

Hampshire Electronics

Quad VCA



4 Independent VCAs In One

Designed and hand-built in the United Kingdom

www.hampshireelectronics.co.uk

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1. Introduction

The Hampshire Electronics **Quad VCA** is a fully analogue, four-channel linear voltage-controlled amplifier designed for flexible level-shaping, modulation control, and signal routing within Eurorack modular systems.

Each of the four VCAs operates as a **completely independent analogue channel**, equipped with:

- A manual **CV attenuator**
- A **bipolar CV offset control**
- Individual **signal input**, **CV input**, and **output** jacks
- A clean, linear response ideal for modulation, audio, and precision control tasks

The inclusion of a bipolar offset allows for precise shaping of any incoming CV, ensuring predictable amplitude control even when using bipolar modulators such as ± 5 V LFOs or envelopes with non-zero baselines.

Hand-built in England, the Quad VCA offers stable, transparent analogue performance in a performance focused 16 HP design.

2. Installation

2.1 Mounting

The Quad VCA occupies **16 HP** of Eurorack space.

Its shallow **20 mm** depth makes it suitable for both skiff and portable cases.

Use standard M3 screws to secure the module into your case's rails.

Ensure adequate clearance for the power ribbon.

2.2 Power Connection

Connect the supplied 16-pin Eurorack ribbon cable to the keyed header on the rear PCB.

Important:

The **red stripe must align with -12 V** on both the module and your bus board.

Always power down your case before connecting or removing modules.

Rail Current Draw Notes

+12 V $\approx$ 23 mA Amplifier and control circuitry

-12 V $\approx$ 23 mA Linear VCAs

+5 V Not used –

Reverse-polarity protection is included for safety.

3. Overview & Features

The Quad VCA is a general-purpose, high-quality linear VCA with the precision and clarity required for both audio and CV duties.

Key Features

- Four **completely independent** linear VCAs
- **Offset control** per channel for positive or negative CV bias
- **CV input attenuator** per channel
- Handles both **audio** and **DC-coupled CV** signals
- Signal and CV range: **-5 V to +5 V**
- 100% analogue signal path
- Independent I/O – **no normalisation, no internal mix**
- 16 HP wide, 20 mm deep
- Reverse-polarity protection
- Hand-built in the UK

Designed to be clean, stable, and predictable, the Quad VCA is suitable for envelope shaping, dynamic control, CV processing, audio level control, and complex modulation routing.

4. Front Panel Overview

The front panel is organised into **four identical vertical channels**, each containing:

Controls

- **CV** – Attenuates the incoming control voltage
- **OFFSET** – Adds positive or negative bias to the CV

Jacks

- **IN** – Main signal input (audio or CV)
- **CV** – Control voltage input
- **OUT** – VCA output

There is no internal mixing; each OUT jack carries only the signal for its own channel.

5. Signal Flow & Channel Architecture

Each channel follows a simple, clean analogue path:

Signal IN → Linear VCA Core → OUT

The effective control signal for the VCA is:

$$\mathbf{CV_effective = (CV_input \times Attenuator) + Offset}$$

This allows:

- Level scaling
- Level inversion
- Forcing a VCA open without CV
- Precisely constraining modulation depth
- Shifting bipolar modulators into usable ranges

Because the VCAs are linear and DC-coupled, they are suitable for both **audio** and **control voltages**.

6. Controls & Inputs

6.1 Signal Inputs

Each channel provides a DC-coupled **IN** jack.

- Accepts audio or CV
 - Nominal range: **-5 V to +5 V**
 - Signals outside this range will not damage the unit but may clip
-

6.2 CV Inputs

Each channel includes a dedicated **CV** jack.

- Accepts **-5 V to +5 V** modulation sources
 - Affects the VCA linearly
 - Fully DC-coupled for envelope, LFO, and step-sequence control
-

6.3 CV Attenuation (*black knob*)

This knob scales the incoming CV:

- Full clockwise: 100% depth
 - Centre: medium depth
 - Fully counter-clockwise: zero depth
 - Allows fine control of modulation intensity
-

6.4 Offset Control (*red knob*)

Applies a bipolar DC bias to the CV circuit:

- Turn right → adds **positive offset** (opens the VCA)
- Turn left → adds **negative offset** (inverts or closes VCA)

This is extremely useful when:

- Using bipolar LFOs but wanting only positive amplitude modulation
- Keeping a drone open without any CV input
- Balancing envelopes from external modules
- Creating tremolo with a controlled minimum level

Offset + CV interplay is the core of the Quad VCA's flexibility.

7. Usage Examples

Example 1 — Standard Envelope VCA

- Patch audio → **IN**
- Envelope → **CV**
- CV knob ~ 75%
- Offset centred

This produces clean amplitude shaping.

Example 2 — Bipolar LFO to Unipolar Modulation

- Bipolar LFO (−5 → +5 V) → **CV**
 - Set **OFFSET** to shift the LFO upward
 - Output now becomes fully positive, useful for filter cutoff or amplitude control
-

Example 3 — Manual VCA / Drone Source

- Leave **CV** jack unpatched
 - Raise **OFFSET**
 - Channel behaves like a manually-controlled volume fader
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Example 4 — CV Processor

- Use the channel as a linear attenuator
 - Or as an inverter (via **OFFSET**)
 - Process envelopes, LFOs, and sequencer voltages
-

Example 5 — Create Dynamic Crossfades

Use two channels with one inverted:

- Channel A — normal CV

- Channel B – CV inverted with OFFSET
 - Outputs form a crossfade pair
-

8. Technical Specifications

Parameter	Specification	Notes
Format	Eurorack	—
Width	16 HP	—
Depth	≈ 20 mm	Skiff-friendly
Power	+12 V @ 23 mA / -12 V @ 23 mA	Reverse-polarity protected
Signal Range	-5 V to +5 V	Audio or CV
CV Range	-5 V to +5 V	DC-coupled
Response	Linear	Suitable for modulation + audio
Architecture	Fully independent 4-channel VCA	No normalisation
Construction	Aluminium front panel	Hand-built in the UK

9. Safety & Compliance

Electrical Safety

Operates exclusively from a **±12 V DC Eurorack supply**.

Contains no user-serviceable parts. Always power down your case before installation or removal.

Compliance

Designed and tested to comply with:

- **UKCA:** Electrical Equipment (Safety) Regulations 2016 and EMC Regulations 2016
- **CE:** Low Voltage Directive 2014/35/EU and EMC Directive 2014/30/EU

Meets the requirements of **EN 55032 (emissions)** and **EN 55035 (immunity)** under self-certification.

Disposal

Do not dispose of with household waste.

Recycle in accordance with **WEEE Directive 2012/19/EU**.

10. Contact & Support

For documentation, firmware, and technical support, visit:

www.hampshireelectronics.co.uk

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