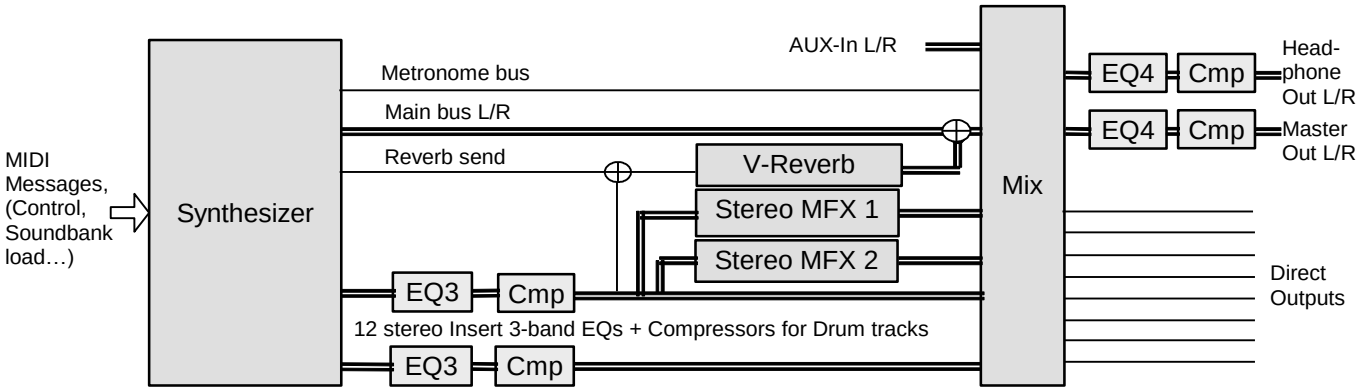
5716 E-Drum Firmware

for SAM5716 / SAM5916

Signal Processing Synoptic



”EQ3” = 3-Bands EQ, “EQ4” = 4-Bands EQ, “Cmp” = Compressor / Limiter

DSP Configuration

Synthesizer	3 DSPs (72 voice)
12 stereo 3-band EQ + Compressors	3 DSPs
Reverb	1 DSP
2x Stereo Multi-FX	2 DSPs
Mix + 4-band EQs + Comp + Dir. Out.	2 DSPs
Optionally:	
USB Audio	*1-2 DSPs*
SPDIF-Out	*1 DSP*
Wave-Import on-the-fly AES encryption	*1 DSP*

Drum Kit Trigger List

Following is the list of all Pad/Triggers with its MIDI notes, triggered on MIDI channel 10:

Pad	Chan#	Name	Note# (hex)	Note# (decimal)
Kick	1	Head	0x24	36
Snare	2	Head	0x26	38
	2	Rim	0x28	40
	2	Cross-Stick	0x25	37
Tom1	3	Head	0x30	48
	3	Rim	0x32	50
Tom2	4	Head	0x2D	45
	4	Rim	0x2F	47
Tom3	5	Head	0x2B	43
	5	Rim	0x3A	58
Tom4	6	Head	0x29	41
	6	Rim	0x27	39
Ride	7	Bow	0x33	51
	7	Bell	0x35	53
	7	Edge	0x3B	59
Crash	8	Bow	0x31	49
	8	Edge	0x37	55
Crash2	9	Bow	0x39	57
	9	Edge	0x34	52
Hi-Hat	10	Open	0x2E	46
	10	Open Edge	0x1A	26
	10	Half Open	0x17	23
	10	Half Open Edge	0x18	24
	10	Near Closed	0x14	20
	10	Near Closed Edge	0x19	25
	10	Closed	0x2A	42
	10	Closed Edge	0x16	22
	10	Pedal Chick	0x2C	44
	10	Pedal Splash	0x15	21
Aux 1	11	Auxiliary 1	0x36	54
Aux 2	12	Auxiliary 2	0x38	56

Trigger table sorted by Note#	
20 - G#0	Drum Kit Near Closed HH
21 - A0	Drum Kit HH Pedal Splash
22 - A#0	Drum Kit Closed HH Edge
23 - B0	Drum Kit Half Open HH
24 - C1	Drum Kit Half Open HH Edge
25 - C#0	Drum Kit Near Closed HH Edge
26 – D1	Drum Kit Open HH Edge
27 - D#1	*GM set High Q*
…	*(see GM sound list)*
35 - B1	*GM set Standard Kick2*
36 - C2	Drum Kit Kick
37 - C#2	Drum Kit X-Stick
38 - D2	Drum Kit Snare
39 - D#2	Drum Kit Tom 4Rim
40 - E2	Drum Kit Snare Rim
41 - F2	Drum Kit Tom 4
42 - F#2	Drum Kit Closed HH
43 - G2	Drum Kit Tom 3
44 - G#2	Drum Kit Pedal HH
45 - A2	Drum Kit Tom 2
46 - A#2	Drum Kit Open HH
47 - B2	Drum Kit Tom 2 Rim
48 - C3	Drum Kit Tom 1
49 - C#3	Drum Kit Crash Cymbal
50 - D3	Drum Kit Tom 1 Rim
51 - D#3	Drum Kit Ride Cymbal
52 - E3	Drum Kit Crash 2 Edge
53 - F3	Drum Kit Ride Bell
54 - F#3	Auxiliary 1
55 - G3	Drum Kit Crash Edge
56 - G#3	Auxiliary 2
57 - A3	Drum Kit Crash Cymbal 2
58 - A#3	Drum Kit Tom 3 Rim
59 - B3	Drum Kit Ride Edge
60 - C4	*GM set Hi Bongo*
…	*(see GM sound list)*
87 - D#6	*GM set Open Surdo*

Chan# is the internally used channel for drum sound play. Externally (on MIDI_IN) all these drums sounds are triggered through MIDI channel 10.

Note# 1 till 9 are used to trigger the metronome click sounds (0x01 = “one”, 0x02 = “two” etc.).

Other notes on MIDI channel 10 are triggering sounds of the standard GM Percussion sound set.
MIDI channels 1-9 and 11-16 can be used for demo/accompaniment song playback (Bass and other tonal instrument tracks, GM compatible).

