QUAVERATO

Owner's Manual

HARMONIC TREMOLO PEDAL

ZEPPELIN DESIGN LABS

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QUAVERATO
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INTRODUCTION

The Quaverato is a versatile tap-time tremolo pedal, giving you a wide range of control over the tremolo speed, depth, wave shape, and duty cycle (or spacing). The Quaverato can also operate as a harmonic tremolo, meaning it can apply tremolo independently to the high and low frequencies. The HARMONIC MIX knob allows you to blend the effect between these two frequency ranges. Further, internal controls allow you to change the cutoff frequencies, so you get to define what is high and what is low. The Quaverato has an entirely analog signal path including a true-bypass switching scheme, while still benefiting from the extended functionality and versatility of digital control.

In November 2018 we introduced full MIDI functionality as an option. See the "Quaverato MIDI Owners Manual" for complete details. You can upgrade your older Quaverato with a simple mod. This involves installing a small circuit board and updating the control software. See "Obtaining Software Updates" on page 13.

HOW TREMOLO WORKS

Tremolo is an effect in which the amplitude (or volume) of an audio signal is turned up and down (or modulated) at a relatively slow rate. You can manually create tremolo by turning the volume knob of your guitar or amp up and down at a constant rate, but tremolo is usually created electrically with a low frequency oscillator (LFO) circuit. An LFO is a circuit that creates a relatively slow periodic waveform, usually slower than 20 oscillations per second (20Hz). In a tremolo effect, the LFO essentially controls a volume-changing component within the audio signal path.

SOME HISTORICAL CONTEXT

In the early 1940's the DeArmond company of Toledo, Ohio started manufacturing the very first stand-alone effect unit: an electro-mechanical tremolo. How this effect worked was very simple, but quite clever. A variable-speed motor caused a grounded copper can to spin around. Inside this can was a conductive liquid and an electrode connected to the audio input. As the can spun, the grounded liquid would slosh around and come into contact with the electrode, causing the audio signal to be shunted to ground. The audio signal would fade in and out at the rate of the sloshing liquid – ingenius!

DeArmond originally designed their electro-mechanical tremolo box for use with electric pianos, but by the 1950's many guitar amplifier manufacturers were implementing fully electrical tremolo effects in their amps. The Fender Company was one of the most notable

amp makers to incorporate tremolo. Ironically enough, Fender mislabeled the effect as "vibrato" on their amps. Vibrato is the effect which uses an LFO to modulate the pitch (or frequency) of an audio signal, whereas tremolo uses the LFO to modulate the volume (or amplitude). They can sound very similar, but they are, in fact, two different effects. Some people speculate that Fender labeled the amps "vibrato" to distinguish them from the pitch-changing whammy bar on their Stratocaster guitar which Fender was marketing as "tremolo" – very confusing. It's no wonder people still get confused by the meaning of "tremolo" and "vibrato."

Throughout the 1960's Fender used several types of electrical tremolo circuits in their various amp models, including *bias-modulating tremolo*, *optical tremolo*, and *harmonic tremolo*.

Bias tremolo is created by modulating the bias voltage on a preamp tube, phase inverter tube, or power tube in an amplifier circuit. This has the effect of partially cutting off the current going through the tube which reduces the tubes' capacity to amplify the signal. Bias-modulated tremolo is associated with a smooth, sine wave oscillation.

Optical tremolo is produced by using an optocoupler to modulate the signal in the preamp circuit of an amp. Optocouplers contain a light dependent resistor (LDR) which is placed next to a light bulb (or LED in modern optocouplers). The voltage to the light bulb is modulated, which in turn modulates the resistance of the LDR, causing the signal to be variably attenuated. Optical tremolos create a pulsing or throbbing sound, and tend to modulate the signal in a more lopsided manner, which tends to be quite pleasing to the ear.

In a **harmonic tremolo** circuit the audio signal passes through a crossover circuit which splits the low frequencies and high frequencies, sending them through their own circuit paths. The two frequency ranges are modulated 180 degrees out of phase from each other: while one frequency range is on, the other is off, and vice versa. Because the low frequencies and the high frequencies are separated from each other, harmonic tremolo has a wonderfully subtle phasing sound that is quite mesmerizing. This type of tremolo was found on many of Fender's early brownface amps, but was soon replaced because of the large number of expensive tubes and components that the circuit needed to operate. Due to the frequency-shifting

characteristics of harmonic tremolo, the effect actually comes close to true vibrato; maybe Fender wasn't too far off after all by calling one of their earliest tremolo circuits "vibrato"!

