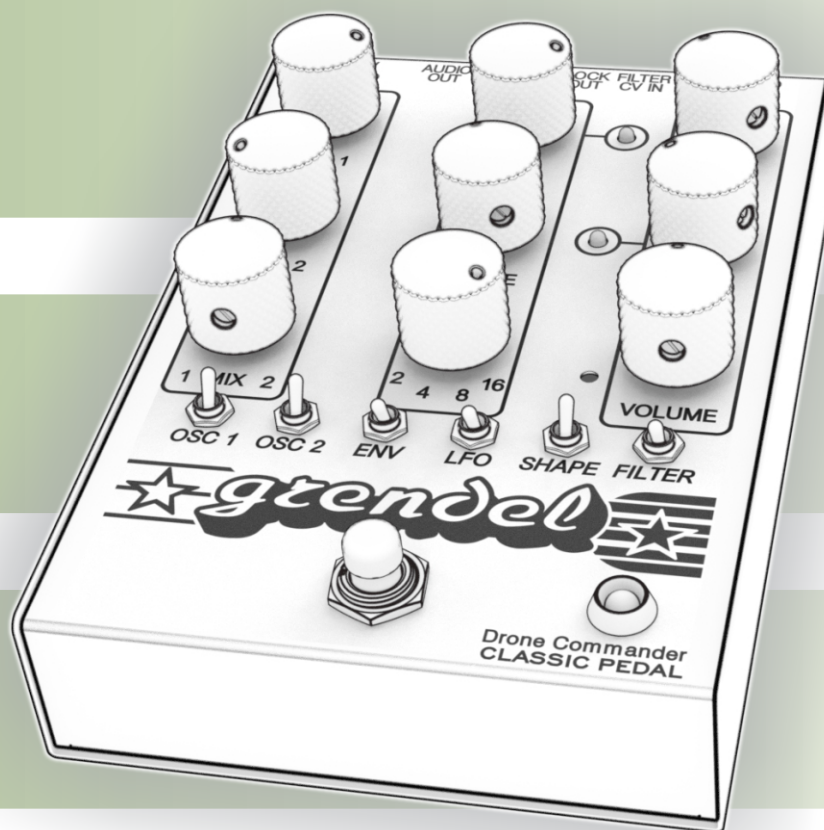


# Grendel Drone Commander CLASSIC PEDAL

*Analog Music Synthesizer*



Rare Waves LLC USA  
[rarewaves.net](http://rarewaves.net)

# What is it?

Grendel Drone Commander Classic Pedal is a unique synthesizer that delivers thick drone tones with the convenience of an FX pedal stompbox.

Grendel Drone Commander Classic Pedal brings back the same true analog oscillators and filter from the sought-after original ammo can model that was made from 2008-2014.

The LFO section delivers rhythmic sweeping modulations that animate the filter.

The stomp switch brings the sound in and out, allowing hands-free convenience when adding analog drone tones to specific parts of your performance.

Get new sound effects by processing external audio signals through Grendel Drone Commander’s filter and LFO, via its 3.5mm monophonic line input jack.

This analog synthesizer fits conveniently into a pedalboard and can be powered with a daisy-chain cable from a standard 9VDC FX pedal power supply.

# So, its just like an effects pedal?

No, because it creates its own sounds, and its not intended to be patched in the middle of a chain of FX pedals. It can process audio like an effect, but please read further on how to do that best.

The stomp switch isn’t a wet/dry bypass switch. Instead, its used to mute/un-mute the output and trigger fade-ins and fade-outs.

# Specifications

Size (L x W x H) .....	16 x 10.5 x 5.5 cm
Mass (not incl. battery) .....	0.6 kg
Battery type .....	9V (PP3)
Power consumption .....	15 mA @ 9V
AC adapter ...	9VDC tip negative (BOSS-type)
Outputs .....	Audio Line Out, Clock Out
Inputs .....	Gate In, Filter CV In, Audio In
Clock Out format .....	analog square wave
MIDI IN/OUT,,.....	not supported
DIN SYNC .....	not supported
1V/oct VCO CV.....	not supported
USB .....	not supported

# Contents

POWER.....	3
CONNECTIONS.....	4
OSCILLATORS.....	5
LFO.....	6
FILTER .....	7
GATE/ENVELOPE .....	8
AUDIO INPUT.....	9
REVISIONS.....	10
PATCH EXAMPLES.....	11 +



## Power switch in jack

The power is on whenever a cable is plugged in to the 1/4" audio output jack.

**Q:** Does it need time to warm up?

**A:** No, its ready to use as soon as power is applied.

To save battery life, unplug the audio output cable when the unit is not in use. (This is not necessary while an AC adapter is connected)

