GND - 1 T

User Guide

Level out

Post Filter

USB MIDI I/O

⎓ + 9V DC

Drift depth

RUN

28

DRUMS

DRIFT

Mod FREEZE

Loop FREEZE

MANUAL 65

MORPH

BLOCK

RAND Target

REVERT

Echo FREEZE

P 1

P 2

P 3

MIDI out

MIDI in

AUX IN

Speak & Glitch

GND-1 T

Select / Edit

Release

(Save)

Circuit Bent

SPEECH CHIP SYNTHESIZER

ALT

modhold

RUN

XPress

Patch

Param

GND-1T

Glitch and Drum Touch

Embrace the mayhem...

Explore circuit bending and controllable chaos like never before

INDEX

PARAMETER EDIT screens

Acknowledgements

Speak
&
Glitch

G
N
D
-
1
T

Glitch
and
Drum

Touch

Embrace the mayhem...

Explore circuit bending and controllable chaos like never before

The GND-1 is based on a faithful emulation of the speech synthesizer chip found in the classic vintage Speak & Spell game. It was inspired by many years of physical circuit bending, but takes it far beyond what's possible in hardware. It offers a whole new approach to chip sound synthesis, looping and rhythm generation.

The GND-1T comes preloaded with a number of preset banks: 000-099 contains the original factory demo loops, and includes a few keyboard patches at the end of the bank. 100-199 is the "Factory loops Vol.2" bank, which showcases the many new features that have been added to the GND-1T since the original Factory loops bank was released. And locations 500-599 contain the original release patches intended specifically for keyboard / melodic use.

KEY FEATURES

- 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 synthesizer

- Over 150 real time parameters, with full stand-alone control and editing using the touch screen and encoders, or via MIDI over both USB and 5-pin DIN
- MIDI USB HOST port for external controllers / keyboards
- Five GROUPS of (3+3) assignable encoders for instant 'live' parameter control via 30 virtual encoders
- MIDI clock master or slave with direct clock sync of Drum triggers, Echo delay time, LFOs, Tempo, and Block Step Morphing
- Additional MIDI clocked *scaling* options with individual PPQN scalers for Drum Rate limiter, LFOs, Tempo, and Loop Length

- Full bidirectional MANUAL MORPH control between any patches with save option at any morph setting
- Powerful Expression Matrix allows every parameter to respond o modwheel, velocity, breath-control, after-touch, and a dedicated expression LFO
- Unique modulation blocks that mix twin waveforms selected from over 40 different wave shapes and signal sources each
- Audio rate modulation of amplitude, pitch and speech filter using the "MFO" (Medium Frequency Oscillator)
- Touch Sensor, main rotary encoder, and MIDI note number assignable to expression matrix controllers and much more
- Extensive randomisation possibilities with undo

- Ultra dynamic MIDI Rhythm Generator algorithm improvises drum grooves on-the-fly as it interacts with the synthesis engine
- Over a dozen Drum parameters, with the same extensive control as synth parameters and saved with each patch
- Drum note triggers can be sent to 40 unique built-in drum kits and external MIDI devices, and act as modulation sources
- Ability to also trigger the built-in drum sounds using external MIDI channel 10 note-on events

- Full stereo 44kHz analog and digital USB Audio I/O , stereo overdrive, (fat) resonant Post-Filter, and echo / looper functions
- Store up to 1000 presets with seamless preset switching and morphing
- Store up to 1000 instantly switchable Driftbuffers, which can also be scaled and 'step-morphed'
- Store up to 1000 SCENES that can capture and recreate complete GND-1T (morphing) states

4

G N D - 1 T

Glitch and Drum Touch

Post Filter Cutoff
ALT = Echo Volume

Stereo 1/4"
Audio out

USB host
(controllers)

USB midi and
audio I/O

DC 9V
center +

P1-3 and [ALT] P1-3
are 6 assignable*
parameter control
encoders

Master level out
ALT = PF (synth) scaler
XPress = Drums scaler

P1 controls DRIFT
depth when DRIFT
is active

Stereo Aux line in
(3.5mm)

MIDI 5P DIN out

Main Encoder
(clickable)

MIDI 5P DIN in

Phones out

Touch Screen

See next page for a
summary of the touch
button and main
encoder functions

Expression (XP)
touch button

Patch page / ALT
touch button

Parameter
EDIT page
touch button

* Five groups of
assignments are
available for a total
of 30 virtual encoders

Level out   Post Filter   USB MIDI I/O   + 9V DC   Drift depth

P 1

P 2

P 3

RUN   28   DRUMS

DRIFT   Mod FREEZE   Loop FREEZE

MANUAL 65   MORPH   BLOCK 4

RAND Target   REVERT   Echo FREEZE

Speak & Glitch GND-1T

Select / Edit

(Save)

Release

AUX IN

Circuit Bent

SPEECH CHIP SYNTHESIZER

ALT

modhold

RUN

XPress   Patch   Param

MIDI out   MIDI in

GND-1T

Glitch and Drum Touch

Touch Button & Main Encoder Summary

Expression touch sensor (e.g Breath)

Show main Patch screen

Show Param Edit Screens

ModHold*

RUN / STOP

Drum(tap**)

Metal Touch buttons:

XPress

Patch ALT

Param

Drum RAND

Synth RAND

* On the main *PATCH* page
XPress before ALT includes touch effect during modhold
ALT before XPress disables touch effect during modhold

On any other page
ALT before XPress modhold is not available, and instead toggles drum mute

** On any page, ALT hold + XPress tap with *RUN off* starts RUN drums only

Level out pot

button	pot sets
no touch	All audio levels
XPress	Drum scaler
ALT	PF (synth) scaler

MAIN ENCODER functions from Any page:

ALT + *click*   = revert last PostFilter or P 1-3 encoder & release its exclude

XPress + *click* = null controller values (modw etc) and touch sensor, cancel value change

Long *hold* = release all excludes
except clock-mode (P20)

Turn any P1-3 enc to cancel release and adjust   P1-3 GROUP

Param + *hold* = *set all excludes*

Xpress + hold = show XP mapping page

Patch page:
* EchoFreeze funcitons not shown (see page 15)

click   = SAVE / DELETE menu
(to cancel click again)

double-click = Restore Saved Globals

ALT+XPress+*click* = mod/loop hold mode

turn   = Encoder ENC XP mapped value (e.g. modWL, see P 35)
unless:
patch # if patch-select mode on
manual morph cntrl if morphing

ALT + *turn*   = patch # (click to cancel)

ALT + XPress + *turn* = touch scaler

Parameter Editing:

click   = undo / revert / null
& for any pot param
release its exclude

hold + *tap screen*
For any switch type parameter release its exclude

turn   = selected pot parameter val

G N D - 1 T

Glitch and Drum Touch

QUICK START

The GND-1T requires a center positive 9V DC power source. Recommended current rating is 500mA or more, especially if connecting a higher draw MIDI controller to the USB-HOST port. A small angled stand is recommended for desktop use

On power-up the main PATCH SCREEN shows the active Patch, which is the last one saved. In total 1000 patches (0-999) can be stored. Via external MIDI these are accessed as 10 banks of 100

The GND-1T comes with a number of factory presets to facilitate immediate auditioning of some of its abilities
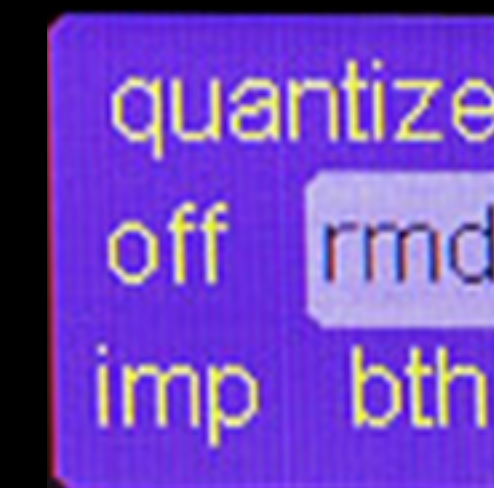
1. Press RUN to hear the patch. Press again to stop the patch

2. Press the patch number or tap the metal Patch button to highlight the patch number and change patches with the main encoder. If RUN is on, you will hear each patch in turn. Empty patches show as "- -" and the user definable Template params are loaded
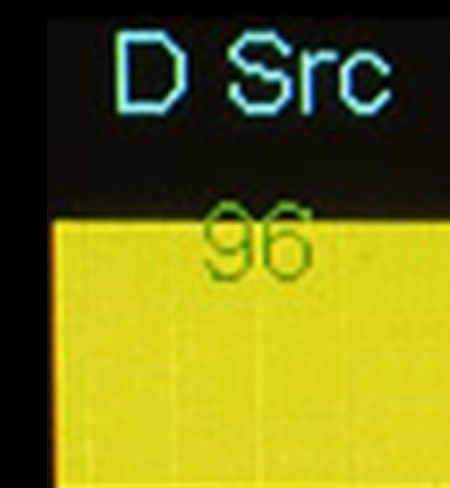
3. To avoid hearing the intervening patches when changing to a more remote one, hold down the metal ALT / PATCH button while turning the encoder. This also works without first highlighting the patch number
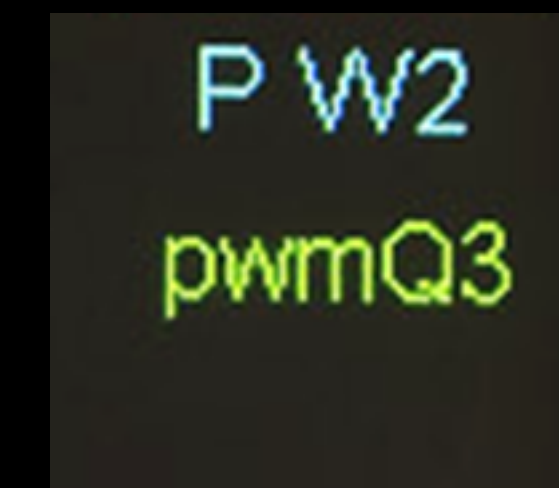
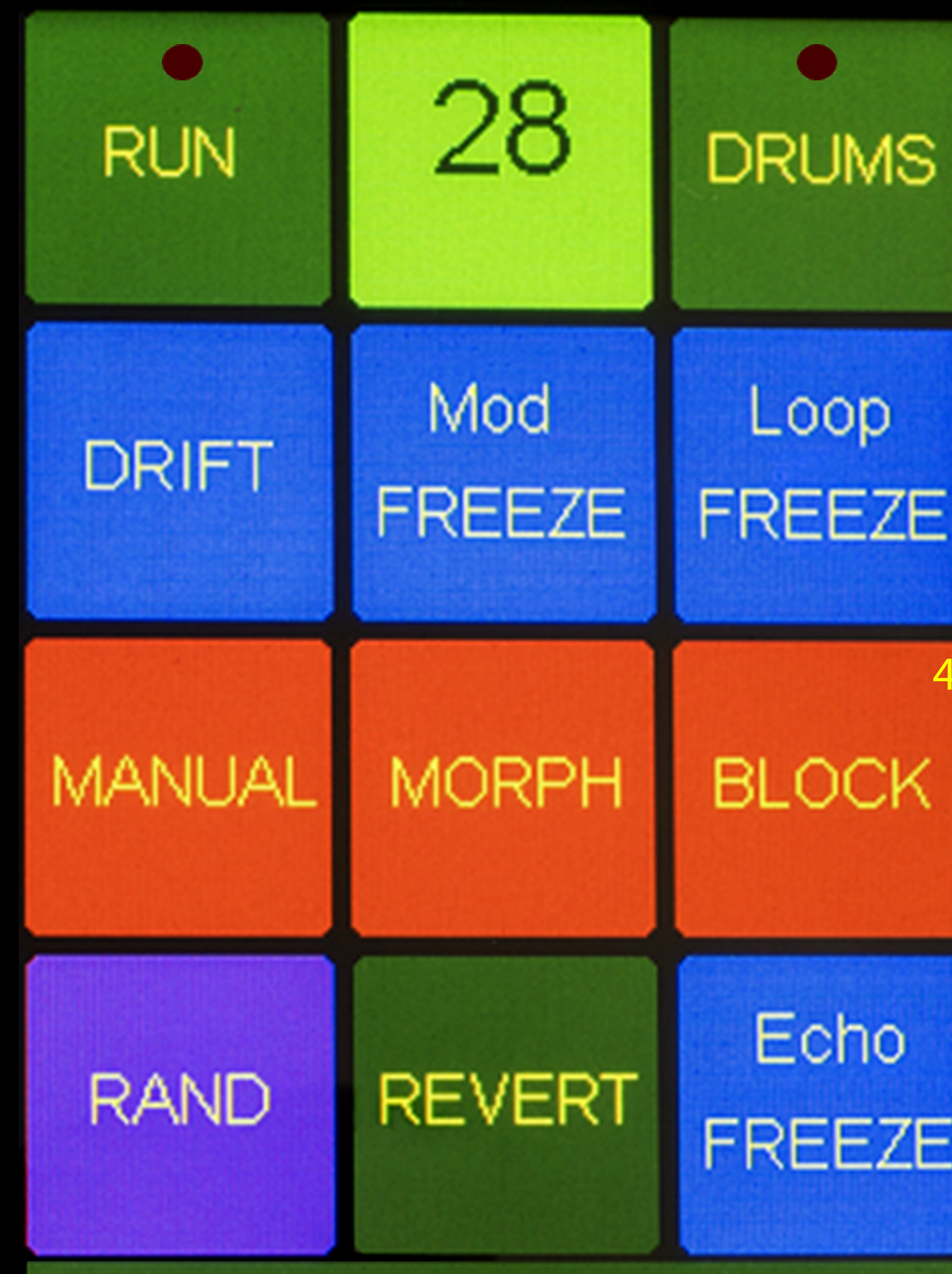|		
RAND	quantize off rmd imp bth	D Src 96
toggle button	multi position switch	pot (use encoder)

P W2 pwmQ3	
text pot (use encoder)	

RAND

quantize off rmd imp bth

D Src 96

P W2 pwmQ3

toggle button — multi position switch — pot (use encoder) — text pot (use encoder)

RUN   28   DRUMS

DRIFT   Mod FREEZE   Loop FREEZE

MANUAL   MORPH   BLOCK

RAND   REVERT   Echo FREEZE

4. If the patch has active drums, the DRUMS button will be lit. Tap it to toggle drums on/off. If both MIDI and internal drums are active, a blue led will light on the DRUM button during drum events. A red led indicates only MIDI, and yellow only internal. ALT+ tap XPress without RUN starts solo drums

5. Press RAND to randomize parameters (you can leave RUN on). Press REVERT to recover the original patch. Press DRIFT for slow continuous randomization where P1 sets DRIFT depth. Try the three FREEZE functions

6. With RUN on, toggle MANUAL morph on. Hold the metal Patch button and select a target patch with the main encoder. After selection the encoder acts as a manual morph control between the current parameters and selected target. Press MANUAL again to exit morphing and retain the morphed param values

7. Hold the metal Param button down to go to the parameter edit index page and select the DRUM2 / WORD page. Press ALT+ INIT (bottom right) followed by RAND WORD to play random words. Create classic circuit bent speech sounds using ALT+ RAND GLITCH or apply more bends on the BEND pages. Adjust Loop, Pitch and Tempo parameters on their respective edit pages

G N D - 1 T

Glitch and Drum Touch

Essentials 1

To go to the last used Parameter edit page tap the metal Param button or hold it down to show the edit index page

To return to the main Patch page tap the metal ALT/Patch button

The GND-1T is controlled using its touch screen*, three metal touch buttons, and multiple encoders. At power-up it shows the MAIN PATCH page and loads the last saved patch. Hold the metal PATCH / ALT button to show additional functions

To start/stop the audio, press RUN from the MAIN PATCH screen, or touch the metal ALT + Param buttons from any page. Hold the ALT button and rotate the main encoder to select a new patch (click to revert). Or tap the ALT button or patch number (highlights) to select patches with just the encoder. Tap again to exit. Empty patch slots show as "- -" and load a user definable patch Template (see page 17)   * The GND-1T uses a resistive touchscreen that requires a slightly firmer touch if using the flat of your finger. For a lighter touch response, use more of your fingernail

N O T E

If any patch parameter (or one of its 5 XP matrix values) is manually adjusted, the parameter and its XP values are EXCLUDED* from further MORPH, DRIFT, RAND and MULTI-MOD effects. To release a *pot* parameter** from exclusion, select it on its Param Edit page and click the main encoder. To release a *button* parameter hold the encoder and tap the screen button. To release all parameters*** use a long press on the main encoder from any page

* This stays in effect (even through patch loads) until manually released, or until a Scene is loaded that reinstates its own exclusions

** The parameter associated with the most recently adjusted PostFilt/Echo or P1-3 encoder can also be released using [ALT] encoder-click. This also restores its last saved value.

*** Except internal MIDI clock mode (off,on-run,on,internal) which has its own release - see clk BPM details on P20

To morph from the current patch to a new one, activate the MANUAL or MORPH screen-button before selecting the new patch. If MANUAL morphing, the main encoder becomes the morph control. In MORPH mode the morph occurs automatically during RUN or MIDI note-on events. BLOCK morphing auto-morphs between multiple patches (or driftbuffers - see below) in accordance with the parameters on the Morph-Drift-params page (press [ALT] + MORPH). Morphing can be gradual, or instant if a STEP mode is activated. Press MANUAL during MORPH or BLOCK morphing to pause auto-morphing. Tap the patch number at any time to advance to the next patch / driftbuffer. See P18.

DRIFT applies continual slow varying randomization, according to its depth and rate settings. Switching DRIFT off retains the Drifted values in a driftbuffer. Driftbuffers can be scaled, cleared, saved/loaded, and even sequenced using special STEP MORPH modes (see P11 & 18). Double tap the drift button to generate a new random driftbuffer constrained by Drift Depth.

