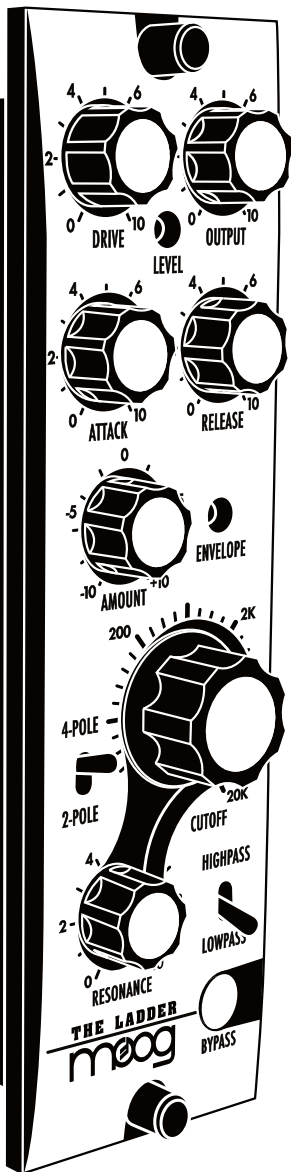
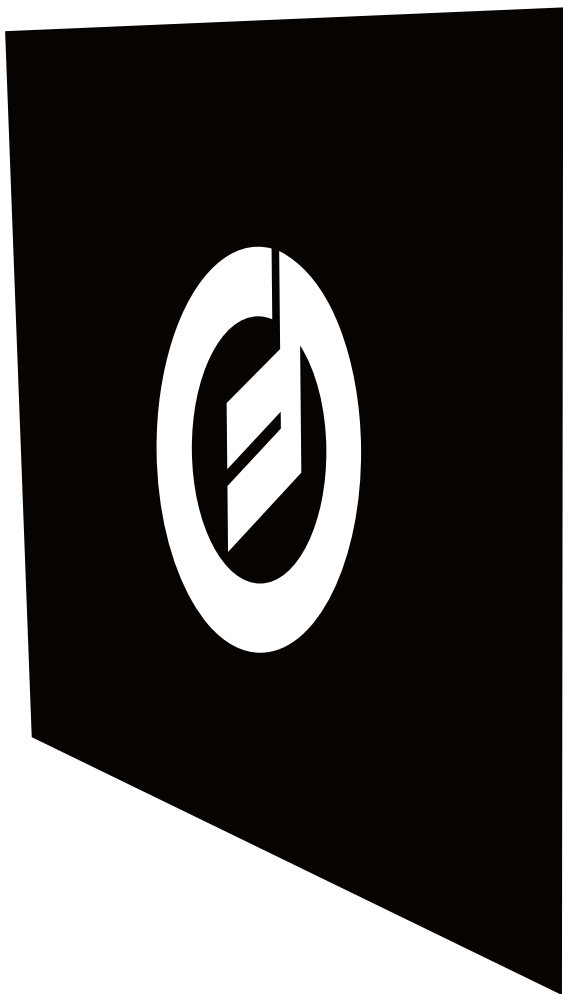




# **500 SERIES - THE LADDER**

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USER'S MANUAL



## **The Ladder Manual**

Thank you for your purchase of The Ladder 500 series module. The Ladder is a Dynamic Transistor Ladder Filter based on Bob Moog's original Ladder Filter design patent, but with specific component and feature upgrades for the recording and pro audio industry. You will find that The Ladder is much more than a simple filter. It is a dynamic and powerful tool for sound sculpting, shaping and creativity. Try it on any sound source to add warmth, remove excessive bottom or add classic Moog funk and more.

The Ladder contains an envelope follower that tracks the loudness contour of a sound and then produces a voltage that follows the dynamics. Every time there is a sound, the envelope voltage goes up and then down affecting the Cutoff frequency. The louder the sound, the higher the envelope voltage goes. Think of this like an invisible hand turning the knob up or down in real time. This is the key to The Ladder's dynamic and creative capabilities.

## CONTROLS

**DRIVE:** Adjusts input signal level for clean, light or extreme filter drive of your sound source. Unlike digital distortion, filter distortion is smooth and pleasing. It's all analog, so go ahead and push it!

**OUTPUT:** Use to optimize the output level of The Ladder.

**ATTACK:** Determines how quickly the envelope follower responds to incoming audio. This allows you to create envelopes with very dynamic, fast attacks that quickly track the input signal, or very slow attacks that ramp up to the input audio for a wide array of filter behaviors.

**RELEASE:** Determines how quickly the envelope follower's release responds to audio. This allows you to create envelopes with very snappy decays that quickly track the input signal or very slow decays that fade out over time.