## Battery installation and replacement

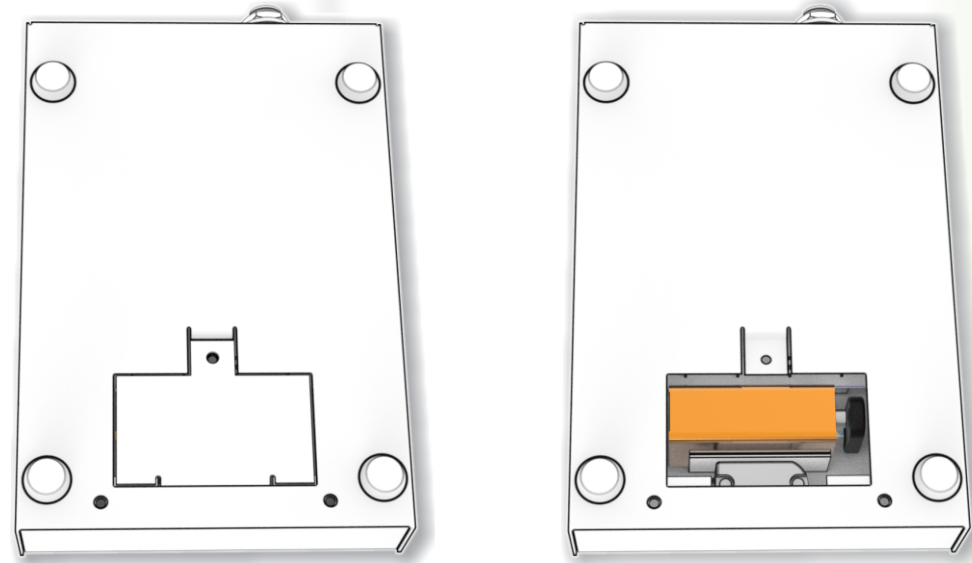
This unit has a replaceable battery.

To access the battery compartment, turn the unit over and rest it on a soft surface.

Remove the screw that secures the battery door and lift the door off. The battery rests inside a bracket within the opening.

It is OK to use an alkaline, carbon-zinc, lithium, or rechargeable battery.

After servicing the battery, immediately replace the battery door to avoid misplaced parts.



**\*\* To prevent damage from corroded / leaking batteries, always remove the battery before putting the unit in storage.**

## Using an AC adapter

This unit requires a BOSS-type AC adapter with 9 volts DC output and tip negative polarity.

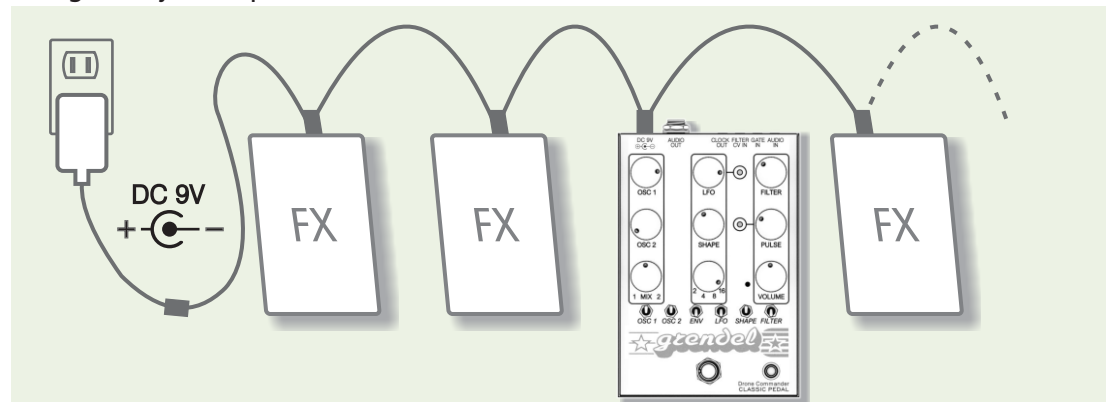
Its current requirement is only 15mA, and it is OK to share power with other FX pedals using a daisy-chain cable.

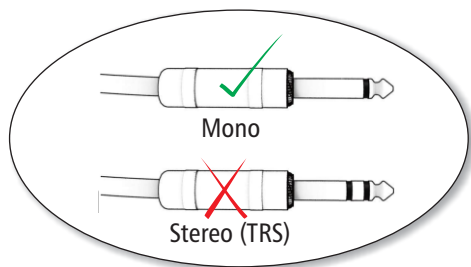
It is protected against reverse polarity and overvoltage.

If the LEDs don't flash after connecting an AC adapter:

- Be sure a mono-type cable is plugged in to Audio Out
- Verify the AC adapter has tip-negative polarity
- Check for damage to the AC adapter cable

Using a daisy-chain power cable (not included)





### Filter CV In

Controls filter frequency from an external voltage source. Connect to external LFO, Envelope Generator, MIDI-CV converter, etc. (not 1 volt/octave)

### Gate In

Turns the sound on/off from an external voltage source. Has the same effect as the stomp switch. Connect to GATE OUT from an analog keyboard, sequencer, or MIDI-CV converter. Also try connecting to an external LFO.

### Clock Out

Synchronizes other gear with this pedal's LFO. The clock frequency is equal to the PULSE rate. Connect to CLOCK IN or SYNC IN on an external analog sequencer. (8 volts square wave output)

### Audio Out

1/4" Line level audio output (-10dBu). Connect to an amplifier, FX pedal, mixer line input, recording device, DI box, audio interface, etc.

### Audio In

Allows processing external audio signals through the pedal's filter, LFO, and gate. Inserting a patch cable mutes the internal oscillators.

For best results with guitar, bass, and microphones, use an external preamp first.

