flight of harmony

the Sound Of Shadows KIT

Digital Delay Effect
Eurorack Module Kit
~rev1.0~

Specifications

Supply Voltage	±12VDC[1]	
Supply Current (max draw @ ±12V)	I_{V+}= 51mA	I_{V-}= -21mA
Max. Input Voltage (@ ±12V)	$10V_{p\text{-}p}$	
Max. Output Voltage	$6V_{p\text{-}p}$	
Input & Ouput (I/O) coupling	Direct[2]	
Output Impedance	1kΩ	
Control Voltage (CV) inputs	$\pm V_{supply}$	
CV input coupling	Direct	
CV input impedance	100kΩ	
Number of pieces (nuts & washers of pots & jacks not counted)	159	
Kit Difficulty	Advanced	

[1] Has been tested and performs well with supply voltages from ±9VDC to ±15VDC.
[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, Mix, and VCA outputs, but not available at the delay output.

Contents

(1) Front Panel
(3) PCB- Main, Potentiometer, Jack
(3) Resistor Card
(1) Semiconductor Card
(1) Capacitor Card

(1) Hardware bag
- (1) 9" ribbon cable
- (1) 2x5 box header
- (1) 2x5 IDC socket connector with strain relief
- (1) 2x8 IDC socket connector with strain relief
- (4) M3x0.5 eurorack mounting screw
- (4) M3 nylon washer
- (4) 1x7 pin header (see note)
- (4) 1x7 socket header (see note)
- (4) Nylon PCB Standoff (see note)

(1) Potentiometer bag
- (2) A100k Potentiometer (Input, Insert)
- (4) B100k Potentiometer
- (6) Washer
- (6) Nut
- (6) Knob

(1) Jack bag
- (10) 3.5mm TS jack
- (10) Washer
- (10) Nut

(1) Reference manual (this thing)

NOTE: This kit is designed to be able to use jacks and/or pots with varied heights from different manufacturers. Lengths of PCB standoffs and pin headers will vary depending on contents. The Potentiometer PCB gets the (2) longer standoffs and (2) longer pin headers.

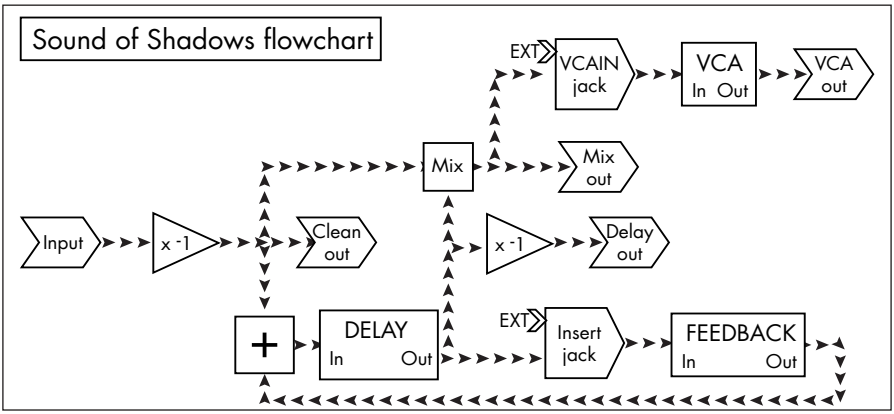
Overview (taken from SoS-E manual)

What is it?

The Sound of Shadows (SoS) is a voltage-controlled (VC) digital delay module based around the PT2399 echo IC[1] from Princeton Technology – which was, by the way, originally designed for Karaoke equipment. The SoS is essentially two separate modules: a delay and a voltage-controlled amplifier (VCA). The focus of the SoS is the delay; the VCA was thrown in because half of an LM13700 IC was unused, so the VCA is very basic.

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 hoover[2] out your bank account.

Remember: every instrument has its quirks and unexpected aspects, so RTFM[3] 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:

Delay

- VC delay rate
- VC feedback level
- Signal input
- Clean, Delayed, and Mix outputs
- Feedback loop insert jack

VCA

- Input breakjack
- CV input
- Output

1) Integrated Circuit
2) Hoover is a company that manufactures vacuum cleaners.
3) RTFM = Read The F*cking Manual

Overview (cont.)

