



ASHEVILLE MUSIC TOOLS

## *Analoger™ AFG-1*

*100% Analog Bucket Brigade Flanger  
A Whooshless Resonant Comb Modulator*



**User Manual Revision A**

Last Revision 05/16/2023

## Introduction

Thank you for your purchase of the Asheville Music Tools Analoger™ series AFG-1 Flanger: a Whooshless Resonant Comb Modulator. This pedal features a reissue Bucket Brigade Delay line to deliver classic Flanger and Chorus sounds with the most natural modulation possible. The synthesizer-inspired control voltage topology provides an extended range of functionality and precision not available in most flangers. The AFG-1 draws upon renowned analog designer Hawker's decades of experience creating modulation and delay-based effects. We hope you enjoy many years of use from your AFG-1 and find it as inspiring and fun as we have.

The AFG-1 is a 100% analog effect, built with over 380 high-quality components to combine vintage audio processing techniques with advanced, high-tech, electronics. At its core is a high headroom, 256 stage, reissue MN3009 Bucket Brigade Device. True sine-wave exponential modulation and a selectable response dynamic envelope detector modulate its VCO based delay clock. It contains tightly tuned, discrete, high-order filters and a compandor with emphasis/de-emphasis to keep the noise floor low while imparting an animated feel. The VCA-based feedback control offers warm regeneration tone and a controlled method of dialing in deeply notched comb filter effects. A JFET input stage and input preamplifier optimizes the signal-to-noise ratio and allows for tone shaping and harmonics enhancing overload at higher settings. The whole ensemble is powered by a protected and highly regulated 15V power supply for carefree operation in any stage or studio environment.

A special thank you to the entire Hypertriangle team, including our sister companies, Asheville Music Tools and Electronic Audio Experiments. Plus John, Liz, Rosser, Miranda, Brad, JohnTone, Hawker and all of the other people who have contributed. This design was truly a team effort, and it was a joy to work with every one of you to bring this pedal to fruition.

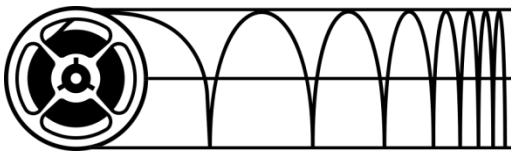
We hope you enjoy many years of use from your AFG-1 and find it as inspiring and fun to play as we have.

## Hawker's Log: What is all this Flanging stuff anyway?

History, Artwork, the Whooshless Wonder, and Flanging versus Phase Shifting

The AFG-1 flanger has a rich history. It is probably my favorite delay-based sound, and is the fourth flanger I have designed for commercial release. This flanger came about by adding the features that I felt were lacking in my previous designs, while building onto the Analoger format.

The AFG-1's graphic pays homage to both the tape flanger of yesteryear and the comb filter frequency response it produced.



Flangers are based on modulating a very short delay line from 0.2ms-10ms. Early flanging was done by grabbing or controlling a tape recorder's take up reel "flange" or motor to be slower than a second unit that was tracking in sync. The first tape was then combined with the second to create a comb filter effect. Frequencies half the delay time were canceled out, while frequencies the same as the delay time were enhanced. Since  $50\text{Hz}^{-1} = 20\text{ms}$ , and  $2\text{KHz}^{-1} = 500\mu\text{s}$  we can see that to cancel these frequencies we require a delay time of  $10\text{ms} - 250\mu\text{s}$ . This is in the range of the AFG-1 and a typical guitar, bass or synth note. One difference in tape flanging is that the 2<sup>nd</sup> tracking tape has its own fixed delay. For this reason, a tape flange can do "through zero" flanging easily where the 1<sup>st</sup> delay may be faster or slower than the static 2<sup>nd</sup> delay. To do this in analog not only adds a potentially undesirable pre-delay, it requires twice as many parts adding to cost and complexity. Thus, the AFG-1 is not a TZ flanger.

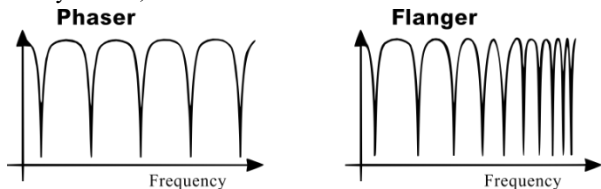
The AFG-1 has some unique features. It utilizes sine wave and bipolar additive modulation as well as phase summing options, unlike traditional flangers. More uniquely, it contains a clipping drive circuit and an envelope follower. The drive circuit came about because I have often used distortion before a flanger to increase harmonic content. I added an envelope follower because I often played my flanger with an expression

pedal, moving my feet in tandem with my picking, and felt an envelope follower would even better capture this dynamic responsiveness.

