flight of harmony

f(h)

Famine 500

Voltage-controlled power starvation Eurorack Module kit
v1

Contents

(1) Front panel
(3) PCB
(1) Resistor card
(1) Semiconductor card
(1) Capacitor card

(1) Hardware bag
> (2) 2x8 box header
> (2) M3x0.5 eurorack mounting screw
> (2) M3 nylon washer
> (8) 3/8" locking PCB standoff
> (2) 1x3 0.1" pitch 0.235" height pin header
> (2) 1x4 0.1" pitch 0.235" height pin header
> (2) 1x5 0.1" pitch 0.235" height pin header
> (2) 1x7 0.1" pitch 0.235" height pin header
> (1) 1x4 0.1" pitch 0.45" height pin header
> (2) 1x3 0.1" pitch machined socket header
> (2) 1x5 0.1" pitch machined socket header
> (2) 1x7 0.1" pitch machined socket header

(1) Power cable bag
> (1) 9" 16-conductor 0.050" pitch ribbon cable
> (1) 12" 16-conductor 0.050" pitch ribbon cable
> (3) 16-pin IDC female socket header (black)
> (3) 16-pin IDC male pin header (grey)

(1) Controls bag
> (2) Potentiometer, B10k
> (2) M7 Washer
> (2) M7 Nut
> (2) M7 Knob
> (2) 3.5mm TS jack
> (2) M6 Washer
> (2) M6 Nut
> (2) SPDT (Single-Pole, Double-Throw) toggle switch (with nut)
> (1) DPDT (Double-Pole, Double-Throw) toggle switch (with nut)
> (3) 10-40 hex nut
> (3) #10 star internal-tooth lock washer

(1) Reference manual (this thing)
(1) Owner's manual (that other thing like this thing)

Kit Notes

Tools

- Soldering iron with large and fine tips
- Hot air gun (advised)
- Solder
- Fine-tip tweezers
- Nut drivers/sockets/wrenches:
  - 7mm (toggle switch)
  - 8mm (jack nuts)
  - 10mm (potentiometer nuts)

Skills

THIS IS NOT A BEGINNER-LEVEL KIT

Kit contains both very small (0603) and relatively large (DPAK) components. The small ones are tricky and the large require a lot of carefully-applied heat.

This kit assumes that you have a basic understanding of electronics, electronic components, and soldering and assembling electronics. Note that this kit is almost entirely Surface Mount Technology (SMT), so the assumption is that you understand how to work with Surface Mount Devices (SMD) and have some experience.

This doesn't mean that you're *completely* on your own, just that I'm not going to hold your hand[1]. Below are a few things to help get you started. Feel free to ignore them.

Assembly Tips

- For the smaller SMD, use the smallest soldering iron tip that you have. My favorite is the Weller ETR: (Not an endorsement, nor do I get anything from it,
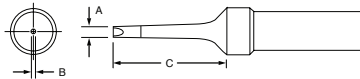
Narrow Screwdriver

Cat. No.	A		B		C	
	in.	mm	in.	mm	in.	mm
ETR	0.062	1.60	0.044	1.12	0.625	15.90

it's just a good reference point.) Remember to switch back to a larger tip when soldering the through-hole components and the regulators.

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1) For many reasons, but two in particular: First, I'd have to leave my house, and I hate doing that. Second, it's really hard to solder with only one hand.

Kit Notes (cont.)

- Good, fine-tip tweezers are a must. The Wiha 4b and 7a tweezers are great[2].

- One helpful trick for soldering SMD with wire solder is to pre-solder one pad for each component location. Next, hold the component in place and touch your soldering iron tip to the pre-soldered pad to reflow the solder. Then you can solder the other side normally.

- *Flux is your friend.* Use flux. Water-soluble flux is best for a clean finish, but you have to make sure to get it all off when done, as it can corrode the joint and some fluxes may also be capacitive. NOTE: The potentiometers and switches are NOT sealed and cannot be submerged; so don't wash them. You can also use no-clean flux.

- *Smallest first.* Solder the components in increasing order of size. Per board, per side, not overall.