On the main patch page, toggle the DRUMS button to enable / disable improvised DRUM triggers (or hold ALT + tap XPress briefly on other pages). Patches are saved & recalled with this status. To preserve the current DRUMS status and internal Kits through subsequent patch changes use ALT+DRUMS to set GLOBAL DRUMS. From STOP hold ALT + tap XPress on the PATCH page to run just the drums. This mode allows external MIDI notes to play the Patch sounds without stopping drums between notes. Internal drum sounds can also be triggered by external devices by sending MIDI ch.10 note-on events (P 25)

Complete setups (including morph parameters) containing the current state of the GND-1 can be saved and recalled as SCENES (P11, 19) Use "clk BPM" on the MIDI page (P20) to set the internal MIDI clock BPM rate, [ALT] tap it to enable or switch internal MIDI clock* modes for each patch. Double-tap to toggle global EXTERNAL mode to use external clocks for all patches *Clocked BLOCK morphing ignores this and forces clocks on

G
N
D
-
1
T

Glitch
and
Drum

Touch

Essentials 2

To see the current firmware version, hold the metal PATCH button during power up

To activate DUAL MONO OUTPUT mode, which sends the Post Filter output / synth to the L channel (tip), and non-Post-Filtered Drums to the R channel (sleeve), hold both PATCH and XPress during power up

To edit the parameters of the current patch, touch the metal PARAM button. Parameters are layed out in 12 functionally grouped pages. A brief touch takes you to the most recently edited page, or a longer hold (or double tap) shows the INDEX page to select an edit page. Tap the metal PARAM button to toggle between the current edit page and the INDEX. To edit a parameter, tap it on the screen. Buttons will toggle, and pots (and "text-pots") respond to main encoder changes.

To assign a (pot) parameter to one of the P1-3 encoders, hold the parameter on the screen and turn the desired encoder. To assign to the [ALT] P1-3 encoders, do the same while also holding the ALT button. To stack up to 3 parameters for any P1-3 or [ALT] P1-3 encoder, add in the metal PARAM button for the second and third parameters. All assignments are automatically saved. A complete set of all the P1-3 and [ALT] P1-3 assignments is called a GROUP. To switch to any of the 5 available groups, hold the main encoder and turn any P1-3 encoder*. The Mod FREEZE button shows the current GROUP in its top left corner

* The pop-up dialog shows the parameter(s) assigned to the encoder being turned for each GROUP. Changing GROUP cancels any pending excludes release

Nearly all parameters in the GND-1T are patch specific, and are saved & recalled for each patch number. There are a small number of additional GLOBAL parameters that can be saved using SAVE GLOBALS, and recalled on power-up or using a double-click of the main encoder on the main patch page. These include the parameters on the MORPH-DRIFT-params page as well as the following: pitchbend up/down, usb level/mix, touch sensor attack/decay, expression touch/note/encoder modes, MIDI drum notes receive (RX) enable, and Run on MIDI start. Only Global parameters that show a "G" can be expression mapped and assigned to P1-3 encoders like the patch-specific parameters

To SAVE* or DELETE a patch, from the MAIN PATCH page click the main encoder to show those options. This also shows SAVE Globals and SAVE Template options (P17), and the Sysex patch send button (P20). Click the encoder again to cancel SAVE mode.

* Save is only allowed to the current patch, or an empty slot indicated by "- -" under the patch number. To overwrite another existing patch, first delete it

The main encoder, and metal XPRESS touch button can act as expression controllers (modWL, and breath-control by default). To assign them to many other functions, set the ENC XP and Tch XP settings on the expression mapping page XPMAP (P35) page. Many of the ENC XP mapping options show a secondary function that applies when the encoder is turned while holding XPress. Hold ALT+XPress on the Patch page, and turn the encoder to set a touch scaler to adjust global touch XP strength, which is reset to 1 on power-up.

The Level out pot sets all analog and USB audio output levels when no buttons are held, and provides distortion free audio at its maximum level. Hold ALT when turning it to scale down only the PostFilter (synth) output, or XPress to scale down the drums. Hold Param to dim the screen brightness. The PF and Drum scalers (and screen brightness) are not affected by any parameter settings or patch changes, and are reset to 1 on power up

GND-1T

Glitch
and
Drum

Touch

MAIN ENCODER

The MAIN ENCODER allows patch selection, parameter value editing, and many other functions when combined with the metal touch buttons (see also page 5)

A short click of the encoder on most pages nulls or restores the edited parameter.

On the main PATCH page

* if patch-select mode is on (patch number is highlighted) patch number changes instead

- *turn* the encoder with ALT held down to change the patch or set a morph target, or if block morphing, relocate the Block Start
- *turn* it on its own to alter the primary ENC XP mapped value it's assigned to (see P35, modWL by default), or if *patch* morphing is active adjust the balance between the two patches being morphed
- turn it with XPress held down to change the secondary ENC XP mapped value it's assigned to (driftbuffer scaler by default)
- *turn* with both ALT+XPress held down to adjust the global touch sensor scaler (initialized to 1.0 at power up)
- *click* to show the patch SAVE* and DELETE options, including SAVE Globals** and Template (P17), and SysEx Send Options

    * Saving is only allowed to the currently loaded patch when not morphing, or an empty patch that shows as "- - ". Click the encoder again to cancel SAVE / DELETE
    ** Global (non patch specific) saved parameters include the MORPH+DRIFT params, USB in & PF, Touch Sensor Attack/Release, and Pitch Bend +/- range
       Global parameters that show a "G" on the screen can be XP mapped and assigned to P1-3 encoders

- *double-click* to reinstate the last saved Global Parameters

- ALT+ XPress+ click toggles between mod-hold (power up default) and loop-hold functions
- when ECHOFREEZE is active, the encoder is also used to set Punch or Dub modes for looped audio (see page 15)

On the PARAMETER EDIT pages

- *turn* the encoder to change the value of the selected parameter on the screen
- *click* the encoder to restore the selected parameter to the value it had <u>when last selected</u> and release its exclude*

    * For button / switch parameters, hold the encoder and tap the screen button to release its exclude

On ANY page*

* Except if param editing and either SCENE (P19), DRIFT BUFFER (P18), or clk BPM (P20) are selected

- ALT+ *click* reverts the last P1-3 encoder change to the assigned parameter's *saved value* and releases its exclude
- XPress+ *click* nulls modwheel, breath, and after-touch controller values, and/or cancels the current encoder operation
- A *long encoder hold* releases all parameter excludes (except clock mode, P20) from morph, drift, multi-mod, and rand commands
- Param (metal button)+ *long hold* sets all parameter excludes (except clock mode)
- XPress+ *long hold* shows the XP mapping page with matrix values for the most recently selected edit parameter
- An encoder *long hold*+ turning any P1-3 encoder selects one of the five available P1-3 GROUPS (page 8)

GND-1T

Glitch and Drum Touch

CORE PARAMS 1

Overview & Modulation

The GND-1 is based on an accurate emulation of the speech synthesizer chip found in the classic vintage Speak & Spell game. As it speaks, the chip reads small fragments of information about voice (oscillator) level and pitch, and the speech filter resonances from ROM memory. The rate at which it does this is the TEMPO parameter in the GND-1T, and sequences of those fragments form a word or LOOP. When the GND-1T is in SPEAK mode (WORD PAGE), the data from the ROM is retrieved from known word locations, otherwise it's random, and a whole new range of sounds is created. The circuit BEND parameters interfere with the interpretation of the ROM data. PITCH scales the ROM pitch contours, and FILTER modifies the speech resonances. ROM pitch-contours can optionally be quantized into musical sequences (P22)

A large number of synthesizer parameters have been added around the speech synthesis core in the GND-1T. Key parameters can be modulated by twin waveform modulation blocks that mix waveforms (Fig.1) derived from two LFOs, two slow SLFOs, and two chaotic CLFOs, as well as AHDSR / ENV, LOOP, OSCENV, DRUMS, MFO and constant values. One of the mod-blocks is reserved for the XPLFO expression controller
* As of FW250915, any modblock's mix output is also available as an input waveform to any other modblock, allowing modblock (cross) feedback

In addition, *every pot parameter** in the GND-1T has five associated values in the EXPRESSION (XP) MATRIX that determine how much the parameter is affected by MODWHEEL, VELOCITY, BREATH-CONTROL, AFTER-TOUCH**, and XPLFO. Setting those values is called expression mapping. To set them, hold the parameter on the edit pages and tap the metal XPRESS button to go to the XP mapping page. Or hold XPress and the main encoder together to map the currently selected parameter. The XPRESS touch sensor by default acts as a breath controller and the main encoder as a modwheel. Both can be re-assigned on the XPmap page

* Except MIDI channel / thru / drum-notes, USB mix, and the morph control parameters other than StepRate
** The Aftertouch matrix can also be driven by the Pitch mod block, providing a second expression lfo (P22, 35)

PITCH, (Speech) FILTER and AMPLITUDE can also be modulated at audio band frequencies using the MFO (mid freq oscillator) modulator. It includes OSC-sync and fine-tuning that allow interesting sonic interactions between the OSC and MFO frequencies, and can itself be modulated using the W1/2 signals from the LOOP mod block

Mod (depth) →   W1, W2 are mod wave shape select

mix

W1   W2

LFO SLFO CLFO   ENV (2)   LFO SLFO CLFO
1   1   1   LOOP (3)   2   2   2
(13) (7) (6)   OSCENV (1)   (13) (7) (6)
                  DRUM (2)
MFO.LFO1 (1)   DC(1) FINE (1) MFO.LFO2 (1)
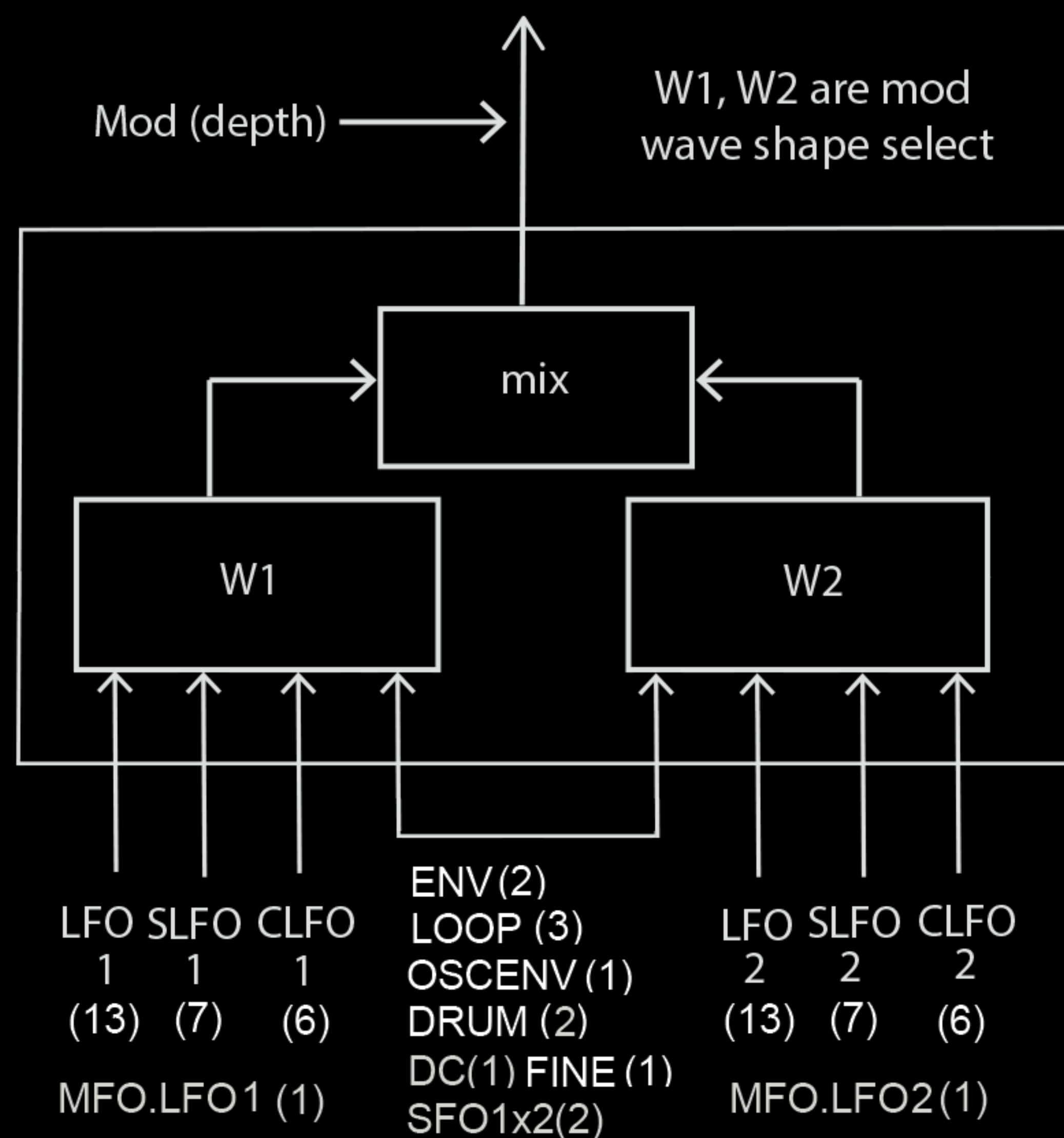   SFO1x2(2)

Fig.1. Twin-waveform (W1,W2) modulation block structure.
Seven blocks for Pitch, Filter, Loop-length, Bends, Drums, Post-Filter, and XPLFO. Some are also shared with other params

GND-1T

Glitch and Drum Touch

Morphing, Drifting, Scenes

CORE PARAMS 2

One of the most powerful features of the GND-1T is its ability to MORPH complete parameter sets from one patch to another while the audio is playing. This can be done under full bidirectional MANUAL control using the main encoder, or automated. Partly morphed patches can be saved at any time as new patches, without disrupting the morphing state between the original patches. To manually morph between the current patch and a new one (the target) activate MANUAL on the PATCH page and select the target using [ALT] + encoder*. Once selected, the encoder becomes the manual morph control. Additional new targets can be selected from any morph state

* or hold MANUAL and tap Param to increment, or Patch(ALT) to decrement. Or press RAND Target to morph to random parameters

To morph automatically from the current patch to a new one (during RUN or MIDI note events) activate MORPH and select the target. To morph continually between multiple patches, starting with the current patch, press BLOCK*. Relocate the block start patch at any time using ALT + encoder. Hold ALT+ press MORPH to set the morph/drift control parameters on the MORPH DRIFT params page (P18) . For gradual parameter morphing leave StpMode OFF, and set Morph and Wait times along with Block size. For instant patch changes set it to ON/ONsync(restart loops), or ClkStp/ClkSnc if MIDI clocked (see MIDI page) and adjust Step Rate, which can be expression mapped and assigned to P1-3 encoders. Set StpMode to KeyStp/KeySnc to step on MIDI note-on events, or DrmStp/ DrmSnc to step on drum triggers. Set StpMode to DrifBuf/Key/Clk/Drm to stepmorph Drift Buffers rather than patches. To cross-fade drift buffers during each step, select DrifXfd (free running) or DclkXfd (clocked). When driftbuffer morphing, the main encoder acts as a Drift Buffer Scaler (see next paragraph). Pause automated morphing by activating MANUAL. Force a step to the next patch or drift buffer by tapping the Patch # screen button. BLOCK and/or MANUAL morph configurations can be saved in Scenes.

* See page 13 for a description of Drum selection options during BLOCK morphing

The DRIFT function on the Patch page slowly randomizes current patch parameters. Set the Drift rate and depth on the Morph Drift params page, or adjust depth using P1 (or ALT P1, see P18) whenever DRIFT is on. Turn off DRIFT to stop further parameter changes, and retain* the drifted sound. The acquired Drift offsets can be cleared (ALT+ DRIFT), temporarily stored (DRIFT+ tap Patch ▼) or reloaded (DRIFT+ tap Param ▲), or permanently stored and recalled via the Drift Buffer # pot** on the Morph Drift params page (P18). Double-tap the DRIFT button to create a random buffer (Drift depth constrained). Drift buffers can be scaled by the Drift Buffer Scaler (0-127, 127=1.0). The Scaler is set to 127 on power-up or whenever DRIFT is activated. When DRIFT is off, Drift depth*** can be used to adjust the Scaler. The Scaler can also be set without affecting Drift depth by using the main encoder when ENC XP mapping (P35) is set to include "DbufScl". Or via MIDI NRPN CC98=83, CC6=0-127

* Non-morphed patch changes clear the Drift buffer, unless changing patches via Note XP (P35). Saving a Patch with non-zero driftbuffer values stores it as you hear it, with the drift offsets applied to all parameters. To preserve the original parameters and driftbuffer separately, save the configuration as a Scene instead of a Patch.

** Turn the encoder to select a Drift buffer. A # symbol indicates the driftbuffer already existts, and @ that it wwas the last buffer loaded. Use ALT+click to SAVE the current buffer to the selected location (tap the screen button to complete), or XP+click to apply the Drift Buffer Scaler to the buffer before saving. To load permanent Drift Buffers (0-999) using the main encoder on the PATCH page, set ENC XP to a mode that includes Dbuf# (see XP mapping P35).

*** And its expression values. To facilitate Scaler access from any Page on the GND-1T, consider assigning encoder P1 to always control drift depth (i.e. even when DRIFT is off)

SCENES* (0-999) are super-presets containing the current state of the GND-1T (see P 19), including all current patch parameter values and exclusion flags, Drift buffer values, Morph states** and parameters, Touch Attack/Release, and XP mapping.

