100 GRIT MANUAL

Contents

Installation

Turn your eurorack system off while installing the module.

Included 10 pin keyed header cable will line up the red stripe on the cable with -12V (labeled STRIPE) on the module.
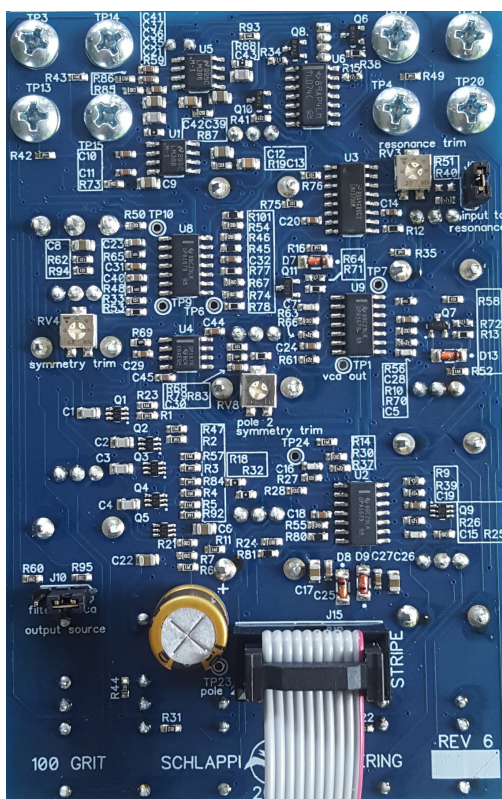
Please ensure that the red stripe is aligned to the -12V rail on the eurorack case power as well.

If you are not using the included cable please be careful to align the -12V (generally indicated with a red stripe) to the side of the jack labeled STRIPE.

The 100 Grit is diode protected so is unlikely to be damaged in the case that reverse voltage is applied, but if you think this is happening turn off your system as quick as possible.

Voltage Standards

We design our modules to the Doepfer Eurorack standard (http://www.doepfer.de/home_e.htm).

All inputs will handle anything from ground to the Eurorack rails +-12V (24V peak to peak, or Vpp) without damage.

Audio path input is optimized for +-5V (10Vpp) but since there is gain to the circuit and attenuators provided at the inputs, signals of a lower or higher amount can be accommodated.

For a clean 10Vpp input signal with the input attuator at about 75% and output gain knob at 75% both OUT and DIST out should be about 10Vpp. Since there is gain to the circuit OUT could be pushed to the rails (approx 22Vpp). The distortion circuit will self limit and never be more than about 12Vpp.

The VCA CV inputs (GAIN, RES CV) are both designed so that 5V input will provide unity gain, more than that will provide some gain.

100 GRIT OVERVIEW

A touch controlled distortion unit ranging from subtle tone control to total sonic obliteration. At it's heart is a classic low pass transistor ladder filter, OTA voltage controlled amplifier, and an output amplifier. The magic comes from the circuit bending influenced touch points and feedback paths turning it into a self contained performace instrument.

AUDIO INPUTS
IN 1 and *IN 2* are the inputs to the filter section, where they are mixed together.

CV INPUTS
Frequency
FM1 and FM2 sum together and control the cutoff frequency of the filter.

Resonance
RES controls the resonance of the filter and is attenuated by the CV pot under the RES bias pot.

