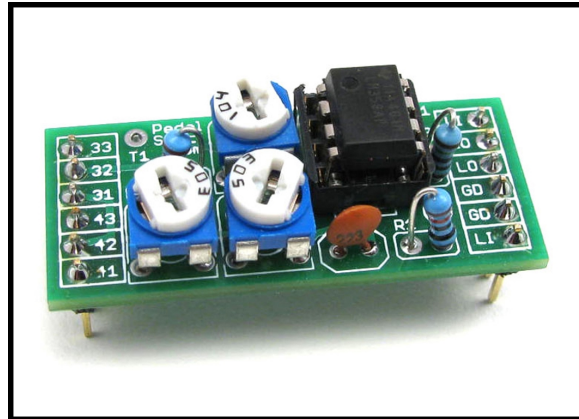# PedalSync™

Voltage Conversion Module (VCM) v1

Key Features

- Converts the limited LFO output from the PedalSync Tru-Foot LFO chips (MV-55 and MV-55B) and their modules to one of four output voltage ranges

- Four output ranges available: 0-5v, 9v, 10v, and 12v

- Adds Depth and Center controls for maximum waveform flexibility

- Designed to maximize voltage output range

- Can be used with standard LM358 op amps or Rail to Rail op amps for full voltage swing

- Probe test point

- Compact design

- CadSoft Eagle footprint available

Building the Module
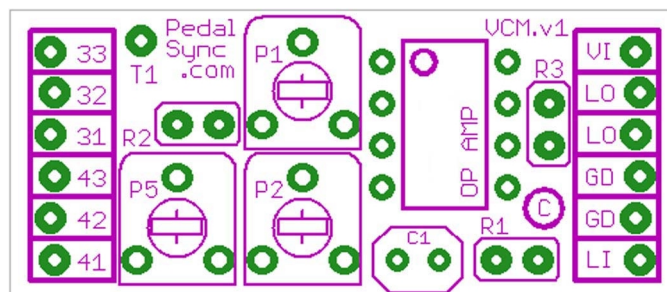
The Voltage Control Module has the following header connections:

33	Pot 3, Lug 3
32	Pot 3, Lug 2
31	Pot 3, Lug 1
43	Pot 4, Lug 3
42	Pot 4, Lug 2
41	Pot 4, Lug 1

Voltage Input	**VI**
LFO Output	**LO**
LFO Output	**LO**
Ground	**GD**
Ground	**GD**
LFO Input	**LI**

The Voltage Control Modules uses the following parts:

C1   .022uF ceramic capacitor

P1   *5V*   30K trimmer (303)
          9V   50K trimmer (503)
          10V   50K trimmer (503)
          12V   100K trimmer (104)

P2   50K trimmer (503)

P5   50K trimmer (503)

R1   10K ohm resistor **(brown, black, black, red, brown)**

R2   *5V*   15K ohm resistor **(brown, green, black, red, brown)**
          9V   33K ohm resistor **(orange, orange, black, red, brown)**
          10V   40.2K ohm resistor **(yellow, black, red, red, brown)**
          12V   47K ohm resistor **(yellow, purple, black, red, brown)**

R3   150 ohm resistor **(brown, green, black, black, brown)**

OP AMP   8-pin socket and LM358 op amp

6-pin headers (2) - *optional*, or direct wire connection

Depth and Center Controls

Pot 3 is the Depth control (B100K). The Depth control varies the LFO output voltage range.

Pot 4 is the Center control (B10K). The Center control varies the center-point of the output voltage.

