Expert Sleepers

General CV

Firmware v1.1
User Manual

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Introduction

Congratulations on your purchase of an Expert Sleepers General CV. Please read this user manual before operating your new module.

In essence, the General CV is a combination of a powerful General MIDI[1] synthesizer, a multi-channel CV-to-MIDI converter, and a host processor capable of generating huge amounts of MIDI data, either in response to the incoming control voltages (CVs) or entirely algorithmically.

Installation

House the module in a Eurorack case of your choosing. The power connector is [Doepfer standard](#). If using the power cable supplied with the module, the red edge of the cable is furthest from the top edge of the PCB, and carries -12V. ("-12V" is marked on the PCB itself next to this end of the connector.) Be sure to connect the other end of the power cable correctly, again so -12V corresponds to the red stripe on the cable.

Power requirements

The General CV draws 91mA on the +12V rail, and 27mA on the -12V rail.

It does not use the 5V rail.

Inputs and Outputs

The General CV has nine inputs and two outputs, all on 3.5mm mono (TS) jack sockets.

The outputs are labelled 'L' and 'R', and are simply the stereo audio outputs from the General MIDI synthesizer. The maximum output level is around ±8V (16V peak-to-peak).

The inputs labelled 'X' and 'Y' are digital inputs, typically used for gates or clocks – simple on/off signals.

Inputs '1', '2' and '3' are unipolar CV inputs.

Inputs '4' through '7' are high-resolution bipolar CV inputs.

All inputs are protected from damage due to voltages outside the recommended range (so long as they remain inside the Eurorack standard ±12V).

Input	Type	Expected voltage range
X, Y	Digital	0 to +5V
1, 2, 3	Analogue, 10 bit	0 to +5V
4, 5, 6, 7	Analogue, 14 bit	-5V to +5V

Controls

The General CV has five rotary encoders, labelled 'A' through 'E'. Each encoder also serves as a push button.

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1   "The General MIDI Specifications … define specific features and behaviors for compliant MIDI devices. In particular, files created for GM devices all use the same GM Sound Set which helps provide for more consistant playback among different MIDI devices." *[MIDI Association](#)*

The function of each encoder varies somewhat depending on the current mode of operation, but in general is as follows:

Encoder	Function
A	Navigate the menu system
B	Turn to adjust parameter; push to advance to next page of parameters Push in, hold and turn to scroll through parameter pages
C	Turn to adjust parameter; push to return to first parameter page
D	Turn to adjust parameter; push to display mode-specific information
E	Turn to adjust parameter; push to show input key

MicroSD card slot

The General CV's MicroSD card slot is on the left of the front panel, below the display.

The exposed contacts of the card should face to the left; the angled side of the card itself points down.

When inserting a card you are advised to observe basic ESD (electrostatic discharge) precautions - see for example here.

The slot is of the "push-push" type - to remove the card, push it in slightly and it will spring out.

MicroSD cards to be used in the General CV should be formatted as FAT32. If the card is bigger than 32GB, partitioning it into 32GB partitions is advised.

In theory any MicroSD card will work, but in practice there is a huge variety of cards on the market and we cannot possible test them all. We recommend 32GB SDHC cards, and in particular have found "SanDisk Extreme 32GB microSDHC UHS-I U3" cards work well.

Menus

The General CV has a fairly simple tree-like menu structure.

Pressing 'A' enters the menu.

While in the menu, turning 'A' moves between menu options on the current level.

Pressing 'A' again enters the next (lower) menu level, or accepts a setting change and exits the menu.

Pressing 'B' goes back (up) one level.

Pressing 'C', 'D' or 'E' exits the menu altogether.

Multi-edit menus

In some menus (for example the EQ settings) more than one setting or value can be simultaneously edited, by turning encoders 'B' through 'E'. Turning 'A' in these cases scrolls between pages of up to four settings each.

Presets

The highest level of 'patch recall' in the General CV is the 'preset'. A preset is made up of

- – a name
- – a mode selection (VCO, Chord etc.)
- – a number of parameters (depending on the mode)
- – effects settings (reverb and chorus)
- – EQ settings
- – input attenuator settings

See below for more information on each of these.

Presets can be stored to flash memory. There are 64 preset slots in flash.

Presets can also be stored to (and loaded from) the Micro SD card.

In what follows, the 'current preset' means the current module state, in RAM, not any of the flash preset locations.

The Presets menu is accessed at the top menu level; the submenu items are as follows.

Load preset

```
Load preset      A: Enter
4                B: Back
                 C: Exit
E.N.YA
```

The 'Load preset' menu allows you to select one of the preset slots, displaying its number and the name of the preset stored in that slot. Pressing 'A' shows the message 'Are you sure?' - press 'A' again to load the preset.

Save preset

```
Save preset      A: Enter
5                B: Back
                 C: Exit
<Empty>
```

The 'Save preset' menu allows you to select one of the preset slots, displaying its number and the name of the preset stored in that slot. Pressing 'A' shows the message 'Are you sure?' - press 'A' again to save the current preset into the selected slot.

Reset preset

This menu allows you to reset the current preset to default values. It has no effect on the presets in flash memory.

Name Preset

```
Name preset      A: Enter
                 B: Back
                 C: Exit
E.N.Ya
```

This allows you to edit the name of the current preset. Typically you would do this before saving it

to flash.

Turning 'B' moves the cursor (the underline); turning 'A' changes the character at the current cursor position.

Load all from SD card

Loads all 64 flash presets from a single file on the SD card (saved with 'Save all to SD card', below). All preset slots will be overwritten with the contents of the file. Note that this does not affect the current preset.

Save all to SD card

Saves all 64 flash presets to a single file on the SD card. The filename is automatically generated and shown once the save is complete.

Load from SD card

Loads a preset file (saved with 'Save to SD card', below) into the current preset. Note that this does not affect any of the flash memory preset slots.

Save to SD card

Saves the current preset to a file on the SD card. The filename is automatically generated (based on the preset name) and shown once the save is complete.

Display Modes

The General CV's display is usually in one of a small number of modes.

Overview

This is the General CV's default display mode. It gives an overview of the current mode, its CV inputs, and the parameters that are attached to the encoders. From left to right, it shows:

– A three letter abbreviation (TLA) of the current mode ('CVM' in the image above).

– Below that, a reminder of what pressing 'A', 'B' and 'E' will do.

– The central section shows what the CV inputs control.

– The right column shows the current page of parameters that can be edited directly by turning the encoders.

Pressing 'B' cycles through pages of up to five parameters each. For example, pressing 'B' in CV To MIDI mode changes the display from that above to

Pressing 'C' takes you back to parameter page zero, which is useful if there are a large number of

pages.

Pressing 'B' and then holding it in while turning the encoder scrolls through the parameter pages (in both directions).

Input Key

```
Input 1 Input 3 Knob A
Input X Input 4 Knob B
Input Y Input 5 Knob C
        Input 6 Knob D
Input 2 Input 7 Knob E
```

Pressing 'E' shows the input key. This is simply a list of the input and knob names, in the same positions on the screen as their corresponding input and parameter names on the overview display. Toggling back and forward between the two modes makes it easy to figure out which input corresponds to which item.

Menu

```
                A: Enter
                B: Back
                C: Exit

Mode
```

When in menu mode (after pressing 'A'), the display changes as above to show the current menu, submenu (if any), and a reminder of the button presses used to navigate.