Controls

Rate: This controls the delay clock rate, which in turn controls how fast the 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 $1.5V_{p\text{-}p}$ 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: Controls the mix between the Clean and Delay signals at the Mix jack.

VCA: Controls the VCA output level. Standard behavior with a minor quirk: this control will not fully attenuate the output, but a negative CV applied to the VCA CV input will bring the level much further down. It was either this or add another IC + associated components to the PCB and jack the price further up.

Jacks

The jacks are grouped by the type and direction (into or out of the module) of the relevant signal. The VCA jacks are just labeled "VCA", as the function of each is already described by what row they are in.

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.

Overview (cont.)

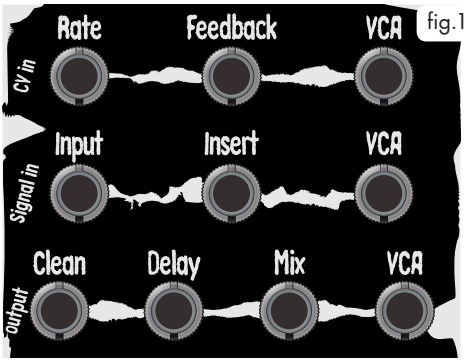


fig.1

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

VCA: Same as feedback, positive CV increases the output level, negative attenuates it.

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[4]. Inserting a plug here will 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.

VCA: This is another breakjack. The input of the VCA is normalized (normally connected to) the Mix output. Inserting a jack here breaks that connection, enabling the VCA to be used completely independently of the rest of the module.

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.

VCA: Output of the VCA.

4) Inserting a plug into a breakjack "breaks" the default signal routing. Removing the plug restores the default routing. In technical terms, it is a Normally-Connected (NC) switched jack.

Overview (cont.)

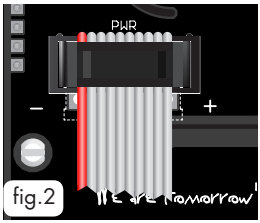


fig.2

Power: The power connector header is a 2x5 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.2).