Note: ***The Depth control can be B1M if the Center control is B100K***

If the Depth and Center controls are not needed, connect a jumper wire between header pins **33** and **32** and skip steps 7-12 in the Dialing It In section.
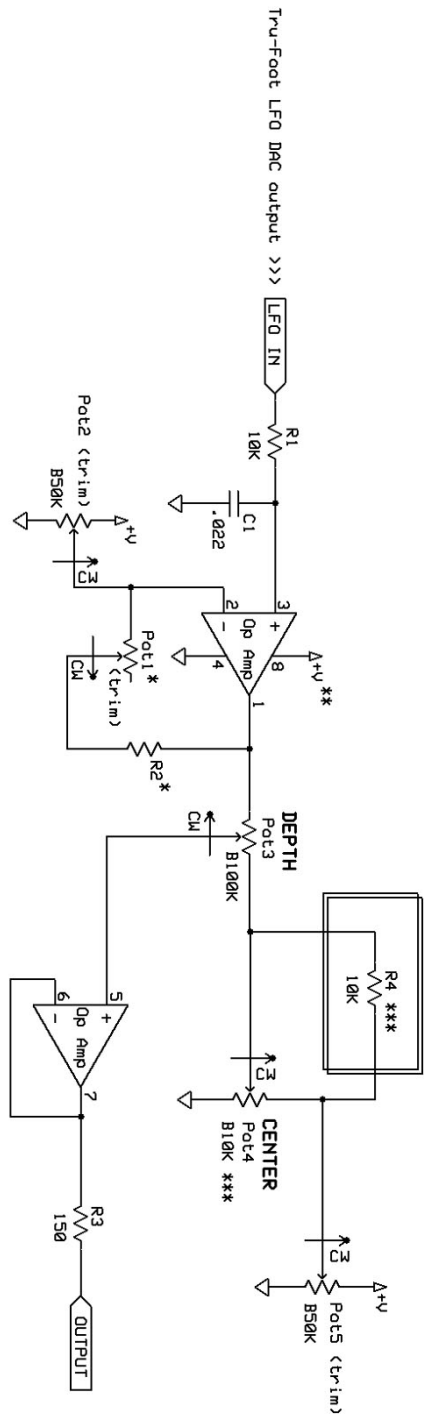
Controlling the VCM with the Four Pots MV-56B chip and Hi-V DigiPot Modules

To make a **programmable VCM**, use a PedalSync Four Pots MV-56B chip or module, together with two of the PedalSync Hi-V DigiPot Modules.

When using the PedalSync Hi-V DigiPot modules for the Depth and Center controls, use the 100K version for <u>both</u> controls. Next, connect a 10K resistor between the Pot 5 output (lug 2) and lug 3 of the Center control.

See schematic on the next page for more details.

Be sure to use a C5K (reverse log) pot at the *input* of the Four Pots MV-56B Module that corresponds to the Hi-V DigiPot for the Center control to offset the effect of the bridging resistor.

Tru-Foot LFO DAC output >>>

LFO IN

R1
10k

C1
.022

Pot2 (trim)
B50K
CW
+V

Op Amp
+
3
2
-
8
1
4
+V **

Pot1 *
(trim)
CW

R2*

DEPTH
Pot3
B100K
CW

R4 ***
10k

CENTER
Pot4
B10K ***
CW

Pot5 (trim)
B50K
CW
+V

Op Amp
6
5
+
-
7

R3
150

OUTPUT

*** Only use R4 if using a 100K Hi-V DigiPot for the Center control
Connect R4 between pins 42 and 43 of the VCM Module
Then use a C5K pot at the Four Pots MV-56B input that corresponds
to the Center control Hi-V DigiPot

Table of Values:

5 Volt Output
Pot1 = B30K
R2 = 15K

9 Volt Output
Pot1 = B50K
R2 = 33K

10 Volt Output
Pot1 = B50K
R2 = 40K

12 Volt Output
Pot1 = B100K
R2 = 47K

> use 1x resistors <

** Voltage output range is limited by input voltage

Op Amp: TS912 or equivalent Rail to Rail gives widest voltage swing

LM358 is optimal low-cost op amp

PedalSync.com

LFO Voltage Conversion Module

| Molten Voltage | Rev 1.3 | |
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Dialing It In

Whether you use a lower cost LM358 dual op amp or a high performance rail to rail dual op amp (*e.g.* TS912), the procedure for dialing in the output levels will be the same.

1) Set the LFO output from MV-55(B) to top speed triangle wave and connect it to the oscilloscope.

Generally the A+ connection on the Tru-Foot LFO Module will be used, although the steps are the same with the inverted [A-] output.

