

Appendix B — VFX MIDI Implementation Chart

MODEL: VFX

MIDI Implementation Chart

Version: 1.0

Function...		Transmitted	Recognized	Remarks
Basic Channel	Default Channel	1 1 - 16	1 1 - 16	
Mode	Default Messages Altered	1 X X	1, 3, 4, Multi X X	memorized (Global Controllers In MONO Mode)
Note Number	True Voice	21 - 108	21 - 108	
Velocity	Note ON Note OFF	O X	O X	
After Touch	Key's Ch's	O O	O O	
Pitch Bender		O	O	
Control Change		1 - 95 1 Mod Wheel 4 Foot 6 Data 7 Volume 70 Momentary Patch Select 71 Timbre Parameter 72 Release Parameter 100 Registered Param Select 101 Registered Param Select	1 - 95 1 Mod Wheel 4 Foot 6 Data 7 Volume 70 Momentary Patch Select 71 Timbre Parameter 72 Release Parameter 100 Registered Param Select 101 Registered Param Select	programmable
Prog Change	True #	0 - 127	0 - 119, 124 - 127	
System Exclusive		O	O	
System Common	: Song Pos : Song Sel : Tune	O O X	O O X	
System Real Time	: Clock : Commands	X X	X X	
Aux Mes-sages	: Local On/Off : All Notes Off : Active Sense : Reset	X X X X	X X X X	
Notes * A Note Off velocity of 64 is always sent for all keys.				

Mode 1: OMNI ON, POLY
Mode 3: OMNI OFF, POLY

Mode 2: OMNI ON, MONO
Mode 4: OMNI OFF MONO

O : YES
X : NO

Appendix A - VFX MIDI Implementation Specification

1 Introduction and Overview

This section describes the MIDI System Exclusive (SysEx) communication protocol used when the VFX is communicating with an external computer (EXT). The protocol is designed to aid the implementation of editing programs running on EXT, and so this information is especially relevant to designers and programmers of editing programs. The commands described here allow editor/librarian programs to collect and alter information about presets, programs, and the multi set within the VFX.

The VFX supports the MIDI **Device Inquiry message** which allows instruments and computers to ascertain the identity of the unit(s) to which they are connected via MIDI. The VFX responds to the following Device Inquiry message by sending a Device ID message. The VFX will respond to the inquiry if the channel information in the message contains either the base MIDI channel of the VFX or the all channel broadcast code (\$7F).

11110000	F0	System Exclusive status byte
01111110	7E	Non Real Time message code
0000nnnn	0x	Base MIDI channel number
or		
01111111	7F	All Channel Broadcast code
00000110	06	General Information message code
00000001	01	Device Inquiry message code
11110111	F7	End of System Exclusive

The following **Device ID message** contains information about the VFX, and is transmitted in response to a Device Inquiry.

11110000	F0	System Exclusive status byte
01111110	7E	Non Real Time message code
0000nnnn	0N	Base MIDI channel number
00000110	06	General Information message code
00000010	02	Device ID message code
00001111	0F	ENSONIQ manufacturer's Code
00000101	05	VFX Product Family ID code - LSByte
00000000	00	VFX Product Family ID code - LSByte
00000000	00	VFX Family Member (Model ID) code LSByte
00000000	00	VFX Family Member (Model ID) code MSByte
00000000	00	Software revision information
00000000	00	
0nnnnnnn	NN	Major Version Number (integer portion)
0nnnnnnn	NN	Minor Version Number (decimal fraction portion)
11110111	F7	End of System Exclusive

2 MIDI System Exclusive Packet Pieces

A packet is a bunch of information, i.e. a message, in the form of a MIDI data stream. Each packet can be divided into three sections or pieces. The first and last packet pieces form the *frame* for a message. The message contains the commands described in section 3. Every message must be preceded with a SysEx head and followed with a SysEx tail. A complete packet looks like this:

SysEx Head Message SysEx Tail

2.1 MIDI System Exclusive Packet Head

This is the common MIDI system exclusive header which must be used on all system exclusive messages to and from the VFX. These six bytes are always sent preceding the message portion of the packet.

11110000	F0	System Exclusive status byte
00001111	0F	ENSONIQ Code
00000101	05	VFX Family ID Code
00000000	00	VFX Model ID Code
0000nnnn	0x	Base MIDI channel number
00000nnn	0x	Message Type (see section 3)

2.2 MIDI System Exclusive Packet Tail

For every head there is a tail. The tail follows the message portion, and is the last byte of every complete SysEx packet.

