



Midiverse Modular

MVM016 – VCO

Build Guide

Thanks for supporting Midiverse Modular! This guide provides basic instructions to build your MVM016 VCO module.

Size: 8HP

Depth: 40mm

Draws 17mA from the +12V rail and 17mA from the -12V rail

This module is recommended for experienced builders only. You must have previous experience with building DIY modules. This guide provides a list of the parts needed to complete the build and some key instructions for success, including calibration steps.

Parts needed to complete the build:

Reference	Qty	Value	Notes
VCO Panel	1		
VCO Control Board	1		
VCO Main Board	1		BC847 & BC857 SMD transistors pre-soldered
Control Board BOM			
R5	1	390R	1/4W 1% Metal film resistors
R3	1	2Kt*	Tempco resistor (Thonk or SynthCube)
R4	1	10K	1/4W 1% Metal film resistors
R2	1	100K	1/4W 1% Metal film resistors
R7	1	240K	1/4W 1% Metal film resistors
R1	1	560K	1/4W 1% Metal film resistors
R6	1	10M	1/4W 1% Metal film resistors
C1, C2	2	0.22uf	Multilayered ceramic capacitor
MULTI_TRIM	1	100R	Multi-turn trimmer potentiometer (3296W)
FREQ, SELFMOD	2	B100K	ALPHA 9mm potentiometer, vertical
TUNE (plastic shaft)	1	B100K	9mm trimmer potentiometer, vertical
1V, FM, PWM, TRI, SIN, SQR	6	3.5mm Jacks	THONKICONN (PJ398SM)
A, B, C, D	4	1x4 pin header	2.54mm 4 pin single row male header
Knobs	2		White, Davies (1900H)
Main Board BOM			
R4, R8, R12	3	1K	1/4W 1% Metal film resistors
R11	1	3.3K	1/4W 1% Metal film resistors

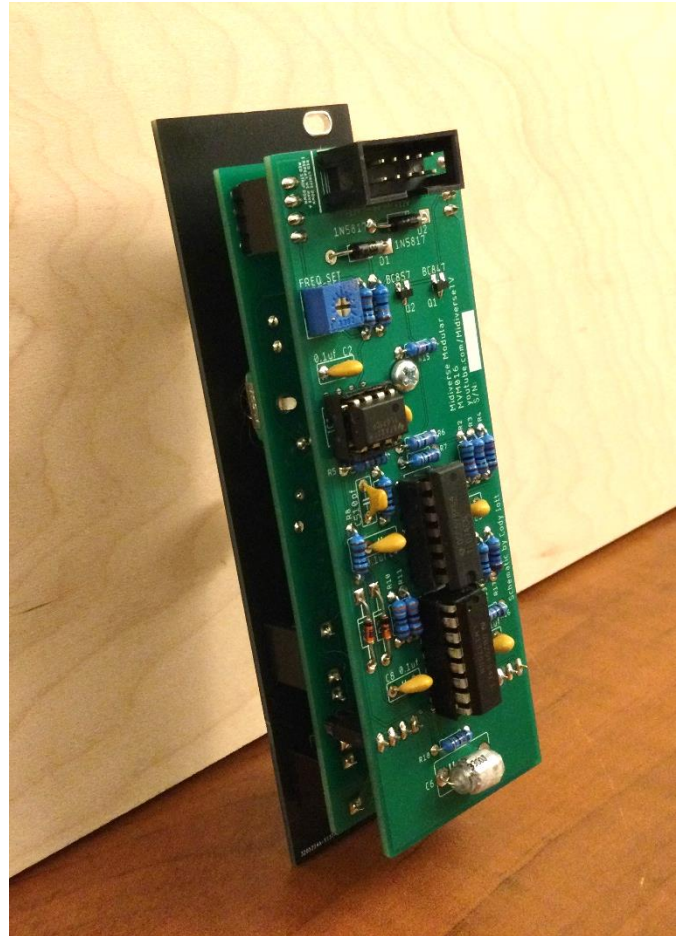
R10	1	3.9K	1/4W 1% Metal film resistors
R16	1	5.1K	1/4W 1% Metal film resistors
R3, R7, R18	3	10K	1/4W 1% Metal film resistors
R2, R5, R15	3	15K	1/4W 1% Metal film resistors
R17	1	47K	1/4W 1% Metal film resistors
R1, R6, R13	3	100K	1/4W 1% Metal film resistors
R14	1	680K	1/4W 1% Metal film resistors
R9	1	10M	1/4W 1% Metal film resistors
FREQ_SET	1	100K	Single-turn trimmer potentiometer (3362P)
D1, D2	2	1N5817	
D3, D4	2	4.3V Zener	
C1, C2, C3, C4, C7, C8	6	0.1uf	Multilayered ceramic capacitor
C5	1	10pf	Multilayered ceramic capacitor
C6	1	0.0033uf	Axial, 50V, 5%, Polystyrene; Part# 23PS233
IC1	1	TL071CP	
IC2	1	TL074CN	
IC3	1	LM13700N	LM13700N/NOPB
IC Socket	1	8 pin Socket	8 Pin DIP IC Socket
IC Socket	1	14 pin Socket	14 Pin DIP IC Socket
IC Socket	1	16 pin Socket	16 Pin DIP Socket
A, B, C, D	4	1x4 pin header	2.54mm 4 pin single row female header
J1	1	2x5 pin header	2.54 mm 10 pin shrouded header
Screws	2		M3 Screw 6mm
Standoff	1		M3 Standoff 11mm

Build Instructions:

The main board will come with the SMD transistors pre-soldered. Populate and solder the resistors, diodes, and capacitors, then the single-turn trimmer, IC sockets, and power header. **DO NOT** solder the jacks, potentiometers, and multi-turn trimmer on the control board yet.

Once all the above-mentioned parts have been soldered on the control and main boards, connect the 4 pin male and female headers together, and then position them between the boards (A with A, B with B, etc.). Carefully solder in the connectors, making sure that the boards are connected evenly. I usually solder in one pin on all connectors, double check the positioning, and if everything looks good, solder in the remaining pins.

If there are anti-rotation tabs on the potentiometers, be sure to break those off now. Pull apart the two boards, populate the control board with the jacks, potentiometers, and the multi-turn trimmer, add the M3 screw and standoff, and attach the front panel. Make sure the screw on the multi-turn trimmer aligns with and fits through the hole on the front panel. Now solder these components, reconnect the two boards, and secure the boards with the back screw.



Calibration:

There are two steps to calibrate the VCO.

First, set the coarse tune and fine tune knobs to 12 o'clock and the self modulation knob fully counterclockwise. Next, plug the sine wave output into a frequency counter and slowly rotate the single-turn trimmer (on the back) until the root frequency reaches roughly 330Hz. The response of the trimmer is quite sensitive, so be careful if you are using speakers during this process.

Next, use the multi-turn trimmer on the front to set 1V/octave scaling. If over tracking, turn counterclockwise, if under tracking turn clockwise.