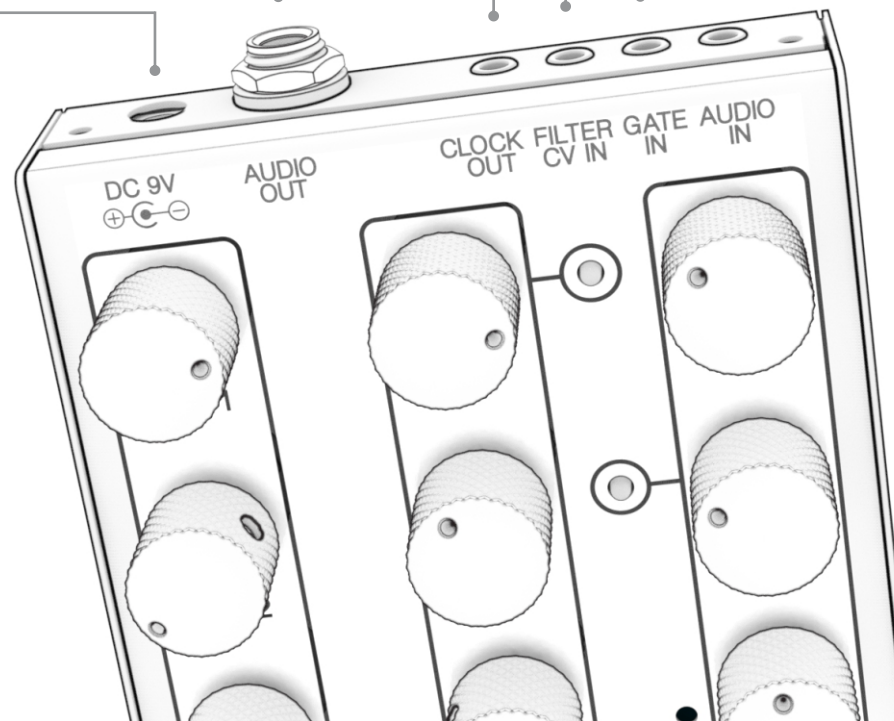
### AC Adapter

Powers the pedal from an AC Adapter. Use a Boss-type FX pedal adapter with 9 volts DC output and center negative polarity (2.1mm).

It's OK to use a daisy-chain cable with multiple pedals.

The internal battery is disconnected when this plug is used.

The pedal has internal protection against damage from reverse polarity and over-voltage.



**Clock Out, Filter CV In, Gate In, and Audio In** require 3.5mm mono cables

- Use standard Eurorack synthesizer patch cables.
- Also OK to use 3.5mm "AUX Cable"
- Use a 3.5mm-to-1/4" adapter when connecting to audio sources with 1/4" line output.

**\*\* To avoid accidental damage, don't connect heavy-weight cables directly to the 3.5mm ports.**



## OSC 1 and OSC 2 knobs

Manual tuning adjustment for the oscillators



The highest pitch, 360 Hz, is near the F above middle C

The oscillators do not have CV input

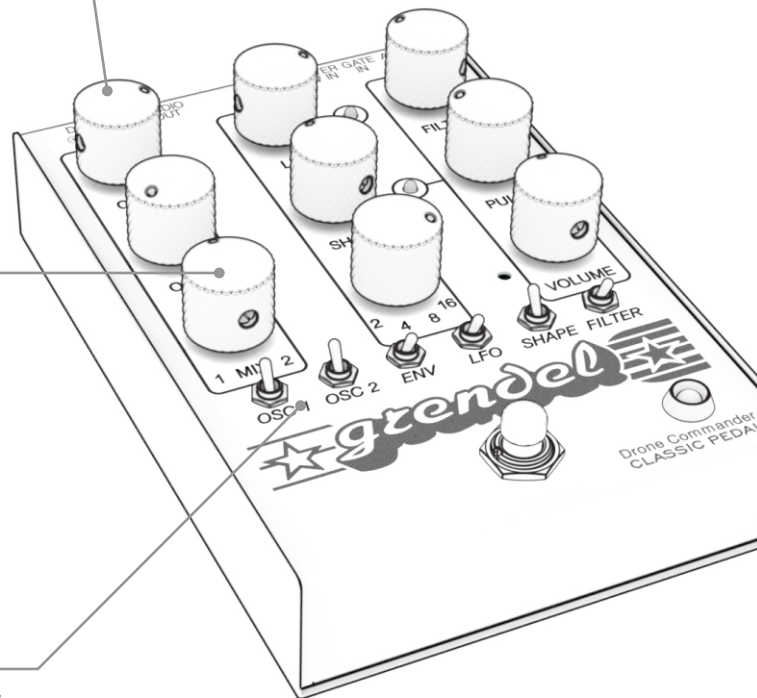
## MIX control

Blends the oscillators together



## OSC 1 and OSC 2 switches

The toggle switches choose the waveform for each oscillator



When **Audio In** is patched, the oscillators are muted and the MIX control is deactivated.

## Tuning Tip: Harmonic Intervals

Practicing this simple procedure will create a harmonic tuning with Oscillator 1 as the low note and Oscillator 2 as the high note.

- Set the MIX knob to only hear Oscillator 1.
- Turn the Filter knob clockwise, to cancel self-oscillations that can interfere with clearly hearing the pitch.
- Using another instrument in your composition as a reference, play the root note of your composition or song, or ask your band mate to play the root note in a low octave.
- Adjust OSC 1 so it is in tune (in unison) with the root note.
- Now, set the MIX knob straight up, so you hear an equal blend of OSC 1 and 2.
- Adjust OSC 2 to a higher pitch than OSC 1. Listen carefully while fine tuning OSC 2 to create a pleasant harmonic interval.

Now the synthesizer is set up for a drone tone that matches the key of the composition or song you're performing.

## LFO knob

Sets the rate of the LFO cycle

This is also the master clock for the PULSE modulations.

