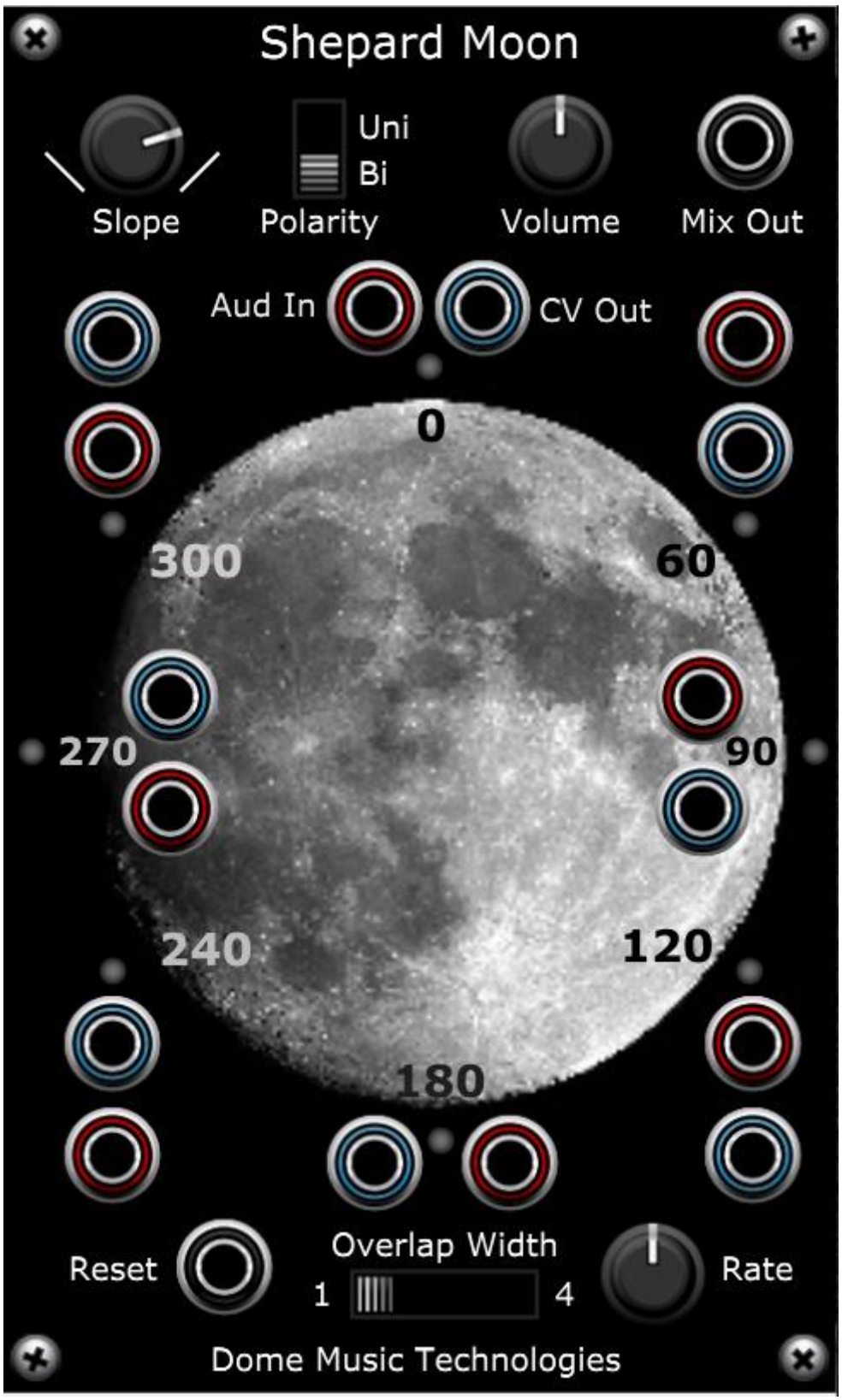
Shepard Moon from Dome Music Technologies