In the AFG-1, the time/freq can be modulated by the LFO and by tracking the user's playing dynamics. Using the envelope on its own removes the sometimes-objectionable whoosh of traditional LFO based flangers when not playing. This adds an articulated effect that effectively turns the **FREQ** knob to the right or left based on your playing. It can produce deep "out-of-band" sounds or aliased dive bombs of long delay times depending on the direction and amount of envelope. The three carefully tuned **ENV** settings adjust the response timing for playing styles and situations anywhere between fast finger picking to melodic ambient strummed soundscapes.

So what is the difference between Flanging and Phasing? Reviewing: In a flanger all notes are delayed the same amount. The flanger cancels frequencies that change depending on the delay time. This happens at harmonic intervals of the **delay time**. The key difference is that, within a flanger's circuit, all frequencies get the same delay time.

**Phasers:** A Phaser, also known as an all pass-filter, shifts frequencies above the cut off frequency by 90 degrees. They are in pairs of stages to get 180 degrees, which will cancel out a signal. This cut off is based on a fixed **frequency** and not time. Therefore, it has a known delay at one frequency only; other frequencies have a different delay time, and phase shift, thus are delayed differently. The resulting comb filter looks different, and is not harmonically related, as shown below.



**More reading at:**

<https://www.soundonsound.com/sound-advice/q-whats-difference-between-phasing-and-flanging>

## **Hawker's Log: About BBDs**

I am often asked what gives analog delay-based effects their characteristic sound. The reason for me is different than I see others usually mention.

A BBD (Bucket Brigade Delay) works by storing a momentary snapshot in a capacitor isolated by a FET network. It passes this sample from one capacitor to the next via a bi-phase clock until it reaches the output. These samples are like water in a bucket brigade line, passing the audio from one “bucket” to the other until it reaches the “fire” at the end. BBDs were originally designed for distance measurement with radar. When the radar signal was sent out, a copy was delayed through a BBD and compared to the reflected signal. By sweeping the time until the reflection cancels out the delayed sample, the delay time, and thus distance, is measured. Early digital oscilloscopes, like the Tektronix 2440, also used them as temporary storage since Analog to Digital converters of the time were too slow. CCD cameras still do this today for the same reason. Today they are used almost exclusively for audio processing in delay, chorus, and flanger effects.

The AFG-1 uses a recreation of the Matsushita/Panasonic MN3009 PMOS BBD from Xvive™. The MN300x series BBDs use a higher voltage for superior clarity, noise, headroom, and distortion compared to the MN320x NMOS types typically found in most stompboxes. However, the MN320x BBDs are capable of wider delay times with a faster clock. The reissue BBDs sound very close to the Panasonic parts but are more transparent and have a lower noise floor, though with less animated character. In addition, the sound does not vary over delay times as much as their predecessors did.

Perhaps the biggest reason analog BBD based delays can do what digital counterparts often cannot is due to Fractional Delay, often referenced as the Doppler Effect. Since the clock moves continuously, delay time moves smoothly and unfixed by incremental steps. That is why analog choruses and flangers tend to feel more natural. The ear is very sensitive to this and perceives this as distance and movement. This trick is how movies pan sound or make you think a bullet just whizzed over your head. Most digital delays simply cannot do this.

With a fixed clock frequency, they can only take a sample step every 48 or 96KHz and step at that increment. This only simulates fractional delay and is not true fractional delay. The ear can hear the difference, and so the brain will process this difference as incorrect. Early digital delays like the Lexicon PCM 41/42 did use a variable clock using a different, now obsolete, process. However, these were the exception, not the rule. Most digitally controlled analog delay based modulation that use a processor-generated clock do not use steps small enough for true fractional delay. Therefore, while they may use a BBD, the modulation does not sound as natural as some picosecond step clocks or true analog modulation.

In addition, BBDs have some other “artifacts” that give them their unique sound. The transfer characteristics, gain, noise, distortion, and frequency response vary depending on the bias voltage and clock frequency making the sound change as the delay time changes. They also do not put out the entire signal at the same time. Half the signal is a ½ clock behind the rest of the signal, yet combined at the same time, making for a strange, smeared mixing of the signal samples slightly out of time.

