

FEA

Dual Band Distortion



www.fealabs.com

About the design:

The FEA Dual Band Distortion pedal was designed to provide an extremely flexible multi-band distortion/overdrive for bass and guitar. Basically it is comprised of a variable crossover, two distortions, an overdrive and a final mixer incorporated into a single pedal.

A variable cross-over divides the incoming bass or guitar signal into two bands of frequencies. The frequency bands are then routed to distortion and overdrive circuits that are specifically tailored for their respective qualities.

The low frequency band is sent to an octave-up distortion circuit. Then both the octave-up distortion and the clean low band signal feed a hard clipping distortion circuit. The octave control functions as a cross-fader between the two signals. This allows the signals to be blended together in any amount desired. The drive control sets the amplification gain of the signal sent to the hard diode clippers. The hard clipping distortion circuit utilizes germanium diodes in a unique asymmetrical configuration which adds even order harmonics to the tone. The tone control operates as a passive high frequency cut filter following the hard clipping stage. Then the level control adjusts the amount of signal from this distortion stage that it is sent to the final mixer circuit.

The high frequency band connects to an overdrive distortion circuit. The overdrive circuit utilizes two audiophile quality discrete FET (field effect transistor) amplifiers employing a global diode feedback loop. This design approach is very different from most designs that have a single amplifier for the overdrive distortion circuit. It is also well known that discrete high gain FET amplifiers add a very pleasant musical quality to the tone. The drive control sets the global gain for the FET overdrive pair. The mid and high tone controls are an active boost/cut type circuit that allows you to precisely dial in on your desired tone. Then finally the level control from this stage adjusts the amount of signal to the output mixer circuit.

The dry level control mixes in various amounts of clean low-band signal along with the two bands of distortion. This is helpful for bass players to restore the low frequencies that become masked or overly compressed during the distortion process.

The distortion bypass footswitch allows either the low or high band distortion to be disabled. This lets the clean signal from the selected frequency band to pass undistorted at unity gain, while the other frequency band continues to provide distortion or overdrive. This feature provides the player with unique tone capabilities that were previously only available to the studio engineer.

The dual rail power supply in the Dual Band Distortion is built on an isolated circuit board. The power supply is over filtered two times to assure exceptionally clean power for the signal circuitry. This power supply generates 18 volts from a 9 volt battery or external power adapter. The 18 volt audio circuit provides plenty of headroom for the signal.

The case is a standard Hammond aluminum enclosure. After the Hammond case is machined and sanded it is then color powder coated. Then the aluminum faceplate is applied and then the entire case is clear epoxy powder coated for protection.

Frank E. Appleton (FEA)

Features:

GENERAL FUNCTIONS:

- **FREQUENCY**- Sets the crossover point for the low and high band distortion and overdrive circuits.
- **DRY LEVEL**- Mixes the clean low-band signal with the analog distortion signals.
- **DIST BYPASS** toggle switch- Selects the bypass for either band of distortion. This replaces the distorted band with its clean signal.
- **BYPASS** footswitch- Activates the function of the DIST BYPASS toggle switch.
- **ACTIVATE** footswitch- Places the Dual Band Distortion unit in the signal chain or in direct bypass mode. In direct bypass mode the signal at the input is directly connected to the output and does not pass through any electronics.

LOW BAND DISTORTION:

- **DRIVE**- Sets the gain of the amplifier for the asymmetrical hard clipping germanium diode circuit.
- **OCTAVE**- Functions as a cross-fader between the low band octave-up signal and the clean signal from the low band output of the crossover. This allows any desired amount of either signal to feed the hard clipping amplifier.
- **TONE**- A passive high frequency cut control following the asymmetrical germanium clipping stage.
- **LEVEL**- Adjusts the amount of the distorted signal to the output mixer.

