

Speak & Glitch GND-1 User manual

(Rev 1.14 January 21, 2023)

Key points

- Faithful emulation of the *classic vintage Speak and Spell* speech chip
- Digitally *circuit bent* and capable of so much more than in hardware
- Synthesis: formant / vowel / glottal / speech / rhythm / groove / circuit bent / glitch / complex oscillator
- Expansive / feature rich / sophisticated / deep architecture allows you to *get inside the speech synthesis chip* and explore this highly unique synthesiser. (This ain't your dad's spelling machine)
- *Over 100 real time parameters*
- *Complete standalone control* of all parameters.
- *MIDI control of all parameters* via USB and/or 5-pin DIN
- *Syncs to MIDI Clock* with highly unique, individually configurable PPQN scalars for tempo, drum rate, LFO speed and loop length.
- Powerful Expression Matrix* with *all parameters as destinations*
- *Unique modulation architecture* for key parameters and expression Matrix
- *Automation* capabilities that enable parameters to *drift and mutate patches*, and *morph between patches*
- Explore *circuit bending* and *controllable chaos* like never before
- Extensive *randomisation* (with undo) possibilities
- Advanced / sophisticated and dynamic *MIDI Rhythm generator that improvises new grooves* along with the speech synthesis engine
- *Audio rate modulation* of amplitude, pitch and filter
- Store up to *1000 presets* with seamless preset switching and *morphing*
- *Stereo* audio output
- *Touch Sensor and rotary encoder* assignable to expression matrix

The following pages provide a short guide to using the GND-1 and a summary of commands and parameters. Further information is provided in the appendices and user manual.

* The GND-1 **expression matrix** specifies how strongly every GND-1 parameter responds to controllers such as modwheel, note-on velocity, breath control, aftertouch, and the internal expression LFO, as well as MIDI-note number, and both the rotary encoder and touch sensor built into the GND-1.

1. GND-1 (Glitch 'n Drum) Quick start guide

- **The GND-1 can be powered from 5V USB power sources using a standard USB-B cable.** After power up the display shows a single preset number describing the bank (100s digit) and patch number (0—99). In total 1000 user patches can be stored in 10 banks.



FIG. 1 GND-1 Controls and connections

Play/Run briefly press the L (run) button. Press again to stop. Connect an external MIDI keyboard/controller to activate MIDI notes (on MIDI channel 1 by default).

Select patch hold down the L button and rotate the encoder. Touching the touch sensor at the same time allows you to 'skip over' patches while scrolling rather than play sequential patches.

Select bank number hold the L button and click the encoder (BANK appears in the display), rotate the encoder. Click the encoder again with the L button still down, or briefly release the L button to go back to changing patch number.

Switch to parameter edit mode click the encoder button. All parameter editing requires only the use of the encoder.

For editing, parameters are divided into three groups labelled Tempo, Pitch, and Loop Length ([see table 1](#)). The group is selected using the 3-way switch.

Edit a parameter scroll to its position within its group, and click the encoder. The display shows a * before the parameter value. Use the encoder to change the value and click to exit. Some parameters have double-click extension options (see table 1 and section 3).

Switch back to patch number display (from edit mode) hold down the L button until the patch number shows.

Select Steady Pitch mode switch to edit mode, scroll to the Pitch parameter, and double click to activate the Steady Pitch extension that imposes A-440Hz tuning on the GND-1 when Pitch is set to 80, and Tune is set to 64 (see section 2/3).

Randomize parameters use two quick R button presses. Choose drums, loop only, or synth+loop randomization by setting the switch in the up, middle, or down position, respectively.

Undo the last randomization hold the L button and use two quick R button presses. This also resets Auto drift if active.

Revert to last saved values use two quick L button presses

Mute (unmute) the Drum triggers hold the L button and tap the touch sensor. The display shows "D off" (or "D on") By default, drums are enabled on power on. Drums remain muted until toggled back on, even if a new patch is loaded.

Drum source, Drum rate, and Drum Volume. It is also essential that the MIDI drum notes are defined in the GND-1's three drum maps. Drum map selection can be automatically varied using the drum map sensitivity parameter.

Use the encoder for expression ensure the GND-1 is in patch display mode. By default, the encoder acts like a modwheel and affects parameters using the modwheel section of the expression matrix. To change its assignment to breath control or aftertouch, hold down the encoder button during power-up (when plugging in the USB cable).

Use the touch sensor for expression with the GND-1 in any mode. By default, the touch sensor affects parameters using the breath control expression matrix. To change it to modwheel or aftertouch, hold down the L button during power-up.

Use MIDI note number for expression assign MIDI notes to the modwheel, breath control, or aftertouch expression matrix, hold down the R button during power-up.

Assign a parameter in the expression matrix in edit mode, scroll to the parameter and hold the encoder button down until the expression dialog appears. Rotate the encoder and click on one of the five available expression controllers, modwheel, velocity, breath control, aftertouch, or expression LFO (XP LFO). Dial in the scaling factor that sets the response strength of the parameter to the controller. Click to finalize, or use a long press to null the scaling factor.

Set the MIDI receive channel hold down both L and R buttons during power-up. A dialog appears to select the channel using the encoder. Click the encoder to complete selection.

Send GND-1 patches to an external device ensure the GND-1 is in parameter edit mode and the switch is in the down position. Three quick presses of the right button starts the Sysex transfer of all patches. To send just the current patch, do the same but with the switch in the up position. Sysex patch data are sent both via USB and the 5-pin DIN output sockets.

Receive GND-1 patches from an external device no action is needed on the GND-1 to receive single patches or complete Sysex dumps. It automatically responds to valid GND-1 Sysex files sent to it. Sysex data can be received using both USB and 5-pin DIN input sockets.

Configure MIDI thru connectivity hold down all three L + R + encoder buttons during power-up. A dialog appears to configure MIDI thru between USB and DIN connectors. The six options include: Off, USB->DIN, DIN->USB, DIN in -> DIN out, DIN in -> USB + DIN out, and All connections.

AUTO drift parameters hold the L button and briefly press the R. The audio starts if not already running, the audio LED turns red and the display shows "AUTO". Repeat to suspend/continue Auto. Use the Auto depth parameter to limit the extent of the Auto drift. Use Randomize-undo or adjust AUTO depth to 0 to reinstate undrifted parameters, or Revert to the last saved ones.

MORPH from one patch to another run the audio for the starting patch. Make sure the 3-way switch is not in the middle (Freeze) position. Hold the R button and turn the encoder to select the target patch. Release the R button to start the morph. The audio LED turns red. The display shows approximate morphing progress from > to >>>>. Press the R button to pause/continue. When complete, the audio Led turns green.

