

# TWA<sup>®</sup>



## KM-01 KRYTICAL MASS<sup>®</sup>

reactive octave fuzz

IN-FLIGHT MANUAL

**TWA®**  
**KM-01 KRYTICAL MASS®**  
**REACTIVE OCTAVE FUZZ**

Thank you for purchasing the **TWA KRYTICAL MASS®**!

Based on the vintage Maestro Bass Brassmaster, **KRYTICAL MASS®** generates a fuzz effect with a prominent upper octave harmonic. The intensity of the fuzz effect is controlled via playing dynamics, creating unique waveform foldback and frequency-filtering effects.

Despite the massive gain that is on tap, the **KM**'s dynamic responsiveness allows for extremely tight, quiet, almost gate-like muting of the fuzz effect via playing dynamics.

While the core circuitry of the **KM** is identical to the Maestro, additional tone filtering options have been added to increase the versatility of the fuzz effect.

Selectable **HIGH PASS**, **LOW PASS**, and adjustable **MIDRANGE** filters offer a wide variety of tonal variants not available from the Brassmaster. A global **EDGE** control adjusts the overall aggressiveness of the fuzz effect from warm to sharp. In addition, selectable positive / negative polarity transformer wiring offers even more tonal options. To top things off a **BIAS** control allows for adjustment of the transistor voltages for even more control over the character of the fuzz effect.

**KRYTICAL MASS®** features mechanical true bypass switching via a 3PDT footswitch.

## THE HISTORY:

Believe it or not, **KRYTICAL MASS**<sup>®</sup> was actually the *second* TWA model ever designed, and we've had the original prototype unit sitting around the office since way back in 2008.

Why did it take us 15 years to release this pedal?! Primarily because I'm a German-raised Virgo and just can't settle on "good enough," but there were other legitimate reasons as well. Allow me to explain:

I've been an obsessive vintage pedal collector since around 1994, when I first realized that all those crazy, magical metal boxes I used to ogle over as a kid were still floating around at vintage guitar shows, pawn shops, & yard sales.

Being a bass player, I simply had to own any pedal with the word "Bass" in the title, and that would of course include the ultra-rare & coveted Maestro Bass Brassmaster.

I used to spend entire weekends scouring Ebay for rare & wonderful finds, and on one of these marathon digital scavenger hunts I not only came across a Brassmaster, but a mint in the box with paperwork Brassmaster. I guess being obsessive has its benefits.

This was right around the time we had started working with uber-engineer **ROBERT DERBY**, who had already completed the **TWA LITTLE DIPPER** circuit that we would debut in 2009.

I sent Robert the Maestro and he did a deep-dive into the circuit to determine what made it tick.

After a few weeks of experimenting, he sent over a hand-built prototype of what would eventually become the **KRYTICAL MASS**<sup>®</sup> that you now own (or should own).

This proto had more controls than the OG Brassmaster. Robert loves to provide options, and he had built in a variety of tone

filters that allowed for many additional variations to the pedal's basic sound.

This proto could get extremely close to nailing the sound of the Maestro, but there was always a tiny difference in the tone that bugged me.

In hindsight this was just me being silly, as that first **KM** proto sounded KILLER, was nearly identical in sound to the original, and also had a ton more sounds on tap to boot.

While I was agonizing over barely perceptible nuances in tone that no one besides me would notice or care about, Malekko Heavy Industry released their Barker AssMaster – a straight-up clone of the Maestro.

Since I knew those guys and didn't want to step on toes, we shelved the **KM** and moved on to other projects – specifically the **TRISKELION**<sup>®</sup>, where we became the first company to clone the Systech **HARMONIC ENERGIZER**<sup>®</sup>.

Over the next few years, I would randomly pull out the BM & KM, do some A/B's, hem & haw, and then put them away again.

Finally in late 2014 I let my sales manager Richie try the **KM** prototype, and he loved it! This was a true test, as Rich is super-picky and only likes certain things. It really did sound great on guitar though, and it was more versatile than the Maestro while also being more organic than the Malekko.