HOW THE QUAVERATO WORKS

The Quaverato is a very versatile tremolo pedal that produces all three types of tremolo sounds mentioned above (bias, optical, and harmonic tremolo). When the guitar signal enters the pedal, it is buffered with a low-gain amplifier stage and then immediately sent to the high pass and low pass filters. The high pass filter (HPF) does exactly what it sounds like: it only lets high frequencies pass through, and blocks the lower frequencies. The low pass filter (LPF) does just the opposite: it passes low frequencies and blocks the high frequencies. See "Figure 2: Filters and Cutoff Frequency" on page 6. The specific cutoff frequency for each of these filters is adjustable via an internal trimmer potentiometer.

Next each signal is sent through a unity gain amplifier and through a digitally-controlled optocoupler. Each optocoupler consists of a light dependent resistor (LDR) and a light emitting diode (LED). The LDR is in series with the audio path. When the LED is dark, the LDR's resistance is at maximum, which is much too high for any audio signal to get through. As the LED gets brighter, the LDR's resistance lowers and allows signal to pass through. At full brightness the LDR's resistance is very low, allowing almost all of the signal to pass through.

The LED is digitally controlled by a microcontroller chip. This microcontroller produces an LFO which causes the LED to turn on and off. The microcontroller has been programmed to give you a wide range of control over how the LFO modulates the brightness of the LED.

Figure 1: Quaverato Block Diagram

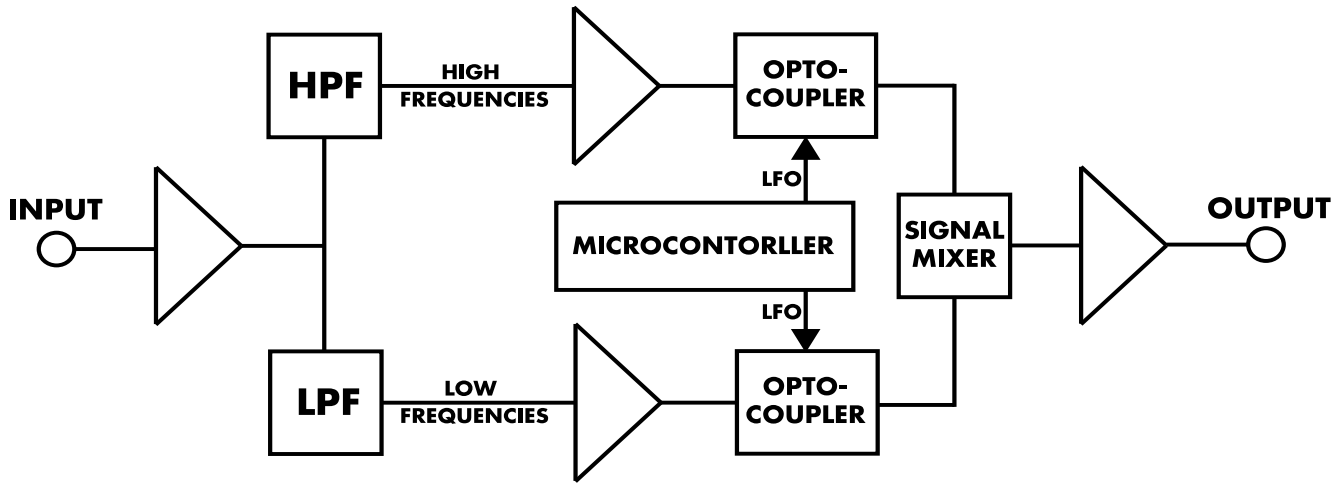
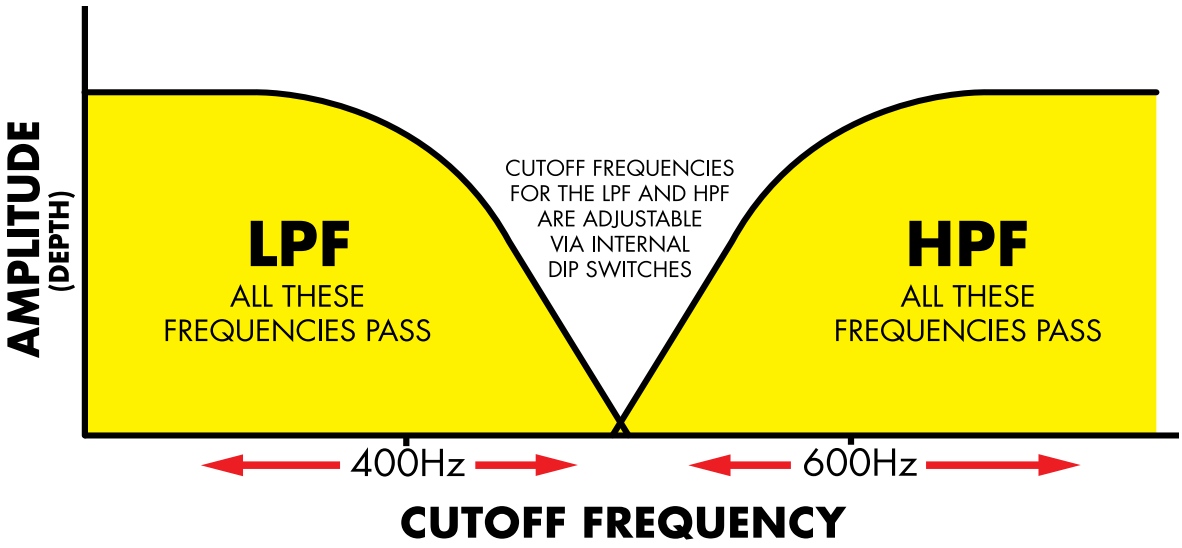


