QS6,7,8,R MIDI SYSEX SPECIFICATION

February 3 1997

SYSTEM EXCLUSIVE FORMAT

The QS MIDI System Exclusive message format is as follows:

F0	System exclusive status
00 00 0E	Alesis manufacturer id#
0E	Quadrasynth family id#
cc	Opcode
dd	Data
:	:
:	:
F7	End-Of-Exclusive

OPCODES:

00 - MIDI User Program Dump   F0 00 00 0E 0E 00 <program#> <data> F7

  <program#>= 0..127 selects individual user programs

<data> is in a packed format in order to optimize data transfer. Eight MIDI bytes are used to transmit each block of 7 QS data bytes. If the 7 data bytes are looked at as one 56-bit word, the format for transmission is eight 7-bit words beginning with the most significant bit of the first byte, as follows:

SEVEN QUADRASYNTH BYTES:
```
0: A7 A6 A5 A4 A3 A2 A1 A0
1: B7 B6 B5 B4 B3 B2 B1 B0
2: C7 C6 C5 C4 C3 C2 C1 C0
3: D7 D6 D5 D4 D3 D2 D1 D0
4: E7 E6 E5 E4 E3 E2 E1 E0
5: F7 F6 F5 F4 F3 F2 F1 F0
6: G7 G6 G5 G4 G3 G2 G1 G0
```

TRANSMITTED AS:
```
0: 0 A6 A5 A4 A3 A2 A1 A0
1: 0 B5 B4 B3 B2 B1 B0 A7
2: 0 C4 C3 C2 C1 C0 B7 B6
3: 0 D3 D2 D1 D0 C7 C6 C5
4: 0 E2 E1 E0 D7 D6 D5 D4
5: 0 F1 F0 E7 E6 E5 E4 E3
6: 0 G0 F7 F6 F5 F4 F3 F2
```

7: 0 G7 G6 G5 G4 G3 G2 G1

There are 400 data bytes sent for a single program dump, which corresponds to 350 bytes of program data. With the header, the total number of bytes transmitted with a program dump is 408. The location of each parameter within a program dump is shown in the next section.

<u>01 - MIDI User Program Dump Request</u>   F0 00 00 0E 0E 01 <program#> F7

 <program#>= 0..127 selects individual user programs

When received, the QS will respond to this message with a MIDI user program dump (00) of the program number selected.

<u>02 - MIDI Edit Program Dump</u>   F0 00 00 0E 0E 02 <edit#> <data> F7

 <edit#>   = 0=program mode edit; 1-16=Mix program edits 1-16

<data> is in the same format as described in 00. Loading a program into the QS program edit buffer will not change the current effect edit buffer, even if the program's effect number is different than the current effect number.

<u>03 - MIDI Edit Program Dump Request</u>   F0 00 00 0E 0E 03 <edit#> F7

 <edit#>   = 0=program mode edit; 1-16=Mix program edits 1-16

When received, the QS will respond to this message with a MIDI edit program dump (02) of the edit program selected.

<u>04 - MIDI Old User Mix Dump</u>   F0 00 00 0E 0E 04 <mix#> <data> F7

 <mix#>   = 0..99 selects individual user mixes; 100=mix edit buffer

<data> is in the same format as described in 00, but with a different number of bytes due to the difference in the mix parameters. As shown later, this command (and the following one) exists to accomodate Quadrasynths with software versions below 2.00. The total number of data bytes sent for a single mix dump is 141, which corresponds to 123 bytes of mix data. With the header, the total number of bytes transmitted with a program dump is 149. When loading a mix into the mix edit buffer, none of the 16 program edit buffers or the effect buffer will be changed,

even if the new mix buffer contains program numbers different than what is currently selected.

05 - MIDI Old Mix Dump Request F0 00 00 0E 0E 05 <mix#> F7

 <mix#>   = 0..99 selects individual user mixes; 100=mix edit buffer

When received, the QS will respond to this message with a MIDI Old Mix dump (04) of the mix selected. It is recommended that the New Mix Dump Request be used instead (0F), since it adds additional Mix parameters into its format.

06 - MIDI User Effects Dump   F0 00 00 0E 0E 06 <effect#> <data> F7

 <effect#> = 0..127 selects individual user effects

<data> is in the same format as described in 00, but with a different number of bytes due to the difference in the effects parameters. The total number of data bytes sent for a single effects dump is 75, which corresponds to 65 bytes of effects data. With the header, the total number of bytes transmitted with a program dump is 83. Although a Program is stored along with its Effects, they are dealt with independently via MIDI.

07 - MIDI User Effects Dump Request F0 00 00 0E 0E 07 <effect#> F7

 <effect#> = 0..127 selects individual user effects

When received, the QS will respond to this message with a MIDI user effects dump (06) of the user effect selected.

08 - MIDI Edit Effects Dump   F0 00 00 0E 0E 08 <edit#> <data> F7

 <edit#>   = 0=program mode effect edit; 1=mix mode effect edit

<data> is in the same format as described in 06.

<u>09 - MIDI Edit Effects Dump Request</u> F0 00 00 0E 0E 09 <edit#> F7

 <edit#>   = 0=program mode effect edit; 1=mix mode effect edit

When received, the QS will respond to this message with a MIDI edit effects dump
(08) of the edit effect selected.

<u>0A - MIDI Global Data Dump</u>   F0 00 00 0E 0E 0A 00 <data> F7

<data> is in the same format as described in 00, but with a different number of bytes
due to the difference in the global parameter size. The total number of data bytes
sent for a global data dump is 23, which corresponds to 20 bytes of global data.
With the header, the total number of bytes transmitted with a program dump is 31.
Note that with version prior to 2.00, the last three bytes of the global data will not
be transmitted, since they did not exist in previous versions.

<u>0B - MIDI Global Data Dump Request</u> F0 00 00 0E 0E 0B F7

When received, the QS will respond to this message with a MIDI global data dump
(0A).

<u>0C - MIDI All Dump Request</u>   F0 00 00 0E 0E 0C F7

When received, the QS will respond to this message with a 128 MIDI User
Program dumps (00), 100 MIDI New User Mix dumps (0E), and 128 User Effects
dumps (06), and a Global data dump (0A), for a total of 79,478 MIDI bytes. A
delay of 4.25 milliseconds will be placed between each dump, resulting in a total
transfer time of about 27 seconds. When receiving a complete dump, the QS does
not require any delay between dumps.

<u>0D - MIDI Mode Select</u>   F0 00 00 0E 0E 0D <mode> F7

 <mode>   = 0 = Program mode; 1 = Mix mode

When received, the QS will change to the mode that was selected. The settings will
be retained from the last time that mode was exited.

<u>0E - MIDI New User Mix Dump</u>   F0 00 00 0E 0E 0E <mix#> <data> F7

 <mix#>   = 0..99 selects individual user mixes; 100=mix edit buffer

<data> is in the same format as described in 00, but with a different number of bytes due to the difference in the mix parameters. This command (and the following one) exists only in Quadrasynths with software versions 2.00 and above. The total number of data bytes sent for a single mix dump is 158, which corresponds to 138 bytes of mix data. With the header, the total number of bytes transmitted with a program dump is 166. When loading a mix into the mix edit buffer, none of the 16 program edit buffers or the effect buffer will be changed, even if the new mix buffer contains program numbers different than what is currently selected.

<u>0F - MIDI New Mix Dump Request</u> F0 00 00 0E 0E 0F <mix#> F7

 <mix#>   = 0..99 selects individual user mixes; 100=mix edit buffer

When received, the QS will respond to this message with a MIDI New Mix dump (0E) of the mix selected.

<u>10 - MIDI Editing</u>

 F0 00 00 0E 0E 10 <0mmfffff><0sspppppp><0ccccddv><0vvvvvvv>F7

    <mm>   =   0=Global, 1=Mix, 2=Program, 3=Effects
    <fffff>   =   Function number 0 through 16, depending on mode
    <ss>   =   Sound 1-4 (0-3) when <mm>=2, effect bus 1-4 (0-3) when <mm>=3
    <ppppp>   =   Page 0 through 23, depending on mode and function
    <cccc>   =   Channel 1 through 16 (0-15); Ignored unless in mix mode & <mm>=1 or 2
    <dd>   =   Data entry pot number 1-4 (0-3)
    <vvvvvvvv>= Parameter value, 8 bit 2's complement

All parameters to be edited must be sent in this format (12 MIDI bytes), regardless of the number of bits required to transmit the value of the parameter. When the QS receives this message, it will edit the specified parameter to the new value and display it. If the function and page selected does not exist in the current configuration, the command will cause the nearest legal function, page, and parameter to be selected, but no edit will occur. If a Mix edit is sent while in program mode, it will be ignored. If this command is received while in compare, it will be ignored. If a program edit command is received, it will place the QS in Edit mode. If the value received is out of range for the parameter selected, the range

will be limited to the nearest legal value. The function and page numbers for each parameter are shown in the next section.

