Qu Mixer MIDI Protocol - Firmware V1.9+　　Oct 2021

This protocol is for use with the Qu-16, Qu-24, Qu-32, Qu-Pac and Qu-SB loaded with firmware version V1.9 or later.

Note　　Firmware V1.9 added new MIDI messages for:

- Remote shutdown.

Note　　For firmware V1.5 onwards the MIDI channel numbers and NRPN ID previously used by Mute Groups were re-allocated to the added DCA Groups to be consistent with other Allen & Heath mixers. Mute Groups channel numbers were changed and are as detailed in this specification.

Qu transmits MIDI messages when changes are made to the mix. It also responds to parameter changes it receives via MIDI, for example from a computer or an external MIDI controller.

MIDI communicates via:

USB – Rear panel USB-B port for direct connection to a computer. This connection also carries audio and is recommended for DAW control and integration.

Note　　The Qu USB-B interface is class compliant so no driver is required for use with Mac. A driver for Windows computers can be downloaded from http://www.allen-heath.com.

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

Note　　TCP MIDI requires an 'active' connection using either the A&H MIDI Control application available from the Allen & Heath website or a BomeBox (https://www.bome.com/products/bomebox) running firmware V1.2 or later.

Note　　Qu allows only one TCP MIDI connection at a time over its Network port.
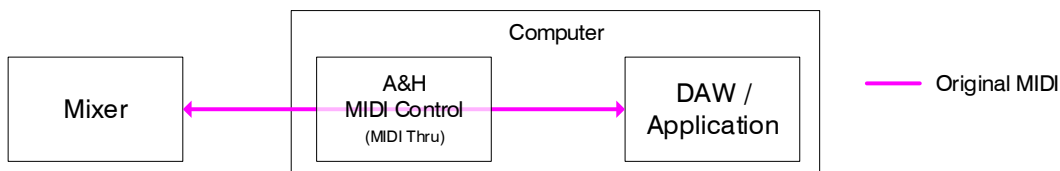
A&H MIDI Control (DAW Control):

Previously known as the 'DAW Control Driver', Allen & Heath MIDI Control works by creating virtual MIDI ports in Mac OS or Windows and then facilitating a MIDI connection between these virtual ports and the mixer either with or without translation.

This enables compatible Allen & Heath mixers (including the Qu) to control DAW software on Mac OS or Windows by emulating popular HUI or Mackie Control protocols with the custom layer MIDI channel strips:
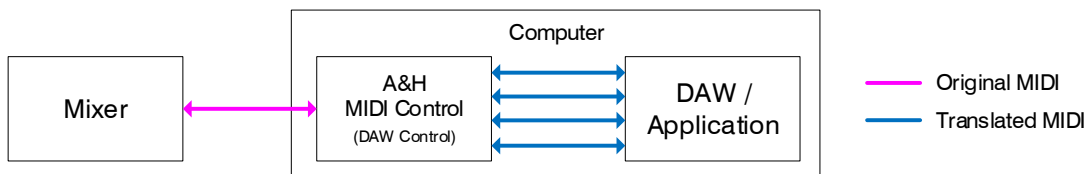
It can be used to send and receive MIDI control messages directly to and from a digital mixer's core for remote control of mixing parameters, scene changes and other functions using the messages detailed in this document:

Simplified control of the most common mixer parameters with MIDI CC messages from the computer is also made possible with the 'CC Translator' options:
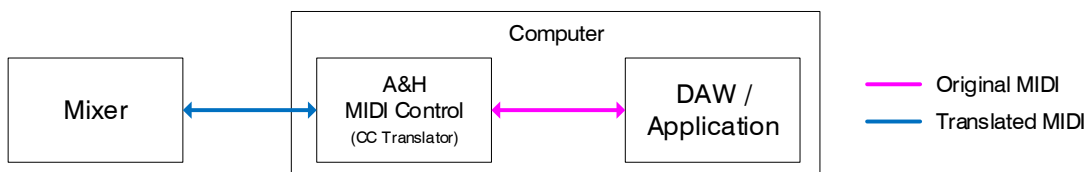
Visit http://www.allen-heath.com to download A&H MIDI Control and refer to the MIDI Control help document for further information on setup and operation.

