

SQ-80 MIDI Implementation Specification (Software Version 1.0)

1.0 Sequencer Dump - Mirage Format

1.1 Mirage Format Wave Sample Requests

The SQ-80 will issue up to four Mirage wavesample absolute dump messages in order to retrieve ESQ-1 sequence data from a Mirage. Refer to the Mirage Advanced Samplers Guide for more information on these messages.

11110000	System Exclusive
00001111	ENSONIQ Code
00000001	Mirage Code
00001010	Wavesample absolute request code
000nLLLL	n=0 lower, n=1 upper
0000LLLL	L =low byte of start address
0000hhhh	
0000hhhh	h= high byte of start address
0000LLLL	
0000LLLL	L= low byte of end address
0000hhhh	
0000hhhh	h= high byte of end address
11110111	End of exclusive

1.1.1 I.D Packet Request

Requests the Mirage to send the data from upper bank locations FF00H through FF0AH. The data sent in response to this request is then checked to determine if the data in the Mirage is actually ESQ-1 sequence data. If it is, then the size of the data block is also checked to determine if the receiving unit has sufficient available memory to load the data. (This is used in the ESQ-1 to determine whether or not the sequencer memory expansion cartridge is required to load the sequence data. It is not an issue with the SQ-80, which has enough internal memory to accommodate any ESQ-1 Sequencer dump.)

1.1.2 Sequencer Variables Request

Requests the Mirage to send the sequencer variables and sequence header data from upper bank locations 0000H through 0132H.

1.1.2 Sequence Data Request

Requests to send the data from the lower bank starting at location 0000H. The end address is determined by the data that was retrieved in the I.D. packet.

1.1.3 Voice Program Request

An optional request to send the voice program data in locations 1000H through 1FF0H of the upper bank. The user may specify whether or not to load the internal program banks of the SQ-80 with this data when the sequence load command is initiated.

2.0 SQ-80 System Exclusive Format

2.1 ESQ/SQ-80 System Exclusive Header

All SQ-80 System Exclusive messages start with the following header. The receiving SQ-80 or ESQ will only

recognize system exclusive messages if the MIDI channel number in the message is the same as the MIDI base channel selected on its MIDI page and its MIDI enable parameter is set to recognize system exclusive messages (i.e the display should show ENABLE=KEYS+CT+PC+SS+SX).

11110000	System Exclusive status byte
00001111	ENSONIQ I.D. code
00000010	ESQ/SQ-80 Product I.D. code
0000nnnn	MIDI channel number

2.2 Program Dumps

To be able to receive this data, the SQ-80 must be in program select mode (i.e. one of the program bank pages must be displayed) and the MIDI enable parameter on the MIDI page must be set to receive system exclusive messages.

2.2.1 Single Program Dump

This transmits the program currently selected on the synth main keyboard (the "straight-synth" program). Refer to Table 1 for details on the structure of the program.

xxxxxxx	ESQ/SQ-80 System Exclusive header
00000001	Single Program Dump code
0000LLLL	2 nybbles per byte of program data
0000hhhh	102 data bytes (204 nybble-ized MIDI bytes) L = low nybble, h = high nybble
11110111	End of exclusive

2.2.2 All Program Dump

This message transmits the 40 programs currently in the four internal banks.

xxxxxxx	ESQ/SQ-80 System Exclusive header
00000010	All Program Dump code
0000LLLL	2 nybbles per byte of program data
0000hhhh	102 * 40 data bytes (9160 nybble-ized MIDI bytes) L = low nybble, h = high nybble
11110111	End of exclusive

2.3 Sequence dumps

Sequencer dumps are transmitted as a multi-packet sequence of messages. The transmitter first sends a dump alert packet. This packet contains the size of the sequence to be transmitted. If the receiver can accept this amount of data it sends an accept message; otherwise it sends a reject message.

After the transmitting SQ-80 receives an accept message, it will then transmit the sequence data dump. If it does not receive an accept message, it transmits the data anyway. This allows sending the data to non-ESQ/SQ-80 devices.

NOTE: Sequence dumps should not be sent to an SQ-80 without first transmitting a sequence dump alert message and then waiting for the response.

