Qu Mixer MIDI Protocol - Firmware V1.3

January 2014

This protocol is for use with the Qu-16 or Qu-24 mixer loaded with firmware version V1.30 or later.

Qu transmits MIDI messages when its controls are operated. It also responds to parameter changes it receives via MIDI, for example from a computer, Qu-Pad or an external MIDI controller.

MIDI communicates via:

USB – Rear panel USB B port for direct connection to Apple Mac computers running OSX 10.6 or later. This is the recommended connection for DAW control.

Note USB MIDI is supported natively by Apple Mac computers so no driver is needed. A driver for Windows computers is not available.

TCP – Rear panel network port for use with a computer, a touch panel or other remote controller with configurable MIDI over a TCP/IP port.

Note TCP MIDI requires a driver for the data to be seen as a MIDI port. An Allen & Heath TCP MIDI driver for Apple Mac computers can be downloaded from the iLive Software web page. A driver is not available for Windows computers.

Note Qu currently allows only one TCP connection at a time over its Network port.

The following Qu functions can be controlled via MIDI:

- Mutes
- Faders and Pan
- Mix and FX sends - Level, Pan, Assign, Pre/Post
- Matrix sends – Level, Pan, Assign, Pre/Post (not Qu-16)
- Audio Groups – Assign (not Qu-16)
- Mute Groups – Assign, Master Mute
- PAFL select
- Input Channel source
- Preamp (local and dSNAKE) – Gain, Pad, 48V
- Insert In/Out
- Input Channel processing – Trim, Polarity, Gate, PEQ, Compressor, Delay
- Mix processing - PEQ, GEQ, Compressor, Delay
- Group and Matrix processing – PEQ, GEQ, Compressor, Delay (not Qu-16)
- Scene Recall
- FX Tap Tempo

DAW Control for Mac computers:

MIDI fader strips can be assigned to the Custom Layer to work with a DAW (Digital Audio Workstation). These send/receive CC and note on/off messages using a different MIDI channel to that used for the Qu functions described above. The MIDI fader strip sends/receives messages relating to:

- Fader position
- Mute key / indicator
- Sel key / indicator
- PAFL key /indicator

You can work directly with these messages or use the Allen & Heath DAW Control driver to convert them into either of the following popular protocols:

- HUI
- Mackie Control

Note DAW Control is available only for Mac computers. A driver for Windows computers is not available.

Go to the Allen & Heath web site to download the DAW Control driver for Mac and for further information in the DAW Control Setup Notes.

Reference

Refer to the table at the end of this document for value listings.

All MIDI message numbers shown in blue in this document are Hexadecimal

Key

Blue	Hexadecimal number, eg, F0
Green	Variable referred to in table or note, eg, **VA** = parameter value
Red	NRPN **ID** number for parameter type, eg. Polarity = 6A
Orange	NRPN Index to specify a second value, eg, **VX**

MIDI channel number **N** (see table)

MIDI channel 1 to 16 = 0 to F

Qu functions use MIDI channel = **N**

MIDI strips (DAW controls) use MIDI channel = **N+1**

Channel numbers **CH** (see table)

FX Send 1 to 4	= 00 to 03	
FX Return 1 to 4	= 08 to 0B	
Mute Groups 1 to 4	= 10 to 13	
Input 1 to 24	= 20 to 37	
Stereo Channels	= 40 to 42	
Group 1-2, 3-4	= 68 , 69	(not Qu-16)
Mix 1 to 10	= 60 to 66	
Main LR	= 67	
Matrix 1-2, 3-4	= 6C , 6D	(not Qu-16)

Active Sensing

Qu supports MIDI Active Sensing over its TCP/IP Ethernet connection to detect connection status. Qu will send an initial Active Sense byte (FE) once an Ethernet connection is established, and then once every 300ms or so during any period of inactivity.

Qu also responds to Active Sense If it receives an Active Sense byte it will expect to receive regular MIDI data from that point onwards (either valid control data, or more Active Sense bytes during any period of inactivity). If it does not receive any data for 12 seconds, it will close the Ethernet connection.

DAW control

MIDI strips assigned to the Custom Layer can provide DAW control.