Gain
GAIN controls the gain of the VCA and how hard the Distortion is being pushed.
This input is attenuated by the CV pot under the GAIN bias pot. No sound will come out of either output without some initial gain.
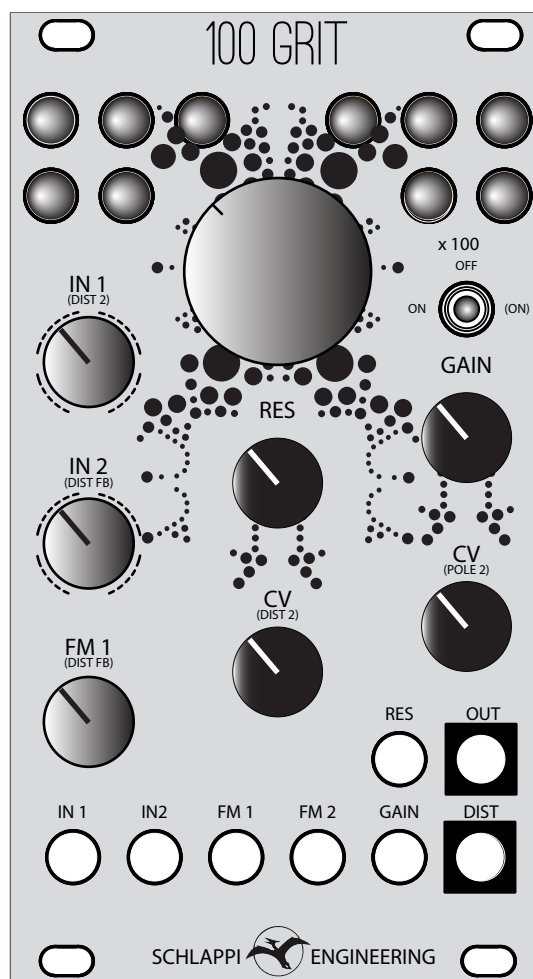
TOUCH POINTS
8 brass balls connected to sensitive points in the circuit and voltage control points. Touch more than one at a time or use with conductive materials as resistive patch points.

GAIN SWITCH
Gain x 100 for extreme distortion

OUTPUTS

OUT
Output from the VCA following the filter

DIST is the output of the distortion circuit following the VCA

To Start:

As a Filter:
Turn down all knobs except IN 1, FREQUENCY (the large knob in the middle), and GAIN
Insert audio into IN 1
Listen to OUT
IN 1 will be your input control and will start to overdrive between 50 and 75%
The FREQUENCY knob must be up so the low pass filter lets audio through
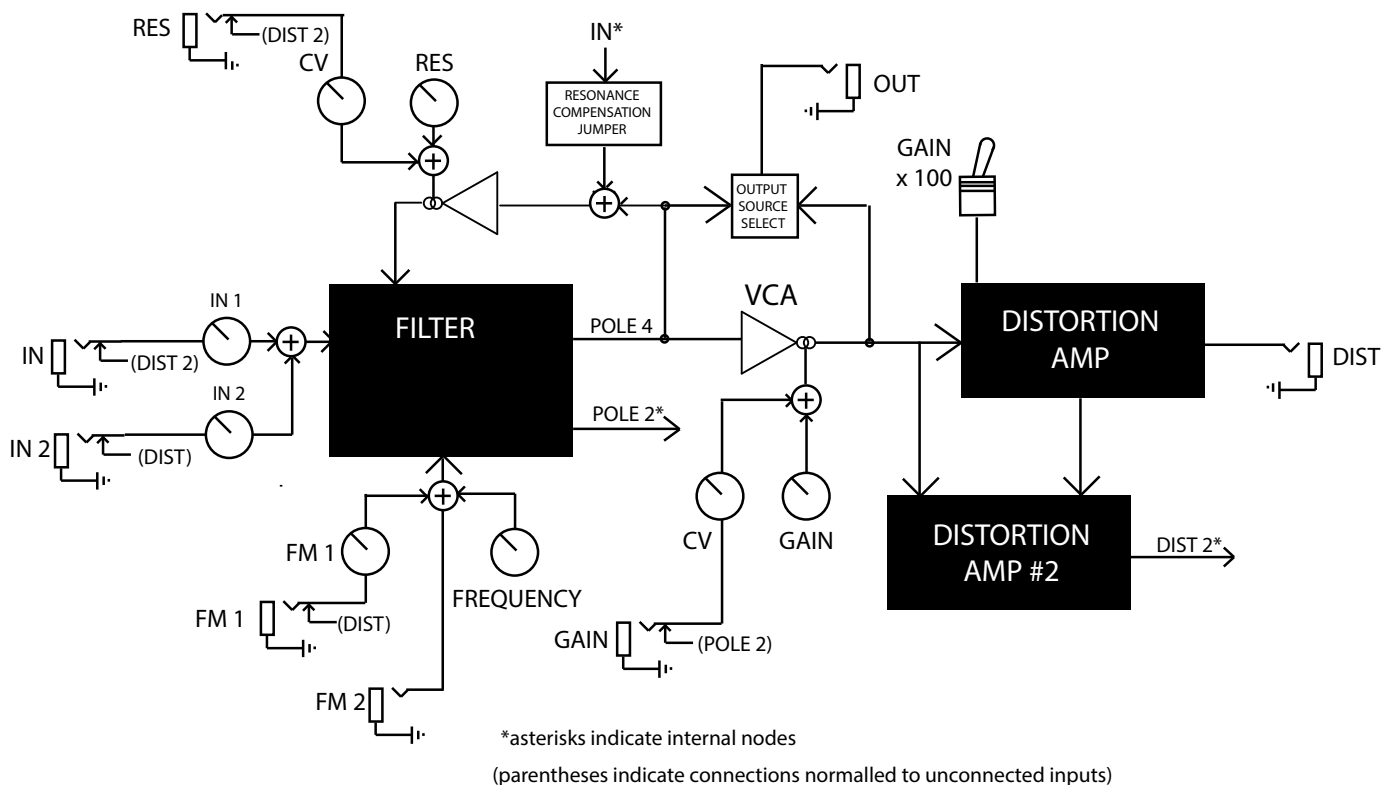GAIN will act as your output volume and will start to overdrive around 75%

