THE HARVESTMAN

DIGITAL AUDIO ELECTRONICS

MODEL 9791 "HERTZ DONUT" OPERATOR'S MANUAL

Dual DIgital Oscillator with Internal Modulation Bus


HERTZ DONUT !!!
FREQUENCY
TRACKING
BAD
WORSE
STUPID
SYNC
WAVEFORM DISCONTINUITY
LO
HI
FREQUENCY
SYNC
DESTINATION
AMP
SHAPE
FREQ
MODULATION INDEX
PRIMARY
MOD
THE HARVESTMAN MODEL 979 · SEATTLE, WASHINGTON USA

THE HARVESTMAN-9791
"HERTZ DONUT"
USER'S MANUAL

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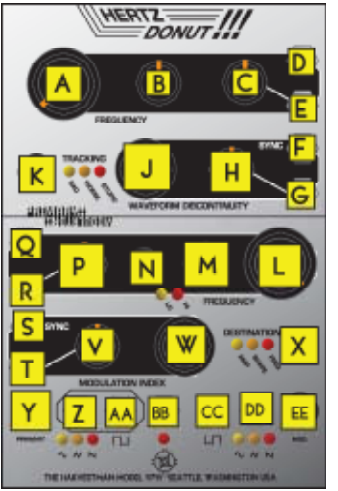

A Primary Osc Coarse Tune
Controls the Primary oscillator frequency. Acts as offset when control voltage is applied to D.

B Primary Osc fine tune

C Primary FM Attenuator - see E

D Tuned Primary CV input
Accepts a 1v/octave control signal. †
E Primary Linear FM input
Linear thru-zero frequency modulation of the Primary oscillator. ‡

F Primary Sync input
Restarts Primary waveform on receipt of a rising edge.

G Waveform Discontinuity CV input *

H Waveform Discontinuity CV Attenuator - see J

J Waveform Discontinuity manual control
Distorts the Primary Oscillator's waveform. Also acts as offset for input G.

K Tracking behavior button
Determines how quickly the Modulation oscillator follows the Primary. Selected behavior is shown on nearby LEDs.

L Modulation Osc Coarse Tune
Controls the Modulation oscillator frequency. Acts as offset when control voltage is applied to Q.

M Modulator Osc fine tune

N Modulator Frequency Range
Selects a high (audio) or low (LFO) range. When Tracking is enabled it selects alternate time constants or operation modes.

P Modulator FM Attenuator - see Q

Q Tuned Modulator CV input
Accepts a 1v/octave control signal. †

R Primary Linear FM input
Linear thru-zero frequency modulation of the Modulator oscillator. ‡

S Modulator Sync input
Restarts Modulator waveform on receipt of a rising edge.

T Modulation Index CV input *

V Modulation Index CV Attenuator - see W

W Modulation Index Manual Control
Applies the Modulator Osc waveform to the parameters selected by button X.

Y Primary Waveform Selector
Selects Primary Osc waveform (shown on LED) to be output from jack Z. When held down for a brief period of time it will enable FM input E. While the input is active pressing this button will switch the FM mode between linear and exponential.

Z Primary Waveform output
+/- 5V waveform output for Primary Osc.

AA Primary Square Wave output
Dedicated square wave/PWM output for Primary Osc.

BB Gate Output
Normally produces the XOR of the square outputs (0-5V), also generates gates when Tracking is enabled.

CC Modulator Square Wave output
Dedicated square wave/PWM output for Modulator Osc.

DD Modulator Waveform output
+/- 5V waveform output for Modulator Osc.

EE Modulator Waveform Selector
Selects Modulator Osc waveform (shown on LED) to be output from jack DD.When held down for a brief period of time it will enable FM input R. While the input is active pressing this button will switch the FM mode between linear and exponential.

* Inputs G, T expect a 0-5V control voltage. Values out of this range may cause mild undefined behavior. Use those manual knobs and attenuators!

† Inputs D, Q expect a 0-10V control voltage. Values out of this range may cause mild undefined behavior. Use those manual knobs and attenuators!

‡ Inputs E, R expect a +/-5V audio signal in linear mode, 0-5V in expo mode.

Introduction

The Hertz Donut is a dual digital oscillator with an internal modulation bus and voltage-controlled waveshaping. Each half of the module can independently track 1v/octave, receive linear thru-zero FM, hard sync, and output four different waveforms over two outputs. The user interface features momentary tactile switches for switching modes, with LED indicators showing most onboard states.

Configuration

The Hertz Donut occupies 17HP of rack space and requires a "Eurorack"-style power distribution board. When connecting the power cable to your enclosure, orient the red band of the module's power cable to point towards the -12V power rail. If you experience difficulty with the module's odd front panel measurement, you may solve this by adding another odd-measured Harvestman module to the system.

Features

Oscillators

The Primary Oscillator features inputs and controls for tuned CV (1v/octave), sync, external FM, and waveform discontinuity. It features a dedicated square wave output as well as a selectable waveform output, switchable between Sine, Triangle, and Saw-tooth. The Modulation Oscillator behaves much like the Primary, but it is missing a facility for modulating the waveform discontinuity.