Parameter Edit

```
Unison Detune    Program
                 Voices
6                Detune
                 Reverb
                 Chorus
```

When not in the menus, turning one of the encoders edits a parameter. The display changes to show the name of the parameter being edited and its current value.

If the parameter is also controlled by CV, the value will be updated in the display as the CV changes.

Auto-blank

To extend the display lifetime, the module will automatically turn the display off after a period of inactivity (the duration of which can be changed in the settings). Turning or pressing any encoder will turn it back on.

List of Programs

Where modes below refer to a 'program', they are referring to one of the 128 General MIDI sounds as follows.

1	(Grand) Piano 1	33	Acoustic Bass	65	Soprano Sax	97	FX 1 (rain)
2	(Bright) Piano 2	34	Finger Bass	66	Alto Sax	98	FX 2 (soundtrack)
3	(El. Grd) Piano 3	35	Picked Bass	67	Tenor Sax	99	FX 3 (crystal)
4	Honky-tonk Piano	36	Fretless Bass	68	Baritone Sax	100	FX4 (atmosphere)
5	El. Piano 1	37	Slap Bass 1	69	Oboe	101	FX 5 (brightness)
6	El. Piano 2	38	Slap Bass 2	70	English Horn	102	FX 6 (goblins)
7	Harpsichord	39	Synth Bass 1	71	Bassoon	103	FX 7 (echoes)
8	Clavi	40	Synth Bass 2	72	Clarinet	104	FX 8 (sci-fi)
9	Celesta	41	Violin	73	Piccolo	105	Sitar
10	Glockenspiel	42	Viola	74	Flute	106	Banjo
11	Music Box	43	Cello	75	Recorder	107	Shamisen
12	Vibraphone	44	Contrabass	76	Pan Flute	108	Koto
13	Marimba	45	Tremolo Strings	77	Blown Bottle	109	Kalimba
14	Xylophone	46	Pizzicato Strings	78	Shakuhachi	110	Bag pipe
15	Tubular Bells	47	Orchestral Harp	79	Whistle	111	Fiddle
16	Santur	48	Timpani	80	Ocarina	112	Shanai
17	Drawbar Organ	49	String Ensemble 1	81	Lead 1 (square)	113	Tinkle Bell
18	Percussive Organ	50	String Ensemble 2	82	Lead 2 (sawtooth)	114	Agogo
19	Rock Organ	51	Synth Strings 1	83	Lead 3 (calliope)	115	Steel Drums
20	Church Organ	52	Synth Strings 2	84	Lead 4 (chiff)	116	Woodblock
21	Reed Organ	53	Choir Aahs	85	Lead 5 (charang)	117	Taiko Drum
22	Accordion (french)	54	Voice Oohs	86	Lead 6 (voice)	118	Melodic Tom
23	Harmonica	55	Synth Voice	87	Lead 7 (fifths)	119	Synth Drum
24	Tango Accordion	56	Orchestra Hit	88	Lead8 (bass+lead)	120	Reverse Cymbal
25	Ac. Guitar (nylon)	57	Trumpet	89	Pad 1 (fantasia)	121	Gt. Fret Noise
26	Ac. Guitar (steel)	58	Trombone	90	Pad 2 (warm)	122	Breath Noise
27	El. Guitar (jazz)	59	Tuba	91	Pad 3 (polysynth)	123	Seashore
28	El. Guitar (clean)	60	Muted Trumpet	92	Pad 4 (choir)	124	Bird Tweet
29	El. Guitar (muted)	61	French Horn	93	Pad 5 (bowed)	125	Teleph. Ring
30	Overdriven Guitar	62	Brass Section	94	Pad 6 (metallic)	126	Helicopter
31	Distortion Guitar	63	Synth Brass 1	95	Pad 7 (halo)	127	Applause
32	Guitar harmonics	64	Synth Brass 2	96	Pad 8 (sweep)	128	Gunshot

List of Drums

EXC1 etc. indicate an exclusive group (e.g. open and closed hi-hat, which cannot sound together).

Note	Standard Kit	Power Kit	Brush Kit	Orchestra Kit	Alternate Kit
27				Closed Hi Hat [EXC1]	
28				Pedal Hi-Hat [EXC1]	
29				Open Hi Hat [EXC1]	
30				Ride Cymbal	
31					
32					
33					
34					
35	Kick drum2	Kick drum2	Jazz BD 2	Kick drum2	Kick drum
36	Kick drum1	Kick drum1	Jazz BD 1	Kick drum1	Kick drum
37	Side Stick	Side Stick	Side Stick	Side Stick	Rim Shot
38	Snare Drum 1	Gated Snare	Brush Tap	Snare Drum 2	Snare Drum
39	Hand Clap	Hand Clap	Brush Slap	Castanets	Hand Clap
40	Snare Drum 2	Snare Drum 2	Brush Swirl	Snare Drum 2	Elec Snare Drum
41	Low Floor Tom	Low Floor Tom	Low Floor Tom	Timpani F	Acoustic Low Tom
42	Closed Hi Hat [EXC1]	Closed Hi Hat [EXC1]	Closed Hi Hat [EXC1]	Timpani F#	Closed Hi-Hat [Exc1]
43	High Floor Tom	High Floor Tom	High Floor Tom	Timpani G	Acoustic Low Tom
44	Pedal Hi-Hat [EXC1]	Pedal Hi-Hat [EXC1]	Pedal Hi-Hat [EXC1]	Timpani G#	Open Hi-Hat 2
45	Low Tom	Low Tom	Low Tom	Timpani A	Acoustic Middle Tom
46	Open Hi-Hat [EXC1]	Open Hi-Hat [EXC1]	Open Hi-Hat [EXC1]	Timpani A#	Open Hi-Hat 1 [Exc1]
47	Low-Mid Tom	Low-Mid Tom	Low-Mid Tom	Timpani B	Acoustic Middle Tom
48	Hi Mid Tom	Hi Mid Tom	Hi Mid Tom	Timpani c	Acoustic High Tom
49	Crash Cymbal 1	Crash Cymbal 1	Crash Cymbal 1	Timpani c#	Crash Cymbal
50	High Tom	High Tom	High Tom	Timpani d	Acoustic High Tom
51	Ride Cymbal 1	Ride Cymbal 1	Ride Cymbal 1	Timpani d#	Ride Cymbal
52	Chinese Cymbal	Chinese Cymbal	Chinese Cymbal	Timpani e	
53	Ride Bell	Ride Bell	Ride Bell	Timpani f	
54	Tambourine	Tambourine	Tambourine	Tambourine	Tambourine
55	Splash Cymbal	Splash Cymbal	Splash Cymbal	Splash Cymbal	
56	Cowbell	Cowbell	Cowbell	Cowbell	Cowbell
57	Crash Cymbal 2	Crash Cymbal 2	Crash Cymbal 2	Crash Cymbal 2	
58	Vibraslap	Vibraslap	Vibraslap	Vibraslap	
59	Ride Cymbal 2	Ride Cymbal 2	Ride Cymbal 2	Ride Cymbal 2	
60	Hi Bongo	Hi Bongo	Hi Bongo	Hi Bongo	Hi Bongo
61	Low Bongo	Low Bongo	Low Bongo	Low Bongo	Low Bongo
62	Mute Hi Conga	Mute Hi Conga	Mute Hi Conga	Mute Hi Conga	Mute Hi Conga
63	Open Hi Conga	Open Hi Conga	Open Hi Conga	Open Hi Conga	Open Hi Conga
64	Low Conga	Low Conga	Low Conga	Low Conga	Low Conga
65	High Timbale	High Timbale	High Timbale	High Timbale	High Timbale
66	Low Timbale	Low Timbale	Low Timbale	Low Timbale	Low Timbale
67	High Agogo	High Agogo	High Agogo	High Agogo	High Agogo
68	Low Agogo	Low Agogo	Low Agogo	Low Agogo	Low Agogo
69	Cabasa	Cabasa	Cabasa	Cabasa	Cabasa