11 - Sector Erase Command   F0 00 00 0E 0E 11 <sector#> F7

  <sector#>= 0..63 selects 128K byte sector number to be erased in FLASH PCMCIA card

The erase command sets all bytes of a sector to FFH. There can be up to 64 sectors of 128K bytes in a FLASH card, which allows for up to 8 megabytes of FLASH memory. Additional commands should not be sent until receiving an ACK or NACK (described below) from the QS. As much as 10 seconds must be allowed before aborting if no ACK or NACK is received.

12- Sector Write Command   F0 00 00 0E 0E 12 <sector#> <block#> <data> <sum> F7

  <sector#>= 0..63 selects 128K byte sector number to be written in FLASH PCMCIA
                card
  <block#>= 0..127 selects 1024 byte block of data to be written in FLASH PCMCIA card
  <sum>= 0..127 seven bit checksum of previous 1173 bytes.

<data> is in a packed format in order to optimize data transfer. Eight MIDI bytes are used to transmit each block of 7 FLASH card data bytes. Like with program dumps, if the 7 data bytes are looked at as one 56-bit word, the format for transmission is eight 7-bit words beginning with the most significant bit of the first byte, as follows:

  SEVEN FLASH CARD BYTES:
0: A7 A6 A5 A4 A3 A2 A1 A0
1: B7 B6 B5 B4 B3 B2 B1 B0
2: C7 C6 C5 C4 C3 C2 C1 C0
3: D7 D6 D5 D4 D3 D2 D1 D0
4: E7 E6 E5 E4 E3 E2 E1 E0
5: F7 F6 F5 F4 F3 F2 F1 F0
6: G7 G6 G5 G4 G3 G2 G1 G0

     TRANSMITTED AS:
0: 0 A6 A5 A4 A3 A2 A1 A0
1: 0 B5 B4 B3 B2 B1 B0 A7
2: 0 C4 C3 C2 C1 C0 B7 B6
3: 0 D3 D2 D1 D0 C7 C6 C5
4: 0 E2 E1 E0 D7 D6 D5 D4
5: 0 F1 F0 E7 E6 E5 E4 E3

6: 0 G0 F7 F6 F5 F4 F3 F2
7: 0 G7 G6 G5 G4 G3 G2 G1

There are 1171 data bytes sent for a single block of a FLASH card sector, which corresponds to 1024 bytes of FLASH card data. With the header, the total number of bytes transmitted with a program dump is 1181. This will take a minimum of 377.92 milliseconds to transmit. Additional commands should not be sent until receiving an ACK or NACK (described below) from the QS. Writes should only be performed on sector blocks known to contain all FFH data. This can be verified by reading the block first (with the next command), or sending an erase command first.

13- Sector Request Command   F0 00 00 0E 0E 13 <sector#> <block#> F7

 <sector#>= 0..63 selects 128K byte sector number to be written in FLASH PCMCIA
                    card
 <block#>= 0..127 selects 1024 byte block of data to be written in FLASH PCMCIA card

This command will cause the QS to respond with an opcode 12H (sector write command), with the contents of the sector block that was requested. If there is no card present, the QS will respond with an opcode 15H.

14 - FLASH Command ACK Response   F0 00 00 0E 0E 14 F7

This command is ignored if received by the QS. It is sent out by the QS after completing an erase command, or receiving a complete sector block write command.

15 - FLASH Command NACK Response   F0 00 00 0E 0E 15 <error> F7

 <error>= 0..4 as follows:
             0 = No card present / Not a FLASH card
             1 = Card write protected
             2 = Erase failed (FLASH chip timeout error)
             3 = Checksum didn't match
             4 = Programming failed (usually because block was not erased first)

This command is ignored if received by the QS. It is sent out by the QS after receiving an erase command that could not be completed, or receiving a complete sector block write command that could not be programmed or whose checksum was invalid. In the case of invalid checksum, the sending device is expected to resend the data at least once before aborting.

NOTES ON FLASH CARDS:

- Best case programming time for each megabyte in a FLASH card will be 7 minutes, 45 seconds, assuming a typical FLASH programming time of 65 milliseconds per sector block, and a typical erase time of 1.5 seconds per sector. This results in a transfer rate of approximately 43 times slower than real time, assuming the samples are at 48KHz.

- The burden is placed on the sending device to avoid possible errors that can occur if a sector above the total memory of a card is erased or written to (due to possible address aliasing). It is not possible for the QS to determine the amount of memory in the card.

- The FLASH card must be a 5 volt only card (no 12 volt required for programming), must have 64K byte sectors, must have 150 nanosecond or better chip enable read access time, and must be compatible with the programming commands and Manufacturer's ID codes of an Am29F040 4-Megabit FLASH memory from AMD.

DEVICE INQUIRY

The QS responds to the Universal Device Inquiry message < F0 7E 7F 06 01 F7 >
Upon receiving this message the QS will respond with the following:

F0 7E 7F 06 02	Universal Device Reply
00 00 0E	Alesis Manufacturer ID
0E 00	QS Family ID, LSB first
0x 00	QS Family Member, LSB first
xx xx xx xx	Software revision, ASCI (ex. 30 31 30 30 = '0100' = 1.00)
F7	End-Of-Exclusive

Quadrasynth Device Family ID's

#define	kQS_QS6	0x0003
#define	kQS_QS8	0x0004
#define	kQS_QS7	0x0005
#define	kQS_QSR	0x0006

Example

Send :
F0 7E 7F 06 01 F7
QS8 responds:
$F0 $7E $7F $06 $02 Universal Device Reply

$00 $00 $0E	Alesis ID
$0E $00	QS family LSB 1st
$04 $00	family member LSB 1st
$ww $xx $yy $zz	software rev.(ASCII)
$F7	EOX

PARAMETER FORMAT

The following specific parameter information shows the locations in which each parameter resides after unpacking the data from its 7 bit MIDI format into the 8 bit format as described in opcode 00, program data dump.

GLOBAL DATA FORMAT

The Global parameters are comprised of 19 bytes of data. Unlike the Program, Mix, and Effects parameters, the Global parameters are not packed into each available bit, so that each parameter occupies its own byte. This results in unused bits for most of the parameter's bytes. These bits must remain at 0. In addition, the signed parameters are kept in 2's complement format, so no offset adjustment is necessary. For direct parameter editing (sysex command 10H), the function, page, and data pot number are shown. The Mode should be set to 0 (=Global), and the Sound and Channel parameters are ignored.

#	Parameter name	Func	Page	Pot	LoLim	HiLim	bits	bit address
0.	Global spare (deleted parameter)						7	0:6-0:0
1.	Pitch transpose*	0	0	2	-12	12	8	1:7-1:0
2.	Pitch fine tune*	0	0	3	-99	99	8	2:7-2:0
3.	Keyboard scaling	0	1	0	0	99	7	3:6-3:0
4.	Keyboard curve *(QS6,7,8 only)	0	1	1	0	2	2	4:1-4:0
5.	Keyboard Transpose	0	1	2	-12	12	8	5:7-5:0
6.	Keyboard mode *(QS6,7,8 only)	0	1	3	0	17	5	6:4-6:0
7.	Controller A number	0	2	0	0	120	7	7:6-7:0
8.	Controller B number	0	2	1	0	120	7	8:6-8:0
9.	Controller C number	0	2	2	0	120	7	9:6-9:0
10.	Controller D number	0	2	3	0	120	7	10:6-10:0
11.	Pedal 1 controller number	0	4	0	0	120	7	11:6-11:0
12.	Pedal 2 controller number	0	4	2	0	120	7	12:6-12:0
13.	MIDI program select	0	5	0	0	17	5	13:4-13:0
14.	Global spare (deleted parameter)						7	14:6-14:0
15.	Clock *(QS7,8,R only)	0	--	--	0	1	1	15:0
16.	Mix Group Channel *(QSR only)	0	6	0	0	16	5	16:4-16:0
17.	General MIDI	0	0	1	0	1	1	17:0
18.	A-D controller reset	0	3	1	0	1	1	18:0

| 19. | A-D controller mode | | | 0 | 3 | 3 | 0 | 2 | 2 | 19:1-19:0 |

* These parameters are transmitted, but are ignored when received as part of a Global data dump (opcode 0A).