- *Minimize heat exposure.* Heat destroys components, and SMD are particularly sensitive because they have less mass to distribute the heat. Flux helps with this too.

- Use the face plate to line up the potentiometers, jacks, and LEDs, before soldering; this is much easier than resoldering them to line them up correctly afterward.

Assembly Order

The easiest build order is as follows:

- Control PCB:
    1. All SMD
    2. All panel components
    3. Socket headers

- Mid PCB:
    1. All SMD
    2. Headers

- Rear PCB:
    1. Rear side SMD — VR- & VR+
    2. Front side SMD
    3. HDROUT, HDRIN, HDR22, HDR23
    4. HDR29, HDR30[3]

NOTE: Use a large tip and a heat gun (if possible) to solder VR- and VR+. The heat sink areas will wick the heat away rapidly, so use the heat gun to preheat the board.

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2) IMO, their 5abb were the best, but they discontinued them so FML. No, you can't have mine.
3) No, there aren't 30 headers, I forgot to update the numbering before finalizing the design.
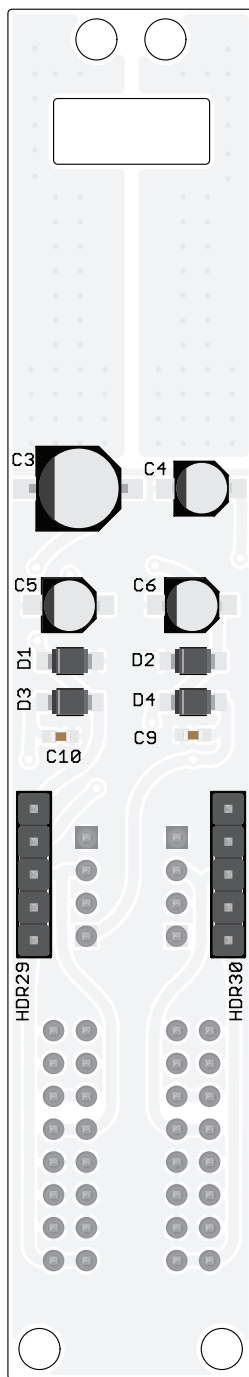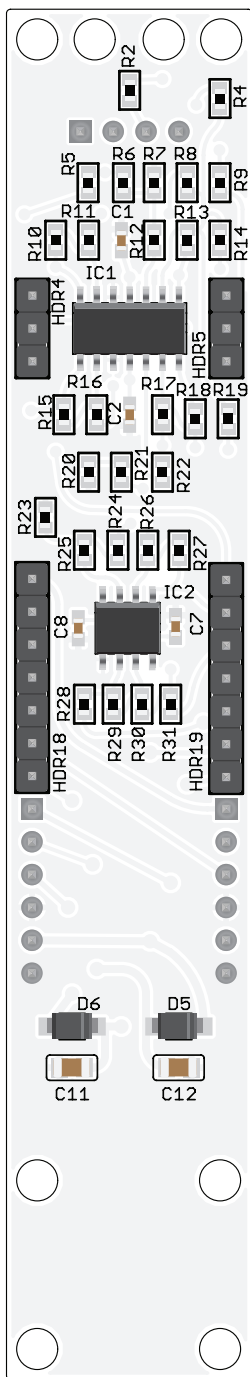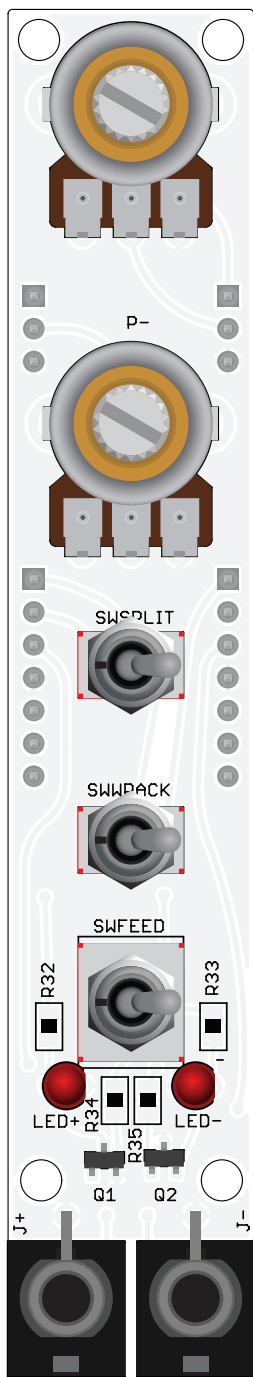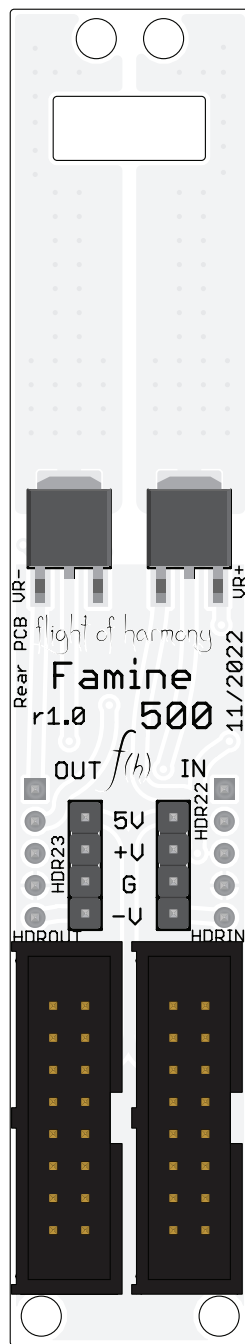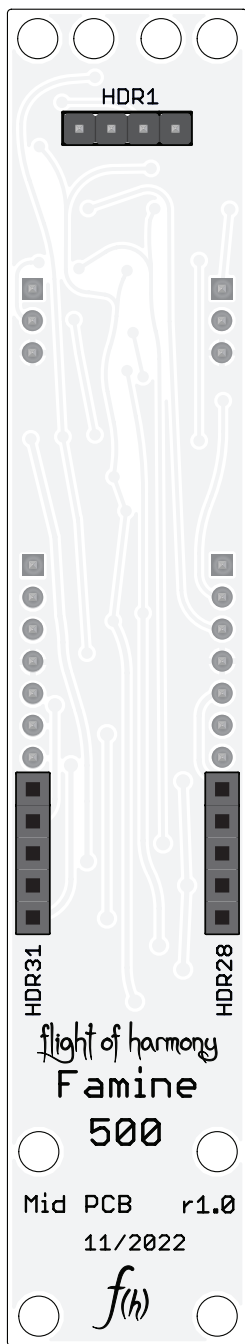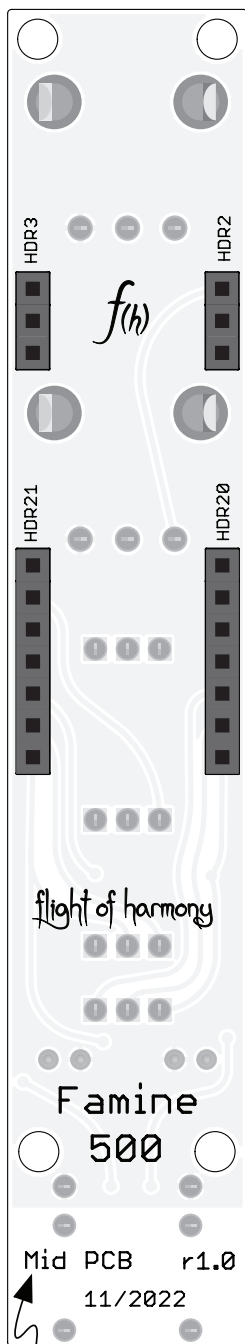
Kit Notes (cont.)

Help

      If you're still having problems, email me! I am always happy to help. When emailing, please include high-resolution pictures of your circuit boards.