11110111	F7	End of System Exclusive
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2.3 Message Format

The VFX message format within the packet frame allows 8 bit data bytes to be transmitted and received using the 7 bit data of MIDI. The MSB of the data bytes must always be a zero, so the bytes are converted to two 4 bit nybbles. These nybbles are converted to bytes whose upper four bits are all zero for transmission. This is a description of the format of all data bytes within the packet frame as they are transmitted or received via MIDI. The details of each message are given in section 3.

0000HHHH	H = Hi 4 bits of data byte - transmitted first
0000LLLL	L = Lo 4 bits of data byte

This represents how the 8 bit byte HHHHLLLL would be transmitted.

3 Message Type List

The next few sections describe the messages to be used between EXT and VFX. The message type corresponds to the last byte of the system exclusive packet head described in section 2.1.

Note:

The SysEx messages outlined below appear as an ordered description of bytes which do not necessarily represent the MIDI format described in section 2.3. Remember, full 8-bit data bytes are always sent as two "nybble-ized" bytes.

3.1 Command Messages (Message Type = 00)

All messages which need some interpretation by the receiver are called *command messages*. Every command message is transmitted using the message format described in section 2.3. The first byte of each command message is the command type byte, which follows the message type byte in the packet head. In the following sections the command type is shown in the section headings.

3.1.1 Virtual Buttons (Command Type = 00)

EXT can simulate button presses from the front panel of the VFX by sending this command. These commands can simulate any single button down being momentarily held down. The button number follows the command type byte in the message.

3.1.1.1 Button Numbers

Logical Number	Front Panel Button Name	Logical Number	Front Panel Button Name
0	unnamed bank 0	28	Wave
1	unnamed bank 1	32	Pitch
2	unnamed bank 2	33	Pitch Mod
3	unnamed bank 3	34	Filters
4	unnamed bank 4	36	Output
5	unnamed bank 5	39	LFO
6	unnamed bank 6	41	Env1
7	unnamed bank 7	44	Env2
8	unnamed bank 8	47	Env3
9	unnamed bank 9	50	Effects (Programming)
10	Cart	53	Select Voice
11	Sounds	54	Copy
12	Presets	55	Write
13	Storage	56	Compare
14	up arrow, INC	57	Volume
15	down arrow, DEC	58	Pan
16	soft key 0, top left	59	Timbre
17	soft key 1, top middle	60	Key Zone
18	soft key 2, top right	61	Transpose
19	soft key 3, bottom left	62	Release
20	soft key 4, bottom middle	63	Patch Select
21	soft key 5, bottom right	66	MIDI (Performance)
22	Master	69	Effects (Performance)
24	MIDI Control	73	Multi A
26	Program Control	74	Multi B
27	Mod Mixer	76	Replace Program

3.1.2 Parameter Change (Command Type = 01)

Single parameters can be edited by EXT using this command. Since this is a short message relative to the much longer bulk dump length of a complete program, program editors running on EXT can change single parameters by using this command faster than by sending a complete program dump when only one or a few parameters change.

Absolute parameter values depend on the parameter page and slot numbers which uniquely define each parameter. Slot numbers are equivalent to soft button numbers. See section 5 of this appendix for the page and slot definitions. Most parameter values are in the low byte of the absolute value word; key range parameter types use the whole word.

00000001	01	Command Type
00000nnn	0x	Voice Number, [0..5]
000nnnnn	0x	Parameter Page Number, [0..31]
00000nnn	0x	Parameter Slot Number, [0..5]
hhhh1111	HL	Absolute Value Hi Byte, [0..255]
hhhh1111	HL	Absolute Value Lo Byte, [0..255]

3.1.3 Edit Change Status (Command Type = 02)

This command is only *transmitted* by the VFX; it is not received. It allows the external editor to retain synchronization with the compare buffer in the VFX. The edit change status command is sent whenever an edit operation initiated from the front panel of the VFX causes more than one parameter to change. The edit change status command will always be preceded by at least one parameter change message. Although the VFX will send parameter change messages, it may not be able to send the new value of every parameter that changed, due to the complexities of internal editing. When EXT receives this message, it should request a complete program dump to re-establish editing sync. The command type is the only byte in this command.

3.1.4 ESP Microcode Program Load (Command Type = 03)

The ESP is the audio effects processor of the VFX. ESP microcode can be downloaded using this command which can facilitate creating new effect programs. This command is currently not implemented, and is reserved for future use.