2.3.1 All Sequence Dump Alert Packet

This message is transmitted by the sending SQ-80 to inform the receiving unit that it wishes to dump the entire sequencer memory. Note: this message will not be recognized by an ESQ-1.

xxxxxxx	ESQ/SQ-80 System Exclusive Header
00100001	SQ-80 All Sequence Dump Alert code
0000LLLL	
0000LLLL	Low byte (in nybbles) of sequence size
0000hhhh	
0000hhhh	High byte (in nybbles) of sequence size
11110111	End of exclusive

2.3.2 One Sequence Dump Alert Packet

Transmitted by the sending SQ-80 to inform the receiving unit that it wishes to dump the currently selected single sequence. This message can be received by an ESQ-1.

xxxxxxx	ESQ/SQ-80 System Exclusive Header
00000111	ESQ/SQ-80 One Sequence Dump Alert code
0000LLLL	
0000LLLL	Low byte (in nybbles) of sequence size
0000hhhh	
0000hhhh	High byte of sequence size
11110111	End of exclusive

2.3.3 Accept Message

Transmitted by the receiving SQ-80 to indicate that it will accept a sequence dump.

xxxxxxx	ESQ/SQ-80 System Exclusive Header
00000100	Sequence Accept code
11110111	End of exclusive

2.3.4 Reject Message

Transmitted by the receiving SQ-80 to indicate that it does not have sufficient memory to accept the dump from the sending SQ-80.

xxxxxxx	ESQ/SQ-80 System Exclusive Header
00000101	Sequence Reject code
11110111	End of exclusive

2.3.5 No Free Sequence Message

Transmitted by the receiving SQ-80 in response to a One Sequence Dump Alert Packet (2.3.2) to indicate that it does not have any empty sequence locations in which to place the incoming sequence.

xxxxxxx	ESQ/SQ-80 System Exclusive Header
00001101	No free sequence reject code
11110111	End of exclusive

2.3.6 All Sequence Dump Packet

This packet contains the sequence data. The data block consists of 1E6H bytes of track and pointer information, followed by the number of bytes of sequence data, as determined by the sequence size specified in the All Sequence Dump Alert packet. (see 2.3.1).

xxxxxxx	ESQ/SQ-80 System Exclusive Header
00100000	SQ-80 Sequence Dump code
0000LLLL	Data..
0000hhhh	variable number of bytes of sequence data L = low nybble, h = high nybble
11110111	End of exclusive

2.3.7 One Sequence Dump Packet

This packet contains the data for the current sequence. The packet will contain the number of bytes specified in the one sequence alert packet (see section 2.3.2).

xxxxxxx	ESQ/SQ-80 System Exclusive Header
00001000	ESQ/SQ-80 One sequence Dump code
0000LLLL	Data..
0000hhhh	variable number of bytes of sequence data L = low nybble, h = high nybble
11110111	End of exclusive

2.4 Request Messages

The following are messages which can be sent to an SQ -80 to initiate program or sequence dumps.

2.4.1 Current Program Dump Request

This request asks for a dump of the currently selected program. The SQ-80 responds with a Single Program Dump Packet (2.2.1).

xxxxxxx	ESQ/SQ-80 System Exclusive Header
00001001	Program Dump Request code
11110111	End of exclusive

2.4.2 All Program Dump Request

This request asks the SQ-80 to dump all 40 of its internal programs. The SQ-80 responds with an All Program

Dump Packet (2.2.2).

xxxxxxx	ESQ/SQ-80 System Exclusive Header
00001010	All Program Dump Request code
11110111	End of exclusive

2.4.3 All Sequence Dump Request

This request asks the SQ-80 to dump all sequencer data. The SQ-80 responds with a Sequence Dump Alert Packet (2.3.1). The requesting unit should then respond with an accept or reject packet as described in section 2.3.1

xxxxxxx	ESQ/SQ-80 System Exclusive Header
00100010	SQ-80 All Sequence Dump Request code
11110111	End of exclusive

2.4.4 One Sequence Dump Request

This request asks the SQ-80 to dump its currently selected sequence. The SQ-80 Responds with an One Sequence Dump Alert Packet (2.3.2).

xxxxxxx	ESQ/SQ-80 System Exclusive Header
00001100	ESQ/SQ-80 One Sequence Dump Request code
11110111	End of exclusive

2.5 Received Virtual Keypad Events

This system exclusive message allows an external device to simulate the pressing of the SQ-80's front panel buttons. The format of the message is an ESQ/SQ-80 System Exclusive Header, followed by the Keypad Command Code, and then a stream of button down and button up codes which is terminated by an End of Exclusive.

