in the
middle of the pan, eliminating the power drop in the middle.

Run the other way, it is useful for Joystick controlled MIXING. For example,
running 4 waveforms from a VCO to 4 VCAs allows you to mix them with a
Joystick. This is also called "Vector Synthesis" since the Joystick voltages
can be replaced with envelope voltages or LFOs. The 4 waveforms could also
be the output of 4 different effects units or other waveform processors.

Another example is to use two envelopes as the inputs. This will produce 10
envelope "variations" that can be routed to 10 different parameters in a
patch (PWM, filter sweep, filter Q, crossfading between two filters,
waveshape control, envelopes times etc.).

If a Joystick is used, it gives you control of patch timbre in real time.
Fun when you are running a sequence and dynamically morphing timbres. For
example, the four corner or side functions can control all 4 attack, decay,
sustain and release times at once. So the single Joystick can give you all
possible envelope shapes mapped across the Joystick plane.

****

Grant?s note on ?The Wiard Layers?
Here is an outline of how I envisioned the discovery of the 300 series
modules. This is in relation to the discussion about modifications.

1. Exploring what the module can do in the sense of a traditional modules.
That is, exploring the tone colors of the VCO, Envelator as ADSR and so on.

2. Exploring the axillary modules within the enclosure. Discovering the VCA
and envelope/slew in the classic VCO for example. Using them to do things
like dynamic depth linear FM or as an additional attenuator for FC.

3. Discovering the strange modes of operation. Like using the Envelators at
audio rates for chaos generation, using the Mixolators as balanced
modulators, switching ranges to "Low" and exploring the outer edges of the
functions.

4. Simple modifications. The multiple jacks labeled A,B,C,D at the bottom of
the modules are only connected by solder bridges. This can be easily removed
and the jacks connected to internal points on the modules. For example
adding the external bank select and the second VCA input on the Wavefrom
City.

5. Complex modifications. Every stage in each module has a test point which
can be used to patch out the module. Each module could support 50 jacks, but
you would need the intelligence of a Martian to use them. None the less, the
idea of "circuit bending" the modules themselves has been built into the
design.

6. Normalizing into virtual instruments. After you have discovered what you
like about the modules, you can permanently normalize them using the exposed
points on the jack boards.

7. The one the customers find that I did not think of...

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Grant: Envelator tips and tricks
Since there are two envelators I will use 1 on the left and 2 on the right.
It doesn't matter though.

1. Shorting OUT+ of 1 to OUT+ of 2 in cycle mode will make the Envelators
alternate. This is the same as patching END1 to GATE2 and END2 to GATE1.

2. Shorting SQR1 to SQR2 will produce hard synch in cycle mode. You can also
run an external oscillator into the SQR output to produce hard synch.

3. Use the mixer at the bottom as a logic inverter to get quadrature
operation like the Buchla. Patch SQR1 to MIXMOD input and set the MIXMOD
control to max. Set MIX to minimum. Put a dummy plug in MIX2. 10 volt road
from a Joystick set to maximum to MIX1. The MIX output is now inverted
version of SQR1. If you route that to GATE2, the second envelator will start
it's attack exactly when the first envelator finishes it's attack and enters
decay phase.

4. For chaotic function generation, patch AMOD1 and DMOD1 to OUT+2 and/or
OUT-2. The patch AMOD2 and DMOD2 to the outputs of envelator 1. Put both in
cycle mode. This is the classic "tail chasing" oscillator that was used in
the original demonstration of chaotic systems. Listen at the MIX ouput. You
will have to set both attack and decay controls to less than maximum. Try
various settings of A,D,AMOD and DMOD for different effects.

****

Dr. Mabuce: Envelator Chaos
patch: DMOD1 to OUT-2, SQR1 to GATE2, GATE1 to SQR2, OUT+1 to MIX1,
OUT-1 to MIXMOD, DMOD2 to MIX OUT, OUT+2 to MIX2, OUT+2 to audio input of
amplifier path

knobs:
(given as approximate clock hour-hand positions- it's the best I can do with
text)
attack1 - 11:00
attack2 - 1:00
decay2 - 11:00
Amod1-doesn't matter
Amod2 - doesn't matter
Mix - 5:00 (maximum)

Decay1, Dmod1, MixMod & Dmod2 become interactive, You just play with
them until the sound makes you happy (or disturbed)

switches:
1-AD 2-cycle

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Sebastian Kuehnl: "Creating a three-dimensional timbre matrix"

Ingredients:

1 Waveform City,
1 Sequantizer,
1 Omni Filter,
1 Mixolator,
1 Joystick (MAY be replaced by any two DC offset sources, such as modwheels,
but shame on you).

If I correctly understand the functionality of the modules, this patch will
use the Sequantizer as an NLT board, and the Omni Filter as a processor/
generator changeling.