3.1.5 Poke Byte to RAM or Cartridge (Command Type = 04)

This command allows bytes to be transmitted to RAM or the E²PROM cartridge using MIDI. The following table describes the download command message. *Use at your own risk.*

00000004	04	Command Type
hhhhhhhh	HH	Address Hi Word
llllllll	LL	Address Lo Word
nnnnnnnn	XX	Data Byte, [0..255]

Note: The VFX does not transmit the following Dump Request commands (command types 05 to 0A). The command type is the only byte in these commands.

3.1.6 Single Program Dump Request (Command Type = 05)

The VFX will dump the current program using the bulk dump message described in section 3.3.1 when it receives this command. If the current program is being edited, the edited version from the compare buffer will be transmitted.

3.1.7 Single Preset Dump Request (Command Type = 06)

The VFX will dump the current preset using the bulk dump message described in section 3.3.3 when it receives this command. If the current preset is being edited, the edited version will be transmitted.

3.1.8 Multi-Set Dump Request (Command Type = 07)

The VFX will dump the multi-set using the bulk dump message described in section 3.3.5 when it receives this command.

3.1.9 Dump Everything Request (Command Type = 08)

The VFX will dump the internal RAM program banks, the internal RAM preset banks, and the multi-set using the bulk dump messages described in section 3.3 when it receives this command. Each dump is a separate message, i.e. the messages are not combined into one.

3.1.10 Internal Program Bank Dump Request (Command Type = 09)

The VFX will dump the internal RAM program banks using the bulk dump message described in section 3.3.2 when it receives this command.

3.1.11 Internal Preset Bank Dump Request (Command Type = 0A)

The VFX will dump the internal RAM preset banks using the bulk dump message described in section 3.3.4 when it receives this command.

3.2 Error Messages (Message Type = 01)

Error messages are transmitted by the VFX when an error occurs while processing any of the command messages described in section 3.1. The VFX ignores error messages.

3.2.1 Command Message Error Codes

These codes are the data byte of error messages.

Code	Name	Meaning
00	NAK	The preceding command message could not be processed. The receiver is busy or the message is unintelligible.
01	INVALID PARAMETER NUMBER	The parameter voice, page, or slot in the preceding parameter value message doesn't make sense.
02	INVALID PARAMETER VALUE	The parameter value in the preceding parameter value message is out of range.
03	INVALID BUTTON NUMBER	The button number in the preceding virtual button message doesn't correspond to any real button number.

3.3 Bulk Dumps of Programs, Presets, and Multi-Sets

Bulk dump data messages are transmitted using the message format described in section 2.3. The message type byte, which is part of the system exclusive header, is given in hexadecimal with the name of the dump message. The actual data bytes for programs and presets are described in section 4. The MIDI data byte lengths are listed in decimal for each message type.

3.3.1 One Program (Message Type = 02)

MIDI Data byte length = $1060 + \text{head and tail} = 1067$

The current selected program is transmitted. If the compare buffer is active (the Compare LED is on), then the program in the compare buffer will be transmitted. If this message is received, the new program will be put in the compare buffer so it can be written to internal or cartridge memory. Remember that the compare buffer is over-written by the incoming data and its previous contents are lost.

3.3.2 All Programs (Message Type = 03)

MIDI Data byte length = $1060 * 60 = 63600 + \text{head and tail} = 63607$

All 60 programs in the 10 internal RAM program banks are contained in this message.

3.3.3 One Preset (Message Type = 04)

MIDI Data byte length = $96 + \text{head and tail} = 103$

The current selected preset is transmitted. If this message is received, the new preset will be put in the preset buffer so it can be written to any preset location. If presets are being edited (the preset LED on, but no preset number LEDs are on), then the received preset will become the current preset.

3.3.4 All Presets (Message Type = 05)

MIDI Data byte length = $96 * 20 = 1920 + \text{head and tail} = 1927$

All 20 presets in the 2 internal RAM preset banks are contained in this message.

3.3.5 Multi-Set (Message Type = 06)

MIDI Data byte length = $100 * 12 = 1200 + 24 + 22 + \text{head and tail} = 1253$

All track data for the 12 Multi A & B tracks and the Multi Effect are transmitted.

4 Parameter Block Data Descriptions

This is a description of the parameter blocks transmitted using the bulk dump messages described in section 3.3. The names and byte offsets of each block parameter are given. The parameter value ranges are included in section 5. The following byte layout is the internal representation and not the MIDI byte format which is described in section 2.3.

4.1 Program Parameters

The first group of parameters through byte offset 82 describe one of the six possible voices in a program. All of the global program parameters are at the bottom of this list. When the program has a custom pitch table installed, voices 5 and 6 are replaced with the pitch table data. In this case, starting at the beginning of voice 5, there is a packed list of fourteen bit records consisting of a 7 bit MIDI key number and 7 bits of pitch fine tune. There are 88 records for the complete keyrange A0 - C8.