Introduction

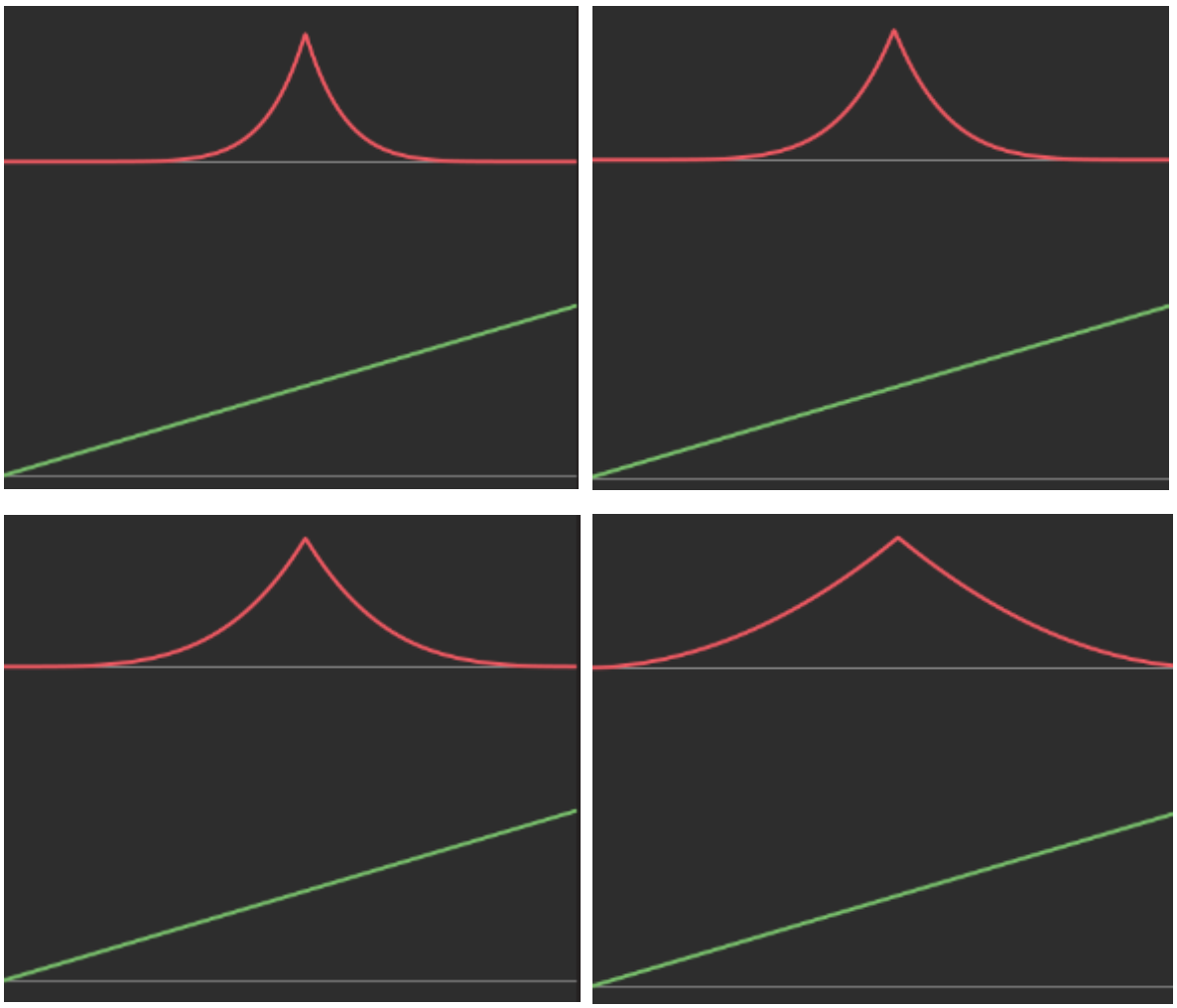
The Shepard Moon module from Dome Music Technologies was initially designed to simplify the construction of 'infinite' patches, such as ascending and descending 'Shepard Tones', and a host of different 'Barber Pole' auditory illusion effects. It is also useful as a simple cross-fading 'audio sequencer'.