## SHAPE knob

Adjusts the waveform for modulating the filter with the LFO cycle

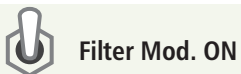


## 2-4-8-16 knob

Choose the number of PULSE modulations per LFO cycle. This also sets the **Clock Out** frequency.

## LFO switch

Enables filter modulation by the SHAPE knob



Filter Mod. ON



Filter Mod. OFF  
(SHAPE cancel)

## SHAPE switch

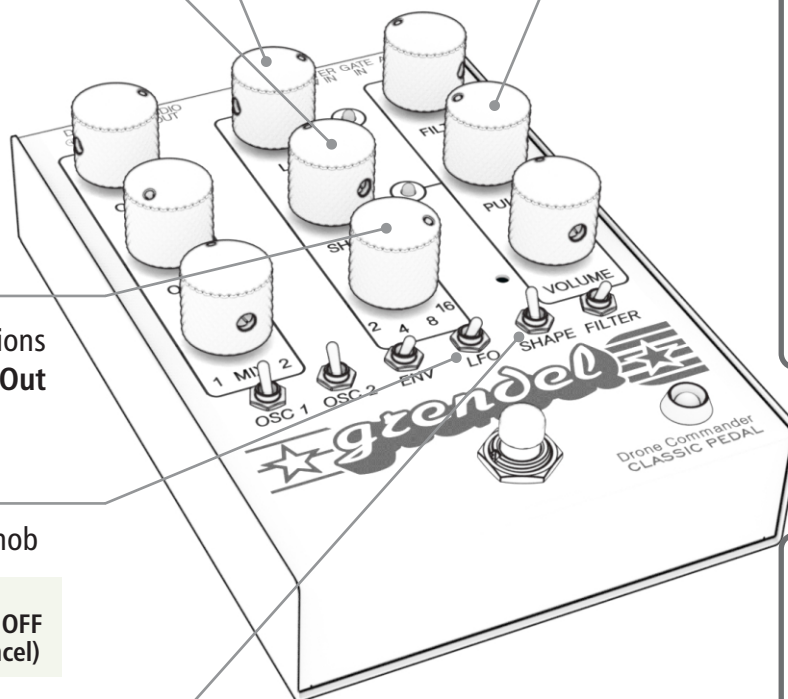
Controls the direction of the filter sweep from the SHAPE knob



Rising Ramp  
Pos. Click



Falling Ramp  
Neg. Click



## PULSE knob

Controls the depth of filter modulation from the 2-4-8-16 knob. The waveform is a square wave. The indicator LED flashes with the timing of the PULSE waveform.

### LFO Tips : Phase Locked Loop

The Pulse LFO waveform is created by a phase-locked loop (PLL). The PLL tracks the LFO and multiplies its frequency by 2, 4, 8, or 16 times.

When you adjust the LFO rate, the PLL does not track the changes instantly, but takes time to lock on. The slower the LFO is, the longer it takes the Pulse to lock on the new tempo.

### LFO Tips : Synchronization

To synchronize the LFO with other analog equipment, patch **Clock Out** from this unit to the Clock In or Sync In on an external sequencer.

This method only applies to external sequencers with analog square wave Clock In

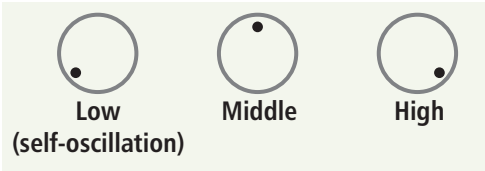
\*\* This unit does not take Clock In from an external sequencer.

To approximately match the tempo of this pedal to an external rhythm, by ear:

- Turn PULSE knob full counter-clockwise
- Turn SHAPE knob full counter-clockwise
- Turn LFO switch ON
- Beat-match the click from the LFO with the external rhythm, listening carefully while turning the LFO knob in small increments.
- When you have got it close enough, wait for the Pulse LED to stabilize, then turn up the PULSE knob.

## FILTER knob

Adjusts the center frequency of the filter  
(Full cutoff is not possible)



## Filter Drive Trim\*\*

Adjusts the amount of filter overdrive

\*\*Normally there is no reason to adjust this setting, but if you like tweaking things, you can try it. To adjust this control, insert a 2mm flat blade screwdriver through the port. The factory setting is 50%.

## FILTER switch

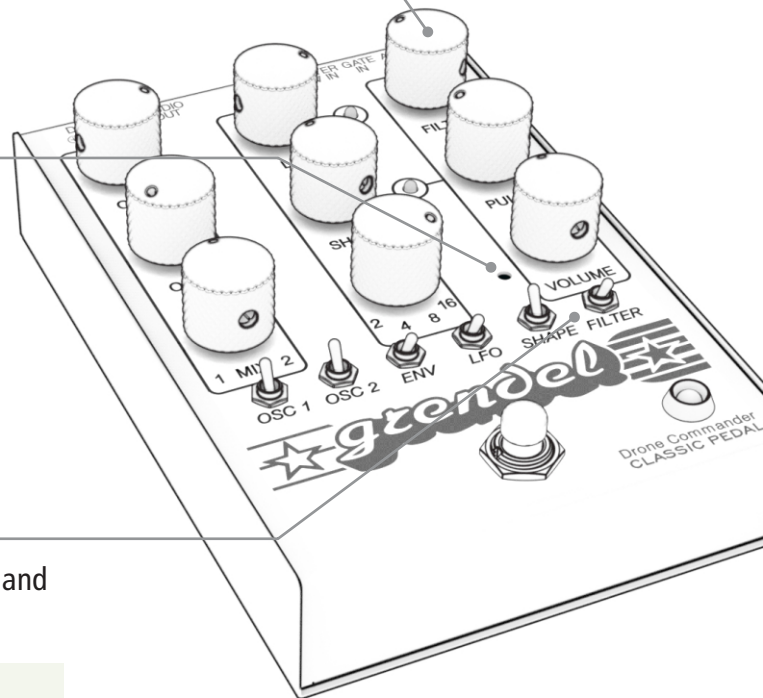
Sets the frequency range of the filter and enables filter self-oscillation