Figure 2: Filters and Cutoff Frequency



Next the high and low frequencies are mixed back together. From there, the signal goes through a final amplifier stage on its way to the volume control and finally the output jack.

FEATURES

To power up your Quaverato, first plug something into the IN jack. Then apply 9V DC center-negative power from any typical pedal power supply.

DEPTH KNOB

Controls the intensity with which the LFO affects the audio signal. In the fully clockwise setting the LFO has maximum effect on the signal. In the fully counterclockwise setting the LFO is off and all signal will pass through without being modulated. The signal will still retain the character provided by the analog circuitry. Depending on how you set the tone (see "INTERNAL CONTROLS" on page 10), this is a good way to fatten up your guitar signal.

MULTIPLIER KNOB

Multiplies the current LFO rate by 0.5, 1, 1.5, 2, 3, or 4. When the TAP footswitch is used to set the LFO rate, the tap time is multiplied by the MULTIPLIER knob setting. This is a dynamic control, meaning you can multiply the rate of the LFO on the fly. The MULTIPLIER knob behaves a little differently in the harmonic tremolo mode (PHASE toggle switch in the OUT position). You may need to set the MULTIPLIER to double-time to get the expected result. This is because in harmonic mode the LFO drives the two optocouplers independently; in traditional mode (PHASE switch set to IN) the LFO drives them together.

WAVE SHAPE KNOB

Selects from five different LFO wave shapes: sine, saw tooth, ramp, triangle, and square.

VOLUME KNOB

Boosts or cuts the amplitude of the audio signal, with unity gain at roughly the 12:00 position. In the factory setting, this knob can boost the signal by around 15dB, so with the LFO off (DEPTH knob fully counterclockwise) the Quaverato can serve as a boost pedal. The tone of the signal can be shaped with the internal HPF and LPF cutoff frequency trimmer pots (see"INTERNAL CONTROLS" on page 10).

RATE KNOB

Sets the rate (or speed) of the LFO. The LFO rate is multiplied by the setting of the MULTIPLIER knob. For each of the five multiplier settings, the RATE knob has a limited minimum and maximum range to which it can adjust the speed of the LFO. The maximum LFO speed of the Quaverato (with both the RATE and MULTIPLIER knobs in the far clockwise position) is around 40Hz. This is fast enough to get some ring modulator-like sounds. The minimum LFO speed (with both the RATE and MULTIPLIER knobs in the far counterclockwise position) is around 0.125Hz (one full cycle every 8 seconds). If the LFO speed is set with the TAP foot switch, that speed is overwritten as soon as the RATE knob is moved. Conversely, if the speed is set with the RATE knob, that speed will be overwritten as soon as the TAP footswitch is pressed.

Please note that at low LFO rates, when you move the RATE knob, the Quaverato waits to complete the current cycle before updating to the new speed.

SPACING KNOB

Changes the spacing (or offset) of the LFO wave shape. This knob warps the sine wave LFO shape in a lopsided manner, creating somewhat of a rounded saw tooth (counterclockwise) or ramp wave (clockwise). With the saw tooth, ramp, triangle, and square LFO shapes, this knob essentially controls the duty cycle: counterclockwise is a lower duty cycle (more time off than on); clockwise is a higher duty cycle (more time on than off).

On this knob, there is a range around the 12:00 position that is a neutral zone, in which the LFO duty cycle is 50%; the LFO is not affected in this setting.

In harmonic tremolo mode (see "PHASE Toggle Switch"), moving the SPACING knob clockwise causes the waveform to linger on the high frequency signal path longer. Conversely, moving this knob counterclockwise causes the waveform to linger on the low frequency signal path longer. You can use this feature to brighten or darken your tone.

