V-Zero

Monophonic Guitar Synthesizer

www.opfxs.com

User Manual

V-ZERO is a monophonic guitar synth based upon principles of subtractive synthesis. When a note is played the pedal senses the pitch of the note and drives the on board oscillators. The generated signals can be mixed and processed in various way by filtering and applying modulations.

Detailed description of every control

Oscillators:

- OSC1 Waveform (4P rotary switch): Sine, Saw, Square, Triangle
- OSC2 Waveform (4P rotary switch): Sine, Saw, PWM, Triangle
- OSC1 Octave (6P rotary switch): 6 octaves range
- OSC2 Octave (6P rotary switch): 6 octaves range
- OSC 1-2 mix (pot): mixes OSC1 and OSC2
- OSC 1 tune (pot): fine tunes OSC1 pitch

Mix and output:

- Mix (pot) : mixes dry guitar signal with synthesizer signal
- Volume (pot): output level
- Output jack: a standard TS jack plug can be used or TRS for splitting the output. TIP of the jack carries synth + dry guitar signal, RING carries dry signal. TIP signal is affected by MIX and VOLUME controls and can be bypassed while RING signal is not affected by MIX or VOLUME and can't be bypassed. Split function permits to drive two different amplifiers or routing the signal to different external devices.

Modulation:

- LFO rate: speed of the LFO
- LFO depth: depth of the LFO
- VCA mod:
  - short press: LFO modulates VCA
  - long press: instrument envelope modulates VCA
- LPF mod:
  - short press: LFO modulates LPF
  - long press: instrument envelope modulates LPF
  - pressing CONTROL and LPF MOD together turns on or off “LPF frequency modulation from OSC2”
- Pitch mod:
  - short press: LFO modulates pitch of both OSC1 and OSC2 (Control LED = green)
  - long press: applies pitch portamento, portamento time can be set with LFO rate pot
  - pressing CONTROL and PITCH MOD together turns on or off LOW TRACKING FUNCTION
- LFO Wave: when off the LFO wave is a sine wave, when on the LFO wave is a square wave
  - short press: toggles between Sine and Square waves
  - long press: turns on Sawtooth wave

Footswitch:

- Control footswitch with bicolor LED:
  - when off the sustain is in STANDARD mode.
  - a short press of the footswitch indicated by green LED turns on NOTE HOLD mode. When NOTE HOLD mode is on the last note picked will play indefinetely until a new note is played.
  - a long press (250 milliseconds) of the footswitch indicated by red LED turns on the LFO.
  - a longer press (1 second) indicated by green/red LED turns on both NOTE HOLD mode than LFO.
  - a very long press (5 seconds) will enter Gate and Tracking select mode.
  - pressing CONTROL and PITCH MOD together turns on or off LOW TRACKING FUNCTION
- Bypass: standard true-bypass switch

Filter:

- LPF: low-pass filter. When full clock-wise the filter is flat. Turning LPF pot anti clock-wise the filter start cutting high frequencies progressively.
- Resonance: controls the amount of resonance (Q parameter) of the filter. When full anti clock-wise resonance is off.

Other infos:

- V-ZERO works with any pick-up position but with some instruments open strings E tracks better with bridge pick-ups.
- V-Zero works with any type of guitar (6 strings, 7 strings etc). Different tunings of the instrument is also possible.

CONTROL LED	HOLD MODE	LFO	PITCH mod button		VCA mod button		LPF mod button	
			short press	long press	short press	long press	short press	long press
off	off	off	off	Portamento ON (portamento time set by LFO rate)	off	Envelope modulation	off	Envelope modulation
YELLOW (short press of CONTROL)	ON	off	off	Portamento ON (portamento time set by LFO rate)	off	Envelope modulation	off	Envelope modulation
GREEN (250ms long press of CONTROL)	off	ON	LFO modulation	Portamento ON + LFO modulation (portamento time set by LFO rate)	LFO modulation	Envelope + LFO modulation	LFO modulation	Envelope + LFO modulation
YELLOW/GREEN (1sec long press of CONTROL)	ON	ON	LFO modulation	Portamento ON + LFO modulation (portamento time set by LFO rate)	LFO modulation	Envelope + LFO modulation	LFO modulation	Envelope + LFO modulation
YELLOW/GREEN blinking (5sec long press of CONTROL)	Gate and Tracking adjust mode							

LOW TRACKING FUNCTION

When CONTROL and PITCH MOD are pressed at same time the LOW TRACKING FUNCTION is turned on or off. In LOW TRACKING mode the pedal will only track lowest notes on fretboard leaving highest ones to pass through unaffected.