High Range



Low Range  
(self-oscillation)



## Filter Tips: Self-oscillation

The Grendel Drone Commander filter can self-oscillate, adding complexity to the tone.

Self-oscillation of the filter happens when the FILTER switch is down, and the FILTER knob is set anywhere from fully counter-clockwise to mid-way.

The self-oscillation gets stronger as the filter is tuned to lower frequencies. It gives an overdriven quality to the sound.

The self-oscillation can alter the sound of OSC 1 and OSC 2, by emphasizing their harmonics.

As the LFO sweeps the filter, the self-oscillations can stair-step through a cascade of overtones and subharmonics from OSC 1 and OSC 2.

To use the pure sound of the filter's self-oscillation, "dead-patch" the **Audio IN** jack. This mutes OSC 1 and OSC 2.

The **Filter CV** input lets you modulate the filter from an external LFO, analog sequencer, or envelope generator. The maximum input voltage range is -10 to +10 volts. The response is not 1 volt/octave. The depth of modulation may be light to moderate, depending on the output voltage range of the device that is patched to Filter CV.

## VOLUME knob

Master volume control for the synthesizer's  
**Audio Out**

## ENV switch

Controls the behavior of the stomp switch  
and **Gate In** jack

The envelope generator is an attack-release  
type (AR) with equal attack and release  
time.



**Mute effect**  
(fast envelope)



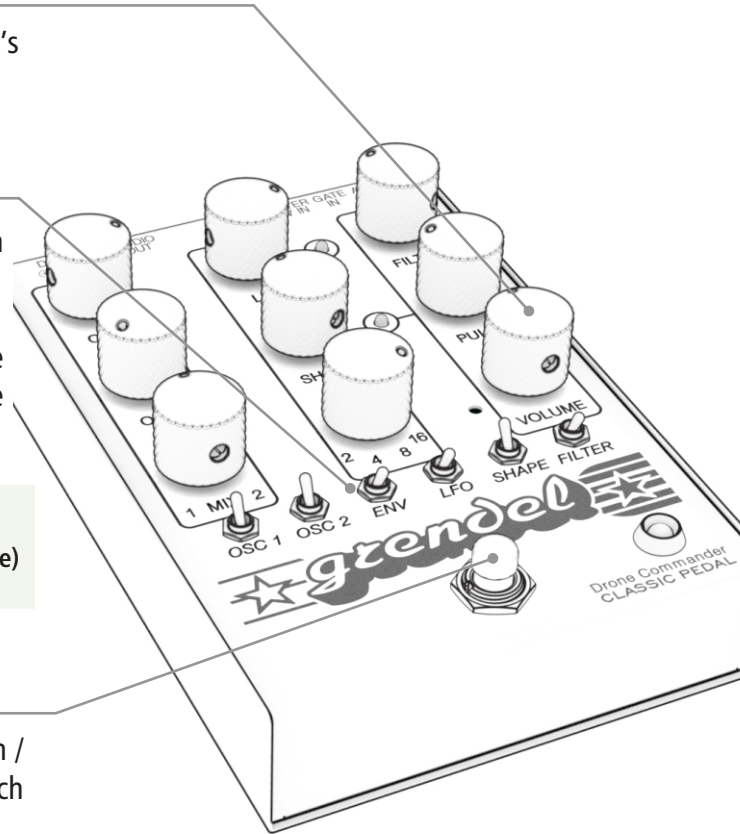
**Fade effect**  
(slow envelope)

## Stomp switch

Mutes the audio output, or gives a fade-in /  
fade-out effect, depending on the ENV switch  
setting.

When the **Gate In** jack is used, the stomp  
switch is still active, and toggles Gate on/off,  
overriding the Gate In status.

**\*\* Use a moderate touch on the stomp  
switch. (Don't use your flying leap attack)**



## Gate Tips: Patching

The **Gate In** jack allows you to switch the  
sound of the pedal on and off from an  
external analog controller. It has the same  
function as the stomp switch.

Connect **Gate In** to the Gate Out of an analog  
keyboard, or analog sequencer. You can also  
patch it to an external LFO or envelope  
generator.

Try self-patching the **Clock Out** jack to the  
**Gate In** jack. This makes the sound cycle on  
and off automatically, and can be used for  
rhythmic effects and tremolo effects. It works  
best when ENV switch is in the UP position.