* Select Scenes using the Scene pot on the Multi-SCENE-Keybd page (P19). A "#" next to a Scene number indicates it exists, and "@" that it was the last one loaded. Click the encoder to LOAD, ALT+ click to SAVE (tap screen) or XPress+ ALT+ click to DELET (tap screen). To load Scenes directly from the patch page, set ENC XP (P35) to include a "Scene" option (see P35)

** Scenes can preserve any combination of BLOCK and MANUAL morph settings, but not single MORPH states.

GND - 1 T

Glitch and Drum Touch

CORE PARAMS 3

OSC level, ENV

The OSCGAIN parameter (PostFilt / OSC page) and optionally OSCENV (ENV page) modify the oscillator level before it goes into the speech FILTER. When OSCENV is "Off" the raw levels from ROM are scaled by OSCGAIN only. Set this to 64 for the original speech chip levels. Set to 0 to eliminate the Synth signal from the audio, but keep sending ROM information to the Rhythm generator and allow AUX input signals to be heard. Double-tap the OSCGAIN control to switch to STEADY GAIN mode, which replaces the ROM levels with the value of OSCGAIN and its expression modifiers (OSCgain pot shows "S")

Enabling OSCENV causes OSCILLATOR AHD (ATTACK-HOLD-DECAY*) smoothing of the ROM levels as they are updated at TEMPO rate. When a new OSCGAIN-scaled ROM level exceeds the current OSCENV value, ATTACK sets the rate at which OSCENV increases. Otherwise DECAY sets the rate of decrease to the new level. Use the AHD->0 option to decay to 0 rather than the new ROM level

 * Although OSCENV and AHDSR ENV share the same ATTACK, HOLD and DECAY parameters, their envelopes operate independently

More complex options either apply Loop FREEZE (+LPfrz) or Mod FREEZE (+modfrz) during the non-zero part of the AHD interval, continuously retrigger the AHD cycle (AHDcyc) between Tempo triggers, or both (cycLPfz, cycMdfz). The Mod FREEZE and Loop FREEZE buttons on the main Patch page show a "^" symbol whenever the current OscEnv mode incorporates AHD freeze intervals. In those modes the Mod and Loop FREEZE buttons (and their expression triggered XFREEZE counter-parts) act as UNFREEZE controls.

Be aware that by design the OSCENV freeze modes disrupt the normal progression of loop or modulation updates. The non-linear interaction between TEMPO, ROM levels, OSCGAIN, AHD times and ATTACK-DECAY MODULATION can produce many interesting OSCENV results. Often AHD modes are best suited to lower TEMPO rates to avoid overlapping the AHD cycles too much

The speech FILTER output is summed with the AUX input and sent to the POST-FILTER (PF). The PF output envelope depth is set by AMP ENV which acts as a mixer between a rectangular envelope at min, and the ENV signal at max. For MIDI Note-On events while RUN is off, or if ENV triggers are active (ENV page), the full AHDSR is used to set the shape of the ENV signal

For RUN activation without active ENV triggers, only ATTACK and RELEASE times are applied and the ENV otherwise remains at unity to preserve good loop levels. To instead trigger a full AHDSR cycle on RUN, turn on RUN T on the ENV page

Note that all signals sent to the PF (including AUX in) are modulated by the output envelope

GND-1T

Glitch and Drum Touch

CORE PARAMS 4

The speech chip data and audio signals are used by the GND-1T's unique multi-parameter rhythm generator to improvise DRUM signals on the fly. Unlike conventional drum programming, the DRUM pages on the GND-1T act just like the other synth parameter pages with pots and switches to shape the rhythm sequences. Trigger sources include ROM update events, internal or external MIDI clocks, and audio signal timing. There is a dedicated modulation block that can be used to alter trigger sensitivity, rate, pattern and kit parameters, and all parameters can be linked to the expression matrix. To randomize drum parameters from any page, hold both XPress and ALT buttons, and tap Param

Drums

The rhythm generator sends out user specified MIDI notes on channel 10 and/or internal DRUM KIT Audio Signals according to the D_out switch on the MIDI KITS page: From any page, hold down Param until the INDEX screen appears and with Param still down, tap the DRUM2 button. The MIDI KITS page allows editing of the MIDI out notes for each of the three MIDI drum maps. When the MUTES button is active, each drum note button also acts as a mute for that sound, both for MIDI output and internal kits. Drum sound mutes are saved and loaded with each patch. Internal drum Kits are selected* on the DRUM2 page. The parameter KIT MODULATION DEPTH on that page allows modulation between the main drum kit and two additional kits, using the DTmix (drum trigger mix) waveform. For MIDI drums, the mod maps are the two unselected ones. For internal Kits they are specified on the DRUM2 page as kit m1 and m2 * Select from 40 fixed drum kits, two that randomize the kit on each hit (RAND2 excludes pitched kits) , and 3 user defined kits (see MIDI ref)

The D SRC pot on the DRUM1 page mixes the trigger sources used by the rhythm generator. At its minimum setting (0) it uses only triggers derived from non-audio events selected by the Dsrc=0 button. These include ROM update times and 3 different MIDI clock options (P23). Set Dsrc to maximum to use only triggers extacted from the audio signal (including USB and echo). DTRIG sets the drum trigger sensitivty and alters drum selection within kits. Higher levels usually correspond to denser soundscapes. D RATE limits the rate of triggers coming from the Dsrc mixer by discarding triggers that are too fast. D PAT changes the patterns generated by the algorithm, and when Dsrc=0 is set to a clk option, its modifier DPMOD can optionally act as Drum swing control instead (64=no swing). IMPROV applies additional randomized improvisation. D RATE mod and IMPROV can be quantized

To enable or disable the rhythm generator, toggle* the DRUMS button on the PATCH page, or on other pages hold ALT and briefly tap XPress . When RUN is not active the latter sequence starts the drums on their own. Use this mode to play synth notes on a keyboard while the drums keep running between notes. The drum parameters, Kits, enable status, and individual note mutes are stored and recalled along with each patch. To retain current Kits and status through patch changes, use ALT+DRUM on the main PATCH page to toggle GLOBAL DRUMS. Internal drum sounds for the currently active Kit can also be triggered using external MIDI ch.10 Note-on events, even when DRUMS is switched off. See the MIDI and MIDI Drum Map pages (P20, P25)
* When morphing or drfiting, this action excludes Drum enable status from following further morph/drift changes. Release it by holding the encoder and tapping the DRUMS button

When morphing you can exclude drum parameters (including kits) from morphing by setting the Order parameter on the MORPH+ DRIFT params page to S-Drm (sequential, exclude drums) or R-Drum (random order, ex. drums). To use drum parameters from a different patch to the BLOCK start patch, select the Patch with the desired drum parameters before activating BLOCK. Then activate BLOCK, and use [ALT]+ encoder to relocate the start of the block

GND-IT

Glitch and Drum Touch

CORE PARAMS 5

Mix structure

The output of the speech FILTER is summed with the AUX input before optionally being sent to the OVERDRIVE* (0 = bypass). USB audio and DRUM PF mix signals can be added on the MIX page. Together these signals form the input to the POST-FILTER and output amplitude ENV shaping stage. The remaining proportions of the USB and DRUM signals not sent to the PF are combined with the PF output for stereo output, and echo input selection

* OscGain values below 64 reduce the effect of the overdrive as well as lowering oscillator signal levels

The stereo output is sent to the analog output and optionally USB when mix>usb is selected. Select D > usb to instead route only the unfiltered portion of the DRUMS (without echo) to USB. This removes the unfiltered drums from the analog output, but leaves the PF portion

AUX
IN

OSCGAIN

FILTER

SPEECH CHIP
SYNTH

+

OVER
DRIVE

POST FILTER
& ENV

PF vol

Dvelvar

INTERNAL
DRUMS

Drum vol

mix

D > PF

D remaining drums
not sent to PF

USB in

mix

usb > PF

USB
AUDIO
IN

usb remaining usb
not sent to PF

+

STEREO
OUT

Echo
vol

ECHO

GND-1T

Glitch and Drum Touch

CORE PARAMS 6

Echo and mini Looper

The ECHO effect in the GND-1T spans from ten ms to about 2.5 seconds. ECHO Volume, Delay Time, Repeats, and input selector are adjusted on the MIX page. Select Digital or Tape echo by double tapping the Echo Volume button (shows 'T' when tape is selected). Delay Time can be MIDI clock-synced using the clk Sync button on the MIDI page (P20), or by double-tapping the Delay pot on the Mix page. Set ECHO Volume from any page using [ALT] + Post Filter Encoder. Activate ECHO FREEZE on the main PATCH page to freeze the current echo buffer. The echo loop keeps playing while the synth can be used in the usual way, selecting other patches etc. ECHOFREEZE at longer delay times can be used as a mini LOOPER with Punch and Dub options. DOUBLE-TAP ECHO FREEZE or the Repeat pot on the MIX page to clear the echo buffer instantly.

ECHO parameter settings are stored and recalled with each patch. To override this and use the current echo parameters while recalling or morphing patches, turn on GLOBAL ECHO on the MIX page. GLOBAL ECHO also applies when ECHO FREEZE is enabled*

* But not when ECHO FREEZE is activated automatically by the expression matrix values for the XFRZ T parameter (BENDS2 page) and XfFRZ mode is set to echo

To facilitate loop construction when ECHO FREEZE is used as a mini LOOPER, first set the delay time and echo volume. It may be preferable to switch RUN off so only the ECHO LOOP is heard. Optionally clear the echo buffer by double-tapping ECHO-FEREZE or the Repeats pot. On the main PATCH page, select PUNCH or DUB mode by clicking or ALT-clicking the encoder when ECHO FREEZE is on. Audio will now be sampled into the loop when ever an external MIDI note is on, or the ECHO FREEZE button in pressed on the screen. Different patches can be selected to sample a wide range of sounds into the loop, and can include AUX input. To sample just AUX input, set the OSCGAIN parameter (POSTFILT / OSC page) to zero before sampling

* Sampling into the loop ignores the usual release time associated with any selected patch and applies an instant off

To exit loop construction click the main encoder. The loop continues to cycle while ECHO FREEZE is on. If ECHO FREEZE is turned off, the loop decays at the REPEATS rate

To toggle ECHO-FREEZE LOOP SEND to POST FILTER*, hold XPress and click the main encoder on the PATCH page

* ECHO FREEZE BUTTON shows "PF"

The following pages describe the button and pot functions available on each screen in detail, starting with the MAIN PATCH page and associated ALT pages, and then each of the PARAMETER EDIT PAGES in turn

G N D - i T

PATCH
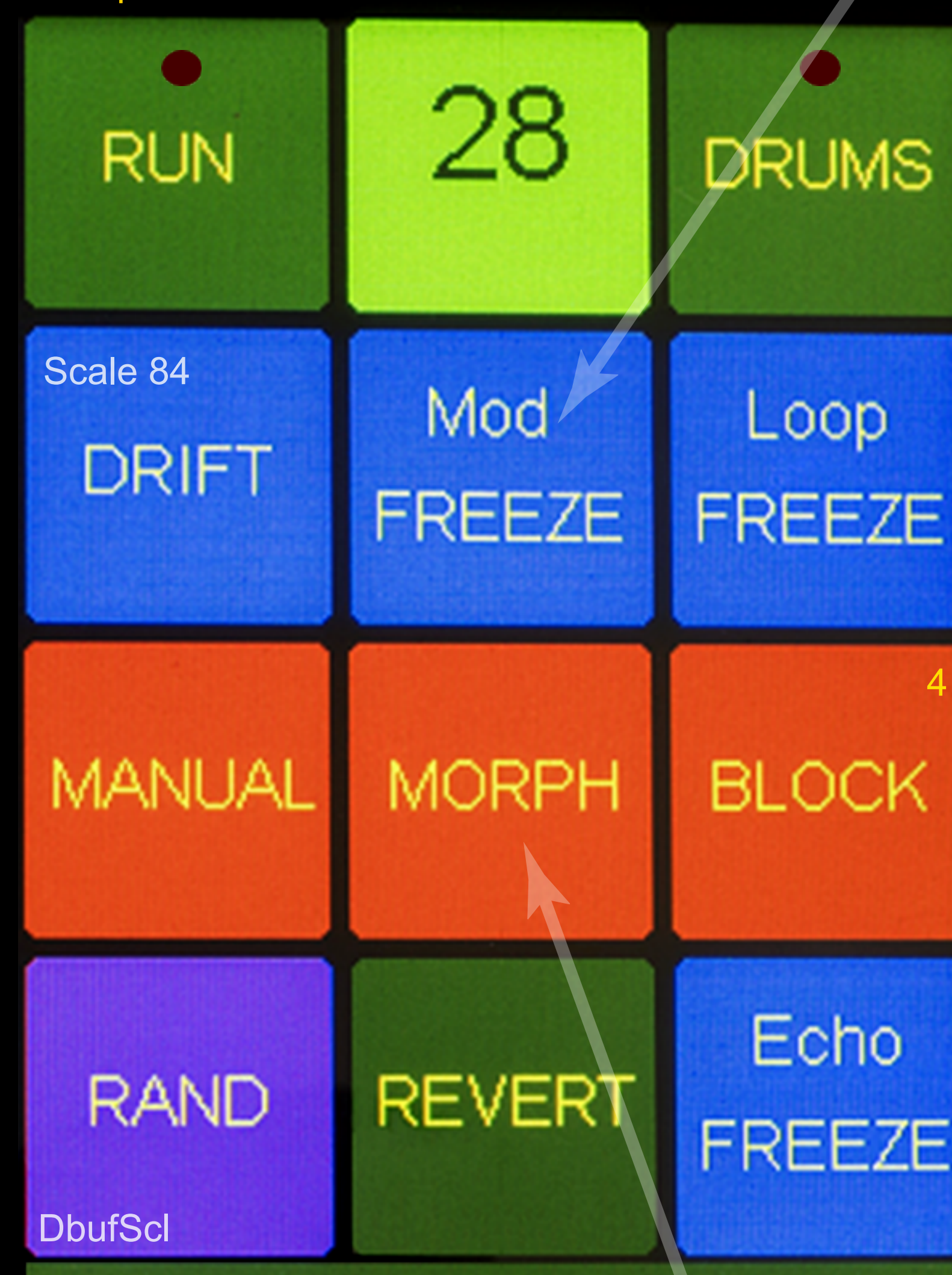
See P17 for [ALT] functions

Tap the PATCH number on the screen or the metal ALT/Patch button to enable encoder patch select mode. To skip over patches hold ALT while turning the encoder

Double tap this button to toggle ERODE (see Bends2 page)
Tap to advance to the next patch while blockmorphing
For clock dependent patches "clk" shows in the top R corner (red if there is no active clk). Hold the metal XPress button and tap the patch number to toggle the internal MIDI clock on/off (see also P20)

For patch # decrement or increment, hold the patch number on the screen and tap the metal Patch▼ or Param▲ button

RUN / STOP patch audio
shortcut [ALT] PARAM

led indicates active MIDI notes
T (top left) indicates env triggers are active
^ (top right) indicates oscEnv is active (see ENV page)

DRIFT slow continuous random drift of patch parameters. P1 enc = Drift depth if Drift is active (see page 11)

Set Drift mode, depth, and rate on the Morph Drift params page. Switch DRIFT off to retain the drifted sound. The acquired Drift offsets can be cleared (ALT+ DRIFT), temp stored (DRIFT+ Patch ▼), or recalled (DRIFT+ Param ▲), or saved-to or loaded-from the permanent Drift buffers 0-999 on the Morph Drift params page (see p18). A # symbol on this button indicates the Drift buffer contains non-zero values.
Drift can be automated using XfrzT (BENDS2 / XPLFO page)
Double-tap to instantaneously create a random Drift-depth constrained Drift buffer
* top left shows the current drift depth or Drift buffer Scaler value

MANUAL MORPH MODE (see page 11) uses the main encoder to morph between the current patch, and a new target* patch

* select target while MANUAL is on, or hold MANUAL and touch Patch ▼ or Param ▲ buttons to decrement or increment the target

RAND randomize synth + drum params or randomize target when morphing or (XP+tap) to randomize drum Kits
RAND Synth = [XPRESS] + tap PARAM
RAND Drums = [XPRESS +ALT] + PARAM

* Bottom left text shows current Main Encoder function as set by ENC XP mapping (unless Patch Morphing), including function change when XPress button is held

MODFREEZE
freezes all modulation block waveforms
shortcut ALT + XPress* = freeze while down
or reverse order XPress + ALT to freeze and include touch sensor effect

^ (top right) indicates the current oscEnv mode invokes mod Freeze, in which case this becomes an "UNFREEZE" button
1-5 (top left) shows the current P1-3 encoder assignment GROUP
* ALT+XPress + encoder click toggles between Mod and Loop Hold

ENABLE / DISABLE Drums (MIDI and internal)
shortcut [ALT] + tap XPress (any page but Patch)
From STOP this shortcut activates RUN DRUMS
RED led indicates external MIDI drum output
BLUE led indicates internal drum output in addition to MIDI
YELLOW led indicates internal drums only
G (top right) indicates global drum parameters mode

LOOP FREEZE
freezes speech ROM data updates
shortcut ALT + XPress* = freeze while down
* ALT+XPress + encoder click toggles between Mod and Loop Hold
^ (top right) indicates current oscEnv mode invokes Loop Freeze

BLOCK MORPH (see page 11) continuous auto morphing between patches* in a block. Activating BLOCK sets the start of the block to the current patch. Relocate it using ALT+encoder. Set parameters on the ALT + MORPH params page
* number in the top right corner shows the current block size

ECHO FREEZE (see page 15) endless echo mode. Modify the loop using: encoder short click for PUNCH IN, ALT-click for DUB. ALT+hold encoder to clear sections in real time
G (top right) indicates global echo parameters mode
Double-tap ECHOFREEZE to clear the echo buffer instantly

REVERT reload all patch parameters as last saved

SINGLE PATCH MORPH (see page 11) auto-morphs from current patch to new target during RUN or MIDI notes. Activate MORPH, and use [ALT] encoder to select the target
"STEP" (top left) indicates block morphing is in step mode, and if so, shows the STEP rate

Glitch and Drum

Touch

[Panel display showing buttons:]
RUN | 28 | DRUMS
Scale 84 DRIFT | Mod FREEZE | Loop FREEZE
MANUAL | MORPH 4 | BLOCK
RAND | REVERT | Echo FREEZE
DbufScl