The name 'Shepard Moon' is a play on words in three different ways:

1. It refers to Shepard Tones, developed by Roger Shepard.
2. It is a homonym of "Shepherd Moon" (which Enya also used as an album title).
3. A tribute to the astronaut Alan Shepard. He was the first American in space, as part of Project Mercury. He also holds the record for being the oldest human to ever set foot on the Moon, being aged 47 during the Apollo 14 mission.

Overview

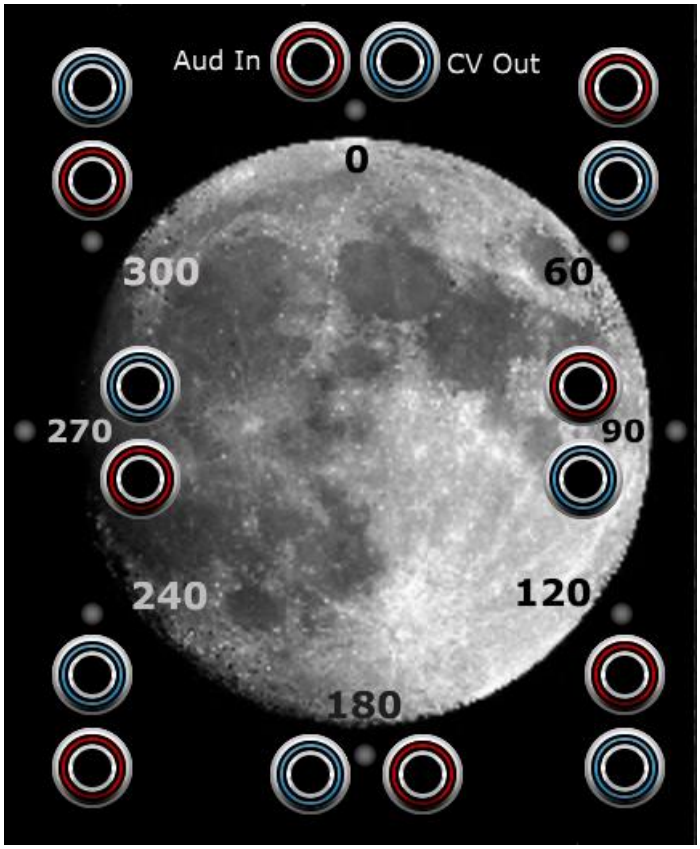
Shepard Moon is made up of several channels of synchronised control voltage ramp waves and automated audio faders. Each channel follows a cycle like this:



Overlap Width = 1 (top left), 2 (top right), 3 (bottom left) and 4 (bottom right).

Red trace = Audio in fader, Green trace = CV out voltage (Unipolar rising slope).

The ‘Moon’ Panel



The main body of the module is populated by the ‘Moon’ Panel. This features an audio input jack, a Control Voltage output jack and a red indicator LED for each channel. Each channel has a fixed 'angle of rotation', which governs the phase of the control voltage output and the audio level of that channel in the final mix. The angles have been chosen to allow equal spacing between channels when using 2, 3, 4 or 6 parallel signal paths:

* 2 signal paths: 0 degrees and 180 degrees.

* 3 signal paths: 0 degrees, 120 degrees and 240 degrees.

* 4 signal paths: 0 degrees, 90 degrees, 180 degrees and 270 degrees.

* 6 signal paths: 0 degrees, 60 degrees, 120 degrees, 180 degrees, 240 degrees and 270 degrees.

Control Voltage (CV Out) Jack

This jack outputs a rising or falling ramp waveform, with direction and intensity controlled by the Slope Knob and the Polarity Switch.

Audio Input Jack

This jack is an input for the return signal from a sound source (like an oscillator) or a sound processor (like a filter or phaser). The audio input is completely muted at the point where the control voltage ramp restarts its cycle. This is the secret behind the ‘endless’ auditory barber-pole illusion.