Note	Standard Kit	Power Kit	Brush Kit	Orchestra Kit	Alternate Kit
70	Maracas	Maracas	Maracas	Maracas	Maracas
71	Short Whistle[EXC2]	Short Whistle[EXC2]	Short Whistle[EXC2]	Short Whistle[EXC2]	Short Whistle[EXC2]
72	Long Whistle[EXC2]	Long Whistle[EXC2]	Long Whistle[EXC2]	Long Whistle[EXC2]	Long Whistle[EXC2]
73	Short Guiro [EXC3]	Short Guiro [EXC3]	Short Guiro [EXC3]	Short Guiro [EXC3]	Vibra Slap
74	Long Guiro [EXC3]	Long Guiro [EXC3]	Long Guiro [EXC3]	Long Guiro [EXC3]	
75	Claves	Claves	Claves	Claves	Claves
76	Hi Wood Block	Hi Wood Block	Hi Wood Block	Hi Wood Block	
77	Low Wood Block	Low Wood Block	Low Wood Block	Low Wood Block	
78	Mute Cuica [EXC4]	Mute Cuica [EXC4]	Mute Cuica [EXC4]	Mute Cuica [EXC4]	
79	Open Cuica [EXC4]	Open Cuica [EXC4]	Open Cuica [EXC4]	Open Cuica [EXC4]	
80	Mute Triangle [EXC5]	Mute Triangle [EXC5]	Mute Triangle [EXC5]	Mute Triangle [EXC5]	
81	Open Triangle[EXC5]	Open Triangle[EXC5]	Open Triangle[EXC5]	Open Triangle[EXC5]	
82					Applauses
83					
84					
85					
86					
87					
88				Applauses	
89					
90					
91					
92					
93					
94					Helicopter
95					
96					Gun Shot
97					
98					
99					
100					
101					
102					Birds
103					
104					
105					
106					SeaShore

Mode Descriptions

The following pages detail the operating modes of the General CV. The mode is the top-level setting in a preset which determines all other operation of the module. Different modes will have different CV inputs, different parameters, and different ways of generating MIDI to control the synthesizer engine.

The mode is selected via the menu; it is the first top-level menu item.

Parameter control

Each mode description starts with a pair of tables detailing the mode's CV Inputs and its Parameters. In the CV Inputs table, an 'x' indicates that the CV input directly controls the parameter of the same name. That is to say, plugging in a patch cable and supplying a CV will override any setting made manually by editing the parameter with the encoder.

'Semitone' voltage range

If the voltage range for a CV input controlling a parameter is given as 'Semitone', this indicates that semitone steps on a 1V/octave scale (i.e. twelfths of a Volt) correspond to the various values of the parameter, with 0V corresponding to parameter value zero.

This is particularly useful when sequencing parameter changes or controlling them from a keyboard. For example, the MIDI file playback modes' File parameters are semitone-controlled, which means that successive notes on a keyboard or from a sequencer play different files.

CV To MIDI mode

```
CVM     Program Reverb  Program
        Gate   Pitch    Voices
A: Menu Sustain Vel'ity Detune
B: Page         Qnt Key Reverb
E: Key  Mod Wh  Qnt Scl Chorus
```

CV Inputs

Input	Voltage Range	Function	Parameter control
X		Gate	
Y		Sustain pedal	x
1	0-5V	Program	x
2	0-5V	Modulation wheel depth	x
3	0-5V	Reverb send amount	x
4	±5V	Pitch (1V/octave)	
5	±5V	Velocity	
6	Semitone	Quantizer Key	x
7	Semitone	Quantizer Scale	x

Parameters

Number	Name	Range	Default	Description
1	Program	0-127	0	Program number
2	Unison Voices	1-8	1	Number of unison voices
3	Unison Detune	0-16	4	Detune amount for unison voices
4	Reverb	0-127	0	Reverb send amount
5	Chorus	0-127	0	Chorus send amount
6	Manual Gate	0-1	0	Manual gate control
7	Sustain	0-1	0	Sustain pedal
8	Quantizer Enable	0-1	0	Enables the quantizer function
9	Quantizer Scale	0-15	0	Scale for the quantizer
10	Quantizer Key	-60 - 60	0	Key for the quantizer
11	Mod Wheel	0-127	0	Modulation wheel depth
12	Transpose	-36 – 36	0	Pitch transpose, in semitones

Mode description

The CV To MIDI mode essentially takes a pitch CV and a gate and generates a MIDI note to send to the synthesizer engine. It is strongly related to the VCO mode (below).

The pitch CV is sampled only when the gate goes high, at which point a MIDI note on message is generated. The note is held until the gate goes low, at which point a MIDI note off message is generated.

The velocity CV is also sampled at note on. At 0V input (equivalently, with nothing connected) the velocity value is 64. Negative voltages reduce the velocity (down to a minimum of 1); positive voltages increase the velocity (up to 127). The velocity value is used in the MIDI note on message.

Parameters

Program

The Program parameter chooses the sound to play; see 'List of Programs' above. A new sound choice only takes effect when a new note starts.

Unison Voices & Detune

If 'Unison Voices' is more than 1, a number of copies of the chosen note will be played, all slightly detuned according to the Detune parameter. This makes the sound 'thicker' or 'fatter' (as well as louder). The detuning of the various voices follows the following table (in which the detune amount is represented by 'd'):

Voices	Detuning
1	None
2	-½d, +½d
3	0, -d, +d
4	-½d, +½d, -1½d, +1½d
5	0, -d, +d, -2d, 2d
6	-½d, +½d, -1½d, +1½d, -2½d, +2½d
7	0, -d, +d, -2d, 2d, -3d, 3d
8	-½d, +½d, -1½d, +1½d, -2½d, +2½d, -3½d, +3½d

Reverb & Chorus

These parameters simply control the amount of signal sent to the effects processors.

Manual Gate

This allows you to manually trigger a sound, which will then continue to play for as long as the parameter is non-zero. Useful for creating drones.

Sustain

This parameter controls the MIDI sustain pedal. If the sustain pedal is on, notes continue to play even after a note off, until the pedal is lifted.

Quantizer Enable/Scale/Key

If enabled, the quantizer element of this mode forces the incoming pitch CV into a particular key and scale before it is used. The available scales are as follows:

Number	Name	Nature (semitones included within an octave)
0	Chromatic	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
1	Major Scale	1, 3, 5, 6, 8, 10, 12
2	Minor Scale	1, 3, 4, 6, 8, 10, 12
3	Triad	1, 5, 8
4	Minor Triad	1, 4, 8
5	Root+Fifth	1, 8
6	Triad + 6	1, 5, 8, 10
7	Minor Triad + 6	1, 4, 8, 10
8	Triad + 7	1, 5, 8, 11
9	Minor Triad + 7	1, 4, 8, 11
10	5 + 6	1, 8, 10
11	5 + 7	1, 8, 11
12	Pentatonic	1, 3, 5, 8, 10
13	Pentatonic Minor	1, 4, 6, 8, 11
14	Natural Minor	1, 3, 4, 6, 8, 9, 11
15	Harmonic Minor	1, 3, 4, 6, 8, 9, 12

Mod Wheel

This parameter directly controls the MIDI modulation wheel (CC #1). The effect on the sound is program-dependent, but is usually a vibrato or similar.