G N D - i T

Glitch and Drum Touch

[ALT] PATCH

Many of the buttons on the main Patch page have secondary functions when ALT (metal Patch button) is held down

[ALT] PATCH toggle "clear echo on patch changes"
If active, shows "clr E" in top left when not block morphing

[XPress + ALT] PATCH
shortcut to clear clock-mode exclude (see P20)

Hold ALT + click the main encoder to show SAVE* and DELETE options:
SAVE save current parameters to Patch
DEL delete current Patch
SAVE Globals save all Global Parameters
SAVE Template save current Parameters as
                Empty Patch "- -" Template**
SEND 1 send current parameters as Sysex Patch
[ALT] ALL send all saved patches over SysEx
[XP] BNK send current bank (e.g. Patches 0-99)

[ALT] RUN PANIC STOP
stop all audio immediately & turn off any note-on events

[ALT] DRIFT clear tthe DRIFT offsets buffer to recover the undrifted sound

[ALT] DRUMS toggle global drums
G (top right) indicates global drum parameters mode

[ALT] Morph
Show MORPH & DRIFT parameters page

[ALT] RAND UNDO
Undo last RAND action, or if a new patch has just been selected, recover the possibly unsaved patch parameters that were active just before the patch change.
If after the patch change you adjust any of the P-encoders, go to the parameter edit screens, or touch a button on the touch screen other than RUN, PATCH #, or UNDO (ALT RAND), you lose the ability to recover the previous patch, and the new patch becomes the next restore point.
Otherwise additional patch changes will continue to be restored to the same first patch on UNDO

[ALT] ECHO FREEZE MIDI setup*
* when ECHO FREEZE is inactive

[ALT] REVERT show
Multi-Mod / SCENE / Keybd page
If any of the Multi-Mod controls are non-zero a led lights next to teh Multi-Mod text on this button

* Save is only allowed to the current patch, or an empty slot. To overwrite another existing patch, first delete it

** The Template parameters are loaded when an empty slot is encountered on Patch changes, except when morphing which instead loads random parameters into the target patch

GND-1T

Glitch and Drum Touch

DRIFT MORPH

Access via PATCH page [ALT] + MORPH

* All DRIFT and MORPH parameters are global rather than patch specific. To retain their current values as power-up defaults, use SAVE GLOBALS from the main Patch page (see also page 11)
The GND1 allows gradual or STEP morphing

DRIFT DEPTH* (see also page 11)
Sets the extent to which parameters are randomly drifted. Wind back to 0 at any time to drift back to original values. Double tap to use ALT-P1 rather than the P1encoder to set depth whenever Drift is on
* can be XP mapped and P1-3 assigned

DRIFT MODE Drift Synth params, Drums, or Both

(GRADUAL) MORPH TIME
time to auto morph from source to target patches when STEP MODE is off

STEP RATE * can be XP mapped and P1-3 assigned
used instead of MORPH TIME when STEP MODE is enabled
When STEP Mode is set to ClkStp or ClkSnc this sets the numbe of MIDI clocks between steps (see the MIDI reference, table 5). Or for DrmStp / DrmSnc the number of drum triggers per step (table 6)

DRIFT BUFFER SELECT (0-999)
# indicates that the Drift Buffer exists, and @ that it is currently loaded
SAVE stores the current drift offsets to the selected permanent Drift Buffer
click Encoder = LOAD Buffer*
ALT+ click = SAVE Buffer (tap screen)
XPress+click = apply dBuf Scaler & Save
XPress+ ALT+ click = DELETE Buffer

Additional Drift Buf button functions: Double tap to create and load a random temporary Drift buffer constrained by Drift Depth. ALT+tap to null the temporary Drift buffer
* To load permanent Drift Buffers directly from the MAIN PATCH page, set ENC XP mode to include a "Driftbuf" option (see P35).

Drift / Synth / Drums	Drift Dp 0 G	Drift Rt G
MphTime	WtTime	BlockSz
StepRt G	StSwing	StpMde OFF
Drift Buf 120 # LOAD	Order S-drm	mph XP MWL-

BLOCK MORPH ORDER
sets the order and mode in which patches in the block are morphed*:
Sequential, Random, Seq *without drum morphing*, Rand *without drum morphing*
* Whenever the GND-1T morphs to a blank patch it temporarily creates a new random target. A block containing only blank patches will morph between continually randomized targets

BLOCK MORPH WAIT TIME
time to hold morphing parameters constant until next morph interval in non-STEP block morphing

DRIFT RATE* Sets the rate at which parameters Drift. Faster rates cause larger effects
* can be XP mapped and P1-3 assigned

BLOCK SIZE FOR BLOCK MORPHING
* set to 0 for continual random target patches that morph back to the source patch during each morph time interval

STEP MODE OPTIONS:
OFF, ON, ONsync (sync restarts loop on step),
KeyStp (STEP activated by 1st MIDI note on)
KeySnc (KeyStp + restart loop on step)-
ClkStp / Snc (STEP on StepRate MIDI clocks)
DrmStp / Snc (STEP on StepRate drum triggers*)
DrmSnc (DrmStp + restart loop on step)
DrifBuf/Key/Clk/Drm ** (Driftbuffer step morphing)
DrifXfd/DclkXfd ** (Driftbuffer cross-fades)
* See MIDI ref table 6 for drums-per-step. Each drum sound 0-7 steps to = a different patch, ranging from the Block start patch, to start+7. Patches with drums disabled generate a random value 0-7 at Drate related rates
** Driftbuffer step morphing switches between permanent Drift buffers (instead of Patches) at StepRate, starting at the selected driftbuffer #. When active, the main encoder on the Patch page controls the Driftbuffer Scaler (reset to unity = 127 on power-up & Drift activation)

MANUAL MORPH EXPRESSION
assign an external controller for manual morphing (modwheel, velocity, breath control, aftertouch)
"-" indicates the selected controller will be disabled from affecting the expression matrix

STEP MODE SWING
alternating step-time asymmetry between consecutive steps in ON, Onsync and DrifBuf step modes. 64 = 50/50 (no swing)

GND-1T
Glitch and Drum Touch

MULTI-MOD
SCENE
KEY RETRIG

The MULTI-MOD parameters simultaneously apply a bipolar offset to the Depth, Mix, W1 or W2 values in many of the modulation blocks in the GND-1T, or to the LFO rates (LFO1,2,SLFO,CLFO). They are saved along with the other Patch parameters, are fully reversible on Patch recall, and can be inhibited by parameter excludes

Access via PATCH page
ALT+MultiMd Keybd

NULL ALL MULTI-MODS

APPLY ALL MULTI-MODS
updates all mod parameters to include the effect of the MULTI-MODS and then nulls the MULTI-MODS

SCENE* SELECT (0-999)*
# indicates that the Scene exists, and
@ that it was the most recent one applied
click Encoder = LOAD SCENE
ALT+ click = SAVE to Scene (tap screen)
XPress+ ALT+ click = DELETE Scene

POST FILTER CUTOFF KEY TRACKING
Cut-off follows MIDI Note-On values

SCENES

MULTI-MOD
DEPTH offset

MULTI-MOD W1 wave shape offset

MULTI-MOD MIX W1/W2 offset

MULTI-MOD W2 wave shape offset

MULTI-MOD LFO RATES

Loop/LFO restart on additional* Note-On events
MFO restart on any Note-On event
* First active note always restarts the Loop, and also LFOs unless Free LFOs is active (LFO page)

Null Multi	MultDep 11	Mult Mx 0
Apply Multi	Mult W1 0	Mult W2 0
SCENE 3 # LOAD	MultiExcl P mod D mod	MultLfo 0
PostFilt Kbtrack	Key Trig Env Env=> 0	Restart LP+Lfo K* Mfo

KEY-DOWN ENV RETRIGGER on additional* Note-On events, starting from either current ENV value, or zero
* First active note always triggers ENV

EXCLUDE PITCH / DRUM MOD CHANGES from MULTI-MOD
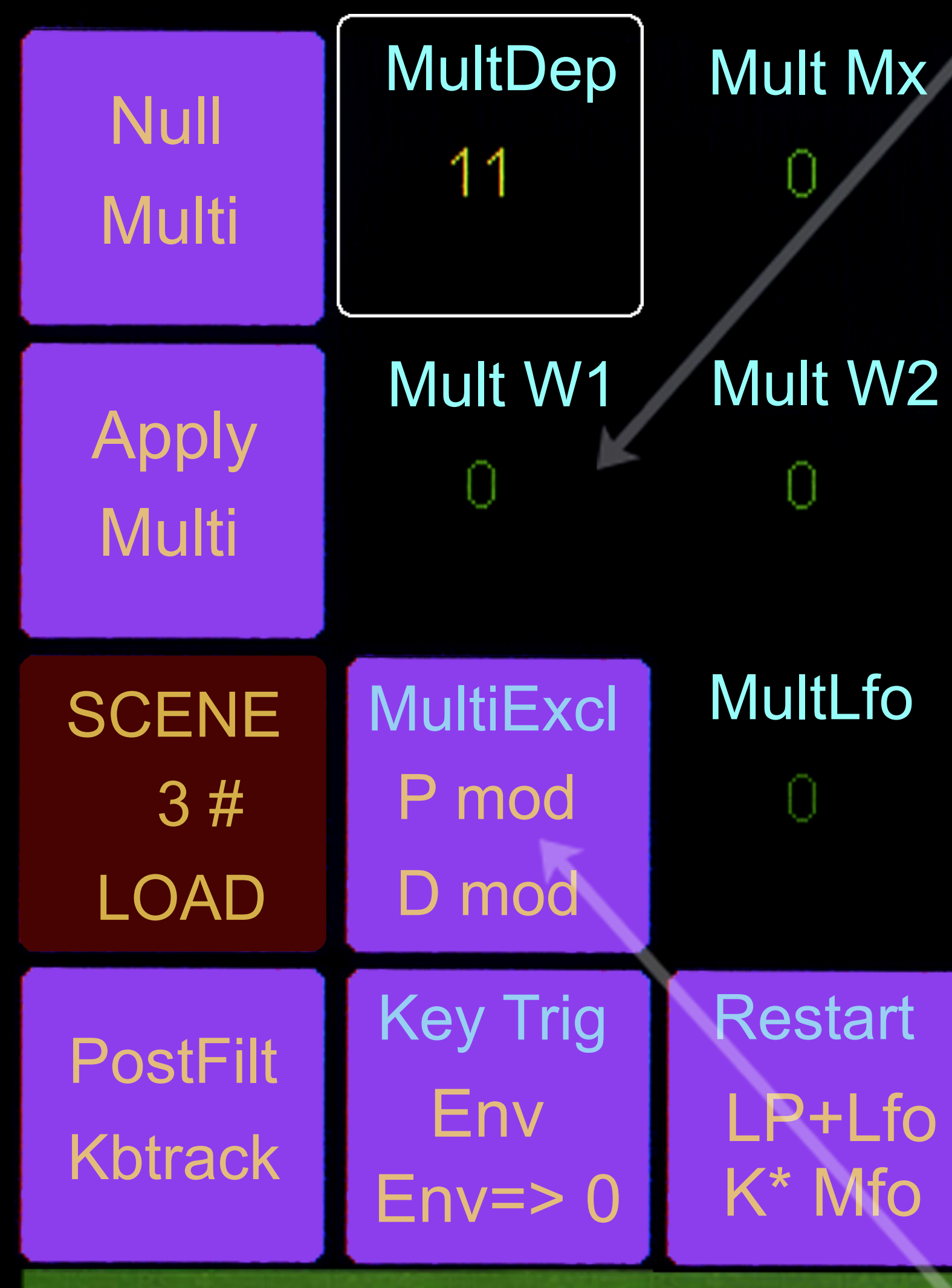
* SCENE SAVE stores all the current patch parameters (including drum on/off status and individual drum mutes) and their excludes, without overwriting the original patch shown on the main Patch page. On Scene load, parameters may therefore differ from those of the original Patch. WARNING: saving to the patch # shown after SCENE load will overwrite the original Patch parameters. SCENES further include all current global Morphing and XP mapping parameters, BLOCK and MANUAL morph status, Drift buffer related parameters, and touch sensor attack / release times. The Global values set by a Scene laod will remain in place for subsequent Patch loads. To reload the Global parameters' power-up default values, double-click the main encoder on the Patch page.

MIDI SET UP

G N D - 1 T

Glitch and Drum

Touch

MIDI Ch: GND-1T Rx CHANNEL (auto saved) use the main encoder to set the MIDI receive channel

[ALT] MIDI Ch (global) toggles drmRX, which allows external MIDI ch10 drum notes to trigger internal drum Kit sounds. MIDI trigger notes are as defined by MIDI Drum Map 0 (P25)

MIDI THRU CONNECTIVITY (auto saved) Off, USB>DIN, DIN>USB, DIN > DIN, DIN>DIN+USB, USB< >DIN, HOST>DIN,HOST>USB, HOST>DIN+USB

[ALT] Thru (global) toggles sncRUN, which causes MIDI Start/Clk to activate the GND-1T RUN command

CLK BPM sets the GND-1T internal MIDI clock rate for the current patch

[ALT] clk BPM sets the internal clock mode* to: off, on-during-run, on, or always-on_internal-only

To toggle the internal clock on/off from the main Patch page, hold the metal XPress button and tap the patch number button. N.B. Clock mode is the only parameter for which the exclude is not released by a long encoder hold. To release it, select the CLK BPM pot and ALT-hold the encoder. Or on the main PATCH page hold both XPress & Patch buttons, and tap the patch number. * During clock-based Block Step Morphing the clock is forced on, unless EXTERNAL MIDI clock mode is set. The clock mode shown on the BPM button is then ignored, and doesn't reflect clock status

DOUBLE TAP to set global EXTERNAL MIDI clock mode (see P38)

CLK SYNC See P38 Select direct MIDI clock sync for of Echo, LFO, and Tempo (ROM update rate)

MIDI CLOCK PPQN *SCALING* ENABLES* for Tempo, LFO1+2, Loop length, and Drum rate

Midi Ch
1
drmRX on

Thru
Off
sncRun on

clk BPM
120
clock on

clk Sync
Echo
LFO
Tempo

Tempo clkScale	ppq Tmp 24
LFOs clkScale	ppq Lfo 24
Loop clkScale	ppq LP 24
Drate clkScale	ppq Drm 24

MIDI CLOCK PPQN SCALERS
24 = unity scaler at 120bpm
12 = double rate at 120bpm
(0 = 48x rate at 120bpm)
48=half rate at 120bpm
etc

Hold [ALT] after selecting one of the PPQN scalers to simultaneously change all 4 scalers with the main encoder

* PPQN scalers don't sync parameters directly to the MIDI clock. Instead they scale the patch's usual parameter values according to the clock BPM rate and each parameter's respective PPQN scaler. BPM=120, and PPQN = 24 sets unity scaling. This approach has the benefit of being able to retain complex non-linear behavior of the scaled parameters. Use clk Sync to directly sync Echo delay time, LFO rates, and Tempo (or double tap those parameter pots). Set Dsrc=0 to a "clk" option to sync drum triggers. Set block-morphing StpMode to a clocked option to direct-sync the morph steps (P38)

GND-1T

Glitch and Drum Touch

INDEX

Most of the GND-1T patch parameters are available via 12 Parameter edit pages that are selectable from the index screen. From any page hold down the metal Param button to show the index page. From any edit page, tap Param to toggle between edit and index pages

On the index page, select the desired Parameter page by pressing its button on the screen, or rotate the encoder and click it

The current selection is highlighted in yellow

Pitch	Drum 1	Drum 2 WORD
MFO	Bend 1	Bend 2 XPlfo
LFO Tempo	Loop Stereo	ENV
Filter	PostFilt OSC	Mix Echo

[ALT] Drum2 goes directly to the MIDI DRUM MAP page rather than DRUM2 / WORD This enables quick access to e.g. individual drum note mutes from any page by holding down Param and tapping Drum2 once the index page shows

To return to the Patch page from any page, briefly tap the metal Patch button

G
N
D
-
1
T

Glitch
and
Drum

Touch

PITCH

The speech chip uses ROM based, time-varying pitch contours for each word/loop. These are scaled up or down by the GND-1T PITCH parameter. Set to values around 80 for the original speech chip pitch

PITCH
Speech ROM pitch scaler.The main encoder steps in semitones. Finer resolution is available using P1-P3 assignment (P2 factory default). Double-tap to invert the ROM pitch contour (shows ? as words can sound like questions in this mode)

PITCH MOD MIX
mixes W1 and W2 pitch modulators. 0=W1,127=W2, 64 = 50/50
Double-tap to replace Aftertouch with the P mix signal in the expression matrix (shows X)

PITCHMOD mode
set polarity and uni- or bipolar modulation. [ALT] tap to select previous option

PITCH MOD DEPTH

PITCH MOD W1 waveform select
W1 waveforms are derived from LFO1, ENV, SLFO1, CLFO1, LOOP, OscEnv, and Drum-note signals

PITCH MOD W2 waveform select
W2 waveforms are derived from LFO2, ENV, SLFO2, CLFO2, LOOP, OscEnv, and Drum-note signals

FIFTHS* adds a second oscillator waveform a fifth below or above the original pitch. "md" indicates modulated fifths, which varies between off, and a fifth below or above according to the Pmix waveform value. [ALT] tap to select previous option

* When using pitch-contour-quantize Major or Minor options, fifths are diminished or augmented where needed to remain in key

TUNE pitch fine tuning parameter (+/- 1 semitone range, 64=0)

PITCH BEND DOWN RANGE
Sets max pitch bend down in semitones
* Global parameter affecting all patches. Save using SAVE GLOBALS on the main patch page

PORTAMENTO sets the time taken to go from one note pitch to the next when two or more notes are active

PITCH BEND UP RANGE
Sets max pitch bend up in semitones
* Global parameter affecting all patches. Save using SAVE GLOBALS on the main Patch page

PITCH CONTOUR QUANTIZE & STEADY PITCH
Quantizes the time-varying pitch contour defined for each word in the speech ROM into chromatic, major, or minor divisions. Or replaces it with a single steady pitch. Set Pitch = 80 for A440 tuning. [ALT] tap to select previous option

