

**ALLEN&HEATH**

**QU**

MIDI Protocol

Issue 2

Qu-5/6/7 firmware V1.1 or later



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# 1. Introduction and setup

MIDI (**M**usical **I**nstrument **D**igital **I**nterface) is a standardised communication protocol that enables digital devices to communicate and allows one piece of equipment to control another.

The Qu sends and receives MIDI over USB (via the **USB-C** port) as well as over ethernet (using MIDI over TCP/IP via the **Network** port).

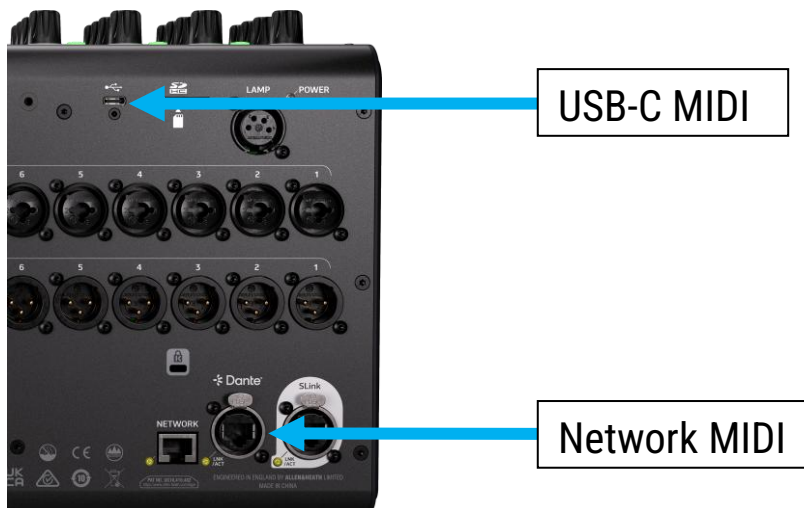
This MIDI can be broken down into two sets of bi-directional messages. Those that are used with Qu mixing parameters (i.e. level control of Qu audio channels), and those used to control external software or equipment (i.e. to control a DAW).

## 1.1 Connection

When connected to a computer using the USB-C port, the Qu will appear as a MIDI input and output device. This can be used with software directly or through use of the [Allen & Heath MIDI Control](#) application.

To send and receive MIDI messages over a network, connect the Qu to a network via its **NETWORK** port. It is also possible to connect to a network *through* the **Dante** port of a Qu-5D, Qu-6D or Qu-7D with the **Control Network Bridge** turned **On** in the **SETUP > Network** screen.

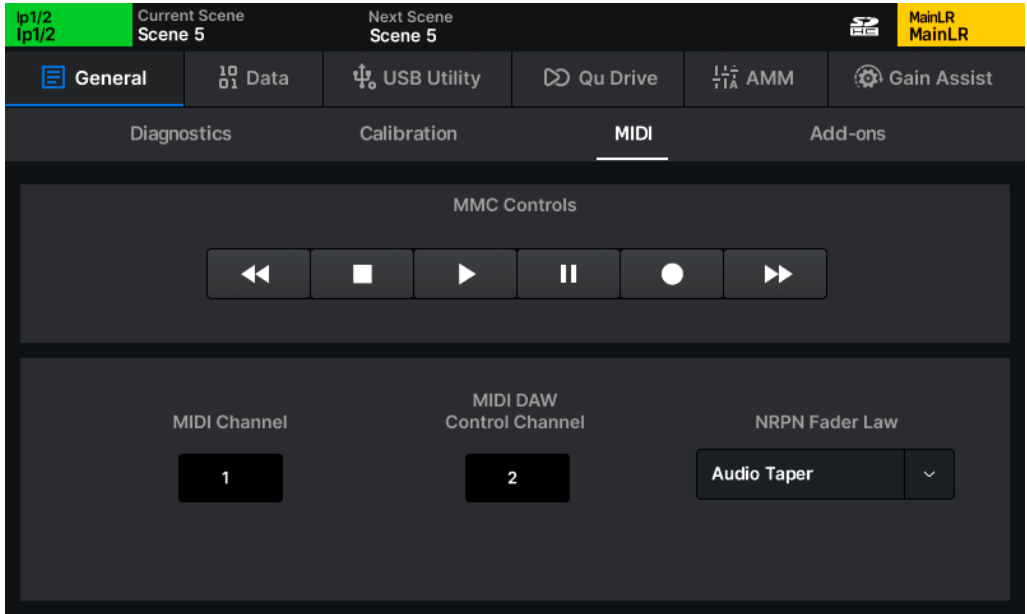
The [Allen & Heath MIDI Control](#) app can be used to manage the network MIDI connection. All other clients used for network communication should be configured to send messages to the Qu's IP address and use port 51325.



## 1.2 MIDI Setup

There are 16 MIDI channels available, and the Qu makes use of 2 of these, one for the mixer itself and one for the MIDI channel strips which can be used with [Allen & Heath MIDI Control](#) to emulate a DAW control surface.

Navigate to **UTILITY > General > MIDI** to view and adjust the Qu MIDI settings. This screen also displays MMC (**MIDI Machine Control**) buttons for control of computer sequencers and DAW's.



**MIDI Channel** – The MIDI Channel of the Qu, used for control to/from the mixer core.

**MIDI DAW Control Channel** - The MIDI channel used for DAW control (and therefore all MIDI fader strips) is automatically set to the Qu MIDI channel +1. To use MIDI channel 1 for DAW control purposes, set the Qu MIDI channel to 16.

**NRPN Fader Law** - value to switch NRPN level control (to and from the Qu core) between Linear Taper or Audio Taper.

❗ See the [Levels](#) section for more information on Fader Laws.