DAW messages can be translated into HUI or Mackie Control protocol using a driver which can be downloaded from the Allen & Heath web site.

Allen & Heath **DAW Control** (driver for Mac computer only)

DAW messages use a different MIDI channel to other Qu MIDI messages:

Qu MIDI channel = **N**
DAW MIDI channel = **N+1**

MIDI strip controls send and respond to the following messages:

Strip Fader

Control Change message:

B(**N+1**), **FD**, **VA**

Where **FD** = Strip fader 00 to 17 (see table)

VA = Fader min to max position = 00 to 7F

Strip keys

The strip keys use **NOTE ON** followed by **NOTE OFF** messages.

Pressing keys send messages.

Key LED indicators respond to received messages.

9(**N+1**), **KY**, 7F, 9(**N+1**), **KY**, 00

Where **KY =**			
	Mute	Strip 1-16 = 00 to 17	(see table)
	Sel	Strip 1-16 = 20 to 37	
	PAFL	Strip 1-16 = 40 to 57	

Mute control

Mute on **NOTE ON** with velocity > or = 40 followed by NOTE OFF

9**N**, **CH**, 7F, 9**N**, **CH**, 00

Mute off **NOTE ON** with velocity < 40 followed by NOTE OFF

9**N**, **CH**, 3F, 9**N**, **CH**, 00

Received Mute messages

Velocity 00 and NOTE OFF messages are ignored

Velocity 01 to 3F = Mute off

Velocity 40 to 7F = Mute on

NRPN Parameter control

Qu mixer parameters are transmitted and received as MIDI **NRPN** (Non-Registered Parameter Number) messages. The MSB (most significant byte) selects the mixer channel (CH), and the LSB (least significant byte) selects the parameter number (ID). The data entry MSB sets the parameter value (VA) and LSB sets the index value for its range (VX) where needed.

(NRPN MSB)	(NRPN LSB)	(Data MSB)	(Data LSB)
BN, 63, CH,	BN, 62, ID,	BN, 06, VA	BN, 26, VX

Fader

BN, 63, CH, BN, 62, 17, BN, 06, VA BN, 26, 07

Where VA –inf to +10dB = 00 to 7F, 0dB = 6B (see table)

Pan

BN, 63, CH, BN, 62, 16, BN, 06, VA BN, 26, VX

Where VA Full Left = 00 to Centre = 25 to Full Right = 4A

VX 04 , 05, 06, 07 = Mix 5-6, 7-8, 9-10, LR

VX 0C, 0D = MTX1-2, 3-4 (not Qu-16)

LR Assign

BN, 63, CH, BN, 62, 18, BN, 06, VA BN, 26, 07

Where VA Off = 00, On = 01

Mix Assign

BN, 63, CH, BN, 62, 55, BN, 06, VA BN, 26, VX

Where VA Off = 00, On = 01

VX 00 to 07 = Mix1-10, LR

VX 10 to 13 = FX send 1-4 (Qu-16 FX1,2 only)

VX 08 , 09, 0C, 0D = Grp1-2,3-4, MTX1-2,3-4 (not Qu-16)

Mute Grp Assign

BN, 63, CH, BN, 62, 40, BN, 06, VA BN, 26, 07

Where VA Off Mute Grp 1-4 = 00 to 03,

On Mute Grp 1-4 = 40 to 43

Mix Pre/Post

BN, 63, CH, BN, 62, 50, BN, 06, VA BN, 26, VX

Where VA Post = 00, Pre = 01

VX 00 to 06 = Mix1-10

VX 10 to 13 = FX send 1-4 (Qu-16 FX1,2 only)

VX 0C, 0D = MTX1-2, 3-4 (not Qu-16)

Send Level

BN, 63, CH, BN, 62, 20, BN, 06, VA BN, 26, VX

Where VA –inf to +10dB = 00 to 7F (see table)

VX 00 to 06 = Mix1-10

VX 10 to 13 = FX send 1-4 (Qu-16 FX1,2 only)

VX 0C, 0D = MTX1-2, 3-4 (not Qu-16)