**AMOUNT:** Determines how the envelope's control-voltage affects the CUTOFF frequency similar to an invisible hand turning the CUTOFF knob in real time. The AMOUNT control is bipolar. This means as you turn the AMOUNT towards -10, the envelope follower's voltage will dynamically decrease the cutoff frequency and as you turn the AMOUNT towards +10, the envelope follower's voltage will dynamically increase the CUTOFF frequency. This allows for a very wide range of unique and dynamic filter effects.

**CUTOFF:** Determines the frequency at which the filter starts to "work". When in LOWPASS mode, frequencies above the CUTOFF frequency are cut while frequencies below the CUTOFF frequency are unaffected. In High Pass mode, frequencies above the CUTOFF frequency are unaffected and frequencies below the CUTOFF frequency are cut.

**RESONANCE:** Changes the way the filter sounds by adding positive feedback peaking at the CUTOFF frequency. This is similar to increasing the Q of a traditional filter, but is much richer in harmonic contribution. As you increase the RESONANCE, you will begin to hear overtones and coloration as well as harmonic emphasis of frequencies around the CUTOFF. When the RESONANCE amount is at zero there is no emphasis of frequencies and the filter is essentially "flat" until the CUTOFF point. Note: As you increase the RESONANCE, the overall output of the filter may appear to decrease. Increasing the OUTPUT control on your module will compensate for this.

**\*WARNING:** *With the RESONANCE placed at about 8, the filter will start to self-oscillate at the CUTOFF frequency producing a sound independent of the actual input. This can be a very musical and fun aspect of The Ladder when coupled with the dynamic response from the envelope. It can also produce extremely high or low frequencies that you may not be able to hear which may damage speakers depending on your CUTOFF settings*

**2 POLE/4 POLE:** Each filter POLE represents a 6dB/Octave slope at the filter CUTOFF. A 2 POLE filter slope is 12dB/Octave and produces a more subtle smooth sound. A 4 POLE filter slope is 24dB/Octave and produces a very aggressive filter closer to the classic coloration of the original Moog Filter. In HIGHPASS mode, the filter slope is reversed.

**HIGHPASS/LOWPASS:** This switch allows you to choose between LOW-PASS and HIGHPASS filter topologies. LOWPASS “passes” low frequencies and “cuts” high-frequencies. The HIGHPASS “passes” high frequencies and “cuts” low-frequencies. For true HIGHPASS or LOWPASS, make sure the RESONANCE is at zero.

**BYPASS:** The Ladder contains a relay-based, hardwire, true BYPASS that completely removes The Ladder from your signal path.

**INPUT LED:** As the input level increases, the INPUT LED will change colors. GREEN indicates a clean input level. ORANGE indicates a small amount of analog coloration that is a pleasing and warm. When the INPUT LED turns RED, filter distortion is clearly noticeable. This is useful for adding grit, edge and compression-like behavior to any sound source.

**ENVELOPE LED:** The ENVELOPE LED indicates envelope signal strength and dynamics. This is determined by the ATTACK, RELEASE and DRIVE settings.

# RECOMMENDED FILTER STARTING POINTS

## Classic Moog Filtering

Drive Note- Set so input LED is orange with red peaks

Attack: 0

Release: 0

Amount: 0 to +3

Cutoff: 1k-3k

Pole: 4

Resonance: 4-6

Filter Type: Lowpass

## Funky Filter

Drive Note- Set so input LED is green with orange peaks

Attack: 1-4

Release: 2-5

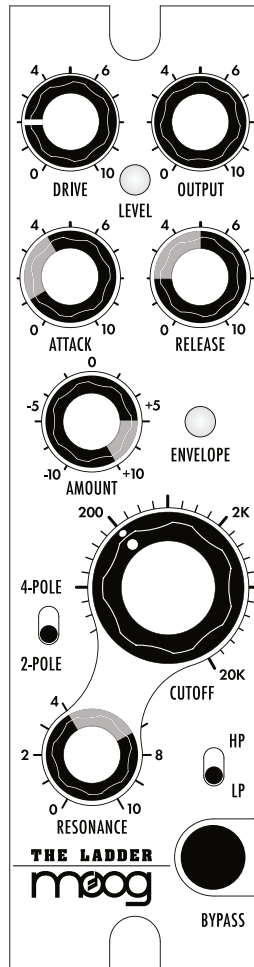
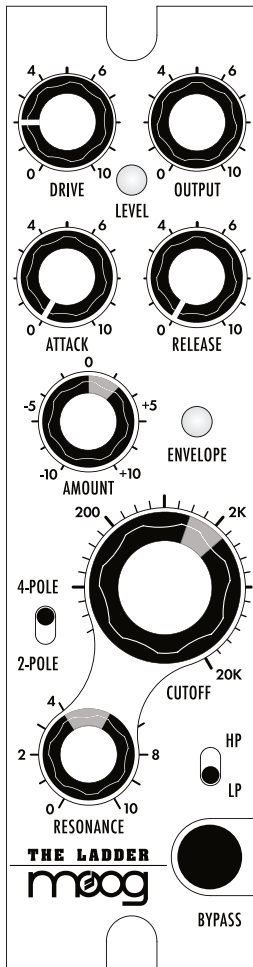
Amount: +6 to +10