**Gate In** jack signal specification:

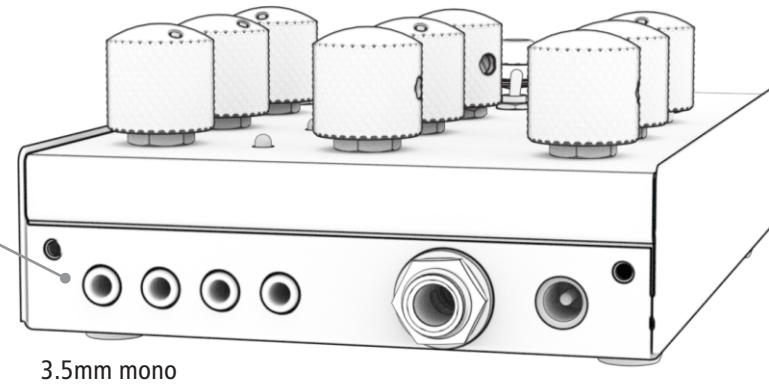
- < 2.5 volts : Gate OFF
- > 2.5 volts : Gate ON

## AUDIO INPUT

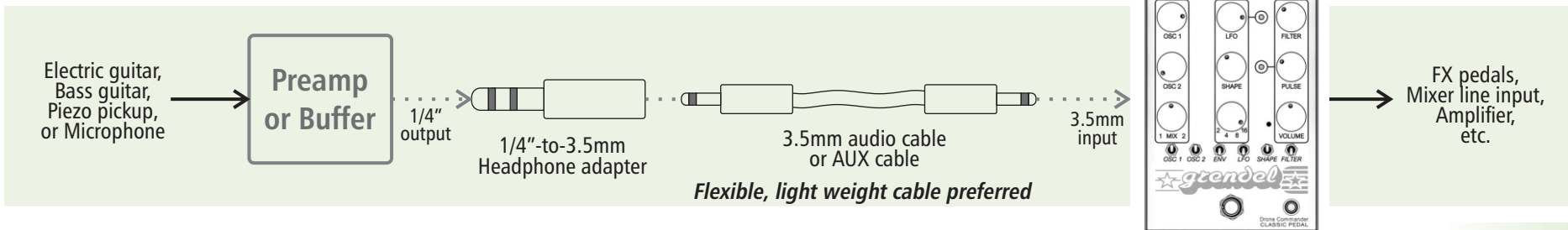
Allows you process external audio through the filter and LFO

Inserting a plug mutes OSC 1 and OSC 2.

\*\* OSC 1, OSC 2, and MIX knobs are inactive when this feature is used



## Suggested connections for processing guitar, bass, and microphone signals:



## Audio Tips: Processing External Signals

The Audio Input feature works best with raw synthesizer waveforms that have a constant signal level, such as the output from a VCO module. When experimenting with it, expect to hear a distorted band-pass filter effect. The Filter Drive Trim (pg. 7) controls the gain level of Audio In.

You'll need a 1/4" - to - 3.5mm adapter when connecting the Audio In to effect pedals or instruments.

To get the best results when processing guitar, bass, or microphone signals, it is recommended to use a preamp or buffer pedal first. Most effect pedals that don't have true bypass switching are OK as a buffer for electric guitar or bass. (Without a buffer, the instrument may sound dull, lacking high end detail.)

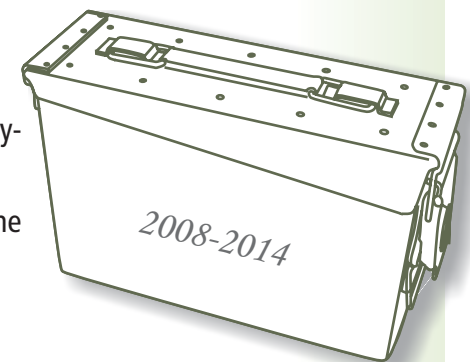
The preamp's gain settings will affect the amount of overdrive in the Drone Commander's filter. Patching a compressor or sustain effect between your preamp and the Drone Commander may also improve the results.

Audio In can be driven by any analog unbalanced line output. If a stereo plug is connected, only one channel will be used. The nominal input level is -10dBu, and the input impedance is 10k ohms.

**Avoid connecting heavy weight cables and adapters directly to this pedal's Audio In jack, as it might be damaged by accidental force.**



## How does Grendel Drone Commander Classic Pedal differ from the original ammo can version?



### Power Supply

- The DC input jack is now tip negative. This lets you power it with FX pedal-style 9VDC adapters and daisy-chain power with other stomp boxes.
- Protection against over-voltage damage caused by connecting an incorrect AC adapter has been added. The unit has a built-in self resetting fuse. (Trying random junk-box AC adapters is no longer a risky maneuver.)
- The power switch is gone. If running on battery, unplug the audio output cable when the unit is not in use.

### Filter section

- The Filter CV In jack now sums its modulation with the internal LFO, so both modulations can be used simultaneously. (The original ammo can disconnects the internal LFO from the filter whenever something is plugged in to Filter CV In.)
- Front panel port to access to the filter drive trimmer has been added. Use a 2mm flat blade screwdriver to adjust this control. The factory setting is 50%.