Other components in a BBD circuit are also responsible for the signature sound of analog delays. BBDs require companding and emphasis/de-emphasis networks to improve the signal to noise ratio, but these add phase changes, limiting and an animated “breathing” compression character to the sound. The design of the filters affects the frequency response, peaking or ringing, and potential aliasing or ring modulation. There are many more parts of the analog design often overlooked in digital recreations that affect the sound as well. This includes the clipping, feedback network, clock stability, modulation wave shaping/curves (exponential or linear, etc.) that are all important to get that great analog sound.

For more reading about BBDs check out these great websites:

<https://www.electrosmash.com/mn3007-bucket-brigade-devices>

<https://www.premierguitar.com/articles/25035-behind-the-bucket-brigade>

<https://pedals.thedelimagazine.com/bbd-chips-the-magic-behind-analog-delay-pedals/>

## Setup

For all Asheville Music Tools products, use only a standard, **9VDC REGULATED**, center-negative power supply from a reputable vendor. For the AFG-1 the supply should be rated for at least 200mA. Vintage style rectified & filtered, but unregulated, supplies are **not acceptable** for use with this product. We like the Truetone™ One Spot® and similar products. When using other pedals in your signal chain, we recommend an isolated power supply.

The AFG-1 may draw over 200mA on power up. Use caution if using multi output supplies with 100mA outputs. **Use the higher current outputs when using this type of supply. Never use a higher voltage with this product.** There are no sonic benefits, and you risk damaging the pedal and voiding the warranty. The pedal will not turn on if it detects an overvoltage supply or high ripple from an unregulated supply. Our products do not use a conventional 9V battery due to the high current draw.

Your Analoger™ Series Pedal ships with a clear plastic protector over each of the knobs. Feel free to peel it off if its presence shows on the knob top.

The AFG-1 has a flexible bypass making it able to be used in various configurations for guitar, synthesizer, or line level applications, including:

- **Standard pedal use:** AFG-1 connected into an amplifier input, with or without other pedals. You may use the pedal in either Buffered or True bypass mode in this configuration.
- **Insert Effect:** Connect the AFG-1 to the effects send/return of your preamp, power amp or mixing console. You may also use the AFG-1 to replace the existing preamp if connected to just the return. Use it this way in buffered Bypass mode only.
- **DI (Direct Input):** The AFG-1 can be used to line match to a mixer or DAW input for the correct drive and signal conversion from the guitar's high impedance out to a console or DAWs low impedance line in. It can also be used as a buffer placed before other pedals. For best results use with 10K or higher line input. Not suitable for 600ohm input impedance of some classic consoles. Use this in buffered Bypass mode only.

## Getting Started

Let us explore the range of controls on your AFG-1.

Connect your guitar or other instrument to the **IN**put jack. Connect an amplifier, other pedals, mixer, or DI box to the **OUT**put jack. If you have an expression pedal (or 0-5V control voltage source like a synthesizer output), connect it to the **EXP**ression input.

Use a 9V regulated 2.1mm, center-negative, power supply, capable of providing at least 200mA of power and connect it to the 9V DC input.

Be sure to power up the AFG-1 **BEFORE** turning on your amplifier to prevent speaker pop and the potential to damage your speakers or headphones.

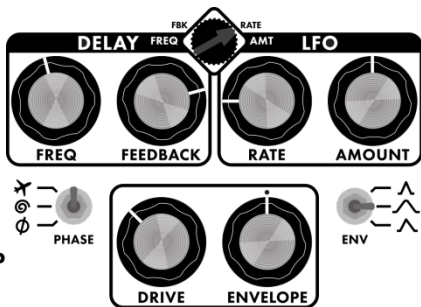
Let's start with a basic flanging sound to familiarize ourselves with the AFG-1. First, set the knobs to the *Home* position shown in the graphic below, and engage the foot switch.

Set **FREQ**, **AMOUNT** & **ENVELOPE** to be near straight up or 12:00 position.

Set **FEEDBACK** knob to the right at about 2:30.

Set the **DRIVE** and **RATE** to 9-11:00. Set the **PHASE** switch to the up position and **ENV** switch to the middle. **EXP** switch clockwise to **RATE**.

This represents a classic Flanger sound.