Auto MORPH between multiple patches in a block Make sure the 3-way switch is not in the middle (Freeze) position. Set the start of the block using patch select. Hold the R button and briefly press the L. The audio starts if not already running, and the audio LED turns red. The display shows approximate morphing progress from > to >>>>. Once the new target is reached, the display shows WAIT time progress (until the next auto morph) from = to =====. Press the R button to pause/continue at any point in the cycle. Morph time, wait time, number of patches in a block, and morphing mode can be set using the set morphing parameters dialogue (see below).

Set morphing parameters Hold the R button and briefly press the encoder. A dialog appears that lets you scroll between four morph control parameters, MORPH time, WAIT time (between auto morphs), NUM P the number of patches in an auto-morph block, and MODE. See section 6 for details. To alter a parameter, click the encoder when scrolling. An * symbol appears to indicate changes can be made. Value changes apply immediately without having to click to apply. Pressing L or R retains the value change, or clicking the encoder after changing the value saves the value as the power up default.

Table 1. Stand-alone Parameter Edit Mode lists (see section 2 for further details)

TEMPO LIST	PITCH LIST	LOOP LENG LIST
• Tempo (speech rate)	• Pitch	• Loop length
• T mod	• Pitch mod	• LPleng mod
• LFO1 rate	Pitch mod mix	• LP mod mix
• LFO2 rate	Pitch mod1 wav	• LP mod1 wav
• SLFO (slow) LFO rate	Pitch mod2 wav	• LP mod2 wav
Cross mod (LFO1, LFO2, SLFO)	XPLFO mod mix	• MFO rate
• CLFO (chaos) LFO rate	• XPLFO THRESHOLD	MFO fine tune
AUTO rate	Osc wav	MFO wave shape
AUTO depth	Brightness	• MFO offset
• Tempo clk PPQN	Brightness mod	• Amplitude MFO mod
• LFO1 & 2 clk PPQN	Brightness mod mix	Pitch MFO mod
• Loop Length clk PPQN	Drive	Filter MFO mod
• Drum rate clk PPQN	• Fiilter	• MFO depth mod
• Drum map	Filter mod	MFO depth mod mix
Drum map sens	Filter mod mix	Word Bank select
Drum trigger source	Filter mod1 wav	• Word select
Drum trigger sens	Filter mod2 wav	• Glitch Bend
• Drum trigger mod	• High Freq Cut (LPF)	Glitch Bend mod
Drum trigger mod mix	Tune	• Gravity Bend
• Drum rate	Portamento	Gravity Bend mod
• Drum rate mod	Pitch Bend Up range	• Plasma Bend
D rate+pattern mod mix	Pitch Bend Down range	Plasma Bend mod
Drum pattern	Phase Stereo	Flux Bend
Drum pattern mod	Filter Stereo	Flux Bend mod
• Drum randomize	Bend Stereo	Warp Bend
Drum mod1 wav	Bend Stereo mod	Warp Bend mod
Drum mod2 wav	• Attack	Bend mod mix
Drum vel out variation	Hold	Bend mod1 wav
Drums Volume (MIDI)	Decay	Bend mod2 wav
Synth Volume (audio)	• Sustain	• M (multi) mod depth
Synth Amplitude Env depth	Release	M mix
	• Freeze XP Threshold	M mod1 wav
		M mod2 wav

Extension options are available by double clicking the encoder for any of the dotted parameters. A full listing of the options is provided in section 3. Key extensions include: **Tempo, LFO1 rate, LFO2 rate, SLFO, and CLFO** enable (or disable) envelope triggers at the associated rate.

Drum map calls up a dialog to change the MIDI drum notes sent out by the Rhythm generator.

Pitch enables the Steady-Pitch mode to facilitate tuning and use steady pitch contours

Attack, or Loop length enable envelope triggers or reset the loop for subsequent key-down events if a key is already down. The Attack extension has an additional option (double click again) that causes the envelope to be set to 0 rather than starting the attack from the last envelope value.

LP mod1 wav and LP mod2 wav enable loop-sync LFO mode for LFO 1 and LFO2, respectively

2. GND-1 Parameter Glossary

Parameters in table 1 that are not self-explanatory are described here. The modulation terms mod, mix, and wav are described in section 4.

Tempo (speech rate) refers here to the rate at which the “speech chip” parameters are updated in the GND-1. For words and phrases, it corresponds to the articulation rate, but more generally it affects the loop rate, independently of pitch. Note that for very short loops the speech parameters may not change, and this parameter can have no effect.

T mod modulation depth for Tempo (or LFO 1 and 2) uses the LPleng mod mix signal as modulation source. Switch from Tempo to LFO 1 & 2 modulation using the double click extension.

MIDI clock PPQN scalers when syncing to MIDI clocks, the GND-1 provides separate PPQN scaling for Tempo, LFOs, Loop length, and Drum rate. Use each parameter’s extension option (by double clicking) to enable its scaler. See also appendix II.

SLFO and **CLFO** are a slow LFO and a chaotic LFO respectively.

The SLFO, LFO 1, and LFO 2 cross modulate each other's speeds using the **Cross mod** parameter.

XPLFO mod mix mixes pitch mod wav1 and wav2 waveforms (see section 4) to create an automated expression controller used in the XPLFO section of the Expression Matrix.

Optionally the XPLFO signal can be forced to 0 whenever it falls below the **XPLFO threshold** value. Setting the threshold to zero allows the XPLFO signal to remain unmodified. Use the extension option to set values above threshold to 127.

The XPLFO modulator waveform can be scaled in ‘live play’ using external controllers via NRPN. In that case, the threshold and clip values are scaled along with the rest of the waveform. The scaler value is reset to unity internally in the GND-1 by (non-morphing) patch changes, INIT and RAND (synth).

Drum map sens allows automated switching between the three drum maps in the GND-1. Set this to 0 to use only the drum map selected by the Drum map parameter.

Drum trigger source specifies the balance between “in-chip ” (D src=0) and synth audio output (D src=127) as trigger source

Pitch in the GND-1 is a multiplicative scaler applied to any pre-existing pitch contour imparted by the speech ROM data. Using this parameter’s double click extension (Steady Pitch) removes the ROM contour and replaces it by a steady pitch. When Pitch is set to 80, and tune is set to 64, midi note-on events produce A-440Hz tuning.

OSC brightness starting with a triangle oscillator when brightness = 0, increasingly cross-fades to one of the waveshapes selected by **OSC wave**: Glottal pulse, Saw, Square, PWM, Pitched Noise. Set to max for standard oscillator waveshape selection.

Drive applies gain / attenuation to the oscillator signal before the filter. Set to 64 for the original speech ROM energy levels. Note that there is a limiter in the DRIVE processing so if oscillator energy levels from the speech ROM are already high, applying more DRIVE may not produce large changes.

Filter Because speech already contains inherent resonant filtering, the GND-1 uses a cross filtering technique to shift and enhance resonant frequencies. Leave the filter at 0 to retain original speech resonances. Note that this is not a standard LPF/BPF/HPF, but a frequency-translation filter control.

