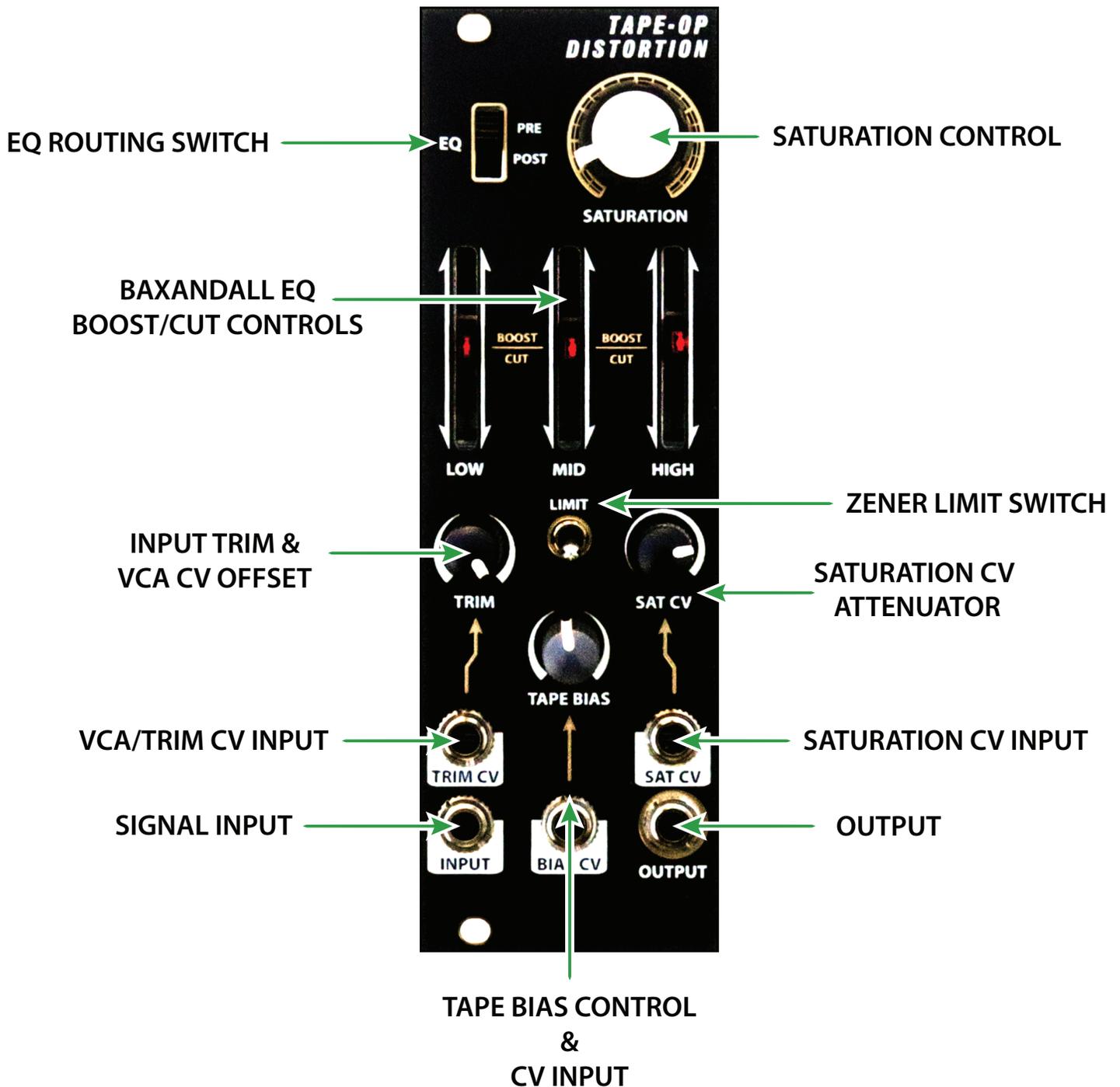


TAPE-OP DISTORTION

SYNOPSIS

TAPE-OP is an 8hp, 100% Analog Tube & Tape Distortion with an integrated Baxandall Equalizer that can be routed before or after the distortion effect. While it is analog, there are no tubes or tape behind the panel - here SSF has designed a discrete op-amp with class-A output stage with multi-diode ladder to emulate the characteristics of vacuum tubes and analog tape saturation. Additional features include a final stage zener hard limit switch for additional distortion and headroom limiting, a built in Voltage Controlled Amplifier with TRIM and TAPE BIAS controls that together with the EQ and SATURATION; can provide a huge variety of colorful saturated tones and compression effects.



VCA & TRIM

Tape-OP can be used as a VCA, albeit with a ton of character. The **TRIM** control is used to set the gain of the input and is nominally set to the max (CW) position for unity gain through the **SATURATION** and **EQ** circuitry. Use the **TRIM** to attenuate the input if needed and as described in later sections of the manual.

To utilize the VCA, patch CV into the **TRIM CV** jack and set the **TRIM** control to the center position when using 5V control voltages. Set **TRIM** to the minimum position if using 10V control voltages. In either case, **TRIM** will behave as an *offset* control for the incoming CV controlling the VCA.

