# Quadrangle Manual

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# General Info

The Quadrangle is quad cascading triggered envelope generator with an attenuverted output per channel.  Each channel has a gate input, voltage controlled attack and decay/release inputs, end of attack and end of cycle trigger outputs, and a mode (AR, Loop and AD) switch.  Each channel's EOC is normalled to the next gate input, resulting in interesting rhythmic opportunities. Channel 4 has a "stop" or "continuous looping" switch which allows either a "one shot" cascaded envelope or continuous cycling of channel 4 to channel 1.  The SUM output allows for longer and more dynamic bipolar envelopes, perfect for interesting modulation. Users also have voltage control over all of the attacks and decay/releases simultaneously when using the ALL A and ALL D/R input jacks.  Massive function generation, modulation, rhythm and versatility sets the Quadrangle in a class of its own.
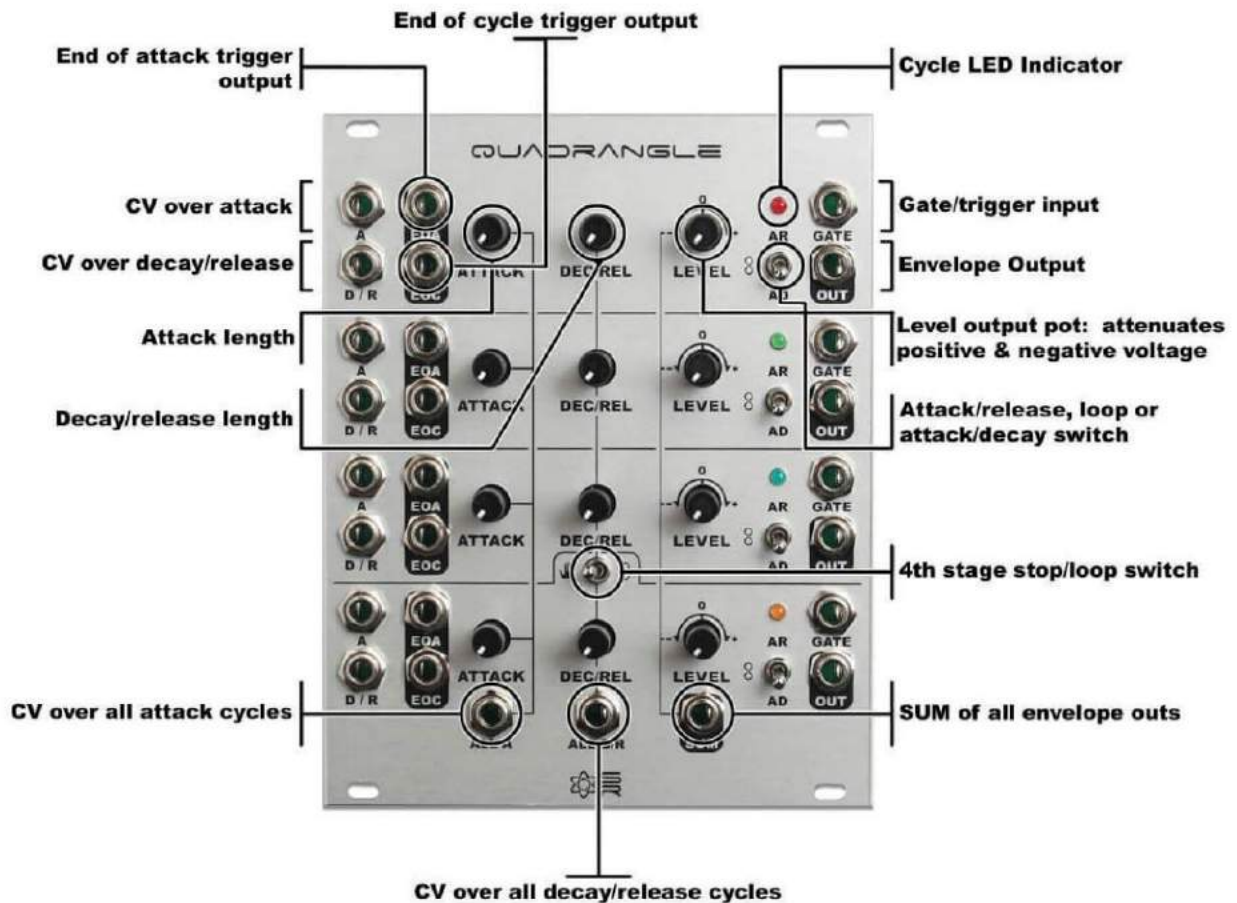
- Features:
    - 4 Cascading envelope generators
    - Attenuverters for each envelope output (dial in that secret sauce!)
    - Attack, Decay/Release and Loop modes per channel
    - From super fast ~2 mS (Audio Rate) envelopes, up to 8 second envelopes
    - CV over Attack and Decay/Release per channel
    - CV over ALL Attack and ALL Decay/Release
    - Bipolar Voltage SUM output of all envelopes
    - End of Attack & End of Cycle trigger outputs per channel
    - Normalled EOC to next channel Gate input (broken when GATE jack is patched)
    - One Shot or Continuous Looping of all channels
- Specifications:
    - Module width: 20HP
    - Module depth: 15mm
    - Current draw:
    - +12V: 64mA
    - -12V: 44mA