High Frequency Cut By default this is a smoothing filter applied to the audio at the end of the processing chain to reduce high frequencies. However, by activating its double-click extension, the smoothing is applied to the speech ROM parameters instead.

Phase, Filter, and Bend Stereo are used to control the stereo sound stage on the basis of L/R differences in phase, filter and bend parameters. The bend stereo parameter, when active, can be modulated using **Bend Stereo mod** to set the depth of the modulator from the Bend modulator.

MFO is a tuneable Mid Frequency Oscillator that spans from sub-audio to part way into the audio spectrum. Because it can create audible sidebands around signal harmonics it can provide new timbres that are not available using typical LFO rates. The MFO can be used to modulate amplitude, pitch, and filter parameters. There are 16 waveform options available via the **MFO waveform** parameter (see table 2).

MFO offset adds a DC offset to the modulator that shifts the normally unipolar modulator downwards (and expands it) to create a bipolar modulator. In amplitude modulation, this corresponds to going from AM to ring modulation.

MFO depth mod (mfoMd) allows the MFO modulation depths set by AMFO, PMFO, and FMFO to be modulated using the waveform created by MFO depth mod mix. The double click extension for mfoMd switches from depth modulation to rate modulation ('r'), or by clicking again to both depth and rate modulation ('b').

Glitch disrupts memory indexing into the speech ROM. It is a high-impact circuit bending parameter that can turn speech into many different abstract rhythm loops. This control is the equivalent of having a large number of 'glitch switches' in a hardware Speak & Spell. The extension option for this parameter flips the speech data.

Gravity is another high-impact circuit bending control that 'binds' sound clusters and increases resonances as its strength increases. Having high settings of Gravity, particular with high Plasma settings as well, can lead to loud steady tones. For that reason, a double click extension for Gravity is included to switch to soft-bends mode ("s"), which uses gentler control curves for both Gravity and Plasma.

Plasma modifies the way Gravity operates and changes the sound clustering, which makes it a great 'live play' parameter. By default, sound binding usually increases with increasing Plasma. It can be made to decrease (inverse plasma) by setting the extension option ("l").

Flux Usually a somewhat more subtle circuit bending control well suited to loop variations.

Warp A grungy bend that produces a combination of distortion, auto-pitch bending, and often wild wailing effects depending on the underlying audio being fed into it.

Multi-modulator parameters (M depth, mix, mod1 wav, mod2 wav) specify a (bipolar) offset to be added to all the LFO modulator blocks simultaneously. Great for quickly creating controlled and fully reversible changes of lots of parameters at once.

3. Parameter extensions (in edit mode)

- The parameters marked with a dot in Table 1 have extension options. They are switched on/off by double-clicking on the parameter in edit mode. If an option is active, it is usually indicated by a letter or symbol next to the parameter value.

Parameter	Extension function (display letter)
TEMPO	loop start retriggers ADSR {"t"}
T mod	set T mod target to LFO 1 & 2, rather than Tempo ("L")
LFO1 rate	LFO1 retriggers ADSR {"t"}
LFO2rate	LFO2 retriggers ADSR {"t"}
SLFO rate	SLFO slow LFO retriggers ADSR {"t"}
CLFO rate	CLFO chaos LFO retriggers ADSR {"t"}
XPLFO thresh	Sets XPLFO CLIP, forcing XPLFO values above threshold to 127 {"c"}
Tempo clock	Enables PPQN MIDI clock scaling of Tempo {"+"}
LFO clock	Enables PPQN MIDI clock scaling of LFO1 and LFO2 {"+"}
Loop clock	Enables PPQN MIDI clock scaling of Loop length {"+"}
Drum clock	Enables PPQN MIDI clock scaling of Drum rate {"+"}
D map	<u>calls up drum mapping dialog</u> (see next page)
D trig mod	Exclude D trig mod from multi mod and Auto drift (".")
D rate	Quantize Drum Rate <i>modulator</i> {"q"}
D rate mod	Exclude D rate mod from multi mod and Auto drift (".")
D rand timing	Quantize Drum timing randomizer {"q"}
Pitch ¹	Replace speech ROM pitch contour with steady pitch {"s"}
Pitch mod	Exlude Pitch mod from multi mod and Auto drift (".")
Filter	Filter soft-clipping {"s"}
HiCut	Apply smoothing to speech ROM Parameters rather than the audio {"p"}
Attack	Keyed 2 nd note AHDSR retrigger {"k", "k!"} second option forces attack to 0
Sustain	Activate Envelope on RUN {"r"} Includes real-time sustain control during RUN
LPmod	Quantize Loop length modulation {"q"}
LPleng	Keyed 2 nd note Loop + LFO retrigger {"k"}
LPmix ²	Sets additive rather than multiplicative LPleng modulation {"+"}
LP W1	Sets <i>LFO1 rate</i> to be derived from the loop length rather than free running {"%"}

LP W2	Sets LFO2 rate to be derived from the loop length rather than free running (“%”)
MFO rate	MFO rate note sync (“s”)
MFO offset	A-mfo turbo mode (“!”)
A mfo	Reset MFO phase on 1 st key down (“k”)
MFO mod mode	MFO mod mode (depth “”, rate “r”, both “b”)
Word ³	MultiWord mode produces a different sound on each key (“m”);
Glitch ⁴	FLIP bitstream (“f”)
Gravity	use softer curves for GRAVITY and PLASMA controls (“s”)
Plasma	invert Plasma effect by making sounds sparser rather than denser (“i”)
Multi dep	<u>calls up null or apply multi-modulator dialog</u> (see below)

^{1.} In steady pitch mode, using the INIT command values of Pitch=80, and Tune=64¹ causes Midi note on events sent to the GND-1 to play in tune re A-440Hz tuning regardless of the selected word or ROM loop address. However, sounds for which the filter resonance sets the pitch, this won’t usually be the case.

^{2.} If LPleng modulation is additive, LFOs are free-running and LPmod quantization is ineffective

^{3.} The WORD-select extension is only available if Speak mode is active.

^{4.} The Glitch extension FLIP can also be toggled by holding down the R button, and tapping the touch sensor.

Drum mapping dialog by default, all three drum maps 0, 1, and 2 send the following standard MIDI drum notes:

Kick 36, Snare 38, C Hat 42, O Hat 46, L Tom 45, H Tom 50, Clap 39, RimShot 37.

To change these notes, set the desired drum map in parameter edit mode. Double-click to activate drum mapping. The first drum sound name (Kick) and its MIDI output note appear. If the note number matches the GND-1 default an * symbol is shown to the right. Optionally scroll to choose a different drum in the list, and click to allow note changes. Adjust the note number, and click again to save the change, or press the L button to cancel. Audition the note assigned to the current drum by pressing the R button at any time while in the drum mapping dialogue.

Re-assigning the notes allows for variation in external device requirements, but can also be used to extend the drum set beyond 8 drums sounds. For example replacing the handclap with a cymbal note in map 1 (but not map 0), allows drum-map sensitivity to activate cymbals in some parts of the audio, and not in others.