The external FM inputs must be manually activated before use. Briefly hold the desired Oscillator's waveform button to enable the external FM input. The LEDs should all switch off - exponential FM is now active. Press the button again to switch to linear thru-zero FM (all LEDs lit). This mode contains objectively superior sidebands, but also includes some jitter at low modulation indices that may be offensive to some users.

Waveform Discontinuity

This function allows modification of the waveforms on the Primary side. Timbral evolutions are easily achieved here.

● Sine: The center of the waveform twists around and expands outwards. It then tries to go back where it came from.
● Triangle: The slopes grow branches and foliage, with several large discontinuities over the sweep of the control.
● Saw: The center of the waveform twists around and expands outwards.

The dedicated square wave output undergoes classic "pulse width modulation" effects when this control is touched.

Modulation bus

The waveform output of the Modulation Oscillator can be used to internally modulate parameters of the Primary Oscillator, without patchcords getting in the way of your hands. The index is manual or voltage controlled, and acts on all selected destinations. Any combination of three destinations are possible.

● - Frequency modulation - Internal thru-zero linear FM with a high index.

● - Waveform discontinuity modulation - Acts over a range of the discontinuity sweep. Use with the manual discontinuity control for more extreme effects.

● - Amplitude modulation - modulates the master amplitude of the Primary's selectable waveform output. The index control acts as a volume control for the upper and lower sidebands.

Modulator tracking

When activated, the frequency of the Modulation oscillator will attempt to follow that of the Primary, with varying degrees of success. The modulation frequency range controls are disabled or assigned alternate functions in these modes.

● - Bad mode:

The Primary Frequency control (and CV input) have a slight delay in "catching up" to new values, which are passed on to the Modulation Oscillator frequency control. This is not very noticeable unless large jumps in CV input are made, or if you assign the modulation oscillator to modulate the primary's frequency. In this FM feedback loop you will experience strange chaotic behaviors that are nicely experienced by listening to the Primary with some waveform discontinuity. Or, use the modulator output to modulate

some other module.

In this mode, the Modulation oscillator manual frequency controls (and CV input) cause an offset from the frequency of the primary osc. If you set the knobs at 12 noon, you will be be near the true primary frequency. Turn the knob in either direction to achieve a positive or negative offset. Now, change the primary frequency and the modulator will follow with this offset, useful for double-stops, octaves, etc.

The gate output of the module goes HIGH when the module has locked onto its destination pitch.

● - Worse mode:

Like the Bad mode, but with a longer convergence time and larger skips. Generates arpeggios from beyond when too much FM feedback is applied.

● - Stupid mode:

The primary oscillator is unaware of how to find its new frequency, so it searches for one and often fails. The Modulation oscillator frequency control lets you choose the time between search updates. Listen to it for long enough and you might start hearing things.

● ● Each of the previous three tracking modes can be extended by pushing the modulation frequency button. This enables shorter time constants or longer searches, depending on the mode.

● ● ● - Good mode:

The modulation oscillator tracks the primary without trouble. The pitch offset is easily tuned by turning the Modulation Frequency controls while watching the gate output LED: unison and octaves will show a slowing of the pulsing light. The gate output features the usual XOR “ringmod” of the square outputs.

● ● Phase offset mode: Push the modulation frequency range button while Good mode is active. Both LEDs should light up. Now, the modulation oscillator output is a strict copy of the Primary’s, but with its waveform shifted 90 degrees forward.

Calibration

Connect the square wave output of either oscillator to a frequency counter or tuner. Turn the manual frequency control all the way down, and adjust the fine tuner until you have 20 Hz. Connect a quantized voltage source (1v/oct) or MIDI-CV interface to that side's tuned CV input. Increase the CV input by several octaves. Double the 20Hz figure for every octave you move, for example, 4 octaves up would result in a frequency of 320Hz. Turn the trimmer on the side of the module corresponding to the oscillator you're listening to. Adjust until the tuner displays the desired frequency.

Calibrate the other half of the module if necessary.

* Don't play with the trimmers or disassemble the module unless you absolutely have to. The guardian will eat you for breakfast if you disturb his beauty sleep.

Warranty

Repairs resulting from a defect of the device or its construction process shall be covered for two years after manufacture, with customer paying transit costs.

Device dysfunction resulting from incorrect power supply voltages, backwards power cable connection, attempted reverse-engineering or decoding of intellectual property, abusive performance, fluid encroachment, or out-of-specification voltage input is not covered by this warranty, and normal service rates will apply.

The Harvestman implies and accepts no responsibility for undesirable harm to person or apparatus caused through operation of this device.

The Harvestman reserves the right to change specifications at any time.

Get in contact!

The Harvestman Digital Audio Electronics
Sebastian Jaeger
sebastian@theharvestman.org
http://www.theharvestman.org
+1 734 260 5801