NEW MIX DATA FORMAT

Mixes contain 138 bytes of packed parameter data. The first 10 bytes are common parameters for all 16 MIDI channels. The next 16 sets of 8 bytes contain each of the channel's parameters. The bit addresses shown are from most significant bit to least significant bit for each parameter, with the byte number first, followed by a colon (:), followed by the bit number. Each parameter should never exceed the limit shown in the table. For bipolar parameters, the limits shown are offset binary, since this is the format that the parameters are stored in. To view the parameters as two's complement numbers, add the value shown in the Offset column. For direct parameter editing (sysex command 10H), the function, page, and data pot number are shown. The Mode should be set to 1 (=Mix), the Sound parameter is ignored, and the Channel parameter should be set to 0 through 15, for channels 1 through 16, respectively. Signed parameters should be sent in 2's complement format.

#	Parameter name	Func	Page	Pot	Offset	Limit	bits	bit address
0.	Mix effect MIDI program change	5	0	2	0	1	1	0:0
1.	Mix effect chan	5	0	3	0	15	4	0:4-0:1
2.	Mix name digit 0	6	0	0	0	95	7	1:3-0:5
3.	Mix name digit 1	6	1	0	0	95	7	2:2-1:4
4.	Mix name digit 2	6	2	0	0	95	7	3:1-2:3
5.	Mix name digit 3	6	3	0	0	95	7	4:0-3:2
6.	Mix name digit 4	6	4	0	0	95	7	4:7-4:1
7.	Mix name digit 5	6	5	0	0	95	7	5:6-5:0
8.	Mix name digit 6	6	6	0	0	95	7	6:5-5:7
9.	Mix name digit 7	6	7	0	0	95	7	7:4-6:6
10.	Mix name digit 8	6	8	0	0	95	7	8:3-7:5
11.	Mix name digit 9	6	9	0	0	95	7	9:2-8:4
12.	Mix spare						5	9:7-9:3
13.	Channel 1 program number	0	0	0	0	127	7	10:6-10:0
14.	Channel 1 program type	0	0	2	0	1	4	11:2-10:7
15.	Channel 1 enable	0	0	3	0	1	1	11:3
16.	Channel 1 volume	1	0	0	0	99	7	12:2-11:4
17.	Channel 1 pan	1	0	1	0	7	3	12:5-12:3
18.	Channel 1 output	1	0	2	0	3	2	12:7-12:6
19.	Channel 1 effect level	2	0	0	0	100	7	13:6-13:0
20.	Channel 1 effect bus	2	0	1	0	4	3	14:1-13:7
21.	Channel 1 pitch octave	3	0	0	-2	5	3	14:4-14:2
22.	Channel 1 pitch semitone	3	0	2	-12	25	5	15:1-14:5
23.	Channel 1 keyboard low note	4	0	0	0	127	7	16:0-15:2
24.	Channel 1 keyboard high note	4	0	1	0	127	7	16:7-16:1

#	Parameter name							bit address
25.	Channel 1 midi in on/off	4	1	0	0	1	1	17:0
26.	Channel 1 midi out on/off	4	1	2	0	1	1	17:1
27.	Channel 1 keyboard on/off **	4	1	3	0	1	1	17:2
28.	Channel 1 wheels on/off	4	2	0	0	1	1	17:3
29.	Channel 1 Aftertouch on/off	4	2	1	0	1	1	17:4
30.	Channel 1 Sustain pedal on/off	4	2	2	0	1	1	17:5
31.	Channel 1 Pedals/controllers on/off	4	2	3	0	1	1	17:6
32.	Channel 1 Spare						1	17:7
33-52.	Channel 2 parameters			(see above)				25:7-18:0
53-72.	Channel 3 parameters			(see above)				33:7-26:0
73-92.	Channel 4 parameters			(see above)				41:7-34:0
93-112.	Channel 5 parameters			(see above)				49:7-42:0
113-132.	Channel 6 parameters			(see above)				57:7-50:0
133-152.	Channel 7 parameters			(see above)				65:7-58:0
153-172.	Channel 8 parameters			(see above)				73:7-66:0
173-192.	Channel 9 parameters			(see above)				81:7-74:0
193-212.	Channel 10 parameters			(see above)				89:7-82:0
213-232.	Channel 11 parameters			(see above)				97:7-90:0
233-252.	Channel 12 parameters			(see above)				105:7-98:0
253-272.	Channel 13 parameters			(see above)				113:7-106:0
273-292.	Channel 14 parameters			(see above)				121:7-114:0
293-312.	Channel 15 parameters			(see above)				129:7-122:0
240-332.	Channel 16 parameters			(see above)				137:7-130:0

** **NOTE**: For the QSR, this parameter is <u>MIDI Group on/off</u>.

OLD MIX DATA FORMAT

This format exists for compatibility with Quadrasynths having software prior to version 2.00. It is presented here for reference, and can only be used for old mix data dumps or requests (no direct editing). When receiving this data Old Mixes contain 123 bytes of packed parameter data. The first 11 bytes are common parameters for all 16 MIDI channels. The next 16 sets of 7 bytes contain each of the channel's parameters. The bit addresses shown are from most significant bit to least significant bit for each parameter, with the byte number first, followed by a colon (:), followed by the bit number. Each parameter should never exceed the limit shown in the table. For bipolar parameters, the limits shown are offset binary, since this is the format that the parameters are stored in. To view the parameters as two's complement numbers, add the value shown in the Offset column.

#	Parameter name	Offset	Limit	bits	bit address
0.	Mix spare (deleted parameter)			7	0:6-0:0
1.	Mix spare (deleted parameter)			1	0:7
2.	Mix spare (deleted parameter)			1	1:0
3.	Mix effect chan	0	15	4	1:4-1:1
4.	Mix name digit 0	0	95	7	2:3-1:5

5.	Mix name digit 1	0	95	7	3:2-2:4
6.	Mix name digit 2	0	95	7	4:1-3:3
7.	Mix name digit 3	0	95	7	5:0-4:2
8.	Mix name digit 4	0	95	7	5:7-5:1
9.	Mix name digit 5	0	95	7	6:6-6:0
10.	Mix name digit 6	0	95	7	7:5-6:7
11.	Mix name digit 7	0	95	7	8:4-7:6
12.	Mix name digit 8	0	95	7	9:3-8:5
13.	Mix name digit 9	0	95	7	10:2-9:4
14.	Mix spare			5	10:7-10:3
15.	Channel 1 program number	0	127	7	11:6-11:0
16.	Channel 1 program type	0	1	1	11:7
17.	Channel 1 enable	0	1	1	12:0
18.	Channel 1 volume	0	99	7	12:7-12:1
19.	Channel 1 pan	0	7	3	13:2-13:0
20.	Channel 1 output	0	3	2	13:4-13:3
21.	Channel 1 effect level	0	100	7	14:3-13:5
22.	Channel 1 effect bus	0	4	3	14:6-14:4
23.	Channel 1 pitch octave	-2	5	3	15:1-14:7
24.	Channel 1 pitch semitone	-12	25	5	15:6-15:2
25.	Channel 1 keyboard low note	0	127	7	16:5-15:7
26.	Channel 1 keyboard high note	0	127	7	17:4-16:6
27.	Channel 1 midi in	0	1	1	17:5
28.	Channel 1 midi out	0	1	1	17:6
29.	Channel 1 keyboard on/off	0	1	1	17:7
30-44.	Channel 2 parameters	(see above)			24:7-18:0
45-59.	Channel 3 parameters	(see above)			31:7-25:0
60-74.	Channel 4 parameters	(see above)			38:7-32:0
75-89.	Channel 5 parameters	(see above)			45:7-39:0
90-104.	Channel 6 parameters	(see above)			52:7-46:0
105-119.	Channel 7 parameters	(see above)			59:7-53:0
120-134.	Channel 8 parameters	(see above)			66:7-60:0
135-149.	Channel 9 parameters	(see above)			73:7-67:0
150-164.	Channel 10 parameters	(see above)			80:7-74:0
165-179.	Channel 11 parameters	(see above)			87:7-81:0
180-194.	Channel 12 parameters	(see above)			94:7-88:0
195-209.	Channel 13 parameters	(see above)			101:7-95:0
210-224.	Channel 14 parameters	(see above)			108:7-102:0
225-239.	Channel 15 parameters	(see above)			115:7-107:0
240-254.	Channel 16 parameters	(see above)			122:7-114:0

PROGRAM DATA FORMAT

Programs contain 350 bytes of packed parameter data. The first 10 bytes are common parameters for all four sounds. The next four sets of 85 bytes contain each of the four sound's parameters. The least significant bit of the first byte of each sound determines if it is a keyboard sound or a drum sound. The parameter definitions of the remaining bits of the first byte as well as the remaining 84 bytes of the sound are determined by this bit. Only one keyboard sound and one drum sound are shown below. Each of the four sounds can be either a keyboard sound or a drum sound. The bit addresses must have the correct offset added to them in order to address the correct sound relative to the beginning of the program. Sound 1's address begins at 10, Sound 2 at 95, Sound 3 at 180, and Sound 4 at 265. The bit addresses shown are from most significant bit to least significant bit for each parameter, with the byte number first, followed by a colon (:), followed by the bit number. Each parameter should never exceed the limit shown in the table. For bipolar parameters, the limits shown are offset binary, since this is the format that the parameters are stored in. To view them as two's complement numbers, add the value shown in the Offset column. For direct parameter editing (sysex command 10H), the function, page, and data pot number are shown. The Mode should be set to 2 (=Program), the Sound parameter set to 0 through 3 for sounds 1 through 4, respectively, and the Channel parameter should be set to 0 through 15, for channels 1 through 16, respectively, when used in Mix mode. Signed parameters should be sent in 2's complement format.