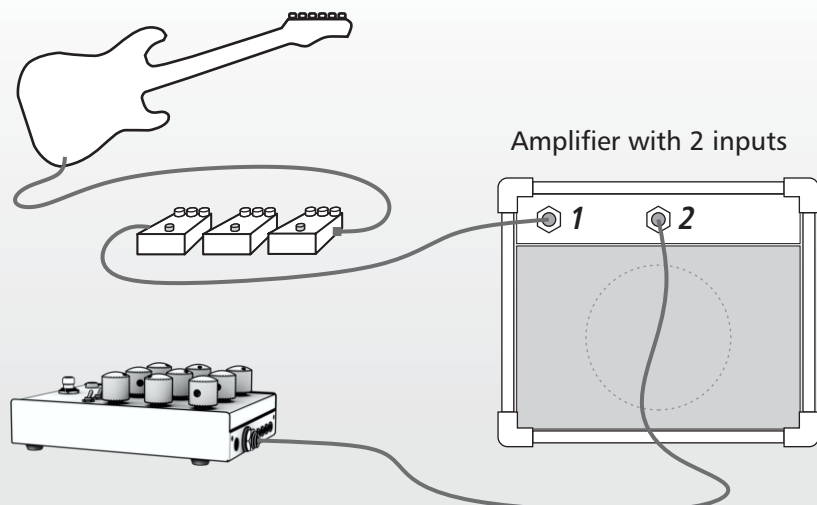
### LFO section

- The main LFO now can reach slower frequencies.
- The PULSE LFO now can track the main LFO at higher frequencies, extending into the low audio frequency range.
- The PULSE LFO has been stabilized so that adjusting the 2-4-8-16 knob does not disrupt its rhythm.
- The Filter CV In jack now sums its modulation with the internal LFO, so both modulations can be used simultaneously. (The original ammo can disconnects the internal LFO from the filter whenever something is plugged in to Filter CV In.)
- An LED has been added that flashes once per LFO cycle.
- The Shape knob can now be set to fully eliminate the sharp click from the LFO cycle, giving a smoother ramp modulation.

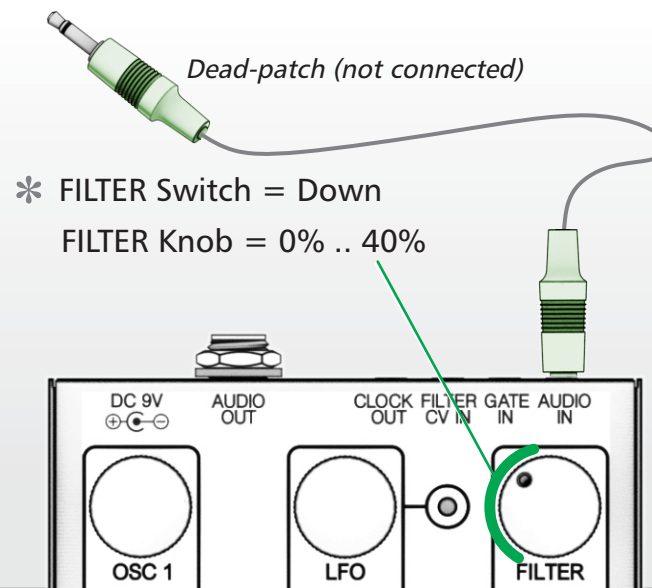
### *Et cetera...*

- Gate control, envelope generator, and VCA have been added, controlled by the stomp switch and Gate In jack.
- The push-pull potentiometer switching has been replaced with toggle switches.
- External Audio In has been added. Patching to Audio In disconnects the internal oscillators. To simply mute the internal oscillators, as was done in the ammo can model by pulling up the MIX knob, dead-patch the Ext. Audio In jack.

