

flight of harmony

the Sound Of Shadows

Eurorack Module
v 3.0





Components

1	Assembled Sound of Shadows digital delay module
1	DC power cable – 9" Ribbon cable (Doepfer standard)
2	M3x0.5x6mm stainless-steel machine screws
2	M3 Nylon washers

Specifications

Supply Voltage	$\pm 12\text{VDC}^1$		
Supply Current (max draw @ $\pm 12\text{V}$ & $+5\text{V}$)	$I_{+12\text{V}} = 19\text{mA}$	$I_{-12\text{V}} = -15\text{mA}$	$I_{+5\text{V}} = 21\text{mA}$
Supply Current (max draw @ $\pm 12\text{V}$)	$I_{+12\text{V}} = 41\text{mA}$		$I_{-12\text{V}} = -15\text{mA}$
Max. Input Voltage (@ $\pm 12\text{V}$)	$10\text{V}_{\text{p-p}}$		
Max. Output Voltage (@ $\pm 12\text{V}$)	$6\text{V}_{\text{p-p}}$		
Input & Output (I/O) coupling	Direct ²		
Output Impedance	$1\text{k}\Omega$		
Control Voltage (CV) inputs	$\pm V_{\text{supply}}$		
CV input coupling	Direct		
CV input impedance	$100\text{k}\Omega$		

1) Has been tested and performs well with supply voltages from $\pm 9\text{VDC}$ to $\pm 15\text{VDC}$.

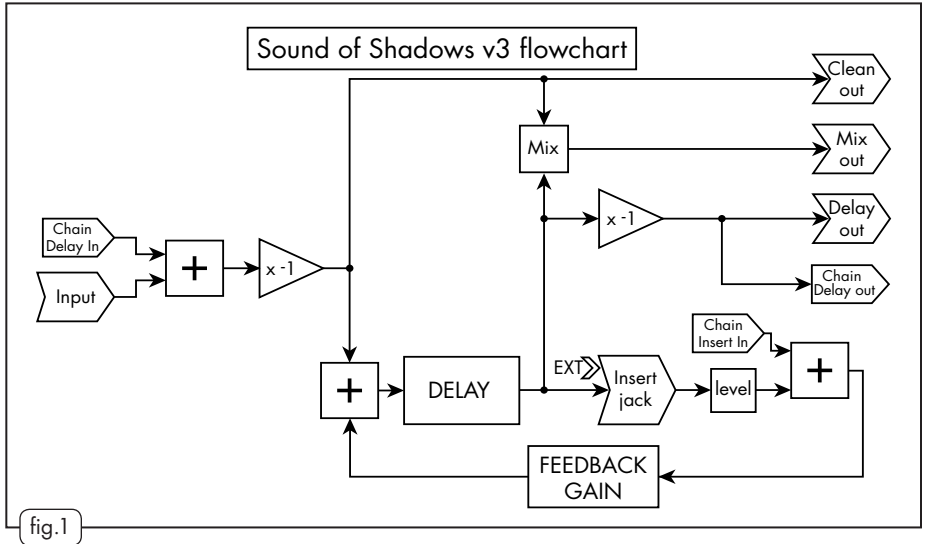
2) I/O jacks are direct-coupled. The Delay circuit itself is not. A DC signal at the input will be available at the Clean, and Mix outputs, but not available at the delay output.

What is it?

The Sound of Shadows (SoS) is a voltage-controlled (VC) digital delay module based around the PT2399 echo IC¹ from Princeton Technology – which was, by the way, originally designed for Karaoke equipment.

As with all f(h) products, the SoS was engineered towards maximizing functionality while keeping cost as low as possible. If some aspects of the unit seem awkward, it is most likely due to this. The goal is to make unique, useful, enjoyable, and affordable instruments, not just hoover² out your bank account.

And remember: every instrument has its quirks and unexpected aspects so RTFM³! All the way through! Specific quirks are mentioned in the description of the particular feature they apply to, so please read this through before emailing!



Feature summary:

- VC delay rate.
- VC feedback level.
- Signal input.
- Clean, Delayed, and Mix outputs.
- Feedback loop insert jack.
- Multiple units can be chained together via rear header.
- Chaining cable available separately.

Controls

Rate: This controls the delay clock rate, which in turn controls how fast the

1) Integrated Circuit

2) Hoover is a company that manufactures vacuum cleaners.

3) RTFM = Read The F*cking Manual!

delay steps through its memory array and thusly the amount of delay. Clockwise rotation increases the rate (which decreases the delay time), counter-clockwise decreases the rate (which increases the delay time).

Feedback: Controls how much of the delayed signal is fed back into the delay cell. Feedback is what creates a reverberation or echo sound – multiple repetitions of an acoustic event. Clockwise rotation increases the amount fed back, and thus the number of repeats, counter-clockwise decreases the amount. The nominal operating area is between 6:00 and 9:00 during normal usage. More than this will set up a self-propagating feedback cycle that will quickly get out of hand.

Insert: This is the attenuator for the feedback loop insert jack. The jack is situated between the delay cell output and the feedback cell input. The feedback cell input is calibrated for the output of the delay cell, which is around 1.5V_{pp} maximum, and most standard signals inserted here will overload the feedback cell unless attenuated, hence the Insert attenuator. Turn clockwise to increase the signal level, counter-clockwise to attenuate.