PAFL select

BN, 63, CH, BN, 62, 51, BN, 06, VA BN, 26, 07

Where VA Off = 00, On = 01

Ch USB Source

Switches between channel current Preamp and current USB source

BN, 63, CH, BN, 62, 12, BN, 06, VA BN, 26, 00

Where VA Off (Preamp) = 00, On (USB) = 01

Ch Preamp Source Switches between mixer rear panel and remote AR rack input source

BN, 63, CH, BN, 62, 57, BN, 06, VA BN, 26, 00

Where VA Off (Local) = 00, On (dSNAKE) = 01

Local Preamp Applies to rear panel local inputs only

BN, 63, CH, BN, 62, ID, BN, 06, VA BN, 26, 07

Where

Gain	ID = 19	VA	Gain -5dB to +60dB = 00 to 7F (see table)
48V PP	ID = 69	VA	Off = 00, On = 01

dSNAKE Preamp Applies to remote AR rack inputs only

BN, 63, CH, BN, 62, ID, BN, 06, VA BN, 26, 07

Where

Gain	ID = 58	VA	Gain +5dB to +60dB = 00 to 7F (see table)
Pad	ID = 59	VA	Out = 00, In = 01
48V PP	ID = 5A	VA	Off = 00, On = 01

Digital Trim Applies to USB source to channel only

BN, 63, CH, BN, 62, 52, BN, 06, VA BN, 26, 07

Where VA Trim -24 to +24dB = 00 to 7F 0dB = 40

Stereo Trim Applies to local ST1, ST2 and ST3 inputs only

BN, 63, CH, BN, 62, 54, BN, 06, VA BN, 26, 07

Where VA Trim -24 to +24dB = 00 to 7F 0dB = 40

Polarity BN, 63, CH, BN, 62, 6A, BN, 06, VA BN, 26, 07

Where VA Off (normal) = 00, On (reversed) = 01

Insert In/Out BN, 63, CH, BN, 62, 6B, BN, 06, VA BN, 26, 07

Where VA Out = 00, In = 01

PEQ BN, 63, CH, BN, 62, ID, BN, 06, VA BN, 26, 07

Where

LF Gain	ID = 01	VA	-12 to +12dB = 00 to 7F	0dB = 40
LF Freq	ID = 02	VA	20Hz to 20 kHz = 00 to 7F	
LF Width	ID = 03	VA	1.5 to 1/9 Oct = 00 to 7F	
LF Type	ID = 04	VA	Bell = 00, Shelf = 06	
LM Gain	ID = 05	VA	-12 to +12dB = 00 to 7F	0dB = 40
LM Freq	ID = 06	VA	20Hz to 20 kHz = 00 to 7F	
LM Width	ID = 07	VA	1.5 to 1/9 Oct = 00 to 7F	
HM Gain	ID = 09	VA	-12 to +12dB = 00 to 7F	0dB = 40
HM Freq	ID = 0A	VA	20Hz to 20 kHz = 00 to 7F	
HM Width	ID = 0B	VA	1.5 to 1/9 Oct = 00 to 7F	
HF Gain	ID = 0D	VA	-12 to +12dB = 00 to 7F	0dB = 40
HF Freq	ID = 0E	VA	20Hz to 20 kHz = 00 to 7F	
HF Width	ID = 0F	VA	1.5 to 1/9 Oct = 00 to 7F	
HF Type	ID = 10	VA	Bell = 00, Shelf = 06	