#	Parameter name	Func	Page	Pot	Offset	Limit	bits	bit address
0.	Program spare (deleted parameter)						7	0:6-0:0
1.	Program spare (deleted parameter)						1	0:7
2.	Program name digit 0	8*	0	0	0	95	7	1:6-1:0
3.	Program name digit 1	8*	1	0	0	95	7	2:5-1:7
4.	Program name digit 2	8*	2	0	0	95	7	3:4-2:6
5.	Program name digit 3	8*	3	0	0	95	7	4:3-3:5
6.	Program name digit 4	8*	4	0	0	95	7	5:2-4:4
7.	Program name digit 5	8*	5	0	0	95	7	6:1-5:3
8.	Program name digit 6	8*	6	0	0	95	7	7:0-6:2
9.	Program name digit 7	8*	7	0	0	95	7	7:7-7:1
10.	Program name digit 8	8*	8	0	0	95	7	8:6-8:0
11.	Program name digit 9	8*	9	0	0	95	7	9:5-8:7
12.	ROM Identifier**						2	9:7-9:6

*If the current sound is a drum, this function number for program name must be 7.
*These 2 bits are used to identify the machine ROM where a program was written.
possible values:

      0 = Quadrasynth Plus / S4 Plus
      1 = QS
      2 = Reserved for future use
      3 = Reserved for future use

If a QS receives a program with a ROM Indentifier of 0, the QS will assume the program originated in a Quadrasynth Plus or S4 Plus. The QS will then re-map the ROM addresses for this program to be compatible with the QS.

Keyboard Sound:

#	Parameter name	Func	Page	Pot	Offset	Limit	bits	bit address
0.	Keyboard / drum mode (=0)	16	0	0	0	1	1	0:0
1.	Sample group	0	0	0	0	47	6	0:6-0:1
2.	Sample number	0	0	2	0	127	7	1:5-0:7
3.	Sound volume	1	0	0	0	99	7	2:4-1:6
4.	Sound pan	1	0	1	0	6	3	2:7-2:5
5.	Sound output	1	0	2	0	2	2	3:1-3:0
6.	Sound effect level	2	0	0	0	99	7	4:0-3:2
7.	Sound effect bus	2	0	1	0	3	2	4:2-4:1
8.	Sound pitch semitone	3	0	0	-24	49	6	5:0-4:3
9.	Sound pitch detune	3	0	2	-99	199	8	6:0-5:1
10.	Sound pitch detune type	3	0	3	0	1	1	6:1
11.	Sound pitch wheel mod	3	1	0	0	12	4	6:5-6:2
12.	Sound pitch aftertouch mod	3	1	1	-99	199	8	7:5-6:6
13.	Sound pitch lfo mod	3	1	2	-99	199	8	8:5-7:6
14.	Sound pitch env mod	3	1	3	-99	199	8	9:5-8:6
15.	Sound portamento mode	3	2	0	0	2	2	9:7-9:6
16.	Sound portamento rate	3	2	2	0	99	7	10:6-10:0
17.	Sound key mode	3	2	3	0	2	2	11:0-10:7
18.	Sound filter frequency	4	0	0	0	99	7	11:7-11:1
19.	Sound filter keyboard track	4	0	1	0	1	1	12:0
20.	Sound filter velocity mod	4	0	3	-99	199	8	13:0-12:1
21.	Sound filter pitch wheel mod	4	1	0	-99	199	8	14:0-13:1
22.	Sound filter aftertouch mod	4	1	1	-99	199	8	15:0-14:1
23.	Sound filter lfo mod	4	1	2	-99	199	8	16:0-15:1
24.	Sound filter env mod	4	1	3	-99	199	8	17:0-16:1
25.	Sound amp velocity curve	5	0	0	0	12	4	17:4-17:1
26.	Sound amp aftertouch mod	5	0	1	-99	199	8	18:4-17:5
27.	Sound amp alfo mod	5	0	2	-99	199	8	19:4-18:5
28.	Sound low note limit	6	0	0	0	127	7	20:3-19:5
29.	Sound high note limit	6	0	1	0	127	7	21:2-20:4
30.	Sound overlap	6	0	2	0	99	7	22:1-21:3
31.	Sound mod 1 source	7	0	0	0	24	5	22:6-22:2
32.	Sound mod 1 destination	7	0	1	0	31	5	23:3-22:7
33.	Sound mod 1 amplitude	7	0	2	-99	199	8	24:3-23:4
34.	Sound mod 1 gate	7	0	3	0	1	1	24:4
35.	Sound mod 2 source	7	1	0	0	24	5	25:1-24:5
36.	Sound mod 2 destination	7	1	1	0	31	5	25:6-25:2

37.	Sound mod 2 amplitude	7	1	2	-99	199	8	26:6-25:7
38.	Sound mod 2 gate	7	1	3	0	1	1	26:7
39.	Sound mod 3 source	7	2	0	0	24	5	27:4-27:0
40.	Sound mod 3 destination	7	2	1	0	31	5	28:1-27:5
41.	Sound mod 3 amplitude	7	2	2	-99	199	8	29:1-28:2
42.	Sound mod 3 gate	7	2	3	0	1	1	29:2
43.	Sound mod 4 source	7	3	0	0	24	5	29:7-29:3
44.	Sound mod 4 destination	7	3	1	0	31	5	30:4-30:0
45.	Sound mod 4 amplitude	7	3	2	-99	199	8	31:4-30:5
46.	Sound mod 4 gate	7	3	3	0	1	1	31:5
47.	Sound mod 5 source	7	4	0	0	24	5	32:2-31:6
48.	Sound mod 5 destination	7	4	1	0	31	5	32:7-32:3
49.	Sound mod 5 amplitude	7	4	2	-99	199	8	33:7-33:0
50.	Sound mod 5 gate	7	4	3	0	1	1	34:0
51.	Sound mod 6 source	7	5	0	0	24	5	34:5-34:1
52.	Sound mod 6 destination	7	5	1	0	31	5	35:2-34:6
53.	Sound mod 6 amplitude	7	5	2	-99	199	8	36:2-35:3
54.	Sound mod 6 gate	7	5	3	0	1	1	36:3
55.	Sound pitch lfo waveform	9	0	0	0	6	3	36:6-36:4
56.	Sound pitch lfo speed	9	0	1	0	99	7	37:5-36:7
57.	Sound pitch lfo delay	9	0	2	0	99	7	38:4-37:6
58.	Sound pitch lfo trigger	9	0	3	0	3	2	38:6-38:5
59.	Sound pitch lfo level	9	1	0	0	99	7	39:5-38:7
60.	Sound pitch lfo mod wheel mod	9	1	1	-99	199	8	40:5-39:6
61.	Sound pitch lfo aftertouch mod	9	1	2	-99	199	8	41:5-40:6
62.	Sound filter lfo waveform	10	0	0	0	6	3	42:0-41:6
63.	Sound filter lfo speed	10	0	1	0	99	7	42:7-42:1
64.	Sound filter lfo delay	10	0	2	0	99	7	43:6-43:0
65.	Sound filter lfo trigger	10	0	3	0	3	2	44:0-43:7
66.	Sound filter lfo level	10	1	0	0	99	7	44:7-44:1
67.	Sound filter lfo mod wheel mod	10	1	1	-99	199	8	45:7-45:0
68.	Sound filter lfo aftertouch mod	10	1	2	-99	199	8	46:7-46:0
69.	Sound amp lfo waveform	11	0	0	0	6	3	47:2-47:0
70.	Sound amp lfo speed	11	0	1	0	99	7	48:1-47:3
71.	Sound amp lfo delay	11	0	2	0	99	7	49:0-48:2
72.	Sound amp lfo trigger	11	0	3	0	3	2	49:2-49:1
73.	Sound amp lfo level	11	1	0	0	99	7	50:1-49:3
74.	Sound amp lfo mod wheel mod	11	1	1	-99	199	8	51:1-50:2
75.	Sound amp lfo aftertouch mod	11	1	2	-99	199	8	52:1-51:2
76.	Sound pitch env attack	12	0	0	0	99	7	53:0-52:2
77.	Sound pitch env decay	12	0	1	0	100	7	53:7-53:1
78.	Sound pitch env sustain	12	0	2	0	99	7	54:6-54:0
79.	Sound pitch env release	12	0	3	0	99	7	55:5-54:7
80.	Sound pitch env delay	12	1	0	0	99	7	56:4-55:6
81.	Sound pitch env sustain decay	12	1	1	0	99	7	57:3-56:5

