

MINIMOD

VCA User Guide

Discrete Transistor Cascaded VCA

Thank you for purchasing the AJH Synth MiniMod VCA module, which like all AJH Synth Modules, has been designed and handbuilt in the UK from the very highest quality components. We hope that it will help and inspire you towards creating some great music and soundscapes!

The MiniMod Discrete Cascaded VCA exactly re-creates the VCA circuitry of the vintage Model D synthesiser in Eurorack modular format. It features two fully discrete transistor VCA cores which are hardwired in series, to which we have added full voltage control to both VCA cores along with an overdrive facility. Particular attention has been paid to the selection and matching of components in the audio signal path, including the use of audiophile grade capacitors and operational amplifiers.

There are two Audio Inputs, each with their own level controls along with two CV inputs which control the gain of VCA 1 and a Master CV Input and level control which controls the gain of VCA 2. An offset control allows a preset gain to be added to VCA 1. Internally it operates at the same voltage and signal levels as the early Model D voltage controlled amplifier and the output of VCA 1 is hardwired to the input of VCA 2.

A high gain (overdrive) mode can be selected with an onboard jumper. This overdrives the Input of VCA 1 by a factor of 3 and forces it into soft clipping - the second VCA can be used in a similar way to the Master volume on a guitar amplifier to control levels so that variable levels of distortion (or "grit") can be added to the sound and still maintain unity gain overall.

Module width is 10 HP of Eurorack space and it is compatible with standard Eurorack cases. The height of the panel is 128.5mm and depth is 26mm . There are four mounting holes at the corners of the module and we provide 4 of M3 rack fixing screws, along with a Eurorack compatible power cable. Current consumption is 40mA from the +12V supply rail and 22mA from the -12V supply rail.

All AJHSynth modules are covered by a one year guarantee against manufacturing defects.

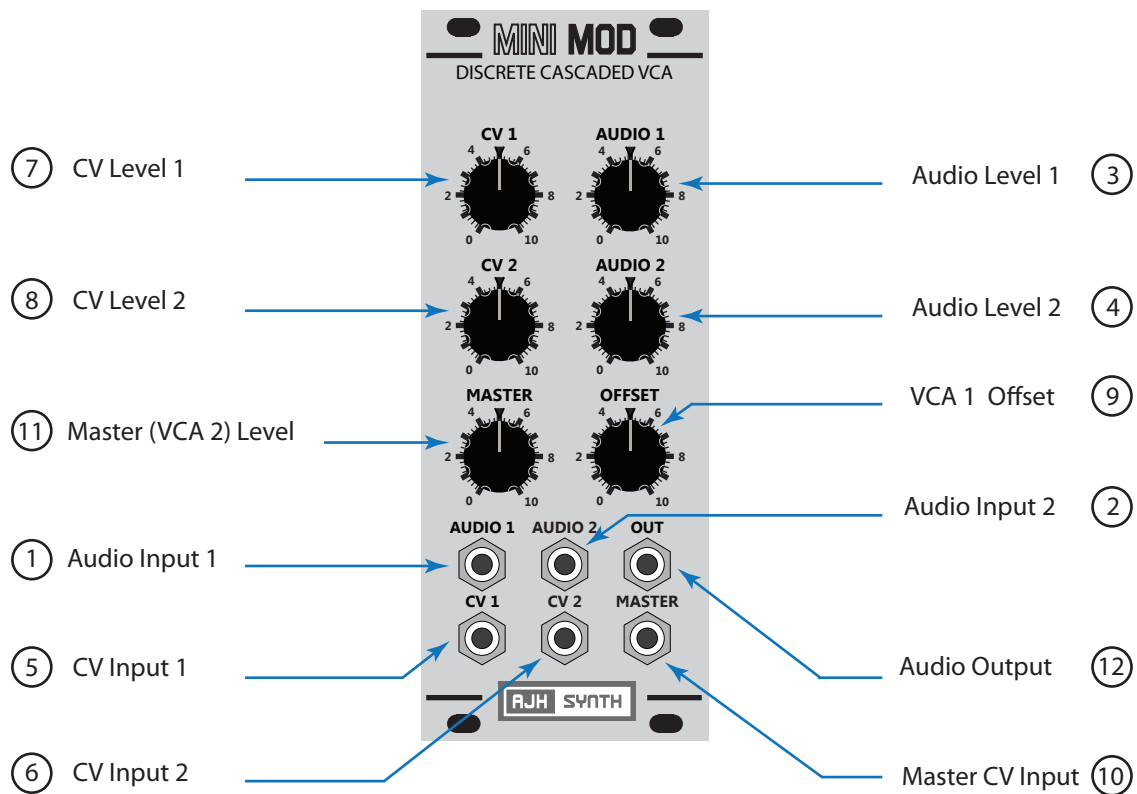
Note:

It is very important that the power supply ribbon cable is connected correctly, see the "adjustment and calibration" section for an illustration of the correct orientation.



