Wiard GR-331 Dual Envelator

Rev: 031001

Dual Envelator	Two circuits - ENV1, ENV2	
	Generator	Processor
Audio	Cycle mode runs into audio range	Short evenlopes triggered at audio rate (into *GATE [in]*)
Control Voltage	Envelopes	DC-coupled cross-fader will mix control voltages

LEDs
The LED bank is split into two sections, where each 4-lamp section shows the current output value (in volts) of its respective envelope. The LEDs increment in 2 volt steps. When the voltage is above 8 volts, the last LED remains on. When no LEDs are lit, the voltage is below 2 volts.

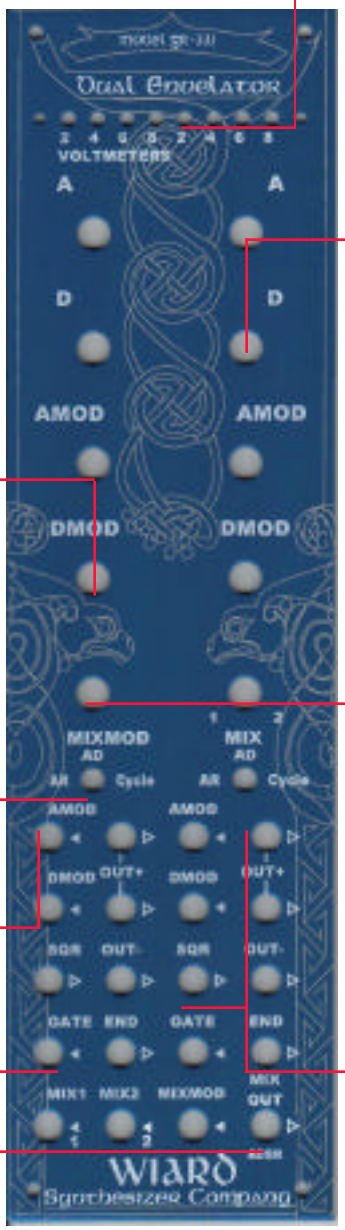
Envelope Controls
A [knob] Attack - The attack time for the envelope.
D [knob] Decay/Release - The decay and/or release time for the envelope. If the AR/AD/Cycle switch is set to AR, this control is the release time used when a gate signal is removed from the *GATE* input jack. If the switch is set to *AD* or *Cycle*, this control is the decay time measured from the time that the envelope completed the attack cycle time

Envelope Modulation Controls
AMOD [knob] - Attack Modulation Setting - Attack Modulation allows for voltage control of the attack time. This control allows adjustment of the amount of modulation to the attack time as input into the *AMOD* input jack. Positive voltages decrease segment time.
DMOD [knob]- Decay Modulation Setting - Decay Modulation allows for the voltage control of the decay (or release) time. This control allows adjustment of the amount of modulation to the decay/release time as input into the *DMOD* input jack. Positive voltages decrease segment time.

Mixer/Cross-fade Controls
MIXMOD [knob] - The Mixture Modulation control is an attenuator for the *MIXMOD* voltage input. This provides for the voltage control of mixed envelope (or other signal) cross-fading. When used as a voltage controlled ADSR, this acts as the sustain voltage control.
MIX [knob] - The Mix control will cross-fade from the MIX1 and MIX2 input jacks, sending the output to the MIXOUT output jack. When the Mix control is used for the two envelopes in the Envelator, this control will allow you to create an ADSR:

- Use Envelope 1 in AD mode, Envelope 2 in AR mode.
- The positive outputs of the two envelopes are normalized to the *MIX1* and *MIX2* inputs (as indicated by the 1 and 2 below the in arrows).
- Set the MIX control to the 12 noon position (evenly mixing the two envelopes).
- Both attack stages will affect the attack stage, then the decay stage of Envelope 1 will drop the voltage to the sustaining level (as controlled by the MIX control). When the gate is released, the release stage of Envelope 2 will provide a release stage for the overall envelope shape.
- The *MIXMOD* knob behaves like a normal "sustain" level control, providing voltage control of the sustain level.

Envelope Mode Selection
AR/AD/Cycle [switch] - This switch determines the function of the envelopes. When set to AR, the envelope will act as an AR envelope, maintaining full level until *GATE [in]* goes "low". In AD mode, the envelope acts as an AD envelope, and will begin decay as soon as the attack stage is complete. The *END* output "pulses" when the decay stage is complete, in Cycle mode, this pulse is fed back to the envelope input, and will force the envelope to re-trigger (oscillate). In this mode, the Envelator output functions as a shaped triangle waveform LFO. When in Cycle mode, the *SQR* output acts as a square wave LFO with the pulse width determined by the settings of the *A* and *D* controls. This output can also be used to clock the Wiard Sequantizer. Each envelope is individually switched.