There is no way to damage the AFG-1 through knob settings so feel free to have some fun exploring how each control works. There are some hidden tricks, gotchas, and advanced possibilities, so once you are done having fun read on to learn more about the AFG-1.



## Operation

The AFG-1 is laid out in homage to modular synthesizers with three main modules. They are the **DELAY** Module, the **LFO** (Low Frequency Oscillator) and the **Drive/Envelope** Modules. Let us look closer at each of these modules.

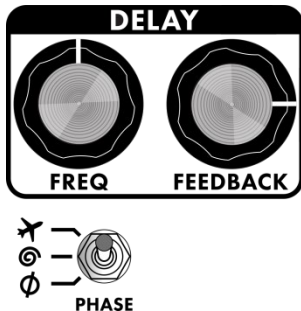
### **DELAY MODULE**

**FREQ:** The **FREQ** knob corresponds to the **MANUAL** knob on a traditional flanger and adjusts the center delay time from ~0.5ms to ~14ms (more using LFO and control voltages). As you turn the knob CW you decrease the delay time which corresponds to higher pitch comb filter sound. Between about 7:00 and 10:00 produces chorus sounds, while past that is more flanging territory.

**PHASE SWITCH:** selects whether the delayed sound mixes and feeds back in phase or out of phase. The up or “**JET**” position produces traditional flanging sounds with the feedback and delayed sound in phase with the dry signal. The middle “**SWIRL**” position is the most subtle mode. It sets the peaks of feedback out of phase with the delayed and dry signal similar to the reverse feedback knob on one of Hawker’s previous wood sided effect designs. Finally, the down or “**PHASE**” position sets both the feedback and delayed signal out of phase with the dry signal. This produces deeper bass and a more vocal sound. This is similar to the **ODD** position of the classic A/DA Flanger or the **TYPE** switch in Hawker’s previous classic black and silver mini-flanger design.

**FEEDBACK:** The **FEEDBACK** knob affects how much signal is fed back into the buckets. On traditional flangers this is called “regeneration”. Feedback creates deep time-based peaks and notches in the signal. At extreme settings it will go into self-oscillation, providing drone tones that are tuned by the **FREQ** knob setting. Try it out, get lost. Come back after and read the next section.

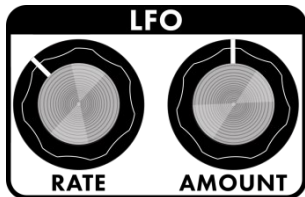
*Be sure to read the control voltage section for information on this module with expression pedals or control voltages.*



## LFO MODULE

The Low Frequency Oscillator (**LFO**) module is a modulation source for animating the **FREQ** (delay time) and providing movement to the notches and valleys of the comb in the signal. Unlike most traditional flangers, our LFO provides exponential, true sine wave, and octave symmetrical modulation (instead of Hz symmetrical) for musical and balanced movement, the way the ear and brain want to experience it. In the synthesizer world, this is the familiar Volt/Octave tracking used for pitch and frequency. Modulation is symmetrical around the **FREQ** setting. Use **FREQ** to set the center point of the modulation and the LFO will move equal fractions of an octave above and below this **FREQ** setting.

**RATE:** The **RATE** (AKA **SPEED**) knob adjusts the speed or rate of modulation from about 0.01Hz to 8.3Hz (wider range via control voltages). At minimum the sweep is almost imperceptibly slow. Lower settings provide a slow whoosh or a rhythmic pitch shift. Medium speeds provide a chorus effect, and faster rates provide a gargling, bubbly sound.



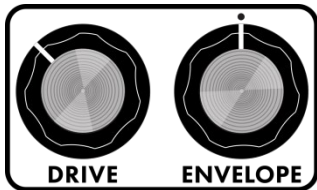
**AMOUNT:** The **AMOUNT** knob controls the depth or range of pitch movement at the speed of the LFO, or the amount of modulation. Set **AMOUNT** low for a deep jet plane whoosh or subtle shimmers. Set **AMOUNT** higher for chorus, octave jumps or wild pitch shifts and spaceship warbles. This is slightly different from the **WIDTH** knob on traditional flangers, which is a pan control between **MANUAL** control and LFO control. Instead, it adds the modulation on top of the **FREQ** setting, rather than panning between the two, and thus provides for more total range and wider control beyond just the **FREQ** panel knob setting.

*Be sure to read the control voltage section for information on this module with expression pedals or control voltages.*

## DRIVE AND ENVELOPE MODULES

The DRIVE and ENVELOPE modules provide further shaping of your tone and control of the flanging sound.

