The Q108 Voltage Controlled Amplifier is a staple of any synthesizer system. The amplitude of any waveform can be controlled by another signal such as an envelope generator, sequencer, oscillator, etc. An Initial Gain control allows manual adjustment of the amplitude and a Level Control determines the impact of the control signal. Both Linear and Exponential responses are available to simulate a variety of real-world sounds. Positive and negative output signal polarities are provided. Two inputs are provided for mixing.

Specifications
Panel Size: Single width 2.125"w x 8.75"h.
Input Signal Range: 10V PP, DC to 20khz
Control Signal Range: 0 to 5V, DC to 1khz
Power: +15V@30ma, -15V@30ma.

Controls and Connectors

Response Switch
Sets the response curve of the control inputs – Linear or Exponential.

Initial Gain Control
Manually sets the output level of the amplifier. This control is mixed with the values of the control signal inputs.

Control #1 Level Control
Determines the impact of Control #1 signal input.

Control Input #1 Connector
Controls the output level of the amplifier. This signal is adjustable with the Control #1 Level control. Its value is mixed with the other control input.

Control Input #2 Connector
Controls the output level of the amplifier. This signal is not adjustable. Its value is mixed with the other control input.

Signal #1 and #2 Input Connectors
These are the signal who’s amplitude will be controlled.

- Output Connector
Inverted output signal.

+ Output Connector
Non-Inverted output signal.
Response is the relationship between the control voltage and the output signal's amplitude.

This Gain control is summed with the 2 control jacks to produce a voltage that controls the amplitude. Normally this stays at zero. If you want the output to stay on, turn this gain up.

This control voltage input goes through the Level control above. This is typically patched to the envelope generator that controls amplitude.

These inputs are the signal whose amplitude will be controlled. These 2 signals are mixed together.

Two outputs provide normal and inverted versions of the input signals.

This controls the amount of affect that Control #1 jack contributes to the output. Typically, this becomes your volume control.

This control voltage input is fixed.
Usage and Patch Tips

Basics
The amplitude of a signal determines its volume. Actually the Q108 Amplifier is a Voltage Controlled Attenuator because it only attenuates signals (reduces the volume), not amplifies them. In any case, the Q108 Amplifier allows control of the amplitude of a signal. Normally a patch will contain an envelope generator that will control the overall amplitude of a sound throughout its duration.

Voltage Levels
It's important to understand the voltage levels used to control the amplifier. The Q108 Amplifier responds to control signals that are 0 - 5 volts. Where 0 volts is off and 5 volts is full volume. The Q109 Envelope Generator produces 0 - 5 volt outputs which are perfect for use by the amplifier and can be patched directly. The Q106 Oscillator produces waveforms that are -5 - +5 volts, so if you want Amplitude Modulation (tremolo) you'll need to attenuate the signal by 2 (adjust the Control Level to 5) and shift it up (adjust the Gain control to 5) which will result in an on-off range. This attenuation and shifting (offset) can also be accomplished with a Q125 Signal Processor.

There are two control signal inputs which are added together with the position of the Gain Control in order to determine the output amplitude. Gain Control input #1 has a level adjustment.

Practical Settings
If you're controlling your Amplifier with a Q109 Envelope Generator, patch its output into Control Input #1, Set the Gain control to 0 and set the Control Input #1 Level to the desired volume.

When controlling the Amplifier with a Q106 Oscillator, patch its output into Control Input #1, Set the Gain control to 5 and set the Control Input #1 Level to the desired volume.

You can use both Oscillators and Envelope Generators to control the Amplifier by mixing both control signals at the amplifier. Only one of them is adjustable. Patch the other through a Q125 Signal Processor, or a Q112 Mixer to adjust it's level if needed.

AC and DC Signals
The Q108 Amplifier will work for both AC and DC signals. This means you can control the amplitude of both audio (AC) signals and of slow moving or non-moving control signals (DC).

One example of this is to use the velocity output from a Keyboard Controller to control the amplitude of an Q109 Envelope Generator which in turn controls the output amplifier. This will result in faster keystrokes causing louder sounds.

Responses
The Response switch allows for both Linear and Exponential responses. This determines how fast the amplitude will rise and fall. Use the Exponential setting for fast string-plucking rise times and the linear for a smoother, slower response. There's nothing better than experimentation to determine which response you're looking for.

Outputs
Inverted and non-inverted outputs are provided. When simply amplifying audio signals you'll just use one of them but for controlling the amplitude of modulation signals you may be able to use the two inverted signals to perform interesting control functions such alternating between two different sounds.
Calibration and Testing

Calibration is accomplished with 3 trim pots. Set jumpers to the factory defaults and center all 3 trim pots before beginning.

**Feedthru Adjustment:**
Set response to Linear, and Gain to 0.
Apply 1Khz +5V triangle waveform to Control Input #2.
Using an Oscilloscope on the 20mv scale, adjust the feedthru trim pot for minimum waveform output deviation.

**Linear gain adjustment:**
Set response to Linear and Gain to 10.
Apply +5.00V to Signal Input #1.
Adjust linear gain trim pot to get +5.00V at +Output.

**Exponential gain adjustment:**
Set response to Exponential and Gain to 10.
Apply +5.00V to Signal Input #1.
Adjust exponential gain trim pot to get +5.00V at +Output.
Recheck Linear Gain due to slight interaction of gain adjustments.

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**Power Connector**

6 pin .1” MTA type connector made by AMP. Available from Mouser Electronics or Digi-Key. Modules have a male PCB mount connector and cable harnesses have a female.

**Part Numbers:**
Female cable mount: #6404416
Male PCB mount: #6404566

**Pinout:**
1 = +15v
2 = key (pin removed)
3 = +5v
4 = gnd
5 = -15v

Not all voltages are used on all modules.

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**PC Board Layout**

![PC Board Layout Diagram]