#	Parameter name	Func	Page	Pot	Offset	Limit	bits	bit address
82.	Sound pitch env trig type	12	1	3	0	3	2	57:5-57:4
83.	Sound pitch env time track	12	2	0	0	1	1	57:6
84.	Sound pitch env sustain pedal	12	2	1	0	1	1	57:7
85.	Sound pitch env level	12	2	2	0	99	7	58:6-58:0
86.	Sound pitch env velocity mod	12	2	3	-99	199	8	59:6-58:7
87.	Sound filter env attack	13	0	0	0	99	7	60:5-59:7
88.	Sound filter env decay	13	0	1	0	99	7	61:4-60:6
89.	Sound filter env sustain	13	0	2	0	99	7	62:3-61:5
90.	Sound filter env release	13	0	3	0	99	7	63:2-62:4
91.	Sound filter env delay	13	1	0	0	100	7	64:1-63:3
92.	Sound filter env sustain decay	13	1	1	0	99	7	65:0-64:2
93.	Sound filter env trig type	13	1	3	0	3	2	65:2-65:1
94.	Sound filter env time track	13	2	0	0	1	1	65:3
95.	Sound filter env sustain pedal	13	2	1	0	1	1	65:4
96.	Sound filter env level	13	2	2	0	99	7	66:3-65:5
97.	Sound filter env velocity mod	13	2	3	-99	199	8	67:3-66:4
98.	Sound amp env attack	14	0	0	0	99	7	68:2-67:4
99.	Sound amp env decay	14	0	1	0	99	7	69:1-68:3
100.	Sound amp env sustain	14	0	2	0	99	7	70:0-69:2
101.	Sound amp env release	14	0	3	0	99	7	70:7-70:1
102.	Sound amp env delay	14	1	0	0	100	7	71:6-71:0
103.	Sound amp env sustain decay	14	1	1	0	99	7	72:5-71:7
104.	Sound amp env trig type	14	1	3	0	3	2	72:7-72:6
105.	Sound amp env time track	14	2	0	0	1	1	73:0
106.	Sound amp env sustain pedal	14	2	1	0	1	1	73:1
107.	Sound amp env level	14	2	2	0	99	7	74:0-73:2
108.	Sound tracking input	15	0	0	0	22	5	74:5-74:1
109.	Sound tracking point 0	15	0	1	0	100	7	75:4-74:6
110.	Sound tracking point 1	15	0	2	0	100	7	76:3-75:5
111.	Sound tracking point 2	15	0	3	0	100	7	77:2-76:4
112.	Sound tracking point 3	15	1	0	0	100	7	78:1-77:3
113.	Sound tracking point 4	15	1	1	0	100	7	79:0-78:2
114.	Sound tracking point 5	15	1	2	0	100	7	79:7-79:1
115.	Sound tracking point 6	15	1	3	0	100	7	80:6-80:0
116.	Sound tracking point 7	15	2	0	0	100	7	81:5-80:7
117.	Sound tracking point 8	15	2	1	0	100	7	82:4-81:6
118.	Sound tracking point 9	15	2	2	0	100	7	83:3-82:5
119.	Sound tracking point 10	15	2	3	0	100	7	84:2-83:4
120.	Sound enable	16	0	3	0	1	1	84:3
121.	Drum number		(cannot edit)		0	9	4	84:7-84:4

Drum Sound:

#	Parameter name	Func	Page	Pot	Offset	Limit	bits	bit address
0.	Keyboard / drum mode (=1)	9	0	0	0	1	1	0:0

#	Parameter	Func	Page	Pot	Offset	Limit	Bits	Address
1.	Spare				0	0	7	0:7-0:1
2.	Drum 1 sample group	0	0	0	0	15	4	1:3-1:0
3.	Drum 1 sample number	0	0	2	0	127	7	2:2-1:4
4.	Drum 1 volume	1	0	0	0	31	5	2:7-2:3
5.	Drum 1 pan	1	0	1	0	6	3	3:2-3:0
6.	Drum 1 output	1	0	2	0	2	2	3:4-3:3
7.	Drum 1 effect level	2	0	0	0	63	6	4:2-3:5
8.	Drum 1 effect bus	2	0	1	0	3	2	4:4-4:3
9.	Drum 1 pitch	3	0	0	-48	97	7	5:3-4:5
10.	Drum 1 pitch velocity mod	3	0	1	0	7	3	5:6-5:4
11.	Drum 1 filter velocity mod	4	0	0	0	3	2	6:0-5:7
12.	Drum 1 velocity curve	5	0	0	0	12	4	6:4-6:1
13.	Drum 1 note number	6	0	0	0	127	7	7:3-6:5
14.	Drum 1 amp envelope decay	8	0	0	0	127	7	8:2-7:4
15.	Drum 1 mute group	8	0	1	0	3	2	8:4-8:3
16.	Drum 1 note range	6	0	2	0	3	2	8:6-8:5
17.	Drum 1 spare				0	0	1	8:7
18-33.	Drum 2 parameters		(see above)					16:7-9:0
34-49.	Drum 3 parameters		(see above)					24:7-17:0
50-65.	Drum 4 parameters		(see above)					32:7-25:0
66-81.	Drum 5 parameters		(see above)					40:7-33:0
82-97.	Drum 6 parameters		(see above)					48:7-41:0
98-113.	Drum 7 parameters		(see above)					56:7-49:0
114-129.	Drum 8 parameters		(see above)					64:7-57:0
130-145.	Drum 9 parameters		(see above)					72:7-65:0
146-161.	Drum 10 parameters		(see above)					80:7-73:0
162.	Sound enable	9	0	3	0	1	1	81:0
163.	Spare				0	0	6	81:7-81:1
164.	Drum number	0-6,8	0	3	0	9	4	82:3-82:0
165.	Spare				0	0	20	84:7-82:4

EFFECT DATA FORMAT

Effects contain 64 bytes of packed parameter data. The first 11 bytes are common parameters for all three configurations. The first 10 exist for compatibility with older software, and are always sent as zeroes. The bit addresses shown are from most significant bit to least significant bit for each parameter, with the byte number first, followed by a colon (:), followed by the bit number. Each parameter should never exceed the limit shown in the table. For bipolar parameters, the limits shown are offset binary, since this is the format that the parameters are stored in. To view them as two's complement numbers, add the value shown in the Offset column. For direct parameter editing (sysex command 10H), the function, page, send, and data pot numbers are shown. The Mode should be set to 3 (=Effects), and the Channel parameter is not used. The Send parameter is not used where the Send parameter is shown as "x" below. Signed parameters should be sent in 2's complement format.

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
0.	Effect spare (deleted parameter)x	2	0	0	0	95	7	0:6-0:0
1.	Effect spare (deleted parameter)x	2	1	0	0	95	7	1:5-0:7
2.	Effect spare (deleted parameter)x	2	2	0	0	95	7	2:4-1:6
3.	Effect spare (deleted parameter)x	2	3	0	0	95	7	3:3-2:5
4.	Effect spare (deleted parameter)x	2	4	0	0	95	7	4:2-3:4
5.	Effect spare (deleted parameter)x	2	5	0	0	95	7	5:1-4:3
6.	Effect spare (deleted parameter)x	2	6	0	0	95	7	6:0-5:2
7.	Effect spare (deleted parameter)x	2	7	0	0	95	7	6:7-6:1
8.	Effect spare (deleted parameter)x	2	8	0	0	95	7	7:6-7:0
9.	Effect spare (deleted parameter)x	2	9	0	0	95	7	8:5-7:7
10.	Effect configuration	x	2	0	0	0	4	4	9:1-8:6

Configuration 0 (4-sends, 1 reverb):