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### Important Links

Store Page
Assembly Instructions
Bill of Materials

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# Quick Start Guide



The Quadrangle is quad cascading triggered envelope generator with bipolar output attenuversion. Each channel has voltage control over attack and decay/release, end of attack and end of cycle trigger outputs, and mode (AR, loop and AD). Each channel's EOC is normalled to the next gate input, resulting in interesting rhythmic opportunities. Channel 4 has a "stop" or "continuous looping" switch which allows either a "one shot" cascaded envelope or continuous cycling. The SUM output allows for longer and more dynamic bipolar envelopes, perfect for interesting modulation. Users also have voltage control over all of the attacks and decay/releases simultaneously when using the ALL A and ALL D/R input jacks. Massive function generation, modulation, rhythm and versatility sets the Quadrangle in a class of its own.

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# About Cascading

The Quadrangle has four envelope "channels." When the top channel (channel 1) has finished its cycle, it sends an internal end of cycle trigger to the channel below it (channel 2). When channel 2 has finished its cycle, it does the same to channel 3. This sequence of triggers is called "cascading." On the Quadrangle, channels cascade from top to bottom. The bottom channel (channel 4) can loop to trigger channel 1.

How cascading works on the Quadrangle:
- If global Loop is enabled, channel 4 will cascade into channel 1. If global Stop is enabled, the cascade will stop after channel 4 completes its cycle.
- A channel can be used independently (so that it is not affected by the cascade) by simply patching a cable into the GATE input of that channel.
- If a channel's GATE jack is in use, it will stop the cascade from the channel above it.
- If global Stop is enabled and all the individual channels are set to AR or AD, the envelopes will cascade from top to bottom when triggered at the gate input, stopping after the fourth channel completes its cycle. If the gate input of channel 1 is used, all channels will cascade. If the gate input of channel 2 is used, channels 2-4 will cascade, etc.
- If any of the individual channels are set to loop, it will continue to loop and cascade the channel below it each time it ends its cycle. This allows the use of fewer cascading channels without an external gate, e.g. looping channel 2 while 3 and 4 are set to AD or AR.
- All the channels can be set to continually cascade.
- If a channel is mid-cycle when it is triggered by the previous channel, it will retrigger.

# Powering Up Your Module

Turn off your modular system before plugging in your Quadrangle module. Plugging in your module while the power is on ("hot swapping") can damage a module. Plug a 10 to 16 pin power cable into the module and then into your power supply, aligning the stripe of the cable with the STRIPE indicator on the power supply. Then power it on!
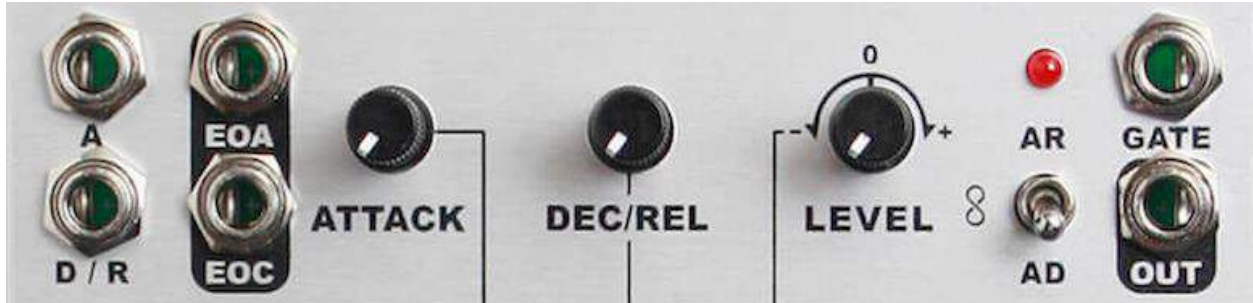
# Testing Instructions

If you built the Quadrangle yourself, use these instructions to test your module to make sure it is fully functional.