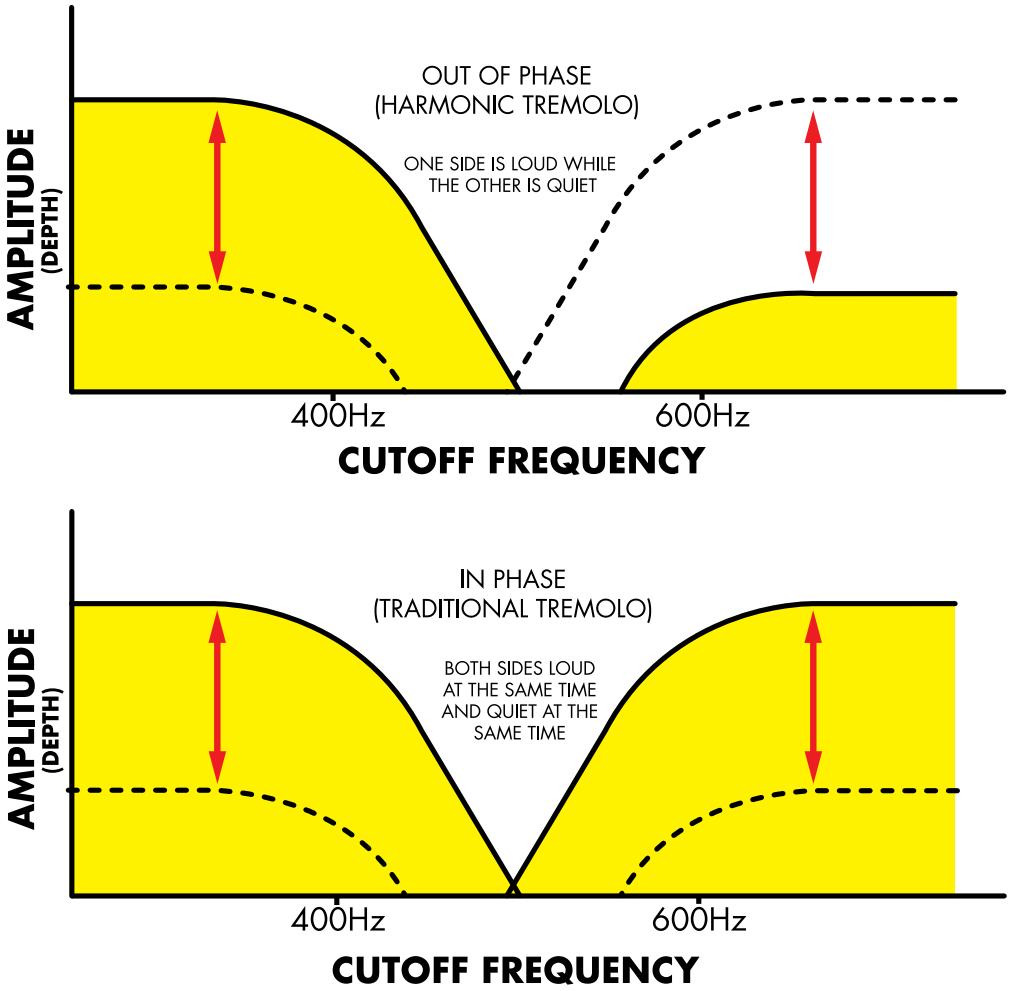
In traditonal tremolo mode (see "PHASE Toggle Switch"), small changes with the SPACING knob can help skew the LFO in an asymmetric way, creating a lopsided wave associated with an optical tremolo.

HARMONIC MIX KNOB

Independently alters the modulation depth of the high and low frequencies. When this knob is set fully counterclockwise, the modulation depth of the high frequencies is zero (no modulation, more high frequencies), and the modulation depth of the low frequencies is determined by the DEPTH knob setting. The opposite is also true: at the fully clockwise position, the modulation of the low frequencies is zero (more low frequencies) and the DEPTH knob determines the amount of modulation applied to the high frequencies. The modulation depth is reduced on a gradient for all the positions in between these extremes. In the 12:00 position there is a neutral zone in which both sides are modulated equally.

The HARMONIC MIX knob is useful while playing fingerstyle technique; that is, when the bass strings hold the rhythm and the melody is played on the higher strings, or vise versa. You can cause the rhythm side to pulse and throb while the melody plays straight – a hypnotic effect!

Figure 3: Phase Modes



PHASE TOGGLE SWITCH

Selects between harmonic or traditional tremolo modes.