Transpose

Transposes the incoming pitch CV, in semitones. Note that this is before the pitch is quantized into the chosen key/scale (if the quantizer is active).

VCO mode

```
VCO    Program Reverb Program
       Gate   Pitch  Voices
A: Menu       Vel'ity Detune
B: Page       Qnt Key Reverb
E: Key  Mod Wh Qnt Scl Chorus
```

Mode description

The VCO mode is very much like the CV To MIDI mode (above) but with some important differences. Please refer to the description of the CV To MIDI mode for most of the details – here we will only highlight what differs.

The conceptual difference between the two modes is that, while the CV To MIDI mode works in MIDI-like terms (that is, there are note ons, and note offs, which define individual & independent notes), the VCO mode works in a manner more like that of an analogue oscillator, that is, it is designed to continually emit sound that tracks the incoming pitch input. The idea is that you could replace one of your analogue VCOs with the General CV in VCO mode and things should generally continue to work in the same way.

Turning on the Manual Gate control is very useful in this mode to enable a constant sound. However, the gate input (X) can still be used, to turn the sound on and off, and to control when the attack portion of the sound (which can often be quite distinct from the sustained portion) plays.

The operational differences from CV To MIDI mode are:

– The Pitch CV controls the sound's pitch continuously, not just when a note is triggered. (This is achieved with MIDI pitch bends.)

– Changing the Program will immediately switch to the new sound.

– Changing the number of Detune Voices immediately retriggers the sound.

– There is no Sustain control.

Clocked Playback mode

```
CLK       Gate    Chorus  Set
          Clock   File    Reverb
A: Menu Retrig            Chorus
B: Page                   Next
E: Key  Reverb            Gate
```

CV Inputs

Input	Voltage Range	Function	Parameter control
X		Clock	
Y		Retrigger	
1	0-5V	Gate	x
2	0-5V	Reverb send amount	x
3	0-5V	Chorus send amount	x
4	Semitone	File	x
5			
6			
7			

Parameters

Number	Name	Range	Default	Description
1	Set	0-31	0	Set list
2	Reverb	0-127	0	Reverb send amount
3	Chorus	0-127	0	Chorus send amount
4	Next	0-31	0	Next file
5	Gate	0-1	0	Enables playback when 1
6	File	0-31	0	Current file
7	Mute channel 1	0-1	0	Mutes playback of MIDI channel 1
8	Mute channel 2	0-1	0	Mutes playback of MIDI channel 2
9	Mute channel 3	0-1	0	Mutes playback of MIDI channel 3
10	Mute channel 4	0-1	0	Mutes playback of MIDI channel 4
11	Mute channel 5	0-1	0	Mutes playback of MIDI channel 5
12	Mute channel 6	0-1	0	Mutes playback of MIDI channel 6
13	Mute channel 7	0-1	0	Mutes playback of MIDI channel 7
14	Mute channel 8	0-1	0	Mutes playback of MIDI channel 8
15	Mute channel 9	0-1	0	Mutes playback of MIDI channel 9
16	Mute channel 10	0-1	0	Mutes playback of MIDI channel 10
17	Mute channel 11	0-1	0	Mutes playback of MIDI channel 11

Number	Name	Range	Default	Description
18	Mute channel 12	0-1	0	Mutes playback of MIDI channel 12
19	Mute channel 13	0-1	0	Mutes playback of MIDI channel 13
20	Mute channel 14	0-1	0	Mutes playback of MIDI channel 14
21	Mute channel 15	0-1	0	Mutes playback of MIDI channel 15
22	Mute channel 16	0-1	0	Mutes playback of MIDI channel 16

Mode description

In this mode, the General CV plays MIDI files stored on a Micro SD card. It does so in time with a clock pulse provided to the 'X' input. (For playback without a clock pulse, see the 'Free Playback' mode below.)

The files should be in standard MIDI file format[2] – such files usually have the extension '.mid'. The General CV supports type 0 (single track) and type 1 (multi-track) files. Such files can be authored in many applications, including some popular DAWs, and can be readily found for download on the Internet (for example here, here, and here).

Up to 32 sets of 32 files each are supported. See 'MIDI file organisation', below.

The launch of a new file is quantized to a musically meaningful position in the current file, to enable seamless transitions between various loops. Selecting the next file to play can be done in one of two ways:

- The File parameter. The chosen file is immediately queued for playing. (Note that this is the parameter exposed as a CV.)

- The Next parameter. Changing this parameter does not immediately queue up a new file; this only takes place when you press 'D'. This lets you scroll through the files to find the one you want without accidentally queueing all the files in between.

Note that changing the set also only happens after changing the Set parameter and pressing 'D'.

Changing set interrupts playback briefly while the set information is cached from the card.

Clock

The clock pulse on 'X' is interpreted as quarter note timing.

A positive-going edge on 'Y' resets the playback to the start of the file.

Mode-specific display

Pressing 'D' activates a mode-specific display. This shows the currently playing file, and the queued file, if any.

---

2   There's a useful technical description of the MIDI file format here.

```
Playing: 0
funkytwn.mid
123-567890123456
```

If not showing the queued file, it shows activity on the 16 MIDI channels. A channel's number is replaced by '-' if the channel is muted.

Parameters

Set

Chooses the current MIDI file set.

Reverb & Chorus

These parameters simply control the amount of signal sent to the effects processors.

Next / File

Select the next file to play, as described above.

Gate

Starts and stops playback. The file starts playing from the beginning when the gate goes high (value of 1).

Mute channel 1-16

Mutes playback on the specified MIDI channel. Any MIDI messages on that MIDI channel in the file being played will not be processed.

Free Playback mode

```
FRE     Gate    Chorus  Set
                File    Reverb
A: Menu Retrig          Chorus
B: Page         Spd Exp File
E: Key  Reverb  Spd Lin Gate
```

CV Inputs

Input	Voltage Range	Function	Parameter control
X			
Y		Retrigger	
1	0-5V	Gate	x
2	0-5V	Reverb send amount	x
3	0-5V	Chorus send amount	x
4	Semitone	File	x
5			
6	±5V	Speed (Exponential)	
7	±5V	Speed (Linear)	

Parameters

Number	Name	Range	Default	Description
1	Set	0-31	0	Set list
2	Reverb	0-127	0	Reverb send amount
3	Chorus	0-127	0	Chorus send amount
4	File	0-31	0	File to play
5	Gate	0-1	0	Enables playback when 1
6	Mute channel 1	0-1	0	Mutes playback of MIDI channel 1
7	Mute channel 2	0-1	0	Mutes playback of MIDI channel 2
8	Mute channel 3	0-1	0	Mutes playback of MIDI channel 3
9	Mute channel 4	0-1	0	Mutes playback of MIDI channel 4
10	Mute channel 5	0-1	0	Mutes playback of MIDI channel 5
11	Mute channel 6	0-1	0	Mutes playback of MIDI channel 6
12	Mute channel 7	0-1	0	Mutes playback of MIDI channel 7
13	Mute channel 8	0-1	0	Mutes playback of MIDI channel 8
14	Mute channel 9	0-1	0	Mutes playback of MIDI channel 9
15	Mute channel 10	0-1	0	Mutes playback of MIDI channel 10
16	Mute channel 11	0-1	0	Mutes playback of MIDI channel 11
17	Mute channel 12	0-1	0	Mutes playback of MIDI channel 12
18	Mute channel 13	0-1	0	Mutes playback of MIDI channel 13

Number	Name	Range	Default	Description
19	Mute channel 14	0-1	0	Mutes playback of MIDI channel 14
20	Mute channel 15	0-1	0	Mutes playback of MIDI channel 15
21	Mute channel 16	0-1	0	Mutes playback of MIDI channel 16

Mode description

In this mode, the General CV plays MIDI files stored on a Micro SD card. It does so at the MIDI file's native tempo, modified by CVs. (For playback synced to a clock pulse, see the 'Clocked Playback' mode above.)