Pmod
+   -
+/-   -/+

Pitch
77

P mod

P W1   P mix   P W2
P75   pwmQ3

Tune   Chroma   Fifths
          Maj Min off   -
          Steady   +   md

Porta   PbndUp   PbndDn
          5   24
          G   G

GND-1T

Glitch and Drum Touch

DRUM1

There are no preset drum patterns stored in the GND-1T. All drum triggers are created by the interaction between source signals and the drum parameter settings

DRUM TRIGGER SOURCE

for the input to the drum algorithm. Sets the balance between 'event signals' (speech ROM updates, internal or external MIDI clocks) at 0, and audio signals (PF output*,echo, USB) at 127. The event signals often produce slower and more regular triggers

* For "Run Drums only" mode, the PF input rather than output is used by D src, as the output is muted by the ENV

EVENT DRIVEN DRUM TRIGGER SRC

Selects whether speech chip ROM update times, or int/ext MIDI clocks* are used as the DSRC=0 signal

* MIDI-clock derived Dsrc triggers are generated every 4 (clk+), 6 (clk), or 12 (clk-) MIDI clock cycles, corresponding to 16th triplets, 16ths, or 8ths.
MIDI start resets the clock counter. DPmod becomes swing control of the Dsrc=0 triggers in these modes

DRUM TRIGGER SENSITIVTY

scales DRUM TRIGGER SOURCE signals, generally causing more triggers at higher settings
set to 0 to inhibit triggers

DRUM TRIGGER RATE

sets upper rate limit of allowed drum triggers. Set to 0 to inhibit triggers

DRUM PATTERN

modifies event timing in the drum algorithms, resulting in pattern variations
Double-tap to toggle STEADY BEAT (shows "S") for clocked Dsrc0 trigger modes, which triggers kick drums on every* MIDI quarter beat (24 clocks).
* Can be affected by Dtrig / DTmod but not Drate / DRmod.
To toggle via MIDI use NRPN CC98 = 80 (see MIDI ref).
Dkit mod is nulled during STEADY BEAT kick triggers

Dsrc=0	D Src	quantize
rom clk+	96	DRmod
clk clk-		Improv
D trig	DTmod	DTKmix
D rate	DRmod	DRPmix
D pat	DPmod	Improv

DRUM TRIGGER SENSITIVITY MOD
uses DTmix as modulator (additive)

QUANTIZE MODES off, DRmod only,
improv only, or both

DRUM TRIG SENS + KIT MOD MIX
mixes W1 and W2 drum modulator waveforms selected on DRUM2 edit page
For D kit modulation see DRUM2 page

DRUM RATE+PATTERN MOD MIX
mixes W1 and W2 drum modulator waveforms selected on DRUM2 edit page

IMPROVISE
depth of additional improvisation / randomization applied to the drum triggers

DRUM TRIGGER RATE MOD depth
uses DRPmix as modulator
Shows "+" at low Drates for which modulation becomes additive (added to Drate) rather than multiplicative (scales Drate)
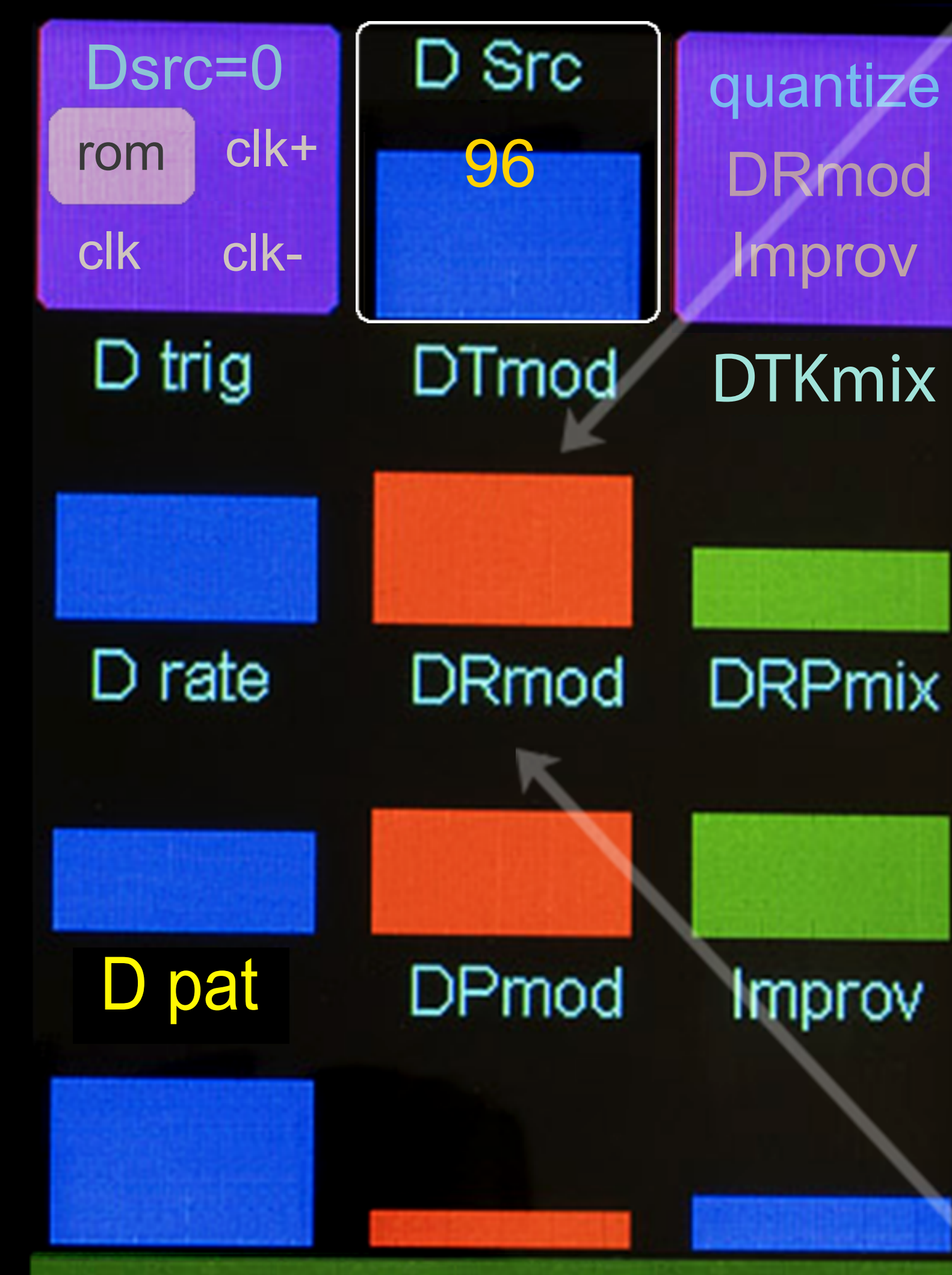
DRUM PATTERN MOD depth
uses DRPmix as modulator waveform
When Dsrc0 is set to a MIDI clocked option this pot can also control DRUM SWING (64=no swing) instead*. Double tap the screen pot to toggle between these modes *Either Swing or Mod, not both

GND-iT

Glitch
and
Drum

Touch

DRUM2 / WORD

DRUM KIT MOD DEPTH
scales DTMIX waveform to switch
from main kit -> m1 -> m2 as modulation
increases.
For external MIDI drums, the current MIDI drum map is
the main map, and the next two act as m1 and m2 with
wrap around to map 0 after 2

ALT+ kit mod = MIDI KITS button
(shows MIDI DRUM MAP page)

MAIN INTERNAL DRUM KIT SELECT*
active at zero or low kit-mod levels. If off,
internal kits m1 and m2 are also disabled.
LED shows current active kit
* see MIDI reference for kit list

DRUM DECAY
Used to shorten the sounds of the
internal drum kits. Set to 127 to leave
original sample lengths

WORD SELECT IN CURRENT WORDBANK
Word 0 - 59

ALT+WORD = RANDOM WORD
Use INIT first to clear all params

WORD BANK SELECT
Choose one of 5 banks each with 60 words

ALT+ WORDBANK = GLITCH* WORD
randomizes both WORD / WORDBANK
and GLITCH parameter value

DRUM MOD W1 waveform select
W1 waveforms are derived from
LFO1, ENV, SLFO1, CLFO1, LOOP,
OscEnv, and Drum-note signals
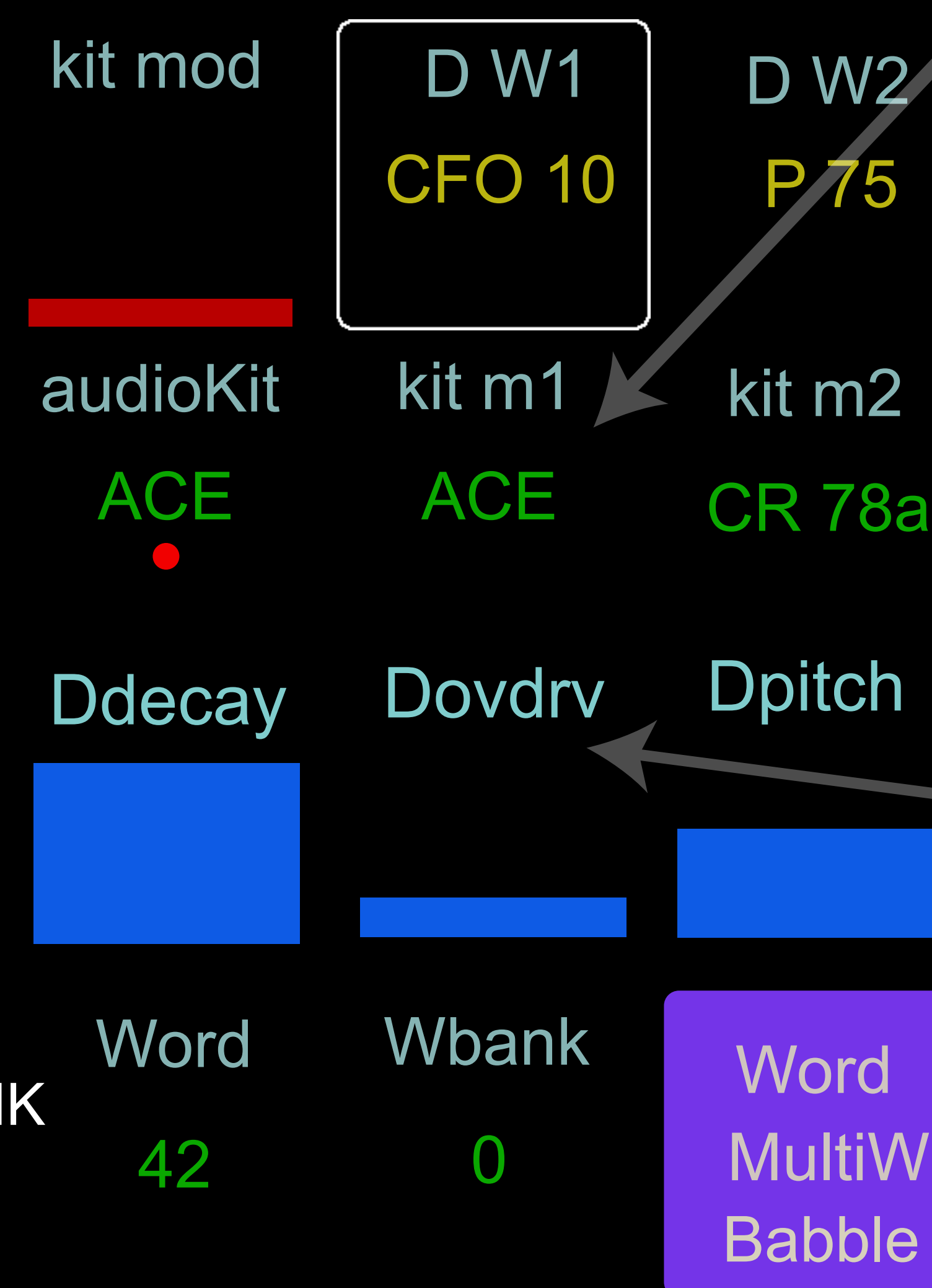
INTERNAL DRUM KIT MOD-1 select
active at medium kit mod levels
set to Off for no drums at those levels

DRUM MOD W2 waveform select
W2 waveforms are derived from
LFO2, ENV, SLFO2, CLFO2, LOOP,
OscEnv, and Drum-note signals

INTERNAL DRUM KIT MOD-2 select
active at high kit mod levels
set to Off for no drums at those levels

DRUM PITCH (64 = original sample pitch)

DRUM OVERDRIVE
Tube overdrive for internal drums

SPEAK MODES
allows the speech chip to produce intelligible
speech sounds if bends and modifiers are zero.
If no speak mode is selected, sounds are random

Word* = Single word, MIDI notes change Pitch
MultiWord = different word on each MIDI key
5 wordbank key-layouts, with 60 words each

Babble = new random word for each loop
MIDI notes change pitch

* Set Loop length to 127 for one-shot speech WORDS when Glitch
and Gravity are also set to 0. Or if triggering via MIDI notes, turn on
keyboard one-shot mode for any parameter settings by double
tapping the Loop pot

ALT + SPEAK MODES =
INITIALIZE PATCH nulls all
bends, modulators, and
expression matrix* to allow
intelligible speech sounds.

* except Breath control XP (touch sensor
by default) for Pitch is set to -31

kit mod

D W1
CFO 10

D W2
P 75

audioKit
ACE

kit m1
ACE

kit m2
CR 78a

Ddecay

Dovdrv

Dpitch

Word
42

Wbank
0

Word
MultiW
Babble

MIDI DRUM MAPS
+ DRUM OUTPUT and INDIVIDUAL DRUM MUTES
FOR MIDI + AUDIO KITS

Access via DRUM2 page [ALT] kit mod button or:

SHORTCUT from any page hold metal Param button until index page appears, keep PARAM down, tap Drum2_WORD

SAVE MIDI DRUM MAPS*
Saves current MIDI drum notes for all three maps as power up default
*not saved by SAVE GLOBALS

ACTIVE MIDI DRUM MAP
Set to 0,1 or 2. The DRUM KIT MOD DEPTH parameter (DRUM2 page) modulates this map up to the next two maps, wrapping around to 0 after 2.

e.g. with the current MIDI MAP set to 2, moderate moulation leveles cause the map to switch to 0, and strong modulation levels to MAP 1

DRUM OUTPUT SELECT
Select whether to send drum triggers to external MIDI devices, use them to play the internal Drum Kits of the GND-1T, or both. Internal kits are selected on the DRUM2 page

ENABLE INDIVIDUAL DRUM MUTES
Activate individual drum note mutes, and allow setting or clearing of mutes by tapping on any drum note pot. When MUTES is switched off, toggle individual (inactive) drum mutes using [ALT] tap. Mutes apply to both MIDI and internal drum kits, and are saved and restored with each patch

SAVE MIDI

Kick 36   **Snare** 38

D MAP 0

O hat 42   **C hat** 46

D out
MIDI internal

L Tom 45   **H Tom** 50

MUTES

Clap 39   **Rim** 37

MIDI DRUM MAPPING
MIDI Drum Maps (D MAP) 0,1 and 2 define for each map the 8 note values sent out by the GND-1T to external MIDI drum devices. Select the current MIDI drum map, click on any of the 8 drum buttons and use the main encoder to set the midi note value sent out for that drum trigger. The maps are Global parameters. To save them for subsequent sessions, click the SAVE button on this page

Drum MAP 0 also defines the MIDI channel 10 note values that can be received by the GND-1T to trigger the currently selected internal Drum Kit sounds. To disable automated algorithm drum triggers, and only hear receieved drums, turn off DRUMS on the main patch page. Or set the drum trigger parameters on the Drum1 page to zero.

To enable/disable channel 10 drum receive responses, toggle "drmRX on/off" parameter on the MIDI page (P20) by holding ALT and tapping the Midi Ch button.

MFO

The MFO (mid freq osc) spans subsonic to moderate audio rates.
In addition to its use for amplitude modulation and ring-modulation,
it can be used to modulate pitch and speech filters, producing unique
effects and timbres

MFO RATE

OSCILLATOR SYNC
OSCsnc makes the MFO track pitch-pot
and MIDI note changes for a single ROM
pitch contour value. Use Type II when you
want it to additionally follow variable ROM
pitch values in longer loops

AM TURBO enables stronger
AM waveshaping

AMPLITUDE MFO DEPTH
modulates synth amplitude
with MFO signal

MFO MOD
Uses the MFO MODMIX signal
to modulate the MFO modulator.
Alters MFO mod-depth, MFO
rate, or both, according to MFO
MOD MODE

OFFSET
offsets the MFO modulator so it can produce
bipolar modulation. Set to max for ring-
modulation and 0 for unipolar AM modulation

MFO FINE TUNE for accurate control of
(sub)harmonic modulation interaction with
OSC frequencies

MFO WAVESHAPE select one of 16
possible MFO waveshapes (see the
MIDI reference for a list). Select SIN for
traditional ring-modulation and lowest
number of sidebands

FILTER MFO DEPTH
modulates speech filters with the MFO signal

MFO MOD MODE
selects whether modulation of the MFO
applies to mod-depth, rate, or both

PITCH MFO DEPTH
modulates OSC pitch with the MFO signal

MFO MODMIX
uses the two waveforms selected
in the Loop modulation block

Free
OSCsnc
Type II

MFO Rt
33

Fine

AMturbo

Offset

Shape
FALL

A MFO

P MFO

F MFO

mod

mix(LP)

modMFO
Depth
Rate

GND-1T

G
N
D
-
1
T

Glitch
and
Drum
Touch

BEND1

GLITCH
This parameter is the equivalent of having a large number of "bend switches" in classic hardware circuit bending. Use in conjunction with the INIT and RANDOM WORD commands on the DRUM2 / WORD page to hear the familiar "nonsense" speech sounds
Double-tap to null all Bend pots

GRAVITY
binds data from the speech ROM to provide denser sound

FLIP flips the speech ROM data

SOFT BENDS changes Gravity and Plasma response curves to produce a milder effect.