As a VCA:
Continue listening to the OUT
Turn down GAIN, apply CV to the GAIN input, and turn up the CV control below GAIN

As a Distortion:
Same as the Filter but now listen to the DIST output
GAIN will now act as your distortion amount

100 GRIT BLOCK DIAGRAM

*asterisks indicate internal nodes
(parentheses indicate connections normalled to unconnected inputs)
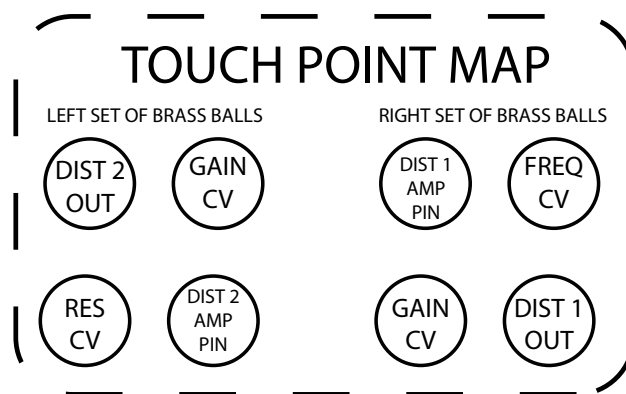
Normalizations

All inputs, when no cable is inserted, have some sort of feedback normalization. These normalizations are indicated on the panel with parentheses (like this). Any control you do not want to affect the sound should be turned fully down (counter clockwise).

There are several signals involved in the normalizations that are not available otherwise.

- DIST 2 is a second unstable distortion amplifier comparing the VCA out and the DIST out
- POLE 2 is the 12dB output from the filter

Normalizations by Inputs

INPUT	KNOB	SIGNAL	EFFECT
IN 1	IN 1	DIST 2	Comparator of DIST 1 and OUT creates extremes square wave chaos. Particularly useful with no input noise box applications.
IN 2	IN 2	DIST	Acts as a distorted resonance path in opposition to the one offered by RES
FM 1	FM 1	DIST	Applies the distortion output as a dynamic form of frequency modulation to the filter. Especially useful for laser sounds in percussion processing, though it can eat up some bass.
GAIN	CV	POLE 2	Modulating the VCA with the second pole of the filter shifts the harmonic content of the signal, providing a relatively subtle form of distortion
RES	CV	DIST	Applies the DIST out as audio rate modulation of the resonance. Depending on the how the resonance amplitude is trimmed will be capable of wild laser sounds and screeches riding on top of the RES. Will oppose the path offered by IN 2.

