Cluster Patch Notes 10/23

I. Patch Ideas

Cluster can be patched in many ways- and as stated above, it's DC coupled , reasonably accurate, great for audio and can handle anything you throw into it. These are some patches to get you started, and hopefully with these as well as the individual sections' descriptions above, you'll be able to come up with plenty of ways to work with it.

VCA (w/ the XY channel)
The XY channel can just as easily be used as a standard linear VCA. Patch a source into the X INPUT, and a positive-going CV source into the Y INPUT. Adjust the Y AMT knob CW to taste. Note that with the Y AMT knob fully CW, +4V will take X from 0 to unity.

VCA (w/ the A/B channel)
If you don't need a crossfader, but you need a linear VCA. Patch a source into the B INPUT and set the A/B knob fully CCW. A positive-going CV source at the A/B CV INPUT will amplify source B, with 8V giving unity gain.

DUCKER (w/ the A/B channel)
Sometimes voltage-controlled *attenuator* is useful. This is an easy thing to patch if you have a crossfader handy. Patch a source into the A INPUT and set the A/B knob fully CCW. A positive-going CV source at the A/B CV INPUT will now *attenuate* source A , with 8V turning it fully off.

RING MOD, OR A "POLARIZER" (w/ the XY channel)
Patch a source into the X INPUT and another source into the Y INPUT. Adjust Y AMT to taste. Monitor the XY OUTPUT or the SUM OUTPUT. This is just as useful for CVs as it is for audio sources.

RING MOD II (w/ the A/B channel)
You can patch another multiplier/ ring modulator using the A/B and Z channels. Patch and mult a source into both the B INPUT and the Z INPUT. Dial the Z AMT knob fully CCW- this gives us an inverted copy of the source. Patch the Z OUTPUT into the A INPUT. Set the A/B knob to 12 o' clock, and patch a bipolar modulation source to the A/B CV INPUT. Monitor the A/B OUTPUT (or SUM OUT).

GATED RING MOD (w/ the XY and A/B channels)
Patch an audio source into the X INPUT, and a bipolar audio source into the Y INPUT. Patch the XY OUTPUT to the B INPUT on the A/B channel. Use the A/B CV INPUT to gate the result.

A.M. THROUGH R.M. PATCH (w/ the XY and A/B channels)
Here is a patch that uses two sections of the Cluster that morphs from NO modulation to Amplitude Modulation to Ring Modulation without a drop in output amplitude.

Patch an audio source into the X INPUT. Patch a (bipolar) modulation source into the B INPUT in the A/B channel. Set the REF switch to ON (A INPUT is unpatched). Patch the A/B OUTPUT to the Y INPUT. Monitor the XY OUTPUT or SUM. The A/B knob takes modulation from OFF through A.M. through to R.M. This is of course voltage controllable vis-a-vis the A/B CV INPUT.

Tip*: This patch works well because we are crossfading from a positive offset voltage to a bipolar modulation source. Somewhere in between, we have a unipolar modulation source at *half* the modulator amplitude, and further, we have the bipolar modulation source at full amplitude- giving us relatively constant peak output amplitude of our source at any setting.*

DIFFERENCER (w/ the A/B and Z channels)
Similar to making the crossfader act as a ring mod, but we are using two different sources here- Patch a source 1 to the Z INPUT, set fully CCW (-) this inverts source 1. Now patch the Z OUTPUT to one of the A/B channel's inputs. Patch source 2 to the other A/B channel's input. The A/B OUTPUT is the difference of the 2 sources.

Tip: *differencing can be super useful, like the old trick of subtracting the input source from the output of a lowpass filter to get a high-pass response..*

MIXER FOR AUDIO OR CV
If it's not already incredibly obvious, you can patch up to 4 sources into Cluster and grab the SUM output for a quick and handy mix for your audio or control sources.

RANDOM TRANSPOSITION (w/ the A/B channel)
Patch a sequencer into the A INPUT and a syncopated random source into the B INPUT, modulate a bit of random into your sequence using the A/B CV INPUT. Simple and effective.

TRANSPOSITION ON A SWITCH (w/ the A/B channel)
This one is pretty obvious, but using the REF switch as a flickable transposition is pretty handy sometimes. Scaling the REF is an easy task using the A/B knob.

SCALED TRANSPOSITION ON A KNOB
An easy way to dial a pitch up or down within some preferred range, say, is to use the Z channel as an offset and patch that offset (the Z OUTPUT) into the XY channel's X INPUT. Use the Y AMT knob to then dial that up or down as desired- for instance- if you set the Z AMT knob to give 1V at the Z OUTPUT- the Y AMT knob will allow you to dial in -1 to +1V, with 0V easily found in the center.

VOLTAGE "MIRROR" (w/ the A/B channel)
Patch a source into the A/B CV INPUT and set the REF switch UP. Dial the A/B knob fully CCW. A positive going CV will now be *subtracted* from the REF voltage (set to 8V by default).

SIMPLE SQUARING/ SINUSOIDAL FREQUENCY DOUBLER (w/ the XY channel)
Patch a bipolar SINE source (or triangle) into both X and Y INPUTS. Adjust the Y AMT knob CW to square the input.

EXP/ LOG SHAPER/ SQUARER (w/ the XY channel)
Patch a source to both X and Y INPUTS. Adjust the Y AMT knob to around 3 o' clock for EXP shaping, 9 o' clock for (inverted) LOG- (note that this patch effectively full-wave-rectifies an input either positively or negatively as it is multiplying a source by itself) use the XY or SUM Out.

