

## FEEDBACK CONSTRUCTION KIT

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This folder contains a runtime Max patch with software equivalents of various hardware devices I have found useful for manipulating audio *feedback*. Most of my experience (going back to student days in the 1970s) has been with acoustic feedback – i.e., between some kind of microphone and speaker or driver – but these modules are equally applicable to wired feedback (“no-input mixing”). This patch was thrown together quickly for a workshop, my apologies for any bugs and deficiencies. Most of the modules should be familiar and self-explanatory in operation, but here are a few tips.

### Input

Left and right inputs are mixed down for a mono signal path. A stepped dB *boost* menu is included as well as faders. *DSP* toggles audio functions on and off; *open* opens a control panel for selecting input device, vector sizes, etc. (best performance when I/O and Signal Vector are small, i.e. 64).

### Output

Level, meter, *mute* – space bar toggles muted state to save your ears and speakers. Single mono signal sent to both left and right audio outputs.

### Limiter

My first critical discovery in the wonderful world of feedback: a limiter prevents the feedback from running away to maximum loudness, keeps it sinusoidal. Only control is the *threshold*: the lower the dB the quieter the output. Toggle from *bypass* (red) to *active* (green) to engage.

### Distortion

Basically, a gritty limiter. Crude emulation of basic distortion/fuzz pedal for guitar.

### Ducker

One of my favorite audio devices, self-mutes the feedback whenever its level crosses the *threshold*, resulting in a kind of pulsed rhythmic limiting. Mess with *attack*, *hold* and *release* (just like on an envelope generator) to change character. Click *reset* if it hangs up.

### Bass & Treble Equalizer

Slide faders to boost and cut bass and treble; use number boxes to change the corner frequencies of the shelving. Useful for balancing feedback between thunder and screech. Equalization is probably the most essential feedback tool, this is the simplest option.

### VST Plug-In (Graphic EQ)

I use a free plug-in of a Graphic EQ (7Q from Manda Audio), you'll have to find your own. Gives you finer control on feedback spectrum than just bass and treble. You can use this window to load and run any other VST plug-in (i.e., distortion pedal, multi-effect device, etc.)

### Parametric EQ

Sweep a boosted peak across the frequency range to “overblow” the feedback like a bugle; notch is useful for nulling a specific ornery pitch. Sliders for *frequency*, +/- (boost/cut) and *Q* (resonance).

### Delay

A simple single-tap digital delay. Adjust *msec* delay in number box. Transforms continuous feedback into something more like an echo.

### Pitch Shift

Three ways of messing with the frequency and timbre of the feedback:

- *Ring Mod*: sum and difference of the frequencies of the feedback and a sine wave oscillator, as set in the *Hz/cents* number box.
- *Frequency Shifter*: the single-sideband variant of the ring mod, produces only the sum of the frequencies of the feedback and oscillator (tune oscillator to negative number to get the differences instead).
- *Harmonizer*: more familiar pitch shifting algorithm that does not distort the spectrum as much as a ring-mod or frequency shifter.

The value in the number box refers to frequency (in Hz) of the sine wave carrier oscillator in the *ring-mod* and *frequency shifter*; in the *harmonizer* mode this number controls the cents of the pitch shift (100 cents in an equal-tempered semitone). *Zero* resets frequency to 0 (no shift). Faders are included for balancing the direct signal from previous stages of processing with the pitch-shifted variant, because it can be difficult to get feedback started without some unshifted signal passing through from input to output.

### Some Notes

- Try these modules singly and in various combinations.
- Omnidirectional dynamic mikes are typically more feedback-friendly than cardioid and condenser ones.
- You can use contact mikes and transducers to feed back through solid objects or liquid, but these arrangements benefit from serious equalization (graphic EQ highly recommended).
- If you’re looking for hardware equivalents of these modules (all those nice knobs to twiddle, but so much heavier), Behringer’s long out-of-production “Intelligate” is a great instrument for ducking experiments, and can be easily found for €/\$ 50- or less on eBay (I bought mine for \$5.24). The Keeley GC-2 is a clean mono limiter in a compact footpedal, not expensive, lighter and smaller than a rack unit.
- A lot of these processes can be also accomplished with commercial plug-ins in whatever DAW you’re using, and can be easily programmed other music software (such as in Pure Data and SuperCollider).

fdbkprocessor080623.1

100%

**INPUT & OUTPUT**

**INPUT**

10 dB boost 0

DSP OFF open

**OUTPUT**

MUTE (space bar)

**LEVEL LIMITING**

**LIMITER**

threshold -20 dB

in out

BYPASS

**DISTORTION**

in dist level out

BYPASS

**DUCKER**

threshold -19 dB attack 2 hold 16 release 2

in out

BYPASS RESET

**EQUALIZERS**

**BASS & TREBLE**

flat 100 Hz 4 kHz flat

BYPASS

**VST PLUG-IN (GRAPHIC EQ)**

OPEN plug

in out

BYPASS

**PARAMETRIC EQ**

frequency 469 Hz Q

flat 0 dB

BYPASS

**PROCESSING**

**DELAY**

0 msec

BYPASS

**PITCH SHIFT**

ring mod

0 Hz/cents

zero

dry wet

BYPASS

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