TOUCH POINT MAP

LEFT SET OF BRASS BALLS   RIGHT SET OF BRASS BALLS

(DIST 2 OUT) (GAIN CV)   (DIST 1 AMP PIN) (FREQ CV)

(RES CV) (DIST 2 AMP PIN)   (GAIN CV) (DIST 1 OUT)

Touch Points

There are eight touch points on the 100 Grit. They are direct resistive connections to parts of the circuit and as such can be connected together with fingers, cables, alligator clips, or any conductive surface. They can also be connected to other modules or external pieces of gear.

There is a current limiting resistor in line with each point and you should not have to worry about connecting it to any other audio source, inside or outside the modular system, however common sense is appreciated and if you have questions feel free to email us.

There is also the possibility of picking up radio stations with some of these points, especially with the "DIST 1 AMP PIN". It is generally an infrequent, location based phenomenon and more likely to occur when only touching one point instead of several.

Left set (clockwise from top left)

SIGNAL	TYPE	DESCRIPTION
DIST 2 OUT	output	Audio output of internal second distortion circuit
GAIN CV	input	CV input for VCA, Audio input can create distortion and generalized AM (amplitude modulation) effects, will be heard at both OUT and DIST outputs,
DIST 2 AMP PIN	input and output	Both an input and an output, can cause effects with only the capacitive loading that comes from touching a finger to the touch point. Will only be heard if applied to an input or the DIST 2 signal is being fed into audio elsewhere in the circuit (such as IN 1).
RES CV IN	input	CV input for resonance (RES). Audio input can create distortion and AM type effects. Will be heard at both outputs but may require some initial resonance to have significant effect.

Right Set (clockwise from top left)

| SIGNAL	TYPE	DESCRIPTION
DIST 1 AMP PIN	input and output	Both an input and an output, can cause effects with only the capacitive loading that comes from touching a finger to the touch point. Will only be heard if applied to an input or at the DIST out.
FREQ CV	input	CV input for filter frequency. Audio rate FM is great for distortion and will be heard at both outputs.
DIST OUT	output	DIST output
GAIN CV	input	CV input for VCA, Audio input can create distortion and generalized AM (amplitude modulation) effects, will be heard at both OUT and DIST outputs, same as on left side.

Touch Point Playing Methods

Here are a few ways I play the touch points, this is only meant to give some ideas, invent your own style!
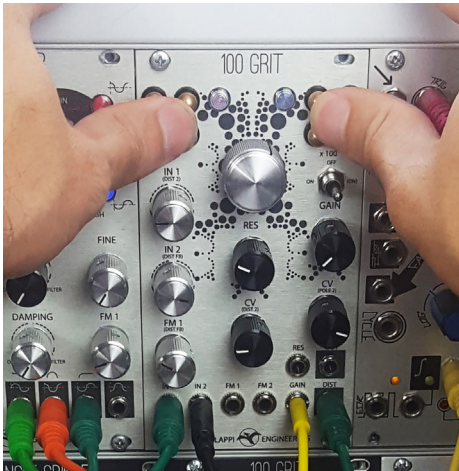
Thumbs

Place one thumb from each hand on a set of four touch points. Rotate or pivot your thumb around to touch two points at a time for more control or push down on all four (our eight by using both hands at once) for complete chaos.