In the OUT position, the high and low frequency optocouplers operate out of phase: the low frequencies are loud when the high frequencies are soft, and vice versa. This is the harmonic tremolo mode, creating a spellbinding, whirling sonic soundscape, caused by a mixture of mild pulsing and subtle pitch shifting.

In the IN position, the two optocouplers operate in phase: the entire audio signal is modulated together, creating a deep, rich pulsing sound. This is the traditional tremolo mode.

BYPASS FOOTSWITCH

Engages the effect circuit when pressed. (See also "MODE Toggle Switch", below.) When the effect is engaged the red LED beside the BYPASS footswitch will light up.

This pedal can be programmed for the effect to be engaged or bypassed upon startup. To switch between these startup modes, do the following:

a. Unplug power from your Quaverato.

b. Press and hold down the BYPASS footswitch and plug power back in.

c. After three seconds the red bypass LED will blink three times, indicating that the pedal is now programmed for the effect to be engaged when powered on.

d. By repeating this process the LED will blink five times, indicating the pedal is now programmed for the effect to be bypassed when powered on (which is the factory setting).

MODE TOGGLE SWITCH

Sets the BYPASS footswitch to toggle (TOG) or momentary (MOM) mode. In TOG mode, each time the BYPASS footswitch is pressed and released the pedal toggles between engaging and bypassing the effect circuit. In MOM mode the BYPASS footswitch engages the effect only when it is pressed and held down, and bypasses the effect when it is released.

TAP TIME FOOTSWITCH

Sets the rate of the LFO by sensing the time between the last two taps. If the LFO speed is set with the RATE knob, that speed is overwritten as soon as the TAP footswitch is pressed twice. Conversely, if the speed is set with the TAP footswitch, that speed will be overwritten as soon as the RATE knob is adjusted.

The green LED by the TAP footswitch flashes at the LFO rate and depth. When the DEPTH knob is fully counterclockwise the LFO is off and the green LED does not flash.

When you press the TAP footswitch, the pedal waits for a second tap to set the time for the LFO rate. If you don't press the footswitch again within a few seconds, the first tap is ignored.

INTERNAL CONTROLS

The Quaverato has a few internal trimmer potentiometers (or "trim pots") and dip switches which control various parameters. See "Figure 4: Internal Controls" on page 11. To access these pots and switches, first remove the two jack nuts from the front of the pedal (1). Next remove the four Philips head screws from the sides (2). Now remove the bottom part of the chassis to access the circuit board.

The trim pots can be adjusted with a small flat-head jeweller's screwdriver. When putting the chassis back together, slide the jacks through the holes on the bottom chassis (3). Before you screw the chassis back together, make sure the DC power jack is flush with the front of the bottom chassis and not stuck behind it (4).

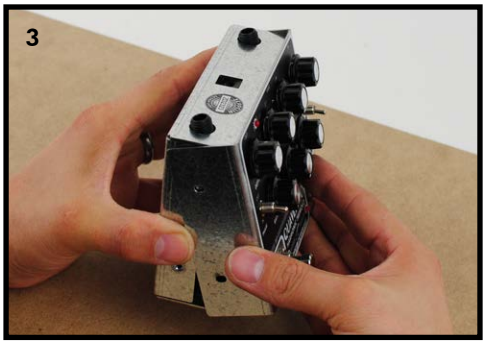
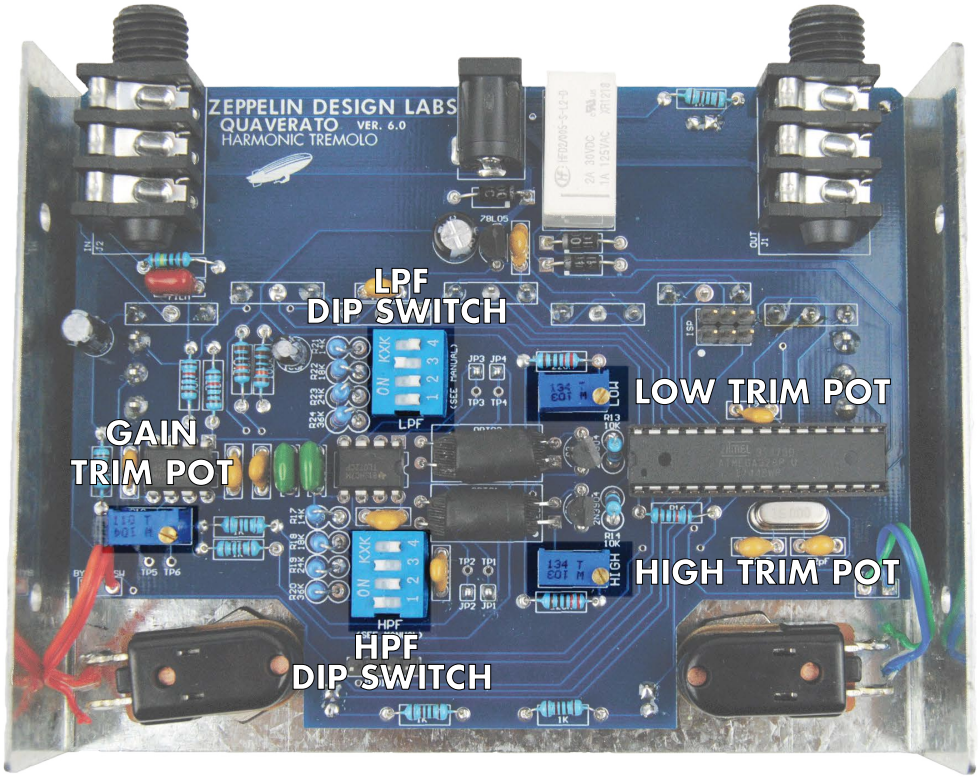