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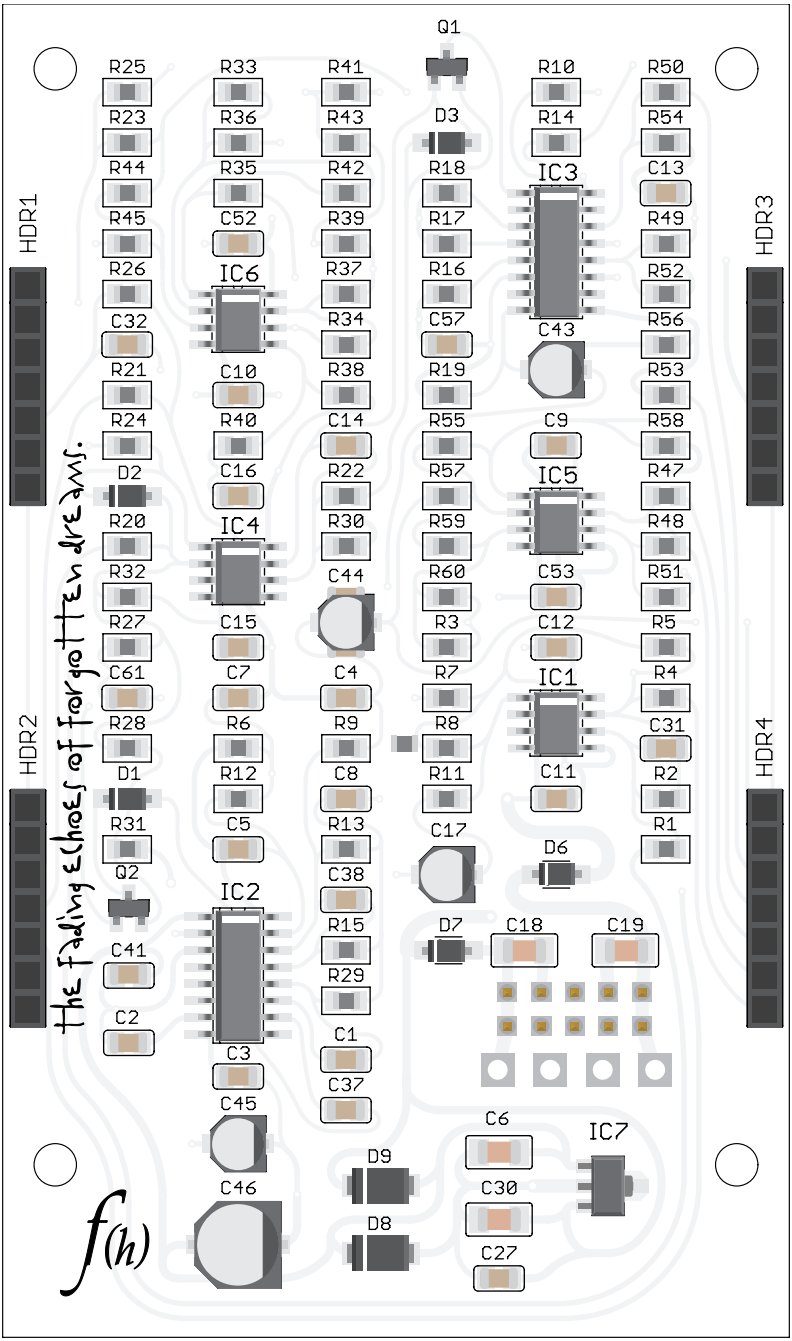
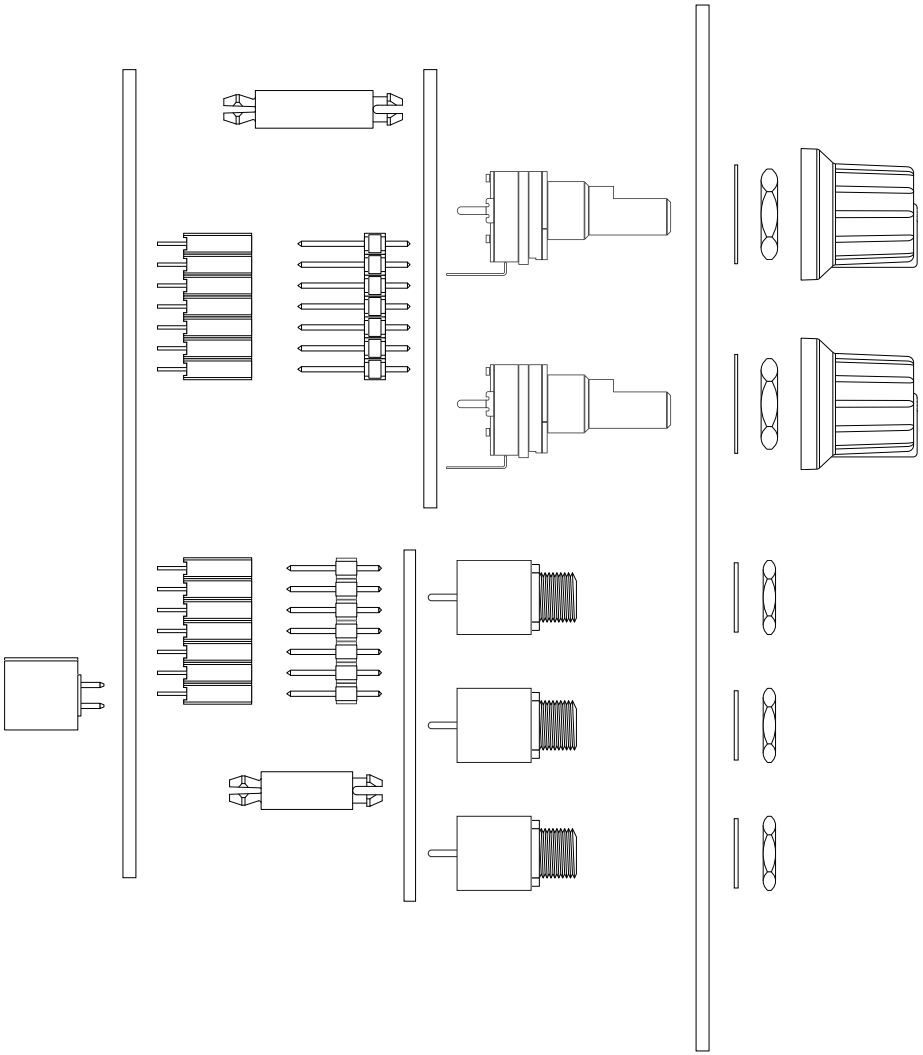
We are tomorrow's shadows...

