flight of harmony

Voltage-controlled power starvation Eurorack Module

v1

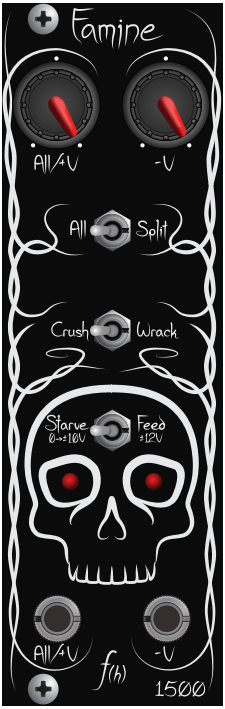

fig. 1: Famine 1500 front panel.

Components

1	Assembled Famine Starvation module
2	4-conductor quick-connect wiring harness
2	M3x0.5x6mm Stainless-Steel machine screws
2	M3 Nylon washers

Specifications

Width	8hp	
Supply Voltage	±12VDC[1]	
Supply Current (max draw @ ±12V)	I_{+12V}= 16mA	I_{-12V}= -14mA
Max. CV Input Voltage	±5V / $10V_{p-p}$	
Max. Output Voltage	≈±10.5V	
Min. Output Voltage	0V	
Max. Output Current (Amps)	1.5 A / 1500 mA	
CV input coupling	Direct	
CV input impedance	30kΩ	

1) Intended for ±12V systems only. Can operate on higher voltages but thermal capacity is untested. Not suitable for lower voltages.

FYI

As with all f(h) products, Famine 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[1] out your bank account.

And remember: every instrument has its quirks and unexpected aspects, so RTFM[2]! Specific quirks are mentioned in the description of the particular feature they apply to, so please read this through before emailing!

What is it?

Famine is a Voltage-Controlled (VC) Power Starvation module. It is placed between your power supply (PS) and the power bus to control the voltage of your power bus - think of it as a Voltage-Controlled Aplifier (VCA) for your power supply. It does not have a convential output signal; Famine's output is the power your modules run on.

What does it do?

Famine restricts the amount of power sent to your modules, starving them, causing erratic behavior. Starvation is a common technique in lofi and circuit bending, used for glitching, and often makes devices behave in completely new ways.

Each device is affected differently and it is impossible to predict what will happen. Some will have a vast change in behavior, while others will just shut off. See the "Tips" section for more on this.

Is it dangerous?

Good question! The answer: maybe. We've been researching this since 2010 and still do not have an answer. *Warning, it gets technical from here:* Damage from undervoltage incidents *does* occur in industrial and home applications - all AC, with mains voltage above 100V, and involving transformers and/or constant-current circuits, usually in power supplies. The damage theory is: to maintain a constant power output, as voltage decreases, current must increase. This increase in current then exceeds the current-handling capacity of the system and it melts down. In the scenario Famine is designed for, it is *after* the PS, internally current- and thermally-limited (on top of whatever protection is built into the PS), and very low-voltage.

Does this mean it is safe? No. Famine is not safe. You use this module entirely at your own risk. f(h) is not reponsible for any damage that may be caused by usage of this module.

Now back to: Is it dangerous? Maybe. Theory says "yes", but actual usage says "not yet". There has been only one reported instance of a module being damaged while being powered by Famine, but we have yet to determine what

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

failed or how. Because of this, caution is advised. Inductive kickback[3] is a known phenomenon, and modules with inductors or electromechanical systems should be avoided.

Controls and Behavior (fig. 2)

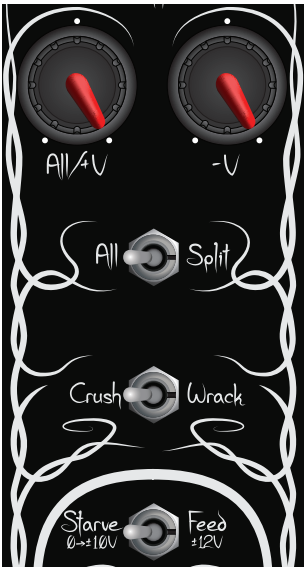

fig. 2: Controls.

Usage note: Performance varies mildly with load, so no exact values can be given.