Drum Kit Edit NRPN Controls

Following is the list of available Edit Controls for the Pads/Triggers mentioned in the table above ((“rr” in NRPN number is the MIDI note number of the according Pad/Trigger):

MIDI Message	HEX Code	Description
Pad Instrument Settings *		
NRPN 10rrH	B9H 63H 10H 62H rr 06H vv	**Attack**, range 0..127, 0 = default 0=0ms, 1=0.38ms,... 16=6ms, ... 32=12ms, ... 48=25ms, ... 64=50ms, ... 80=100ms, 96=200ms, 112=400ms, 127=1sec
NRPN 11rrH	B9H 63H 11H 62H rr 06H vv	**Decay**, range 0..127, 64 = default
NRPN 12rrH	B9H 63H 20H 62H rr 06H vv	**Tone** (filter cut frequency), range 0..127, 64 = default **
NRPN 16rrH	B9H 63H 16H 62H rr 06H vv	**Sound Group** vv=0..maxNB (maxNB depends on sound bank) corresponds to the Prg# of drum set in sound bank -100 ***
NRPN 17rrH	B9H 63H 17H 62H rr 06H vv	**Sound Instr** vv= 0..maxNB (maxNB depends on sound bank) corresponds to the Key# in sound bank drum set -1 ***
NRPN 18rrH	B9H 63H 18H 62H rr 06H vv	**Coarse Pitch** vv=40..64..88 = -24..0..+24 semitones
NRPN 19rrH	B9H 63H 19H 62H rr 06H vv	**Fine Pitch** vv=0 (no modify)…127 (+1 semitone)
NRPN 1ArrH	B9H 63H 1AH 62H rr 06H vv	**Sound Volume**, vv=0..127
Pad Mixer Settings**		
NRPN 1BrrH	B9H 63H 1BH 62H rr 06H vv	**Pad Volume**, vv=0..127
NRPN 1CrrH	B9H 63H 1CH 62H rr 06H vv	**Panning**, vv=0..127, 64 = center
NRPN 1DrrH	B9H 63H 1DH 62H rr 06H vv	**Reverb** (Ambience) send level, vv=0..127
NRPN 1ErrH	B9H 63H 1EH 62H rr 06H vv	**Multi-FX 1** send level, vv=0..127
NRPN 1FrrH	B9H 63H 1FH 62H rr 06H vv	**Multi-FX 2** send level, vv=0..127
Pad EQ Settings **		
NRPN 20rrH	B9H 63H 20H 62H rr 06H vv	Equalizer ON/OFF, 0=OFF, else ON
NRPN 21rrH	B9H 63H 21H 62H rr 06H vv	Low Band Gain, 0=-15dB…64=0dB…127=+15dB
NRPN 22rrH	B9H 63H 22H 62H rr 06H vv	Mid Band Gain, 0=-15dB…64=0dB…127=+15dB
NRPN 23rrH	B9H 63H 23H 62H rr 06H vv	High Band Gain, 0=-15dB…64=0dB…127=+15dB
NRPN 24rrH	B9H 63H 24H 62H rr 06H vv	Low Band Freq, 0=20Hz…127=16KHz (14bit precision, 1Hz step)
NRPN 25rrH	B9H 63H 25H 62H rr 06H vv	Mid Band Freq, 0=20Hz …127=16KHz (14bit precision,1Hz step)
NRPN 26rrH	B9H 63H 26H 62H rr 06H vv	High Band Freq, 0=20Hz …127=16KHz (14bit precision,1Hz step)
NRPN 27rrH	B9H 63H 27H 62H rr 06H vv	Mid Band Q, 0=0.1 …127=8
Pad Compressor Settings **		
NRPN 28rrH	B9H 63H 28H 62H rr 06H vv	Compressor ON/OFF, 0=OFF, else ON
NRPN 29rrH	B9H 63H 29H 62H rr 06H vv	Attack time: 0=fast attack (0.1ms), … 60=1ms, …100=10ms, till 127=slow attack (100ms), exp. Curve
NRPN 2ArrH	B9H 63H 2AH 62H rr 06H vv	Release time: 0=fast release (10ms), … 60=100ms, … 100=1s, till 127=slow release (~5s), exp. Curve
NRPN 2BrrH	B9H 63H 2BH 62H rr 06H vv	Threshold: 127=0dB, 64=-6dB, 32=-12dB, 16=-18dB, 8=-24dB, 4=-30dB, 2=-36dB 0=-Inf
NRPN 2CrrH	B9H 63H 2CH 62H rr 06H vv	Ratio: 127=1/128, 126=2/128 (1/64), 125=3/128, … 64=64/128 (1/2), … 0=1/1
NRPN 2DrrH	B9H 63H 2DH 62H rr 06H vv	Boost: 0=1x ... 127=8x
NRPN 2ErrH	B9H 63H 2EH 62H rr 06H vv	Knee : 0=hard, else soft
Pad Channel Routing**		
NRPN 2FrrH	B9H 63H 2FH 62H rr 26H lb 06H mb	**Routing Drums** bus switches, 14bit (including NRPN LSB value): MSB (mb) bits 6/5 : Master (Main) Out L/R *MSB (mb) bits 4/3 : reserved* MSB (mb) bits 2/1 : Headphone Out L/R MSB (mb) bit 0 : Direct Out 7 LSB (lb) bit 6 : Direct Out 6 … LSB (lb) bit 0 : Direct Out 0 mb=lb=0 : all Drum channel direct signal muted (-> Direct OFF)

Notes:

* Edit controls of all Hihat trigger notes are working on same parameter set and needs only to send once (rr=46).

** Tone, Pad Mixer, EQ and Compressor and Routing settings are done per pad trigger group (e.g. head + rim, or bow + edge + bell). NRPN needs only to send once using the “head” resp. “bow” trigger note.

*** “Sound Select” is managed by sending “Sound Group” NRPN and “Sound Instr.” NRPN. Available Sound Groups in Dream-AcousticDrums-5000 demo sound bank are: 0=Kick, 1=Snare, 2=Tom, 3=Crash, 4=Ride, 5=Hihat, 6=Percussions, 7=SFX (8=Metronome sounds, 10=Wave-Import sounds if supported by firmware)

For this firmware the Hihat drumset (PC#105) in sound bank should be organized in HH groups as follows: key#1 is Open HH, key#2 is Open HH Edge, key#3 is Half-Open HH, key#4 is Half-Open HH Edge, key#5 is Near-Closed HH, key#6 is Near-Closed HH Edge, key#7 is Closed HH, key#8 is Closed HH Edge, key#9 is HH Pedal Chick, key#10 is HH Pedal Splash, key#11..20 is group next HH sound etc.