LED Indicator

The LED Indicator will light up to half-brightness when the overall cycle is in the vicinity of a channel. It will light up to full-brightness when the overall cycle is within +/- 25 degrees of the channel.

Slope Knob and Polarity Switch

These controls determine the direction and intensity of the CV ramp output signals.

Polarity Switch

The Polarity Switch determines if the ramp is bipolar or unipolar. In the “Bi” position, the ramp will vary between +x volts and -x volts, up to a maximum of +/- 6 V. In the “Uni” position, the ramp will vary between 0V and +6V (rising) and between 0V to -6V (falling).

Slope Knob

The Slope Knob has a range of +/- 12. Positive values represent a rising ramp, and negative values represent a falling ramp. The following table shows some useful setting values:

Slope Knob	Polarity Switch	Voltage Range	Suggested Application
+/- 2	Bi	-1 to +1	Two channels (0, 180), with ramps 1V (one octave) apart.
+/- 3	Bi	-1.5 to +1.5	Three channels (0, 120, 240), with ramps 1V (one octave) apart.
+/- 4	Bi	-2 to +2	Four channels (0, 90, 180, 270), with ramps 1V (one octave) apart.
+/- 8	Bi	-4 to +4	Four channels (0, 90, 180, 270), with ramps 2V (two octaves) apart.
+/- 6	Bi	-3 to +3	Six channels (0, 60, 120, 180, 240, 300), with ramps 1V (one octave) apart.
+/- 12	Bi	-6 to +6	Six channels (0, 60, 120, 180, 240, 300), with ramps 2V (two octaves) apart.
+/- 4	Uni	0 to +/- 2	Two channels (0, 180), with ramps 1V (one octave) apart.
+/- 6	Uni	0 to +/- 3	Three channels (0, 120, 240), with ramps 1V (one octave) apart.
+/- 8	Uni	0 to +/- 4	Four channels (0, 90, 180, 270), with ramps 1V (one octave) apart.
+/- 12	Uni	0 to +/- 6	Six channels (0, 60, 120, 180, 240, 300), with ramps 1V (one octave) apart.

Volume Knob and Mix Out Jack

Shepard Moon is a monaural processor. The Mix Out Jack is a mixed signal with the sum of all the attenuated signals from the channel Audio Input Jacks. The Volume control controls the final output level.

Overlap Width Switch

There are four audio fade profiles available on Shepard Moon. The four shapes are shown in the Overview section of this document. Position 1 has the narrowest profile, and fades in and out rapidly as the cycle approaches each channels angle. The profile gets progressively wider as the value increases. At Position 4, the audio signal only fades out completely when the cycle is exactly 180 degrees out-of-phase with the channel's angle. There are no hard-and-fast rules for which Overlap Width setting is appropriate, but a general rule of thumb is that you can afford narrower widths when you are using more channels.

Reset Input Jack

The Reset Input will restart the main cycle at the 0 degrees position (top dead centre). It is activated whenever an input voltage increases from below 2.5 V to above 2.5 V. It is edge-triggered, so the cycle will continue to advance even if the Reset input voltage remains above 2.5V. Reset can be used to synchronise two Shepard Moons together, or if you want to trigger an audio sequence on each key press (by feeding the GATE CV SOURCE signal into it).

Cycle Rate Knob

The Cycle Rate Knob determines how long it takes to execute one full cycle of 360 degrees.

At the 7 o'clock position, a full cycle takes 1,000 seconds to complete (0.001 Hz).

At the 12 0'clock position (default), a full cycle takes 10 seconds to complete (0.1 Hz).

At the 5 0'clock position, a full cycle takes 1/10th of a second to complete (10.0 Hz).

Note that if you are using multiple channels to achieve a smooth 'barber pole' auditory illusion, then the perceived cycle time is divided by the number of active channels. For example, if you were using the six channels at 60 degree increments, then the *duration of the perceived cycle time* would be one sixth of the value set on the Rate Knob. Or, put another way, the *frequency of the perceived cycle rate* will be six times faster than the value set on the Rate Knob.