Byte Offset	Parameter Name
0	Env1 Initial Level
1	Env1 Attack Time
2	Env1 Peak Level
3	Env1 Decay Time 1
4	Env1 Breakpoint 1
5	Env1 Decay Time 2
6	Env1 Breakpoint 2
7	Env1 Decay Time 3
8	Env1 Sustain Level
9	Env1 Release Time
10	Env1 Level Velocity Sensitivity
11	Env1 Attack Time Velocity Sensitivity
12	Env1 Keyboard Tracking
13	Env1 Mode (hi nybble) and Velocity Curve (lo nybble)
14	Env2 Initial Level
15	Env2 Attack Time
16	Env2 Peak Level
17	Env2 Decay Time 1
18	Env2 Breakpoint 1
19	Env2 Decay Time 2
20	Env2 Breakpoint 2
21	Env2 Decay Time 3
22	Env2 Sustain Level
23	Env2 Release Time
24	Env2 Level Velocity Sensitivity
25	Env2 Attack Time Velocity Sensitivity
26	Env2 Keyboard Tracking
27	Env2 Mode (hi nybble) and Velocity Curve (lo nybble)
28	Env3 Initial Level
29	Env3 Attack Time
30	Env3 Peak Level
31	Env3 Decay Time 1
32	Env3 Breakpoint 1
33	Env3 Decay Time 2
34	Env3 Breakpoint 2
35	Env3 Decay Time 3
36	Env3 Sustain Level
37	Env3 Release Time

Byte Offset	Parameter Name
38	Env3 Level Velocity Sensitivity
39	Env3 Attack Time Velocity Sensitivity
40	Env3 Keyboard Tracking
41	Env3 Mode (hi nybble) and Velocity Curve (lo nybble)
42	Pitch Root Key
43	Pitch Fine Tune
44	Pitch Table
45	Pitch Env1 Modulation Amount
46	Pitch LFO Modulation Amount
47	Pitch Glide (hi nybble) and Pitch Modulation Source (lo nybble)
48	Pitch Modulation Amount
49	Filter #1 Cutoff
50	Filter #1 Keyboard Modulation Amount
51	Filter #1 Env2 Modulation Amount
52	Filter Mode (hi nybble) and Filter #1 Modulation Source
53	Filter #1 Modulation Amount
54	Filter #2 Cutoff
55	Filter #2 Keyboard Modulation Amount
56	Filter #2 Env2 Modulation Amount
57	Filter #2 Modulation Source
58	Filter #2 Modulation Amount
59	Volume Fade Shape
60	Volume Fade Key Zone Low
61	Volume Fade Key Zone High
62	Volume and Pre-Gain Switch (MSB)
63	Pan Mod Source (hi nybble) and Volume Mod Source (lo nybble)
64	Volume Modulation Amount
65	Pan
66	Pan Modulation Amount
67	Voice Priority (hi nybble) and Output Routing (lo nybble)
68	LFO Waveshape (hi nybble) and LFO Mod Source (lo nybble)
69	LFO Depth
70	LFO Mode (lo nybble) and LFO Speed Mod Source (hi nybble)
71	LFO Speed Modulation Amount
72	LFO Speed
73	LFO Delay Time
74	Waveform
75	Wave Class (hi nybble) and Wave Mod Source (lo nybble)
76	Wave Mod Amount
77	Wave Start Index
78	Noise Source Rate
79	Wave Delay Time
80	Mixer Curve (hi nybble) and Mixer Mod Source #1 (lo nybble)
81	Mixer Scaler (hi nybble) and Mixer Mod Source #2 (lo nybble)
82	Velocity Threshold

(end of Voice #1 structure)

Byte Offset	Parameter Name
83	Voice #2 (same structure as Voice #1)
166	Voice #3 (same structure as Voice #1)
249	Voice #4 (same structure as Voice #1)
332	Voice #5 (same as Voice #1 or program pitch table data, if enabled)
415	Voice #6 (same as Voice #1 or program pitch table data, if enabled)
498	Program Name - (11 bytes or characters)
509	Program Patch #1 (lo 6 bits)
510	Program Patch #2 (lo 6 bits)
511	Program Patch #3 (lo 6 bits)
512	Program Patch #4 (lo 6 bits)
513	Program Trigger Mode (hi nybble) and Pitch Table Switch (lo nybble)
514	Program Glide Time
515	Program Delay Factor (hi nybble) and Global Bend Range (lo nybble)
516	Program Restrike
517	Program Timbre (Performance parameter)
518	Program Release (Performance parameter)
519	Program Effect Parameter #1
520	Program Effect Parameter #2
521	Program Effect Parameter #3
522	Program Effect Parameter #4
523	Program Effect Parameter #5
524	Program Effect Parameter #6
525	Program Effect Parameter #7
526	Program Effect Parameter #8
527	Program Effect Select
528	Program Effect FX1 Mix
529	Program Effect FX2 Mix

4.2 Preset Parameters

Presets are stored as an array of variable size bit fields packed into consecutive bytes.