General & Effects NRPN Controls

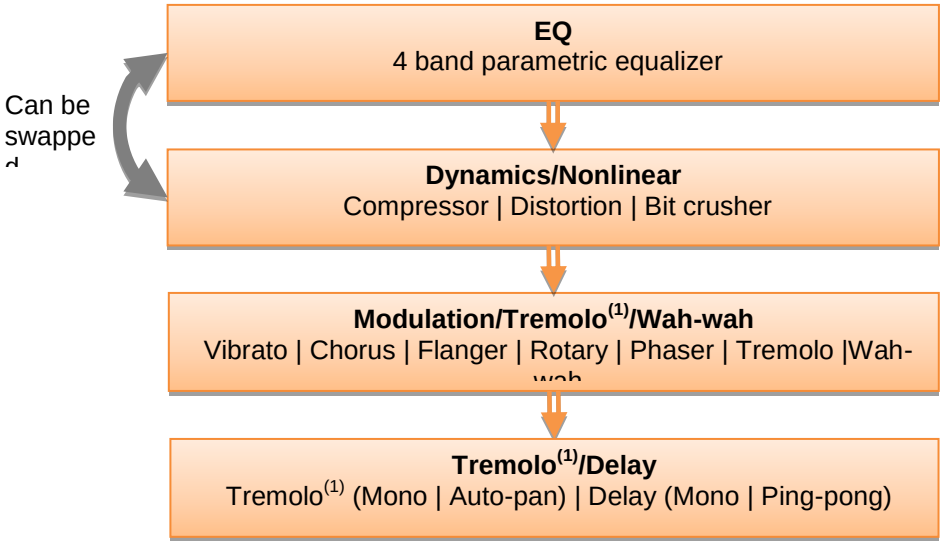
NRPN # (High|Low)	Description		Power-up default
General			
3700h	**Routing** bus switches for Main+Reverb, 14bit (see description of NRPN 2FrrH, page 3)		
3701h	**Routing** bus switches for Multi-FX 1 out, 14bit (see description of NRPN 2FrrH, page 3)		-
3702h	**Routing** bus switches for Multi-FX 2 out, 14bit (see description of NRPN 2FrrH, page 3)		-
3703h	**Routing** bus switches for Metronome bus, 14bit (see description of NRPN 2FrrH, page 3)		-
3704h	**Routing** bus switches for AUX-IN, 14bit (see description of NRPN 2FrrH, page 3)		-
3707h	Synth Master volume	0 (mute) to 7Fh (max)	7Fh
Metronome settings			
1701h	Metronome click sound selection	0..5 (Voice, Metronome, Claves, Sticks, Cowbell, Beep)	0
1A01h	Metronome click level	0 (mute) to 7Fh (max)	7Fh
Room Reverb			
0300h	Reverb Level	0 (mute) to 127 (max)	64
0301h	Pre-Delay Time	0 = 0ms, till 127 = 250ms	0
0302h	Reverberation Time	0 (shortest) till 7Fh (longest)	64
0303h	Pre-High-Pass Filter Frequency	0=OFF…64=~500Hz...127=~1KHz	0
0304h	High-Shelf Filter (Tone) Gain	0=-12dB, 64=0dB, till 127 = +6dB	64
0305h	High Damp	0= no damping, till 127=max damping	0
0307h	Reverb **Type**	0..2=Room, 3..5=Hall, 6..8=Plate1, 9..11=Plate2	5 (Hall Large)
0309h	Reverb ON/OFF	0 = OFF, else ON	ON
Master Output Parametric 4-Bands Equalizer *			
3855h	Equalizer ON/OFF	0=OFF, else ON	OFF
3808h	Low Band Gain	0=-15dB…40h=0dB…7Fh=+15dB	40h
3809h	Low Mid Band Gain	0=-15dB…40h=0dB…7Fh=+15dB	40h
380Ah	High Mid Band Gain	0=-15dB…40h=0dB…7Fh=+15dB	40h
380Bh	High Band Gain	0=-15dB…40h=0dB…7Fh=+15dB	40h
380Ch	Low Band Freq. (note 1)	0=20Hz…7Fh=16kHz	
380Dh	Low Mid Band Freq. (note 1)	0=20Hz…7Fh=16KHz	
380Eh	High Mid Band Freq. (note 1)	0=20Hz…7Fh=16KHz	
380Fh	High Band Freq. (note 1)	0=20Hz…7Fh=16kHz	
3810h	Low Mid Band Q-Factor	0:Q=0.1 …7Fh:Q=8.0	
3811h	High Mid Band Q-Factor	0:Q=0.1 …7Fh:Q=8.0	
Master Output Compressor/Limiter *			
3818h	Compressor ON/OFF: =0 OFF, else ON		OFF
3819h	Attack time: 0=fast attack (0.1ms), … 60=1ms, …100=10ms, till 127=slow attack (100ms), exp. Curve		40h
381Ah	Release time: 0=fast release (10ms), … 60=100ms, … 100=1s, till 127=slow release (~5s), exp. Curve		40h
381Bh	Threshold: 127=0dB, 64=-6dB, 32=-12dB, 16=-18dB, 8=-24dB, 4=-30dB, 2=-36dB 0=-Inf		7Fh
381Ch	Ratio: 127=1/128, 126=2/128 (1/64), 125=3/128, … 64=64/128 (1/2), … 0=1/1		0
381Dh	Boost: 0=1x ... 127=8x		0
381Eh	Knee : 0=hard, else soft		0

* Note :
Headphone Output Parametric 4-Bands Equalizer and Compressor/Limiter are controlled using NRPNs **3Axxh.**

Output Levels			
3807h	Master Output Level	0=mute, to 7Fh=0dB	40h (-6dB)
3A07h	Headphone Output Level	0=mute, to 7Fh=0dB	40h (-6dB)
3B00h	Direct Out 1 Level	0=mute, to 7Fh=0dB	7Fh (0dB)
3B01h	Direct Out 2 Level	0=mute, to 7Fh=0dB	7Fh (0dB)
3B02h	Direct Out 3 Level	0=mute, to 7Fh=0dB	7Fh (0dB)
3B03h	Direct Out 4 Level	0=mute, to 7Fh=0dB	7Fh (0dB)
3B04h	Direct Out 5 Level	0=mute, to 7Fh=0dB	7Fh (0dB)
3B05h	Direct Out 6 Level	0=mute, to 7Fh=0dB	7Fh (0dB)
3B06h	Direct Out 7 Level	0=mute, to 7Fh=0dB	7Fh (0dB)
3B07h	Direct Out 8 Level	0=mute, to 7Fh=0dB	7Fh (0dB)
3B10h	Direct Out 1 & 2 mode	0=mono, 1=stereo	1 (stereo)
3B11h	Direct Out 3 & 4 mode	0=mono, 1=stereo	1 (stereo)
3B12h	Direct Out 5 & 6 mode	0=mono, 1=stereo	1 (stereo)
3B13h	Direct Out 7 & 8 mode	0=mono, 1=stereo	1 (stereo)

Stereo Insert Multi-FX

This Multi-Effect configuration is running in one DSP:



(1)Tremolo can be selected either in the Modulation or in the Tremolo/Delay block, but not in both simultaneously (see “Configuration” NRPN below)

Multi-FX NRPN Controls

Stereo Insert Multi-FX1 is controlled by NRPN numbers with n=4, Multi-FX2 by numbers with n=5.

