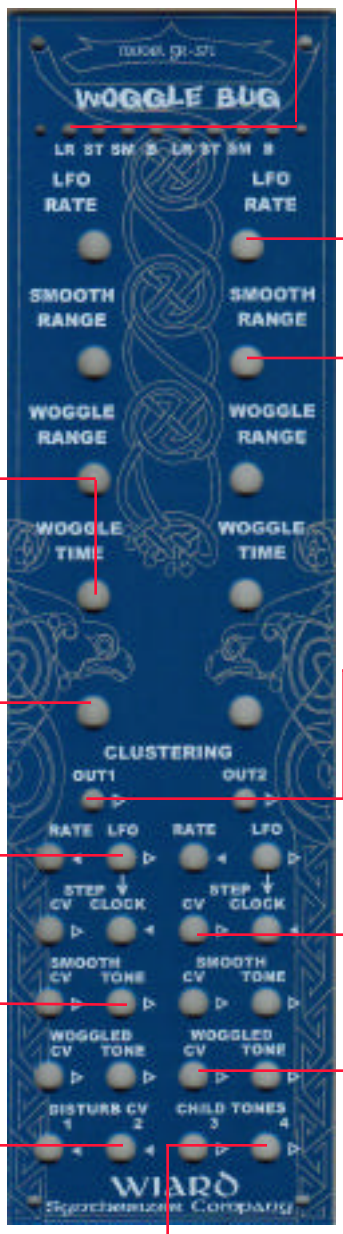
Wiard GR-371 Woggle Bug

Rev: 031001

Woggle Bug	Two circuits - WOG1, WOG2	
	Generator	Processor
Audio	Out1, Out2 Smooth Tone Woggle Tone Child Tones	None
Control Voltage	Step CV Smooth CV Woggled CV LFO (SQR)	None

LEDs
LR (LFO Rate) Green, lit when *LFO [out]* is at 10v.
ST (Stepped Voltage) Red/orange, indicates voltage at *STEPPED CV [out]*.
SM (Smooth Voltage) Red/orange, indicates voltage at *SMOOTH CV [out]*
B (Bug Light) Yellow, indicates audio pulse rates at OUT1 [out] and OUT2 [out]



LFO Control
LFO RATE [knob] Value added to voltage at *RATE [in]*, controls LFO rate linearly (1 cycle / 20 sec to 50 cycles / sec). Sets rate of change of SMOOTH out tone and CV.

Oscillator Range
SMOOTH RANGE [knob] Sets the range of SMOOTH TONE out (1-6 octaves).

Woggle Control
WOGGLE RANGE [knob] Sets the range of *WOOGLED TONE [out]* (1-6 octaves).
WOGGLE TIME [knob] Sets the lock in time of the woggle oscillator phase locked loop. The B lamp is off when the woggle PLL is in lock.

Step and Tone Range Setting
CLUSTERING [knob] Sets the range of probable values for the *STEP CV [out]*. At minimum, equal probability of voltage from 0 – 10 V at *STEP CV [out]*. At maximum, limits change to next value - samples tend to cluster.

Main Output Section
OUT1, **OUT2** [out] Primary audio outs for the Woggle Bugs. Audio is output when B LED is lit.

LFO Section
RATE [in] 0-10v added to *LFO RATE* to vary LFO rate from 0.05-50 Hz.
LFO [out] 0-10v square wave from 0.05-50 Hz.

Stepped Output
STEP CV [out] 0 – 10V stepped random voltage. A new voltage is selected at each positive going clock pulse at *STEP CLOCK [in]*.
STEP CLOCK [in] New voltage selected each time a positive clock pulse crosses 1.5V. Normalized to *LFO [out]*.