The files should be in standard MIDI file format – such files usually have the extension '.mid'. The General CV supports type 0 (single track) and type 1 (multi-track) files. Such files can be authored in many applications, including some popular DAWs, and can be readily found for download on the Internet (for example here, here, and here).

Up to 32 sets of 32 files each are supported. See 'MIDI file organisation', below.

Choosing a set list is achieved by changing the Set parameter and pressing 'D'. Changing set interrupts playback briefly while the set information is cached from the card.

Speed

The MIDI files play at their own tempo, as programmed into the file. (If there is no tempo information in the file, 120bpm is assumed.)

This playback speed can be modulated by CVs on inputs 6 & 7.

Input 6 has an exponential 1V/octave response. That is, for every 1V the CV rises, playback speed doubles; for every 1V the CV falls, playback speed halves.

Input 7 has a linear response. At -5V, playback is stopped altogether; at +5V, the speed is doubled.

Mode-specific display

Pressing 'D' activates a mode-specific display. This shows the currently playing file.

It also shows activity on the 16 MIDI channels. A channel's number is replaced by '-' if the channel is muted.

Parameters

Set

Chooses the current MIDI file set.

Reverb & Chorus

These parameters simply control the amount of signal sent to the effects processors.

File

Selects the file to play.

Gate

Starts and stops playback.

Mute channel 1-16

Mutes playback on the specified MIDI channel. Any MIDI messages on that MIDI channel in the file being played will not be processed.

Drums mode

```
DRM   Drum     Chorus  Drum
      Trigger          Reverb
A: Menu          Vel'ity Chorus
B: Page
E: Key   Reverb
```

CV Inputs

Input	Voltage Range	Function	Parameter control
X		Trigger	
Y			
1	0-5V	Drum	x
2	0-5V	Reverb send amount	x
3	0-5V	Chorus send amount	x
4			
5	±5V	Velocity	
6			
7			

Parameters

Number	Name	Range	Default	Description
1	Drum	35-81	35	Drum selection
2	Reverb	0-127	0	Reverb send amount
3	Chorus	0-127	0	Chorus send amount

Mode description

The fairly simple mode allows the triggering of General MIDI drum sounds, with the selection of drum sound under CV control.

The 'X' input triggers the drum.

The velocity CV controls the drum's MIDI velocity. At 0V input (equivalently, with nothing connected) the velocity value is 64. Negative voltages reduce the velocity (down to a minimum of 1); positive voltages increase the velocity (up to 127).

Parameters

Drum

Selects the drum sound. See 'List of Drums' above.

Reverb & Chorus

These parameters simply control the amount of signal sent to the effects processors.

Drums 9 mode

CV Inputs

Input	Voltage Range	Function	Parameter control
X		Trigger X	
Y		Trigger Y	
1	0-5V	Trigger 1	
2	0-5V	Trigger 2	
3	0-5V	Trigger 3	
4	0-5V	Trigger 4	
5	0-5V	Trigger 5	
6	0-5V	Trigger 6	
7	0-5V	Trigger 7	

Parameters

Number	Name	Range	Default	Description
1	Drum X	27-106	35	Drum selection for input X
2	Drum Y	27-106	38	Drum selection for input Y
3	Drum 1	27-106	44	Drum selection for input 1
4	Drum 2	27-106	42	Drum selection for input 2
5	Drum 3	27-106	46	Drum selection for input 3
6	Drum 4	27-106	49	Drum selection for input 4
7	Drum 5	27-106	50	Drum selection for input 5
8	Drum 6	27-106	47	Drum selection for input 6
9	Drum 7	27-106	45	Drum selection for input 7
10	Kit	1-5	1	Selects drum kit

The following parameters are in groups of five, one group for each of drums X/Y/1-7:

Number	Name	Range	Default	Description
1	Pitch	0-127	64	Per-drum pitch (64 = 'natural' pitch)
2	Level	0-127	127	Per-drum volume level
3	Pan	0-127	64	Per-drum pan position
4	Reverb	0-127	0	Per-drum reverb send amount
5	Chorus	0-127	0	Per-drum chorus send amount

Mode description

In this mode, every CV input is a drum trigger input, offering nine independently triggerable drums. Each drum can be chosen from one of the available General MIDI drum sounds, and can have its pitch, volume, pan and effects settings independently determined.

Inputs X & Y always trigger with velocity 127. Inputs 1-7 use the level of the triggering CV to determine the velocity. CVs above 0.5V trigger the input, with the minimum velocity of 1 at 0.5V, rising to full velocity (127) at 5V.

Parameters

Drum X/Y/1-7

Selects the drum sound. See 'List of Drums' above.

Kit

Selects the drum kit, from which all drum sounds will be taken. See 'List of Drums' above.

Pitch

The pitch of the drum, in semitones. A value of 64 plays the drum at its normal pitch; higher and lower values tune the drum up or down respectively.

Level

The volume level of the drum.

Pan

The pan position of the drum. A value of 64 is centre.

Reverb & Chorus

The effects send levels for the drum.

Chord mode

```
CHD      Program Scale  Program
         Gate    Pitch   Key
A: Menu  Sustain Vel'ity Scale
B: Page          Key     Shape
E: Key   Inversn Shape   Inversn
```

CV Inputs

Input	Voltage Range	Function	Parameter control
X		Gate	
Y		Sustain	x
1	0-5V	Program	x
2	0-5V	Inversion	x
3	0-5V	Scale	x
4	±5V	Pitch (1V/octave)	
5	±5V	Velocity	
6	Semitone	Key	x
7	Semitone	Shape	x

Parameters

Number	Name	Range	Default	Description
1	Program	0-127	0	Program number
2	Key	-60 - 60	0	Chord Key (e.g. C, F♯)
3	Scale	0-6	0	Chord Scale (e.g. major, minor)
4	Chord Shape	0-8	4	Chord Shape (e.g. triad, seventh)
5	Inversion	0-3	0	Chord Inversion
6	Reverb	0-127	0	Reverb send amount
7	Chorus	0-127	0	Chorus send amount
8	Manual Gate	0-1	0	Manual gate control
9	Sustain	0-1	0	Sustain pedal
10	Live Edit	0-1	0	Live edit mode
11	Transpose	-36 - 36	0	Pitch transpose, in semitones
12	Break Spacing	0-500	0	Broken chord spacing (in milliseconds)
13	Break Direction	0-2	0	Broken chord direction
14	Cutoff Scale	0-127	64	Scales the sound's filter envelope
15	Resonance Scale	0-127	64	Scales the sound's filter resonance
16	Attack Scale	0-127	64	Scales the sound's envelope attack
17	Decay Scale	0-127	64	Scales the sound's envelope decay
18	Release Scale	0-127	64	Scales the sound's envelope release