## 1 Drone accompaniment for guitar

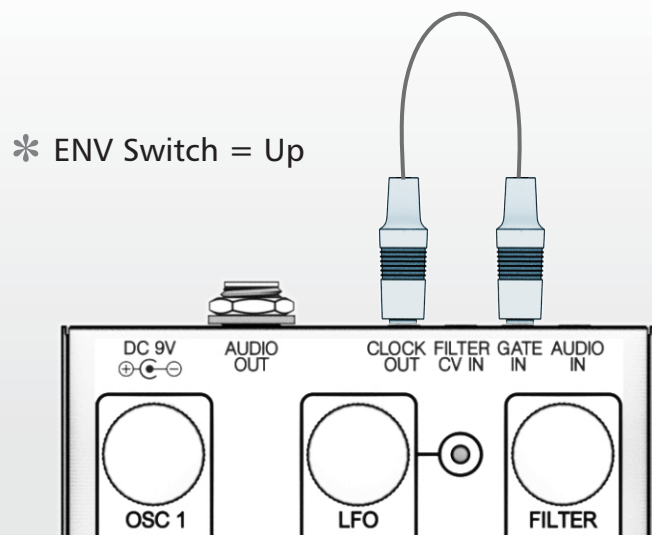


## 2 Pure filter self-oscillation

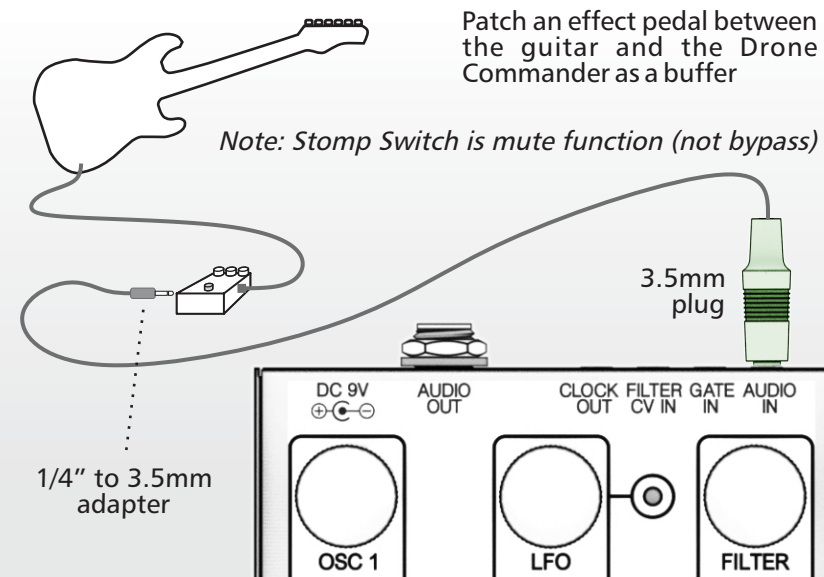


## 3 Auto-gate / Tremolo drone

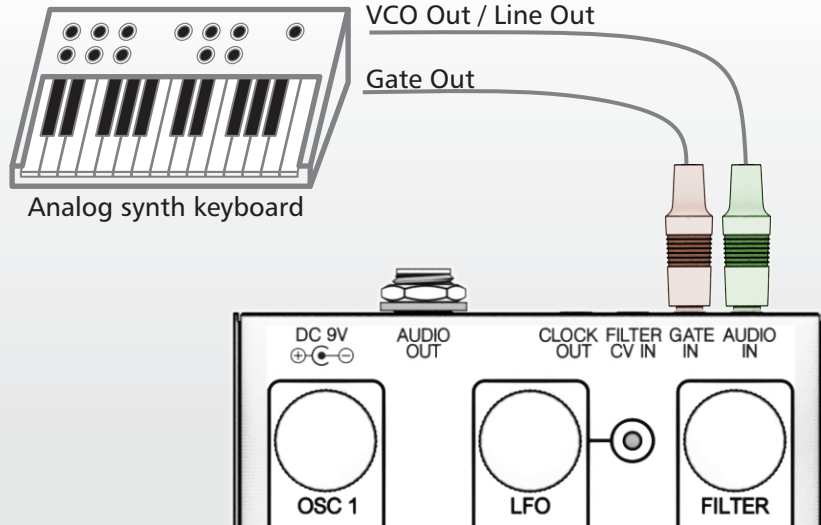
Note: Stomp Switch function is affected



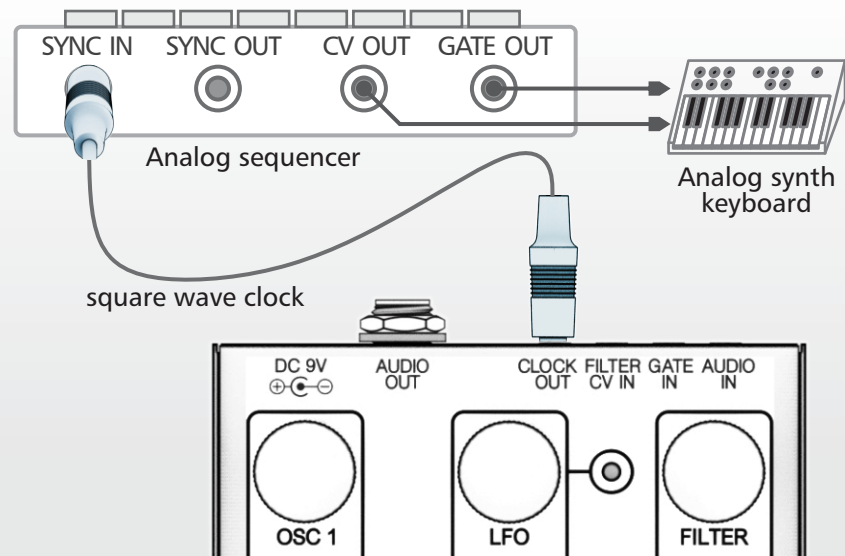
## 4 Processing guitar with Drone Commander



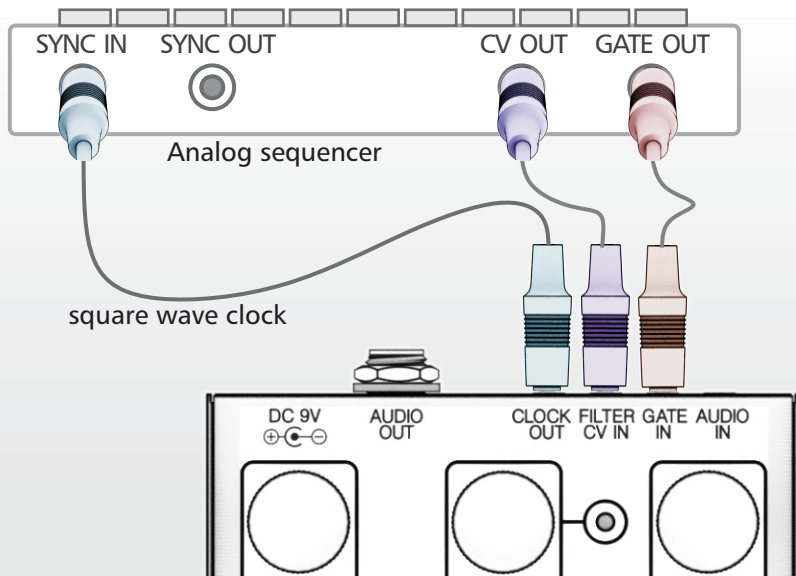
## 5 Interfacing with an external keyboard synth



## 6 Sequencer connection 1



## 7 Sequencer connection 2



## 8 Filter modulation with external BPM control