Configuration

NRPN	Description
nC00h	Effects Configuration: • 0 = Off • 1 = Dyn -> EQ -> Mod/Wah -> Tremolo/Delay • 2 = Dyn -> EQ -> Mod/Tremolo /Wah -> Delay • 3 = EQ -> Dyn -> Mod/Wah -> Tremolo/Delay • 4 = EQ -> Dyn -> Mod/Tremolo /Wah -> Delay

Compressor

NRPN	Description
n100h	0 = Off, 1 = On
n102h	Attack Time: 0 = fast attack (96µs) … 0x7FFF=slow attack (120ms)
n103h	Release Time: 0 = fast release (15ms) … 0x7FFF=slow release (6s)
n104h	Ratio: 0 = 1:1 … 0x7FFF = Limiter
n105h	Threshold : 0 = -Inf … 0x7FFF = 0dB
n106h	Makeup Gain (Boost) in dB 0 = 0dB … 0x7FFF = +18dB

Distortion

NRPN	Description
n800h	0 = Off, 1 = On
n801h	Type: • 0 = Overdrive: gentle transistor saturation • 1 = Distortion: heavier transistor saturation • 2 = Fuzz1: smooth fuzz • 3 = Fuzz2: nasty fuzz • 4 = Tube: tube saturation • 5 = Asymmetrical: sort of single side (half wave) saturation
n802h	Input Brightness: 0 = min ... 0x7FFF = max
n803h	Distortion Amount (Drive) : 0 ≈unity gain … 0x7FFF = maximum gain, depends on type
n804h	Output Brightness: 0 = min ... 0x7FFF = max
n805h	Output Level: 0 = 0.0 ... 0x7FFF = 1.0

Bit Crusher

NRPN	Description
n400h	0 = Off, 1 = On
n401h	Bit Resolution: 0 = full 24 bit resolution, 1…16 = bit resolution in bits
n402h	Down-Sampling Factor : 1…16
n403h	Output Brightness: 0 = min ... 0x7FFF = max
n404h	Output Volume: 0 = 0.0 ... 0x7FFF = 1.0

4 Bands Parametric EQ

NRPN	Description
n900h	0 = Off, 1 = On
n92bh (1)	Band type: • 0 = Off • 1 = Low pass 6dB • 2 = Low pass 12dB • 3 = Low shelf • 4 = Peak/Notch • 5 = High shelf • 6 = High pass 6dB • 7 = High pass 12dB
n93bh(1)	Frequency in Hz: 20 ... 20000
n94bh(1)	Q in range: 0.1 … 16
n95bh(1)	Gain in range: -24 … 0…+24 dB (only for Peak/Notch, Low shelf and High shelf)

(1) ‘b’ in range 0..3 = EQ band

Modulation Effect

NRPN	Description
n300h	0 = Off, 1 = On
n301h	Type: 0 = Chorus, 1 = Vibrato, 2 = Flanger, 3 = Phaser, 4 = Rotary
n302h	Waveform: 0 = Triangle, 1 = Sine
n303h	Level: 0 = 100% dry ... 0x7FFF = 100% wet (Chorus, Flanger, Phaser). N/A for Vibrato (100% wet)
n306h	Depth: 0 = 0.0 ... 0x7FFF = 1.0
n307h	Rate: 0 = 0Hz ... 0x7FFF ≈ 10Hz.
n308h	Modulation Delay: Chorus: 0x0 = 0.25ms ... 0x7FFF ≈ 20ms Flanger: 0x0 = 0.125ms ... 0x7FFF ≈ 10ms others: N/A
n309h	Feedback: 0 = no feedback ... 0x7FFF = max
n30Bh	Rotary Slow / Fast selector: 0 = Slow, else Fast Rate
n30Ch	Rotary fast modulation rate: 0 = 0Hz ... 0x7FFF = ~10Hz.
n30Dh	Rotary Acceleration Time : time it takes to go from slow to fast Rate: 0 = 5.8s ... 0x7FFF = 0.2s
n30Eh	Rotary Brake Time: time it takes to go from fast Rate to slow Rate: 0 = 5.8s ... 0x7FFF = 0.2s
n30Fh	Rotary speaker directivity: 0 = omnidirectional ... 0x7FFF = maximum directivity
n310h	Rotary Mic Angle: angle between stereo pickup microphones: 0 = 0°, 1 = 45°, 2 = 90°, 3 = 135°, 4 = 180°

Wah-Wah

NRPN	Description
n200h	0 = Off, 1 = On
n201h	Mode: 0 = Dyn up, 1 = Dyn down, 2 = Dyn up sharp, 3 = LFO
n202h	Filter type: 0 = Low pass, 1 = Band pass
n203h	Filter center frequency: 0 = min ... 0x7FFF = max
n204h	Filter Resonance: 0 = min ... 0x7FFF = max
n205h	Dyn wah Sensitivity: 0 = none ... 0x7FFF = max
n206h	Dyn wah Decay time: 0 = 10ms ... 0x7FFF = 5s
n207h	LFO Amount: 0 = none ... 0x7FFF = max
n208h	LFO Rate: 0 = 0Hz ... 0x7FFF ≈ 10Hz.

Tremolo

NRPN	Description
n500h	0 = Off, 1 = On
n501h	Type: 0 = Mono (tremolo), 1 = Stereo (auto-pan)
n503h	Shape 0 = Triangle ... 0x7FFF = Square
n504h	Depth: 0 = none ... 0x7FFF = max
n505h	Modulation Rate: 0 ≈ 1Hz ... 0x7FFF ≈ 20Hz

Delay

NRPN	Description
n700h	0 = Off, 1 = On
n701h	Type: 0 = Mono, 1 = Stereo (ping-pong)
n702h	Level: 0 = 0.0 ... 0x7FFF = 1.0
n703h	Pre low pass filter cutoff frequency: 0≈2kHz ... 0x7FFF=off
n705h	Delay time : 0 = 0 ... 0x7FFF = 1365ms
n706h	Delay feedback: 0 = 0 ... 0x7FFF = 99%
n707h	Feedback high frequency damping amount: 0 = 0 ... 0x7FFF ≈ 99%

Mix

NRPN	Description
nA00h	Main Volume
nA01h	Main L/R pan
nA02h	AUX Volume
nA03h	AUX L/R pan
nA04h	to Global Reverb send level

Wave Import NRPN Controls (.WAV import from USB stick - only available if enabled in firmware)