Null or Apply multi-modulator dialog nulls multi-mod depth, mix, W1, and W2 offset parameters, or first adds their values to the associated individual parameters and then nulls the multi values. To change from “Null” to “Add” mode, rotate the encoder clockwise.

4. GND-1 LFO modulation architecture

The LFO modulation architecture employed throughout the GND-1 is shown in Fig. 2. The inputs to all modulation blocks include the system wide rates LFO1 and LFO2, slow SLFO, chaotic CLFO, and the AHDSR (envelope) signal.

The parameter SLFO rate actually controls two slow LFOs, SLFO1 and SLFO2 that differ slightly in rate. Similarly, the CLFO rate controls two related but different chaotic signals CLFO1 and CLFO2.

Within each LFO mod block, two waveforms (W1, W2) are selected. W1 is selected from a list of 17 possible waveforms (see appendix II, table 2). The first 13 of those are derived from the LFO1 rate, and the remainder from the AHDSR (envelope), SLFO1, and CLFO1. W2 is similarly selected from 17 waveforms derived from the LFO2 rate, AHDSR, SLFO2 and CLFO2. The two wavs are mixed using the mix parameter, and then scaled using mod depth.

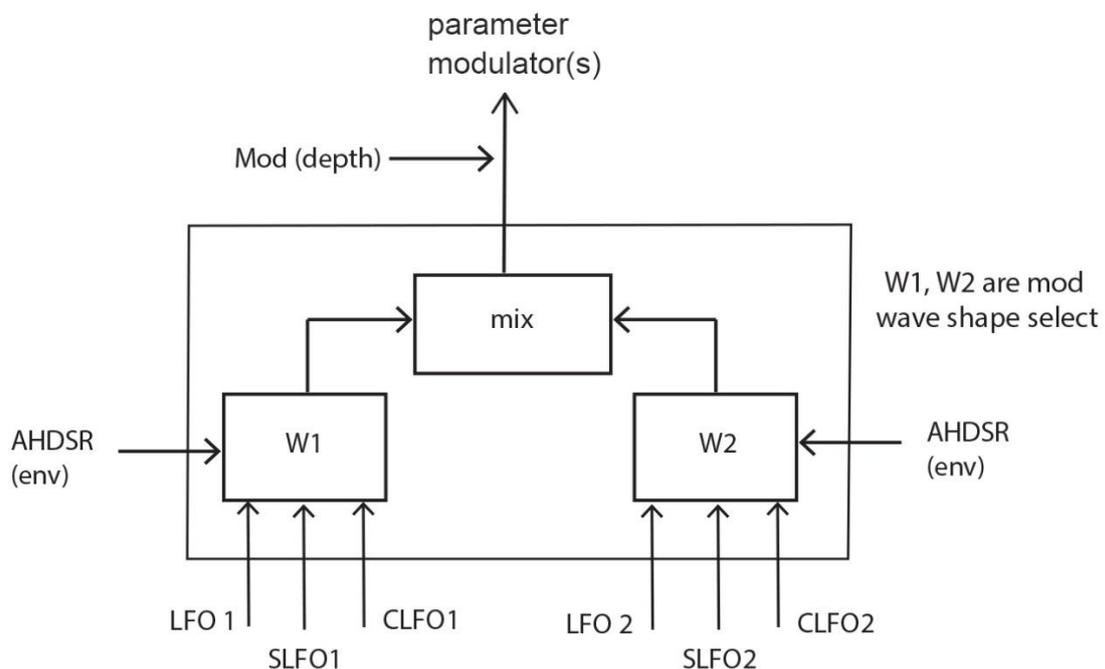


Fig. 2. GND-1 LFO modulation architecture.

There are five such LFO modulation blocks implemented in the GND-1, one each to modulate Pitch, Filter, Loop length, (circuit) Bends, and Drum parameters. Four of these have a second modulator output with a mixer of its own:

- Pitch W1 and W2 are used for the expression LFO (using the XPLFO mix parameter)
- Filter W1 & W2 are used for Brightness modulation (using Brightness mod mix)
- LPleng W1 & W2 are used for MFO depth modulation (using MFO depth mod mix). In addition the LPleng mix output is used by T mod to modulate tempo or LFO1 & 2.
- Drum W1 & W2 have separate mixers for drum trigger mod, and rate+pattern mod.

5. Randomization, Auto drift, and multi-controls

The GND-1 has an extensive set of controls to randomize, automate and simultaneously affect multiple parameters, and if desired to also undo those changes.

Random Press the R button twice to randomize parameters. This applies separately to drum parameters (3-way switch up), the loop address or word if in Speak mode (switch mid), or both synth and loop parameters (switch down). The most recent randomization can be undone by holding the L button and pressing the R button twice. By design the randomize commands modify many, but not all parameters. Notable exceptions include Pitch, AHDSR, Drum map and velocity-out variation, and midi clock PPQN scalars. The random function also sets the synth Volume to 127, and clears the multi-mod parameters.

Auto drift slowly randomizes the parameters of a patch according to the Auto rate and Auto depth parameters. The latter limits the extent to which parameters are allowed to vary relative to the original values. It can be adjusted in real time, which allows drifted parameters to be 'wound back' towards the original parameters at any time. Adjusting depth to 0 fully restores/retains the original values, and setting it to a non-zero value afterwards starts a new random drift. The Auto function does not affect all parameters. Notable exceptions include Pitch, Tempo, Drum map, vol, and rate (but not rate mod). In addition, Pitch mod, Drum trig mod, and Drum rate mod can be optionally excluded using the double click extensions described in section 3.

The **Drum random timing** parameter applies randomization to the drum trigger times. It can be used subtly to 'humanise' the drums, or strongly to impart greater variations. It can be quantized to (sub)multiples of the drum rate using its double-click extension option. Combined with the other drum controls, modulators, and expression matrix, it allows an almost limitless range of rhythms and grooves.

Multi-mod parameters simultaneously apply an offset to the modulation **depth, mix and waveshapes W1 and W2** (see section 4) of the modulation blocks in the GND-1. They are saved and recalled along with a patch as separate parameters from the individual modulators, and therefore fully reversible at later times. Activating the multi mod-depth extension option (by double clicking in parameter edit mode) brings up a dialog allows all four multi-controls to be **nulled**, or their values to be **added** to the individual modulation block parameters (and then nulled).

Expression null hold down both the L and encoder buttons to bring up a dialog that lets you null any of the 5 sections of the expression matrix (modwheel, velocity, breath control, aftertouch, XPLFO).

Encoder null with the patch number on the display, hold down the encoder button to null the current encoder value.

Mod null with the patch number on display, hold down both the R and encoder buttons to null all modulator depths, and the four multi-mod offset values. The expression matrix and MFO main parameters remain unaffected, but the MFO-mod-depth mod is set to 0.