All/+V: With the **All/Split** toggle in *All,* this knob controls both +V and -V output. When the toggle is set to *Split*, it controls only the +V output. Clockwise (CW) rotation increases voltage[4], counter clockwise (CCW) decreases voltage. (fig. 3)

-V: With the **All/Split** toggle in *Split,* this knob controls the -V output. When the toggle is set to *All*, it has no effect on anything. Clockwise (CW) rotation increases voltage, counter clockwise (CCW) decreases voltage. (figs. 4, 5)

All/Split: When set to *All*, +V and -V outputs are simultaneously controlled by the **All/+V** knob and CV input jack. When set to *Split*, the +V output is controlled by the **All/+V** knob and CV input jack, and the -V output is controlled by the **-V** knob and CV input jack

Crush/Wrack: *Only functions when **All/Split** is set to All*. This selects how the outputs change relative to each other. In *Crush*, the -V mirrors the change of +V (fig. 3). In *Wrack*, the -V output moves inversely with +V. (figs. 6-8)

Starve/Feed: True bypass[5] switch to enable or disable **Famine**. Set to *Starve* to enable **Famine**, set to *Feed* to disable **Famine**. (figs. 9, 10)

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3) While capacitors try to keep *voltage* constant, inductors (transformers, chokes, motors, etc.) try to keep *current* constant. Inductive kickback is when current through an inductor tries to reverse direction. As current flows through an inductor it generates a magnetic field. This field circulates in a direction that reinforces the flow and opposes changes to it. If the flow stops or is reversed, the magnetic field tries to force the flow to remain the way it was, and can cause current surges before it collapses.

4) This is an OCD nightmare. as value goes from 0 to 12, it is increasing. From 0 to -12, however, is decreasing numerically, but the absolute value is increasing, as is the magnitude. And so, throughout this manual, "increasing" and "decreasing" are used in the absolute value/magnitude sense, ignoring the polarity.

5) "True Bypass" means that when the device is bypassed, it is *completely* disconnected from whatever circuit it was affecting, as opposed to only *partially* disconnected. Typically this is by breaking both the input and output connections, while the horrible, icky, bad, *untrue* bypass may only disengage the output connection, which leaves the input of the device still attached to the circuit, draining it like a leech, and potentially coloring the signals.

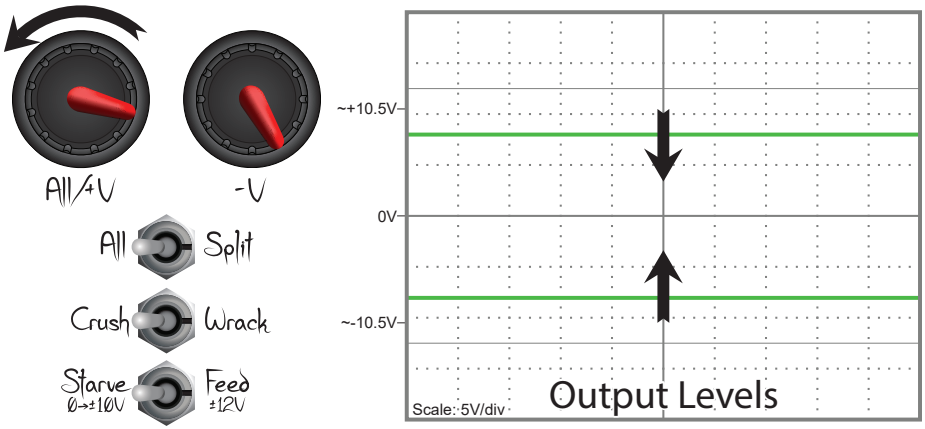

fig. 3: **All/+V** with **All/Split** toggle in *All*.