      Most of the troubleshooting requests I have received were solved by zooming in and closely examining the pictures. Cold solder joints are sneaky and hard to spot if you haven't dealt with them before. A cold solder joint is where the solder doesn't adhere to both the pad and the component lead, and just flowed around one of them without making contact. They happen, and they suck, but they're easy fixes once you find them.
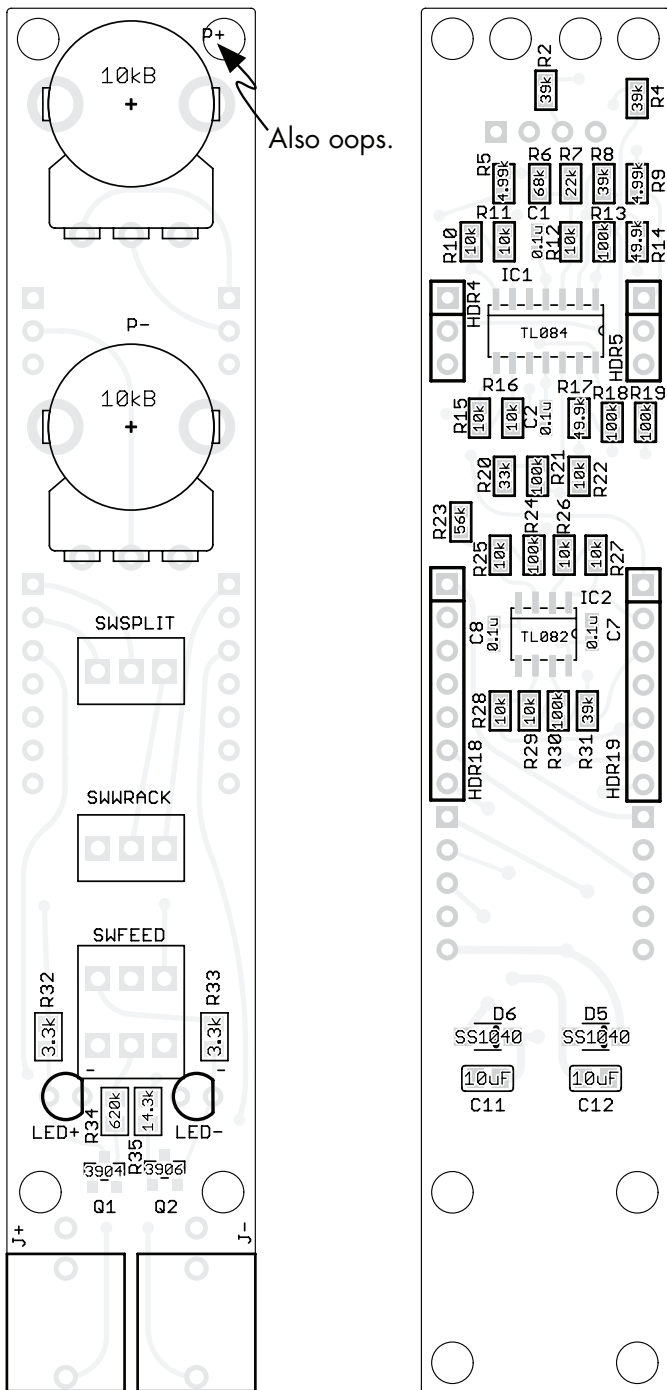
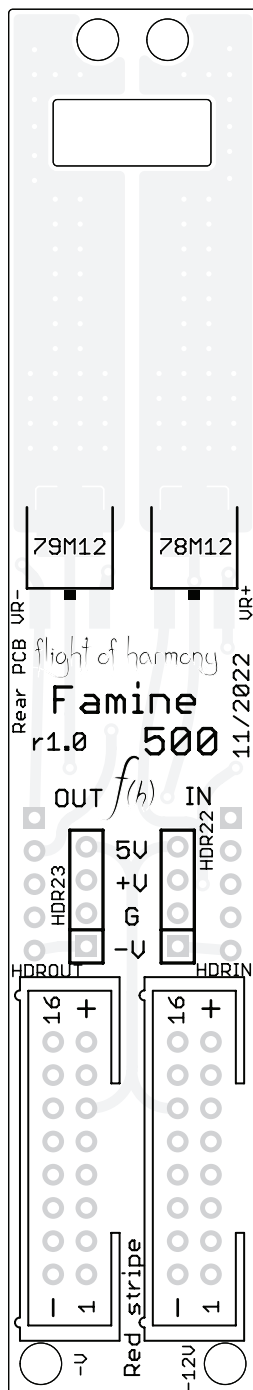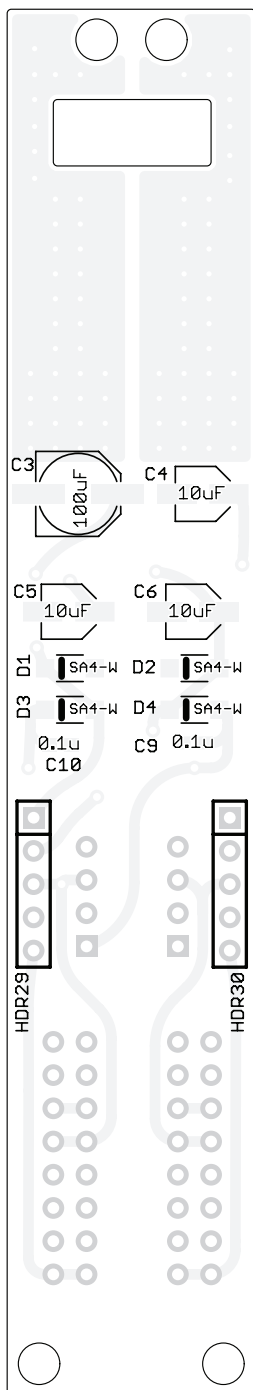# PCB Assembled Front View