NOTE: Each Button Down keypad event should be followed by a Button Up event for the same button to prevent the inbound keypad event processor from becoming "hung up" while waiting for a button to be released. This should usually be done within one system exclusive message. It should also be possible to follow up with separate messages, but be careful not to leave dangling button downs !

xxxxxxx	ESQ/SQ-80 System Exclusive header
00001110	Keypad Command code
	(Data stream...)
0nnnnnnn	Any number of keypad events (button down/up codes) One button down or button up event per byte. (button codes are specified in the table below)
11110111	End of exclusive

Button Codes				Front Panel Button Name
Down		Up		
Dec	Hex	Dec	Hex	
01	01	52	34	ENV1
02	02	53	35	ENV2
03	03	54	36	ENV3
04	04	55	37	ENV4
05	05	56	38	LFO1
06	06	57	39	LFO2
07	07	58	3A	LFO3
08	08	59	3B	OSC1
09	09	60	3C	OSC2
10	0A	61	3D	OSC3
11	0B	62	3E	DCA1
12	0C	63	3F	DCA2
13	0D	64	40	DCA3
14	0E	65	41	DCA4
15	0F	66	42	FILTER
16	10	67	43	MODES
17	11	68	44	SPLIT•LAYER
18	12	69	45	MASTER
19	13	70	46	MIDI
20	14	71	47	CONTROL
21	15	72	48	STORAGE
22	16	73	49	WRITE
23	17	74	4A	COMPARE
24	18	75	4B	INC (up arrow)
25	19	76	4C	DEC (down arrow)
26	1A	77	4D	CREATE
27	1B	78	4E	EDIT
28	1C	79	4F	TRACKS-SELECT
29	1D	80	50	LOCATE
30	1E	81	51	TRACKS-MIX•MIDI
31	1F	82	52	RECORD
32	20	83	53	STOP
33	21	84	54	PLAY
34	22	85	55	BANK 1
35	23	86	56	BANK 2
36	24	87	57	BANK 3
37	25	88	58	BANK 4
38	26	89	59	INTERNAL
39	27	90	5A	CART A
40	28	91	5B	CART B
41	29	92	5C	SEQUENCE
42	2A	93	5D	SOFTKEY 0
43	2B	94	5E	SOFTKEY 1
44	2C	95	5F	SOFTKEY 2
45	2D	96	60	SOFTKEY 3
46	2E	97	61	SOFTKEY 4
47	2F	98	62	SOFTKEY 5
48	30	99	63	SOFTKEY 6
49	31	100	64	SOFTKEY 7
50	32	101	65	SOFTKEY 8
51	33	102	66	SOFTKEY 9

As you may have observed, the button up codes are differentiated from the button down codes by a positive offset of 51 decimal or \$33 hex. The Button Code 00 is reserved for illegal key events within the system and should not be sent to the SQ-80. Also, button codes out of the range specified in the above table should not be sent to the SQ-80.

2.5.1 Compare Button Status Message

This message is both sent and received by the SQ-80. It is sent whenever the Compare status of the SQ-80 is changed by pressing the Compare button. The same message format is recognized when it is received from another SQ-80 or ESQ product if recognition of system exclusive messages is enabled (MIDI ENABLE=KEYS+CT+PC+SS+SX).

xxxxxxxx	ESQ/SQ-80 System Exclusive header
00010000	Compare Status Command code
0000000n	Status of the Compare button n=1, Compare On n=0, Compare Off
11110111	End of exclusive

2.6 MIDI Song Selects

MIDI Song Selects may be received by the SQ-80 when the setting of the MIDI Enable parameter is "KEYS+CT+PC+SNGSL" or "KEYS+CT+PC+SS+SX". Inbound MIDI Song Selects are recognized only in sequencer STOP or SNGS (Song Stop) modes. Song Selects 00 to 19 will select defined songs within that range and put the sequencer into Song Mode. Selects for undefined songs will be ignored. The ESQ-1 will interpret MIDI Song Selects 20 through 79 as sequence selects, and will map them onto SEQ-1 through SEQ-60. A Song Select 20, for example, will select SEQ-1 if it is defined, and will then put the sequencer into Sequence Mode. MIDI Song Selects are transmitted whenever a song or sequence is selected from the SEQ BANK pages by using the softkeys on the front panel (virtual keypad events will also transmit them).