PEQ	In/Out	BN, 63, CH,	BN, 62, 11,	BN, 06, VA	BN, 26, 00
		Where VA Out = 00, In = 01			
HPF	Freq	BN, 63, CH,	BN, 62, 13,	BN, 06, VA	BN, 26, 07
		Where VA 20Hz to 20kHz = 00 to 7F			
HPF	In/Out	BN, 63, CH,	BN, 62, 14,	BN, 06, VA	BN, 26, 00
		Where VA Out = 00, In = 01			
GEQ	Gain	BN, 63, CH,	BN, 62, 70,	BN, 06, VA	BN, 26, VX
		Where VA Gain -12 to +12dB = 00 to 7F			
		VX 00 to 1B = Each of 28 bands (see table)			
GEQ	In/Out	BN, 63, CH,	BN, 62, 71,	BN, 06, VA	BN, 26, 00
		Where VA Out = 00, In = 01			
Gate		BN, 63, CH,	BN, 62, ID,	BN, 06, VA	BN, 26, 07
		Where			
	Attack	ID = 41	VA 50us to 300ms = 00 to 7F		
	Release	ID = 42	VA 10ms to 1s = 00 to 7F		
	Hold	ID = 43	VA 10ms to 5s = 00 to 7F		
	Threshold	ID = 44	VA -72 to +18dB = 00 to 7F		
	Depth	ID = 45	VA 0 to 60dB = 00 to 7F		
Gate	In/Out	BN, 63, CH,	BN, 62, 46,	BN, 06, VA	BN, 26, 00
		Where VA Out = 00, In = 01			
Comp		BN, 63, CH,	BN, 62, ID,	BN, 06, VA	BN, 26, 07
		Where			
	Type	ID = 61	VA 4 types = 00, 01, 02, 03		
	Attack	ID = 62	VA 300us to 300ms = 00 to 7F		
	Release	ID = 63	VA 100ms to 2s = 00 to 7F		
	Knee	ID = 64	VA Hard knee = 00, Soft knee = 01		
	Ratio	ID = 65	VA 1:1 to inf = 00 to 7F, 2.6:1 = 50		
	Threshold	ID = 66	VA -46 to +18dB = 00 to 7F		
	Gain	ID = 67	VA 0 +18dB = 00 to 7F		
Comp	In/Out	BN, 63, CH,	BN, 62, 68,	BN, 06, VA	BN, 26, 00
		Where VA Out = 00, In = 01			
Delay	Time	BN, 63, CH,	BN, 62, 6C,	BN, 06, VA	BN, 26, 07
		Where VA Input 0 to 85ms = 00 to 7F			
		VA Mix 0 to 170ms = 00 to 7F			
Delay	In/Out	BN, 63, CH,	BN, 62, 6D,	BN, 06, VA	BN, 26, 00
		Where VA Out = 00, In = 01			

Delay FX Time

To set delay time. Can be used for Tap Tempo.
Can use one or two NRPN messages:
Use MSB message only for course time value resolution.
Use LSB followed by MSB message for fine resolution.

LSB: BN, 63, CH, BN, 62, 49, BN, 06, VAf BN, 26, VX

MSB: BN, 63, CH, BN, 62, 48, BN, 06, VAc BN, 26, VX

Where VAf Fine resolution time value = 00 to 7F
VAc Course resolution time value = 00 to 7F
VX Delay parameter 05 = Left tap
07 = Right tap
(See table for examples of time value)

Delay FX Link

To link or unlink the Left and Right tap time.

BN, 63, CH, BN, 62, 48, BN, 06, VA BN, 26, 06

Where VA Off (unlinked) = 00
On (linked) = 7F

Scene Recall

Qu uses **Bank Select** and **Program Change** messages for Scene recall. Only Bank 1 is used.

Transmitted Scene message

Qu transmits this message when a Scene is recalled using the touch screen or a SoftKey:

(Bank1 MSB)	(Bank1 LSB)	Recall Scene
BN, 00, 00,	BN, 20, 00,	CN, SS

Where SS = Scene1 to 100 = 00 to 63 (see table)

Received Scene message

Qu responds to the following message if Bank1 is currently selected:

Recall Scene
CN, SS

Where SS = Scene1 to 100 = 00 to 63 (see table)

To set Bank1

Qu will ignore Scene change messages if the Bank is not set to 1.

(Bank1 MSB)	(Bank1 LSB)
BN, 00, 00,	BN, 20, 00

Device Connection

Note Qu currently allows only one TCP connection at a time over its Network port.

TCP Client Configuration

Clients should be configured to use TCP port 51325

Active Sensing

Qu supports MIDI Active Sensing over its TCP/IP Ethernet connection to detect connection status. Qu will send an initial Active Sense byte (FE) once an Ethernet connection is established, and then once every 300ms or so during any period of inactivity.