Number	Name	Range	Default	Description
19	<none>			No parameter
20	<none>			No parameter
21	Layers	1-5	1	Number of layers
22	Program 2	0-127	0	Program number for layer 2
23	Program 3	0-127	0	Program number for layer 3
24	Program 4	0-127	0	Program number for layer 4
25	Program 5	0-127	0	Program number for layer 5
26	Volume 1	0-127	100	Volume level for layer 1
27	Volume 2	0-127	100	Volume level for layer 2
28	Volume 3	0-127	100	Volume level for layer 3
29	Volume 4	0-127	100	Volume level for layer 4
30	Volume 5	0-127	100	Volume level for layer 5
31	Pan 1	-64 – 63	0	Pan position for layer 1
32	Pan 2	-64 – 63	0	Pan position for layer 2
33	Pan 3	-64 – 63	0	Pan position for layer 3
34	Pan 4	-64 – 63	0	Pan position for layer 4
35	Pan 5	-64 – 63	0	Pan position for layer 5
36	Coarse tune 1	-64 – 63	0	Coarse tuning (semitones) for layer 1
37	Coarse tune 2	-64 – 63	0	Coarse tuning (semitones) for layer 2
38	Coarse tune 3	-64 – 63	0	Coarse tuning (semitones) for layer 3
39	Coarse tune 4	-64 – 63	0	Coarse tuning (semitones) for layer 4
40	Coarse tune 5	-64 – 63	0	Coarse tuning (semitones) for layer 5

Mode description

Chord mode takes a pitch CV and uses it to build a chord. The chord key, scale, shape and inversion can be controlled. The chord may also be broken i.e. the notes played with a short delay between them.

The gate CV starts and stops the chord playing.

The velocity CV is applied to each note in the chord. At 0V input (equivalently, with nothing connected) the velocity value is 64. Negative voltages reduce the velocity (down to a minimum of 1); positive voltages increase the velocity (up to 127).

Mode-specific display

Pressing 'D' activates a mode-specific display. This shows the notes in the current chord, as note

names above their octave number.

Parameters

Program

The Program parameter chooses the sound to play; see 'List of Programs' above.

Key

The key in which the chord is generated – C, D♭, D etc.

Scale

The scale used to build the chord. The available scales are as follows.

Name	Notes	Example (on C)
Major	1, 3, 5, 6, 8, 10, 12	C D E F G A B
Natural Minor	1, 3, 4, 6, 8, 9, 11	C D E♭ F G A♭ B♭
Dominant	1, 3, 5, 6, 8, 10, 11	C D E F G A B♭
Fully Diminished	1, 3, 4, 6, 7, 9, 10, 12	C D E♭ F F♯ A♭ A B
Dominant Dim	1, 2, 4, 5, 7, 8, 10, 11	C D♭ E♭ E F♯ G A B♭
Augmented	1, 4, 5, 8, 9, 12	C E♭ E G A♭ B
Whole Tone	1, 3, 5, 7, 9, 11	C D E F♯ G♯ A♯

Chord Shape

The shape of the chord. The available shapes are as follows.

Name	Notes (within scale)	Example (in C major)
None	1	C
Octave	1-1(8ve)	C C(8ve)
Two Octaves	1-1(8ve)-1(15ma)	C C(8ve) C(15ma)
Root/Fifth	1-5	C G
Root/Fifth + 8ve	1-5-1(8ve)	C G C(8ve)
Triad	1-3-5	C E G
Triad + 8ve	1-3-5-1(8ve)	C E G C(8ve)
Sus4	1-4-5	C F G
Sus4 + 8ve	1-4-5-1(8ve)	C F G C(8ve)
Sixth	1-3-5-6	C E G A
Sixth + 8ve	1-3-5-6-1(8ve)	C E G A C(8ve)
Seventh	1-3-5-7	C E G B

Name	Notes (within scale)	Example (in C major)
Seventh + 8ve	1-3-5-7-1(8ve)	C E G B C(8ve)
Ninth	1-3-5-7-2(8ve)	C E G B D

Inversion

The chord inversion. For example the first inversion takes the first note of the chord and moves it an octave up, so the lowest note in the chord is now the second (e.g. C E G becomes E G C). See e.g. here for a fuller explanation of inversions.

Reverb & Chorus

These parameters simply control the amount of signal sent to the effects processors.

Manual Gate

This allows you to manually trigger a sound, which will then continue to play for as long as the parameter is non-zero. Useful for creating drones.

Sustain

This parameter controls the MIDI sustain pedal. If the sustain pedal is on, notes continue to play even after a note off, until the pedal is lifted.

Live Edit

If enabled, changes to any of the chord's characteristics will retrigger the chord so they can be applied. Otherwise, changes are only applied when a new chord is triggered.

Transpose

Transposes the incoming pitch CV, in semitones. Note that this is before the pitch is quantized into the chosen key/scale.

Break Spacing & Direction

If Spacing is non-zero, the chord notes will be played as a short sequence, rather than all at once. E.g. C E G would be played as C, then E, then G (with each note held as played).

Break Direction controls which way the notes are played – up (C E G), down (G E C), or alternately up & down (not unlike strumming a guitar).

Cutoff & Resonance Scale

These parameters scale the sound's time-variant filter's cutoff and resonance (Q). At a value of 64 the sound is as-programmed.

Attack, Decay & Release Scale

These parameters scale the sound's amplitude envelope's attack, decay and release times. At a value of 64 the sound is as-programmed.

Layers; Program, Volume, Pan, Coarse tune 1-5

A composite sound may be formed by layering up several programs. Each layer has its own program number, volume, pan and tuning.

Arpeggiator mode

```
ARP      Program  Scale    Program
         Clock    Pitch    Key
A: Menu  Reset    Vel'ity  Scale
B: Page           Key      Shape
E: Key   ArpMode  Shape    Inversn
```

CV Inputs

Input	Voltage Range	Function	Parameter control
X		Clock	
Y		Reset (or Gate)	
1	0-5V	Program	x
2	0-5V	Arp Mode	x
3	0-5V	Scale	x
4	±5V	Pitch (1V/octave)	
5	±5V	Velocity	
6	Semitone	Key	x
7	Semitone	Shape	x

Parameters

Number	Name	Range	Default	Description
1	Program	0-127	0	Program number
2	Key	-60 - 60	0	Chord Key (e.g. C, F♯)
3	Scale	0-6	0	Chord Scale (e.g. major, minor)
4	Chord Shape	0-8	3	Chord Shape (e.g. triad, seventh)
5	Inversion	0-3	0	Chord Inversion
6	Reverb	0-127	0	Reverb send amount
7	Chorus	0-127	0	Chorus send amount
8	Gate Length	0-127	64	Gate length, as a fraction of clock time
9	Sustain	0-1	0	Sustain pedal
10	Transpose	-36 - 36	0	Pitch transpose
11	Arp Mode	0-4	0	Arpeggiator mode
12	Arp Range	1-3	1	Arpeggiator range (octaves)
13	Clock Divisor	1-64	1	Clock divisor
14	Clock Multiplier	1-64	1	Clock multiplier
15	Gated not Reset	0-1	0	Whether input 'Y' is reset or gate
16	Cutoff Scale	0-127	64	Scales the sound's filter envelope
17	Resonance Scale	0-127	64	Scales the sound's filter resonance
18	Attack Scale	0-127	64	Scales the sound's envelope attack

Number	Name	Range	Default	Description
19	Decay Scale	0-127	64	Scales the sound's envelope decay
20	Release Scale	0-127	64	Scales the sound's envelope release

Mode description

This mode, like the Chord mode (above), takes a pitch CV and uses it to build a chord. However rather than playing the notes as a chord, it uses them to play a continuous arpeggio, in time with the provided clock.

