The tELHARMONIC is a multi-voice, multi-algorithm synthesizer module named for the music hall considered by some to be the location of the first electronic music concerts. It was coded by Tom Erbe, with the goal of presenting three historically important pioneering electronic tone generation techniques less often implemented within the modular synthesizer.

The tELHARMONIC's roots go back further than the advent of electronic music, as it also takes a new approach to handling music theory in the modular context. TONIC, INTERVAL, DEGREE and D-GATE, allow for patch-programming of complex chord progressions, scales, melodies and playing styles. This voltage-controlled music theory guides the algorithms in a unified way, whereas CENTROID, FLUX and H-LOCK sculpt the timbre of each algorithm uniquely, allowing for complex sounds to be created around a unified melodic structure and pattern.

GATE OUT: Outputs a gate signal at each change in **Degree**. DC-coupled. 10V gate. The associated LED provides visual indication of activity.

FM IN: Input for linear frequency modulation of the tELHARMONIC core. Modulates all 3 algorithms (**N Out**, **H Out**, and **P Out**). AC-coupled. Expects maximum signal level of 15Vpp.

N OUT: Output for the single-voice noise algorithm. Pitch is set by the **Tonic** and **Degree**. Bandwidth is set by **Flux**. Does not respond to **Interval**, **Centroid**, or **H-Lock**. AC-coupled. 8Vpp signal.

H OUT: Output for the 3 voices of the harmonic algorithm. Core frequency is set by **Tonic** and **Degree**. The pitch spacing (harmonic relationship of the 3 voices to one another) is set by **Interval** and **Degree**. Timbre of this output is controlled by **Flux**, **Centroid**, and **H-Lock**. AC-coupled. 10Vpp signal.

P OUT: Output for the 3 voices of the phase mod algorithm. Core frequency is set by **Tonic** and **Degree**. The pitch spacing (harmonic relationship of the 3 voices to one another) is set by **Interval** and **Degree**. Timbre of this output is controlled by **Flux** and **Centroid**. Response to Flux is the inverse of that of the **N Out** and **H Out**. Does not respond to **H-Lock**. AC-coupled. 10Vpp signal.

TONIC ROTARY: Adjusts the pitch of all 3 Voices across 6 octaves.

TONIC CV IN: Unity, unquantized 1V/octave pitch control input. Range: 0-6V.

INTERVAL ROTARY: Sets the pitch spacing of the 3 harmonic and phase mod voices to form triads (with 2 inversions), fifths, unison, or octave relationships. Continuously variable, aside from the 2 inversions for triads.

COLOR STAFF: Visual indicator that changes color to display the state of **Interval** and **Degree**. Pulse indicates frequency of the **Tonic**.

DEGREE ROTARY: Quantized note selection, relative to the pitch as defined by **Tonic**. Also determines sonority of the triad, where applicable.

INTERVAL CV ATTENUATOR: Bi-polar attenuator for **Intrvl** CV input.

DEGREE CV ATTENUATOR: Bi-polar attenuator for **Degree** CV input.

INTERVAL CV IN: CV input for **Interval**. Range: 0-5V.

D-Gate IN: Gate input for activation of the **Degree** parameter. Normalled high, so with nothing patched, **Degree** is always active. Requires a clock/gate signal of at least 5V. and width of at least 10ms.

DEGREE CV IN: Quantized CV input for **Degree**. Range: +/- 2V.

H-LOCK BUTTON/LED: With **Flux** greater than 10%, this sets the harmonic selected by the **Centroid** parameter to be locked on. Multiple harmonics may be locked on. LED brightness indicates the number of harmonics locked on. To un-lock Harmonics, set **Flux** to 0% or press and hold the **H-Lock Button** for one second, until the **H-Lock LED** fades off. This parameter only affects the harmonic algorithm. Press and hold for 5 seconds to enter the **Spiratone** mode. Press without holding to return to **Harmonic** mode.

CENTROID ROTARY: This rotary has a different effect on the output: **H Out**- modulates or selects harmonics for emphasis by **Flux** and **H-Lock** parameters. **P Out**- sets the phase modulation ratio. **N Out**- No effect.

FLUX COMBO POT: Unipolar combo rotary. With nothing patched to **Flux CV in**, this functions as a standard panel control. When a control signal is patched to the **Flux CV in**, it functions as an attenuator for that signal, as it is applied to the **Flux** parameter.

Flux has a different effect on the 3 outs: **N Out**- increasing **Flux** focuses the noise around the fundamental, as set by **Tonic** and **Degree**. **H Out**- At 0V (**Flux** fully CCW), all harmonics are equally emphasized. Increasing **Flux** de-emphasizes all harmonics surrounding the Centroid, with the exception of those that are currently locked by **H-Lock**. This de-emphasis has the effect of emphasizing the **Centroid**. **P Out**- **Flux** sets the index of phase modulation — the ratio is set by **Centroid**. The response is inverse to that of the **H Out** and **N Out**. At 0V (**Flux** fully CCW), maximum phase modulation is achieved. Gradually increasing this parameter decreases the index of the phase modulation.

FLUX CV IN: Unipolar CV input for Flux. Range: 0 to +8V.

CENTROID CV ATTENUATOR: Bi-polar attenuator for **Centroid** CV input.

CENTROID CV IN: CV input for **Centroid**. Range: 0-8V.

H-LOCK IN: Gate input for setting harmonics to be locked ON. Requires a clock/gate signal amplitude of at least 5V and a width of at least 10ms.

Composing with tELHARMONIC 101

- The left side of the module allows for patch programming chord progressions, scales, and melodies. It consists of the TONIC, INTERVAL, DEGREE and D-GATE parameters and the visual indication of the Color Staff. Although you will find great detail below about the inner workings in the next section, no knowledge of music theory is required. These parameters respond to cv, just like anything else in your system. Here are some quick pointers:

- Think of Tonic as the main pitch/frequency control, similar to the grey knob on a DPO or STO. It is continuous (not quantized) and responds 1V/Oct.

- Interval sets the spread of the pitch/frequency between voices in the H Out and P Out. There are 3 voices that can be set to triad, fifth, unison, octaves and anywhere in-between. Whatever Interval is selected will be maintained when TONIC is manipulated. Unison (about 3 o'clock) has all 3 voices set to the same note for behavior typical of a VCO.

- Degree adds or subtract up to two octaves from the base frequency set by Tonic. It has a Quantized response and also tracks 1v/Oct. when the DEGREE CV Attenuator is set Full CW. Because DEGREE is a quantized parameter, it has a "musically valid" response to any cv used.

- Whenever Degree changes values, a gate is generated and available for use at the Gate Out.

- The D-Gate Input operates as a Track & Hold for the DEGREE parameter. With nothing patched, D-Gate is held high and DEGREE will always be actively tracking the signal patched to the DEGREE CV IN. With a clock, gate, pulse or trigger patched to D-Gate, the DEGREE parameter will only track the signal patched to DEGREE CV IN while the D-Gate is held high.