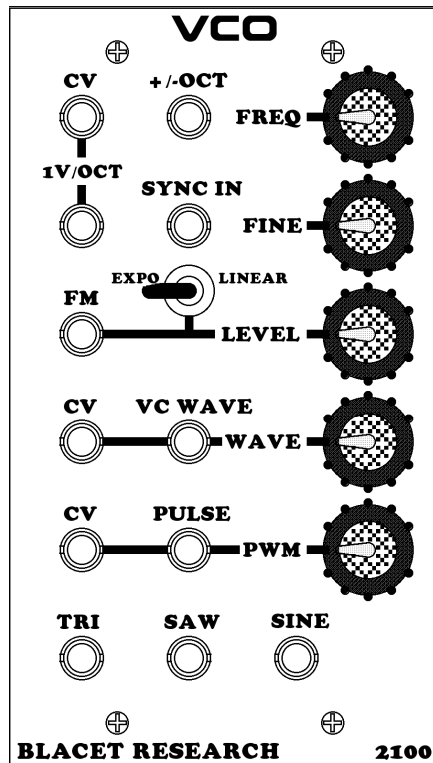


VCO

BLACET RESEARCH MODEL VCO2100 Voltage Controlled Oscillator Module

Users Manual



Blacet Research 15210 Orchard Rd Guerneville CA 95446
blacet@blacet.com <http://www.blacet.com> 707-869-9164

Contents Copyright.

Reproduction by any means including the Internet prohibited without permission.
This document contains proprietary and trade secret information of Blacet Research and is provided as a service to the module owner. Any unauthorized duplication or transferral may violate trade secret laws.
Contents subject to change without notice.

Introduction

The VCO2100 is a highly accurate and stable voltage controlled oscillator module that responds to a one volt per octave control input.

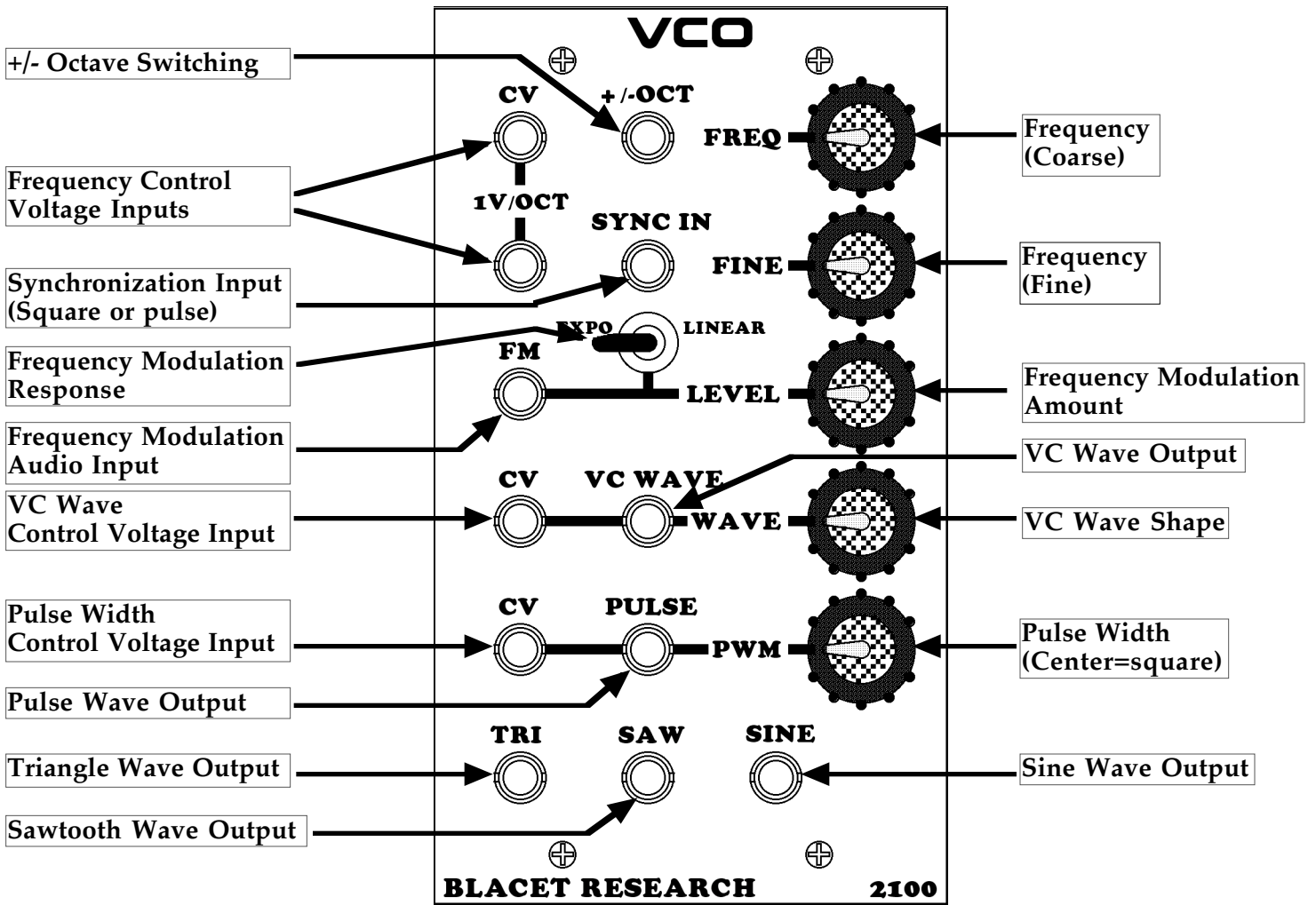
Five different waveforms are generated across the ultra audio, audio and sub audio range. Sine, triangle, sawtooth, pulse and VC wave are all simultaneously available. The VC wave uses a control voltage to morph from a triangle wave to various highly distorted square waves. The pulse waveform has a width CV input which can be swept from extinction through square to extinction.