Figure 4: Internal Controls



CALIBRATION MODE

The Quaverato splits the incoming signal into two frequency ranges, LOW and HIGH. You have a lot of control over how these two bands sound. You may find it helpful to completely isolate one of the bands so you can hear it clearly. For this we provide the optional Calibration Mode.

1. Disconnect power from the pedal.
2. Hold down both of the footswitches and plug the power back in.
3. Continue to hold the two footswitches down for three seconds. The LEDs will flash several times and the pedal enters Calibration Mode.

In this mode only one of the optocouplers is on at a time. When the HARMONIC MIX knob is in the clockwise position, only the high optocoupler is on, allowing you to hear only the signal through the HPF. When the HARMONIC MIX knob is set to the counterclockwise position, only the low optocoupler is on, allowing you to hear only the signal through the LPF.

To exit Calibration Mode and hear both frequency bands mixed together, just power the pedal off and on again.

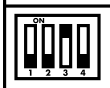
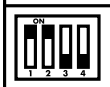
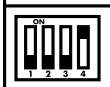
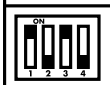
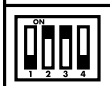
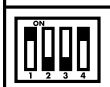
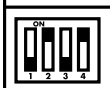
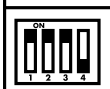
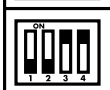
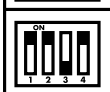
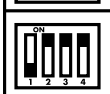
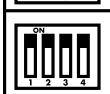
CROSSOVER FREQUENCY ADJUST

The ability to adjust the HPF and LPF cutoff frequencies makes the Quaverato a highly versatile pedal. In "Figure 4: Internal Controls" on page 11, the two dip switches for crossover frequency adjustment are labeled LPF DIP SWITCH and HPF DIP SWITCH. Table 1 shows the dip switch settings for various cutoff frequencies. Feel free to play around with these switch settings to explore the sonic possibilities. You will get the most dramatic "whooshey" or "phasey" harmonic tremolo sounds when the HPF is set to a very high setting and the LPF is set to a very low setting. The further apart they are the more dramatic the effect will be, but a lot of the high- and mid-range frequencies will be more muted, similar to turning down the tone knob on your guitar.

With the HPF set very low and the LPF set very high, the phasing harmonic tremolo sounds will be more subdued, but the high-mid clarity will be more present. We set the LPF to 400Hz and the HPF to 600Hz at the factory to strike a balance of cool phasey sound and high-mid clarity. For even more control with the high-mids, see "Low/High Volume Adjust", below.

NOTE: For circuit stability please make sure at least one of the switches on each dip switch is in the "ON" position at all times.

Table 1: DIP Switch Crossover Frequencies

	200Hz
	301Hz
	401Hz
	500Hz
	517Hz
	600Hz
	701Hz
	722Hz
	822Hz
	904Hz
	919Hz
	1000Hz
	1120Hz
	1220Hz
	1420Hz

LOW/HIGH VOLUME ADJUST

The output levels of the low and high signal paths can be adjusted independently. This adjustment sets the maximum current given to each of the optocouplers' LEDs. The higher the maximum current, the brighter the LED can get, causing the LDR's resistance to be less, which in turn allows more signal to pass through. In "Figure 4: Internal Controls" on page 11, the pot labeled LOW TRIM POT controls the maximum volume of the low frequency signal, and the pot labeled HIGH TRIM POT controls the maximum volume of the high frequency signal. To make the volume of either signal path louder, turn the potentiometer clockwise. To lower the volume, turn the pot counterclockwise.