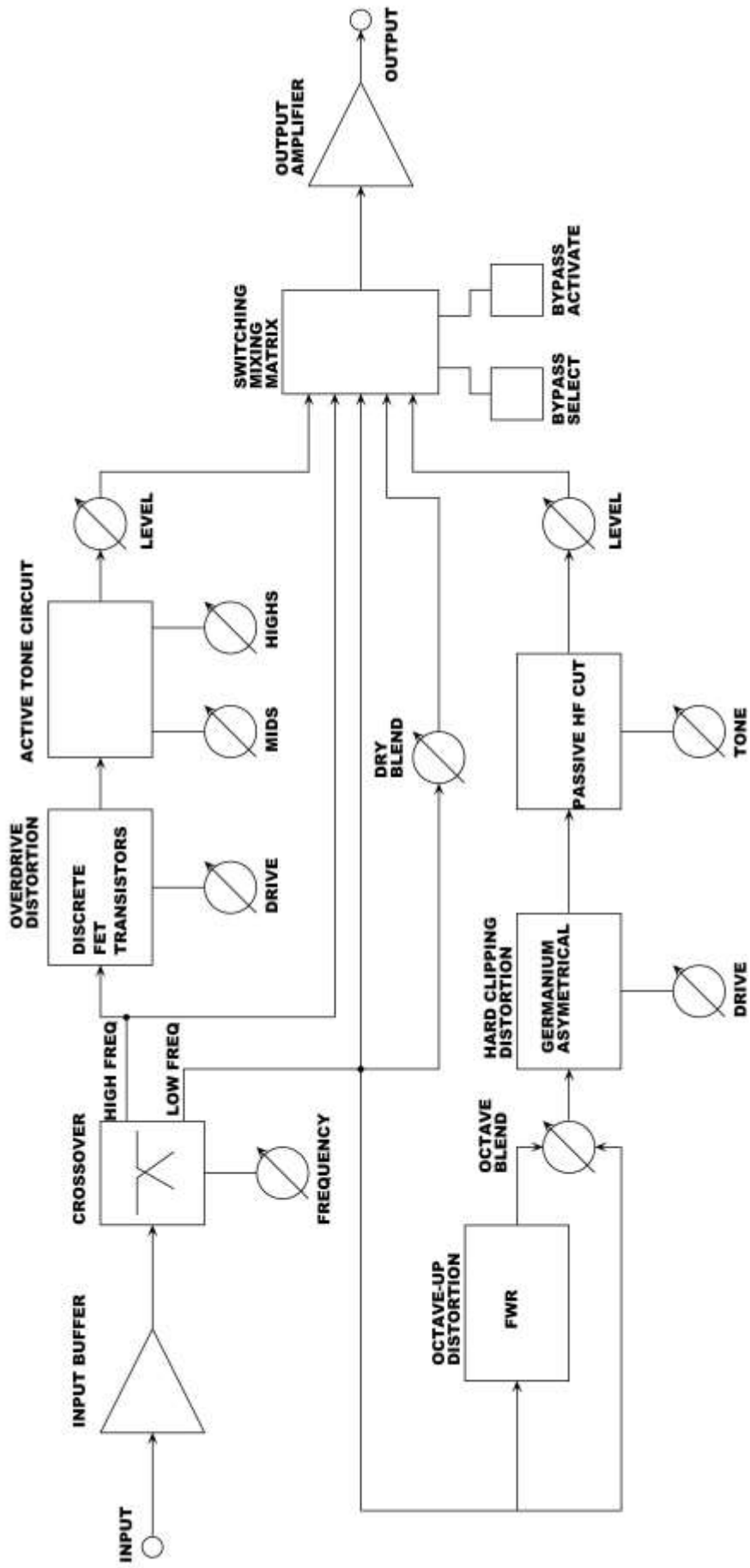
HIGH BAND OVERDRIVE:

- **DRIVE**- Sets the gain of the discrete FET (field effect transistor) amplifiers in the overdrive circuit.
- **MIDS** and **HIGHS**- Adjusts the mid and high frequency levels with an active boost/cut tone circuit following the overdrive circuit.
- **LEVEL**- Adjusts the amount of the overdrive signal to the output mixer.

POWER SUPPLY:

- The power supplies onboard voltage charge pump allows the circuitry to operate at 18volts (+9 and -9 volt rails) from a single 9-volt battery or AC power adapter of 9 volts. This allows the signal plenty of headroom from active electronic guitars and aggressive playing techniques (i.e. pop and slap).
- The “switch on” power supply current is less than 1 μ A (micro amp) on the signal ground at the INPUT jack. This is approximately 45,000 times (-93dB) less than the commonly used method of connecting the battery’s negative terminal to ground via the sleeve of the plug inserted into the INPUT jack. The “switch on” sensing method used in the FEA Dual Band Distortion keeps nearly all of the circuit’s generated white noise and transient currents out of the INPUT stage signal ground. Extreme measures have been taken to keep the power and signal paths as clean as possible. **NOTE: Unplug the cord from the INPUT jack when not in use to prolong battery life.**

Block Diagram:



Technical Specifications:

- LOW BAND Distortion:** **Asymmetrical germanium**
- LOW BAND Octave:** **Full-wave rectification**
- HIGH BAND Overdrive:** **Discrete FET with diode feedback**
- Maximum Input:** **14.5dBu**
- Maximum Output:** **12.5dBu**
- Crossover:** **Variable 100Hz to 1KHz**
- Input Impedance:** **1M ohm**
- Output Impedance:** **1K ohm**
- Power adapter
noise rejection:** **40dBu @ 60Hz
>90dBu @ 2KHz**
- Current Consumption:** **Approx. 30mA**
- Battery Life:** **Approx. 15 hours continuous use**
- Power adapter:
(Not Included)** **9VDC 2.1mm Barrel Connector
with negative center pin**

Battery replacement:

Remove the four screws on the bottom cover to access the battery compartment. If storing the unit for long periods of time the battery should be removed to prevent corrosion of the battery snap. Be sure to place the battery wires along the side of the battery in the battery pocket and use care while replacing the bottom cover.

Warranty:

The FEA Dual Band Distortion is fully covered for a period of 5 (five) years and the foot switches are covered for 1 (one) year against defects in material and workmanship. Abuse and neglect are not covered under the warranty. The customer will be responsible for shipping cost to and from FEA Labs for repairs. Contact me before attempting to ship a unit for repair at: info@fealabs.com.

All repairs made outside of the warranty period will be very reasonable (usually only the cost of the parts)... your satisfaction is priority one.

Contact FEA Labs at:

Website: www.fealabs.com

Email: info@fealabs.com