



## ALM021 / MCO

### TECHNICAL SPECIFICATIONS

Power: +12V 40ma / -12V 15ma  
Size: 6HP  
Depth: 38mm  
Resolution: 16Bit/48Khz with AKM codec.

### Module Installation

With your modular synth powered **off** connect the 10 pin end of the supplied standard eurorack power connector cable to the 10 pin power connector on the rear of the module.

The red stripe on the cable should be orientated to match the text 'RED' marked on the rear of the module near the power connector (this is -12V). Connect the other 16 pin end of the cable to your eurorack bus board (Refer to your bus board documentation for the correct orientation).

You are now safe to power up your modular synth. If the module fails to power up check you have the power cable correctly orientated and have carefully read this manual.

# MCO

<http://busycircuits.com/alm021>

The 'MCO' is a compact digital oscillator. It features a main 'morphing' wavetable output, an additional copy of this output with overlaid variable pulse segments (ala Alpha Juno style saw wave pwm) and a sub square wave output an octave down to the main output. The waveform and pulse segment width can be both directly and voltage controlled. The pulse segment distribution can also be voltage controlled via the 'type' input. Expect an early 90s slightly crunchy digital type sound (ala Ensoniq, Kawaii Kx synths) rather than something striving for perfect analog emulation.

### V/OCT INPUT

Sets the output frequency. Follows 1 volt per octave standard.

Frequency range is approx 10 octaves 12hz to 14Khz.

Expect aliasing at higher frequencies (top 3-4 octaves).

### SYNC INPUT

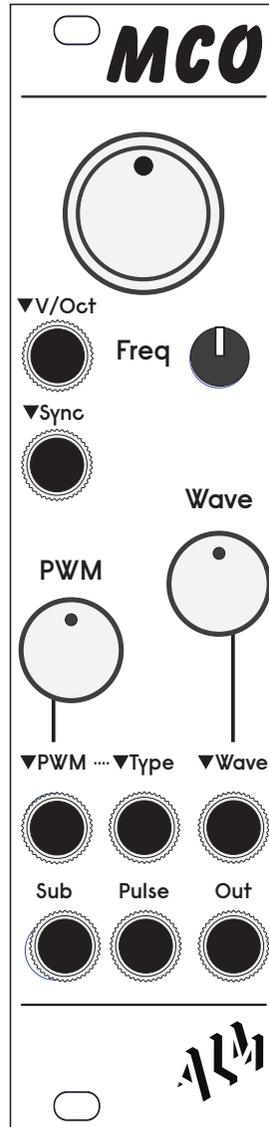
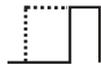
In the presence of an input waveform rising edge the output waveform phase is reset.

### PWM CONTROL AND INPUT

Alters the duty cycle of the overlaid segments present in the Pulse output.

Input expects 0-5V. At max 5v (fully clockwise knob) no PWM is present - i.e duty cycle 100%.

Input voltage is added to the PWM knob position offset.



### FREQUENCY CONTROLS

Sets the base frequency for the oscillator output. The v/oct input is added to this.

The main control knob sweeps approx 6 octaves.

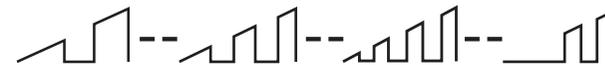
### WAVE CONTROL AND INPUT

Selects the output waveform for both the 'pulse' and main audio outputs.

Output blends between 10 different waveforms which are;  
*noise > tri > saw > sine > bell > organ > '4 oct' > organ > voice > pulse*

### TYPE INPUT

An applied voltage increases the number and arrangement of pulse segments used on the pulse output. 0 - 5V range.



### OUTPUTS

*Out* - main audio output - Waveform from selected wave control (approx +/-8v)

*Pulse* - As the main output but with pulse width segments superimposed on to it.

*Sub* - A 50% duty cycle pulse wave an octave lower than main out. (approx +/-8v)

### V/OCT Tracking Calibration

Calibration is performed by carefully adjusting the trimmer on the back of the module. Apply 1V to v/oct input, and tune the oscillator via front panel controls to C1. Next change the input voltage to 3V and now adjust trimmer on reverse until you get C4. You may need to go back and forth and repeat the process a couple of times for best results.

You should expect good tracking over at least 5 octaves. Note the module ships pre-calibrated.

### Support

Need help? Email your questions to [help@busycircuits.com](mailto:help@busycircuits.com)

For the latest news, additional info, downloads and firmware updates please visit the ALM website at <http://busycircuits.com> and follow @busycircuits on Twitter and Instagram.

### Limited Warranty

From the date of manufacture this device is guaranteed for a period of 2 years against any manufacturing or material defects. Any such defects will be repaired or replaced at the discretion of ALM. This does not apply to;

- Physical damage arising from mistreating (i.e dropping, submerging etc).
- Damage caused by incorrect power connections.
- Overexposure to heat or direct sunlight.
- Damage caused by inappropriate or misuse.
- Use of incorrect or non official firmware

No responsibility is implied or accepted for harm to person or apparatus caused through operation of this product. By using this product you agree to these terms.