Cutoff: 200Hz

Pole: 2

Resonance: 4-7

Filter Type: Lowpass



### Compression Filter

Drive Note- Set so input LED is orange

Attack: 1-3

Release: 0-5

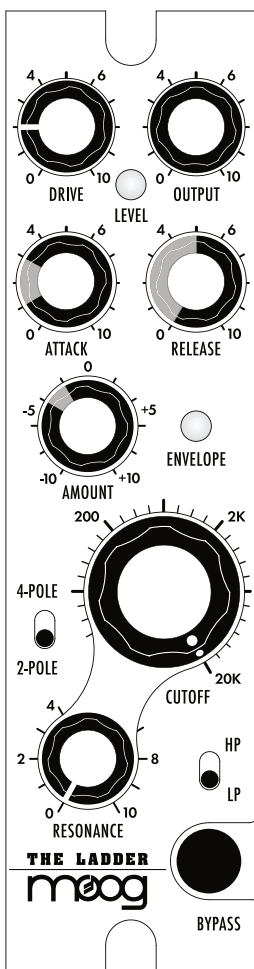
Amount: -2 to -4

Cutoff: 20k

Pole: 2

Resonance: 0

Filter Type: Lowpass



### Filter Gate

Drive Note- Set so input LED is green

Attack: 0-1

Release: 3-9

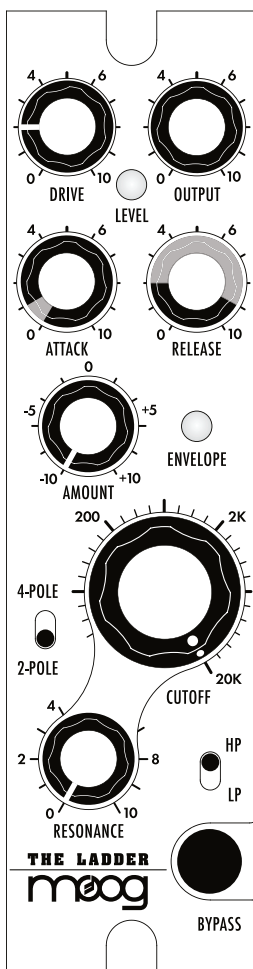
Amount: -10

Cutoff: 20k

Pole: 2

Resonance: 0

Filter Type: Highpass



**Stereo Linking Two Units:** You can stereo link two units together via an optional jumper wire.

To do this, connect the stereo linking kit cable to J1 on each of two modules. Your unit is factory configured for the most common mode of stereo linking. If you require different operation, the following options are available via the DIP switch labeled “SW4”, located in the upper left corner of the PCB.

**Switch 1:**

When ON, the envelope follower and cut-off settings are the average between both unit’s knob placement. When OFF, the unit becomes a SLAVE following the envelope and cutoff setting of the MASTER unit (whose DIP switch is left ON). This is useful in MONO if the MASTER unit becomes a side chain input to the SLAVE unit’s audio.

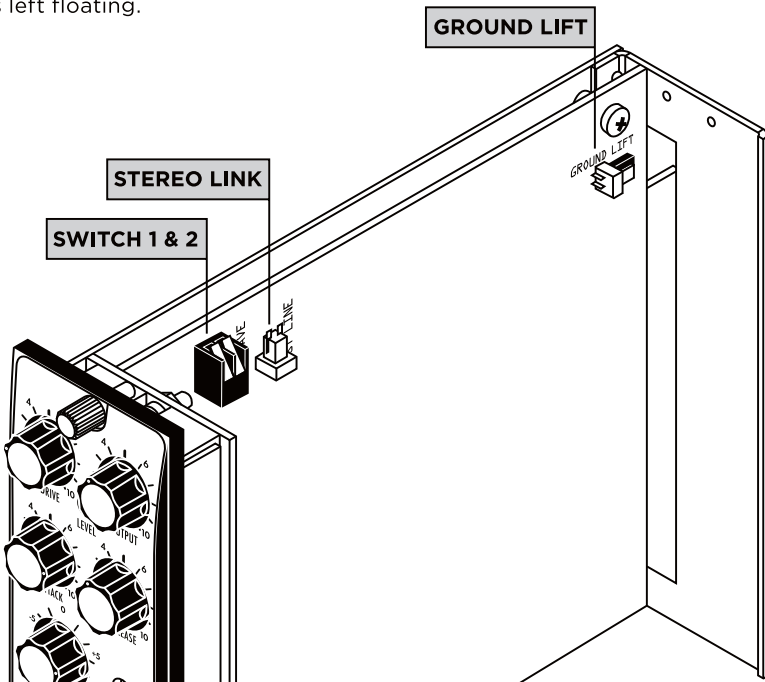
**Switch 2:**

Set to ON (normal operation) the unit’s resonance setting is the average of both units knob placement. Set to OFF, each unit has control over its own resonance setting.