NRPN # (High|Low)	Description
3664h	val=01h : Get File List Answer is one “File Info” SysEx per file val=20h : Exit Folder Answer is ACK or NACK val=21h : Get Disk Info Answer is “Disk Info” SysEx val=77h : Get User Sounds List Answer is “User Sound Info” Sysex per slot val=79h: Get User Sounds Memory Answer is “User Sound Mem” Sysex
3665h	Val=0..FileNb-1: Enter Folder Answer is ACK or NACK
3667h	val= 0…FileNb-1: do Wave-Import of selected file from USB-Stick val= 0x7F : do Wave-Import of all files from the current USB-Stick directory
3668h	Val=0 … MaxIndex-1: remove selected User-Sound from NAND-Flash val= 0x7F: remove all imported User-Sounds from NAND-Flash

Notes:
FileNb is max number of WAV files from Disk (50 in current demo firmware)
MaxIndex is max number of imported User sounds in NAND-Flash (100 in current Wave-Import module)
File name with extension, displayed, is limited to 50 characters.

NRPN 3664h

Get File List (value = 01h)

The list of valid WAV files available on USB-Stick can be retrieved by sending NRPN 3664H with value 01H. Answer will be some SySex messages: one message per WAV. Format is shown below:

SysEx Answer	Comment
F0h 7Dh	SysEx Header (Manufacturer ID = 7Dh for board internal communication)
01h	“File Info”
ii ii	File Index
aa	File Attributes (see below)
nn nn … nn nn 00h	File Name with Extension (7-bit ASCII, 50*nn characters max)
F7h	SysEx End

File Attributes: Bit 0: Read only, Bit 1: Hidden, Bit 2: System, Bit 3: Volume, Bit 4: Directory, Bit 5: Archive

When File List is finished this message is send:

SysEx Answer	Comment
F0h 7Dh	SysEx Header
02h	“File List finished”
nn nn	Total file number
F7h	

Get Disk Info (value = 21h)

The USB disk info can be retrieved by sending NRPN 3664H with value 21H. Answer will be the below SysEx:

SysEx Answer	Comment
F0h 7Dh	SysEx Header
21h	“Disk Info”
ss ss	Size (14 bit) in 100MB steps. 1 => 0.1GB , 10 => 1.0GB, 0 if “No Disk”
nn nn … nn nn 00h	Part Name (7-bit ASCII, 11*nn characters Max)
F7h	

Note: Disk Info is also send each time the USB-Stick is inserted or removed

Get User Sounds List (value = 77h)

The list of User-Sounds available in NAND-Flash can be retrieved by sending NRPN 3664H with value 77H. Answer will be some SySex messages: one message per User-Sound (or NACK “empty” if no sound), format is shown below:

SysEx Answer	Comment
F0h 7Dh 77h ii ii nn nn … nn nn 00h F7h	SysEx Header “User-Sound Info” Index 0-terminated sound name (7-bit ASCII, 50*nn characters max)

When User Sounds List is finished this message is send:

SysEx Answer	Comment
F0h 7Dh 78h nn nn F7h	SysEx Header “User Sounds List finished” Total file number

Get User Sounds Memory (value = 79h)

The memory information for User-Sounds available in NAND-Flash can be retrieved by sending NRPN 3664H with value 78H. Answer will be a SySex message, format is shown below:

SysEx Answer	Comment
F0h 7Dh 79h ii ii ii ii ii ii nn nn nn nn nn F7h	SysEx Header “User-Sound Memory” Max number of User Sounds (16bit value, build from the three 7bits values) Number of allocated User Sounds (16bit value, build from the three 7bits values) Remaining memory size (32bit value, build from the five 7bits values)

NRPN 3667h

Import selected Wave file (value = File index)

The selected .wav file is imported inside system by sending NRPN 3667h with value ‘index’ (index is returned inside answer for ‘Get File List’). Answer will be some SysEx messages, format is shown below:

If accepted it sends (if not it will send a NACK message, see last page)

SysEx Answer	Comment
F0h 7Dh 70h pp F7h	SysEx Header “single Wave Import started / in progress” progress in percent (0..100)

(not fully supported yet, only sends a single message with pp=0 at import start)

When done it sends

SysEx Answer	Comment
F0h 7Dh 71h ii ii F7h	SysEx Header “single Wave Import finished” User-Sound index (drumset note# - 1)

Import all Wave files from current directory (value 7Fh)

Each .wav file available in the current USB-Stick directory is imported inside system by sending NRPN 3667h with value 7Fh. Answer will be some SysEx messages, one message per .wav file proceed, format is shown below:

If accepted it sends (if not it will send a NACK message, see last page)

SysEx Answer	Comment
F0h 7Dh 72h F7h	SysEx Header "All Wave Import started"

SysEx Answer	Comment
F0h 7Dh 73h ii ii F7h	SysEx Header "All Wave Import in progress" current file index

When done, it sends a SysEx message with the number of imported WAV Files:

SysEx Answer	Comment
F0h 7Dh 74h nn nn F7h	SysEx Header "All Wave Import finished" number of WAV imported

How to playback imported .WAV / User-Sound
A drumset at Program Change 110 is generated, note 1 to 101 allows to play 100 imported WAV sounds.

Supported format of .WAV File
Only PCM type, Mono or Stereo channels, variable sampling rate (44.1kHz, 48kHz…), 16/24/32 bits per sample. Limited to 8M samples per channels.

The USB-Stick must be FAT16/FAT32 formatted.

NRPN 3668h

Remove selected User-Sound (index)

Remove selected User-Sound (imported Wave) inside NAND-Flash by sending NRPN 3668h with value = index (note# -1). Answer will be a SysEx message, format is shown below:

SysEx Answer	Comment
F0h 7Dh 75h xx xx F7h	SysEx Header "Selected User Sound removed" Index value

Remove all User-Sounds (7Fh)

Remove all User-Sounds inside the NAND-Flash by sending NRPN 3668h with value 7Fh. Answer will be a SysEx message, format is shown below:

SysEx Answer	Comment
F0h 7Dh 76h F7h	SysEx Header "All User Sounds removed"

ACK / NACK Message

In case a command cannot be processed, or an error happen, a NACK (not acknowledged) SysEx message will be send as reply, format is shown below:

SysEx Answer	Comment
F0h 7Dh	SysEx Header
ac	7Ch = ACK (OK), 7Eh = NACK (Error)
ee	NACK Error Code: 0 = empty, 1 = not succeed. Wave Import Error code.
(ii ii)	(current file index, when it occurs during 'Import All' operation)
F7h	

Wave Import Error codes:

2 = recognized WAV file has type <>1 (PCM): not supported. Or has 'fmt ' chunk with a too small size
4 = channel sample data length from WAV file is more than 0x800000 (8M) samples
8 = not all expected sample data from recognized WAV file has been received
9 = file read access stops before its expected end
32 = not enough free memory inside NAND Flash to store the WAV file sample data
33 = no free entry for a WAV (max. 100 slots)
64 = partially recognized information from WAV file, not reached the 'data' chunk
127 = no WAV file recognized

Real-time control

HiHat pedal

The 5716EDrum firmware accepts MIDI Control 4 message (Foot Controller) to receive the actual position of the Hihat controller pedal. Depending on the Hihat controller value, the triggered sound will not be the same:

Foot Controller value 0 to 11: Note On 46 will play the Open-Hihat sound
Foot Controller value 12 to 31: Note On 46 will play the Half-Open Hihat sound (slight sizzle)
Foot Controller value 32 to 64: Note On 46 will play the “Near-Closed” Hihat sound (sizzle)
Foot Controller value 65 to 127: Note On 46 will play the Close Hihat sound

Cymbal choke

For Ride cymbal choke, a Key-Aftertouch message with value 127 should send to Ride-Edge note (59):

AnH 3Bh 7Fh

“n” is the MIDI channel, default n=9 (MIDI channel 10)

All Ride cymbal sounds will be muted (51,53,59).

For Crash cymbal choke, a Key-Aftertouch message with value 127 should send to Crash-Edge note (55).
For Crash2 cymbal choke, a Key-Aftertouch message with value 127 should send to Crash2-Edge note (52).

NB: note played while cymbal edge is pressed are played normally (not choked)!

Drum Kit select

The Program Change on drum channel (C9H pp) is only valid in case of Drum Kit preset tables are defined in 5716EDrum firmware. Typically all parameters of a Drum Kit will be stored in the Host CPU memory (in this case C9H pp message should not be used). Upon selection a Drum Kit these parameters will be sent to the 5716 board in a bulk on serial or parallel port. For efficient data transfer be aware that the firmware supports MIDI running status, and is storing NRPN MSB/LSB values.

Auto-Test

Built-in auto-test program is included which can be used for board production testing. To start the Auto-Test, send NRPN 3751H with value 23H. Sine waveforms at different frequencies will be output to the DAC to indicate test in progress, as follows:

Test in progress	Output frequency
External RAM Test running	~750 Hz
RAM Test failure	~4000 Hz
PASS	~1000 Hz

Last sine waveform is output constantly to allow test of audio output. Board must be reset to exit test mode and return in normal mode.

Detailed MIDI Implementation

For MIDI channel 10 (Drum track):

MIDI Message	HEX Code	Description
NOTE ON	99H kk vv	Note ON #kk(1-127), velocity vv(1-127). vv=0 means NOTE OFF
NOTE OFF	89H kk vv	Note OFF #kk(1-127), vv is don't care.
PROGRAM CHANGE	*C9H pp*	*Drum Kit select, see page 13*
KEY AFTERTOUCH	A9H kk vv	Cymbal Choke, see page 13
CTRL 04	B9H 05H cc	Hihat Control, see page 13
CTRL 06	B9H 06H cc	NRPN Data MSB
CTRL 07	B9H 07H cc	Drum Kit Volume (default=127)
CTRL 38	B9H 26H cc	NRPN Data LSB
CTRL 98	B9H 62H vv	NRPN low
CTRL 99	B9H 63H vv	NRPN high
CTRL 120	B9H 78H 00H	All sound off (abrupt stop of sound)
CTRL 123	B9H 7BH 00H	All notes off
NRPN xxyyH	B9H 63H xxH 62H yyH 06H vv	**NRPN Controls**, see page 3 and follows

For MIDI channels 1-9 and 11-16 (GM tracks):

MIDI Message	HEX Code	Description	Compatibility
NOTE ON	9nH kk vv	Note ON kk(1-127), velocity vv(1-127), vv=0 means NOTE OFF	MIDI
NOTE OFF	8nH kk vv	Note OFF kk(1-127), vv is don't care.	MIDI
PITCH BEND	EnH bl bh	Pitch bend as specified by bh|bl (14 bits) Maximum swing is +/- 1 tone (power-up). Can be changed using « pitch bend sensitivity ». Center position is 00H 40H.	GM
PROGRAM CHANGE	CnH pp	Program (patch) change: Refer to GM sounds list	GM/GS
CHANNEL AFTERTOUCH	DnH vv	vv pressure value. Effect set using Sys. Ex. 40H 2pH 20H-26H	MIDI
CTRL 00	BnH 00H cc	Bank select: Refer to GM sounds list	GS
CTRL 01	BnH 01H cc	Modulation wheel. Rate and maximum depth can be set using SYSEX	MIDI
CTRL 05	BnH 05H cc	Portamento time	MIDI
CTRL 06	BnH 06H cc	Data entry : provides data to RPN and NRPN	MIDI
CTRL 07	BnH 07H cc	Volume (default=100)	MIDI
CTRL 10	BnH 0AH cc	Pan (default=64 center)	MIDI
CTRL 11	BnH 0BH cc	Expression (default=127)	MIDI/GM
CTRL 64	BnH 40H cc	Sustain (damper) pedal	MIDI
CTRL 65	BnH 41H cc	Portamento ON/OFF	MIDI
CTRL 66	BnH 42H cc	Sostenuto pedal	MIDI
CTRL 67	BnH 43H cc	Soft pedal	MIDI
CTRL 71	BnH 47H cc	TVF Resonnance modify (same as NRPN 0121h)	GM/GS
CTRL 72	BnH 48H cc	Env release time modify (same as NRPN 0166h)	GM/GS
CTRL 73	BnH 49H cc	Env attack time modify (same as NRPN 0163h)	GM/GS
CTRL 74	BnH 4AH cc	TVF cutoff freq modify (same as NRPN 0120h)	GM/GS
CTRL 75	BnH 4BH cc	Env decay time modify (same as NRPN 0164h)	GM/GS
CTRL 76	BnH 4CH cc	Vibrato rate modify (same as NRPN 0108h)	GM/GS
CTRL 77	BnH 4DH cc	Vibrato depth modify (same as NRPN 0109h)	GM/GS