PCB Assembled Rear View

HDR3

HDR2

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HDR21

HDR20

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HDR1

HDR31

HDR28

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Famine
500

Mid PCB   r1.0
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Rear PCB VR−   VR+

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r1.0   11/2022

OUT *f(h)* IN

HDR23   HDR22

5V
+V
G
−V

HDROUT   HDRIN

Oops, should say "Control".

SMD Reference

P+

10kB
+

Also oops.

P−

10kB
+

SWSPLIT

SWWRACK

SWFEED

3.3k R32

3.3k R33

LED+   620k   14.3k   LED−
R34   R35
3904   3906
Q1   Q2

J+   J−

39k R2

39k R4

R5   R6 R7 R8   R9
4.99k 68k 22k 39k 4.99k

R11 C1   R13
R10 10k 10k 0.1u 100k 49.9k R14
R12

IC1

HDR4   TL084   HDR5

R16   R17   R18 R19
R15 10k 10k 0.1u 49.9k 100k 100k
C2

R20 R21
33k 100k 10k R22
R24

R23   R25   R26 R27
56k 10k 100k 10k 10k
R29 R30 R31 R39k
R28 10k

IC2

C8   C7
0.1u TL082 0.1u

HDR18   HDR19

D6   D5
SS1040   SS1040

10uF   10uF
C11   C12

C3
100uF

C4
10uF

C5
10uF

C6
10uF

D1 SA4-W

D2 SA4-W

D3 SA4-W

D4 SA4-W

0.1u
C10

C9 0.1u

HDR29

HDR30

79M12

78M12

VR-

VR+

Rear PCB

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OUT $f(h)$ IN

5V

+V

G

-V

HDR23

HDR22

HDROUT

HDRIN

16 +

16 +

- -V

- 1

- 1

- -12V

Red stripe

Exploded View

Controls & LED Installation

Finger-tight

Finger-tight

Solder first

These too

Set lens to desired height then solder
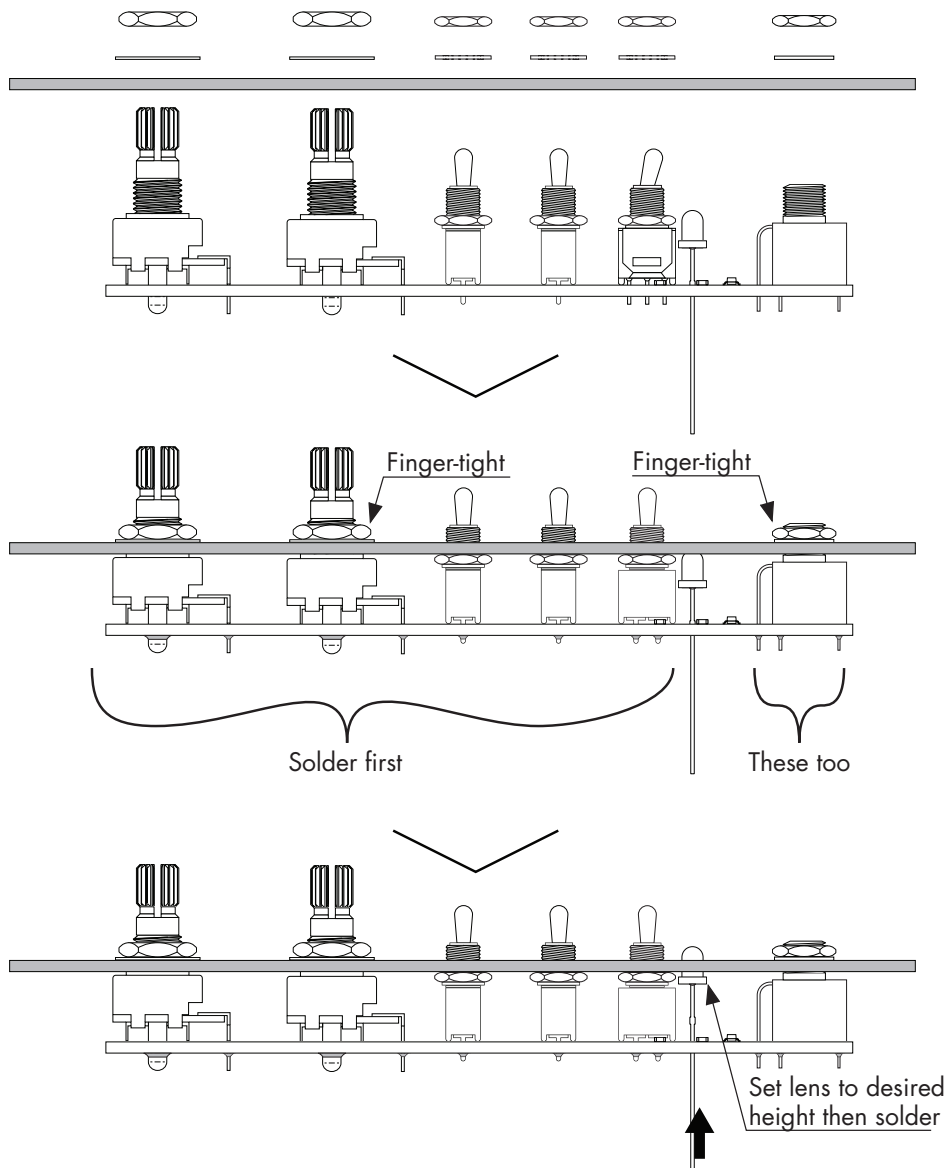
Power Cable Assembly

Power in cable (9"/23cm)

Socket header (black)
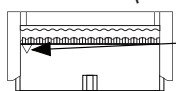
Triangle indicates pin1
(location of red stripe)
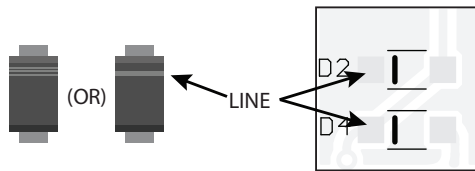
Power out cable (12"/30.5cm)