The clock is provided at input 'X'.

Input 'Y' is either a reset input, in which case a pulse here resets the arpeggiator to the start of its pattern, or a gate input, in which case the arpeggiator only runs when the gate is high.

The velocity CV is applied to each note. At 0V input (equivalently, with nothing connected) the velocity value is 64. Negative voltages reduce the velocity (down to a minimum of 1); positive voltages increase the velocity (up to 127).

Mode-specific display

```
E  G  A  C
4  4  4  5
```

Pressing 'D' activates a mode-specific display. This shows the notes in the current arpeggio, as note names above their octave number. The currently sounding note is highlighted.

Parameters

Program

The Program parameter chooses the sound to play; see 'List of Programs' above.

Key, Scale, Chord Shape, Inversion, Transpose

Please refer to the corresponding parameter descriptions for the Chord mode.

Reverb & Chorus

These parameters simply control the amount of signal sent to the effects processors.

Gate Length

Each note in the arpeggio is held for a fraction of the clock period. This parameter controls that fraction. At 64 the note is held for half the clock period.

Sustain

This parameter controls the MIDI sustain pedal. If the sustain pedal is on, notes continue to play even after a note off, until the pedal is lifted.

Arp Range

When set to 1, the arpeggio is simply the notes formed by the chord. When set to 2 or 3, a copy of the chord is appended to the pattern, one or two octaves higher, creating a longer pattern that spans multiple octaves.

Arp Mode

Specifies the way in which the notes from the chord are played to create an arpeggio. The options are as follows:

Name	Behaviour	Example (on C major triad)
Up	Notes are played from lowest to highest.	C E G C E G ...
Down	Notes are played from highest to lowest.	G E C G E C ...
Alt	Notes are played alternately up and down.	C E G E C E G ...
Alt2	Notes are played alternately up and down, repeating the top & bottom notes.	C E G G E C C E G ...
Up -8ve	See below.	
Down -8ve	See below.	
Alt -8ve	See below.	
Alt2 -8ve	See below.	
Random	Notes are played in a random order.	

The "-8ve" modes differ from the basic modes in how they treat the Range parameter (above), for shapes which end in "+8ve". As an example, consider the Triad+8ve shape in C major, which contains the notes:
C E G C(8ve)

If Range is set to 2, this pattern is repeated an octave higher, so modes Up/Down/Alt/Alt2 will arpeggiate the notes:
C E G C(8ve) C(8ve) E(8ve) G(8ve) C(15ma)

Note how C(8ve) is repeated. The "-8ve" modes skip this repeated note, so for example the Up-8ve mode will play:
C E G C(8ve) E(8ve) G(8ve) C(15ma) C E G ...

Clock Divisor & Multiplier

The incoming clock can be divided (slower) or multiplied (faster). A combination of the two can produce some useful fractional timings.

Gated not Reset

Controls whether input 'Y' is a reset input (value 0) or gate input (value 1).

Cutoff & Resonance Scale

These parameters scale the sound's time-variant filter's cutoff and resonance (Q). At a value of 64 the sound is as-programmed.

Attack, Decay & Release Scale

These parameters scale the sound's amplitude envelope's attack, decay and release times. At a value of 64 the sound is as-programmed.

MIDI file organisation

MIDI files for use in the Clocked Playback and Free Playback modes need to be arranged on an SD card in a particular way, which is detailed here.

Files should be organised in to Sets. Each set is a folder at the root level of the card. The name of the folder must be 31 characters or less, but there are no restrictions on what characters may be used in folder names.

Each set folder holds a number of MIDI files. MIDI files can be named however you like. Other files can exist in the same folder; they will be ignored.

At the top level of the card, there must be a 'set list' file, which lists the sets in the order you want them to appear in the module's list. The filename of this file must be exactly 'setlist.txt', and it should be a plain text file (not a rich text file, a Word document, etc.). The contents of the file will look something like this:

```
generalcv setlist v1
096 Lowdown
135 Swing Beat
00 World Beats
GM songs
```

That is, the first line is 'generalcv setlist v1', and the following lines are the folder names.

In each set folder, you also need a 'playlist' file, which lists the MIDI files in the order you want them to appear. The filename of this file must be exactly 'playlist.txt', and it should be a plain text file (not a rich text file, a Word document, etc.). The contents of the file will look something like this:

```
generalcv playlist v1
funkytwn.mid
BossDrum.mid
africa.mid
bladerunner.mid
orinflow.mid
```

That is, the first line is 'generalcv playlist v1', and the following lines are the file names.

Each file may also have settings. Settings appear as lines beginning with '-', for example

```
096 Lowdown Crash.mid
-launchQuantize=1
096 Lowdown Outro.mid
-loop=0
```

If a setting appears at the top of a playlist, before any MIDI file, it applies as a default for all files in the list, for example

```
generalcv playlist v1
-launchQuantize=8
096 Lowdown 8-Bar.mid
```

The possible settings are as follows:

Setting	Default	Description
`-loop`	1	Sets whether the file loops.
`-launchQuantize`	4	Sets the launch quantization in quarter notes. Used only in Clocked Playback mode.

Effects

```
Reverb                    A: Enter
Type          Hall 2      B: Back
Volume        144         C: Exit
Time          127
Feedback      0
```

```
Chorus 1                  A: Enter
Type          Chorus 3    B: Back
Volume        144         C: Exit
Delay         64
Feedback      9
```

```
Chorus 2                  A: Enter
Rate          3           B: Back
Depth         19          C: Exit
```

```
Gains                     A: Enter
Output Gain 63            B: Back
                          C: Exit
```

All modes offer two global audio effects, Reverb and Chorus, though both can in fact offer a wider range of effects than the name suggests. The synthesizer voices have independent effects sends to these two effects processes, and indeed the drum parts have per-drum settings for reverb and chorus depth.

The effects settings are accessed from the top-level menu, and are presented as three multi-edit pages. Reverb is on the first page, and Chorus takes up the next two. Turn 'A' to switch between pages; turn 'B' through 'E' to edit the four parameters on the current page.

Note that any change to the effects settings restarts the effects processor; you will hear for example the reverb go silent and then start again. Also, changing the reverb type sets the other reverb settings to defaults appropriate to that type; likewise for the chorus type and chorus settings.

The available reverb modes are:

Room 1, Room 2, Room 3, Hall 1, Hall 2, Plate, Delay, Pan Delay

The reverb feedback setting is only relevant for Delay and Pan Delay.