Tip: *to easily offset the LOG shaper outlined above- Patch XY OUT into the B INPUT of the A/B section, and flip the REF switch up. Use the A/B OUTPUT and adjust the A/B knob to offset the result as needed.*

DISTORTED FULL-WAVE RECTIFIER
See patch above. In a pinch, a multiplier makes for an easy rectifier.

MORE **EXPONENTIAL SHAPER**
Mult an input source into X INPUT and either one of the A/B INPUTS or the Z INPUTS. Now, patch the SUM (or -SUM) OUTPUT back into the Y INPUT. This is basically the patch above- except now we have effectively doubled the gain of the source that's being fed back to the Y INPUT- resulting in much steeper waveshaping. Dial the Y AMT knob over to around 2 o'clock and the A/B or Z knob up just a bit- since we have finite headroom to work with here, it's very season-to-taste. At a certain point, our waveform flattens out and becomes linear again at the top. Experiment.

FULL WAVE RECTIFIER II (w/ the A/B channel)
For a more linear full-wave rectifier patch- Mult a bipolar source into the B INPUT and the A/B CV INPUT, flip the REF switch to UP, and set the A/B knob CW. Monitor the A/B or SUM OUTPUT for a full-wave-rectified copy of your input source. Note that depending on the amplitude of your input source and the REF switch's jumper setting, you may need to adjust the A/B knob a bit to get it right.

What's the trick here? The input source is being attenuated while it is simultaneously panning over to an offset voltage as it goes negative- the resultant sum of this is a semi-distorted inversion of the source.

OPPOSABLE VOLTAGES
Using the “NOT SUM” and SUM OUTPUTS simultaneously can be a useful setup in a patch- one knob can simultaneously sweep one parameter up and one down, or send opposing CVs. This might be useful, for instance, to accurately tune 2 filters or delays in a stereo or series configuration.. As always, experiment.

II. <u>More patch ideas, using gates.</u>
In the world of modular synthesis, electronics and programming, there are many functional conventions that overlap one another and sometimes it is helpful to think of a thing as another thing- as they can be functionally equivalent in practice, with Cluster, being a set of basic processing functions, you can squeeze even more functionality out of 8HP by noting the following:

CV / AUDIO SWITCH
Any VCA can be used as a “switch” by using a gate voltage as the control signal. So, in the Cluster, with the “VCA” patches outlined in **section I**, you’ve got two switches at your disposal, and they handle any signal in your synth just fine. A great use of a lag processor, such as the

Sport Modulator, is to add some slew-limiting to gates for applications like this, for triggered slow fades/ wipes.

A/B or 2:1 SWITCH
Using the A/B channel as a switch is simple and effective. To switch from A to B, dial the A/B control fully CCW and use a positive going gate voltage of 8V or more as your control source.

INVERT, NOT INVERT SWITCH (w/ the A/B channel)
A multiplier inverts, or not, when controlled as such. This is just like the **Ring Mod II** patch from **section I** above, but set the A->B control fully CCW. Patch a source into the A INPUT, and patch it’s inversion into the B INPUT (using the XY section or Z section). Patch a gate source to the A/B CV INPUT, and monitor A/B or SUM OUT. When the gate is LOW, the source will be non-inverted, HIGH, inverted. (This can obviously be done more simply with the XY channel, but with a bipolar control signal..)

LOGICAL INVERSION (w/ the A/B channel)
The **Voltage Mirror** patch in **section I** also facilitates a logical inverter- using a gate as the control source in that patch, A/B OUTPUT will give you the logical inversion of the input.

“AND” LOGIC (w/ the A/B or XY channel)
A Linear VCA can give you the boolean AND function, where the output is LOW unless both inputs go HIGH. Using the A/B or XY channel as a **Linear VCA** from **section I**:
Patch gate source 1 into the CV INPUT, and gate source 2 into the INPUT. Logically speaking, the output will be LOW unless both inputs are HIGH.

“OR” LOGIC (w/ the A/B channel)
You can obtain a boolean OR function with the A/B channel by patching a source into the A INPUT, and multing a second source into the B INPUT as well as the AB CV INPUT. When either source goes high, A/B OUTPUT will go high, at or around the same amplitude.

“XOR” LOGIC (w/ the XY, A/B and Z channels)
This one’s complicated, and admittedly, not very wieldy in the field! But stuff like this is fun to try and figure out. An XOR function is analogous to an absolute-value’d multiplication in analog systems, so what we need is a Voltage Mirror (positively offset inversion) and a multiplier that responds to unipolar signals. So, we’ll use the XY channel as an inverter here, and add a positive offset to that with the Z channel to get the first part, and use the A/B channel for the second part.

1. Mult gate source 1 into the X INPUT as well as the A INPUT of the A/B channel. Dial the Y AMT pot fully CCW to invert gate 1. Now, we have to offset it positively, so dial the Z AMT pot fully CW (Z range jumper should be set to 8V for this one, it’s set to 4V by default).

1. Take the SUM output (which is now our “mirrored” gate 1) and patch it to the B INPUT in the A/B section. We now have a crossfader that fades between gate 1 and it’s inversion. Set the A/B pot fully CCW. Patch gate source 2 into the A/B CV INPUT. Monitor the A/B OUTPUT.

We now should have effectively an XOR gate. If both signals are either HIGH or LOW, the output will be LOW. It will only go HIGH when they are different.

Tip: *since you made it this far, you can try this patch with good old slopey continuous signals too, for a nice waveshaper!*

-FIN-