Byte Offset	Bit Mask	Parameter Name
0	VVVVVVVC	V olume (hi 7 bits) and first bit of MIDI Channel (LSB)
1	CCCSXXX	MIDI Channel (hi 3 bits), S tatus (bits 3 & 4), and eX ternal controller number (lo 3 bits)
2	XXXXTTTT	eX ternal controller number (hi nybble) and T ranspose (lo nybble)
3	TTTTLLLL	T ranspose (hi nybble) and L ow key (lo nybble)
4	LLLHHHHH	L ow key (hi 3 bits) and H igh key (lo 5 bits)
5	HHSSPPP	H igh key (hi 2 bits), patch S elect (bits 3-5), and MIDI P rogram number (lo 3 bits)
6	PPPPRRL	MIDI P rogram number (hi nybble), p ressure type (bits 2-3), and r elease time (lo 2 bits)
7	LLLLLLPP	r elease time (bits 2-7) and P an (lo 2 bits)
8	PPPPPEE	P an (bits 2-7) and E ffect routing (lo 2 bits)
9	ESxxxxxx	E ffect routing (MSB) and S ustain pedal on/off (bit 6) x = spare bits reserved for future use
10	iiiiiii	i nternal program number

4.3 Multi-Set (Multi A & B) Parameters

This message consists of the data from the 12 Multi A & B tracks, the track status array, and an effect definition.

Byte Offset	Parameter Name
0	Track 1 Program pointer (MSByte = Program number 0..179)
4	Track 1 Recording Controllers control block
8	Track 1 Pitchwheel
10	Track 1 Modwheel
12	Track 1 Patch Select Buttons
14	Track 1 External Controller XCTRL
16	Track 1 CV Pedal
18	Track 1 Volume
20	Track 1 Sustain Pedal
22	Track 1 Sostenuto Pedal
24	Track 1 Timbre
26	Track 1 Release
28	Track 1 Pressure
30	Track 1 Mix
32	Track 1 Mute Status
34	Track 1 Last Key
36	Track 1 Effect Routing Override
38	Track 1 Patch Select override
39	Track 1 Sustain Enable switch
40	Track 1 Key Down List Head
42	Track 1 MIDI Channel
43	Track 1 MIDI Program number
44	Track 1 MIDI Pressure type (off,mono,poly)
45	Track 1 MIDI Status (local,midi,both)
46	Track 1 Key Zone low key
47	Track 1 Transpose
48	Track 1 Key Zone high key
49	Track 1 Pan

(end of Track 1 structure)

50	Track 2 parameters (same structure as Track 1)
100	Track 3 parameters (same structure as Track 1)
150	Track 4 parameters (same structure as Track 1)
200	Track 5 parameters (same structure as Track 1)
250	Track 6 parameters (same structure as Track 1)
300	Track 7 parameters (same structure as Track 1)
350	Track 8 parameters (same structure as Track 1)
400	Track 9 parameters (same structure as Track 1)
450	Track 10 parameters (same structure as Track 1)
500	Track 11 parameters (same structure as Track 1)
550	Track 12 parameters (same structure as Track 1)
600	Multi Track status array

Byte Offset	Parameter Name
612	Multi Effect Parameter #1
613	Multi Effect Parameter #2
614	Multi Effect Parameter #3
615	Multi Effect Parameter #4
616	Multi Effect Parameter #5
617	Multi Effect Parameter #6
618	Multi Effect Parameter #7
619	Multi Effect Parameter #8
620	Multi Effect Select
621	Multi Effect FX1 Mix
622	Multi Effect FX2 Mix

5 Parameter Page and Slot Definitions

This is a table of all parameter page and slot (or soft button) numbers for voice and system parameters including the parameter value ranges.