Revert press the L button twice to restore all patch parameters to their last saved values, with the exception of the Auto rate and depth parameters. To also change the Auto parameters, change to another patch and back again, or issue the revert command using the external CC.

Initialize when a patch is deleted, or a blank patch is selected, or the INIT command is issued using its CC, the parameters are initialized as described in appendix II, and the expression matrix and all modulators are set to zero. From this state, use the word and wordbank parameters to have the GND-1 speak words and phrases.

6. Patch morphing

The GND-1 contains a powerful morphing engine that allows all current parameters to evolve over time towards the values of another patch in the GND-1. To use the morph controls, ensure the 3-way switch is not in the middle (Freeze) position.

Start a manual morph select the starting patch and press run. Hold down the R button and select the target patch using the encoder. The morph starts when the R button is released. The audio LED turns red. The display shows approximate morphing progress from > to >>>>. When complete, the target patch keeps running and the audio Led turns green. The time taken to morph between patches can be adjusted the from seconds to minutes using the morph parameter dialogue (see below). Press the R button at any time to **pause/continue** morphing.

Auto morphing allows continual morphing between the patches in a specified block within a bank. Set the start of the block by loading a patch in the usual way. In the morph parameter dialogue (see below) set the length of the block (number of patches) using the NUM P parameter. Set the time for which the new target patch values are held before morphing to the next patch using WAIT. And set the MODE parameter to determine whether patches in the block are morphed sequentially (modes 0 and 2), or in random order (modes 1 and 3). MODE also determines whether morphing is inclusive of the drum parameters (modes 0 and 1) or not (modes 2 and 3).

Activate auto-morphing hold the R button and briefly press the L button*. The audio starts if not already running, and the audio LED turns red. The display shows approximate morphing progress from > to >>>>. Once the new target is reached, the display shows WAIT time progress from = to ====. The cycle keeps repeating until auto-morph is deactivated or the audio is stopped. Press the R button at any time to **pause/continue** morphing.

Switch off morphing while manual or auto morphing audio is running, hold the R button and press the L. The audio led will turn green, and patch values will remain as they were. Stopping the audio using a short L press also preserves the partially morphed parameter values. In both cases, re-activating auto morph immediately selects a new target in the block and restarts the morph cycle from the current parameters.

Set the morph parameters from the patch-display view, hold the R button and briefly press the encoder. A dialog appears that lets you scroll between MORPH time, WAIT time, NUM P, and MODE. These four parameters are global and apply to all patches. To alter a parameter, click the encoder. An * symbol appears to indicate changes can be made. Value changes are applied immediately without having to click the encoder. Press L or R to exit the dialog and retain the adjusted values for the current session only. Or click the encoder to save any changes as the power-up default, and return to scrolling to allow further parameter changes.

* if a manual morph is in progress (audio led = red) this button sequence will stop any morphing. Repeat the sequence to start auto morphing towards the next target.

Apply a manual morph while auto-morphing starts a new morph from the current parameters to the manual target, and continues auto-morphing within a new block starting from the target.

Apply a random function while morphing (using two R button presses, and the Switch not in mid position) replaces the current parameters and starts a new morph towards the current target. Switch up = randomize drums, down= randomize synth + loop.

Setting NUM P = 0 has special significance for all auto-morphing modes. In this case, the *synth and loop* parameters are automatically randomized at the start of each cycle, and morph back to the original patch values during the rest of the cycle. For modes 0 and 1, this also applies to the drum parameters. Setting NUM P to = 1 causes no such randomization when auto-morphing is active, and instead cycles around a single unchanging patch unless parameters are adjusted (including via the random functions, which restart the morph cycle).

Mode 0 = sequential patches + drum morphs at all NUM P + drum rand at P=0

Mode 1 = random patches + drum morphs at all NUM P + drum rand at P=0

Mode 2= sequential patches + NO drum morphs at all NUM P + NO drum rand at P=0

Mode 3 = random patches + NO drum morphs at all NUM P + NO drum rand at P=0

Save a partially morphed patch while morphing press both L and R buttons* to start the usual save procedure. Pause is activated automatically to avoid the patch changing during the save procedure. Upon completion of the save the GND-1 does not switch to the saved patch as it does in normal save operations. Instead, it returns to the originating patch, remaining in pause. Release the pause to continue morphing towards the previous target. The audio can continue to run throughout this process.

The ability to **edit parameters** is retained during morphing, both using the GND-1 controls and external CC messages. However, any changes made will be temporary because the morphing process will continue towards the target. Exclude the drum parameters from morphing using MODE 2 or 3, and midi sync clock PPQN scalars using NRPN messages, to allow direct control over those parameters when morphing.

Drum parameters can be excluded from morphing by using morphing MODE 2 and 3.

PPQN midi clock scalars can be excluded from morphing using midi NRPN commands (see appendix II).

* Saving during a morph using midi CC (NRPN) commands does not activate the morph pause

Appendix I: Summary of button functions

(A) Global functions (patch display + parameter edit mode)

LEFT BUTTON:

<i>short press*</i>	=	Run (audio LED on) / Stop
<i>2x short press</i>	=	Revert to saved patch
<i>Hold during Powerup</i>	=	Assign touch sensor to expression controller

RIGHT BUTTON:

Single short press:		Mode change: if patch showing, function is shown in display led shows status
1. Switch up	=	LOOP A/B mode (A = LED off, B = LED on)*
2. Switch mid	=	FREEZE (locked after 2 sec, short press to release)
3. Switch down	=	SPEAK mode: words** (LED on) / random sounds (LED off)*
<i>2x short press:</i>		
1. Switch up	=	Randomize Drums
2. Switch mid	=	Randomize Loop (or WORD in Speak mode)
3. Switch down	=	Randomize Loop and Synth parameters
<i>HOLD during Powerup</i>	=	Assign MIDI note-on number to expression controller

LEFT+RIGHT:

<i>Hold L + short R</i>	=	AUTO-drift toggle, and Run if not already running
<i>Hold R + short L</i>	=	AUTO-morph toggle, and Run if not already running
<i>Hold L + 2x short R</i>	=	Undo last randomize command
<i>Long press both (1 sec)</i>	=	Start SAVE sequence
<i>HOLD during Powerup</i>	=	Set MIDI receive channel

LEFT+RIGHT+ENC

<i>Long press (1 sec)</i>	=	Start DELETE sequence (and initialize patch on completion)
<i>Hold During Powerup</i>	=	set MIDI USB / DIN thru connectivity

HOLD LEFT + TAP TOUCH SENSOR = toggle Drum mute on / off

HOLD RIGHT + TAP TOUCH SENSOR = toggle FLIP (Glitch extension)
unless switch is in mid (Freeze) position

* When morphing is active and patch is on display, these functions are disabled - see (B).

** To obtain unaffected words and phrases in Speak mode, parameters such as circuit bends and filter settings should be at 0.