I decided to restart this project, and I had Robert start work on shrinking down the large, hand built thru-hole proto into a more pedalboard-friendly SMD unit.

Soon enough we had an SMD version of the **KRYTICAL MASS**<sup>®</sup> circuit, but there was only one problem: As cool as it sounded, it didn't match up with the Brassmaster as well as the OG proto did.

In some ways the SMD proto was actually cooler than the Brassmaster — it had an insane upper-octave effect, and the tone-filtering sweep as the pedal squashed notes & released them was even more intense.

Unfortunately, it didn't have the tight gating of the original pedal or the massive, fat low-end — Two features that are essential to cop the vibe of the Maestro.

After multiple attempts to match up the new prototype to the original, we wound up shelving the project once again when we turned our attention to the Maxon Custom Shop in 2019.

When Maxon cut ties with us in 2021, we had no choice but to shift our focus to **TWA**. We took a hard look at our arsenal of half-realized pedals and decided to give the **KM** one last shot at glory.

I had Robert re-analyze the original hand-built prototype to determine why it behaved so much like the Maestro. Copying a circuit is simple — figuring out what makes a circuit magical is a whole other level.

Robert once again proved his mettle — after myopic analysis he determined that a variety of specific capacitor types & values as well as the type & rating of the diodes used were essential to the sound.

After exacting measurements of all these values on the original proto, Robert laid out a new PCB that incorporated both SMD and T/H components where needed to match the magic.

The result is unquestionable — **KRYTICAL MASS®** has been achieved.

Mission accomplished.

**-KEVIN BOLEMBACH**  
*President, TOTALLY WYCKED AUDIO*

The **KRYTICAL MASS**<sup>®</sup> is covered by a 3 year parts and labor warranty.

For more information and to register your warranty,  
please visit our website:

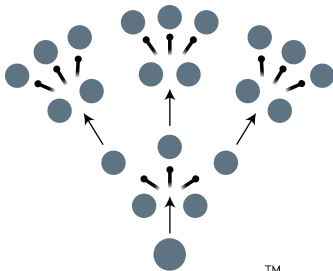
**WWW.TOTALLYWYCKEDAUDIO.COM/WARRANTY**

The **KRYTICAL MASS**<sup>®</sup> is made in the USA.

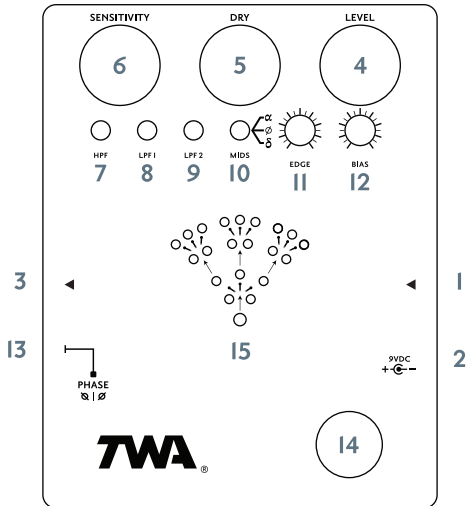
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**GO GIT SUM!!!**



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## FRONT PANEL CONTROLS

- INPUT** – 1/4" unbalanced audio. Connect input signal here.
- DC In** – Connect to tip-negative 9VDC regulated power source via a 5.5mm O.D./2.1mm I.D. tip-negative male barrel plug with a minimum of 100mA of current available.  
(**PA-9ECS POWER-ALL ECO-DAPTER** recommended)
- OUTPUT** – 1/4" unbalanced audio. Connect to amplifier, recording equipment, or other effects.
- LEVEL** – Controls output level of effected signal. Turn clockwise for more volume/level/output.

5. **DRY** – Controls output level of dry (unaffected) signal. Turn clockwise to increase dry signal volume/level/output.
6. **SENSITIVITY** – Controls the intensity of the fuzz effect via playing dynamics. Turning clockwise will allow for more fuzz effect with a lighter pick attack. At higher **SENSITIVITY** settings with strong pick attack, the fuzz will “fold up” on itself, creating a tone-filtering effect as notes decay.