CTRL 78	BnH 4EH cc	Vibrato delay modify (same as NRPN 010Ah)	GM/GS
CTRL 84	BnH 54H vv	Portamento control	GS
CTRL 91	BnH 5BH vv	Reverb send level vv=00H to 7FH	GS
CTRL 93	BnH 5DH vv	Chorus send level vv=00H to 7FH	GS
CTRL 98	BnH 62H vv	NRPN low	MIDI
CTRL 99	BnH 63H vv	NRPN high	MIDI
CTRL 100	BnH 64H vv	RPN low	MIDI
CTRL 101	BnH 65H vv	RPN high	MIDI
CTRL 120	BnH 78H 00H	All sound off (abrupt stop of sound on channel n)	MIDI
CTRL 121	BnH 79H 00H	Reset all controllers	MIDI
CTRL 123	BnH 7BH 00H	All notes off	MIDI
CTRL 126	BnH 7EH 00H	Mono on	MIDI
CTRL 127	BnH 7FH 00H	Poly on (default power-up)	MIDI

CTRL CC1	BnH ccH vvH	Assignable Controller 1. cc=Controller number (0-5Fh), vv=Control value (0-7Fh). Control number (ccH) can be set on CC1 CONTROLLER NUMBER (Sys. Ex 40 1x 1F). The resulting effect is determined by CC1 controller function (Sys.Ex. 40 2p 40-4A)	GS
CTRL CC2	BnH ccH vvH	Assignable Controller 2. cc=Controller number (00h-5Fh), vv=control value (0-7Fh). Control number can be set on CC2 CONTROLLER NUMBER (Sys.Ex. 40 1x 20). The resulting effect is determined by CC2 controller function (Sys.Ex.40 2p 50-5A).	GS
RPN 0000H	BnH 65H 00H 64H 00H 06H vv	Pitch bend sensitivity in semitones (default=2)	MIDI/GM
RPN 0001H	BnH 65H 00H 64H 01H 06H vv	Fine tuning in cents (vv=00 -100, vv=40H 0, vv=7FH +100	MIDI
RPN 0002H	BnH 65H 00H 64H 02H 06H vv	Coarse tuning in half-tones (vv=00 -64, vv=40H 0, vv=7FH +64	MIDI
NRPN 0108H	BnH 63H 01H 62H 08H 06H vv	Vibrate rate modify (vv=40H -> no modif)	GS
NRPN 0109H	BnH 63H 01H 62H 09H 06H vv	Vibrate depth modify (vv=40H -> no modif)	GS
NRPN 010AH	BnN 63H 01H 62H 0AH 06H vv	Vibrate delay modify (vv=40H -> no modif)	GS
NRPN 0120H	Bnh 63H 01H 62H 20H 06H vv	TVF cutoff freq modify(vv=40H -> no modif)	GS
NRPN 0121H	BnH 63H 01H 62H 21H 06H vv	TVF resonance modify (vv=40H -> no modif)	GS
NRPN 0163H	Bnh 63H 01H 62H 63H 06H vv	Env. attack time modify(vv=40H ->no modif)	GS
NRPN 0164H	BnH 63H 01H 62H 64H 06H vv	Env. decay time modify(vv=40H -> no modif)	GS
NRPN 0166H	BnH 63H 01H 62H 66H 06H vv	Env. release time modif(vv=40H ->no modif)	GS
Standard Sysex	F0H 7EH 7FH 09H 01H F7H	General MIDI reset (note 4)	GM
Standard Sysex	F0H 7FH 7FH 04H 01H 00H ll F7H	Master volume (ll=0 to 127, default 127) (note 4). Not reset by GS reset	GM
SYSEX	F0H 41H 00H 42H 12H 40H 00H 00H dd dd dd dd xx F7H	Master tune (default dd= 00H 04H 00H 00H) -100.0 to +100.0 cents. Nibblized data should be used (always four bytes). For example, to tune to +100.0 cents, sent data should be 00H 07H 0EH 08H (note 4)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 00H 04H vv xx F7H	Master volume (default vv=7FH) (note 4) Not reset by GS reset.	GS
SYSEX	F0H 41H 00H 42H 12H 40H 00H 05H vv xx F7H	Master key-shift (default vv=40H, no transpose) (note 4)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 00H 06H vv xx F7H	Master pan (default vv=40H, center) (note 4)	
SYSEX	F0H 41H 00H 42H 12H 40H 00H 7FH 00H xx F7H	GS reset (note 4)	GS
SYSEX	F0H 41H 00H 42H 12H 40 01H 10H vv1 vv2 vv3 vv4 vv5 vv6 vv7 vv8 vv9 vv10 vv11 vv12 vv13 vv14 vv15 vv16 xx F7h	Voice reserve : vv1= Part 10 (Default vv=2) vv2 to vv10 = Part 1 to 9 (Default vv=2) vv11 to vv16= Part 11 to 16 (Default vv=0) (note 4)	GS

SYSEX	F0H 41H 00H 42H 12H 40H 01H 30H vv xx F7H	Reverb type (vv=0 to 7), default = 04H 00H : Room1 01H : Room2 02H : Room3 03H : Hall1 04H : Hall2 05H : Plate 06H : Delay 07H : Pan delay (note 5)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 01H 31H vv xx F7H	Reverb character, default 04H (note 5)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 01H 32H vv xx F7H	Reverb Pre-LPF, 0 to 7, default 0 (note 5)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 01H 33H vv xx F7H	Reverb master level, default = 64 (note 5)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 01H 34H vv xx F7H	Reverb time (note 5)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 01H 35H vv xx F7H	Reverb delay feedback. Only if reverb number=6 or 7 (delays) (note 5)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 01H 37H vv xx F7H	Reverb pre delay time (vv=0 to 7Fh = 0ms to 127ms). Only if reverb number=0 to 5 (reverbs)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 01H 38H vv xx F7H	Chorus type (vv=0 to 7), default = 02H 00H : Chorus1 01H : Chorus2 02H : Chorus3 03H : Chorus4 04H : Feedback 05H : Flanger 06H : Short delay 07H : FB delay (note 5)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 01H 39H vv xx F7H	Chorus Pre-LPF, 0 to 7, default = 0 (note 5)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 01H 3AH vv xx F7H	Chorus master level, default = 64 (note 5)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 01H 3BH vv xx F7H	Chorus feedback (note 5)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 01H 3CH vv xx F7H	Chorus delay (note 5)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 01H 3DH vv xx F7H	Chorus rate (note 5)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 01H 3EH vv xx F7H	Chorus depth (note 5)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 01H 3FH vv xx F7H	Chorus send level to reverb, default=0 (note 5)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 02H 00H vv xx F7H	EQ Low Freq, vv: 0=200Hz, 1=400Hz, default 0	GS
SYSEX	F0H 41H 00H 42H 12H 40H 02H 01H vv xx F7H	EQ Low Gain, vv: 0=-12dB, 40h=0dB, to7Fh=+12dB, default 60h=+6dB	GS
SYSEX	F0H 41H 00H 42H 12H 40H 02H 02H vv xx F7H	EQ High Freq, vv: 0=3KHz, 1=6KHz, default 0	GS
SYSEX	F0H 41H 00H 42H 12H 40H 02H 03H vv xx F7H	EQ High Gain, vv: 0=-12dB, 40h=0dB, to7Fh=+12dB, default 60h=+6dB	GS
SYSEX	F0H 41H 00H 42H 12H 40H 1pH 02H nn xx F7H	MIDI channel to part assign, p is part (0 to 15), nn is MIDI channel (0 to 15, 16=OFF). This SYSEX allows to assign several parts to a single MIDI channel or to mute a part. (note 3) Default assignment : <u>part</u> <u>MIDI channel</u> 0 9 (DRUMS) 1-9 0-8 10-15 10-15	GS