(B) Patch mode specific functions

ENCODER BUTTON:

- Short press* = Switch to Parameter Edit mode/display
- Long press* = Null encoder controller value (modwheel default)

RIGHT BUTTON WHEN MORPHING:

- Short press* = Pause / resume morphing

HOLD RIGHT + CLICK ENC = set up patch morphing parameters

HOLD RIGHT + TURN ENC = initiate single patch morph (on R release)
while audio is running

HOLD LEFT+ HOLD ENC = Clear expression matrix

HOLD RIGHT+ HOLD ENC = Clear all modulators

(C) Parameter edit mode specific functions

LEFT BUTTON:

- Long press, or* = Switch to Patch display
Hold L + short ENC press

RIGHT BUTTON:

- 3x Short press* = SysEx Dump: Sends the current patch if the switch is up,
or all patches if the switch is down
** The GND-1 must be in parameter edit mode **

ENCODER BUTTON:

- Short press* = Toggle between list scrolling and parameter editing
- Long press* = Assign current parameter to expression matrix if scrolling
or set scaler value to 0 if scaling
- 2x Short press* = parameter extension for select parameters
(marked in Table 1)

Appendix II: GND-1 MIDI CC reference

CC	Function	Range	Comments
0	Bank select	0-9	
2	Breath control	0-127	
3	Plasma	0-127	Modifies the effect of Gravity
4	AUTO depth	0-127	
5	Portamento	0-127	
6	NRPN data MSB		
7	Channel Volume	0-127	
9	Amplitude ADSR depth	0-127	
11	Expression param select	0-127*	*CC of any parameter included in the 3 stand-alone lists. If omitted, the last parameter edited or displayed is used
12	Expression controller Select	0-4	0=modheel 1=velocity 2=breath 3=aftertouch 4=XPLFO
13	Expression scaler value	0-127 bipolar	0=max neg, 64=0, 127 = max pos
14	Attack	0-127	
15	Hold	0-127	
16	Decay	0-127	
17	Sustain	0-127	
18	Release	0-127	
19	Tempo (speech rate)	0-127	
20	LFO1 rate	0-127	
21	LFO2 rate	0-127	
22	LFO 1 and 2 modes <i>* Note that CCs like this require careful programming and are not well suited to rotary controls</i>	0-5	0 both free 1 both Loop scaled 2 LFO 1 free 3 LFO 1 Loop scaled 4 LFO 2 free 5 LFO 2 Loop scaled
23	Cross mod LFO1+2+SLFO	0-127	
24	SLFO Slow LFO rate	0-127	
25	CLFO Chaos LFO rate	0-127	
26	XPLFO mix (Pmod wav12)	0-127	
27	XPLFO threshold	0-127	
28	Osc Waveshape	0-5	See Table 2
29	Osc Brightness	0-127	
30	Brightness mod Dep	0-127	Additive with folding
31	Brightness mod Mix	0-127	From Filter mod block
33	Pitch	32-117	MIDI note values

34	Pitch mod depth	0-127	Additive
35	Pitch mod mix	0-127	
36	Pitch mod wav1	0-16	See Table 2
37	Pitch mod wav2	0-16	See Table 2
38	NRPN DATA LSB		
39	Plasma bend mod depth	0-127	Additive
40	Filter	0-127	
41	Filter mod depth	0-127	Additive with folding
42	Filter mod mix	0-127	
43	Filter mod wav1	0-16	See Table 2
44	Filter mod wav2	0-16	See Table 2
45	Filter soft clipping	0=off, else on	
46	Loop length	0-127	
47	LP leng mod depth	0-127	Multiplicative
48	LP leng mod mix	0-127	
49	Lp leng mod wav1	0-16	See Table 2
50	Lp leng mod wav2	0-16	See Table 2
51	LP leng mod Quantize	0=off, else on	
52	Glitch	0-127	
53	Glitch bend mod depth	0-127	Additive with folding
54	Gravity	0-127	
55	Gravity bend mod depth	0-127	Additive with folding
56	Flux	0-127	
57	Flux bend mod depth	0-127	Additive with folding
58	Warp	0-127	
59	Warp bend mod depth	0-127	Additive
60	Bend mod mix	0-127	
61	Bend mod wav1	0-16	See Table 2
62	Bend mod wav2	0-16	See Table 2
63	Flip, and invert Plasma	0-3	0 = Flip off 1 = Flip on 2 = invert Plasma off 3 = invert Plasma on
64	Freeze	0=off, else on	(sustain pedal)
65	PStereo (phase)	0-127	
66	FStereo (filter)	0-127	
67	BStereo (bend)	0-127	
68	BStereo Mod (bendmod)	0-127	Multiplicative
69	Drum src mix	0-127	0 = speech updates 127= synth audio
70	Drum volume	0-127	
71	Drum vel out variation	0-127	
72	Drum map	0-2	
73	Drum map sensitivity	0-127	Audio level sensitivity
74	Drum trigger sensitivity	0-127	
75	Drum trig sens mod	0-127	Multiplicative

76	Drum trig sens mod mix	0-127	
77	Drum rate	0-127	
78	Drum rate mod	0-127	Additive
79	Drum pattern	0-127	
80	Drum pattern mod	0-127	Additive with folding
81	Drum rate+pat mod mix	0-127	
82	Drum mod wav1	0-16	See Table 2
83	Drum mod wav2	0-16	See Table 2
84	Drum timing random	0-127	
85	DrtMod + Drnd Quantize	0-5	0 = both off 1 = both on 2 = Drum rate mod Quantize off 3 = Drum rate mod Quantize on 4 = Drum rand Quantize off 5 = Drum rand Quantize on
86	Pitchbend up range	0-48	Semitones
87	Pitchbend down range	0-48	Semitones
88	Tune	0-127	
89	ADSR retrigger source	0-10	0 = all off 1 = Loop (tempo) off 2 = Loop (tempo) on 3 = LFO1 off 4 = LFO1 on 5 = LFO2 off 6 = LFO2 on 7 = SLFO off 8 = SLFO on 9 = CFO off 10 = CLFO on
90	MIDI Clock Sync Enable	0-9	0 = all off 1 = all on 2 = Tempo PPQN scaling off 3 = Tempo on 4 = LFO1+2 off 5 = LFO1+2 on 6 = LP leng off 7 = LP leng on 8 = Drum rate off 9 = Drum rate on
91	Multi Mod Depth	0-127 bipolar, 64=0	Offsets mod depth params
92	Multi Mix	0-127 bipolar, 64=0	Offsets mod mix params
93	Multi wav1	0-127 bipolar, 64=0	Offsets wav1 shapes
94	Multi Wav2	0-127 bipolar, 64=0	Offsets wav2 shapes
95	Key Retrigger Mode	0-5	0 = both off 1 = both on with Attack from last val