Pay attention that primary functions of CONTROL and PITCH MOD will be turned ON too, so you may need to press CONTROL and PITCH MOD again (not at same time) to go back at previous status.

V-Zero memorizes the status of LOW TRACKING FUNCTION and will recall it at next power on. By default it's turned off.

LPF frequency modulation from OSC 2

When CONTROL and LPF MOD are pressed at same time the Low Pass Filter is frequency modulated by a pitched down version of OSC 2. Basically this replaces LFO modulation (when LPF mod is short pressed). Modulation wave is fixed as TRIANGLE but the pitch range can be selected with OSC2 Octave rotary switch. Modulation is proportional to the note played (the lower the note pitch and lower frequency modulation will be).

Pay attention that primary functions of CONTROL and LPF MOD will be turned ON too, so you may need to press CONTROL and PITCH MOD again to go back at previous status.

V-Zero memorizes the status of LPF frequency modulation and will recall it at next power on. By default it's turned off.

HOW to set GATE ON threshold and TRACKING range:

Long press CONTROL footswitch for 5 seconds until CONTROL LED starts blinking. Move LFO RATE pot to set GATE ON threshold and LFO DEPTH pot to set TRACKING range. Play until you find the best setting to suit your playing. Once finished press CONTROL once to store the settings and exit.

You can set both GATE and TRACKING at same time or just one of them. Parameters for GATE ON and TRACKING are only updated when pots are moved, so if you only want to set GATE ON only move LFO RATE pot and leave LFO DEPTH in position.

GATE ON threshold sets the point where gate turns on and signal from oscillators is output.

TRACKING range is used to set the response of V-ZERO all over the fretboard. Low settings improve tracking on low frequency notes, high settings improve tracking on high notes. Just play with the control until you find the sweet spot and balance between low and high notes tracking.

EXPRESSION PEDAL ASSIGN FUNCTION

You can assign almost every knob and rotary switch (with exception of Dry/synth Mix, Level and Wave rotary selectors) to an expression pedal.

Connect an expression pedal to EXP jack with a TRS jack cable:

To make the assignment:
1) press ASSIGN button (left side RED LED will turn ON)
2) move the desired control you want to assign (left side RED LED will turn OFF)

To clear assignment long press ASSIGN button for more than 2 seconds, left side RED LED will blink fast to confirm that assignment has been cleared.

TIPS

Avoid playing close to the amplifier with pickups facing the speakers, this can make tracking of V-Zero less effective, always play with pickups off-axis with respect to speakers or 180° from them.

LEFT SIDE bi-color LED

This LED is used both to check the EXPRESSION assignment/erase process and check when MIDI message is received. When a MIDI message is being received the GREEN LED will turn ON.

MIDI

Note ON and note OFF messages

V-Zero detects note ON and note OFF messages, you can play V-Zero with an external MIDI keyboard.

Control Change – CC

With control change messages you can modify every V-Zero parameters and turn on some hidden functions.

Some V-Zero parameters have to be assigned to MIDI before being able to control them via MIDI.

For example, take the LFO Speed, to be able to control it via MIDI you need to set CC number “1” (LFO Speed to MIDI) to “1”. Once the LFO SPEED to MIDI is set to “1” the LFO Speed control knob on V-Zero will stop working cause it’s now handled by MIDI and you can now send to CC number “0” the data from 0 to 127 to change LFO Speed.

Example for LFO Speed:

1) Send to CC number “1” the CC data “1”. LFO Speed now is assigned to MIDI
2) Send to CC number “0” the CC data from 0 to 127 to change LFO Speed
3) To clear the MIDI assignment send to CC number “1” the CC data “0”. Now LFO Speed is set by V-Zero LFO Speed knob.