**DRIVE:** The Drive knob is a tweak of the highly regarded preamp and drive circuit of our ADG-1 pedal. This version provides more character, with rich saturation and tone shaping as the drive is increased. This generates extra harmonics to work with when combined with comb filtered flanging tones. At about 9:00 the drive is unity gain, with a transparent and flat response. As gain is increased it becomes increasingly saturated and sculpted, providing nearly 36dB of total gain with a subtle midrange emphasis.



**ENVELOPE:** The Envelope knob provides a means of articulated “Whooshless” dynamic flanging as made famous by musicians like Frank Zappa, who used the MicMix Dynaflanger 265, or effects like the Eventide Instant Flanger FL201. This flange effect rides your dynamics and gets out of the way when not playing, eliminating the sometimes unwanted whoosh artifacts of typical flangers. The envelope is situated in the chain post DRIVE and can be thought of as a third hand turning the FREQ knob with your playing dynamics. At noon the effect is disabled. To the right it is the same as manually turning the FREQ knob clockwise, and to the left the same as turning it counterclockwise.

**ENV SHAPE SWITCH:** Controls the response of the envelope control signal. The top setting is great for dynamic playing with a fast attack and release time but may be jittery with some audio modulation artifacts. The lower setting is a slightly longer attack and much longer release and is great for picking or rhythm strumming with a smoother fade out. The middle setting provides for a long ambient attack and slowly fading release. If not using the envelope control, this setting is suggested to reduce false triggers.



## **CONTROL VOLTAGE or EXPRESSION SECTION:**

Using the **EXP** knob and an external **EXP**ression pedal or control voltage with your AFG-1 will greatly increase the dynamic playing and tonal possibilities, as well as expand the control range beyond the extent of the front panel knobs alone. Use a standard 10-50K linear expression pedal or expression controller that uses the +5V voltage supplied on the ring jack and outputs the control voltage on the tip. Or, use a 0-5V external CV voltage source from a Eurorack module, Synthesizer, DAW, or similar.

**CAUTION:** Voltages over +5V or below 0V may damage your AFG-1. Use only standard 0-5V control voltages. If your expression pedal has a trim knob, you may find it helpful to use this feature to reduce the range of the expression pedal to less than a full knob sweep to make it easier to dial in the exact sound you seek and be less sensitive to the exact foot position.

Please note: To provide a wider playing capability with expression inputs, the control setting selected by the **EXP**ression switch will reduce the knob range and setting slightly. Think of it as turning the knob to -1. The **EXP** controls are additive with their corresponding knob in that the **EXP** input is added to the knob. For full control voltage range set the knob to the most counter clockwise (CCW) setting, however using both you may get delay times, feedback amounts or LFO rates / amounts beyond those achieved by using just the knob. Unlike the ADG-1, the AFG-1 **FREQ** is additive like the rest of the controls. **Freq/Delay** times beyond the normal knob position will produce a very short delay and extra high frequency comb.

Use only your fingers, a plastic screwdriver, a guitar pick or similar plastic device to turn the 4-position **EXP** rotary switch. Never use a metal object that could damage the shaft. If you use this feature frequently, we have included a knob (C&K part # 297F02000). Note this knob will turn the shaft but there is not enough shaft length through the enclosure to permanently secure the knob to the shaft and it may fall off. Do not glue the knob to the shaft or your AFG-1 will not be serviceable.

## **FOOT SWITCHES**

**BYPASS FOOTSWITCH:** Turns the effect on or off. The LED is lit when engaged and will modulate to the LFO rate in approximately a triangle wave shape. A user accessible switch located inside the AFG-1 is user selectable for true bypass or buffered bypass depending on your preference.

### **TRUE BYPASS / BUFFERED BYPASS:**

If you carefully remove the 4 screws holding the cover on to the back of your AFG-1 you will see a bypass setting switch underneath the jack board on the left edge of the PCB. This is the **ONLY** user accessible option on your AFG-1.

### **Do not adjust any of the carefully calibrated factory set trim pots.**

Use the switch, on the left side of the jack board, to select true bypass (Default – switch to the outside of the enclosure) or buffered bypass (switch towards the inside of enclosure). In true bypass, when the effect is not engaged, the input is coupled directly to the output and does not pass through any active electronics. If you have loading, high frequency loss, noise or interference issues from long cable runs or high impedance sources, select buffered bypass. This uses the internal JFET input buffer as a simple buffered output with approximately 4K ohm output impedance. Buffered bypass may have a slight (~1dB) gain loss depending on the impedance match. This is normal.