The LFO output will be approximately 1-2.4 volts, but will vary from chip to chip. The yellow trace is the LFO output:
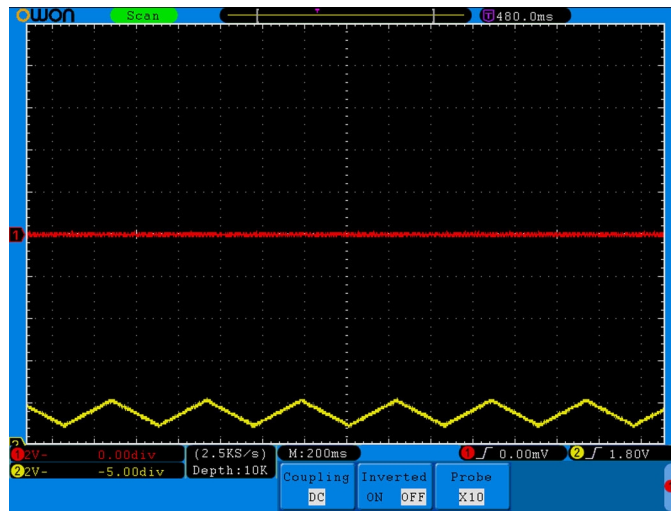

*The oscilloscope photos show a 0-9 volt conversion.*

2) Connect the LFO output from the MV-55(B) chip or module to the LFO Input [**LI**] header pin on the VCM module.

3) Rotate **P1** [gain] (top trimmer on VCM module) full left.

4) Set **P2** [reference voltage] (trimmer below P1 on VCM module) to center.

5) Put probe at Test Point 1, labeled [**T1**] on VCM module.

   Note: Pin 33 is identical to T1 and may be used as the test point.

6)   Adjust **P2** until the bottom of the bottom of the waveform just touches ground, or gets as close to ground as possible without flattening out.
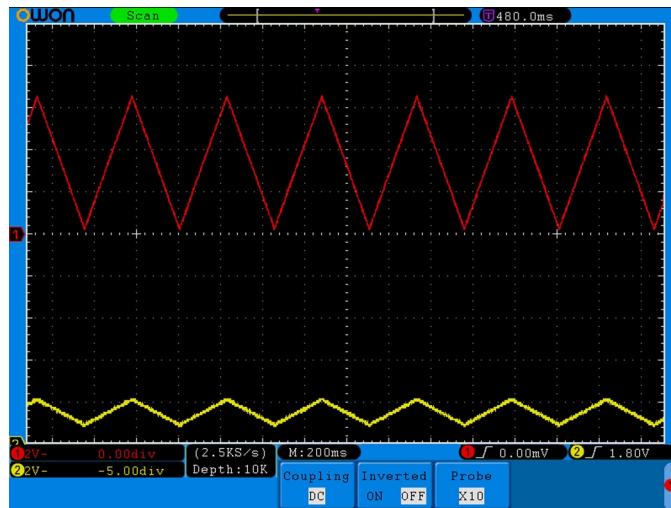

7)   Raise **P1** (gain) to get the top spike as close as possible to top without clipping - or up to desired top voltage if less than input voltage.
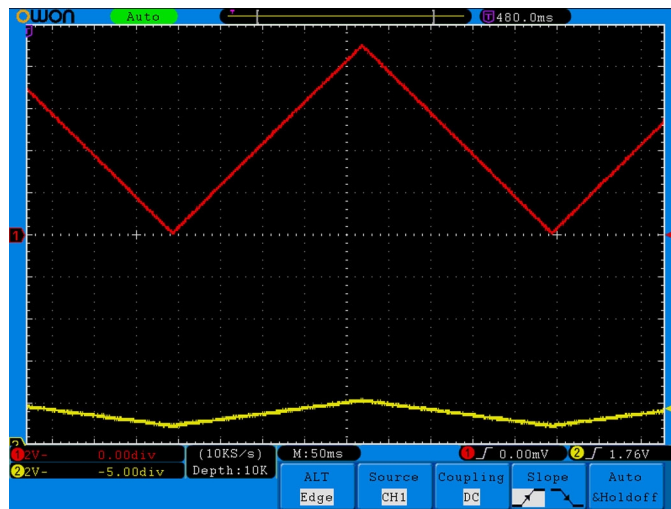

   Note: P1 and P2 may need to be fine-tuned until the waveform is as tall as possible without clipping.

8)   Move the test probe to LFO Output, labeled [**LO**] on VCM module.

9)   Set Depth control (Pot 3) to minimum (full left).