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
PITCH SEND 1:									
11.	Send 1 pitch type	0	0	0	0	0	5	3	9:4-9:2
If 11= 0 thru 3 (chorus and flange):									
12.	Send 1 pitch speed	0	0	1	1	0	99	7	10:3-9:5
13.	Send 1 pitch shape	0	0	1	0	0	1	1	10:4
14.	Send 1 pitch depth	0	0	1	2	0	99	7	11:3-10:5
15.	Send 1 pitch feedback	0	0	1	3	0	99	7	12:2-11:4
16.	Send 1 pitch mix	0	5	0	0	0	99	7	13:1-12:3
If 11= 4 (pitch detune):									
12.	Send 1 pitch detune	0	0	1	0	-99	198	8	10:4-9:5
13.	Spare							0	
14.	Spare							7	11:3-10:5
15.	Spare							7	12:2-11:4
16.	Send 1 pitch mix	0	5	0	0	0	99	7	13:1-12:3
If 11= 5 (resonator):									
12.	Send 1 resonator tuning	0	0	1	0	0	99	7	10:3-9:5
13.	Spare							1	10:4
14.	Send 1 resonator decay	0	0	1	2	0	99	7	11:3-10:5
15.	Spare							7	12:2-11:4
16.	Send 1 pitch mix	0	5	0	0	0	99	7	13:1-12:3
DELAY SEND 1:									
17.	Send 1 delay type	0	4	0	0	0	2	2	13:3-13:2
18.	Send 1 delay input	0	4	1	0	-99	198	8	14:3-13:4

If 17=0 (mono delay):

#	Name								
19.	Send 1 delay 10ms	0	4	1	1	0	79	7	15:2-14:4
20.	Send 1 delay 1ms	0	4	1	2	0	9	4	15:6-15:3
21.	Spare							6	16:4-15:7
22.	Spare							4	17:0-16:5
23.	Send 1 delay feedback	0	4	1	3	0	99	7	17:7-17:1
24.	Spare							7	18:6-18:0
25.	Send 1 delay mix	0	5	0	1	0	99	7	19:5-18:7

If 17=1 (stereo delay):

#	Name								
19.	Send 1 left delay 10ms	0	4	1	1	0	39	7	15:2-14:4
20.	Send 1 left delay 1ms	0	4	1	2	0	9	4	15:6-15:3
21.	Send 1 right delay 10ms	0	4	2	1	0	39	6	16:4-15:7
22.	Send 1 right delay 1ms	0	4	2	2	0	9	4	16:8-16:5
23.	Send 1 left delay feedback	0	4	1	3	0	99	7	17:7-17:1
24.	Send 1 right delay feedback	0	4	2	3	0	99	7	18:6-18:0
25.	Send 1 delay mix	0	5	0	1	0	99	7	19:5-18:7

If 17=2 (ping-pong delay):

#	Name								
19.	Send 1 delay 10ms	0	4	1	1	0	39	7	15:2-14:4
20.	Send 1 delay 1ms	0	4	1	2	0	9	4	15:6-15:3
21.	Spare							6	16:4-15:7
22.	Spare							4	17:0-16:5
23.	Send 1 delay feedback	0	4	1	3	0	99	7	17:7-17:1
24.	Spare							7	18:6-18:0
25.	Send 1 delay mix	0	5	0	1	0	99	7	19:5-18:7

REVERB SEND 1:

#	Name								
26.	Reverb type	0	3	1	0	0	6	4	20:1-19:6
27.	Send 1 reverb input 1	0	3	0	0	0	1	1	20:2
28.	Send 1 reverb input 2	0	3	0	1	0	2	2	20:4-20:3
29.	Send 1 reverb balance	0	3	0	2	-99	198	8	21:4-20:5
30.	Send 1 reverb input level	0	3	0	3	0	99	7	22:3-21:5
31.	Send 1 reverb prdly 10ms	0	3	1	1	0	29	5	23:0-22:4
32.	Send 1 reverb prdly 1ms	0	3	1	2	0	9	4	23:4-23:1
33.	Send 1 reverb inut premix	0	3	1	3	-99	198	8	24:4-23:5
34.	Send 1 reverb input filter	0	3	2	0	0	99	7	25:3-24:5
35.	Send 1 reverb decay	0	3	2	1	0	99	7	26:2-25:4
36.	Send 1 reverb diffusion	0	3	3	2	0	99	7	27:1-26:3
37.	Send 1 reverb density	0	3	3	0	0	99	7	28:0-27:2
38.	Send 1 reverb low decay	0	3	2	2	0	99	7	28:7-28:1
39.	Send 1 reverb high decay	0	3	2	3	0	99	7	29:6-29:0
40.	Send 1 reverb mix	0	5	0	2	0	99	7	30:5-29:7

PITCH SEND 2:

#	Name								
41.	Send 2 pitch type	1	0	0	0	0	5	3	31:0-30:6

If 41= 0 thru 3 (chorus and flange):

#	Name								
42.	Send 2 pitch speed	1	0	1	1	0	99	7	31:7-31:1
43.	Send 2 pitch shape	1	0	1	0	0	1	1	32:0
44.	Send 2 pitch depth	1	0	1	2	0	99	7	32:7-32:1
45.	Send 2 pitch feedback	1	0	1	3	0	99	7	33:6-33:0
46.	Send 2 pitch mix	1	5	0	0	0	99	7	34:5-33:7

If 41= 4 (pitch detune):

#	Name								
42.	Send 2 pitch detune	0	0	1	0	-99	198	8	32:0-31:1
43.	Spare							0	
44.	Spare							7	32:7-32:1
45.	Spare							7	33:6-33:0
46.	Send 2 pitch mix	1	5	0	0	0	99	7	34:5-33:7

If 41= 5 (resonator):

#	Name								
42.	Send 2 resonator tuning	1	0	1	0	0	60	7	31:7-31:1
43.	Spare							1	32:0
44.	Send 2 resonator decay	1	0	1	2	0	99	7	32:7-32:1
45.	Spare							7	33:6-33:0
46.	Send 2 pitch mix	1	5	0	0	0	99	7	34:5-33:7

DELAY SEND 2:

#	Name								
47.	Send 2 delay type	1	4	0	0	0	2	2	34:7-34:6
48.	Send 2 delay input	1	4	1	0	-99	198	8	35:7-35:0

If 47=0 (mono delay):

#	Name								
49.	Send 2 delay 10ms	1	4	1	1	0	79	7	36:6-36:0
50.	Send 2 delay 1ms	1	4	1	2	0	9	4	37:2-36:7
51.	Spare							6	38:0-37:3
52.	Spare							4	38:4-38:1
53.	Send 2 delay feedback	1	4	1	3	0	99	7	39:3-38:5
54.	Spare							7	40:2-39:4
55.	Send 2 delay mix	1	5	0	1	0	99	7	41:1-40:3

If 47=1 (stereo delay):

#	Name								
49.	Send 2 left delay 10ms	1	4	1	1	0	39	7	36:6-36:0
50.	Send 2 left delay 1ms	1	4	1	2	0	9	4	37:2-36:7
51.	Send 2 right delay 10ms	1	4	2	1	0	39	6	38:0-37:3
52.	Send 2 right delay 1ms	1	4	2	2	0	9	4	38:4-38:1
53.	Send 2 left delay feedback	1	4	1	3	0	99	7	39:3-38:5
54.	Send 2 right delay feedback	1	4	2	3	0	99	7	40:2-39:4
55.	Send 2 delay mix	1	5	0	1	0	99	7	41:1-40:3

If 47=2 (ping-pong delay):

#	Name								
49.	Send 2 delay 10ms	1	4	1	1	0	39	7	36:6-36:0
50.	Send 2 delay 1ms	1	4	1	2	0	9	4	37:2-36:7
51.	Spare							6	38:0-37:3
52.	Spare							4	38:4-38:1
53.	Send 2 delay feedback	1	4	1	3	0	99	7	39:3-38:5
54.	Spare							7	40:2-39:4

55.	Send 2 delay mix	1	5	0	1	0	99	7	41:1-40:3
56.	unused								

REVERB SEND 2:

57.	Send 2 reverb input 1	1	3	0	0	0	1	1	41:2
58.	Send 2 reverb input 2	1	3	0	1	0	2	2	41:4-41:3
59.	Send 2 reverb balance	1	3	0	2	-99	198	8	42:4-41:5
60.	Send 2 reverb input level	1	3	0	3	0	99	7	43:3-42:5

PITCH SEND 3:

61.	Send 3 pitch type	2	0	0	0	0	2	2	43:5-43:4

If 61 = 0 or 1 (chorus and flange):

62.	Send 3 pitch speed	2	0	1	1	0	99	7	44:4-43:6
63.	Send 3 pitch shape	2	0	1	0	0	1	1	44:5
64.	Send 3 pitch depth	2	0	1	2	0	99	7	45:4-44:6
65.	Send 3 pitch feedback	2	0	1	3	0	99	7	46:3-45:5
66.	Send3 pitch mix	2	5	0	0	0	99	7	47:2-46:4