Feel free to play around with the relative levels of these two signal paths to adjust tone to your taste. The calibration procedure described on page 42 of the Quaverato Assembly Instructions describes how to measure and adjust these trim pots to a particular value. You need a multimeter and soldering iron to do this, but you can adjust them without these tools if you just count and keep track of the number of turns you give each pot.

If you set either or both of these pots too high, you may notice some unpleasant distortion when larger signals are sent into the pedal. This happens when the optocoupler's output hits the final amplifier stage too hard. If you hear distortion, adjust these two pots down the same number of counterclockwise turns.

OUTPUT GAIN ADJUST

In "Figure 4: Internal Controls" on page 11, the pot labeled GAIN TRIM POT controls the gain for the output amplifier circuit. From this point the output signal is attenuated by the VOLUME knob on its way to the output jack. We have set this gain trim pot to give roughly 15dB boost when the VOLUME knob is at maximum. If you increase this trim pot much more you might start hearing distortion. This happens when the signal exceeds the amplifier stage headroom. The gain pot is meant to be used primarily to increase the signal level if you have turned down the low and/or high signal pots, to make up the volume difference. Turning this pot clockwise decreases the gain, counterclockwise increases the gain.

PROGRAMMING THE QUAVERATO

SOFTWARE VERSION

To determine the software version on your Quaverato, power off the pedal and then do the following:

1. Press and hold the TAP button.
2. Power the pedal on.
3. Keep holding the TAP button and soon the TAP LED will start blinking. It will blink out the three-digit software version number.

OBTAINING SOFTWARE UPDATES

Software updates are freely available and super-easy to install with ZDL Updater app for PC. You will also need a little piece of hardware called a USB-Tiny Programmer to connect your pedal to your PC. Download and install ZDL Updater, run the program and then click the "?" to open a detailed Help document.

CUSTOMIZING THE CODE

The Quaverato software was developed in the Arduino Integrated Development Environment (IDE). If you are an Arduino enthusiast, you can download the Quaverato open-source code from the Quaverato page at zeppelindesignlabs.com, edit it and upload (or "flash") it to your Quaverato to make your own custom pedal. If you know how to program, you know how to flash; nonetheless, you may find our ZDL Updater app (see above) a handy utility for getting your custom sketches onto your Zeppelin device.

The Quaverato software is covered by the Creative Commons Share Alike/Attribution/Non-Commercial license. You may modify and redistribute the Quaverato software as long as you a) redistribute it under the same license as the original, b) give proper attribution to all previous contributors, and c) don't try to sell your work without talking to us about it first.

MIDI CONTROL

Full MIDI control is available as an upgrade, at time of purchase or as an aftermarket add-on. Quaverato serial numbers ZD3672 and higher come loaded with MIDI-redy software (version 2.3.6 and higher). Lower serial numbers might be upgradeable as well; write to us at info@zeppelindesignlabs.com. The MIDI functionality allows your Quaverato to be controlled via any MIDI controller that can send program change data and/or control change data. To start using the Quaverato's MIDI capabilities, just attach your MIDI control device to the Quaverato MIDI IN jack using the provided adapter cable.

MIDI CHANNEL

The Quaverato is factory set to listen to MIDI messages on all channels (omni).

To select a specific MIDI receive channel:

1. With your Quaverato off and hooked up to your MIDI controller, enter the Quaverato's calibration mode by holding down both the TAP and BYPASS switches while you power the pedal on. Continue to hold these switches down until the LEDs blink several times.
2. With the MIDI controller, send any program change message or a control change message to the Quaverato on the channel you wish to use. The Quaverato is now permanently set to listen to MIDI messages on that channel, until you repeat this process to change it to a different channel.
3. Cycle the power off and on to exit calibration mode.

PRESETS

The Quaverato stores 6 presets (1-6) that can be recalled with program change messages (0-5).

To save a preset:

1. Set the Quaverato to a configuration that you want to store.
2. Switch to TOG (toggle) mode and hold down the BYPASS switch. After about 5 seconds, the red LED will start blinking.
3. While keeping the BYPASS switch held down, turn the MULTIPLIER knob to the preset number you want to use, in accordance with the table on the following page.
4. Release the BYPASS switch. The red LED will blink the number of times corresponding to the preset number. The preset is saved until the next time you re-program that preset.

Note that Presets 1-6 in the Quaverato are saved to MIDI program change values 0-5. To recall a preset, just send a program change message to the Quaverato with the value corresponding to the particular preset you want to use (0-5, not 1-6).