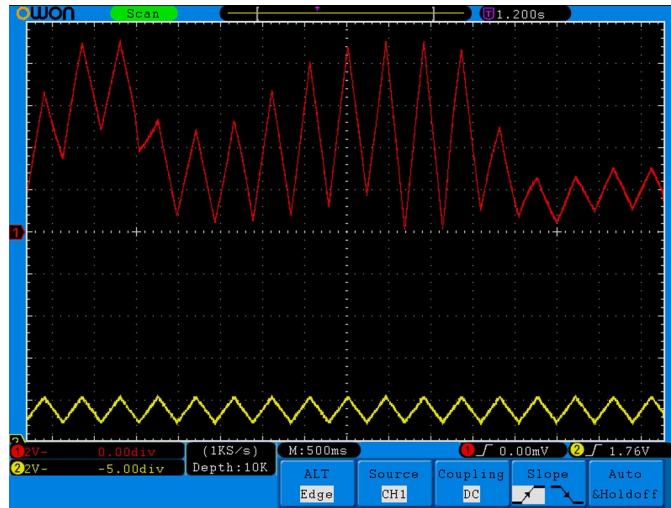10)   Set Center control (Pot 4) to maximum (full right).

11)   Set **P5** [center top voltage] (bottom left trimmer on VCM module), to *minimum* then dial it up until the maximum allowable voltage is JUST reached.
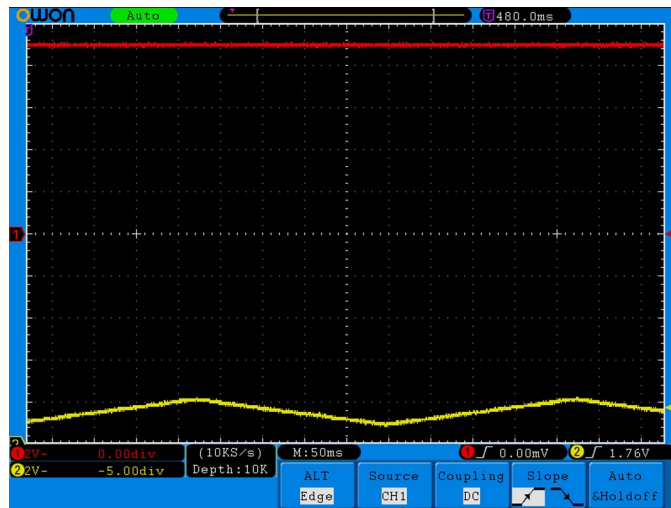
12)   Test Center control (Pot 4) to make sure the output voltage swings between zero and the desired voltage.
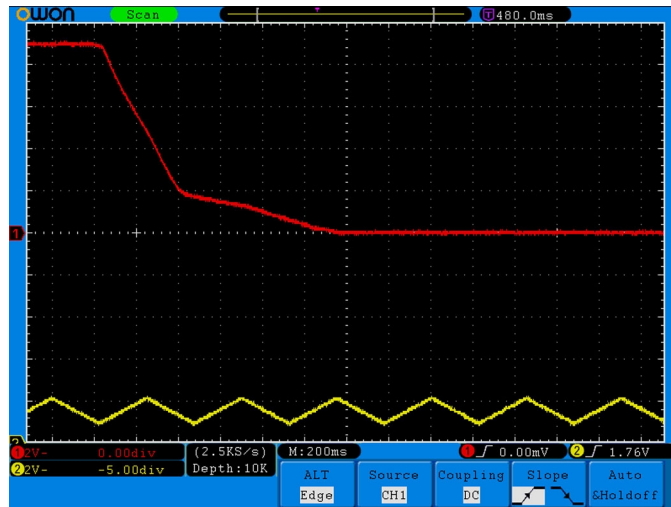
13)   Expand the Depth while adjusting the Center and watch the magic:

Electrical Considerations

Always use filtered and regulated power with the VCM Module or noise and warble can result.

Performance of the module is not guaranteed when using input voltages beyond the stated output voltage of the module.

Dimensions

Circuit board: 1.6 x 0.7"

Header pins are spaced 0.1" and the two header strips are 1.4" apart

A complete set of CadSoft Eagle footprints for PedalSync modules is available for download at:
www.PedalSync.com

Related Products

•   Use with Tru-Foot LFO chips MV-55 and MV-55B and their modules.

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