Page	Slot	Range	Parameter Name and Description
Master pages			
0	0	-128..+127	Master Tune
0	1	0..15	Touch: - SOFT,MED,FIRM,HARD 1-4
0	2	0..12	System Bend Range
0	3		undefined
0	4	0..4	FS1 Auxiliary Footswitch Configuration: - UNUSED,SOSTENU,PATCH L,ADVANCE
0	5	0,1	FS2 Footswitch Configuration: - SUSTAIN,PATCH R
1	0		undefined
1	1	0,1	Slider mode: - NORMAL,TIMBRE
1	2	0,1	CV Pedal Configuration: - VOL,MOD
1	3,4		undefined
1	5	0,1	System Pitch Table: - CUSTOM,NORMAL
MIDI Control pages			
2	0	0..15	MIDI Base Channel
2	1		undefined
2	2	0,1	MIDI Send Channel: - BASE,TRACK
2	3	0..4	MIDI Mode: - OMNI,POLY,MULTI,MONO A,MONO B
2	4		undefined
2	5	0..95	MIDI External Controller number
3	0		undefined
3	1	0,1	MIDI System Exclusive enable flag
3	2,3		undefined
3	4	0,1	MIDI Controllers enable flag
3	5	0,1,2	MIDI Program Change enable flag
Program Control page			
4	0		undefined
4	1	0,1	Pitch Table enable flag
4	2	0..13	Program Bend Range (13=global)
4	3	0..3	Delay Multiplier: - X1,X2,X4,X8
4	4	0..99	Program Restrike
4	5	0..99	Program Glide Time

Page	Slot	Range	Parameter Name and Description
Mod Mixer page			
5	0		undefined
5	1	0..15	Mod Mixer Mod Source #1
5	2	0..15	Mod Mixer Mod Source #2
5	3		undefined
5	4	0..15	Mod Mixer Scaler
5	5	0..15	Mod Mixer Shape
Wave Page — pages 6-9 are used for all wave types or classes but there are different interpretations of parameters depending on the current wave class. When changing wave page parameters, be sure the wave class is set first, otherwise parameter values may be invalid. When the wave class is changed, the other wave parameters are reset to default values.			
The following slots are for the sampled wave classes (strings, brass, bass, breath, tuned percussion, and percussion).			
6	0	0..108	Wave Name
6	1	0..9	Wave Class
6	2	0..251	Delay Time (251=key up)
6	3	0..127	Wave Start
6	4	-127..127	Wave Velocity Start Mod
6	5	0,1	Wave Direction: - FORWARD, REVERSE
The following slots are specifically for TRANSWAVE class (06)			
7	4	0..15	Wave Mod Source
7	5	-127..+127	Wave Mod Amount
The following slots are specifically for the WAVEFORM and INHARMONIC classes (07 and 08, respectively)			
8	3-5		undefined
The following slots are specifically for the looping MULTI-WAVE class (09)			
9	3	0..243	Loop Wave Start number
9	4	1..243	Loop Length
9	5	0,1	Loop Direction: - FORWARD, REVERSE
Pitch page			
10	0	-4..+4	Pitch Octave
10	1	-12..+12	Pitch Semitone
10	2	-127..127	Pitch Fine Tune
10	3		undefined
10	4	0..2	Pitch Table type: - SYSTEM, ALL-C4, CUSTOM
10	5		undefined
Pitch Mod page			
11	0		undefined
11	1	0..15	Pitch Mod Source
11	2	-99..+99	Pitch Mod Amount
11	3	0..4	Glide Mode: - NONE, PEDAL, MONO, LEGATO, TRIGGER
11	4	-127..+127	Pitch Env1 Mod Amount
11	5	-127..+127	Pitch LFO Mod Amount

Page	Slot	Range	Parameter Name and Description
Filter pages			
12	0	0,1	Filter #1 Type: - LO-PASS/2,LO-PASS/3
12	1	0..127	Filter #1 Cutoff
12	2	-127..+127	Filter #1 Keyboard Tracking Amount
12	3	0..15	Filter #1 Mod Source
12	4	-127..+127	Filter #1 Mod Amount
12	5	-127..+127	Filter #1 Env2 Mod Amount
13	0	0..3	Filter #2 Type: - HI-PASS/2,HI-PASS/1,LO-PASS/2,LO-PASS/1
13	1	0..127	Filter #2 Cutoff
13	2	-127..+127	Filter #2 Keyboard Tracking Amount
13	3	0..15	Filter #2 Mod Source
13	4	-127..+127	Filter #2 Mod Amount
13	5	-127..+127	Filter #2 Env2 Mod Amount
Output pages			
14	0	0..127	Volume
14	1	0..15	Volume Mod Source
14	2	-127..+127	Volume Mod Amount
14	3	-128..+127	Keyboard Scaling amount (-128=ZONE)
14	4		undefined
14	5	21..108	Scaling Key Range (low and high keys)
15	0,1		undefined
15	2	0..2	Output Destination: - DRY,FX1,FX2
15	3	0..127	Pan
15	4	0..15	Pan Mod Source
15	5	-127..+127	Pan Mod Amount
16	0	0,1	Voice Pre-Gain Switch
16	1		undefined
16	2	0..2	Voice Priority: - LO,MED,HI
16	3,4		undefined
16	5	-127..+127	Voice Velocity Threshold
LFO pages			
17	0	0..99	LFO Rate
17	1	0..15	LFO Rate Mod Source
17	2	-127..+127	LFO Rate Mod Amount
17	3	0..127	LFO Depth
17	4	0..15	LFO Depth Mod Source
17	5	0..99	LFO Delay
18	0		undefined
18	1	0..6	LFO Waveshape
18	2	0,1	LFO Restart Switch
18	3,4		undefined
18	5	0..127	Noise Source Rate