Pin header (gray)
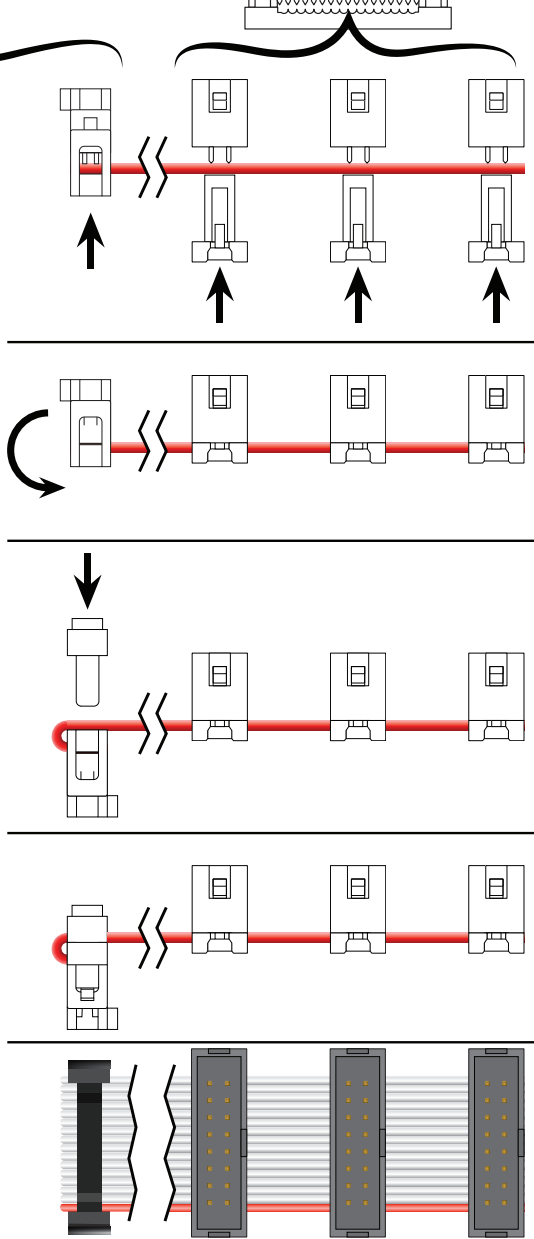
Miscellaneous

IC Orientation

There are many ways to mark proper orientation on ICs. Manufacturers keep changing the marks, and some may use combinations of them, but they all tell the same thing: where pin 1 is.

They all orient in the same direction relative to the mark.
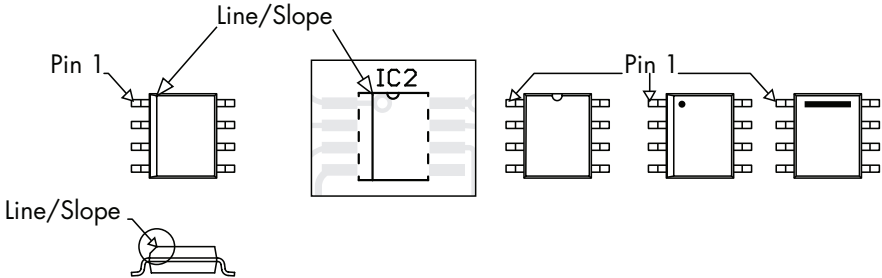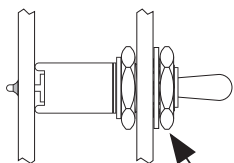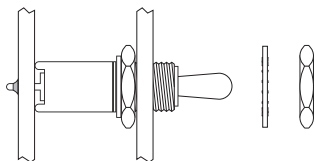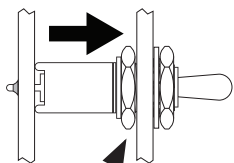

Diode Orientation

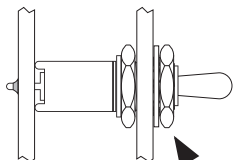## LED and capacitor Orientation
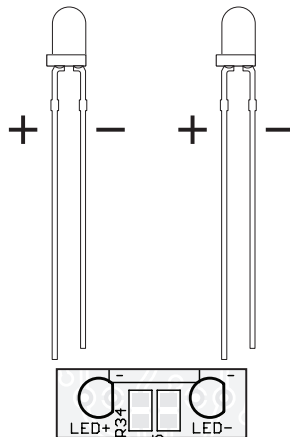
Miscellaneous (cont.)

Toggle switches are slightly shorter than the jacks and potentiometers, so the jam nut (rear nut) must be run flush with the panel before tightening the outer nut to prevent deforming the panel.

Spin flush with panel, do not tighten.

Spin flush with panel.

Tighten gently with nut driver/wrench/socket.

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