The following Qu audio functions can be controlled via MIDI:

- Mutes
- Faders and Pan
- Mix and FX sends - Level, Pan, Assign, Pre/Post
- Matrix sends (not Qu-16) – Level, Pan, Assign, Pre/Post
- Audio Groups (not Qu-16) – Assign, (plus Level, Pan, Pre/Post if in Mix mode)
- Mute Groups – Assign, Master Mute
- DCA Groups – Assign, Master Level, 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)
- Channel Names
- Scene Recall
- FX Tap Tempo
- MMC Transport Control
- Remote Shutdown

MIDI fader strips:

MIDI fader strips can be assigned to the Custom Layer or accessed directly in the app. These send/receive CC and note on/off messages using a different MIDI channel to the one 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
- DAW Bank Up/Down (via Soft Key)

You can work with these messages directly or use the Allen & Heath MIDI Control application to translate them for use with a DAW.

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, e.g. 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
DCA Groups 1 to 4	= 10 to 13
Input 1 to 32	= 20 to 3F
Stereo Channels	= 40 to 42
Mute Groups 1 to 4	= 50 to 53
Group 1-2 to 7-8	= 68 to 6B
Mix 1 to 10	= 60 to 66
Main LR	= 67
Matrix 1-2, 3-4	= 6C, 6D

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 the Allen & Heath **DAW Control** driver which can be downloaded from the [Allen & Heath web site](#).

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 1F (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 1-32 = 00 to 1F	(see [table](#))
		Sel	Strip 1-32 = 20 to 3F	
		PAFL	Strip 1-32 = 40 to 5F	

Bank Up/Down
Qu SoftKeys can be assigned as DAW Bank Up or Bank Down keys.
These use **NOTE ON** followed by **NOTE OFF** messages which are converted by DAW Control to become the Bank Up/Down control.

Bank Up   9(**N+1**), 7E, 7F, 9(**N+1**), 7E, 00
Bank Down   9(**N+1**), 7F, 7F, 9(**N+1**), 7F, 00

MMC (MIDI Machine Control)
Available on-screen and as SoftKey functions.

Sysex message   F0, 7F, 7F, 06, **TC**, F7

Where **TC** transport control:

01 = Stop

02 = Play

04 = Fast Forward

05 = Rewind

06 = Record Strobe

09 = Pause

Mute control

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

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

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

9N, CH, 3F,   9N, 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

Group Mode   BN, 63, CH,   BN, 62, 5E,   BN, 06, VA   BN, 26, 00

Where   VA   Group mode = 00, Mix mode = 01

Note   This is unidirectional – Sent from mixer but not received

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

Where   VA   –inf to +10dB = 00 to 7F   (0dB = 62, 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   08, 09, 0A, 0B = Grp 1-2, 3-4, 5-6, 7-8

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 0B = Mix1 to 9-10, LR

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

VX   08, 09, 0A, 0B, 0C, 0D = Grp1-2 to 7-8, MTX1-2 to 3-4

Mute Grp Assign   BN, 63, CH,   BN, 62, 5C,   BN, 06, VA   BN, 26, 07

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

On Mute Grp 1-4 = 40 to 43

DCA 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 to 9-10

VX   08 to 0B = Grp1-2 to 7-8 (in Mix mode)

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 to 9-10

VX   08 to 0B = Grp1-2 to 7-8 (in Mix mode)

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

dSNAKE Patch   BN, 63, CH,   BN, 62, 5D,   BN, 06, VA   BN, 26, 00

Where **VA**   dSNAKE input socket index 00 to 27

Note   This is unidirectional – Sent from mixer but not received

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, VX

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

VX = dSNAKE socket index (00 to 27) (dSNAKE input patch)

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 40   (linear)

               VA   Mix 0 to 170ms = 00 to 7F   (linear)

               VA   Group 0 to 170ms = 00 to 7F   (linear)

               VA   Matrix 0 to 170ms = 00 to 7F   (linear)

Delay   In/Out BN, 63, **CH**,   BN, 62, 6D,   BN, 06, **VA**   BN, 26, 00

        Where **VA**   Out = 00, In = 01

Remote Shutdown B0, 63, 00   B0, 62, 5F   B0, 06, 00   B0, 26, 00

Note: The QU mixer will require a hard power reset to switch on the mixer.