When not using the Insert jack, it is recommended to keep this control turned fully clockwise, to the maximum position. Otherwise, you are attenuating the output of the delay cell, which will affect everything else further down the signal path.

Input: This is the input level control. Just like a volume knob – clockwise increases level, counter-clockwise attenuates the signal level.

Mix: Um, yeah. Guess what this controls? The balance of the mixed signal at the Mix output! Seriously, this controls the mix between the Clean and Delay signals at the Mix jack, really!

Jacks

The jacks are grouped by the type and direction (into or out of the module) of the relevant signal.

CV in

Rate: Quirk warning: Rate CV behavior is inverted. Negative increases rate, positive decreases. If that bugs you too much, just think of it as the delay CV input and the issue magically disappears! Positive increases the delay, and negative decreases the delay.

Feedback: This works normally, positive CV increases feedback, negative decreases same.

Signal in

Input: This is kind of important for a delay unit: you need a signal to delay, or else they're somewhat dull effects. This is the jack where that signal is input into the delay.

Insert: This is the feedback loop insert breakjack. Inserting a plug here will

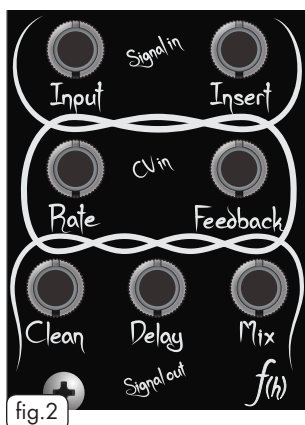


fig.2

disconnect the output of the delay cell from the input of the feedback cell, with the inserted signal now going directly to the feedback gain cell.

One use for this is to insert an effect – or even another delay unit (yes, they can be daisy-chained quite effectively) – into the feedback loop. To do this, patch the Delay out into the desired effect, and the output of the effect into the Insert jack. You may need to adjust the Insert level control (see above) for best sound.

Output

Clean: A buffered and inverted copy of the input signal.

Delay: The buffered & scaled output of the delay cell

Mix: A linear mix of the Clean and Delay signals, the balance of which is set by the Mix control pot.

Chaining Header

The rear header is to chain two or more SoS together for longer delay times, and other effects, without using up the front jacks. There is one output and two possible inputs (See fig.1 for graphical locations of the connection points.):

Delay out: Buffered, inverted, delay signal output.

Delay In: Equivalent to the Input jack. Chained signal is summed with input signal and sent directly to delay cell with no attenuation (see following Chaining Delay Trimmer section).

Insert in: Equivalent to using the Insert jack, but without breaking signal path. Chained signal is summed with output of Delay and Insert, then sent through the feedback gain cell before entering the delay circuit, allowing signal attenuation.

Chaining Delay Trimmer

During development, it was noticed that overdriving the delay input of the second Sound of Shadows resulted in some delightfully horrific mangling, screeching, and generally cacophonous sounds. However, it could not be the default because it also drove the output up to $\pm 10V$, risking damage to connected modules. This trimmer is the compromise.

Want a dangerous, horrendous, mess? Turn it all the way down (counter-clockwise). Want a safe, factory-friendly setting? Turn it all the way up (clockwise). In between? Put it where you want it. To repeat, however, and in officially-legal-sounding words⁴ :

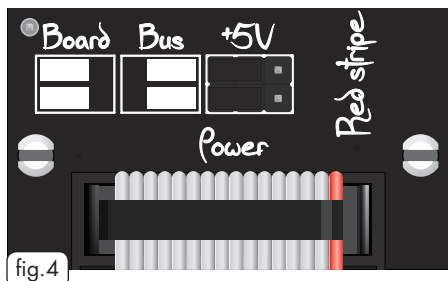
WARNING: USE AT YOUR OWN RISK. USE OF THIS FEATURE WILL CAUSE OUTPUT LEVELS THAT ARE NOT COMPATIBLE WITH EURORACK STANDARDS AND WILL DAMAGE SOME MODULES, AND MAY DAMAGE THE REST. FLIGHT

4) >A.K.A.: Royal Capslock

OF HARMONY CANNOT ACCEPT RESPONSIBILITY FOR ANY DAMAGE CAUSED BY USE OF THIS FEATURE.

The Chaining Delay Trimmer only affects the chained signal connected to the Delay In pin and has no effect on unchained devices.

Power



The power connector header is a 2x8/16-pin shrouded box header which accepts the standard Doepfer power cable. This header style is polarized, meaning the connector can only be inserted one way, to prevent connecting the power backwards and damaging the unit.

This assumes that you are using either the supplied cable or one manufactured by Doepfer.

Looking at the rear of the module, the negative supply (red stripe) is on the left, positive supply is on the right (see fig.4).

+5V Source Selection

The Header marked "+5V" allows you to select whether the +5V is supplied by the main +5V power bus or derived internally from the +12V supply. Set the shunts in the position indicated by the PCB legend.

Stuff

A big thank you to those who have sent in suggestions and comments, keep them coming!

Comments, samples, suggestions, complaints to:
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We are tomorrow's shadows...

$f(h)$