The sawtooth wave has been especially designed for optimal use with the Mini Wave Module.

Audio Frequency Modulation can be applied to the FM input which can be switched to a linear or exponential response. This input has an attenuator.

The sync input can be used with a pulse wave to have oscillators lock together when they are close in frequency.

The +/- Octave input allows precision switching up one octave with a CV > +2.5V or down one octave with a CV < -2.5V. An on board tune button connects to the + octave circuitry, providing a convenient resource for calibration.



Controls and Operation

Warm Up Time: All analog oscillators will drift a few Hertz as power is applied. This is due to the individual components warming up at different rates as voltage flows through them. A portion of this voltage is converted to heat and will effect the actual part values in a small way. Allow at least five minutes for warm up and resist the urge to tweek the Fine tune pot during this time. After warmup, a very minor adjustment of the Fine tune knob may be necessary.

Freq. (coarse tune) and Fine Tune: Freq. sweeps the entire usable range of the VCO. Fine covers about one-half octave.

Sync In: Insert a pulse or square wave from another VCO to have the VCOs lock together when they are close in frequency.

CV 1V/OCT: There are two jacks that allow precise control of the VCO. One of these might typically be attached to a MIDI-CV converter or a keyboard with 1V/oct output. The other jack can be used for vibrato, for example.

+/- OCT: This jack allows precise octave switching with a +/- control voltage. When the CV is greater than +2.5V, the VCO will jump up one octave. When the CV is less than -2.5V, the VCO will jump down one octave.

FM Input, Expo/Linear Switch, Level Control Pot: External audio or waveforms from the same VCO can be used for frequency modulation which causes interesting changes in the output wave. Using the Linear switch setting will result in less frequency shifting of the VCO. The amount of FM is controlled by the Level pot. The FM input is capacitively coupled.

VC Wave CV input, VC Wave Output, Wave Pot: At minimum CV in or with the Wave pot turned FCCW, the VC Wave output is a triangle wave. With increasing CV or pot rotation, the wave will assume a more squarish shape. The wave modulation circuit uses unsymmetrical diode clipping with green and white LEDs. The CV is designed to be in the range of 0-10V. Negative control voltages will attenuate the waveform and may be used for envelope functions. You can also feed any of the VCO waveforms back into the CV input.