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# Channel Controls

The Quadrangle has four channels. Each one looks like this:



### A: CV over Attack
- CV control over the Attack cycle of the envelope. The input signal is additive and subtractive to to the physical position of the potentiometer.

### D/R: CV over Decay/Release
- CV control over the Decay cycle of the envelope. The input signal mimics the pot range and is additive and subtractive to to the physical position of the potentiometer.

### EOA: End of Attack trigger output
- Sends a trigger when the envelope has completed the Attack portion of the cycle.

### EOC: End of Cycle trigger output
- Sends a trigger when the envelope has completed its cycle.

### ATTACK
- Sets the length of the Attack cycle. Minimum: ~2ms. Maximum: ~2 seconds.

### DEC/REL: Decay/Release
- Sets the length of the Decay cycle. Minimum: ~2ms. Maximum: ~2 seconds.

### LEVEL
- Controls the output voltage of the envelope, with a range of -5V to +5V. At 12:00, the envelope sends zero volts. When turned fully toward the - symbol, it sends 0 to -5V. When turned fully toward the + symbol, it sends 0 to +5V.



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### LED

- The LED illuminates for the entire length of the envelope. It starts off dimly and then brightens, reaching full brightness at the peak of the attack. It dims during the decay cycle.

## Switch

- The selector switch has three options:
    - AR: Attack / Release. This gives an ASR cycle (attack / sustain / release).
    - ◯ (Channel Loop): Retriggers the channel's cycle each time the channel ends. If the channel is not mid-envelope, it will automatically cycle whenever it is switched to Loop.
    - AD: Attack / Delay. This gives an AD cycle

## GATE: Gate/trigger input

- Gates/triggers the channel. Patching a cable into this jack will stop the previous channel from internally triggering or retriggering current channel. To use this channel independently of the other channels, plug a "dummy cable" into this jack (a cable that is unconnected at the other end).

## OUT: Envelope output

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# Global Controls

## Stop / Loop Switch



- 8 (Global Loop):
    - The global Loop control is different than the channel Loop. While the channel Loop allows each channel to self-cycle independently, the global Loop triggers channel one when channel four's cycle is complete.
    - If individual channels are looped AND the global Loop is engaged, each channel will self-cycle until it is retriggered by the previous channel's end of cycle.
    - If all channels are set to AR of AD when the switch moves from Stop to Loop, nothing will happen until one of the channels receives a trigger or one of the channel switches is set to Loop (even if momentarily).

- ✋ (Stop):
    - Stops channel four's end of cycle from internally triggering channel one.



## ALL A: CV over all attack cycles
- Affects the length of attack of all four envelopes. The input signal is additive to the physical position of the attack potentiometers in each channel. A four-second attack cycle can be accomplished by turning the ATTACK pot on a channel fully clockwise and adding 5V to the ALL A jack.

## ALL D/R: CV over all decay / release cycles
- Affects the decay / release of all four envelopes. The input signal is additive to the physical position of the D/R potentiometers in each channel. A four-second D/R cycle can be accomplished by turning the DEC/REL pot on a channel fully clockwise and adding 5V to the ALL D/R jack.



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## SUM: Sum of all envelope outputs

- Sums together all envelope outputs, whether they are functioning simultaneously or one at a time. This allows for longer and more dynamic envelopes. This can be useful in a couple ways:
    - Channels can cascade into each other, creating one long envelope.
    - Simultaneously looping channels can create interesting rhythms.

# Additional Notes

## Very short cycles

The attack and decay cycles can be as short as 2ms each, so when both the ATTACK and DEC/REL pots are turned fully counterclockwise, the envelope will be extremely fast, faster than many other modules. This is normal and intentional.

## Voltages

All envelope outputs are maximum 5V peak to peak, including the SUM output.

**More questions? Get a hold of us here:**
**503-417-1130**
**info@synthrotek.com**

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