Example for LFO Depth:

1) Send to CC number “3” the CC data “1”. LFO Depth now is assigned to MIDI
2) Send to CC number “2” the CC data from 0 to 127 to change LFO Depth
3) To clear the MIDI assignment send to CC number “3” the CC data “0”. Now LFO Speed is set by V-Zero LFO Depth knob.

Basically all the parameters with “to MIDI” mean that sending a “1” will turn on MIDI assignment and sending a “0” will turn off MIDI assignment for that specific parameter.

MIDI messages table

CC number	CC data	Description	Info
0	0-127	LFO Speed	
1	0-1	LFO Speed to MIDI	
2	0-127	LFO Depth	
3	0-1	LFO Depth to MIDI	
4	0-4	LFO Wave Select	0: Sine 1: Square 2: Saw 3: Triangle 4: PWM
5	0-1	LFO Wave Select to MIDI	
6	0-1	LFO SAW wave Invert	Invert the direction of the LFO sawtooth wave
7	0-127	LFO PWM duty cycle	
8	0-1	OSC 1&2 Mix to MIDI	
9	0-127	OSC 1&2 Mix	
10	0-127	Instrument Input Level	
11	0-1	OSC 1 Wave Select to MIDI	
12	0-3	OSC 1 Wave Select	0: Sine 1: Saw 2: PWM 3: Triangle
13	0-1	OSC 2 Wave Select to MIDI	
14	0-3	OSC 2 Wave Select	0: Sine 1: Saw 2: PWM 3: Triangle
15	0-1	OSC 1 Octave Select to MIDI	
16	0-5	OSC 1 Octave Select	
17	0-1	OSC 2 Octave Select to MIDI	
18	0-5	OSC 2 Octave Select	
19	0-127	OSC 1 PWM duty cycle	
20	0-127	OSC 2 PWM duty cycle	
21	0-1	OSC 1 Tune to MIDI	
22	0-127	OSC 1 Tune	
23	0-11	OSC 1 Tune Notes	
24	0-11	OSC 2 Tune Notes	
25	0-1	LPF to MIDI	
26	0-127	LPF	
27	0-1	LPF Resonance to MIDI	
28	0-127	LPF Resonance	
29	0-1	LPF Modulation switch to MIDI	
30	0-2	LPF Modulation switch	
31	0-1	LFO -> VCA to MIDI	
32	0-1	Envelope to MIDI	
33	0-1	LFO -> VCA toggle	
34	0-1	Envelope source select	
35	0-1	LFO -> VCO to MIDI	
36	0-1	LFO -> VCO toggle	
37	0-1	Portamento to MIDI	
38	0-1	Portamento Toggle	
39			
40			
41	0-1	Master Tune to MIDI	
42	0-127	Master Tune	
43	0-1	OSC 1 to Voice 2	
44	0-1	OSC 2 to Voice 2	
45	0-1	HOLD Voice 2	
46	0-127	Synth Level	
47	0-1	Control Footswitch HOLD to MIDI	
48	0-1	Control Footswitch HOLD	
49	0-1	Control Footswitch LFO to MIDI	

50	0-1	Control Footswitch LFO	
51	0-127	Portamento	
52	0-20	EG Attack Time	Attack time of envelope generator from 1ms to 2001ms in steps of 100ms
53	0-19	EG Release Time	Release time of envelope generator from 201ms to 4001ms in steps of 200ms
54			
55			
56			
57			
58	0-1	LFC -> EG	Low frequency clock triggers the envelope generator
59	0-127	LFC Rate	Frequency of low frequency clock
60	0-127	LFC duty	Sets duty cycle of the clock from 1% to 99%
127	0-16	Set MIDI input channel	1-16 for the channel, 0 for listening to all channels (default mode). This parameter is saved in V-Zero memory and loads at power up.

PURE DATA MIDI PATCH

If you have a USB MIDI Controller you can download our Pure Data patch to start playing with V-Zero via MIDI from your computer. To run the V-Zero Pure Data patch you need to install Pure Data, go here to download Pure Data.

MIDI LED

This LED flashes in GREEN when a MIDI message is received.

Tech Specs:

- The pedal works with standard 9V DC PSU negative center.
- Current consumption min: 260 mA (all LEDs OFF)
- Current consumption max: 290mA (all LEDs ON)
- Input Impedance: 1M ohm
- Output Impedance: 100 ohm