The touch points are placed so that an output is always placed next to an input, so any adjacent pair should have an effect.
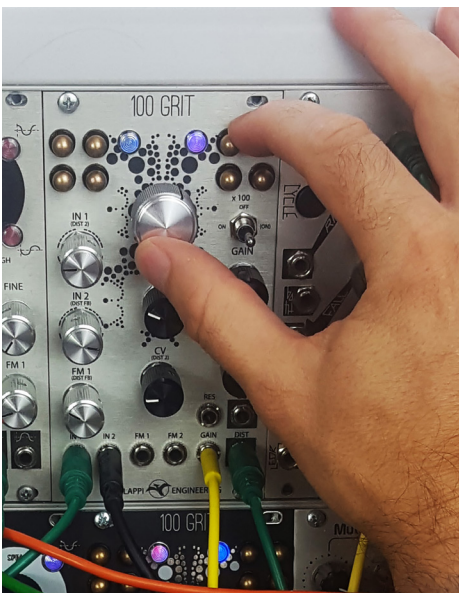
Frequency knob and finger

Grab the cutoff frequency knob with one hand or finger and move it while using another hand or finger to push on the touch points

Cables

Since the touch points are essentially resistive patch points you can use the tip of a patch cable to patch from another cv or audio source into the inputs or from one of the output points into another module. Alligator clips should also work.

Suggested Patches

Here are a few basic patches to start out with

VCF/VCA

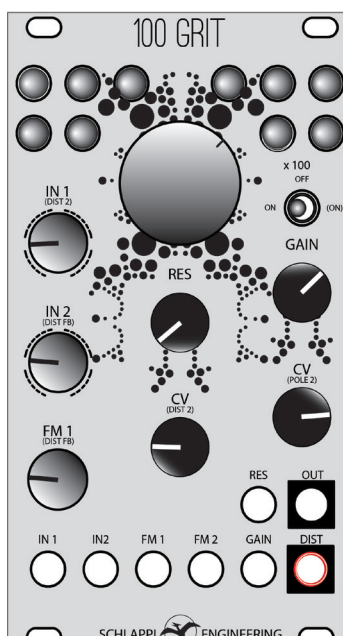| KNOB POSITIONS		
	IN 1	75% CW
	RES	25% CW
	GAIN	75% CW
	FREQUENCY	75% CW
	ALL OTHERS	FULL CCW

- Input audio at IN1 jack, above 75% will add distortion
- Listen to the OUT
- GAIN will control volume, above 75% will add more distortion
- Insert an envelope to GAIN jack and turn up CV (under GAIN knob) for VCA
- Insert V/OCT CV to FM 2 to roughly track along with incoming signal
- Turn FREQUENCY and RES knobs to get a feel for the filter character
- Each unused input (IN2, FM1, RES CV) has a feedback path normalled to it

DISTORTION

KNOB POSITIONS		
	IN 1	75% CW
	GAIN	75% CW
	x100 SWITCH	OFF (then ON)

- Input audio at IN 1 jack
- Listen to the DIST output
- GAIN and GAIN CV will now control distortion amount
- Try keep RES full CCW but bring up RES CV for distorted resonance
- Flip x100 to ON or (ON) for full screaming distortion
- Try turning each knob one at a time to see how they affect the tone
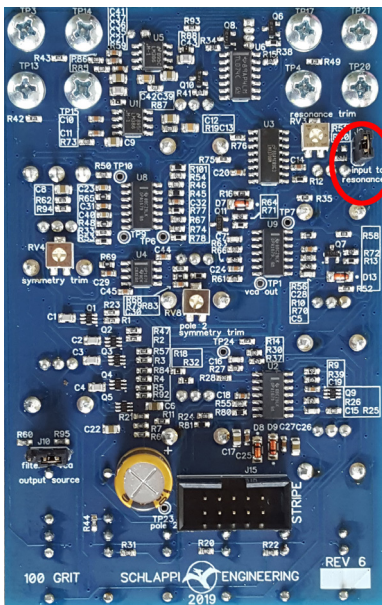- Experiment with touchpoints, touching two or more at a time

NOISE BOX

KNOB POSITIONS		
	IN 1	25% CW
	IN 2	25% CW
	GAIN	60% CW
	GAIN CV	60% CW
	RES CV	25%
	x100 SWITCH	ON

- No inputs
- Listen to the DIST output
- Play the touch points (at least two at a time, maybe all 8)
- Explore all feedback paths

Headers

There are two headers on the 100 Grit, both may be changed to suit your preferences