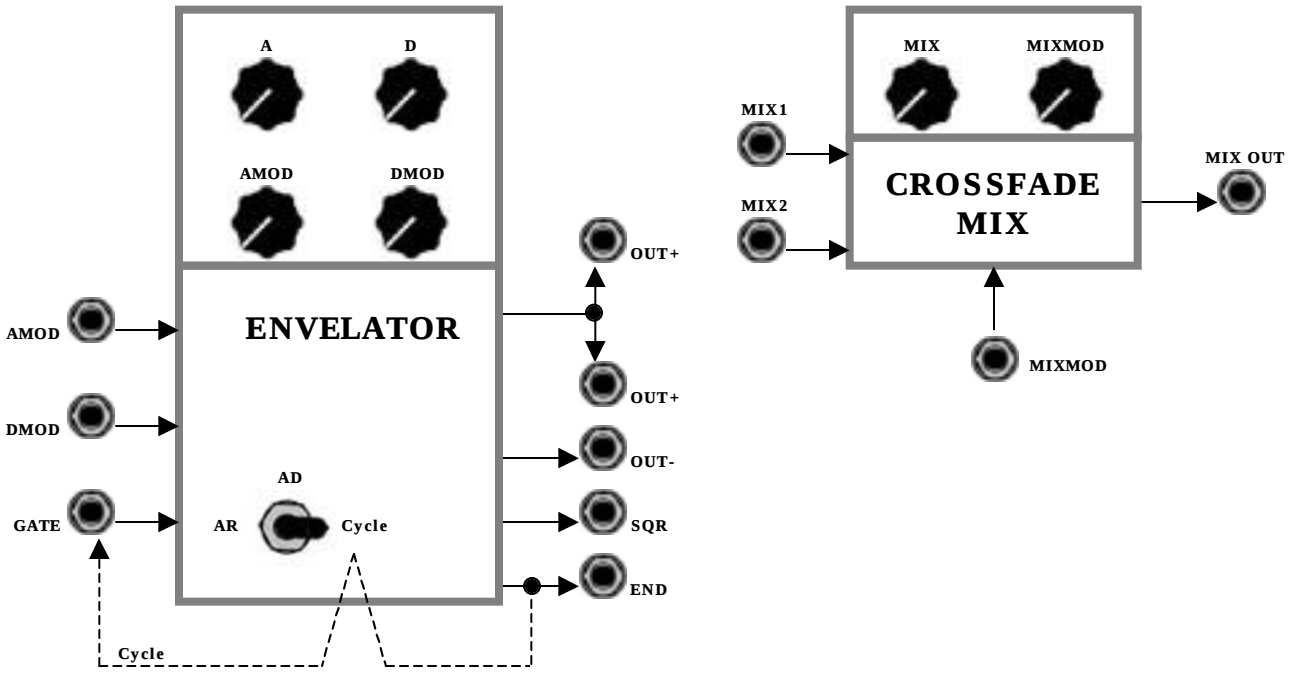


Envelope Trigger and Modulation
AMOD [in] - Voltage control input for Attack rate modulation.
DMOD [in] - Voltage control input for Decay/Release rate modulation.
GATE [in] - The gate or trigger input used to start the envelope function.

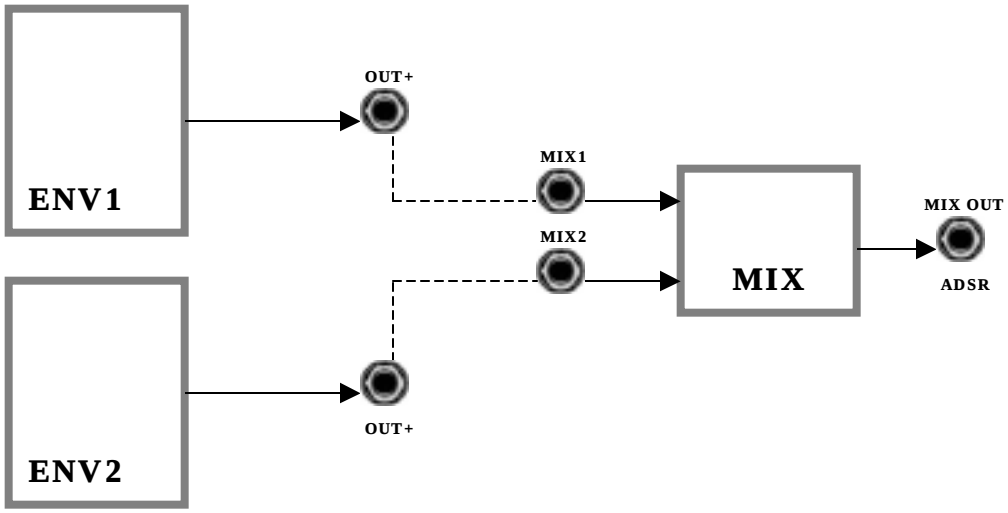
Envelope Outputs
END [out] - When the Decay (or Release) phase of the envelope is complete, a "pulse" is output from this jack.
OUT+ [out] - The positive envelope output.
OUT- [out] - The negative envelope output.
SQR [out] - The output of the trigger latch, where the signal goes high during the attack phase and goes low for the decay portion of the envelope.