NOTE: At full counter-clockwise setting, the output of the effect signal will be zero.

7. **HPF** (*high-pass filter*) – Turns on a high pass filter that is located after the circuit’s input buffer. Adds extra edge to the fuzz effect.
8. **LPF 1** (*low-pass filter #1*) – Turns on a low pass filter that is located after the circuit’s clipping diodes & transformer. Adds more low-end to the fuzz effect.
9. **LPF 2** (*low-pass filter #2*) – Turns on a low pass filter that is located after the circuit’s twin-T filter. Alters overall tonality of the fuzz effect.
10. **MIDS** – Passive coil-capacitor midrange control (think Neve). 3-Way switch with center-off. Positions  $\alpha$  &  $\delta$  (up/down) cut mids at specific frequencies in the 1k – 1k8 Hz range.  $\alpha$  (up) is particularly good with guitar to achieve a fat, wooly vintage fuzz tone.

NOTE: In the back of the **KM** there is a midrange trim pot (center bottom). This trim will adjust the Q or sharpness of the cutoff of the midrange frequencies referenced above.



11. **EDGE** – High-frequency roll-off control to “warm up” the overall tone of the pedal. Turn clockwise for more edge/sizzle, counterclockwise for more warmth, roundness, etc.
12. **BIAS** – Adjusts voltage feed to transistors in drive amp (before diodes and xfo). Full CCW is full voltage, full CW is approx. 30-40% less. 10-11 o’clock is “transition point” where additional harmonic content becomes evident. Blast a low note and let it ring then listen to just this pot from top to bottom of sweep.
13. **POLARITY** – Internal switch accessible via side hole in chassis. Changes wiring of internal transformer from  $\text{Ⓚ}$  positive (up position) to  $\text{Ⓞ}$  negative (down position). Positive will have more low-end, negative will have some low-end cut.
14. **BYPASS** – Engages or disengages the effect. **KRYTICAL MASS**<sup>®</sup> features True Bypass switching via a mechanical 3PDT switch.
15. **LED ARRAY** – The LED array is based on the scientific illustration for an atomic critical mass reaction. The **LED ARRAY** has two different display options, which are selectable via a rear-mounted mini-switch (remove backplate to access). These are as follows:
  - LED’s light in a cyclic pattern from lowest LED through to the highest LED’s. The rate of this cycling pattern is controlled by a trim pot accessible via the back of the pedal (remove backplate to access).
  - All LED’s in display light when pedal is engaged & remain lit until pedal is bypassed.

## OPERATING YOUR KRYTICAL MASS

- Before making any connections, set **SENSITIVITY**, **DRY**, and **LEVEL** controls to their lowest (fully counterclockwise). Make sure pedal is bypassed (LEDs dim).
- Make all the appropriate power and audio connections. The **KRYTICAL MASS**<sup>®</sup> draws a maximum of 155 mA of current when engaged.
- Engage the footswitch—**KM-01 LED ARRAY** will glow brightly and/or begin to cycle, depending on the program setting of the array (See: 15. **LED ARRAY**).
- Adjust **LEVEL**, **DRY**, and **SENSITIVITY** to taste.

NOTE: At maximum settings, **KRYTICAL MASS**<sup>®</sup> has extremely high output level. Proceed with caution.

- Proceed with caution.

**PLEASE NOTE:** When the pedal is receiving power, but is not engaged, the **LED ARRAY** will be dimly lit. This acts as a visual indicator to confirm that your pedal is receiving power. When the pedal is engaged, the **LED ARRAY** will light brightly and either stay lit or cycle depending on setting (see above).

# FLIGHT DATA

**CODE NAME:** **KRYTICAL MASS<sup>®</sup> v1.0**

**FUNCTION:** **REACTIVE OCTAVE FUZZ**

**POWER:** 9-volt DC, tip-negative polarity input  
2.1 mm ID barrel connector  
Reverse polarity protection  
Heavy DC filtering  
Over-Current protection  
Heavy bias voltage filtering  
Current draw in LED cycling mode:  
27 mA all OFF / 155 mA all ON  
Current draw in LED continuous on mode:  
105 mA when engaged

**AUDIO:** There are six main active sections in the KM.  
All six are designed around discrete transistor amps and buffers. T/H Film caps are used in the audio path for optimal sound reproduction. All audio transistors are T/H as well. NOS Germanium diodes are also used.