Input to Resonance (J9)
By default this header should be ON.
This feeds the input to the resonance summing point, mainting the bass frequencies and preventing much of the volume loss associated with certain classic synthesizers resonance path. Removing this will change the resonance character of the filter, allowing for more whistling types sounds and allowing the self oscillation to overtake the input signal.
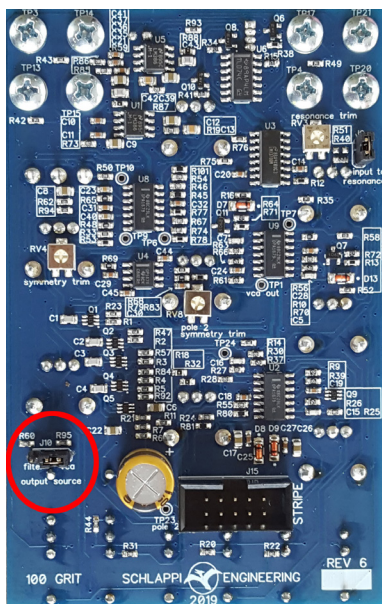

Output Source (J10)
By default this header should be on the right two pins, labeled "VCA".
This chooses where the OUT signal is taken from. If the header is moved to the left two pins it will come from the direct output of the filter, and not be affected by the GAIN knob.

Calibration

Resonance Amplitude Trim (RV3)

There is a certain amount of "trim to taste" on this and I have two ways I have calibrated it.
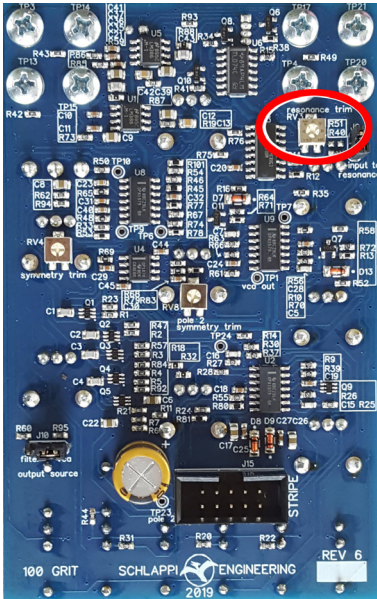
1. Cutoff knob at 50% (straight up), RES at 60% and gain at 75% listen to OUT jack, other knobs at 0%
Turn RV3 until it just starts to self=ocillate.

This will allow you to define the amount of travel the control has until it starts to self oscillate

2. Input at 75%, Cutoff knob at 50% (straight up), RES at 0%, RES CV at 100% and gain at 75% listen to OUT jack.

Turn RV3 until you achieve the amount of howling nastiness you would like to hear with the internally routed feedback loop available at RES CV. This is best done while listening to dynamic program material, such as a kick drum or bass line.

Symmetry Trim (RV4, RV8)
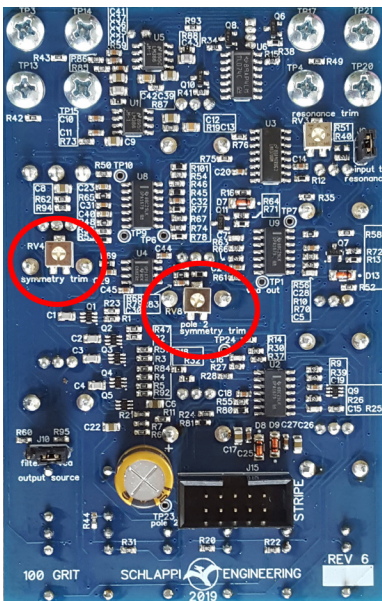
Please do not touch these two trim pots. There is no creative element here, if they are not trimmed correctly it will be difficult to get the filter to oscillate and proper calibration requires a decent oscilloscope. If you still have questions feel free to email us.

Contact Us

If you have any questions or feel like we have left anything out please feel free to contact us at:
eric@schlappiengineering.com