**GROUND LIFT**

**J3 - Ground lift:**

The input and output ground (PIN 1 of the XLR connector) is shunted to the chassis and electrical ground. When the jumper is removed the ground is left floating.



## Specifications

Audio I/O: Balanced line level +19dB $\mu$  to -16dB $\mu$  input accepted

Filter Type: Dynamic Low Pass and Dynamic High Pass Transistor Ladder Filter

Envelope Follower RMS detector, bi-polar with variable attack & release

Attack: 250 $\mu$ S to 2.0 seconds

Release: 150mS to 2.0 seconds

Envelope Follower Amount Control: Positive and Negative Modulation Of Filter Cutoff

Input Impedance: 24K $\Omega$  balanced differential, 12K $\Omega$  unbalanced single ended.

Output Impedance: 50 $\Omega$  differential, 25k single ended

Max. Output Level: Better than +22dB $\mu$ , balanced.

Drive Gain: 36dB

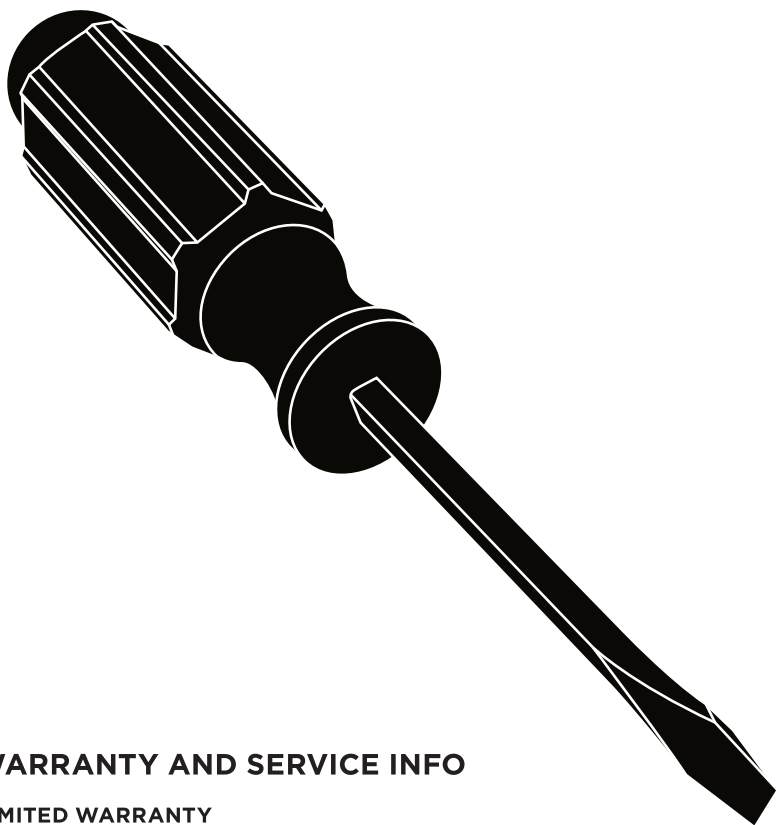
Output Gain: 36dB

Frequency Response Better than +/-0.5dB 20Hz - 20KHz pass band. Better than +/- 1.5dB 5Hz - 24KHz pass band

Bypass: Hard Relay Bypass

Power Consumption: Less than 105mA +16V, less than 75mA -16V

\*Specifications subject to change without notice



## **WARRANTY AND SERVICE INFO**

### **LIMITED WARRANTY**

Moog Music warrants that its products will be free from defects in materials or workmanship, and shall conform to specifications current at the time of shipment, for a period of one year from date of purchase. During the one-year period, any defective products will be repaired or replaced, at Moog Music's option, on a return-to-factory basis. This Warranty covers defects that Moog Music determines are no fault of the user.

### **RETURNING YOUR PRODUCT FOR REPLACEMENT/REPAIR**

You must obtain prior approval and an RMA number from Moog Music before returning any product to us. Wrap your product carefully and pack it in its original carton.

The warranty will not be honored if the product is not properly packed. Send it to Moog Music with transportation and insurance charges paid.

A reasonable cost for service, materials and return freight will be charged to replace materials found defective through fault of the user, or for which the one year warranty period has expired.

Transportation and insurance charges from Moog Music to your United States address for products repaired or replaced under warranty will be paid by Moog Music.