INVERT PLASMA inverts the effect of Plasma to produce sparser rather than denser sounds.

ORBIT simulates hardware bends that cause ROM address and data lines to interact. Often works well as an A/B variation

GRAVITY and PLASMA
are highly non-linear and at higher levels in particular can lead to loud and highly resonant sounds. Use Soft B, iPlasma, and the Filter 'Derez' parameter to moderate their effect

GLITCH MOD DEPTH

GRAVITY MOD DEPTH

PLASMA MOD DEPTH

FLUX MOD DEPTH

Bendmix mod waveform for these 4 modulators is set on the BEND2 page

FLUX
A milder circuit bend that often produces more subtle rhythmic variations

PLASMA
Modifies how gravity is applied. Use INVERT PLASMA to invert its effect and obtain sparser sound

Flip | Glitch 38 | GLmod
Soft B | Gravity | GRmod
iPlasm | Plasma | PlsMod
Orbit | Flux | FlMod

BEND2
XPlfo

BLUR
smooths the PITCH, FILTER and level
of speech ROM fragments
Double-tap to apply only to voiced
fragments and avoid high pitch-bends

BENDS MOD W1 waveform select W1
waveforms are derived from LFO1, ENV,
SLFO1, CLFO1, LOOP, OscEnv, and
Drum-note signals

EXPRESSION FREEZE MODE
sets LOOP, modulation*, or Echo
FREEZE, or DRIFT to be auto-activated
when XFrz T is exceeded by the sum of its
expression matrix signals **

* Setting XfrxMode to mod by default means locking the LFOs,
so LFO based XPlfo and P mix signlas can't be used for
expression automation. To overcome this, double tap Xfrz T
to run the LFOS in 'Background mode'.
For Oscenv modes that activate loop or mod freeze during
AHD envelopes, XFREEZE acts as an "UNFREEZE" control

XPLFO MOD W1 waveform select
W1 waveforms are derived from
LFO1, ENV, SLFO1, CLFO1, LOOP,
OscEnv, and Drum-note signals

The XPLFO modulator is used as an automated
expression controller signal that can be applied to
any continuous parameter via the expression matrix.
To assign a parameter hold the parameter on the
screen and touch the XPRESS sensor

WARP
Unique audio band self-modulation
that causes frequency warping and
distortion. Adopted from a custom
bend developed initially on hardware
Speak & Spell speech chips

Blur | Warp 0 | Erode
B W1 | B mix | B W2
Sfo1 r | | pwmQ4
XfrzMode (loop, mod, echo, drift) | XFrz T ● | XPlfoScl
XlfoW1 | XlfoMx | XlfoW2

XPLFO MIX
mixes XPLFO W1 and W2
waveforms to produce the
XPLFO signal for use in the
expression matrix
0=W1,127=W2, 64 = 50/50

BENDS MOD MIX
mixes W1 and W2 bend modulators.
0=W1,127=W2, 64 = 50/50

ERODE corrupts individual bits in the
ROM data stream to produce variations
on the current patch theme. Rate covaries
with the Tempo parameter
Shortcut on the main PATCH page:
Double-tap the patch number screen-button to toggle ERODE

BENDS MOD W2 waveform select
W2 waveforms are derived from
LFO2, ENV, SLFO2, CLFO2, LOOP,
OscEnv, and Drum-note signals

XPLFO SCALER
Scales down the magnitude of the
XPLFO waveform before being applied
in the expression matrix

XPLFO MOD W2 waveform select W2
waveforms are derived from LFO2, ENV, SLFO2,
CLFO2, LOOP, OscEnv, and Drum-note signals

EXPRESSION FREEZE THRESHOLD
Sets threshold that the sum of the expression
matrix signals for this parameter must exceed
to trigger a Loop, mod, or echo-Freeze, or Drift
command (led turns on). Double-tap to enable
"Background LFO" mode which allows mod
freeze automation without locking XPlfo and Pmix

** The expression matrix values for XFrz T scale
their controller signals prior to testing against
Xfrz T. Set the matrix value to 127 to compare a
controller value directly against the threshold

GND-1T

Glitch and Drum Touch

LOOP STEREO

LOOP LENGTH*
changes the number of speech/sound elements included in the loop, which are updated at Tempo rate. Setting this very short allows the loop to be used as a complex oscillator waveform, which is useful e.g. for 'keyboard patches'.
Double-tap this pot to toggle LINEAR loop length:
This sets the loop length exactly to the displayed number of speech fragments (otherwise the range is logarithmic). When Tempo and Drums are both direct clocked, you can set a known number of drum beats per loop using this mode.

* Setting the Loop length to 127 in WORD mode, when Glitch and Gravity bends are set to 0, causes the length of the loop to automatically be adjusted to match the length of each word.

RAND LOOP
randomizes loop ROM address and turns off speak modes
[ALT] Restore LOOP
restores ROM address and speak mode state*
[XPress] Nudge LOOP
slightly shifts the loop ROM address
* Loop restore values are (re)defined by these events:
Patch load, save, or revert
RAND synth and WORD functions
Setting Word or Wbank (Drum2 page)

LOOP MOD W1 waveform select
W1 waveforms are derived from LFO1, ENV, SLFO1, CLFO1, LOOP, OscEnv, and Drum-note signals

BENDS STEREO MOD DEPTH
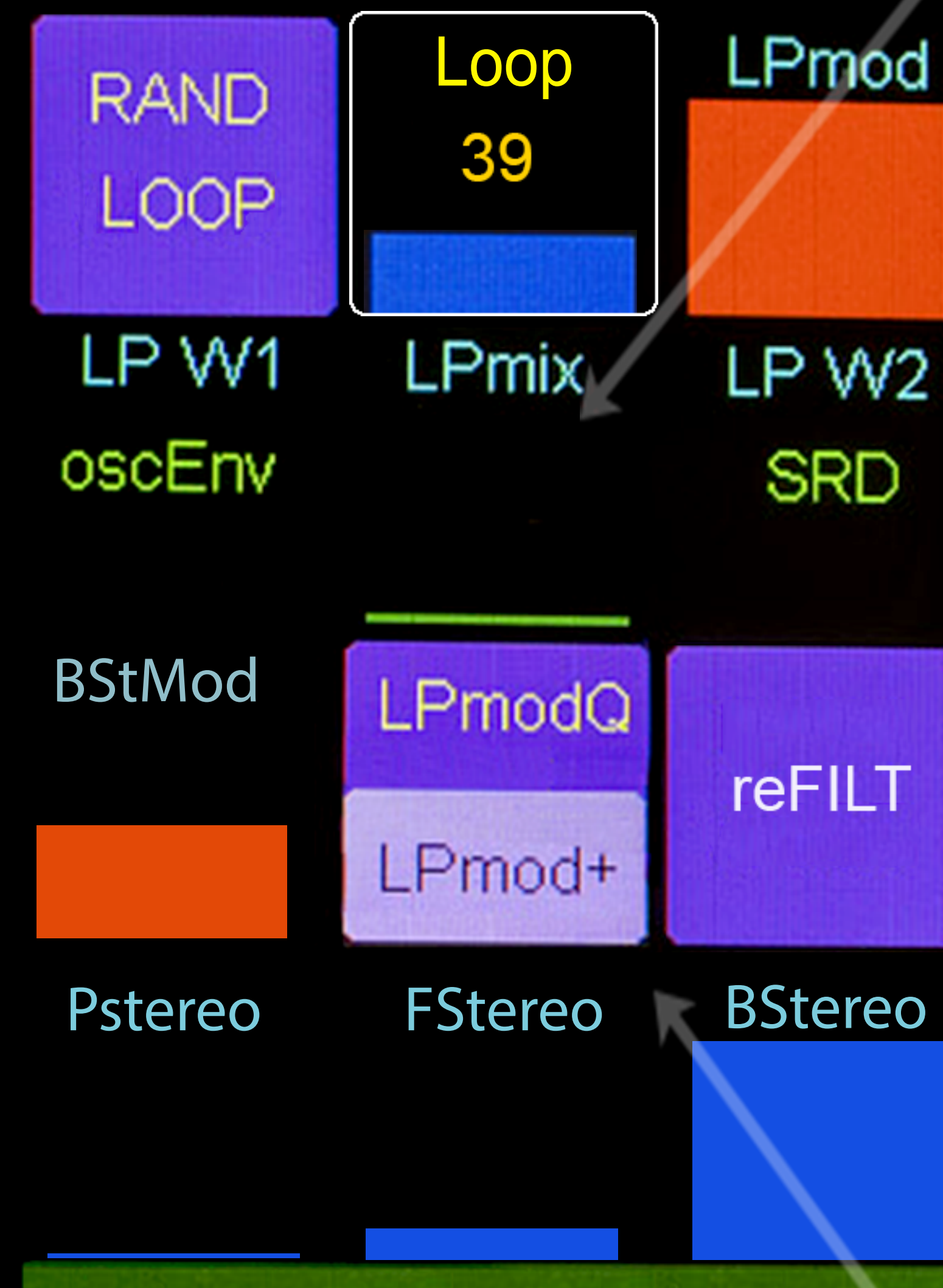uses BENDS MOD MIX waveform to modulate BENDS STEREO

PHASE STEREO
Imparts a (milder) stereo image using phase differences

RAND LOOP — LP W1 — oscEnv
Loop 39 — LPmix
LPmod — LP W2 — SRD
BStMod — LPmodQ / LPmod+ — reFILT
Pstereo — FStereo — BStereo

LOOP LENGTH MOD MIX
mixes W1 and W2 loop modulators.
0=W1,127=W2, 64 = 50/50

LOOP LENGTH MOD DEPTH
Double-tap this pot to toggle ONESHOT mode This issues an internal 'all notes off' at the end of the loop (set oneshot via MIDI using NRPN CC 98=84)
Loop length modulation wavefroms are inverted in the GND-1T so that higher waveform values produce shorter (faster) loops. For this reason the DC=1 mod waveform doesn't change the loop.

LOOP MOD W2 waveform select
W2 waveforms are derived from LFO2, ENV, SLFO2, CLFO2, LOOP, OscEnv, and Drum-note signals

LOOP ReFILTER mode
reloads the FILTER and resets the effect of GRAVITY on each loop cycle to produce more regular loops

BENDS STEREO
Activates dual circuit bending engines for potentially strong stereo* streams with independent but temporally related sounds in L and R channels
* requires bend parameters to be active

LOOP MODULATION MODE
LPmod+ sets additive LOOP length modulation, otherwise modulation is multiplicative (scaler).
LPmodQ* quantizes modulation and restricts it to integer (sub)multiples of the loop length
* not available in additive mode

FILTER STEREO
Introduces asymmetric offsets between L and R speech filters, producing essentially different speech formants

G N D - 1 T

Glitch and Drum Touch

LFO / TEMPO

For MIDI clocked control see P38

LFO MOD DEPTH
uses the BENDS mod mix waveform to modulate LFO1 and LFO2 rates

PULSAR LFO1/2 MODE
LFO 1 and 2 take turns in completing one oscillation cycle, and are held at 0 during their inactive cycle

FREE RUNNING LFOS
LFOs are not restarted on RUN or MIDI Note-on events

TEMPO**
sets the rate at which speech ROM data are updated from SPEECH ROM i.e. how fast words are spoken, or more generally the speed of the sounds in a loop. For very short loops with only a single data fragment, Tempo changes will not be audible because the same parameters are reloaded at each update
** Double-tap to toggle TEMPO direct clocking mode

LFO1 RATE* led shows rate
Shows "clk" if LFOs are direct MIDI synced

* Double-tap either LFO1 or 2 to toggle LFOs direct clocking mode

LFmd(B)   LFO 1 ●   LFO 2 ●
21

Pulsar   LPsnc 1   LPsnc 2

● SLFO ●   ● CLFO ●

Free

Tempo   Tmd(LP)   CROSS

TEMPO MOD DEPTH
uses the Loop length mod mix waveform to modulate Tempo
When Tempo is direct synced to MIDI clk (P20, P38), this can optionally be a TEMPO SWING control instead*:
Double tap to toggle between modes
* Either Swing OR Mod is applied, not both

LFO1 LOOP / DRUM SYNC
LOOP: LFO1 rate is a scaled version of the estimated (variable) Loop rate.
Rate limited for very short loops. Only effective if "LPmod+" is off (LOOP page)
DRUM: MIDI clocked LFO2 is DRUM Dsrc0 clk synced

LFO2 RATE8 led shows rate
Shows "clk" if LFOs are direct MIDI synced

LFO2 LOOP / DRUM SYNC
LOOP: LFO2 rate is a scaled version of the estimated (variable) Loop rate.
Rate limited for very short loops. Only effective if "LPmod+" is off (LOOP page)
DRUM: MIDI clocked LFO2 is DRUM Dsrc0 clk synced

CLFO1 (left led) and CLFO2 (right) RATE
sets the rate of a "3D" Chaotic LFO where CLFO1 and 2 are projections of that oscillator in two of the dimensions. Their rates have time-varying ratios, and their varying amplitudes rarely reach extreme values of 0 or 1

CROSS MODULATION DEPTH
LFO1, LFO2, and SLFO three-way cross modulation depth

SLFO 1 (left led) and 2 (right) RATE
sets the rate of the (Slow) SLFOs.
SLFO2 rate is a fixed non-integer multiple of SLFO1 (about 1.44x)
Double-tap to toggle SLFOs start at minimum** value (shows "m")
** also see MIDI REF NRPN CC98 = 81

GND-iT

Glitch and Drum Touch

ENV

Full AHDSR ENV triggers are activated by MIDI Note-On events. And also by LFOs, SLFO1, CLFO1, LOOP-start and RUN activation if the corresponding trigger enable at the bottom of this screen is on

If RUN is started without any active trigger source, a modified ENV is generated that applies ATTACK time on RUN, and remains at maximum until STOP is issued and RELEASE time is applied

ATTACK TIME
applies to all ENV / OSCENV events
Optionally modulated by ADmd
(Attack/Decay modulator)

SUSTAIN LEVEL
applies to triggered AHDSR events only

RUN ENV TRIGGER ENABLE
when off (default) RUN / STOP applies only Attack / Release times according to the Amp Env depth. When on, starting RUN triggers a full AHDSR event

LFO 1 and 2 ENV TRIGGER ENABLES

Although AHDSR and osc OSCENV envelopes share ATTACK, HOLD, and RELEASE parameters they operate independently with AHD triggers always at TEMPO rate regardless of any AHDSR triggers

HOLD TIME
applies to AHDSR and OSCENV events only

RELEASE TIME
applies to all ENV events
Optionally modulated by ADmd

DECAY TIME
applies to AHDSR and OSC ENV events only. Optionally modulated by ADmd

ATTACK / DECAY MOD DEPTH (ADmd)
uses Pitch mod waveform to shorten attack and decay times as pitch mod rises

OSC ENV MODE
When off, OSC levels are updated immediately from the speech ROM and scaled only by OSCGAIN (OSC page). Switch to various AHD modes to enable attack/hold/decay smoothing*.
See page 12 for more details
* RUN button shows "^"

LOOP SYNC ENV TRIGGER ENABLE

SYNTH AMPLITUDE ENV MOD DEPTH
sets depth of ENV amplitude modulation

SLFO and CLFO ENV TRIGGER ENABLES

Attack   Hold   Decay
Sustain   Release   ADmd(P)
Amp Env   Osc Env AHD->0
Run T
Env trig Lfo1 Lfo2   Env trig Slfo Clfo   Loop T

FILTER

G
N
D
-
1
T

Glitch
and
Drum

Touch

The speech chip uses specific sequences of multi-resonance speech filter settings to create each word. The FILTER parameter allows you to shift those filter frequencies and resonances
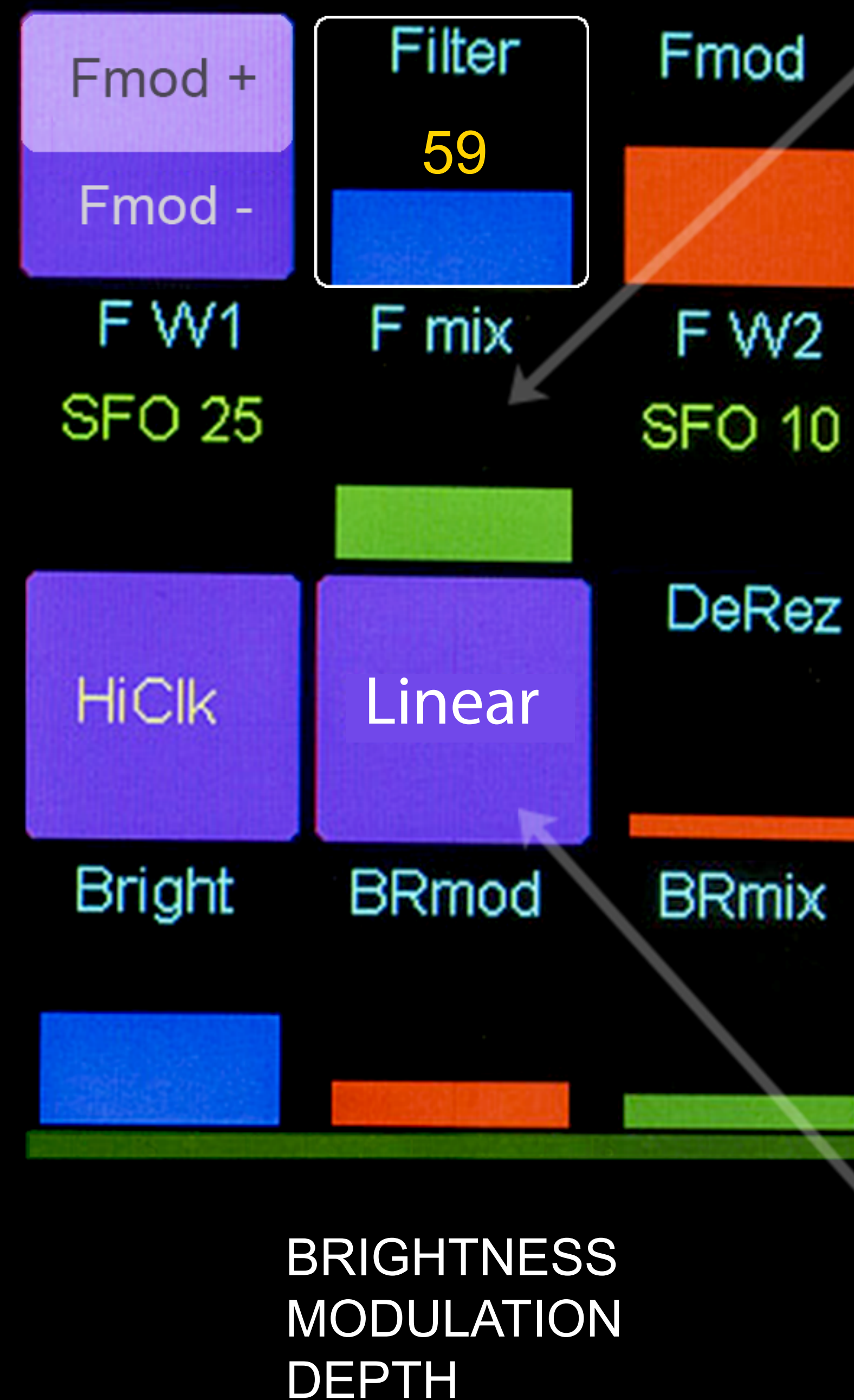
FILTER
sets the amount the speech filter frequencies
and resonances are shifted (see also Linear below).
Double-tap to toggle Soft clipping (shows 's') rather than
hard-limiting, and invoke a smoother unvoiced excitation source