PWM CV input, Pulse Wave Output, PWM pot: Applying a +/-5V CV or turning the pot will alter the pulse width from off at -5V to an increasing pulse width. With no CV and the pot centered, the wave will be a square wave (on time = off time). Increasing the pot rotation or applying a positive CV will cause the on portion of the wave to increase until it is on all the time. At this point, no sound will be generated.

Power Input Jack J13: A source of regulated +/-15Vdc power must be supplied to this PCB jack to run the module. Note the current requirements in the "Specifications" section.

Connections to this jack should be made only when the power supply is OFF and the connector must be positioned correctly on the pins.

As using the wrong supply can cause damage to the unit, please contact us if you have any questions! Do not attempt to use "wall warts" to power the module.

Calibration

Calibration typically is best done with a scope, DMM and frequency counter. Adjusting RT5 and RT6 might be done by ear. Adjusting RT1 and RT2 can be done by ear using a known accurate keyboard for a frequency reference. RT3 and RT4 must be adjusted before RT1 and RT2.

Before calibration, power up the module for at least five minutes to allow the circuit to stabilize.

RT3: -1.00V Trim. Connect a voltage less than -2.5V to +/-OCT (J2) (-15V maximum is OK.) Adjust the voltage at TP1 to -1.000V.

RT4: +1.00V Trim. Push S2 Tune on the PCB or connect a voltage greater than +2.5V to +/-OCT (J2) (+15V maximum is OK.) Adjust the voltage at TP1 to +1.000V.

RT5: Triangle Symmetry Trim. This trimmer must be adjusted **before** RT6. Monitor the TRI output (J10) on the oscilloscope. Adjust RT5 for best symmetry. If you are adjusting by ear, set the trimmer for the purest tone (fewest higher frequencies).

RT6: Sine Distortion Trim. Monitor the Sine output (J12) on the oscilloscope. Adjust RT6 for best symmetry. If you are adjusting by ear, set the trimmer for the purest tone (fewest higher frequencies).

RT1: Frequency CV Scale. (Start by setting **RT2 (HF)** to about 40% of rotation.) Monitor the SAW output (J11) with a frequency counter. Adjust the Freq and Fine front panel pots to about mid point and dial in a reading of 100 Hz. Push the on board Tune switch (S2). This is near the center of the PCB. The saw frequency should jump up one octave to 200 Hz. Go back and forth, adjusting **RT1** until you get the 100/200 octave.

Note that the actual frequency is not very important; the octave (2X F) ratio **is** important. If you are tuning by ear, use an octave on a digital keyboard for reference.

RT2: High Frequency Trim. Set the Freq and Fine controls to about 4 KHz. Push the on board Tune switch (S2). Adjust RT2 until you get about 8 KHz. Again, you are adjusting for a 2X frequency ratio. This trimmer adjusts for the tendency of the VCOs higher frequencies to be a bit flat.

RT1 and RT2 adjustments will interact a bit; go back and check the RT1 setting.

Options

Add a switch to cut out the FM input capacitor. Two pads are located below C2. These can be connected to a SPST switch.

Specifications

Front Panel Size: 5.25 x 3" W

Module Depth: 6"

Input/Output Jacks: 3.5 mm (1/8")

Frequency Voltage Control: exponential; 1V/Oct.