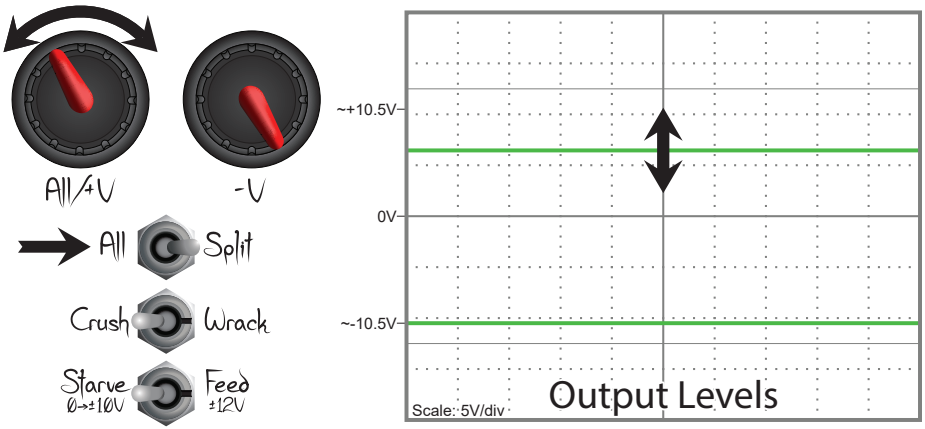

fig. 4: **All/+V** with **All/Split** toggle in *Split*.

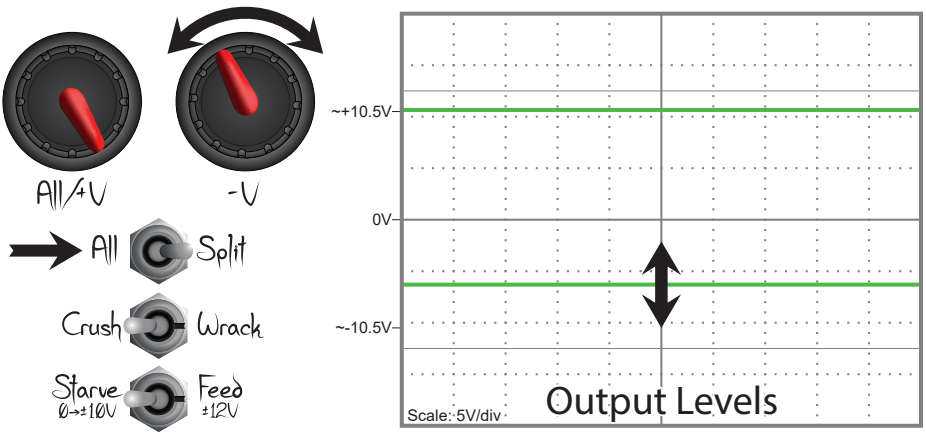

fig. 5: **-V** with **All/Split** toggle in *Split*.

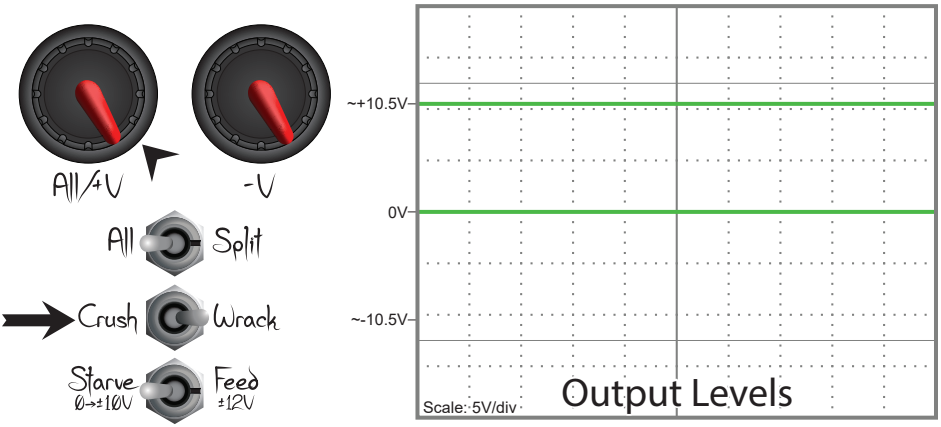

fig. 6: **All/+V** fully CW with **Crush/Wrack** toggle in *Wrack*.