FILTER MOD MIX
mixes W1 and W2 filter modulators.
0=W1,127=W2, 64 = 50/50

FILTER MOD POLARITY

FILTER MODULATION DEPTH

FILTER MOD W1 waveform select
W1 waveforms are derived from
LFO1, ENV, SLFO1, CLFO1, LOOP,
OscEnv, and Drum-note signals

FILTER MOD W2 waveform select
W2 waveforms are derived from
LFO2, ENV, SLFO2, CLFO2, LOOP,
OscEnv, and Drum-note signals

Fmod +	Filter	Fmod
Fmod -	59	
F W1	F mix	F W2
SFO 25		SFO 10

DEREZ reduces the speech filter resonances.
At max setting, the speech filter becomes all-
pass, and the oscillator is filtered only by the
resonant POST-FILTER, which allows more
traditional keyboard/synth patches to be
created

HIGH-RATE SPEECH CHIP CLOCK
Speech filter resonant frequencies are
doubled, but pitch is unaltered

DeRez

HiClk   Linear

Bright   BRmod   BRmix

BRIGHTNESS fades between OSC
waveform and low-harmonic-content
triangle waveform. Set to max for
unmodified OSC waveform

BRIGHTNESS MOD MIX
uses FILTER MOD W1 and W2 waveforms
to create a BRIGHTNESS modulator waveform

BRIGHTNESS
MODULATION
DEPTH

LINEAR FILTER MODE
Speech formant frequencies shift downward
as Filter increases, and resonances remain
relatively constant

POSTFILT
OSC

The POST-FILTER follows after the speech FILTER output is summed with the AUX input, and OverDrive is optionally applied. USB audio and Drums can also be added to the POST-FILTER input (MIX page), as can echo-loops when ECHOFREEZE is on (see page 15)

POST-FILTER
CUTOFF FRQ

POST-FILTER MOD MIX
mixes W1 and W2 filter modulators.
0=W1,127=W2, 64 = 50/50

POST-FILTER UNIPOLAR / BIPOLAR
MOD Bipolar mode modulates the cutoff
frequency both up and down, and
doubles the total range

POST-FILTER MOD W1 select
W1 waveforms are derived from
LFO1, ENV, SLFO1, CLFO1, LOOP,
OscEnv, and Drum-note signals

POST-FILTER MODULATION DEPTH
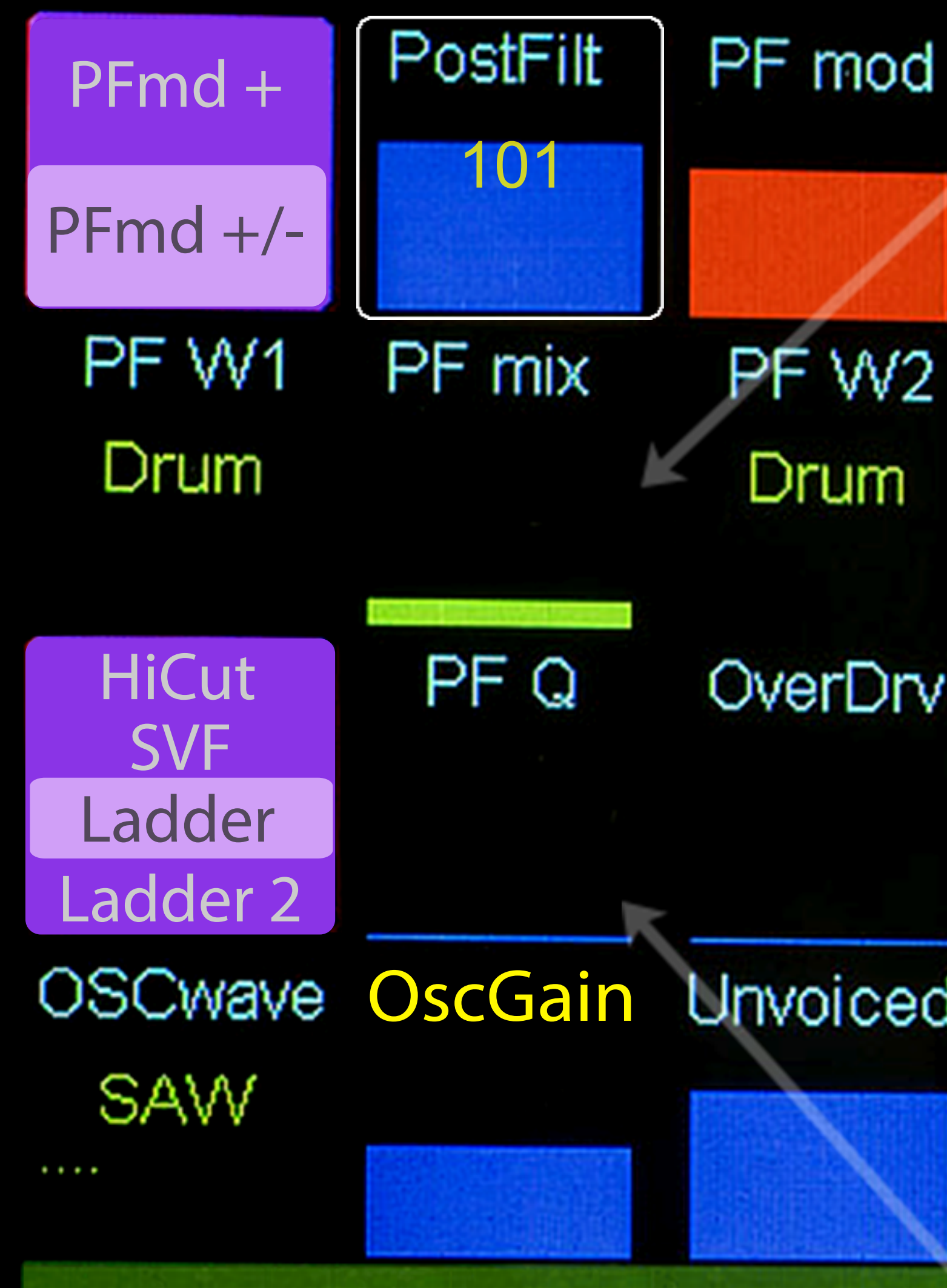
POST-FILTER MOD W2 select
W2 waveforms are derived from
LFO2, ENV, SLFO2, CLFO2, LOOP,
OscEnv, and Drum-note signals

```
PFmd +          PostFilt      PF mod
PFmd +/-          101

PF W1           PF mix        PF W2
Drum                          Drum


HiCut            PF Q        OverDrv
SVF
Ladder
Ladder 2
OSCwave        OscGain       Unvoiced
SAW
....
```

POST-FILTER TYPE select low-pass
filter type from mild HF cut, low-
pass State Variable Filter, analog
modelled resonant Ladder, or
high resonance diode "Ladder 2"
[ALT] tap to select previous option

OVERDRIVE DISTORTION
Tube overdrive applied before POST-FILTER
Double-tap for Boost mode (shows "+")
=> Fuller tube distortion, with clean tube sound
for low overdrive values

OSC WAVEFORM SELECT with
16 steps cross fading between
consecutive waveforms:
VOX, SAW, SQR,
Pulsed Noise (PNZ), PWM,
and octave-up SQR
Double-tap to smooth the
PWM steps (shows "~")
Note this option is not morphed

UNVOICED SPEECH ATTENAUTION
attenuates unvoiced speech fragments
(like 's', 'sh', 'f' etc) that may become
too loud after circuit bending

OSC LEVEL GAIN (pre FILTER)
Scales the speech ROM energy levels: 0 = OSC off*,
64=unity gain, 127 = max gain. Double tap this control
to replace the ROM levels with a 'steady' gain value
set by this pot and its expression values. Bottom
right of the pot shows "S" for STEADY GAIN when active

POST-FILTER RESONANCE ("Q")
(doesn't apply to HiCut post-filter type)

* Set to 0 to allow AUX input signals to be heard without Synth sounds

G N D - 1 T

Glitch and Drum Touch

MIX
ECHO

POST-FILTER OUT VOLUME for analog and USB audio out. Synth + AUX-in are always routed through the PF. Optional additional inputs include drums, USB audio in, and echoFreeze Loop
Double-tap to route the PF output through the Echo buffer before output (shows "E")
This allows Delay time changes (and pitch effects for Tape Delay mode) to be applied to the PF signal, even when Repeats = 0.

DRUM VOLUME for external MIDI out, and internal drums prior to D->PF mix. Affects both analog and USB audio out
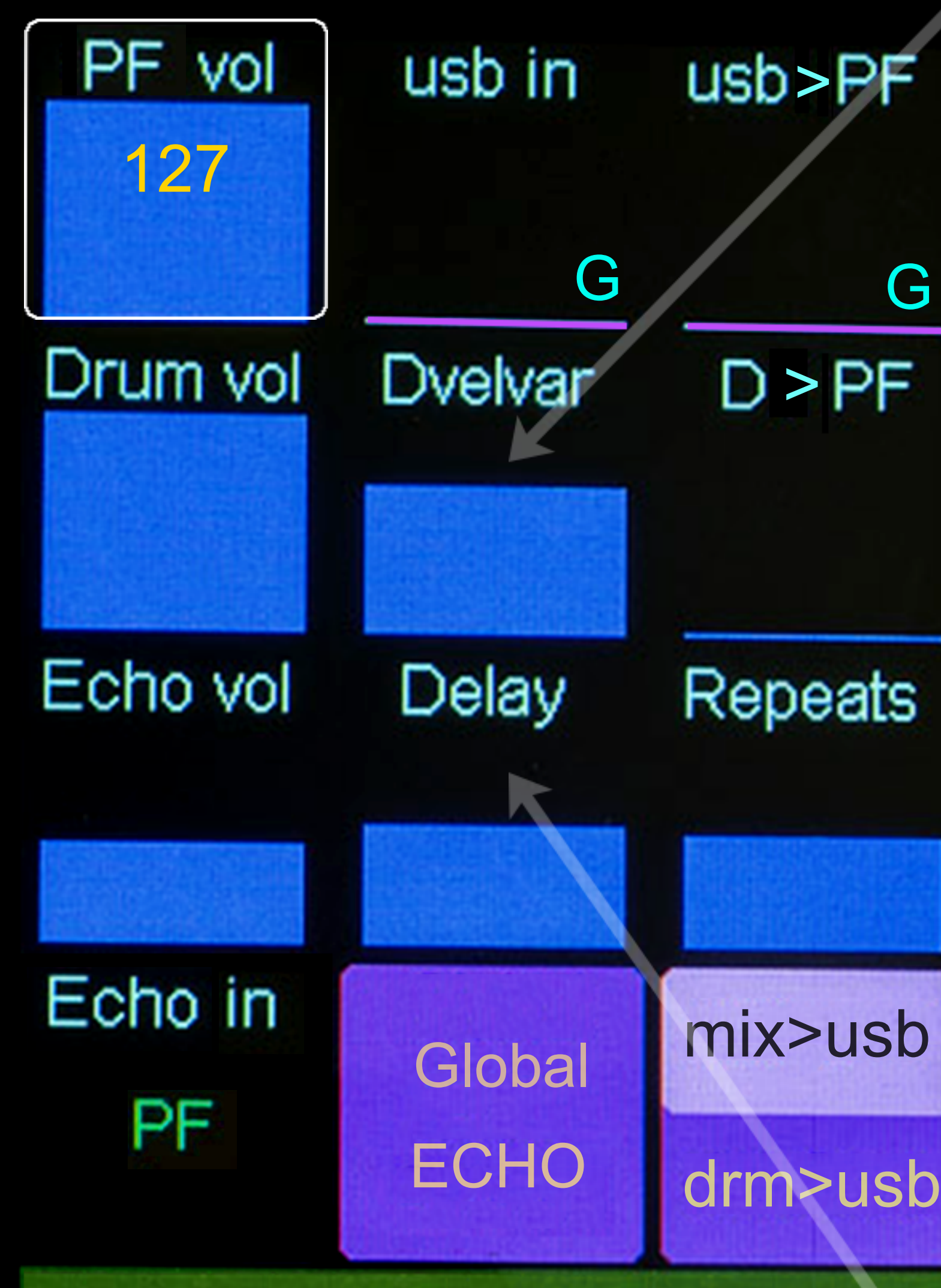
ECHO VOLUME
for analog and USB* audio out
(ALT+POSTFILTER ENC)
Double-tap to toggle TAPE ECHO mode on/off (shows T)
* when mix>usb is selected

ECHO INPUT SELECT
Select any combination of Post-Filter, Drums and USB audio

USB AUDIO INPUT LEVEL

* Global parameter affecting all patches. Save using SAVE GLOBALS on the main Patch page

DRUM OUTPUT VELOCITY VARIATION
sets amount of 'Note-On velocity variation' appled to the drum trigger signals

USB AUDIO INPUT POST-FILTER MIX
sets proportion of USB audio input signal sent to POST-FILTER

* Global parameter affecting all patches. Save using SAVE GLOBALS on the main Patch page

DRUMS POST-FILTER MIX
sets proportion of internal DRUMS audio sent to POST-FILTER

ECHO REPEATS
Echo feedback amount*
Double-tap to NULL the ECHO BUFFER
* ignored if echo Freeze is active (see Patch page)

USB AUDIO OUTPUT SELECT
select off, entire mix, or (dry) internal drums only, to be sent to USB audio output.
If drm>usb is selected unfiltered Drums are are excluded from the analog audio output (but PF drums are retained)

GLOBAL ECHO
allows current echo parameters to be retained across Patches

* Note that saving a patch with inherited global echo parameters will overwrite the patch's own parameters

ECHO DELAY TIME up to about 2.5 sec
For Tape Echo Mode (see ECHO VOL) delay time changes impart temporary pitch shifts Double-tap to toggle clk sync
Shows "clk" in bottom right when ECHO is synced to MIDI clock (P20)

Panel display:

PF vol	usb in	usb>PF
127		G G
Drum vol	Dvelvar	D > PF
Echo vol	Delay	Repeats
Echo in PF	Global ECHO	mix>usb / drm>usb

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Glitch
and
Drum
Touch

XPMAP

XPRESS + hold main encoder (from any page)

The expression matrix in the GND-1T allows any continuous patch parameter to be modulated by controllers modwheel, velocity, breath-control, after-touch, and the automated XPlfo. To link a parameter to the matrix, hold its pot in the Param Edit pages and touch the metal XPRESS button to show this page. Touch any controller pot to set the strength of its effect on the parameter being mapped (-127 to +127).
All five XP values for every patch parameter in the GND-1T are saved and recalled with the patch.
Three controls at the bottom of the XPMAP page set touch sensor, note on, and main encoder assignments

Parameter being expression mapped and its MIDI CC info for external XP mapping

Effect of Breath controller on the parameter being mapped

Clear current parameter XP values
+ALT = CLEAR ENTIRE MATRIX !