If 61 = 2 (resonator):

62.	Send 3 resonator tuning	2	0	1	0	0	99	7	44:4-43:6
63.	Spare							1	44:5
64.	Send 3 resonator decay	2	0	1	2	0	99	7	45:4-44:6
65.	Spare							7	46:3-45:5
66.	Send 3 pitch mix	2	5	0	0	0	99	7	47:2-46:4

DELAY SEND 3:

67.	Send 3 delay input	2	4	0	0	-99	198	8	48:2-47:3
68.	Send 3 delay 10ms	2	4	0	1	0	79	7	49:1-48:3
69.	Send 3 delay 1ms	2	4	0	2	0	9	4	49:5-49:2
70.	Send 3 delay feedback	2	4	0	3	0	99	7	50:4-49:6
71.	Send 3 delay mix	2	5	0	1	0	99	7	51:3-50:5

REVERB SEND 3:

72.	Send 3 reverb input 1	2	3	0	0	0	1	1	51:4
73.	Send 3 reverb input 2	2	3	0	1	0	2	2	51:6-51:5
74.	Send 3 reverb balance	2	3	0	2	-99	198	8	52:6-51:7
75.	Send 3 reverb input level	2	3	0	3	0	99	7	53:5-52:7

DELAY SEND 4:

76.	Send 4 delay 10ms	3	4	0	1	0	79	7	54:4-53:6
77.	Send 4 delay 1ms	3	4	0	2	0	9	4	55:0-54:5
78.	Send 4 delay feedback	3	4	0	3	0	99	7	55:7-55:1
79.	Send 4 delay mix	3	5	0	0	0	99	7	56:6-56:0

REVERB SEND 4:

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
80.	Send 4 reverb balance	3	3	0	0	-99	198	8	57:6-56:7
81.	Send 4 reverb input level	3	3	0	2	0	99	7	58:5-57:7

MODULATION:

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
82.	MIDImod source 1	x	1	0	0	0	10	4	59:1-58:6
83.	MIDImod destination 1	x	1	0	1	0	36	6	59:7-59:2
84.	MIDImod level 1	x	1	0	2	-99	198	8	60:7-60:0
85.	MIDImod source 2	x	1	1	0	0	10	4	61:3-61:0
86.	MIDImod destination 2	x	1	1	1	0	36	6	62:1-61:4
87.	MIDImod level 2	x	1	1	2	-99	198	8	63:1-62:2
88.	Spare								63:7-63:2

Configuration 1 (4-sends, 2 reverb):

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
DELAY SEND 1:									
11.	Send 1 delay 10ms	0	4	0	1	0	119	7	10:0-9:2
12.	Send 1 delay 1ms	0	4	0	2	0	9	4	10:4-10:1
13.	Send 1 delay feedback	0	4	0	3	0	99	7	11:3-10:5
14.	Send 1 delay mix	0	5	0	0	0	99	7	12:2-11:4
PITCH SEND 1:									
15.	Pitch input level	0	0	0	2	0	99	7	13:1-12:3
16.	Send 1 pitch type	0	0	0	0	0	1	1	13:2
17.	Send 1 pitch speed	0	0	1	1	0	99	7	14:1-13:3
18.	Send 1 pitch shape	0	0	1	0	0	1	1	14:2
19.	Send 1 pitch depth	0	0	1	2	0	99	7	15:1-14:3
20.	Send 1 pitch mix	0	5	0	1	0	99	7	16:0-15:2
REVERB SEND 1:									
21.	Reverb type	0	3	1	0	0	6	4	16:4-16:1
22.	Send 1 reverb input level	0	3	0	0	0	99	7	17:3-16:5
23.	Send 1 reverb prdly 10ms	0	3	1	1	0	29	5	18:0-17:4
24.	Send 1 reverb prdly 1ms	0	3	1	2	0	9	4	18:4-18:1
25.	Send 1 reverb inut premix	0	3	1	3	-99	198	8	19:4-18:5
26.	Send 1 reverb input filter	0	3	2	0	0	99	7	20:3-19:5
27.	Send 1 reverb decay	0	3	2	1	0	99	7	21:2-20:4
28.	Send 1 reverb diffusion	0	3	3	2	0	99	7	22:1-21:3
29.	Send 1 reverb density	0	3	3	0	0	99	7	23:0-22:2
30.	Send 1 reverb low decay	0	3	2	2	0	99	7	23:7-23:1
31.	Send 1 reverb high decay	0	3	2	3	0	99	7	24:6-24:0
32.	Send 1 reverb mix	0	5	0	2	0	99	7	25:5-24:7
REVERB SEND 2:									
33.	Send 2 reverb input level	1	3	0	0	0	99	7	26:4-25:6

PITCH SEND 3:

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
34.	Send 2 pitch speed	2	0	0	1	0	99	7	27:3-26:5
35.	Send 2 pitch shape	2	0	0	0	0	1	1	27:4
36.	Send 2 pitch depth	2	0	0	2	0	99	7	28:3-27:5

REVERB SEND 3:

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
37.	Reverb type	2	3	1	0	0	6	4	28:7-28:4
38.	Send 3 reverb input level	2	3	0	0	0	99	7	29:6-29:0
39.	Send 3 reverb prdly 10ms	2	3	1	1	0	29	5	30:3-29:7
40.	Send 3 reverb prdly 1ms	2	3	1	2	0	9	4	30:7-30:4
41.	Send 3 reverb inut premix	2	3	1	3	-99	198	8	31:7-31:0
42.	Send 3 reverb input filter	2	3	2	0	0	99	7	32:6-32:0
43.	Send 3 reverb decay	2	3	2	1	0	99	7	33:5-32:7
44.	Send 3 reverb diffusion	2	3	3	2	0	99	7	34:4-33:6
45.	Send 3 reverb density	2	3	3	0	0	99	7	35:3-34:5
46.	Send 3 reverb low decay	2	3	2	2	0	99	7	36:2-35:4
47.	Send 3 reverb high decay	2	3	2	3	0	99	7	37:1-36:3
48.	Send 3 reverb mix	2	5	0	0	0	99	7	38:0-37:2

REVERB SEND 4:

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
49.	Send 4 reverb input level	3	3	0	0	0	99	7	38:7-38:1
50.	Spare								58:5-39:0

MODULATION:

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
51.	MIDImod source 1	x	1	0	0	0	10	4	59:1-58:6
52.	MIDImod destination 1	x	1	0	1	0	36	6	59:7-59:2
53.	MIDImod level 1	x	1	0	2	-99	198	8	60:7-60:0
54.	MIDImod source 2	x	1	1	0	0	10	4	61:3-61:0
55.	MIDImod destination 2	x	1	1	1	0	36	6	62:1-61:4
56.	MIDImod level 2	x	1	1	2	-99	198	8	63:1-62:2
57.	Spare								63:7-63:2

Configuration 2 (4-sends, 1 lezlie):

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
PITCH SEND 1:									
11.	Spare							3	9:4-9:2
12.	Send 1 lezlie speed	0	0	0	1	0	1	7	10:3-9:5
13.	Send 1 lezlie motor	0	0	0	0	0	1	1	10:4
14.	Send 1 lezlie horn	0	0	0	2	0	±6*	7	11:3-10:5
15.	Spare							7	12:2-11:4

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
16.	Send 1 lezlie mix	0	5	0	0	0	99	7	13:1-12:3

DELAY SEND 1:

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
17.	Spare							2	13:3-13:2
18.	Send 1 delay input	0	4	0	0	0	99	8	14:3-13:4
19.	Send 1 delay 10ms	0	4	0	1	0	79	7	15:2-14:4
20.	Send 1 delay 1ms	0	4	0	2	0	9	4	15:6-15:3
21.	Spare							6	16:4-15:7
22.	Spare							4	17:0-16:5
23.	Send 1 delay feedback	0	4	0	3	0	99	7	17:7-17:1
24.	Spare							7	18:6-18:0
25.	Send 1 delay mix	0	5	0	1	0	99	7	19:5-18:7

Parameters 26 through 88 are identical to configuration 0.

* This parameter is stored as 7 bit 2's complement, with 0 to 6 representing the positive values, and 127 to 122 representing -1 to -6, respectively.

Configuration 3 (2-sends, with EQ):

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address

PITCH SEND 1:

> Parameters 11 through 16 are identical to configuration 0.

DELAY SEND 1:

> Parameters 17 through 25 are identical to configuration 0.

REVERB SEND 1:

> Parameters 26 through 40 are identical to configuration 0.

PITCH SEND 2:

> Parameters 41 through 46 are identical to configuration 0.