Frequency Range: 30S to 60 KHz

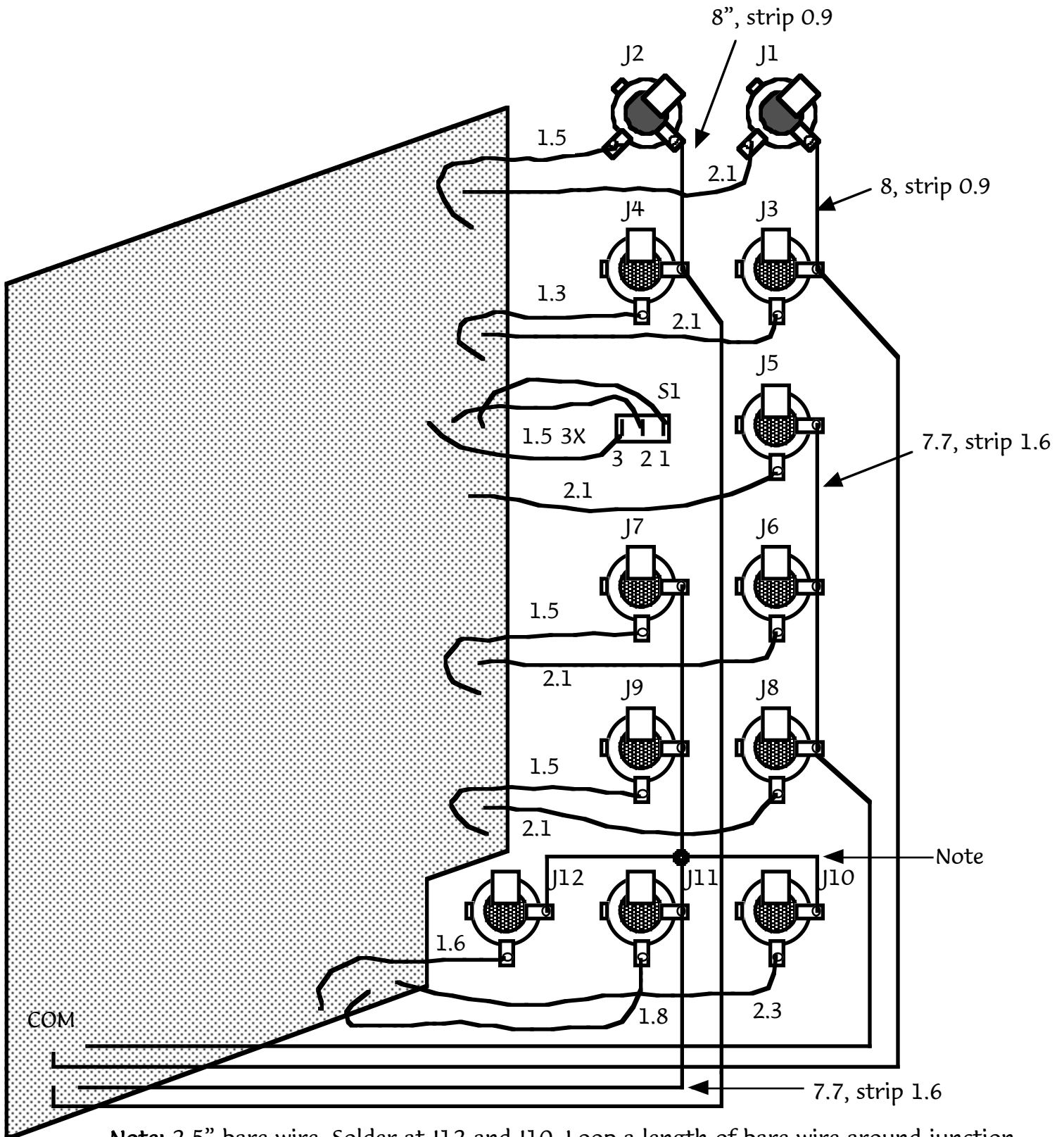
Waveforms: Sine, Triangle, Sawtooth (pos. ramp), Pulse, VC Wave

CV Range: Frequency, PWM, +/- OCT: +/-5V. VC Wave: 0-10V

Output Level: +/-5V nominal

Power: +/-15 Vdc @+55/-55 mA

Front Panel Wiring Diagram



Note: 2.5" bare wire. Solder at J12 and J10. Loop a length of bare wire around junction with J7,9,11 com wire. Solder and trim excess wire. .

Troubleshooting, Repair, Warranty

If you encounter problems that you can't solve, contact us, preferably via e-mail with a description of the problem. Let us know what does and does not work. We can then help you get your module working. We can fix modules for a minimum fee of \$25.

The parts contained in this unit have been carefully selected and tested. They are guaranteed for 90 days from the date of purchase. If you believe that you have a defective part (or if you have a part missing), contact us so we can provide you with a replacement or repair.