Instructions:

0. Patch the same pitch control to the 1v/oct inputs of the OMNI and the
VCO WC.

1. Patch the sine wave output from the WC to the multiple, and from there,
2. patch one sine wave to the WC's VCA,
3. patch the VCA output to the WC's NLT,
4. select an NLT function that folds a sine wave in the classic Buchla/
Serge way,
5. patch another sine wave to the SEQ stage select input,
6. use the square wave from the WC to trigger the SEQ,
7. patch the EG from the WC to both the VCA CV input and the SEQ's transpose
input,
8. set the EG to slope times slow enough to make the foldover-induced
timbral sweep in the WC NLT plentifully relishable (=looong! ;-),
9. set the SEQ's stages to arbitrary, preferably large intervals (at least
two stages should be fully down/up),
10. patch the SEQ 10v output and the NLT output to the OMNI and mix them to
equal volumes.

Interruption: at this point, there should be two rich sounding waves in the
filter input, each of which hardly resembles classic analog sounds, and is
further dynamically varied by the EG. Since one phase on the SEQ will take
eight times longer to cycle than one phase in the WC NLT, the two waves are
three octaves apart. (By using the SEQ reset input, a two octave spread can
be had, but at the cost of four SEQ stages, which will make the sound only
half as detailed.)

The less linear and the "wilder" the selected WC NLT function, the larger
the perceived timbral and pitch difference between the two SEQ and NLT
outputs. By twiddling the SEQ stages and searching for similar and
relatively linear functions on the WC, the sounds can be made approximate
each other. In the most extreme case, a PPG Wave like sound can be achieved.
Also, by applying some lag (glide) on the SEQ, its sound can be smoothened.
(I don't know if the lag is
linear or exponential? The latter would be better here since the smoothening
would be independent from pitch.)

Now if the two sounds ARE spread widely, the OMNI voltage controlled mode
morphing can be used to discriminate between them like this:

11. Set the OMNI frequency to the middle between the frequencies of the two
input sounds; temporarily introducing self oscillation will help to adjust
the relations precisely, but it will be best to use your ears rather than
sticking to mathematical ratio.
12. Set mode to bandpass,
13. attenuate the X output of the joystick to 3/4 the full range (7.5 volts)
with one of the MIXOLATOR sections,
14. patch the attenuated X voltage to the OMNI mode morph input.

Using the joystick over the entire X axis will now sweep between lowpass and
hipass, and the 24db/oct cutoff should now clearly attenuate either of the
two inputs in either mode.

Now a third dimension (= another direction to "morph into") is introduced:

15. Patch the third sine wave from the WC multiple to the second MIX section
in VCA mode,
16. patch the joystick's Y-axis to the multiple on the OMNI, and from there,
17. use one Y voltage to control attenuation of the sine wave on MIX 2,
16. use a second Y voltage to control the Q amount on the OMNI (with full
index);
17. now patch the output from MIX 2 to the OMNI's linear FM input.

As you move up the Y axis, the filter will start to self oscillate, the
filtered signal will cease to pass - the filtered NLT timbre morphs into a
two operator FM timbre.

Optionally, if you want to have the VCF frequency envelope swept in the two
"filter the two NLT sounds" modes: 23. attenuate the envelope with a VCA
whose attenuation is controlled by the inverse of the control source that
you previously applied to the FM index and the Q. This is just to make sure
the FM sound will produce keyboard-compatible pitches, but if that's not
desired and the results should instead be less foreseeable, it can be left
of course.

I didn't include gating, the sound at this point is just an endless drone -
mostly of interest for examination of the morphing sweeps. But there are
more reasons to add the Classic VCO to the patch than just making use of its
VCA and EG for gating the drone sound; actually The patch is just a basic
configuration to start from, and points to begin modifying could be:

Using the Classic VCO for the SEQ NLT sound; with now freely definable
octave spread/ slight detune/ individual vibrato settings/ etc etc, this
will allow really PPG-like sounds....

Controlling SEQ trigger and select inputs from different VCOs, which Gary
Chang described as a method to generate "ultra hard synch" like sounds....

ERRATA on the above:
I made a big mistake in my "3D timbre matrix" patch: the sine wave that
selects the stages on the SEQ must of course be eight times slower than the
pulse (or other) wave that triggers it, so it can't be from the same VCO.

(...Unless you use another WC, or a Miniwave, deploying the "binary rate
multiply bank"; Or unless you use an Envelator as a rate divider; the
sloped output should make for a nice SEQ select input as well.)

So to make the patch work like intended, skip to the end of my previous
message, where I mentioned the alternative of adding the Classic VCO to the
patch for variation. The original "3D patch" WILL work with this slight
modification:

- Use the Classic VCO sine wave as the SEQ select input;
- Synch the WC VCO to the Classic VCO (a soft synch setting should suffice,
we don't want to the sine wave on the WC VCO to distort) and make it three
octaves higher.

(If the synch is left out and there is some detuning, the two waves
controlling the SEQ will interfere and the SEQ output, but then you may like
that?)

Another, smaller mistake in my patch was the use of an EG for the SEQ
transpose input. Just leave it away. It will actually just introduce DC
offset, not cause a function remapping like the WC's NLT board does.