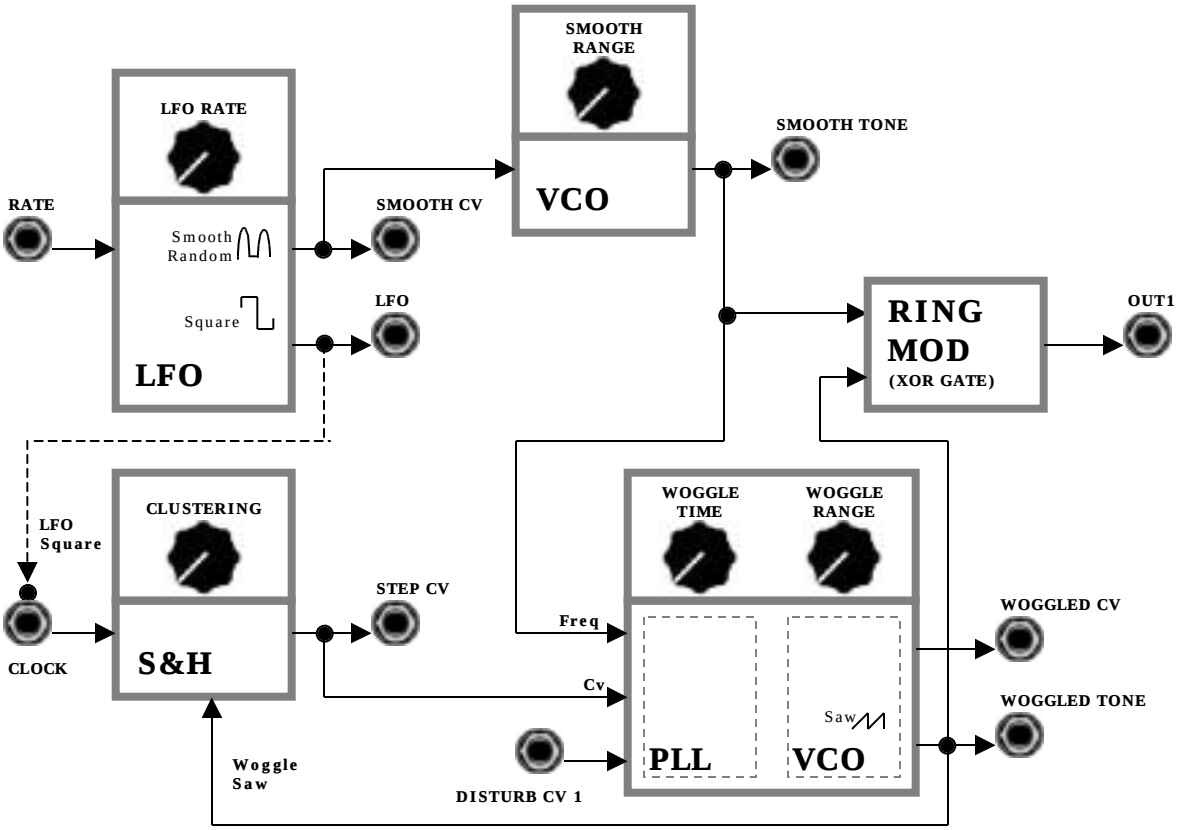
Smooth Output
SMOOTH CV [out] 0-8v smooth random voltage. Probable rate of change set by *LFO RATE* knob added with *RATE [in]*.
SMOOTH TONE [out] 0-10v audio rate square wave, the frequency range of which is set by the *SMOOTH RANGE* knob.

Woggled Output
WOGGLED CV [out] 0 – 8V product of the smooth and stepped random voltages. The demodulated output of a phase locked loop frequency modulation detector tracking the smooth tone and being disturbed by the step control voltage. PLL loop lock-in time is set by *WOGGLE TIME* knob. When the PLL is in lock, the B LED is off.
WOGGLED TONE [out] 0 – 10V audio rate square wave, the frequency range of which is set by the *WOGGLE RANGE* knob.

Woggle PLL/VCO Disturb CV Inputs
DISTURB CV 1, DISTURB CV 2 [in] 0-10v control voltage added to *STEP CV* out at the *WOGGLE TONE* in. *WOGGLE RANGE* knob must be set to less than maximum for this input to work, 1 goes to left Woggle Bug and 2 goes to right.

Child Tone Outputs
Child tones are the XOR (ring mod) product of the two Woggle Bug parents.
CHILD TONES 3 [out] – 0 – 10V pulse wave which is the audio XOR product of the *SMOOTH TONE [out]* of each Woggle Bug. Sound changed by both SMOOTH TONE controls.
CHILD TONES 4 [out] – 0 – 10V pulse wave which is the audio rate XOR product of the *WOGGLE TONE [outs]* of each Woggle Bug. Sound affected by all 10 knobs.