2.7 MIDI Device Inquiry/I.D. Messages

2.7.1 Device Inquiry Message

The SQ-80 supports the MIDI Device Inquiry message which allows instruments and computers to ascertain the identity of the unit(s) to which they are connected. The SQ-80 will respond to the following Device Inquiry Message with the Device ID Message detailed below. The SQ-80 will respond to the inquiry if the channel information in the message contains either the base MIDI channel number of the SQ-80 or the all channel broadcast code (\$7F).

11110000	System Exclusive status byte
01111110	Non real time message
0000nnnn	nnnn=MIDI Channel number
or	
01111111	All channel broadcast code
00000110	General Information message code
00000001	Device Inquiry Message message code
11111110	End of Exclusive

2.7.2 Device ID Message

When the SQ-80 receives a correctly formatted MIDI Device Inquiry message it will respond with the following Device ID Message. This message follows the MMA recommendations for device ID messages, and contains information about the responding device including manufacturer, product family and software revision.

11110000	System Exclusive Status byte
01111110	Non real time message
0000nnnn	nnnn=Base MIDI Channel
00000110	General Information message code
00000010	Device ID Message code
00001111	ENSONIQ System Exclusive manufacturer's code
00000010	ESQ/SQ-80 Product Family code (lsb)
00000000	ESQ/SQ-80 Product Family code (msb)
00000011	SQ-80 Family Member code (lsb)
00000000	SQ-80 Family Member code (msb)
00000000	Software revision information
00000000	
0nnnnnnn	Major Version number (integer portion)
0nnnnnnn	Minor version number (decimal fraction)
11111110	End of Exclusive

2.8 ESQ-1 Sequence Messages Received

These ESQ-1 Sequencer Messages are received and understood by the SQ-80 but not transmitted.

2.8.1 ESQ-1 All Sequence Dump Alert

This message is transmitted by the sending ESQ-1 to inform the receiving unit that it wishes to dump the entire sequencer memory.

xxxxxxx	ESQ/SQ-80 System Exclusive Header
00000011	ESQ-1 All Sequence Dump Alert code
0000LLLL	
0000LLLL	Low byte (in nybbles) of sequence size
0000hhhh	
0000hhhh	High byte (in nybbles) of sequence size
11110111	End of exclusive

2.8.2 ESQ-1 All Sequence Dump Packet

This packet contains the sequence data. The data block consists of 132H bytes of track and pointer information, followed by the number of bytes of sequence data, as determined by the sequence size specified in the All Sequence Dump Alert packet. (see 2.8.1).

xxxxxxxx	ESQ/SQ-80 System Exclusive Header
00000110	ESQ-1 Sequence Dump code
0000LLLL	Data..
0000hhhh	variable number of bytes of sequence data L = low nybble, h = high nybble
11110111	End of exclusive

SQ-80 Parameter Number List

The numbers below are the numbers that are sent in the Parameter Select controllers (MIDI Controller #'s 98 and 99). Note that the SQ-80 will recognize MIDI Parameter Selects only if System Exclusive messages are enabled (ENABLE=KEYS+CT+PC+SS+SX on the MIDI Page.)