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Controls, Inputs and Outputs



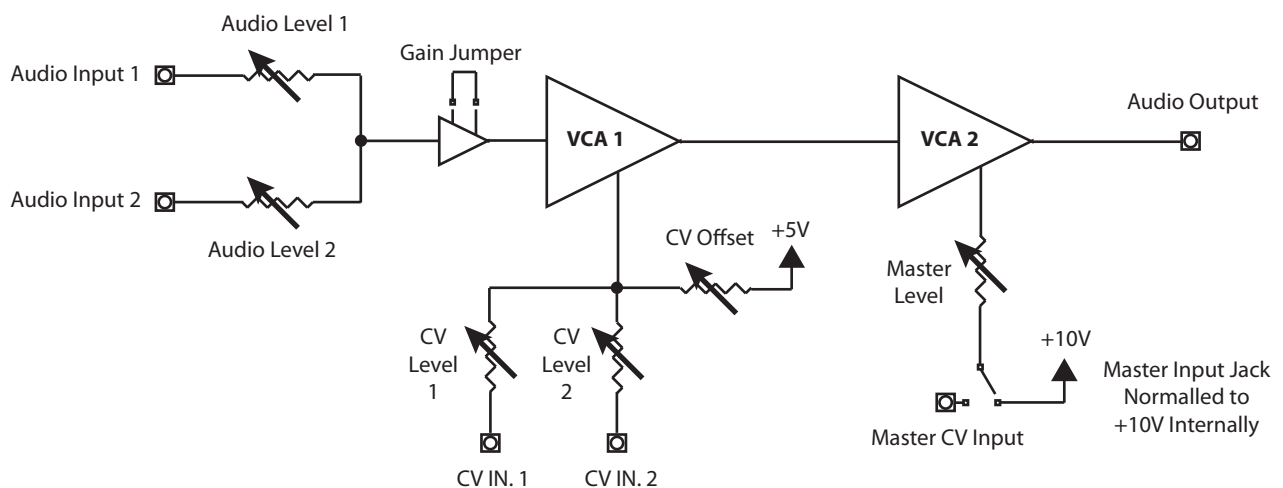
- ① Audio Input 1 : Audio Input 1 forms part of a 2 input audio mixer which is attached to the front end of VCA 1, this input is mixed with Input 2 at a level set by Audio 1 Level Control (3). Signal levels of up to +/- 5 Volts are acceptable.

Note:

Just like the VCA on the vintage Model D synthesiser on which this module is based, the input stage is AC coupled - therefore it is not possible to process DC control voltages through the Audio Inputs - it is suitable for processing audio signals only. However, if DC control voltages are accidentally connected to the Audio Inputs it will not cause any damage to the module.

- ② Audio Input 2 : Audio Input 2 forms part of a 2 Input audio mixer which is attached to the front end of VCA 1. This input is mixed with Input 1 at a level set by Audio 2 Level Control (4). Signal levels of up to +/- 5 Volts are acceptable. Should more Audio inputs be needed a Eurorack compatible audio mixer can be connected to either Audio Input 1 or 2.
- ③ Audio Level 1 : Sets the amount of signal from Audio Input 1 (between 0% and 100%) that is mixed with Audio Input 2 and sent to the Input of VCA 1.
- ④ Audio Level 2 : Sets the amount of signal from Audio Input 2 (between 0% and 100%) that is mixed with Audio Input 1 and sent to the input of VCA 1.
- ⑤ CV Input 1 : Control voltage Input for VCA 1, this is mixed with CV Input 2 (6) and the sum of these voltages control the gain of VCA 1. An input voltage range of +/- 5 V is acceptable and +5V gives approximately unity gain. Negative voltages will generally be ignored unless combined with a (larger level) positive voltage from CV Level 2 control, in which case the resulting voltage will be (CV2 - CV1). The output of both VCA 1 and VCA 2 repond in a linear manner in relation to all CV inputs.