			2 = key restart Loop off
			3 = key restart Loop on
			4 = key restart AHDSR off
			5 = key restart Attack from last val
			6 = key restart Attack from 0
96	Xpression Freeze Thresh	0-127	
97	High Freq Cut	0-127	0 = max HF cut, 127 = no HF cut,
98	NRPN param low byte		
99	NRPN param high byte		
100	Drive (pre filter)	0-127	64=unity gain re speech ROM data
101	Tempo (or LFO) mod	0 -127	"T mod" uses LPleng mod mix signal
102	Start/Stop	0=stop, else run	
103	Auto	0=off, else on	
104	Auto rate	0-127	
105	Revert / Reload patch	any non-0 value	
106	Randomize Commands	0-5	0 = (no effect) 1 = rand Loop + Synth params 2 = rand Loop 3 = rand Synth params 4 = rand Drums 5 = undo last rand 127 = rand Loop + Synth + Drums
107	Word Bank select	0-4	
108	Word index (in bank)	0-59	
109	Play mode	0-4	0 = Loop A mode 1 = Loop B mode: resets filter each cycle 2 =Speak off 3=Speak on, multiword 4=Speak on, single word 24=unity @120bpm (1=24x, 0=48x)
110	Tempo clk PPQN scaler	0-127	
111	LFO clk PPQN scaler	0-127	
112	LP length clk PPQN scaler	0-127	
113	Drum rate clk PPQN scaler	0-127	
114	MFO rate	0-127	
115	MFO fine tune	0-127	
116	MFO offset	0-127	
117	MFO Amp mod	0-127	
118	MFO Pitch mod	0-127	
119	MFO Filter mod	0-127	
120	Stop all sound	Any value	
121	<u>Initialize</u>	Any value > 0	* see below
122	MFO mod depth mod	0-127	Multiplicative
126	MFO mod mix	0-127	From LPleng mod block
127	MFO mode commands	0-8, 10-25	0=pitch track off 1=pitch track on 2=AM turbo off 3=AM turbo on

4=MFO phase key reset off
 5=MFO phase key reset on
 6=MFO-mod affects MFO depth
 7=MFO-mod affects MFO rate
 8=MFO-mod affects both

10-25 = MFO Wave shape
 (see table 2)

Outputs on MIDI channel 16: * see NRPN for additional outputs

CC 115	LFO1 CC OUTPUT
CC 116	LFO2 CC OUTPUT
CC 117	SLFO 1 CC OUTPUT
CC 118	CLFO 1 CC OUTPUT
CC 119	AHDSR OUTPUT

* CC 121 "Initialize" reset state

Issuing the initialize command sets most GND-1 parameters to 0, with the following exceptions:

Tempo (CC 19) = 82	S Vol = 127	Pitch (CC 33) = 80
LFO1 rate (CC 20) = 64	LP leng (CC 46) = 90	Brightness (CC 29) = 127
LFO2 rate (CC 21) = 64	Drum src (CC 69)= 40	PBendUp (CC 86) = 5
SLFO rate = (CC 24) 64	Drum trig (CC 74) = 64	PBendDown (CC 87) = 24
CLFO (CC 25) rate = 64	Drum rate (CC 77) = 64	Hold (CC 15)= 10
XPLFO mix (CC 26) = 127	Drum vol (CC 70) = 127	Decay (CC 16) = 60
AUTO depth (CC 4) = 127	Drum velVar (CC 71) = 100	Sustain (CC 17) = 127
AUTO rate (CC 103) = 64	Tune (CC 88) = 64	Release (CC 18)= 40

In addition, all clock sync PPQN scalars are set to 24, resulting in unity scaling at 120 BPM.

Table 2. GND-1 waveshape select values for oscillator and modulation blocks

Voiced Oscillator waveform values

0	Vocal glottal pulse (from Speak & Spell)
1	Saw
2	Square
3	PWM
4	Pitched Noise

(LFO) Modulator waveform values

0	Triangle
1	Square
2	Pulse 25% low
3	Pulse 25% high
4	Falling Exponential
5	Rising Exponential
6	Quantized PWM (3 PW steps per cycle)
7	Quantized PWM (4 PW steps)
8	Quantized PWM (5 PW steps)
9	RND RANDOM (LFO-sync)
10	8 RD 8-step RAND (LFO sync)
11	6 RD 6-step RAND (LFO sync)
12	SRD smoothed RAND
13	ENV AHDSR envelope
14	INV inverse envelope
15	SLFO (slow) LFO 1/2
16	CLFO (chaos) LFO 1/2

Table 2 (continued)

MFO waveform values

Stand alone 'mfo W' and external CC 127 (MFO MODE CONTROL) waveform numbering

Stand alone	CC 127	description
0	10	Sinusoid (default)
1	11	Sinusoid raised to the power 3 (narrow lobes)
2	12	Broken Sinusoid (negative part of the sinusoid is shifted positive, positive part is shifted negative) resulting in a sharp transient where sin 0-crossings normally occur
3	13	Ramp down
4	14	Ramp up
5	15	Pulse 5% high
6	16	Pulse 20 % high
7	17	Pulse 80% high
8	18	Pulse 95% high
9	19	Square 50% high
10	20	10% depth XPIfo PWM (re square)
11	21	20% depth XPIfo PWM
12	22	40% depth XPIfo PWM
13	23	60% depth XPIfo PWM
14	24	80% depth XPIfo PWM
15	25	100% depth XPIfo PWM

Note that there are 5 static rectangular PWs (CC127 waveforms 15-19, at 5% 20% 80%, 95%, and 50% high respectively). There are 6 additional rectangular waveforms that are nominally 50% square waves but have time varying PW that changes to different extents in response to the XPIfo. They range from +-10% PW variation for CC127 waveform 20, to +-100% for CC127 waveform 25. Setting the XPIfo output to create static signals, e.g. using the XPIfo threshold and scaling parameters may allow additional static PW MFO signals.

NRPN parameters (CC 99, 98, 6, 38)

Extended control is available using MIDI NRPN commands. To use NRPNs with the GND-1 issue the following CC commands (in this order):

(1) CC 99 (NRPN PARAM MSB) (2) CC 98 (NRPN PARAM LSB):

Together these determine the GND-1 NRPN function / parameter (table 3)

(3) CC 6 NRPN data (MSB) (4) optionally CC 38 (LSB)

e.g. To save or delete a patch:

1. Specify the BANK number (CC99=0, CC98=0, CC6=bank 0-9)
2. Specify the PATCH number within the BANK (CC99=0, CC98=1, CC6=patch 0-99)
3. Issue the delete or save command (CC99=0, CC98=2, CC6: 0=delete, otherwise save)

Parameters only need to be resent when they change. As an example of NRPN use, the following sequence will save the currently active patch to bank 1/ patch 4

CC 99=0

CC 98=0, CC6=1

CC 98=1, CC6=4

CC 98=2, CC6=1 (save rather than delete)

On power up, the GND-1 initializes CC 99 to 0, so setting CC 99 to 0 can often be omitted unless it has been changed via external control.