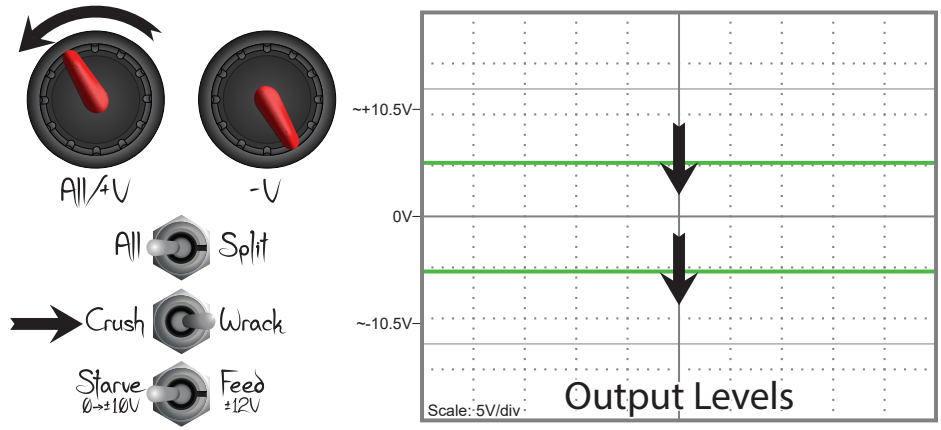

fig. 7: **All/+V** decreasing CCW with **Crush/Wrack** toggle in *Wrack*.

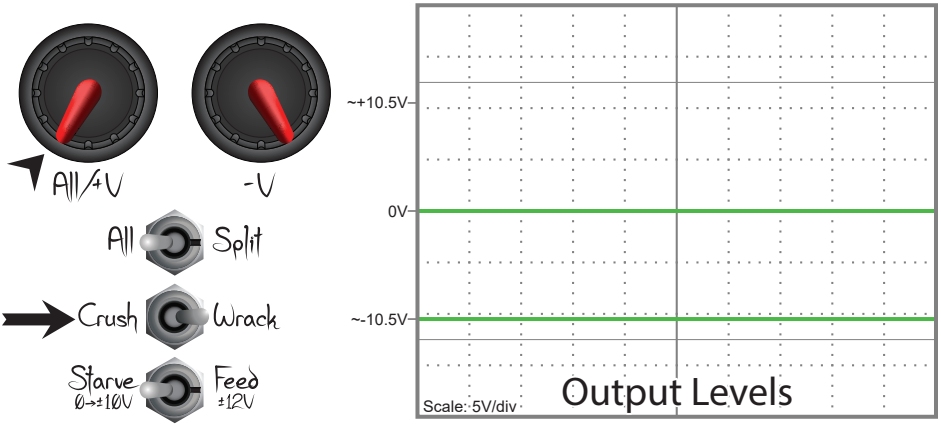

fig. 8: **All/+V** fully CCW with **Crush/Wrack** toggle in *Wrack*

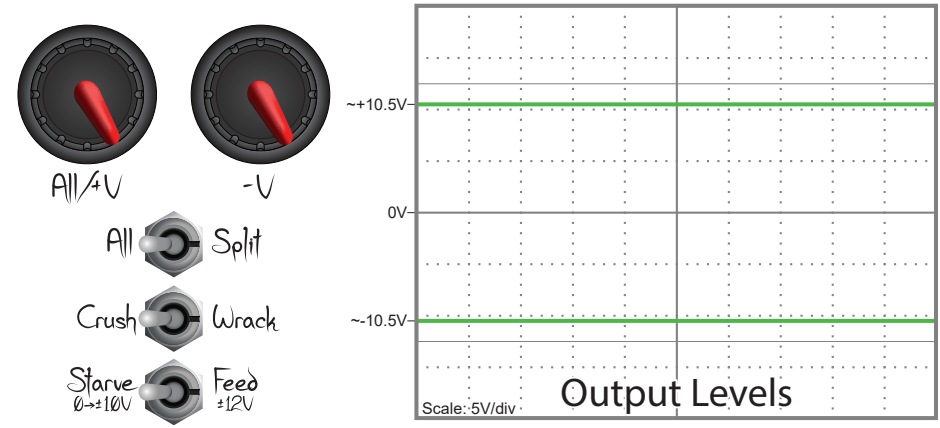

fig. 9: **Starve/Feed** toggle in *Starve* with knobs at maximum.