Woggle Bug First Order Units



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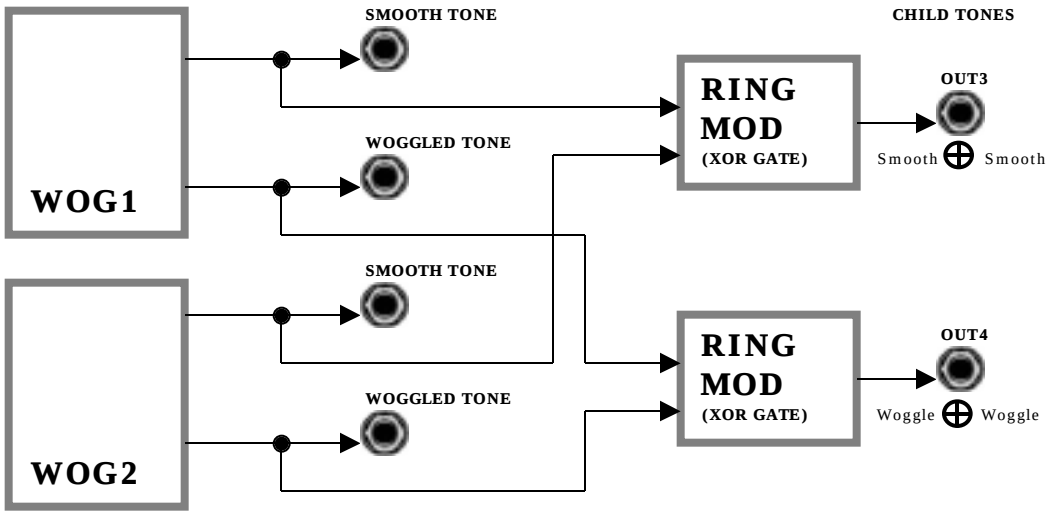

Woggle Bug Module Description

The newest module in the Wiard system is the *Woggle Bug*. The Woggle Bug is an utterly unique module that produces complex random voltages and tones. It reproduces the set of random voltages available from the original Buchla Model 265 "Source of Uncertainty" module. This long out of production module is representative of the most musical random voltage generators produced in the first "Golden Age" of modular synthesizers. The design has been enhanced with the addition of 4 audio rate oscillators and 4 XOR gates which produce the effect of ring modulation or “klang” tones.

The Woggle Bug adds 4 permanently coupled audio VCOs to the random voltage outputs. Through a design trick, the single mechanical module contains the equivalent functionality of **18** electrical modules. Obviously, all the patch points cannot be brought out to the front panel.

From a philosophical perspective, the Woggle Bug was designed to “replace” the control voltages produced by a keyboard during performance. Thus the Woggle Bug replaces the output signals generated by modulation wheels, key CV, and gate with smooth, stepped, and stepped plus LFO control signals (respectively), generated by the module.

The modules are permanently patched into a unique arrangement of two identical "Woggle Bugs" and their "Child Tones". Each Woggle Bug has 3 control voltage inputs, 4 control voltage outputs and 5 audio outputs. Child tones are the ring modulated outputs of the two Woggle Bug "parents".

The control voltage outputs are the reason for the module and correspond to the more traditional sample and hold units with lag processors as found in other modulars. The module produces stepped, smoothed (lag processed) and "woggled" (stepped voltages with decaying sinusoids at the edges) control voltages in the range of 0 to 10 volts. These voltages are usable with any other brand of voltage controlled modular. The audio tones are essentially a "free" add-on due to the design trick. The smooth voltages are produced by cascaded lag processors which produce a "very" smooth voltage that produces natural sounding wind and surf patches.

The module as a whole produces 8 simultaneously available electronic tonalities. The tonalities are deliberately very raw in nature. Part of the 1950's sound is the simple square and sawtooth waveforms output by electronic test equipment. Mixed together and put through a tape delay, well, you'll be doing battle with your Id monster in no time! Certain sets of tones are reminiscent of the “cybernetic circuitry” used to produce the electronic tonalities for the movie “Forbidden Planet”. The module is produced with fine “Cold War” silicon which is thematically consistent with a tribute to 50s and 60s electronic music.

This applies to only some settings of the 10 controls and some of the 8 outputs. Other settings produce the sound of very large insects, or swarms of large insects. It **can not** make keyboard sounds and **can not** be controlled by a keyboard. Hooray!

Each Woggle Bug purchaser gets a free lifetime membership in "The Loyal Order of the Woggle Bug", an imaginary fraternal order with the privilege of displaying this fine emblem upon your Fez.

There are two circuits in the module, see block diagram below.