*Note: if your signal is cutting out or thin sounding, check that the bypass switch is fully set to one position or the other. If it is stuck in the middle, your unit may not function properly.*

## Specifications:

- **Type:** 100% Analog signal and control path
- **Delay Time:** 0.52ms – 13.5ms typical. 0.33ms - 85ms with use of LFO, Envelope and / or external Control Voltages
- **Feedback:** Off to self-oscillation and beyond using EXP input coupled with knob position.
- **Rate:** LFO RATE, Sine Wave from <0.01Hz to 8.3Hz (~16Hz with CV control)
- **Amount:** LFO depth control from OFF to ~85% of FREQ sweep
- **Drive:** Up to 36dB of boost with clipping and increasing band pass characteristic as gain is increased.
- **ENV control:** Positive and Negative FREQ control modulation attenuator, center off. Greater than 100% modulation possible.
- **Envelope:** Attack and Release selectable Fast/Fast (~40ms / ~60ms), Slow / Slow (600ms / 800ms), Medium / Slow (60ms / 700ms).
- **Phase Switch:** 3 Position; Positive Wet and Feedback, Out of phase Feedback, or Out of phase feedback and wet signal. 4<sup>th</sup> “secret” mode, in phase feedback, out of phase wet on PCB with modification.
- **Expression Switch:** 4 position rotary selects Freq, Feedback, Rate or Amount external control. All controls are additive to the front panel knob adding extended range. TRS jack usable with CV or Expression pedal, (CV range is 0-5V). Ring supplied current limited ~5V output. Control input on Tip.
- **Bypass Footswitch:** effect on/off. User selectable True Bypass or JFET Buffered (Accessible by removing AFG-1 Cover)
- **Power:** 9VDC @ <150mA. 75-120mA typical. Up to 300mA start up. Standard pedal center negative 2.1mm x 5.5mm barrel.
- **Input impedance:** >1M $\Omega$
- **Output impedance:** 1K $\Omega$  Max (5k max for buffered bypass)
- **Noise Reduction:** 2:1 broadband with 10dB HF emphasis
- **Genuine Hammond™** die-cast aluminum enclosure
- **Dimensions:** D=4.95” (12.5 cm), W=3.75” (9.4 cm), H=2.25” (5.8 cm)
- **Weight:** 14oz (425g)

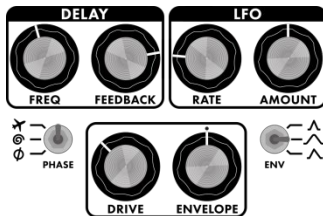
*Note: All specifications subject to change at the whim of our overloads*

## Presets:

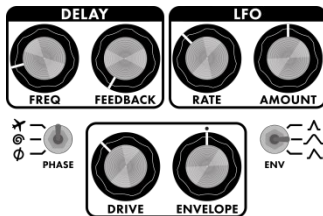
Let's try out some sonic ideas for the AFG-1 and lay down the comb filtering. The presets here range from classic flange to far out freak out and funkiness. Remember kids, since analog circuits have some variability, the exact knob setting may be slightly different from those shown below. Be sure to tweak to taste. Drive and Envelope settings may vary based on the output of your instrument.

**Note: Set ENV control to Rate if not using Expression Pedal:**

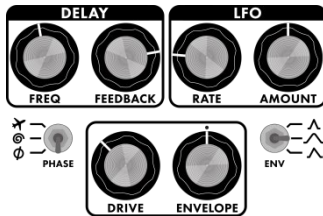
**Classic Flanger:** Starting with the knobs and switches as shown to the right creates a classic flanger sound. Adjust LFO rate and AMOUNT to taste. Tweak FREQ for the desired tone or crank Feedback some more for seriously deep jet whooshing sweeps.



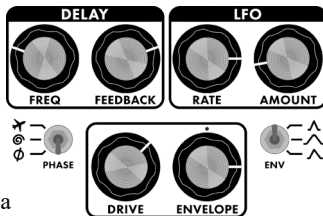
**Chorus:** By reducing the FREQ knob and removing the feedback we have a classic Chorus sound. Again, adjust the Freq, RATE and AMOUNT to taste. You may find that a slightly faster RATE and less AMOUNT provides for a more traditional chorus sound.