<u>Page</u>	<u>Param #</u>		<u>Parameter</u>
	<u>dec</u>	<u>hex</u>	
ENV1	0	00	ENV1 L1 parameter
	1	01	ENV1 L2 parameter
	2	02	ENV1 L3 parameter
	3	03	ENV1 LV parameter
	4	04	ENV1 T1V parameter
	5	05	ENV1 T1 parameter
	6	06	ENV1 T2 parameter
	7	07	ENV1 T3 parameter
	8	08	ENV1 T4 parameter
	9	09	ENV1 TK parameter
ENV2	10	0A	ENV2 L1 parameter
	11	0B	ENV2 L2 parameter
	12	0C	ENV2 L3 parameter
	13	0D	ENV2 LV parameter
	14	0E	ENV2 T1V parameter
	15	0F	ENV2 T1 parameter
	16	10	ENV2 T2 parameter
	17	11	ENV2 T3 parameter
	18	12	ENV2 T4 parameter
	19	13	ENV2 TK parameter
ENV3	20	14	ENV3 L1 parameter
	21	15	ENV3 L2 parameter
	22	16	ENV3 L3 parameter
	23	17	ENV3 LV parameter
	24	18	ENV3 T1V parameter
	25	19	ENV3 T1 parameter
	26	1A	ENV3 T2 parameter
	27	1B	ENV3 T3 parameter
	28	1C	ENV3 T4 parameter
	29	1D	ENV3 TK parameter

<u>Page</u>	<u>Param #</u>		<u>Parameter</u>
	<u>dec</u>	<u>hex</u>	
ENV4	30	1E	ENV4 L1 parameter
	31	1F	ENV4 L2 parameter
	32	20	ENV4 L3 parameter
	33	21	ENV4 LV parameter
	34	22	ENV4 T1V parameter
	35	23	ENV4 T1 parameter
	36	24	ENV4 T2 parameter
	37	25	ENV4 T3 parameter
	38	26	ENV4 T4 parameter
	39	27	ENV4 TK parameter
LFO1	40	28	LFO1 frequency parameter
	41	29	LFO1 reset parameter
	42	2A	LFO1 humanize switch parameter
	43	2B	LFO1 modulation waveform parameter
	44	2C	LFO1 L1 parameter
	45	2D	LFO1 delay parameter
	46	2E	LFO1 L2 parameter
	47	2F	LFO1 modulation source parameter
LFO2	48	30	LFO2 frequency parameter
	49	31	LFO2 reset parameter
	50	32	LFO2 humanize switch parameter
	51	33	LFO2 modulation waveform parameter
	52	34	LFO2 L1 parameter
	53	35	LFO2 delay parameter
	54	36	LFO2 L2 parameter
	55	37	LFO2 modulation source parameter
LFO3	56	38	LFO3 frequency parameter
	57	39	LFO3 reset parameter
	58	3A	LFO3 humanize switch parameter
	59	3B	LFO3 modulation waveform parameter
	60	3C	LFO3 L1 parameter
	61	3D	LFO3 delay parameter
	62	3E	LFO3 L2 parameter
	63	3F	LFO3 modulation source parameter
OSC1	64	40	OSC1 octave parameter
	65	41	OSC1 semitone parameter
	66	42	OSC1 finetune parameter
	67	43	OSC1 waveform parameter
	68	44	OSC1 modulation source 1 parameter
	69	45	OSC1 modulation amount 1 parameter
	70	46	OSC1 modulation source 2 parameter
	71	47	OSC1 modulation amount 2 parameter

Page	Param #		Parameter
	dec	hex	
OSC2	72	48	OSC2 octave parameter
	73	49	OSC2 semitone parameter
	74	4A	OSC2 finetune parameter
	75	4B	OSC2 waveform parameter
	76	4C	OSC2 modulation source 1 parameter
	77	4D	OSC2 modulation amount 1 parameter
	78	4E	OSC2 modulation source 2 parameter
	79	4F	OSC2 modulation amount 2 parameter
OSC3	80	50	OSC3 octave parameter
	81	51	OSC3 semitone parameter
	82	52	OSC3 finetune parameter
	83	53	OSC3 waveform parameter
	84	54	OSC3 modulation source 1 parameter
	85	55	OSC3 modulation amount 1 parameter
	86	56	OSC3 modulation source 2 parameter
	87	57	OSC3 modulation amount 2 parameter
DCA1	88	58	DCA1 level parameter
	89	59	DCA1 output enable parameter
	90	5A	DCA1 modulation source 1 parameter
	91	5B	DCA1 modulation amount 1 parameter
	92	5C	DCA1 modulation source 2 parameter
	93	5D	DCA1 modulation amount 2 parameter
DCA2	94	5E	DCA2 level parameter
	95	5F	DCA2 output enable parameter
	96	60	DCA2 modulation source 1 parameter
	97	61	DCA2 modulation amount 1 parameter
	98	62	DCA2 modulation source 2 parameter
	99	63	DCA2 modulation amount 2 parameter
DCA3	100	64	DCA3 level parameter
	101	65	DCA3 output enable parameter
	102	66	DCA3 modulation source 1 parameter
	103	67	DCA3 modulation amount 1 parameter
	104	68	DCA3 modulation source 2 parameter
	105	69	DCA3 modulation amount 2 parameter
DCA4	106	6A	DCA4 modamt parameter
	107	6B	PAN position parameter
	108	6C	PAN modulation source parameter
	109	6D	PAN modulation amount parameter