Mixer I/O
MIX1 [in] - Input 1 for the Mix function. This input is normalized to the **OUT+** output of Envelator 1.
MIX2 [in] - Input 2 for the Mix function. This input is normalized to the **OUT+** output of Envelator 2.
MIXMOD [in] - An input signal that is added to the MIX control to cross-fade from **MIX1** to **MIX2** input.
MIXOUT/ADSR [out] - The output of the Mix function. This output is normally a mix of the two Envelator positive outputs (ADSR).

Dual Envelator First Order Units



Dual Envelator Second Order Units



Dual Envelator Module Description

The Wiard envelope generator, the Envelator , is a multi-function dual slope linear function generator. The module contains two identical units.

The attack and decay slopes are individually voltage controllable with input attenuators. Each unit outputs the envelope, inverse of the envelope (negative going envelope), a voltage step signal during the attack phase, and a pulse at the end of the decay phase. The gate input has a three position switch which selects: **Attack-Release** where the output remains high as long as the gate is high, **Attack-Decay** where the decay phase begins immediately after the attack phase regardless of the gate level at the gate input. **Cycle** where the gate input is connected to the end pulse which causes the unit to act as an low frequency oscillator (LFO). The LFO extends into the low audio range and has triangle and square outputs. Any triangular or sawtooth shape or pulse width can be adjusted by the attack and decay controls.

The module also contains a DC coupled voltage controlled cross-fader which forms the sustain control when patched as a classic ADSR. It can also be used to mix two modulation sources when patched as two LFOs. The cross-fader will also handle audio signal through the full audio range. This is useful for replicating oscillator waveshapers which cross-fade from a sine wave signal to a waveform with higher harmonic content. An example would be the Buchla Model 258 oscillator.

The Envelator module contains:

- Two Multi-mode envelope generators/oscillators which will work in the low audio range
- A voltage "cross-fader" which will work both for control voltages and audio signals

Dual Envelator Example Patches

Assumptions

- Notation used: MPN (see *Modular Patch Notation (MPN) Explained* for a discussion on MPN)
- Only one module: Envelators.
- Two envelator circuits in a Dual Envelators module: Env1, Env2.

Hello World

Top Envelators
Env1.**Controls**
[(AMOD, DMOD)=7,
A=5, --Attack
D=11, -- Release
AR/AD/CYCLE SWITCH=AR]
Env2.**Controls**
[(AMOD, DMOD)=7,
A=5, --Attack
D=11, --Decay
AR/AD/CYCLE SWITCH=AD]
Controls
[MIXMOD=7,
MIX=12] --Sustain
Connect
[+VC ATTACK -> (Env1.AMOD, Env2.AMOD),
+VC DECAY -> Env2.DMOD,
+VC RELEASE -> Env1.DMOD,
+VC SUSTAIN -> MIXMOD,
KBD.GATE -> (Env1.GATE, Env2.GATE),
MIX OUT -> +VCF and +VCA]

Comment
The classic ADSR attack patch. Both A knobs control the attack. Vary all AMOD and DMOD, and MIXMOD controls for different results.