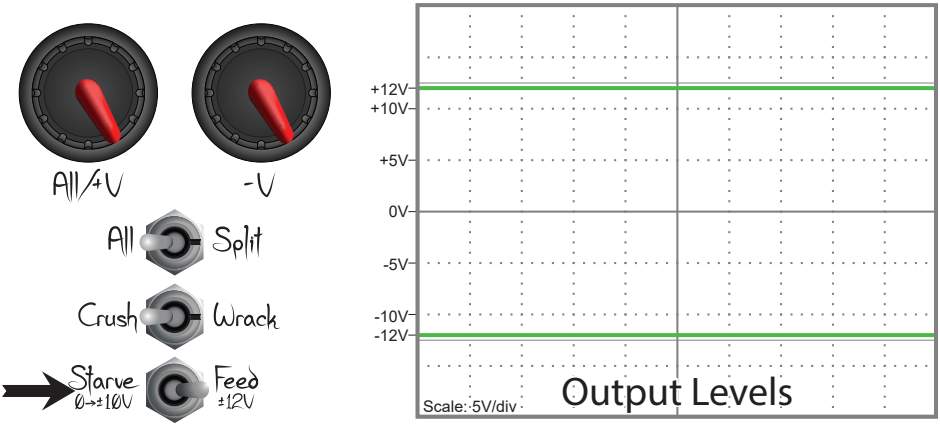

fig.10: **Starve/Feed** toggle in *Feed*.

The eyes (fig. 11)

fig. 11: The eyes.

The eyes of the skull glow to indicate the amount of starvation being applied: brighter = more starvation = less voltage.

Jacks (fig 12)

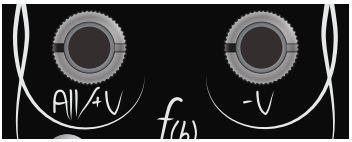

fig.12: Jacks.

CV works opposite to the knobs: as CV increases, output voltage decreases, i.e., more voltage = more starvation.

All/+V: CV input jack, summed with **All/+V** knob. With the **All/Split** toggle in *All,* this jack controls both +V and -V output. When the toggle is set to *Split*, it controls only the +V output.

-V: CV input jack, summed with **-V** knob. *Only functions when **All/Split** is set to Split.* With the **All/Split** toggle in *Split,* this jack controls the -V output.

Rear connections (fig. 13)

CAUTION

These connectors are directly connected to the power supply and can be extremely hazardous. Do not touch them directly while powered or allow them to contact conductive items in your case.

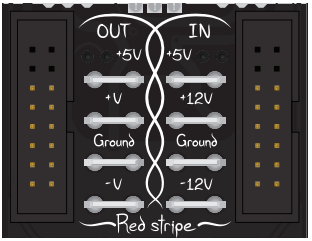

fig. 13: Rear power connections.

OUT: The side on the left is Famine's output section.

IN: The side on the right is Famine's input section.

Connector types

The 2x8/16-pin headers and the 1/4" (6.35mm) quick-connect headers are the same as those standard on Doepfer-style power distribution boards (busses).

As you can see in fig. 13 and on the module itself, there wasn't enough room for all the pins, so the Gate and CV pins were removed. I apologize if this inconveniences the two of you who still use those pins. You can use a small 2x2 jumper cable between busses to transmit those signals if needed. I can even make one for you if you're polite about it.

+5V

There is no starvation of the +5V rail, so the +5V headers are shorted together to allow the +5V to pass through to the bus if needed. A 5V converter module (like the f(h) 5x5 module) connected to the 12V supply can be used if you want the +5V starved as well.

Heat Sinks

CAUTION

The heat sinks are directly connected to the power supply and can be extremely hazardous. Do not touch them directly while powered or allow them to contact conductive items in your case.

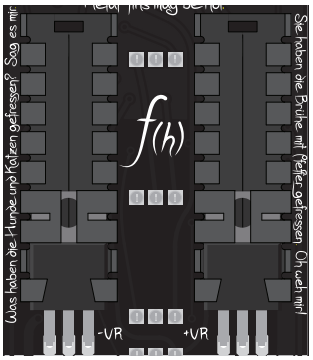

fig. 14: Heat Sinks.

The -VR heat sink is connected to the -V output pin and the +VR is connected to ground.

The heat sinks can get very hot during use, make sure they do not contact or come near to anything flammable, burnable, or meltable (like power cables).