The available chorus modes are:

Chorus 1, Chorus 2, Chorus 3, Chorus 4, FB Chorus, Flanger, Short Del, FB Delay

A fourth page under 'Effects' is entitled 'Gains', and currently offers one control, which is over the module's output gain. This is the gain of the DAC stage, after the digital synthesizer output, and is variable in 1dB steps. A value of 57 corresponds to 0dB; 63, the maximum, is +6dB. Note that high gains could result in clipping if the synthesizer output itself is very loud, as could happen for example with playback of a full multi-channel MIDI file.

Equalisation (EQ)

```
EQ Left Levels      A: Enter
Low            96   B: Back
Low Mid        64   C: Exit
High Mid       64
High           96
```

```
EQ Freqs            A: Enter
Low            12   B: Back
Low Mid        27   C: Exit
High Mid      114
High           64
```

```
EQ Right Levels     A: Enter
Low            96   B: Back
Low Mid        64   C: Exit
High Mid       64
High           96
```

```
Link                A: Enter
Left/Right  1       B: Back
                    C: Exit
```

All modes offer global EQ settings. The left and right audio channels have independent EQ cut/boost controls, which can be linked (which they are by default).

There are four bands of EQ: Low, Low Mid, High Mid, High

Each band's level is a number from 0 to 127, corresponding to a range of ±12dB cut/boost (64, the centre value, is 0dB).

The frequency at which each band operates can also be controlled.

A final submenu item offers a reset function, which resets the EQ to its default state.

Input Attenuators

```
Attenuators 1-3     A: Enter
Atten 1       128   B: Back
Atten 2       128   C: Exit
Atten 3       128
```

```
Attenuators 4-7     A: Enter
Atten 4       128   B: Back
Atten 5       128   C: Exit
Atten 6       128
Atten 7       128
```

Each of the seven CV inputs has an attenuator control, which can be used to lower the range of strong input CVs to one more appropriate to the controlled parameter.

Note though that since these are software attenuators, there is a loss of resolution as compared to attenuating the signal in analogue hardware before it hits the module.

Each attenuator has a value from 0 to 128. At 128, the input is unattenuated.

Settings

The Settings menu provides access to some global settings which are not part of a preset. These settings are stored and reapplied when the module powers up.

After editing the setting value, pressing 'A' stores the new value to flash memory. Leaving the menu

via 'B' or 'C' abandons the change without saving.

The available settings are as follows.

Setting	Value range	Function
Contrast	0-255	Sets the display contrast/brightness.
Recall enable	0-1	Enables the Recall Bus if set to 1.
Forward MIDI	0-1	If set to 1, incoming MIDI from the expansion header will be sent directly to the synthesizer engine, instead of being processed by the module itself.
Disable jingle	0-1	Prevents the module playing its startup jingle.
Display blank	1-30	Sets the time (in minutes) before the display blanks.

Miscellaneous

The top level menu item 'Misc' provides access to some miscellaneous functions that don't fit anywhere else.

Misc menu item	Function
Show firmware version	Displays the current firmware version.
Show MicroSD info	Displays information about the inserted MicroSD card. The card format is displayed, followed by its contents. Press 'E' to resume normal operation.
Panic – All Notes Off	Sends MIDI 'All Notes Off' messages to the internal synthesizer on every MIDI channel.
Panic – All Sound Off	Sends MIDI 'All Sound Off' messages to the internal synthesizer on every MIDI channel.
Self-test	Runs the synthesizer engine's self-test procedure. A sequence of three simple audio tones will be output if all is well.
Reboot	Causes the module to reboot.
Zero offsets	Measures and stores any DC offsets on the inputs, which are then subtracted out in normal operation. Be sure no patch cables are connected to the module's inputs before invoking this function.
Show inputs	Shows the raw values at the inputs. Intended for factory use only.
Test inputs	Enters a mode which displays an oscilloscope-like view of the inputs. Intended for factory use only.

Select Bus

If enabled in the settings, the General CV will respond to save/recall messages on the Select Bus.

The Select Bus is a means of inter-module communication currently supported by a handful of modules from various manufacturers, including the Malekko Varigate 8+, Macro Machines Storage Strip and the Make Noise Tempi.

Note that the General CV only responds to save/recall messages. It does not initiate them.

MIDI I/O

The General CV has an expansion header on the PCB which can be used to add a pair of traditional 5-pin DIN MIDI ports to the module (one input/one output). This is compatible with the Expert Sleepers disting mk4 MIDI breakout.

Connections

The MIDI ports are exposed on a 4-pin expansion header (labelled GT2) at the top of the PCB. All of the necessary electronics are on the PCB; all that needs to be added is the actual sockets.

The header pin-out is as follows:

Pin	Function
1	OUT pin 4
2	OUT pin 5
3	IN pin 5
4	IN pin 4

Pin numbers refer to the 5-pin DIN socket as in the MIDI standard.

The header is a standard 0.1" pitch header compatible with e.g. typical IDC cable sockets.

MIDI "Low-Voltage Signaling"

When MIDI was first conceived, standard logic circuits ran at 5V, and the initial hardware reference designs worked on this assumption. However, there is nothing in the MIDI standard that actually requires a specific voltage, since it operates as a current loop via an opto-isolator.

Nowadays it is much more common for logic to run at 3.3V or lower. The MIDI Manufacturers Association has now released a reference hardware design based on 3.3V, which they call the "Low-Voltage Signaling" standard, and it is this that the General CV uses.

The General CV is therefore fully compatible with any device that adheres strictly to the MIDI specification, but may not be with devices that play fast and loose with the spec and assume 5V.

Download the full MIDI electrical specification here.

MIDI Implementation

MIDI input

Currently the General CV does not receive any MIDI (though it will forward incoming MIDI directly to the synthesizer engine, if this is enabled in the settings), with the exception of the following SysEx messages.

Message	Function
`F0h 00h 21h 27h 1Ch 01h F7h`	Causes the General CV to take a screenshot and save it to the SD card.

MIDI output

Currently the General CV does not send any MIDI.

Firmware Updates

The General CV's firmware can be updated using a Micro SD card. The process is as follows:

- Download the firmware from the Expert Sleepers website.

- Unzip the download.

- Copy the file 'image.hex' from the unzipped download to the root folder of a Micro SD card.

- Insert the Micro SD card into the General CV's socket.

    - The exposed contacts of the card should face to the left; the angled side of the card itself points down.

    - **You are advised to observe basic ESD (electrostatic discharge) precautions** - see for example here. Don't be wearing a nylon sweater in an air conditioned room.

- Restart the General CV with the 'A' knob pressed. (You can do this by power cycling it, or by rebooting from the Misc menu.) It will go through the first stage of its startup sequence, showing the bootloader version number.

- Keep the 'A' knob pressed until the message "Release encoder to begin flashing..." is shown.

    - If at this point the General CV shows the message "Firmware not found on card", no firmware file could be found on the card. Remove the card and check its contents and formatting.

- Release the knob to begin the flashing process. (If you change your mind and don't want to proceed, simply turn the power off.)

- When the flashing process starts, the display updates to indicate progress. Do not remove the card or turn off the power during the update.

- When the flashing process is complete, the General CV will show the message "Success" if successful, or "Error:" plus an error code if there was a problem.

- Press 'E' to reboot the General CV and resume normal operation.

Acknowledgments

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'General CV' logo and boot-up animation by Jason Evans.

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Credit for the idea of publicly announcing the module on April 1st goes to Michael Bearpark.