Table 3. GND-1 NRPN functions listing

CC 99	CC 98	function	CC 6 data	CC 38 data
0	0	Bank number (for delete or save)	0-9	N/A
0	1	Patch number (for delete or save)	0-99	N/A
0	2	Save/ delete specified patch	0=delete, else save	N/A
0	3	Save/delete current active patch	0=delete, else save	N/A
0	4	Apply / null multi mods	0=null. else apply & then null	N/A
0	5	Clear expression matrix or part thereof	0 = all, 1=modwheel, 2=velocity, 3=breath, 4=aftertouch, 5=XPLFO	N/A
0	6	CC output control	0 = all off 1 = all out 2 = LFO 1 out off 3 = LFO 1 out to CC 115 4 = LFO 2 off 5 = LFO 2 out to CC 116 6 = SLFO off 7 = SLFO out to CC 117 8 = CLFO off 9 = CLFO out to CC 118 10 = AHDSR off 11 = AHDSR out to CC 119 12 = loop sync note out off 13 = loop sync note out on 14 = morphing note out off 15 = morphing note out on 16 = Status Out off 17 = Status Out On	All on midi CH 16 Note # 60 Note # 48 <u>Status out</u> enables CC output messages from the GND-1: includes patch and bank changes, run/stop, revert, rand (and undo), auto-drift, freeze, Speak mode, Loop A/B, drum mute, flip, INIT.
0	7	ABS/REL CC mode	0=absolute (default) else relative	Relative mode is only available for unipolar 0-127 continuous parameters

0	8	Morph time	0 = fastest morph (immediate) 127 = slowest morph (minutes)	Applies to single morphed patch changes, and auto-morphing
0	9	Wait Time	0 = negligible 127 = minutes	'patch hold' between morph transitions in Auto morphs
0	10	Auto Morph range	0-100	Number of "morph-to" patches in range: 0-100 0 = single patch self-randomizing each cycle
0	11	Morph mode	0-3	0=sequential 1=random 2=sequential no drum morphs or randomization 3=random no drum morphs or randomization
0	12	Morph control	0-7	0 = normal prog changes (default) 1= morphed prog changes 2=stop Auto morphing 3=start Auto morphing 4= Pause morph 5= Pause off (default) 6=inhibit PPQN morph 7=allow PPQN morph (default)
0	13	Drum mute	0-1	0 = mute off 1 = mute on
0	14	XPLFO clip	0-1	0 = clip off 1= clip on
0	15	XPlfoScaler	0-127	0 = zero XPlfo 127 = full range
0	16	Multi exclude	0 -7	0 = exclude none 1 = exclude all 3 2 = include pitch mod in multi 3 = exclude pitch mod 4 = include drum trig 5 = exclude drum trig 6 = include drum rate 7 = exclude drum rate
0	17	T mod target	0=Tempo mod, else LFO1+2	
0	18	Soft bends	0 = default control curves, else 'soft' curves	Applies to Gravity and Plasma curves

0	19	Inhibit DIN SysEx	0 = send SysEx to DIN else inhibit DIN SysEx.	
0	20	Additive LPleng modulation	0 = multiplicative else additive	For additive LPleng modulation LFOS are always free running and LPmod quantization is ineffective
0	21	HiCut ROM Parameters	0 = audio HiCut else ROM Parameters HiCut	
0	22	Steady Pitch	0 = use varying speech ROM pitch contour else use steady pitch	In steady pitch mode, setting Pitch=80, and Tune=64 causes Midi note on events sent to the GND-1 to play in tune re A-440Hz tuning regardless of the selected word or ROM loop address.
0	23	RUN envelope	0 = disabled (default) else causes envelope to be triggered on RUN	If disabled, envelope is only activated on key-down or trigger events. When enabled, this also allows continuous sustain control in RUN mode

GND1 Sysex patch data format

Each patch is described by 6 consecutive blocks: 1 parameter block, followed by 5 expression matrix blocks. All sysex blocks are delineated by a starting byte **F0** and closing byte **F7**

Following F0, the GND1 identifier is always **06 06 06**

Following that is the block function descriptor:

7F = main parameter block (contains patch + bank + LOff + 100 parameters)

7E=modw expression matrix

7D=velocity

7C=breath

7B=aftertouch

7A=XPIfo

*** When sending sysex to the GND1, the order should be:

1. Param block (block type 7F)
2. XP blocks for modw – aftertouch (7E - 7B)
3. XP block for XPIfo (7A)

Upon receiving the XPIfo block, the GND1 saves the complete patch to SD, on the assumption that the previous blocks have already been received.

GND-1 Sysex requests

In addition to manual sysex patch dumps instigated from the GND1, the GND1 responds to sysex patch data requests in the following format:

F0 06 06 06 command patch bank F7

Where command specifies which blocks in the patch/bank are requested:

all blocks = 0x64

param block = 0x6F

Xp modw = 0x6E

Xp vel = 0x6D

Xp breath = 0x6C

Xp after = 0x6B

Xp XPIfo = 0x6A

It is also possible to request

- (1) The saved preset parameters for the patch number the GND-1 is currently set to
- (2) The currently active patch parameters
- (3) The current morphing parameters in the GND-1

The sequence in this case requires no patch/bank number:

F0 06 06 06 command F7

In either case the returned bank and patch numbers in the response sysex block(s) inform you of the patch number the GND1 is set to.

The Sysex command values to request the saved parameters for the current GND1 patch are :

all blocks = 0x54

param block = 0x5F

Xp modw = 0x5E

Xp vel = 0x5D

Xp breath = 0x5C

Xp after = 0x5B

Xp XPIfo = 0x5A

The Sysex command values to request the currently active GND1 PARAMETERS are :

all blocks command = 0x44

Param block = 0x4F

Xp modw = 0x4E

Xp vel = 0x4D

Xp breath = 0x4C

Xp after = 0x4B

Xp XPIfo = 0x4A

The Sysex command value to request the current MORPHING parameters in the GND1 is 0x34.

This returns a Sysex message in the following format:

F0 06 06 06 34 Morph_Time Wait_Time Auto_Morph_Range
Morph_Mode F7

Acknowledgements

Having spent many years circuit bending hardware Speak and Spell games, the idea for the GND-01 arose from my desire for more extensive control over the unique sounds produced by the speech synthesis chip in those games. This was made possible by using an accurate software emulation of the chip's workings as well as speech data in those games. And after many months of *digital* circuit bending, and adding a synthesis shell with about 30 MIDI-controlled parameters, I presented the result to Joe Manton. I think neither of us at that time expected the further development of the GND-01 to be as explosive as it turned out. After almost daily exchanges of ideas for over many more months, the synthesizer shell grew to over 100 parameters, and now includes layers of automation, modulation, and expression control that at the outset I would have hardly thought possible. It is my hope that the excitement we experienced in creating the GND-01 has produced an instrument that will inspire others too.

Richard van Hoesel

Rev 1.0, September, 2022