SYSEX	F0H 41H 00H 42H 12H 40H 1pH 15H vv xx F7H	Part to rhythm allocation, p is part (0 to 15), vv is 00 (sound part) or 01 (rhythm part). This SYSEX allows a part to play sound or drumset. There is no limitation of the number of parts playing drumset. Default assignment : part 0 plays drums (default MIDI channel 9) all other parts play sound. (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 1pH 40H v1 v2 ... v12 xx F7H	Scale tuning, p is part (0 to 15), v1 to v12 are 12 semi-tones tuning values (C, C#, D, ... A#, B), in the range -64 (00H) 0 (40H) +63(7FH) cents. This SYSEX allows non chromatic tuning of the musical scale on a given part. Default v1, v2, ... ,v12 = 40H, 40H,...,40H (chromatic tuning). Scale tuning has no effect if the part is assigned to a rhythm channel or if the sound played is not of chromatic type. (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 1pH 1AH vv xx F7H	Velocity slope from 00H to 7FH (default = 40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 1pH 1BH vv xx F7H	Velocity offset from 00H to 7FH (default = 40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 1pH 1FH vv xx F7H	CC1 Controller number (00-5FH) (default = 10H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 1pH 20H vv xx F7H	CC2 Controller number (00-5FH) (default = 11H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 00H vv xx F7H	Mod pitch control (-24,+24 semitone) (default = 40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 01H vv xx F7H	Mod tvf cutoff control (default = 40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 02H vv xx F7H	Mod Amplitude control (-100%-+100%) (default=40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 03H vv xx F7H	Mod lfo1 rate control (default = 40H). n is don't care. Rate is common on all channels	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 04H vv xx F7H	Mod lfo1 pitch depth (0-600 cents) (default=0AH) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 05H vv xx F7H	Mod lfo1 tvf depth (default = 0H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 06H vv xx F7H	Mod lfo1 tva depth (0-100%) (default = 0H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 10H vv xx F7H	Bend pitch control (-24,+24 semitone) (default = 42H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 11H vv xx F7H	Bend tvf cutoff control (default = 40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 12H vv xx F7H	Bend Amplitude control (-100%-+100%) (default=40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 14H vv xx F7H	Bend lfo1 pitch depth (0-600 cents) (default=00H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 15H vv xx F7H	Bend lfo1 tvf depth (default = 0H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 16H vv xx F7H	Bend lfo1 tva depth (0-100%) (default = 0H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 20H vv xx F7H	CAF pitch control (-24,+24 semitone) (default = 40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 21H vv xx F7H	CAF tvf cutoff control (default = 40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 22H vv xx F7H	CAF Amplitude control (-100%-+100%) (default=40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 24H vv xx F7H	CAF lfo1 pitch depth (0-600 cents) (default=00H) (note 3)	GS

SYSEX	F0H 41H 00H 42H 12H 40H 2pH 25H vv xx F7H	CAF lfo1 tvf depth (default = 0H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 26H vv xx F7H	CAF lfo1 tva depth (0-100%) (default = 0H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 40H vv xx F7H	CC1 pitch control (-24,+24 semitone) (default = 40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 41H vv xx F7H	CC1 tvf cutoff control (default = 40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 42H vv xx F7H	CC1 Amplitude control (-100%-+100%) (default=40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 44H vv xx F7H	CC1 lfo1 pitch depth (0-600 cents) (default=00H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 45H vv xx F7H	CC1 lfo1 tvf depth (default = 0H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 46H vv xx F7H	CC1 lfo1 tva depth (0-100%) (default = 0H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 50H vv xx F7H	CC2 pitch control (-24,+24 semitone) (default = 40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 51H vv xx F7H	CC2 tvf cutoff control (default = 40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 52H vv xx F7H	CC2 Amplitude control (-100%-+100%) (default=40H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 54H vv xx F7H	CC2 lfo1 pitch depth (0-600 cents) (default=00H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 55H vv xx F7H	CC2 lfo1 tvf depth (default = 0H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 2pH 56H vv xx F7H	CC2 lfo1 tva depth (0-100%) (default = 0H) (note 3)	GS
SYSEX	F0H 41H 00H 42H 12H 40H 4pH 22H nn xx F7H	with 'p'=MIDI track, 'nn': 0 = track in normal mode, 1 = send to MFX1, 2 = send to MFX2, 3 = send to both MFX	GS / DREAM

Notes :

1. NRPN sending method : CTRL#99=high byte, CTRL#98=low byte, CTRL#6=vv. Example : NRPN 0108h = 40h -> CTRL#99=1, CTRL#98=8, CTRL#6=64.
2. x or xx means « don't care »
3. Cross system exclusive :
   Address can be 040h xxh xxh or 050h xxh xxh
   If addresse=040h xxh xxh : system exclusive applies to midi port 1 (midi channels 0-Fh) if received on midi port1 , applies to midi port 2 (midi channels 10-1Fh) if received on midi port 2.
   If addresse=050h xxh xxh, cross system exclusive : applies to port 2 if received on port1, applies to port 1 if received on port2
4. Non cross system exclusive applying only on receiving port :
   System exclusive applies to midi port 1 (midi channels 0-Fh) if received on midi port1.
   System exclusive applied to midi port 2 (midi channels 10-1Fh) if received on midi port2.
5. Non cross system exclusive applying on both ports :
   System exclusive will be applied to all midi channels (0-1Fh). Can be received on port 1 or port 2 indifferently.
   This is the case for all system exclusive concerning reverb and chorus because reverb and chorus are the same for both ports 1 and 2.
6. Drumset edit NRPN : 4 different drumset edit tables are implemented :
   - 1 for midi port 1 channel 10
   - 1 for midi port 2 channel 10
   - 1 for midi port 1 channels 1-9 or 11-16 : for all these channels, edit table is the same
   - 1 for midi port 2 channels 1-9 or 11-16 : for all these channels, edit table is the same