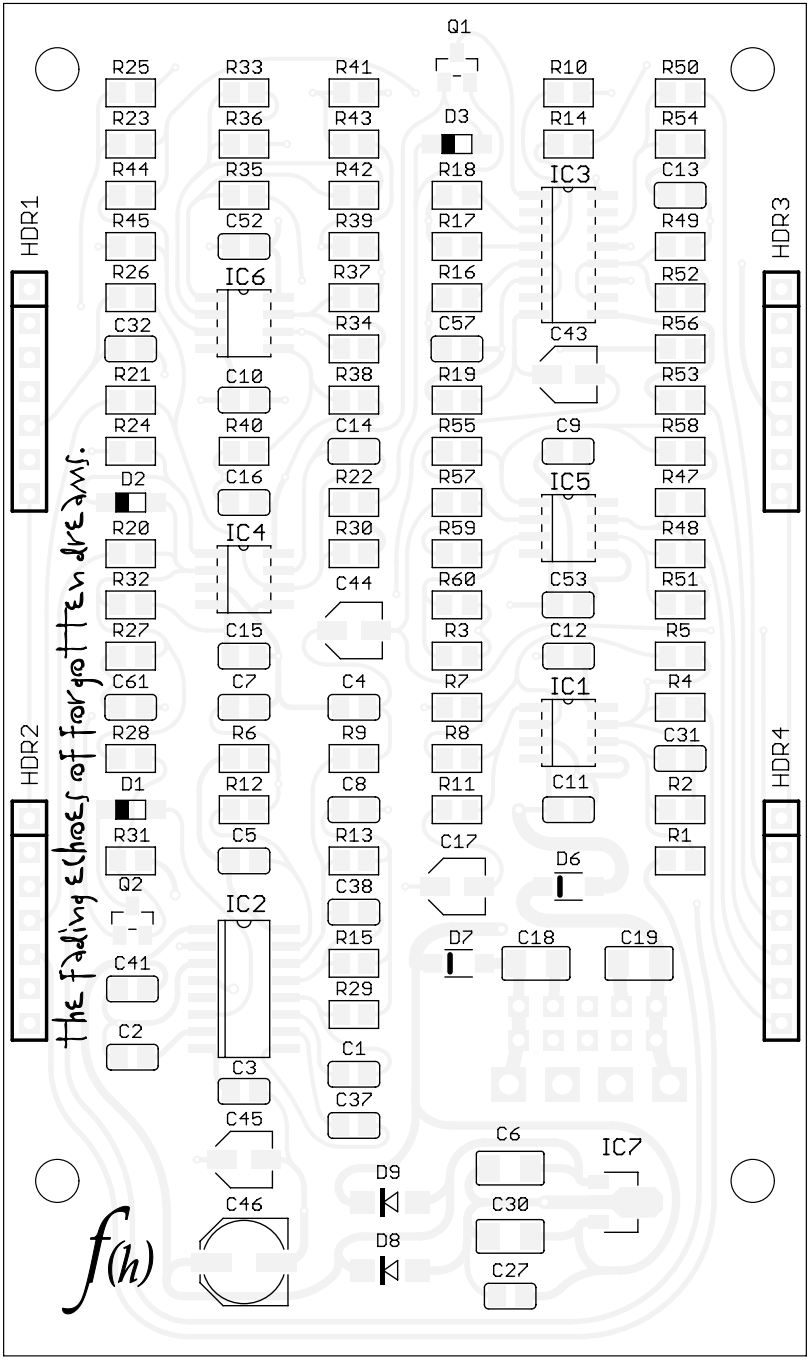
PCB Assembled View



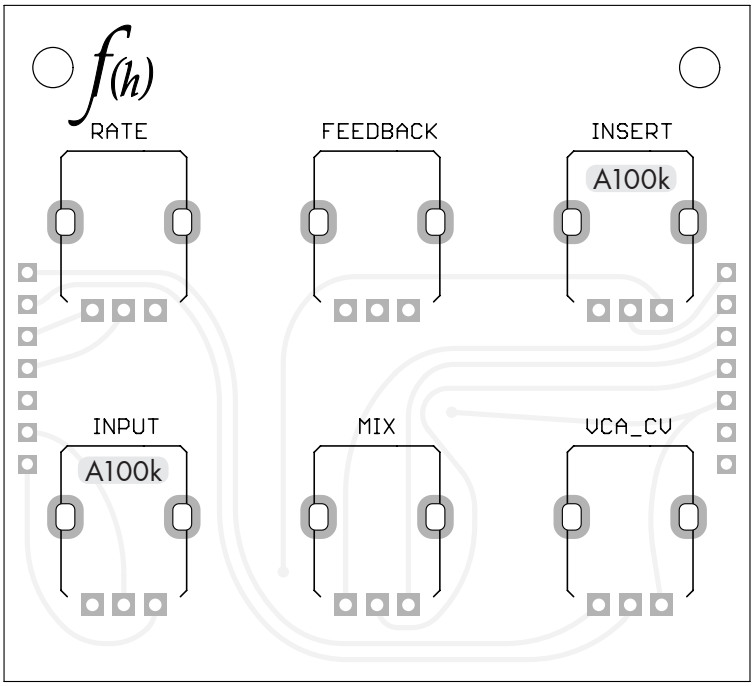
Exploded View

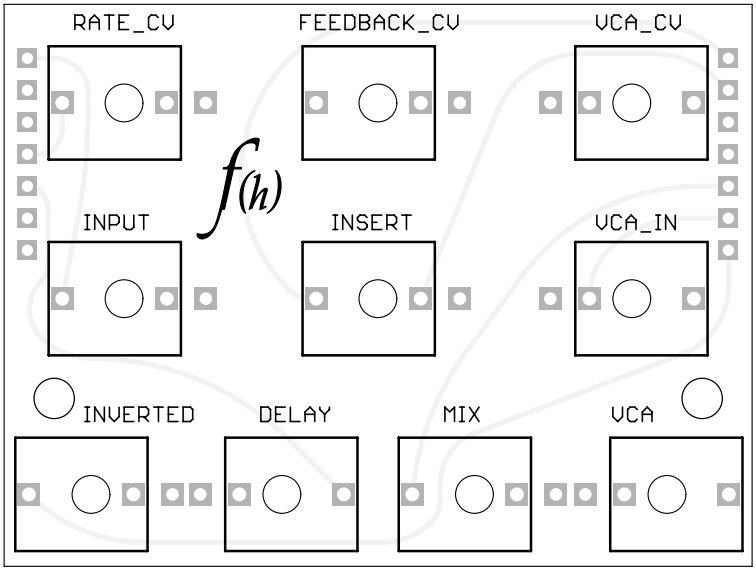


SMD Reference

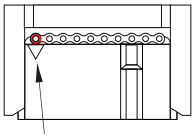


Control & Jack Reference

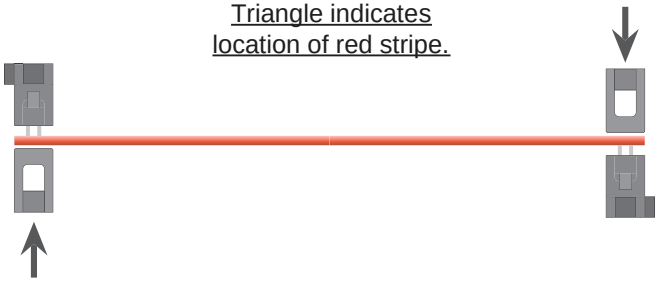




Power Cable Assembly



Triangle indicates
location of red stripe.



Miscellaneous