TCH XP* maps the metal XPress touch sensor to Modwheel, Breath-control, or Aftertouch controllers, which allows the touch-sensor to affect all parameters mapped to that controller in the expression matrix. Alternatively, TCH XP can be mapped to pitch-bend up or down, ENV trigger (optional + Breath), or Note trigger (optional + Breath)
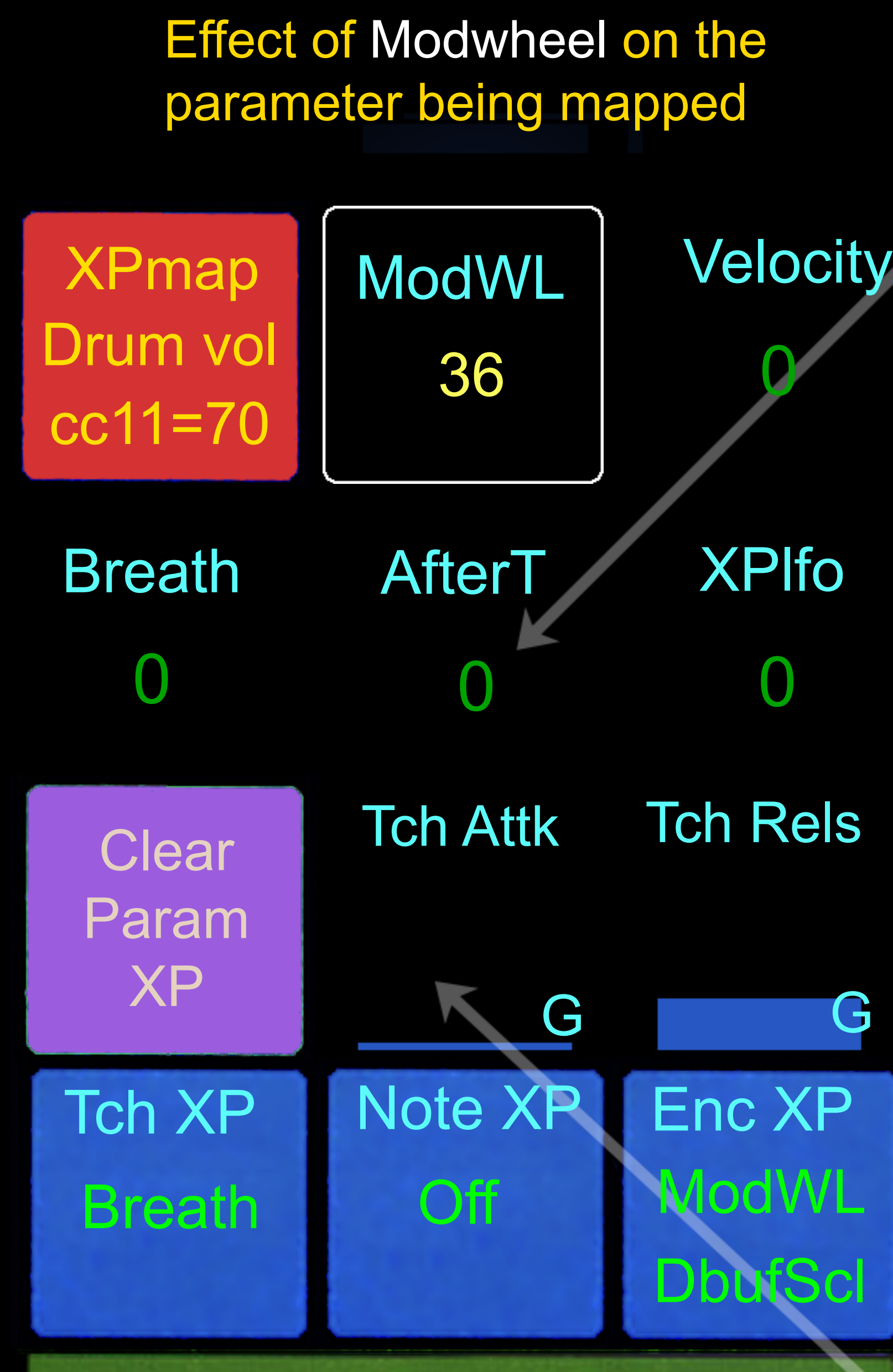
NOTE XP* maps MIDI note-on events to expression controller values for modW, Breath-control, or After-touch. Or maps each note to a different Patch, or to different Manual Morph control values.

For Note-Patch modes, select the patch loaded by middle C using the main encoder in the usual way. Holding a note down during selection shows the patch for that note. Patch modes preserve the current drift buffer offsets across patches and respect parameter excludes. "N+" patch modes preserve note pitch changes. "N+Plgto" avoids patch changes during legato playing. For Morph offset modes, the note adds an offset to the manual morph value, with C60 = zero offset. "N+" morph offset modes preserve pitch changes. "N+Msplit" mode plays the source patch below C60, and target above it. Legato playing retains the initial note-down patch.

Effect of Modwheel on the parameter being mapped

Effect of After-touch on the parameter being mapped. ** Double-tap to use the P mix modulator instead of aftertouch as a second expression LFO

Effect of MIDI Velocity on the parameter being mapped

Effect of XPlfo on the parameter being mapped

Touch Sensor Release Time* Slows the decay of the touch sensor value after touch release. Can be XP mapped and P1-3 assigned

ENC XP* sets the Patch Page encoder function Where two options are shown, the second one is for encoder adjustments while holding the XP button down
Options include ModWheel, Breath Control, and AfterTouch, which all affect parameters through the expression matrix. As well as: DbufScl = Drift Buffer Scaler, Dbuf # = driftbuffer select and load* , BPM, Scene select and load*, StpRate = Block Morph Step Rate   * Click the encoder before releasing XPress to cancel
 DriftBuf or Scene selection
Note that setting ENC XP to a Scene select option prevents subsequebt Scene loads from changing this option. The pot/button turns red to indicate this (from FW260112A)

Touch Sensor Attack Time* Slows the rise of the touch sensor value upon touch. Can be XP mapped and P1-3 assigned

* Global parameters, save using SAVE GLOBALS on Patch Page

XPmap Drum vol cc11=70

ModWL 36

Velocity 0

Breath 0

AfterT 0

XPlfo 0

Clear Param XP

Tch Attk

Tch Rels

G

G

Tch XP Breath

Note XP Off

Enc XP ModWL DbufScl

Modblock W1 / W2 waveforms

Additional descriptions of OSCW and MFO waveforms, and internal drum kits, are available in the GND-1T MIDI reference

GND-1T

Glitch and Drum Touch

LFO 1/2 rate waveforms:*

TRI	triangle
SQR	square
P75	75% high pulse
P25	25% high pulse
FALL	falling saw
RISE	rising saw
pwmQ3	3-step pwm
pwmQ4	4-step pwm
pwmQ5	5-step pwm
RND	random at lfo rate
8R	8-value random
6R	6-value random
SRD	smoothed random

ENVELOPE waves

ENV	ENV (AHDSR or RUN modified, Page 25)
INV	1-ENV

SLFO and CFO 1/2 rate waveforms:*

SLFOx	slow triangle
Sfox 10	10% high Pulse
Sfox 25	25% high pulse
Sfox 50	50% high pulse
Sfox 90	90% high pulse
Sfox rp	random PW
Sfox r	random at SLFO rate
Clfox	chaotic LF oscillator
Cfox 10	approx 10% high
Cfox 25	approx 25% high
Cfox 50	approx 50% high
Cfox 90	approx 90% high
Cfox r	random at CLFO rate

Loop rate waveforms:

LP 10	10% high Pulse
LP 50	50% high Pulse
LP rnd	random at loop rate

Other waveforms:

oscEnv	OscEnv (Page 8)
Drum	Current Drum Note
D rev	reverse order D notes
Fine	0.059463 (semitone)
DC=1	1 (max)
Sfo 1x2	SLFO1 x SLFO2
Sf1x2 T	Sfo 1x2 thresholded at 50%
mfo.lfo*	"Rungler" waveform
	Samples mfo @ lfo 1 or 2 rate

Modblock (cross) feedback waveforms:

All 10 modblock mixer output waveforms
(see MIDI reference Page 13)

* For these waveforms W1 modulators are derived from LFO 1, SLFO 1, and CFO 1 rates, and W2 from LFO 2, SLFO 2, and CFO 2 rates. Remaining waveforms are derived from identical signals for W1 and W2

GND-1T

Glitch and Drum Touch

Trouble Shooting

Hardware

Audio & phones output

The main audio output is 1/4" STEREO and is not designed to support a mono cable Use a stereo splitter for this

For large low impedance studio monitor headphones, an external headphone amp is recommended.

USB host port

The host port is designed to power a single keyboard controller.

A known issue occurs with the Arturia Minilab II, which can produce 'stuck notes' when sending fast modwheel touch-slider changes and notes to the host port. Stuck notes can be cleared using Panic Stop (ALT + screen Patch # button). This can be avoided by using a small unpowered USB hub between the controller and GND-1T

Touch screen

For optimal viewing, an angled stand at about 40 degrees is recommended for desktop use. The screen powers up at max brightness. Hold Param and turn the level out pot to dim it. For a lighter touch screen response use more of your finger nail rather than the flat of you finger

Software / Patch settings

No sound (any patch)
Check Level out settings, including PF scaler [ALT] + level , and Drum scaler [XPress] + level. (see also SysEx Patch transfer errors below)

No sound (patch specific)
As a circuit bent device, there are multiple ways in which a patch can produce no sound. A few things to look out for are listed here:
Lower high Gravity/Plasma settings, or apply softB, vary the Glitch control
Check FreezeT XP mapping
Check OscEnv mode (esp. LPfrz modes), OSCgain level, Post Filter cutoff, ENV trigger modes (including touch sensor ENV assignments) and AHDSR

No internal audio drum sounds
Check the USB output mode on the MIX page is not set to D>usb (drums only)
Check the internal Drum Kits are not set to Off
Check D>PF settings. If drums are fully mixed to PF, no direct drum sounds will remain in the mix, and you must use RUN (rather than run Drums only) to activate the (PF and) output ENV

No AUX input sounds
The AUX input is mixed with the raw synth signal prior to th PF and ENV stage. To hear the AUX signal you must therefore activate the synth using RUN or MIDI on notes.
To hear only AUX input without the synth set OSCgain to 0

No or slow modulation responses
Check Xfr mod (BENDS2) and FreezeT XP
Check OscEnv mode for modFrz modes

No Tempo changes
Check LOOP length - short loops that contain a single sound fragment are not affected by Tempo
Check OSCenv for LPfrz modes - Tempo may be higher than decay time allows, effectively locking the LOOP

Touch, Note, or Enc XP controller issues
Check you don't have more than one of these assigned to the same controller (modwheel, breath etc)
Touching the metal XPress sensor can produce warbling values due to variable body capacitance. Steady it by using other fingers to touch the GND-1T enclosure

SysEx Patch transfer errors
If you have a SysEx manager that allows MIDI thru, ensure that the thru connection for GND-1T to itself is disabled during SysEx transfers If sending patches, be sure to send all 6 blocks to avoid the GND-1T staying muted (see MIDI REF)

Manual Morph endpoints not as expected
Make sure all excludes are released using a long press on the main encoder (see P 11). Use revert to restart the loop at the nearest endpoint

V2.0 MIDI clocks

The V2.xx firmware first released in March (2025) provides improved ability of the GND-1T to sync processes both within, and external to the GND-1T, when using MIDI clocks. In addition to the previous ability to scale various parameters using incoming MIDI clock-rate and PPQN scalers (1), there are now also several direct clock-sync options. The GND-1T can also act as a BPM clock master sending clocks over all 3 MIDI ports (USB, USB-Host and DIN).

The rate of the internal MIDI clock when acting as a clock master is set by the new "clk BPM" parameter, that's available on the MIDI page in stand-alone operation, or using NRPN CC98=117 via MIDI. BPM is a patch-specific parameter that can be fully mapped via the expression matrix, so it can be manipulated by modwheel, velocity, breath control, aftertouch, and automated using the XPlfo. The internal-clock mode can be switched between off, on-during-run, always on, and internal-clocks-only (always on, no clocks sent out over MIDI). In stand-alone operation hold ALT and tap the clk BPM button to toggle through these modes. For MIDI control see NRPN CC 98=73 and 72. N.B.The exclude flag for clock mode is not released by a long encoder hold: instead select the clk BPM pot, and ALT-HOLD the main encoder to release it. Or on the main patch page hold XPress & ALT and tap the patch #

When using external clocks be sure to set the internal clock off. Alternatively, double tap the BPM button on the MIDI page to switch the GND-1T into (or out of) global EXTERNAL clock mode. In this mode, the GND-1T ignores the patch-specific clock mode parameter and instead always uses the external MIDI clock, including on patch load or revert commands. This allows a common external clock rate to be applied to all patches. Global EXT mode is disabled by default on power up, and can also be set using NRPN with CC 98 =77, CC 6 = 0/1 (1=enabled).

Five processes within the GND-1T can be directly controlled by the MIDI clock. The first of these is the Drum trigger timing. To enable this set the Dsrc=0 parameter on the Drum1 page to one of the three clk modes (2). Selectable trigger times correspond to 8ths (clk-), 16ths(clk), or 16th triplets (clk+). The rate of those triggers is subsequently limited using the Drate parameter by dropping triggers that occur faster than the Drate cutoff allows. At a low Drate values, you will always get slow drum triggers even for fast MIDI clock rates (or fast Tempos if Dsrc=0 is set to ROM). But the clock-based triggers that are allowed through are always aligned with the originating MIDI clocked drum triggers. Be sure to set Dsrc to 0 if you want only clock derived triggers, otherwise you will also mix in audio-based triggers at other times. To allow clk triggers and Drate to vary together with BPM, enable the Drate clkScale button on the MID page (see (1) below).

When drum triggers are MIDI clocked, DPmod (pattern mod) optionally can be a Drum Swing control instead (64 = no swing). In that mode, Swing is applied to the same time division as defined by the selected Dsrc=0 clk option, i.e. 8ths (12 MIDI clock) for clk-, 16ths (6 clocks) for clk, and 16th triplets (4 MIDI clocks) for clk+. Select whether DPmod or Dswing is active by double tapping the screen pot, or using MIDI NRPN CC 98 = 76 (see the MIDI ref).

(1)   The four buttons in the middle column of the MIDI page are the previously available clock scaling enables for Tempo, LFO, Loop length, and Drate.
      While these don't sync those parameters directly to the MIDI clock, they scale the patch's default values for them according to the clock BPM rate and
      each parameter's respective PPQN scaler. This has the benefit of retaining complex modulations of those parameters.

(2)   The three new clk modes replace the previous LFO drum trigger modes. To retain LFO/Drum sync with the new Dsrc=0 clk modes, enable direct
      LFO clk sync on the MIDI page, as well as "D sync" on the LFO page.

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Glitch
and
Drum

Touch

V2.0 MIDI clocks (continued...)

Three additional patch-specific parameters that can be directly synced to internal or external MIDI clocks are Echo delay time, LFO 1&2 rates, and Tempo (ROM update rate). Enable these on the MIDI page using the clkSync button options. Clocked LFO and Steprate pots share a common mapping of pot-value to number of MIDI clocks, which is shown in Table 5 of the MIDI reference. When the LFO rates and drums are both direct synced, the LFO rate Loop-sync buttons (LP snc) on the LFO page become Drum Sync buttons (D snc). Activating them aligns the LFO rate updates with the drum triggers. Subsequent Drate limiting is however an asynchronous process.
Direct clock sync of the Tempo parameter causes slower ROM update rates than usual in the GND-1T because MIDI clocks are very slow compared to the internal unclocked rates often used by the 1T (especially with intelligible speech).). A clocked Tempo value of 100 causes ROM updates to occur every 4 MIDI clocks. Each Tempo change of +5 decrements that by 1 clock, and -5 increments it by 1. So for example, reducing Tempo from 100 to 90, adds 2 clock cycles for a total of 6 clocks per update (sixteenths). The maximum rate corresponding to a ROM update on every clock is applied for any clocked Tempo values of 115 and above.

Use the clock-scaling method described on the previous page to retain faster Tempos that scale proportionally with MIDI clock rates. Direct synced Tempos are probably most useful when used to sequence more general sound fragments from ROM at musical/timed intervals. Since direct-syncing Tempo means syncing ROM updates, setting the Drums Dsrc=0 button to "ROM" means Drum triggers by extension will also be clock synced. Tempo modulation in clocked mode can alternatively act as a Tempo swing control (P30). When either LFO or Tempo are direct synced, their MIDI clock PPQN scalers are ineffective.

The single global parameter that can be direct synced is Block Step Morphing when StepMode is set to ClkStep or ClkSync mode (the latter restarts the loop on each step). The StepRate parameter in this case determines how many MIDI clocks go by between steps (MIDI reference, Table 5). Clock synced Step morphing can also be achieved using Drum Step and Drum Sync Step modes when Dsrc=0 is set to a clk mode. In these modes each of the 8 drum sounds selects a different patch from the 8 patches starting at the block-start. Blocksize and Order settings are ignored, with exception of the "-D" Order option that specifies no drum morphing. StepRate in this mode determines how many drum triggers elapse between patch changes (see the MIDI reference, Table 6).

Double-tap functions

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Glitch
and
Drum

Touch

A number of screen pots and buttons have double-tap functions, as summarised below.
Those screen pots have yellow rather than cyan labels.

MAIN PATCH page: (1) PATCH = ERODE (2) DRIFT = rand Drift buffer (3) ECHO FREEZE = clear echo buffer

PITCH page (P22): (1) PITCH = Invert the Speech ROM pitch contour (2) PMIX = use PMIX instead of Aftertouch in the expression matrix (also via Aftertouch on the XPmapping page)

DRUM1 page (P23): (1) DPAT = Steady Beat (2) DPMOD = DP Mod / Dswing toggle for clocked drum modes only

BEND 1 page (P27): GLITCH = null all Bend pots

BEND 2 page (P28): BLUR = smooth only pitched ROM fragments (2) XFRZ T = 'background LFO' mode to allow XfrzMode = mod freeze automation using XPlfo and P mix

LOOP STEREO page (P29): LOOP = Toggle LINEAR length mode LPMOD = Toggle ONESHOT mode

LFO TEMPO page (P30): (1) SLFO toggle "start SLFOs at min" rather than mid-way rising (2) TMD = Tempo mod / swing toggle if Tempo is direct clocked

POSTFILT OSC page (P33): (1) OVERDRIVE = Tube Boost (2) OSCWAV = smooth PWM steps (3) OSCGAIN = Steady Gain

FILTER page (P32): FILTER = Use Soft clipping (instead of hard limit at Filter output) + use a smoother noise source for unvoiced speech fragments

MIX page (P34): (1) PF VOL= Send PF through ECHO buffer before output (2) ECHO VOL= Tape Echo Mode (3) REPEATS = clear echo buffer instantly

MORPH DRIFT PARAMS page (P18): (2) DRIFTDEPTH = set P1 / ALT-P1 driftdepth control during DRIFT (2) DRIFT BUF= new random Drift buffer

In addition, parameter specific direct clocking modes can be enabled by double tapping TEMPO, LFO1/2, and ECHO DELAY pots