Qu also responds to Active Sense If it receives an Active Sense byte it will expect to receive regular MIDI data from that point onwards (either valid control data, or more Active Sense bytes during any period of inactivity). If it does not receive any data for 12 seconds, it will close the Ethernet connection.

Sysex Header

Sysex Header

	A&H ID	Qu-16 mixer	Major/Minor version	MIDI channel
F0,	00, 00, 1A,	50, 11,	01, 00,	0N

Get System State

An external controller such as an iPad running the Qu-Pad app can use MIDI **Sysex** messages to request and receive the current parameter state of the Qu mixer.

REQUEST:

Sysex Header, 10 **<iPadFlag>**, F7

Where **<iPadFlag>** = 1 identifies the incoming connection as Qu-pad.

REPLY:

Sysex Header, 11, **< BoxID >** , **< Version >** , F7

Where **< BoxID >** = 1 identifies the outgoing connection as the Qu-16 mixer

< Version > = **<Major>**,**<Minor>** = Qu firmware version (7bit data)

Subsequent push of NRPN messages to update current state.

Subsequent End Sync Response:

Sysex Header, 14, F7

If **<iPadFlag>** is set in the initial request the Qu mixer will expect to receive an Active Sense byte within 5 seconds. If not, it will close the Ethernet connection. This is how the lost communication mechanism is enforced for Qu-Pad.

Get Meter Data

An external controller such as an iPad running the Qu-Pad app can use MIDI **Sysex** messages to request and receive the current meter data from the Qu mixer.

REQUEST:

Sysex Header, 12, F7

REPLY:

Sysex Header, 13, **< MeterData >** , F7

Where **< MeterData>** = Push of all meter data (Described below).

Meter values are signed dB values, coded as fixed point 7Q8 offset 8000 format, stored as unsigned 16 bit numbers, (transmitted in “7-bit-ized” format in the Sysex).

Encoding of meter data:

The 8-bit file data needs to be converted to 7-bit form, with the result that every 7 bytes of file data translates to 8 bytes in the MIDI stream.

For each group of 7 bytes of file data, the top bit from each is used to construct an eighth byte, which is sent first. For example:

AAAAaaaa BBBBbbbb CCCCcccc DDDDdddd EEEEeeee FFFFffff GGGGgggg

becomes :

0ABCDEFG 0AAAaaaa 0BBBbbbb 0CCCcccc 0DDDdddd 0EEEeeee 0FFFffff 0GGGgggg

The final group may have less than 7 bytes, and is coded as follows (example with 2 bytes in the final group):

0AB00000 0AAAaaaa 0BBBbbbb

Example:	7-bit-ized binary	00100000 01111100 00000000
	Unpacks to 8-bit-ized binary	01111100 10000000
	Equivalent to hexadecimal	7C80
	Remove the offset:	(int16_t) 7C80 – (int16_t) 8000 = FC80
	Float and scale:	(float) FC80 / 256.0f = -3.5dB

The meter data is transmitted in the following order:

Qu-16(24)

16(24)x mono Input Channel metering blocks each comprising:

- Post Preamp
- Post PEQ
- Post Compressor
- Post Delay
- Gate Side Chain
- Compressor Side Chain
- Gate Gain reduction
- Compressor Gain Reduction

64(0)x unused meters (legacy):

3(3)x stereo Input Channel metering blocks each comprising:

- Post Preamp L
- Post PEQ L
- Post Compressor L
- Post Delay L
- Gate Side Chain L
- Compressor Side Chain L
- Gate Gain reduction L
- Compressor Gain Reduction L
- Post Preamp R
- Post PEQ R
- Post Compressor R
- Post Delay R
- Gate Side Chain R
- Compressor Side Chain R
- Gate Gain reduction R
- Compressor Gain Reduction R

16(144)x unused meters (legacy):

4(4)x mono Mix metering blocks (Mix1,2,3,4) each comprising:

- Pre Insert
- Matrix
- Post PEQ
- Post GEQ
- Post Compressor
- Post Fader
- Post Insert
- Compressor Side Chain
- Compressor Gain Reduction

4(4)x stereo Mix metering blocks (Mix5-6, 7-8, 9-10, LR) each comprising:

- Pre Insert L
- Matrix L
- Post PEQ L
- Post GEQ L
- Post Compressor L
- Post Fader L
- Post Insert L
- Compressor Side Chain L
- Compressor Gain Reduction L
- Pre Insert R
- Matrix R
- Post PEQ R
- Post GEQ R
- Post Compressor R
- Post Fader R
- Post Insert R
- Compressor Side Chain R
- Compressor Gain Reduction R

0(2)x stereo Group Metering blocks each comprising: (Qu-24 only)

- Pre Insert L
- Matrix L
- Post PEQ L
- Post GEQ L
- Post Compressor L
- Post Fader L
- Post Insert L
- Compressor Side Chain L
- Compressor Gain Reduction L
- Pre Insert R
- Matrix R
- Post PEQ R
- Post GEQ R
- Post Compressor R
- Post Fader R
- Post Insert R
- Compressor Side Chain R
- Compressor Gain Reduction R

0(2)x Stereo Matrix each comprising: (Qu-24 only)

- Pre Insert L

Matrix L
Post PEQ L
Post GEQ L
Post Compressor L
Post Fader L
Post Insert L
Compressor Side Chain L
Compressor Gain Reduction L
Pre Insert R
Matrix R
Post PEQ R
Post GEQ R
Post Compressor R
Post Fader R
Post Insert R
Compressor Side Chain R
Compressor Gain Reduction R

1(1)x stereo Monitor metering block comprising:

PAFL L
PAFL R
PAFL Mono sum
Talkback
Signal Generator
Main Pre Fader L
Main Pre Fader R
Main Post Fader L
Main Post Fader R
Main Mono Sum Pre Fader
Main Mono Sum Post Fader
USB A Record Out L
USB A Record Out R
3 Unused Meters
RTA 31 bands L
RTA 31 bands R

4(4)x stereo FX metering blocks each comprising:

Send L
Send R
Send Mono sum
Pre PEQ L
Pre PEQ R
Tap Tempo L
Tap Tempo R
Post PEQ L
Post PEQ R
9x unused meters

MIDI channel

N	Qu	Hex
1	1	0
2	2	1
3	3	2
4	4	3
5	5	4
6	6	5
7	7	6
8	8	7
9	9	8
10	10	9
11	11	A
12	12	B
13	13	C
14	14	D
15	15	E
16	16	F

N +1	DAW	Hex
1	2	1
2	3	2
3	4	3
4	5	4
5	6	5
6	7	6
7	8	7
8	9	8
9	10	9
10	11	0A
11	12	0B
12	13	0C
13	14	0D
14	15	0E
15	16	0F
16	1	00

DAW

MIDI Strip

MS	Strip	Hex
1	1	00
2	2	01
3	3	02
4	4	03
5	5	04
6	6	05
7	7	06
8	8	07
9	9	08
10	10	09
11	11	0A
12	12	0B
13	13	0C
14	14	0D
15	15	0E
16	16	0F
17	17	10
18	18	11
19	19	12
20	20	13
21	21	14
22	22	15
23	23	16
24	24	17

Mute Sel PAFL

KY	Strip	Hex	Hex	Hex
1	1	00	20	40
2	2	01	21	41
3	3	02	22	42
4	4	03	23	43
5	5	04	24	44
6	6	05	25	45
7	7	06	26	46
8	8	07	27	47
9	9	08	28	48
10	10	09	29	49
11	11	0A	2A	4A
12	12	0B	2B	4B
13	13	0C	2C	4C
14	14	0D	2D	4D
15	15	0E	2E	4E
16	16	0F	2F	4F
17	17	10	30	50
18	18	11	31	51
19	19	12	32	52
20	20	13	33	53
21	21	14	34	54
22	22	15	35	55
23	23	16	36	56
24	24	17	37	57