Page	Slot	Range	Parameter Name and Description
Envelope pages			
19	0		undefined
19	1	0..127	Env1 Initial Level
19	2	0..127	Env1 Peak Level
19	3	0..127	Env1 Breakpoint 1 Level
19	4	0..127	Env1 Breakpoint 2 Level
19	5	0..127	Env1 Sustain Level
20	0		undefined
20	1	0..99	Env1 Attack Time
20	2	0..99	Env1 Decay 1 Time
20	3	0..99	Env1 Decay 2 Time
20	4	0..99	Env1 Decay 3 Time
20	5	-100..+99	Env1 Release Time
21	0	-127..+127	Env1 Keyboard Tracking
21	1		undefined
21	2	0..9	Env1 Velocity Curve
21	3	0..2	Env1 Mode: - NORMAL,FINISH,REPEAT
21	4	0..127	Env1 Level Velocity Sensitivity
21	5	0..127	Env1 Attack Time Velocity Sensitivity
22	0		undefined
22	1	0..127	Env2 Initial Level
22	2	0..127	Env2 Peak Level
22	3	0..127	Env2 Breakpoint 1 Level
22	4	0..127	Env2 Breakpoint 2 Level
22	5	0..127	Env2 Sustain Level
23	0		undefined
23	1	0..99	Env2 Attack Time
23	2	0..99	Env2 Decay 1 Time
23	3	0..99	Env2 Decay 2 Time
23	4	0..99	Env2 Decay 3 Time
23	5	-100..+99	Env2 Release Time
24	0	-127..+127	Env2 Keyboard Tracking
24	1		undefined
24	2	0..9	Env2 Velocity Curve
24	3	0..2	Env2 Mode: - NORMAL,FINISH,REPEAT
24	4	0..127	Env2 Level Velocity Sensitivity
24	5	0..127	Env2 Attack Time Velocity Sensitivity
25	0		undefined
25	1	0..127	Env3 Initial Level
25	2	0..127	Env3 Peak Level
25	3	0..127	Env3 Breakpoint 1 Level
25	4	0..127	Env3 Breakpoint 2 Level
25	5	0..127	Env3 Sustain Level
26	0		undefined
26	1	0..99	Env3 Attack Time
26	2	0..99	Env3 Decay 1 Time
26	3	0..99	Env3 Decay 2 Time
23	4	0..99	Env3 Decay 3 Time
26	5	-100..+99	Env3 Release Time

Page	Slot	Range	Parameter Name and Description
27	0	-127..+127	Env3 Keyboard Tracking
27	1		undefined
27	2	0..9	Env3 Velocity Curve
27	3	0..2	Env3 Mode: - NORMAL,FINISH,REPEAT
27	4	0..127	Env3 Level Velocity Sensitivity
27	5	0..127	Env3 Attack Time Velocity Sensitivity

The effect parameter pages are dependent on the currently selected effect. When changing effect page parameters, be sure the effect type is selected first, otherwise parameter values may be invalid. When the effect type is changed, the other effect parameters assume default values. Page 28 of each effect type is shared - the differences are noted when different from page 28 of the Hall Reverb.