FX Parameter Control

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
	(See table for examples of time values)
VX	Delay parameter 05 = Left tap,
	07 = Right tap

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** = Scene 1 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** = Scene 1 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 MIDI 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.

Qu uses Sysex messages to communicate much of its data.

Sysex Header

	Sysex Header			
	A&H ID	Qu 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.

Note On request, the mixer MIDI channel (**N**) is not known therefore an 'All Call' Sysex Header is sent. The reply returns the MIDI channel number. This number should be used in subsequent messages.

REQUEST: **Sysex Header (All Call),** 10 **<iPadFlag>**, F7

Where **Sysex Header (All Call)** = F0, 00, 00, 1A, 50, 11, 01, 00, 7F
And **<iPadFlag>** = 1 identifies the incoming connection as Qu-pad.

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

Where **< BoxID >** identifies the outgoing connection Qu mixer model:
Where 1 = Qu-16
       2 = Qu-24
       3 = Qu-32
       4 = Qu-Pac
       5 = Qu-SB

< 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.

Channel Naming

Get Name from Qu

REQUEST: **Sysex Header**, 01, **CH**, F7

REPLY: **Sysex Header**, 02, **CH**, **<Name>**, F7

Where   **< Name >** = String of hex ascii characters

Set Name

Sysex Header, 03, **CH**, **<Name>**, F7

Where   **< Name >** = String of hex ascii characters

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, **< MeterOnOff >**, F7

REPLY:

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

Where   **< MeterData >** = Push of all meter data (Described below).
Where   **< MeterOnOff >** = 0 (meters Off), 1 (meters On)

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

Transmission of meter data:

The meter data is transmitted in blocks in the following order:

Qu-24	Qu-24	Qu-32, Qu-Pac, Qu-SB
16 Mono Input blocks	24 Mono Input blocks	24 Mono Input blocks (CH1-24)
80 unused meters	3 Stereo Input blocks	3 Stereo Input blocks
3 Stereo Input blocks	180 unused meters	20 unused meters
20 unused meters	4 Mono Mix blocks	8 Mono Input blocks (CH25-32)
4 Mono Mix blocks	4 Stereo Mix blocks	4 Mono Mix blocks
4 Stereo Mix blocks	2 Stereo Group blocks	4 Stereo Mix blocks
1 Stereo Monitor block	2 Stereo Matrix blocks	4 Stereo Group blocks
4 Stereo FX blocks	1 Stereo Monitor block	2 Stereo Matrix blocks
	4 Stereo FX blocks	1 Stereo Monitor block
		4 Stereo FX blocks

Note   Stereo Mix blocks include Mix 5-6, 7-8, 9-10, LR

Each block contains the following meters:

Mono Input block

Post Preamp
Post PEQ
Post Compressor
Post Delay
Gate Side Chain
Compressor Side Chain
Direct Out
Gate Gain reduction
Compressor Gain Reduction
Ducker Gain Reduction

Stereo Input block

Post Preamp L
Post PEQ L
Post Compressor L
Post Delay L
Gate Side Chain L
Compressor Side Chain L
Direct Out L
Gate Gain reduction L
Compressor Gain Reduction L
Ducker Gain Reduction L
Post Preamp R
Post PEQ R
Post Compressor R
Post Delay R
Gate Side Chain R
Compressor Side Chain R
Direct Out R
Gate Gain reduction R
Compressor Gain Reduction R
Ducker Gain Reduction R

Mono Mix block

TB/SigGen
Pre-Insert
Post-PEQ
Post-GEQ
Post Compressor
Post Fader
Post insert
Compressor Side Chain
Compressor Gain Reduction
Ducker Gain Reduction