Single Voice Tone

Top Envelators
Env1.**Controls**
[A=5,
D=12,
AR/AD/CYCLE SWITCH=AR]
Env2.**Controls**
[(AMOD, DMOD)=5,
(A, D)=12,
AR/AD/CYCLE SWITCH=CYCLE]
Controls
[MIXMOD=5,
MIX=7]
Connect
[+DUMMY PLUG -> MIX1,
Env1.SQR -> MIX2, --Optional
Env1.OUT+ -> MIXMOD,
KBD.CV -> (Env2.AMOD, Env2.DMOD),
KBD.GATE -> Env1.GATE,
MIX OUT -> +VCF OR +VCA]

Comment
In this patch, Env2 acts as an oscillator that is controlled by a keyboard pitch, while Env1 is used to control a VCA (using the mixer as a VCA) triggered by a keyboard gate signal. MIXMOD cross-fades from no signal (dummy plug) to the tone produced by Env2, so in effect MIXMOD is acting as a VCA, and the patch as a whole produces a voice. Not keyboard tracking.

Elementary Chaotic System

Top Envelators
Env1.**Controls** and
Env2.**Controls**
[(AMOD, DMOD)=5,
(A, D)=5,
AR/AD/CYCLE SWITCH=Cycle]
Controls
[MIXMOD=7,
MIX=12]
Connect
[Env1.OUT+ -> (Env2.AMOD, Env2.AMOD),
Env2.OUT+ -> (Env1.AMOD, Env1.AMOD),,
MIX OUT -> +VCF OR +VCA]

Comment
Vary all A and D controls for different results.

Alternating LFOs

Top Envelators
Env1.**Controls**
[(AMOD, DMOD)=7,
(A, D)=3,
AR/AD/CYCLE SWITCH=Cycle]
Env2.**Controls**
[(AMOD, DMOD)=7,
(A, D)=12,
AR/AD/CYCLE SWITCH=Cycle]
Controls
[MIXMOD=7,
MIX=12]
Connect
[Env2.OUT+ -> Env1.OUT+,
MIX OUT -> +LFO SIGNAL]

Comment
The output of the LFOs will alternate.

Audio or LFO Synch

Top Envelators
Env1.**Controls** and
Env2.**Controls**
[(A, D)=3,
AR/AD/CYCLE SWITCH=Cycle]
Controls
[MIXMOD=5, --Full on
MIX=7]
Connect
[Env1.SQR -> Env2.SQR,
MIX OUT -> +MON]

Balanced Modulation

Top Envelators
Env1.**Controls** and
Env2.**Controls**
[(A, D)=3,
AR/AD/CYCLE SWITCH=Cycle]
Connect
[Env2.OUT+ -> MIXMOD,

Env1.OUT- -> MIX2,
MIX OUT -> +MON] --Balanced mod out

Comment
Also called Ring Modulation, cross-fades between phase inverted signals. Note that Env1.OUT+ is normalized to MIX1.

Trigger Delay

Top Envelators
Env1.**Controls**
[A=5,
D=11]
Connect
[KBD.GATE -> Env1.GATE,
Env1.END -> Env2.GATE,
Env1.OUT- -> MIX2,
Env2.OUT+ -> +VCF OR +VCA] --Delayed env

Comment
Env1 is used to create a delay before Env2 is triggered. Hence Env1.END triggers Env2.

Pulse Bursts

Top Envelators
Env1.**Controls**
[(AMOD, DMOD)=7,
A=9,
D=5,
AR/AD/CYCLE SWITCH=AD]
Env2.**Controls**
[(AMOD, DMOD)=7,
(A, D)=12,
AR/AD/CYCLE SWITCH=CYCLE]
Controls
[MIXMOD=5,
MIX=7]
Connect
[+DUMMY PLUG -> MIX1,
Env1.SQR -> MIXMOD,
Env2.SQR -> MIX2,
KBD.GATE -> Env1.GATE,
MIX OUT -> +Envelope trigger input] – Pulse Burst

Comment
Used to create roll (>2) or flam (=2) triggers. Env1 creates a square long envelope while Env2 generates short square pulse train, which causes a burst of short pulses (Env2) for the duration of Env1. So Env1 is used to trigger the bursts. Vary Env1.A for different numbers of pulses, and Env2.A for pulse width and Env2.D for pulse spacing.

Quadrature Envelope

Top Envelators
Env1.**Controls** and
Env2.**Controls**
[(A, D)=12,
(AMOD, DMOD)=7,
AR/AD/CYCLE SWITCH=any value]
Controls
[MIXMOD=5,
MIX=7]
Connect
[+DUMMY PLUG -> MIX2,
JOYSTICK.X -> MIX1, --+10v signal
Env1.SQR -> MIXMOD,
MIX OUT -> Env2.GATE, --Inverter
KBD.GATE -> Env1.GATE]

Comment
Env2 starts at the end of Env1's attack phase. In effect, MIX OUT acts as a logic inverter.