**Sections (in order from input to output):**

- I. **Input buffer** - Creates buffered DRY signal and amped signal to boost audio level to sensitivity control. 1 Meg ohms input impedance using a Darlington transistor.

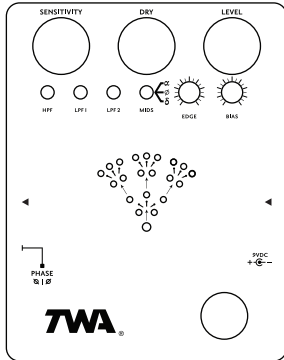
- II. **Modulation driver** - (As named by Maestro) - Boosts signal more to drive diode array (germanium) and transformer following (w/some filter switches).  
[Phase switch for transformer output here: + = in phase with input, - = reverse phase]
- III. **Filter drive** - Zero gain follower buffer to drive Twin T filter.
- IV. **Twin T filter** - Using 1% tolerance resistors and through-hole film caps with 2% tolerance.
- V. **Filter amp** - Recovery after volume loss through Twin T, buffer before Level pot.
- VI. **Output buffer** - Zero gain follower circuit with less than 600 ohm output impedance (can drive a long line without signal loss).

**SWITCHING:** Mechanical true bypass (3PDT)  
HPF sub-mini switch (on/off)  
LPF1 sub-mini switch (on/off)  
LPF2 sub-mini switch (on/off)  
Mids 3-way sub-mini switch (on1/off/on2)  
Phase: Side-mounted internal DIP switch  
(+/- phase)  
LED: Internal DIP switch  
(continuous on/cycling)

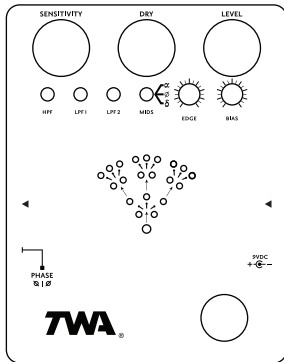
**INDICATORS:** Critical Mass symbol LED array

- On = bright LED
- Bypass = dim LED
- No power = dark LED

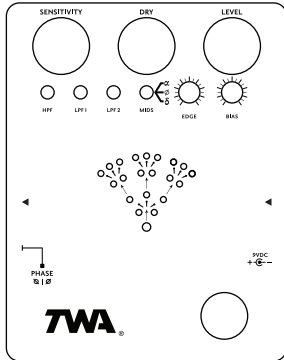
**CONNECTORS:** Input / Output (1/4")  
Power (2.1mm ID / 5.5mm OD Barrel)



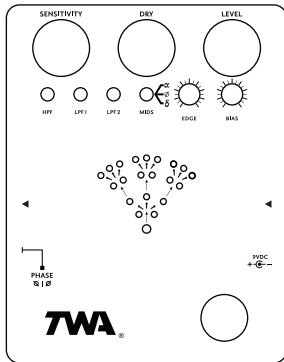
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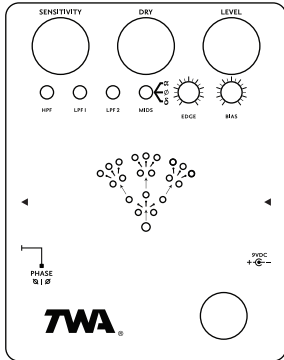
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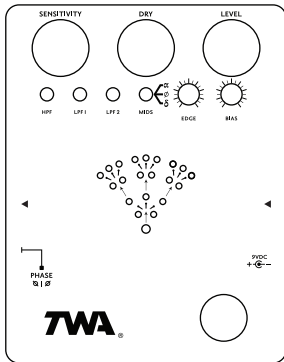
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*The way of the future...*