Hall Reverb

Page	Slot	Range	Parameter Name and Description
28	0		undefined
28	1	0..15	Effect Type
28	2	0..99	Decay Time
28	3		undefined
28	4	0..127	Reverb (FX1) Mix
28	5	0..127	Reverb (FX2) Mix
29	0,1		undefined
29	2	0..250	Pre-delay Time
29	3,4		undefined
29	5	0..127	Early Reflection
30	0,1		undefined
30	2	0,1	FX2 Mode: - NORMAL.STEREO.SEND,LEFT.WET/RIGHT.DRY
30	3,4		undefined
30	5	0..99	High Frequency Damping

Dynamic Reverb

Page	Slot	Range	Parameter Name and Description
29	0		undefined
29	1	-128..127	Decay Modulation Amount
29	2	0..250	Pre-delay Time
29	3	0..11	Decay Modulation Source
29	4		undefined
29	5	0..127	Early Reflection

(page 30 is the same as the Hall Reverb for this effect)

Multi-Voice Chorus			Parameter Name and Description
Page	Slot	Range	
28	4	0..127	Chorus (FX1) Mix
28	5	0..127	Chorus (FX2) Mix
29	0	0..99	Chorus Rate
29	1	0..127	Chorus Depth
29	2	0..100	Chorus Delay Time
29	3	-128..127	Chorus Feedback
29	4,5		undefined
30	0,1		undefined
30	2	0,1	FX2 Mode: - NORMAL.STEREO.SEND,LEFT.WET/RIGHT.DRY
30	3-5		undefined
Chorus and Reverb			Parameter Name and Description
Page	Slot	Range	
28	4	0..127	Chorus (FX1) to Reverb Mix
28	5	0..127	Reverb (FX2) Mix
29	0	0..99	Chorus Rate
29	1	0..127	Chorus Depth
29	2	0..250	Chorus Delay Time
29	3	-128..127	Chorus Rate Modulation Amount
29	4	-128..127	Chorus Depth Modulation Amount
29	5	0..127	Chorus Mix
30	0		undefined
30	1	0,1	LFO Waveshape
30	2	0..11	Chorus Mod Source
30	3,4		undefined
30	5	0,1	Reverb High Frequency Cut Switch
Flanger and Reverb			Parameter Name and Description
Page	Slot	Range	
28	4	0..127	Flanger (FX1) to Reverb Mix
28	5	0..127	Reverb (FX2) Mix
29	0	0..99	Flanger Rate
29	1	0..127	Flanger Minimum
29	2	0..127	Flanger Maximum
29	3	0..11	Flanger Rate Modulation Source
29	4	-128..127	Flanger Minimum Modulation Amount
29	5	-128..127	Flanger Maximum Modulation Amount
30	0		undefined
30	1	0..15	Flanger Mix Level
30	2	-128..127	Flanger Feedback
30	3,4		undefined
30	5	0,1	Reverb High Frequency Cut Switch

Delay and Reverb

Page	Slot	Range	Parameter Name and Description
28	4	0..127	Delay (FX1) to Reverb Mix
28	5	0..127	Reverb (FX2) Mix
29	0	0..250	Delay Time
29	1	-128..127	Delay Regeneration
29	2		undefined
29	3	-128..127	Delay Time Modulation Amount
29	4	-128..127	Delay Regeneration Modulation Amount
29	5	0..127	Delay Mix
30	0,1		undefined
30	2	0..11	Delay Modulation Source
30	3,4		undefined
30	5	0..99	Reverb High Frequency Damping

Flanger, Delay, and Reverb

Page	Slot	Range	Parameter Name and Description
28	4	0..127	Flanger and Delay (FX1) to Reverb Mix
28	5	0..127	Reverb (FX2) Mix
29	0	0..99	Flanger Rate
29	1	0..127	Flanger Minimum
29	2	0..127	Flanger Maximum
29	3	-128..127	Flanger Feedback
29	4,5		undefined
30	0	0..200	Delay Time
30	1	-128..127	Delay Regeneration
30	2	0..127	Delay Mix
30	3,4		undefined
30	5	0,1	Reverb High Frequency Cut Switch

Rotary Speaker Simulator

Page	Slot	Range	Parameter Name and Description
28	2	0..250	Delay Time
28	4	0..127	Rotating Speaker (FX1) to Delay Mix
28	5	0..127	Delay (FX2) Mix
29	0	0..99	Rotor Speed Low
29	1	0..99	Rotor Speed High
29	2	0,1	Lo-Rotor Switch
29	3	0..11	Rotor Speed Modulation Source
29	4		undefined
29	5	0..2	Motor Mode: - CONTIN,SWITCH,TOGGLE
30	0		undefined
30	1	0..250	Feedback Lag
30	2	-128..127	Repeats
30	3	-128..127	Feedback Lag Amount
30	4		undefined
30	5	0..127	Stereo Width

The following slots are for the overdrive version of the rotary speaker simulator only.

28	2	0..127	Overdrive Level (FX1 and FX2)
30	2		undefined