<u>Page</u>	<u>Param #</u>		<u>Parameter</u>
	<u>dec</u>	<u>hex</u>	
FILTER			
	110	6E	FILTER Fc (cutoff) parameter
	111	6F	FILTER Q (resonance) parameter
	112	70	FILTER modulation amount 3 parameter
	113	71	FILTER modulation source 1 parameter
	114	72	FILTER modulation amount 1 parameter
	115	73	FILTER modulation source 2 parameter
	116	74	FILTER modulation amount 2 parameter
MODES			
	117	75	MODES AM switch parameter
	118	76	MODES glide parameter
	119	77	MODES mono switch parameter
	120	78	MODES sync switch parameter
	121	79	MODES voice reassign switch parameter
	122	7A	MODES envelope reset switch parameter
	123	7B	MODES wave reset switch parameter
	124	7C	MODES cycle switch parameter
SPLIT/LAYER			
	125	7D	S/L split layer switch parameter
	126	7E	S/L split layer program parameter
	127	7F	S/L layer switch parameter
	128	80	S/L layer program parameter
	129	81	S/L split direction parameter
	130	82	S/L split program parameter
	131	83	S/L split point parameter

* the following parameter numbers (132-143) are used for the non-pcb system parameters

System parameters:

MASTER			
	132	84	MASTER tuning parameter
	133	85	MASTER velocity parameter
	134	86	MASTER pedal switch parameter
	135	87	MASTER pitch bend range parameter
	136	88	MASTER pitch bend mode parameter
MIDI			
	137	89	MIDI base channel parameter
	138	8A	MIDI overflow switch parameter
	139	8B	MIDI xcontrol parameter
	140	8C	MIDI pressure parameter
	141	8D	MIDI mode parameter
	142	8E	MIDI enable parameter

* The parameters on the MIDI Page (137-142) can be selected but not modified via MIDI.

MODEL: SQ-80**MIDI Implementation Chart**Date: 9/7/87
Version: 1.0

Function...		Transmitted	Recognized	Remarks
Basic Channel	Default Channel	1 1- 16	1 1- 16	
Mode	Default Messages Altered		1, 3, 4, Multi	memorized (Global Controllers In MONO Mode)
Note Number	True Voice	21 - 108	21 - 108	
Velocity	Note ON Note OFF	○ ○	○ ○	
After Touch	Key's Ch's	○ ○	○ ○	
Pitch Bender		○	○	
Control Change		1 - 95 1 Mod Wheel 2 Breath 4 Foot 6 Data 7 Volume 96 Inc 97 Dec 98 Param 99 Param	1 - 95 1 Mod Wheel 2 Breath 4 Foot 6 Data 7 Volume 96 Inc 97 Dec 98 Param 99 Param	programmable
Prog Change	True #	0 - 119	0 - 119	
System Exclusive		○	○	
System Common	: Song Pos : Song Sel : Tune	○ ○ X	○ ○ X	
System Real Time	: Clock : Commands	○ Clock ○ Start, Stop, Cont	○ Clock ○ Start, Stop, Cont	
Aux Mes-sages	: Local On/Off : All Notes Off : Active Sense : Reset	X X X X	X X X X	
Notes				

Mode 1: OMNI ON, POLY
Mode 3: OMNI OFF, POLYMode 2: OMNI ON, MONO
Mode 4: OMNI OFF MONO○ : YES
X : NO