The **Woggle Bug** module contains:

- 2 Voltage Controlled Low Frequency Oscillators
- 4 Sample and Hold Units
- 4 Lag Processors
- 4 Audio Rate Voltage Controlled Oscillators
- 4 Balanced Modulators ("ring modulators")

Or the contents of a somewhat large modular, in a single module size, for the price of a single module!

The Woggle Bug is useful both as an alien sound source and as a source of random voltages for aleatoric composition and to add automatic articulation to static sequencer and keyboard patches. The STEP CV out is most musical when quantized with a Mini-Wave in 0-10 volt range. The CLUSTERING knob will limit step-to-step excursions inside the 5 octave quantization range of the Mini-Wave.

Woggle Bug Example Patches

Assumptions

- Notation used: MPN (see *Modular Patch Notation (MPN) Explained* for a discussion on MPN)
- Only one module: WoggleBug.
- Two woggle circuits in a Woggle Bug module: WOG1, WOG2.

Hello World

Top Wog2
Controls
[(LFO RATE, WOGGLE TIME)=9,
(SMOOTH RANGE, WOGGLE RANGE)=5,
CLUSTERING=7]
Connect
[OUT2 -> +MON]

Comment
Good starting point for experiments. Adjust the knobs and note their effect on the tone. It is recommended that you listen to the tonalities with and without delay effects.

Tone Shaping

Top Woggle Bug
Wog1.**Controls**
[(LFO RATE, CLUSTERING)=7,
(SMOOTH RANGE, WOGGLE RANGE, WOGGLE TIME)=5]
Wog2.**Controls**
[(LFO RATE, WOGGLE TIME)=9,
(SMOOTH RANGE, WOGGLE RANGE)=5,
CLUSTERING=7]
Connect
[CHILD TONES 4 -> +MON]

Comment
All controls will affect tone.

Disturbing the Oscillator

Top Woggle Bug
Wog1.**Controls**
[LFO RATE=12]
Wog2.**Controls**
[(LFO RATE, WOGGLE TIME)=9,
(SMOOTH RANGE, WOGGLE RANGE)=12,
CLUSTERING=7]
Connect
[Wog1.LFO -> Wog2.DISTURB CV 2,
Wog2.OUT2 -> +MON]

Self Modulation

Top Wog2
Controls
[(LFO RATE, CLUSTERING)=7,
(SMOOTH RANGE, WOGGLE RANGE)=5,
WOGGLE TIME=9]
Connect
[STEP CV -> RATE,
OUT2 -> +MON]

Comment
Self-modulating its own clock, random voltages at random times. An external attenuator (such as the VCA on a Wiard Classic VCO module) will be useful to control the range of time variation. Patch *STEPPED CV [out]* to *+ATTENUATOR [in]*, and *+ATTENUATOR [out]* to *RATE [in]*.

Fast Disturbance

Top Woggle Bug
Wog1.**Controls**
[LFO RATE=9]
Wog2.**Controls**
[(LFO RATE, CLUSTERING)=7,
(SMOOTH RANGE, WOGGLE RANGE)=5,
WOGGLE TIME=9]
Connect
[Wog1.LFO -> Wog2.CLOCK,
Wog2.OUT2 -> +MON]

Comment
Slow smooth tone with fast disturbance. Smooth and stepped CV clocked at different rates.

More Disturbing the Oscillator

Top Woggle Bug
Wog1.**Controls**
[(LFO RATE, SMOOTH RANGE)=5,
WOGGLE RANGE=12,
WOGGLE TIME=9,
CLUSTERING=7]
Wog2.**Controls**
[(LFO RATE, WOGGLE TIME)=9,
(SMOOTH RANGE, WOGGLE RANGE)=12,
CLUSTERING=7]
Connect
[Wog1.WOGGLED CV -> Wog2.DISTURB CV 2,
Wog2.OUT2 -> +MON]

Experimental Suggestions

- The two smooth CV outputs when run to filter frequency (FC1) and bandwidth (QMOD) produce natural sounding wind and surf when the filter is processing white or pink noise.
- The WOGGLED TONE output can directly drive a Mini-Wave in the 0-10v range, this will give 256 waveforms to "woggle". It is also useful as a FM modulation source for klangorous sequencer patches.
- The DISTURB CV inputs will accept audio rate signals and produce klangorous FM directly at the WOGGLE TONE outputs.
- The OUT1 and OUT2 signals can be patched to an envelope follower to produce interesting DC envelopes for other tones. The ATTACK-RELEASE envelopes in the Classic VCO and Waveform City will act as envelope followers with fast attack and medium decay settings.