DELAY SEND 2:

> Parameters 47 through 56 are identical to configuration 0.

REVERB SEND 2:

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
57.	Send 2 reverb input 1	1	3	0	0	0	1	1	41:2
58.	Send 2 reverb input 2	1	3	0	1	0	2	2	41:4-41:3
59.	Send 2 reverb balance	1	3	0	2	-99	198	8	42:4-41:5
60.	Send 2 reverb input level	1	3	0	3	0	99	7	43:3-42:5
61.	Spare								43:5-43:4

EQUALIZER:

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
61.	Low EQ Frequency	x	6	0	0	0	5	3	44:0-43:6

#	Parameter name								
62.	Spare								44:5-44:1
62.	Low EQ Gain	x	6	0	1	0	12	4	45:1-44:6
62.	Spare								45:4-45:2
63.	Hi EQ Frequency	x	6	0	2	0	7	3	45:7-45:5
62.	Spare								46:3-46:0
64.	Hi EQ Gain	x	6	0	3	0	9	4	46:7-46:4
65.	Spare								58:5-47:0
	MODULATION:								
82.	MIDImod source 1	x	1	0	0	0	10	4	59:1-58:6
83.	MIDImod destination 1	x	1	0	1	0	36	6	59:7-59:2
84.	MIDImod level 1	x	1	0	2	-99	198	8	60:7-60:0
85.	MIDImod source 2	x	1	1	0	0	10	4	61:3-61:0
86.	MIDImod destination 2	x	1	1	1	0	36	6	62:1-61:4
87.	MIDImod level 2	x	1	1	2	-99	198	8	63:1-62:2
88.	Spare								63:7-63:2

Configuration 4 (Overdrive, Chorus, Delay, Reverb, Lezlie):

#	Parameter name	Send	Func	Page	Pot	Offset	Limit	bits	bit address
	PITCH SEND 1:								
11.	Send 1 pitch type	0	0	0	0	0	2	2	9:3-9:2
12.	Spare							1	9:4
13.	Send 1 pitch input 2	0	0	0	1	0	3	2	20:4-20:3
14.	Send 1 pitch input balance	0	0	0	2	-99	198	8	35:7-35:0
	If 11= 0 thru 1 (chorus and flange):								
13.	Send 1 pitch speed	0	0	1	1	0	99	7	10:3-9:5
14.	Send 1 pitch shape	0	0	1	0	0	1	1	10:4
15.	Send 1 pitch depth	0	0	1	2	0	99	7	11:3-10:5
16.	Send 1 pitch feedback	0	0	1	3	0	99	7	12:2-11:4
17.	Send 1 pitch mix	0	5	0	2	0	99	7	13:1-12:3
	If 11= 2 (resonator):								
13.	Send 1 resonator tuning	0	0	1	0	0	60	6	10:2-9:5
14.	Spare							2	10:4-10:3
15.	Send 1 resonator decay	0	0	1	2	0	99	7	11:3-10:5
16.	Spare							7	12:2-11:4
17.	Send 1 pitch mix	0	5	0	2	0	99	7	13:1-12:3
	LEZLIE SEND 1:								
18.	Send 1 lezlie input 1	0	0	2	0	0	1	1	41:3
19.	Send 1 lezlie input 2	0	0	2	1	0	8	4	40:6-40:3
20.	Send 1 lezlie input balance	0	0	2	2	-99	198	8	42:4-41:5
21.	Send 1 lezlie speed	0	0	3	1	0	1	1	38:5
22.	Send 1 lezlie motor	0	0	3	0	0	1	1	41:2
23.	Send 1 lezlie horn	0	0	3	2	0	±6*	7	40:2-39:4

24.	Send 1 lezlie mix	0	5	1	3	0	99	7	31:7-31:1

DELAY SEND 1:

25.	Send 1 delay type	0	4	0	0	0	2	2	13:3-13:2
26.	Send 1 delay input balance	0	4	0	2	-99	198	8	14:3-13:4
27.	Send 1 delay input 2	0	4	0	1	0	5	3	36:2-36:0

If 25=0 (mono delay):

28.	Send 1 delay 10ms	0	4	1	1	0	79	7	15:2-14:4
29.	Send 1 delay 1ms	0	4	1	2	0	9	4	15:6-15:3
30.	Spare							6	16:4-15:7
31.	Spare							4	17:0-16:5
32.	Send 1 delay feedback	0	4	1	3	0	99	7	17:7-17:1
33.	Spare							7	18:6-18:0
34.	Send 1 delay mix	0	5	0	3	0	99	7	19:5-18:7

If 25=1 (stereo delay):

28.	Send 1 left delay 10ms	0	4	1	1	0	39	7	15:2-14:4
29.	Send 1 left delay 1ms	0	4	1	2	0	9	4	15:6-15:3
30.	Send 1 right delay 10ms	0	4	2	1	0	39	6	16:4-15:7
31.	Send 1 right delay 1ms	0	4	2	2	0	9	4	16:8-16:5
32.	Send 1 left delay feedback	0	4	1	3	0	99	7	17:7-17:1
33.	Send 1 right delay feedback	0	4	2	3	0	99	7	18:6-18:0
34.	Send 1 delay mix	0	5	0	3	0	99	7	19:5-18:7

If 25=2 (ping-pong delay):

28.	Send 1 delay 10ms	0	4	1	1	0	39	7	15:2-14:4
29.	Send 1 delay 1ms	0	4	1	2	0	9	4	15:6-15:3
30.	Spare							6	16:4-15:7
31.	Spare							4	17:0-16:5
32.	Send 1 delay feedback	0	4	1	3	0	99	7	17:7-17:1
33.	Spare							7	18:6-18:0
34.	Send 1 delay mix	0	5	0	3	0	99	7	19:5-18:7

REVERB SEND 1:

35.	Reverb type	0	3	1	0	0	6	4	20:1-19:6
36.	Send 1 reverb input 1	0	3	0	0	0	1	1	20:2
37.	Send 1 reverb input 2	0	3	0	1	0	5	3	31:0-30:6
38.	Send 1 reverb balance	0	3	0	2	-99	198	8	21:4-20:5
39.	Send 1 reverb input level	0	3	0	3	0	99	7	22:3-21:5
40.	Send 1 reverb prdly 10ms	0	3	1	1	0	29	5	23:0-22:4
41.	Send 1 reverb prdly 1ms	0	3	1	2	0	9	4	23:4-23:1
42.	Send 1 reverb inut premix	0	3	1	3	-99	198	8	24:4-23:5
43.	Send 1 reverb input filter	0	3	2	0	0	99	7	25:3-24:5
44.	Send 1 reverb decay	0	3	2	1	0	99	7	26:2-25:4
45.	Send 1 reverb diffusion	0	3	3	2	0	99	7	27:1-26:3
46.	Send 1 reverb density	0	3	3	0	0	99	7	28:0-27:2
47.	Send 1 reverb low decay	0	3	2	2	0	99	7	28:7-28:1

48.	Send 1 reverb high decay	0	3	2	3	0	99	7	29:6-29:0
49.	Send 1 reverb mix	0	5	1	0	0	99	7	30:5-29:7

OVERDRIVE SEND 1:

50.	Send 1 overdrive type	0	6	0	0	0	1	1	44:5
52.	Send 1 overdrive balance	0	6	1	2	-99	198	8	48:2-47:3
63.	Send 1 overdrive treshold	0	6	0	2	0	99	7	50:4-49:6
64.	Send 1 overdrive brightness	0	6	1	0	0	99	7	49:1-48:3
65.	Send 1 overdrive mix	0	6	0	0	0	99	7	31:7-31:1

EQUALIZER:

61.	Low EQ Frequency	x	6	0	0	0	5	3	44:0-43:6
62.	Low EQ Gain	x	6	0	1	0	12	4	45:1-44:6
63.	Hi EQ Frequency	x	6	0	2	0	7	3	45:7-45:5
64.	Hi EQ Gain	x	6	0	3	0	9	4	46:7-46:4

MODULATION:

82.	MIDImod source 1	x	1	0	0	0	10	4	59:1-58:6
83.	MIDImod destination 1	x	1	0	1	0	22	6	59:7-59:2
84.	MIDImod level 1	x	1	0	2	-99	198	8	60:7-60:0
85.	MIDImod source 2	x	1	1	0	0	10	4	61:3-61:0
86.	MIDImod destination 2	x	1	1	1	0	22	6	62:1-61:4
87.	MIDImod level 2	x	1	1	2	-99	198	8	63:1-62:2
88.	Spare								63:7-63:2

* This parameter is stored as 7 bit 2's complement, with 0 to 6 representing the positive values, and 127 to 122 representing -1 to -6, respectively.