Preset #	**MULTIPLIER Setting**	**Program Change Value**
1	1:2	0
2	1:1	1
3	1.5:1	2
4	2:1	3
5	3:1	4
6	4:1	5

CONTROLLING INDIVIDUAL PARAMETERS

All of the Quaverato's parameters are controllable via MIDI control change numbers (CC#'s). See the MIDI Implementation Chart, page 17, for more information on specific parameters.

USING A MIDI EXPRESSION PEDAL

To use a MIDI expression pedal with the Quaverato, set the expression pedal transmit channel to match the Quaverato receive channel, and set the expression pedal CC# to 30. Useful parameters to control on the Quaverato are RATE, DEPTH, SPACING, and HARMONIC MIX. These parameters all respond linearly to values 0-127. The expression pedal will control the most recently adjusted parameter (knob only) on your Quaverato. So just plug in the MIDI expression pedal and then nudge the knob that you want the pedal to control. At any time during use, nudge a different knob to change the parameter controlled by the expression pedal.

QUAVERATO IN STEREO

It is possible to use two Quaveratos (Quaverati?) in tandem to create stunning stereo pan effects. Control Change #35, LFO INVERT can be used to flip one of your pedals out-of-phase to the other: when pedal A is loud, pedal B is soft, and vice versa. As indicated in the MIDI Implementation Chart, just send a CC# 35, any value from 0 to 63, to invert the LFO. You must split your signal upstream, to send identical audio into the two Quaveratos. You must split the MIDI as well, and send identical MIDI into each pedal. In this way, the pedals will always be in sync, but out of phase. Run the two pedal-outputs to your stereo mix. A stereophonic harmonic tremolo can be one of the most compelling and mysterious effects you can apply to guitar.

MIDI BEAT CLOCK (MIDI CLOCK)

The beat clock, or " MIDI clock" is a clock signal that is broadcast via MIDI to ensure that several MIDI-enabled devices stay in synchronization. The MIDI clock is useful for keeping several modulation or time-based pedals at the same tap time. MIDI clock messages are independent of MIDI channel, so all pedals in the MIDI chain can receive these messages.

In the Quaverato, control change number 51 enables and disables MIDI clock messages. Data values 0-63 set the Quaverato to ignore MIDI clock messages, and values 64-127 set the Quaverato to listen to these messages. In accordance with the MIDI clock specification, when the Quaverato is set to listen for MIDI clock messages, every 24th incoming clock message is counted as one tap on the tap footswitch (one quarter note).

Do not use the TAP footswitch while the pedal is listening for MIDI clock data. You will confuse your Quaverato.

MIDI IMPLEMENTATION CHART

FUNCTION	CC#	DATA
DEPTH	20	0-127, CORRESPONDING TO FULL LEFT-FULL RIGHT
MULTIPLIER	21	0-21=1:2 22-43=1:1 44-65=1:1.5 66-87=2:1 88-109=3:1 110-127=4:1
WAVE SHAPE	22	0-25=SINE 26-50=SAW 51-75=RAMP 76-100=TRIANGLE 101-127=SQUARE
RATE	24	0-127, CORRESPONDING TO FULL LEFT-FULL RIGHT. SEE QUAVERATO OWNERS MANUAL FOR DETAILS REGARDING BPM.
SPACING	25	0-127, CORRESPONDING TO FULL LEFT-FULL RIGHT
HARMONIC MIX	26	0-127, CORRESPONDING TO FULL LEFT-FULL RIGHT. 63-64 IS A NULL ZONE WITH THE BANDS BALANCED.
PHASE	27	0-63=OUT, 64-127=IN
MODE	28	0-63=MOMENTARY, 64-127=TOGGLE
BYPASS	29	ANY VALUE TOGGLES THE BYPASS STATE
EXPRESSION PEDAL	30	0-127. CONTROLS THE KNOB MOST RECENTLY ADJUSTED.
LFO INVERT	35	0-63=INVERTED, 64-127=FACTORY. FLIPS PHASE OF OPTOCOUPLER LEDs TO ALLOW 2 QUAVERATOS TO BE USED IN STEREO.
BEAT CLOCK IGNORE	51	0-63=BEAT CLOCK IS OFF, 64-127=BEAT CLOCK IS ON
TAP TIME	93	ANY VALUE IS RECOGNIZED AS A TAP FOOTSWITCH PRESS
OMNI CHANNEL ON	125	ANY VALUE. MAKE SURE YOU SEND THIS COMMAND ON THE RECEIVE CHANNEL THE QUAVERATO IS CURRENTLY SET TO.
OMNI CHANNEL OFF	124	ANY VALUE. WHEN INVOKED, QUAVERATO REVERTS TO THE PREVIOUSLY SET RECEIVE CHANNEL.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