SATURATION

Tape-OP was designed to emulate the saturation profile of vintage tube based analog tape machines with the ability to go way up past 11 on the dial. This is in contrast to most tape saturation modules and plug-ins that offer a lighter application of this effect. That being said, if you prefer a subtle application, keep the **SATURATION** control very low or even down all the way while giving attention to the **TRIM** and **EQ** levels with modest adjustments.

SATURATION may be voltage controlled by patching CV into the **SAT CV** jack. The CV polarity should generally be positive, up to 10V. However, bipolar and negative CV can also be used. Negative CV will have a ducking effect on the saturation and is even capable of fully attenuating the output signal. In either case, the **SATURATION** control will set your base level and the **SAT CV** attenuator adjusts the depth of modulation.

Try using an LFO to modulate SAT CV for a colorful tremolo.

Use a VCO to modulate SAT CV for some truly extreme bass and lead sounds. Make sure to track your input and CV v/oct with each other to keep the sounds consistent while playing melodies.

Experiment using one or more envelopes to control the input level and saturation separately for more dynamics.

TAPE-BIAS

TAPE-BIAS emulates the input bias control found on tube devices and tape machines, although also taken a bit to the extreme.

This control should be set to the center position for a balanced input to the saturation circuitry. The **BIAS** can be set positive or negative - and due to the asymmetrical clipping nature of the saturation effect, can produce a different sound depending on the bias polarity and input signal shape.

The most straight forward use of the **BIAS** control is to alter the order of harmonics presented by the saturator. When we add or subtract **BIAS**, this changes the symmetry of the input signal and results in a proliferation of the even-order harmonics. **BIAS** can be pushed even further to nearly surpass the input headroom range and result in attenuation or a broken-up high-passed sound. This is more evident at lower saturation settings when extreme **BIAS** settings are used. Even still, there is enough **SATURATION** to push these highly biased signals into full blown distortion. There will be a noticeable difference in the falling trail of the signal when you use **SAT CV** to modulate.

Use **BIAS CV** to modulate the **TAPE BIAS** with a control voltage. This can be any polarity, but **BIAS CV** responds best to slower control voltages. The effect when using an LFO to modulate **BIAS** is similar to PWM and is most intense when **SATURATION** is set to the mid-point or below this position.

LIMIT

The **LIMIT** switch engages a hard zener diode limiter for additional distortion and headroom limiting. More info about the **LIMIT** function is at the end of the **EQ ROUTING** section of the manual, on the next page.

BAXANDALL EQ & ROUTING

BAXANDALL EQ:

This is a three channel EQ tuned to work best with the saturation circuitry and TRIM control. There is a lot of gain staging between the TRIM, SATURATION and BOOST/CUT controls - it is advised that you use all three together, along with the LIMIT switch if overall gain is a concern - but more importantly to shape the characteristics of the distortion. Don't forget that the BIAS control has a great effect on the sound as well.

The EQ bands are interactive to a degree and a lot of gain is possible with the controls. I suggest to focus on small changes rather than pushing the controls to the max/min. While the EQ works great on basic waveforms, the more harmonic content you present at the input, the greater and more rewarding the EQ effects will be, for obvious reasons.

The EQ band frequencies and gain were tuned to work best the bandwidth of the saturation circuit as well as provide ample attenuation of the most affected bands beyond the inherent gain they provide. Below we show the center frequencies and available boost/cut range in decibels for the three EQ bands:

LOW: ~20Hz, +/- ~11dB

MID: ~530Hz +/- ~8 dB

HIGH: ~5.5kHz +/- ~11dB

EQ band sliders should be set to the center-line position for a flat response.

EQ ROUTING:

The EQ provides a LOW, MID, and HIGH boost & cut control for tailoring your saturation and compression effects. The EQ can be routed to come either before (PRE) or after (POST) the saturation circuitry.

When in the PRE position, the equalizer bands can be used to drive particular frequencies harder into saturation-compression, or attenuate them to deemphasize these effects. Boosting the bands and/or the input level has dramatically less affect on the output amplitude while in PRE. That being said, reducing the TRIM can offer extra headroom before saturation if needed.

When in the POST position, the equalizer is used to shape the harmonic content after saturation is applied. The tape/tube style compression will be applied in general to your signal - and the EQ can be used to boost or cut the harmonics generated by the saturation. Since the EQ can provide a lot of gain or attenuation, output level is heavily affected by your EQ settings while in POST.

There will be enough gain to hard clip the output stage of Tape-Op, and/or any input stages from modules down the line. You can take advantage of reducing the SATURATION control and adjusting the TRIM control in order to limit hard clipping if high levels of BOOST in one of the EQ bands is desired. Alternatively, you can adjust each of the bands accordingly to emphasize the desired frequency band.

If you would like to take advantage of the additional hard clip distortion or enhance mid-high frequency distortion while limiting the output swing, flip the toggle switch to the LIMIT position.

The headroom of LIMIT when engaged is ~14.5Vpp (PRE) and ~19Vpp (POST)

TECHNICAL

Connect the supplied power cable to the module by aligning the RED STRIPE with the Power Header side labeled -12V RED on the PCB. You cannot break the module by applying power in reverse - the module just wont do anything if you do. Just unplug it and attach the power cable correctly if this happens.

Maximum Power Consumption: +33mA, -27mA