Stereo Mix/Grp/Mtx block

TB/SigGen L
Pre Insert L
Post PEQ L
Post GEQ L
Post Compressor L
Post Fader L
Post Insert L
Compressor Side Chain L
Compressor Gain Reduction L
Ducker Gain Reduction L
TB/SigGen R
Pre Insert R
Post PEQ R
Post GEQ R
Post Compressor R
Post Fader R
Post Insert R
Compressor Side Chain R
Compressor Gain Reduction R
Ducker Gain Reduction R

Stereo Monitor block

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

Stereo FX block

Send L (at FX device input)
Send R (at FX device input)
Send Mono sum
Pre PEQ L
Pre PEQ R
Tap Tempo L
Tap Tempo R
Post PEQ L
Post PEQ R
9 unused meters

Reference Tables

In the following tables, Qu mixing (audio core) parameters have a blue border and MIDI channel strip messages (used for DAW control) have an orange border.

MIDI channel

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

Input Channel (CH)

CH	Hex
1	20
2	21
3	22
4	23
5	24
6	25
7	26
8	27
9	28
10	29
11	2A
12	2B
13	2C
14	2D
15	2E
16	2F
17	30
18	31
19	32
20	33
21	34
22	35
23	36
24	37
25	38
26	39
27	3A
28	3B
29	3C
30	3D
31	3E
32	3F
ST1	40
ST2	41
ST3	42

Mix (CH VX)

Mix	Hex	Hex
1	60	00
2	61	01
3	62	02
4	63	03
5-6	64	04
7-8	65	05
9 -10	66	06
LR	67	07
Grp1-2	68	08
Grp3-4	69	09
Grp5-6	6A	0A
Grp7-8	6B	0B
MTX1-2	6C	0C
MTX3-4	6D	0D

FX Ret (CH)

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

FX Send (CH VX)

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

Mute Group (CH)

MG	Hex
1	50
2	51
3	52
4	53

Mute Grp Assign (VA)

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

DCA Group (CH)

DG	Hex
1	10
2	11
3	12
4	13

DCA Grp Assign (VA)

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

Local Gain (19 VA)

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

dSNAKE Gain (58 VA)

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

Fader / Send Level (VA)

dBu	Hex
+10	7F
+5	72
0	62
-5	4F
-10	3F
-15	36
-20	2F
-25	27
-30	1F
-35	17
-40	10
-45	0C
-inf	00

GEQ Bands (70, 71 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

Compressor Type (61 VA)

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

Delay FX time (VAf VAc)

Time	Hex	Hex
5ms	00	00
100ms	31	44
200ms	22	54
400ms	05	64
800ms	70	73
1.36sec	7F	7F

Scene Number (SS / SS)

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

MIDI Strip Fader (MS)

Strip	Hex
1	00
2	01
3	02
4	03
5	04
6	05
7	06
8	07
9	08
10	09
11	0A
12	0B
13	0C
14	0D
15	0E
16	0F
17	10
18	11
19	12
20	13
21	14
22	15
23	16
24	17
25	18
26	19
27	1A
28	1B
29	1C
30	1D
31	1E
32	1F

MIDI Strip Keys (Mute / Sel / PAFL)

Strip	KY Hex	KY Hex	KY Hex
1	00	20	40
2	01	21	41
3	02	22	42
4	03	23	43
5	04	24	44
6	05	25	45
7	06	26	46
8	07	27	47
9	08	28	48
10	09	29	49
11	0A	2A	4A
12	0B	2B	4B
13	0C	2C	4C
14	0D	2D	4D
15	0E	2E	4E
16	0F	2F	4F
17	10	30	50
18	11	31	51
19	12	32	52
20	13	33	53
21	14	34	54
22	15	35	55
23	16	36	56
24	17	37	57
25	18	38	58
26	19	39	59
27	1A	3A	5A
28	1B	3B	5B
29	1C	3C	5C
30	1D	3D	5D
31	1E	3E	5E
32	1F	3F	5F