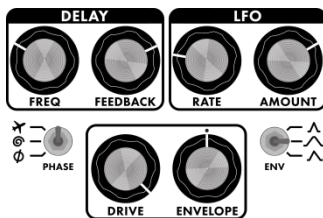
**Deep Ellum Flanger Blues:** Returning to the classic Flanger position, try the three Phase switch positions. The middle gives smooth swirls, while the lower setting produces accentuated deep bass or vocal sounds. This effect is more pronounced as you move the FREQ knob CW or increase the Feedback.



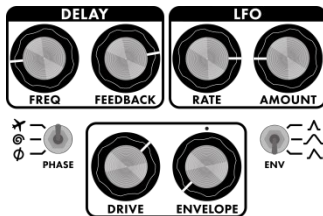
**Talk Box:** Adding Envelope control, adjust the **FREQ** slightly CCW and increase the **ENVELOPE** knob to the right to compensate. Using a fast envelope, add a little shimmer with the **LFO**. Place the phase switch down and increase the **Drive** bite to get whooshless dynamic flanging that sounds almost like a talk box. Eat your heart out Peter Frampton.



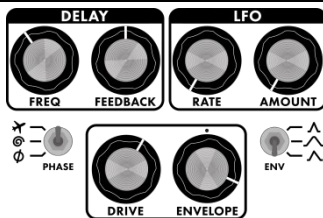
**Barracuda.** Need we say more? Let's get to the *Heart* of the matter with this classic flanger defining sound. Bump Bitty Bump Bump Ba Da.. Ah Wheeee!



**Interstellar Overdrive:** Boldly go where no flanger has gone before. Using the **ENVELOPE** control to take the **FREQ** to "out-of-band" places while setting a fast attack with slow release, we get some crusty aliased, dive-bombing & ring-mod overtones. Try the phase switch down for more Boing-for-your-Buck.

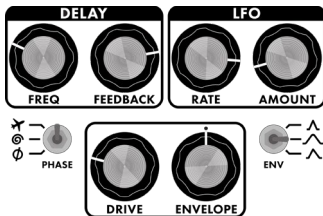


**Breathe in the Light:** Ride the healing waves of ambient release. Use this purely envelope controlled setting to embrace letting go. Play big sustaining cords and / or add your favorite echo effect in front and then set the **DRIVE** and **ENVELOPE** controls to taste.

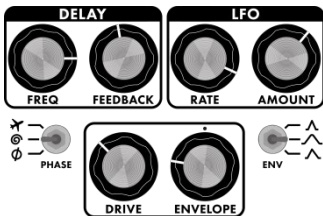




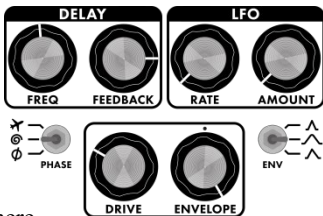
**Res-O-Flange:** An echo-like resonance with a subtle, leslie-like warble. Tune the **FREQ** knob to the key you are playing in and enjoy the otherworldly, sitar-like drone. Try setting the phase to the down position to swap your sitar for a “tubular bells” resonator.



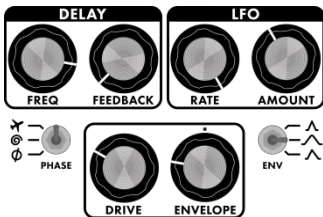
**Tape Chewer:** Using the swirl setting, you can achieve unique textures without dominating the sound. By combining the envelope with a fast LFO, you can evoke the sound of a worn-out, crinkly tape and a slipping belt drive.



**Acme Flange ‘n Hancer:** This setting is very subtle and entirely dynamic. Use the envelope to add a dynamic sweep of harmonics that sits neatly under your playing. Nice with fuzz or drive in front. Try higher **FREQ** settings for a more sparkly sound. If you didn’t hit Bypass you might not even know it was there.



**Classic Vibes:** Hep Hep Cat, and put on some groovy vibes my friend. This higher tuned warble is just the thing to add some flair and texture to your noodling and feel the vibes you groovy cat.



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*Tools To Inspire Your Creative Muse*



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## Changelog

Revision	Date	Notes
Rev A	05/16/2023	Production release
Rev 1	03/30/2023	Prototype manual

Visit our website for more information, mods, hacks, and presets.

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