- ⑥ CV Input 2 : Works in the same fashion as CV Input 1. Any voltage applied to this Input is attenuated by CV 2 Level control (8) and summed with CV 1 Level output voltage, the resultant control voltage regulates the gain of VCA 1 between zero and unity.
Note that CV 1 & CV2 act on VCA 1 ONLY, see signal flow diagram below.
- ⑦ CV Level 1: Sets the amount of control voltage (between 0% and 100%) sent from CV Input 1 (5) to regulate the gain of VCA 1
- ⑧ CV Level 2 : Sets the amount of control voltage (between 0% and 100%) sent from CV Input 2 (6) to regulate the gain of VCA 1
- ⑨ VCA 1 Offset : Sets the initial gain of VCA 1 by applying a control voltage directly to the CV input node, so that it effectively acts as a manual volume for the VCA . See the signal flow chart below for a visual indication of function.
- ⑩ Master CV Input : A voltage applied to this input varies the gain of VCA 2. When no jack is connected the switch contact of the jack socket is connected (normalised) to +10V and the gain of the VCA can be manually controlled by the Master Level control (10). This emulates the "Pedal" control and Input of the Model D, but with a greater gain range. Control voltages up to +10V can be connected to this Input.
- ⑪ Master Level : Controls the CV voltage level to VCA 2. If no jack is connected to Master CV Input (9) then a setting of 5 (12 o'clock) will give unity gain for VCA 2. If VCA 1 is being over driven by removing J1 (C) then this can be turned down so that unity gain from the VCA Output is maintained, in a similar fashion to the Master volume control on a guitar amplifier. If a CV signal is fed into Master CV Input (9) then this controls the level of this signal fed to the VCA gain cell between 0% (no audio output) and 100% (Unity gain with +/-5V audio input).
- ⑫ Audio Output : Audio output. The output signal level is typically +/- 5V but can be much higher (up to +/-11v) if the Gain Jumper (J1) is removed, so it is important that the output level is controlled with the Master Level Control (10) to prevent overloading modules which are connected downstream.
- Ⓒ Gain Jumper : (J1 on PCB) Removing this Jumper boosts the level of signal fed to the input of VCA 1 by almost 300%. This overdrives the VCA core and creates up to 20% of tube-like harmonic distortion. With the Gain Jumper removed care must be taken to adjust the Master Level control to reduce the gain of VCA 2 by a corresponding amount and keep the output level around +/-5V to prevent possible damage to other modules downstream of this module.

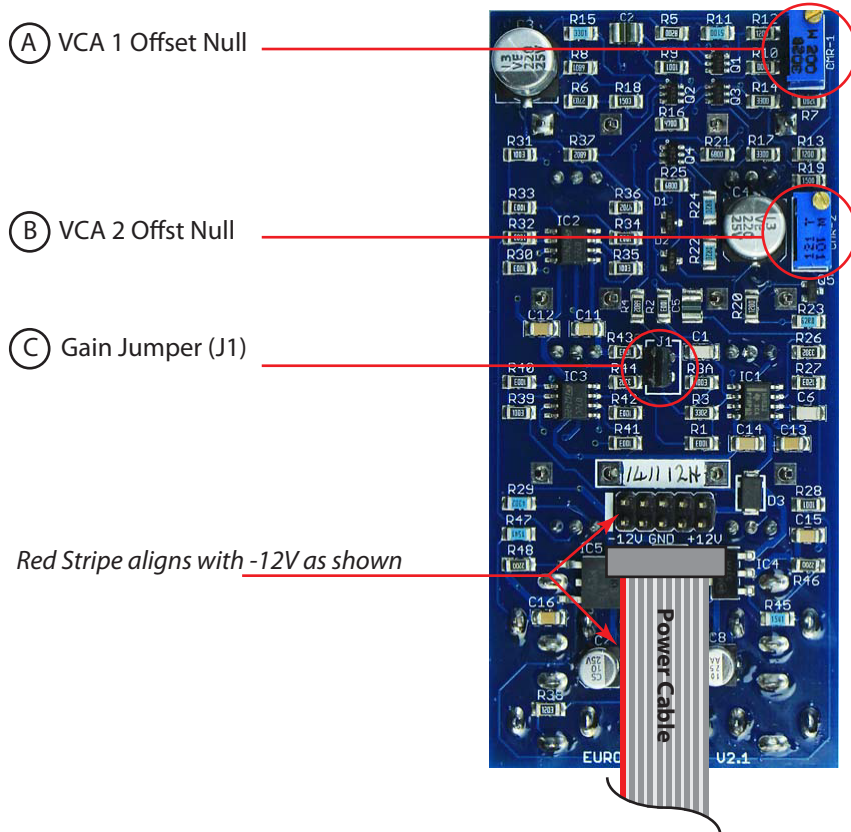


MiniMod Cascaded VCA
 Audio and CV Signal Flow Chart

Adjustment and Calibration

Note:

This information is given for completeness, the MiniMod VCA is calibrated after manufacture and under normal circumstances should not require any user adjustment.



- (A) VCA 1 Offset Null : **FOR MANUFACTURER ADJUSTMENT ONLY**, specialist test equipment is needed to calibrate this trimmer correctly.
- (B) VCA 2 Offset Null : **FOR MANUFACTURER ADJUSTMENT ONLY**, specialist test equipment is needed to calibrate this trimmer correctly.
- (C) Gain Jumper (J1) : Removing J1 increases the gain of the signal fed to the input of VCA 1 by almost 300%. See previous page for a fuller description and suggested use.

If you need any help using this module or have any technical questions please feel free to contact us at support@ajhsynth.com