Scene number

SS	Scene	Hex	Scene	Hex
1	1	00	65	40
2	2	01	66	41
3	3	02	67	42
4	4	03	68	43
5	5	04	69	44
6	6	05	70	45
7	7	06	71	46
8	8	07	72	47
9	9	08	73	48
10	10	09	74	49
11	11	0A	75	4A
12	12	0B	76	4B
13	13	0C	77	4C
14	14	0D	78	4D
15	15	0E	79	4E
16	16	0F	80	4F
17	17	10	81	50
18	18	11	82	51
19	19	12	83	52
20	20	13	84	53
21	21	14	85	54
22	22	15	86	55
23	23	16	87	56
24	24	17	88	57
25	25	18	89	58
26	26	19	90	59
27	27	1A	91	5A
28	28	1B	92	5B
29	29	1C	93	5C
30	30	1D	94	5D
31	31	1E	95	5E
32	32	1F	96	5F
33	33	20	97	60
34	34	21	98	61
35	35	22	99	62
36	36	23	100	63
37	37	24		
38	38	25		
39	39	26		
40	40	27		
41	41	28		
42	42	29		
43	43	2A		
44	44	2B		
45	45	2C		
46	46	2D		
47	47	2E		
48	48	2F		
49	49	30		
50	50	31		
51	51	32		
52	52	33		
53	53	34		
54	54	35		
55	55	36		
56	56	37		
57	57	38		
58	58	39		
59	59	3A		
60	60	3B		
61	61	3C		
62	62	3D		
63	63	3E		
64	64	3F		

Input Channel

CH	CH	Hex
1	1	20
2	2	21
3	3	22
4	4	23
5	5	24
6	6	25
7	7	26
8	8	27
9	9	28
10	10	29
11	11	2A
12	12	2B
13	13	2C
14	14	2D
15	15	2E
16	16	2F
17	17	30
18	18	31
19	19	32
20	20	33
21	21	34
22	22	35
23	23	36
24	24	37
ST1	ST1	40
ST2	ST2	41
ST3	ST3	42

FX Return

CH	CH	Hex
1	1	08
2	2	09
3	3	0A
4	4	0B

FX Send

CH	CH	Hex	VX	Hex
1	1	00	1	10
2	2	01	2	11
3	3	02	3	12
4	4	03	4	13

Mix

CH	Mix	Hex	VX	Hex
1	1	60	1	00
2	2	61	2	01
3	3	62	3	02
4	4	63	4	03
5-6	5-6	64	5-6	04
7-8	7-8	65	7-8	05
9 -10	9 -10	66	9 -10	06
LR	LR	67	LR	07
Grp1-2	Grp1-2	68	Grp1-2	08
Grp3-4	Grp3-4	69	Grp3-4	09
MTX1-2	MTX1-2	6C	MTX1-2	0C
MTX3-4	MTX3-4	6D	MTX3-4	0D

Local Gain value

19	VA
dB	Hex
+60	7F
+50	6B
+40	57
+30	44
+20	30
+10	1D
+5	13
0	0A
-5	00

dSNAKE Gain value

58	VA
dB	Hex
+60	7F
+50	67
+40	50
+35	45
+30	39
+25	2E
+20	22
+10	0B
+5	00

Fader/Send value

VA	
dBu	Hex
+10	7F
+5	74
0	6B
-5	61
-10	57
-15	4D
-20	43
-25	39
-30	2F
-35	25
-40	1B
-45	11
-inf	00

GEQ Bands

70	VX
Freq	Hex
31.5Hz	00
40Hz	01
50Hz	02
63Hz	03
80Hz	04
100Hz	05
125Hz	06
160Hz	07
200Hz	08
250Hz	09
315Hz	0A
400Hz	0B
500Hz	0C
630Hz	0D
800Hz	0E
1kHz	0F
1k25	10
1k6	11
2kHz	12
2k5	13
3k15	14
4kHz	15
5kHz	16
6k3	17
8kHz	18
10kHz	19
12k5	1A
16kHz	1B

Delay FX time

	VAc	VAf
Time	Hex	Hex
5ms	00	00
100ms	44	31
200ms	54	22
400ms	63	77
800ms	73	68
1.36sec	7F	7F

Compressor Type

61	VA
Type	Hex
Manual Peak	00
Manual RMS	01
Auto Slow Opto	02
Auto Punchbag	03

Mute Group

	CH
MG	Hex
1	10
2	11
3	12
4	13

Mute Grp Assign

		VA
MG	off	on
1	00	40
2	01	41
3	02	42
4	03	43