If you intend to run Famine under a heavy load (over 500mA), make sure to allow for heat circulation and/or venting. Heavy loads are not recommended in shallow cases.

Example connections

Famine includes two sets of 4-conductor wiring harnesses, with one wire each for +5V, +12V, Ground, and -12V. You can also connect via the 2x8 headers or any combination of the two. Adapter cables are also fine.

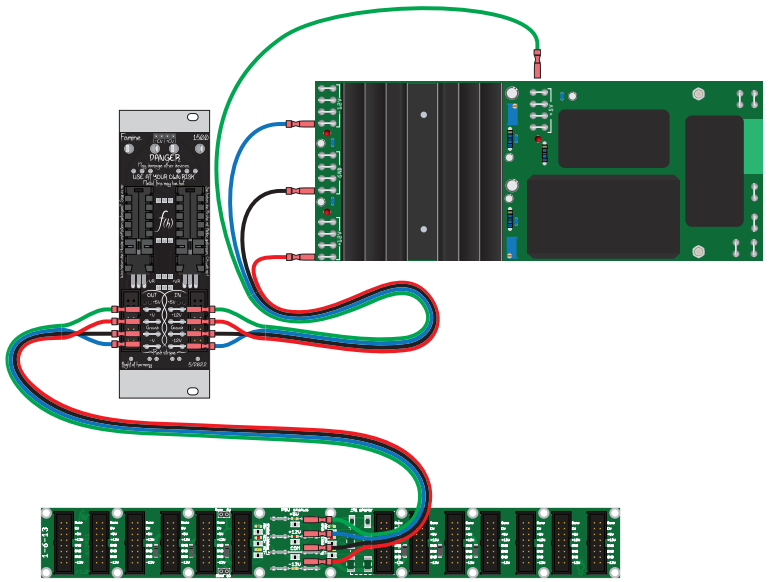
fig. 15: Connection example #1.

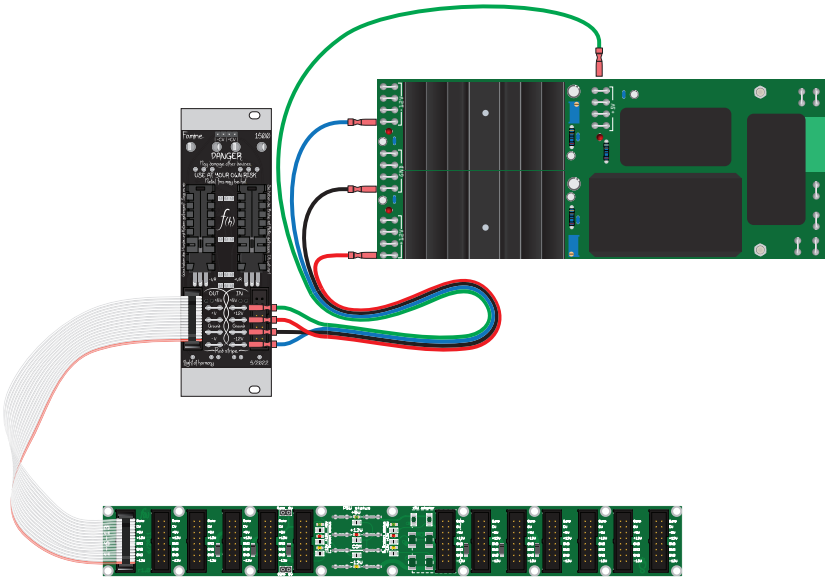

fig. 15: Connection example #2.

Hail and thanks to:

James and the ~~Giant Peach~~ Great Wizard. James for reminding me I had blabbed about Famine ten years ago and it was long overdue, and MxR Frost for torturing every damn module they laid wizardy hands on. James, the world will blame you for this one.

Huge thanks and appreciation to Wildfire Laboratories. Their great Commodity Fetishism module helped me say "Screw it, I'm doing it." Go buy their stuff, it's all really cool. (https://wildfirelaboratories.com/)

Finally, eternal gratitude to Einstürzende Neubauten for every damn thing they've done. This is your fault too.

Stuff

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

Comments, samples, suggestions, complaints to: flight@flightofharmony.com

http://www.flightofharmony.com

Oh weh mir...