**Apply/Cancel** - Apply or disregard any changes.

❗ Touching any of the **MMC Controls** sends standard MMC transport messages to **all** channels. These can be used with the Allen & Heath MIDI Control app for DAW control and can also be assigned to Soft Keys.

## 1.3 Types of message

MIDI messages can be presented in different ways in various hardware and software, including plain text, binary, decimal and hexadecimal.

As an example, these are four ways to represent the same message:

Plain text	MIDI Channel 1, C-1, Note on
Binary	1001 0000 0000 0000 0111 1111
Decimal	144 0 127
Hexadecimal	0x90 0x00 0x7F

This document uses the representations you are most likely to come across for each kind of message when communicating with the Qu, and a conversion table is included in the [Reference Tables](#) section.

**Note On/Off** – The Qu uses a note on followed by a note off for MIDI strip keys and MIDI triggering of the Qu Soft Keys.

**MMC** – **MIDI Machine Control** is used to send transport control messages from the Qu.

- ❗ MMC messages are 'Real Time Universal System Exclusive' messages and are sent to all connected devices rather than being assigned to a single MIDI channel.

**CC (Continuous Controller)** – For each MIDI channel there are 128 continuous controllers, each of which can have a value between 0 and 127 (128 steps). These are used by MIDI strip faders, MIDI on Soft Rotaries and other parameters with more than just an on/off state.

**Bank/Program Change** – Used to recall Qu scenes.

**Show Control** – Industry standard control to synchronise audio and visual equipment. MIDI Show Control can be used with the Qu's Cue List.

**NRPN (Non-Registered Parameter Number)** – For high-resolution control (16384 steps) and access to many more parameters, NRPN messages are used to communicate with Qu to control levels, panning, mutes and assignments.

NRPN messages can be thought of as a specific string of CC messages, with MSB (**M**ost **S**ignificant **B**yte) and LSB (**L**east **S**ignificant **B**yte) representing a parameter number and data bytes representing parameter value.

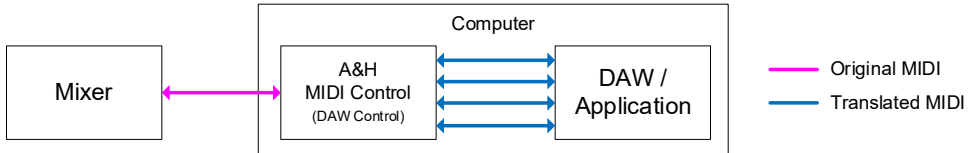
NRPNs can be used to set the absolute value of a parameter or to increment/decrement a parameter value.

These are displayed as hexadecimal values in this document, and it should be noted that the '0x' prefix has been removed for brevity.

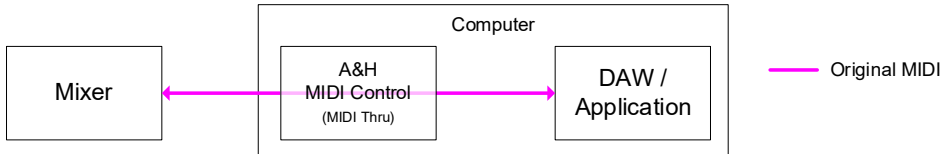
## 1.4 Allen & Heath MIDI Control and DAW Control

The **Allen & Heath MIDI Control** app 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.

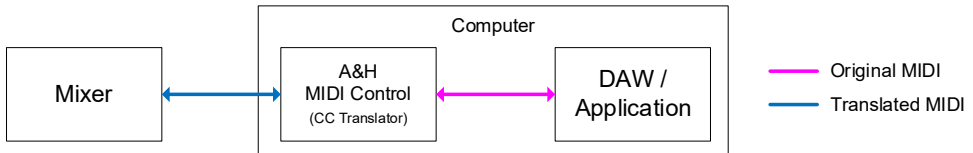
This enables MIDI channel strips and Soft Key options on the Qu to control DAW software on Mac OS or Windows by emulating popular HUI or Mackie Control protocols.



It can be used to send and receive MIDI control messages directly to and from the Qu core for remote control of mixing parameters, scene changes and other functions (as detailed in this document).



Simplified control of the most common mixing parameters using MIDI CC and Note On/Off messages from the computer is also made possible with the 'CC Translator' options.



Visit the Allen & Heath website ([www.allen-heath.com](http://www.allen-heath.com)) to download the latest version of **Allen & Heath MIDI Control** and refer to the Help document for information on setup and configuration.

## 2. MIDI Faders and Soft Controls

### 2.1 MIDI faders

The Qu has 32 freely assignable MIDI fader strips. Refer to the Qu User Guide for information on surface strip assignment.


Each strip sends and responds to the following messages sent on the **MIDI DAW Control Channel**:

MIDI Strip	Mute Key	Sel Key	PAFL Key	Fader
1	C-1 Note ON/OFF	G#1 Note ON/OFF	E4 Note ON/OFF	CC#0
2	C#-1 Note ON/OFF	A1 Note ON/OFF	F4 Note ON/OFF	CC#1
3	D-1 Note ON/OFF	A#1 Note ON/OFF	F#4 Note ON/OFF	CC#2
4	D#-1 Note ON/OFF	B1 Note ON/OFF	G4 Note ON/OFF	CC#3
5	E-1 Note ON/OFF	C2 Note ON/OFF	G#4 Note ON/OFF	CC#4
6	F-1 Note ON/OFF	C#2 Note ON/OFF	A4 Note ON/OFF	CC#5
7	F#-1 Note ON/OFF	D2 Note ON/OFF	A#4 Note ON/OFF	CC#6
8	G-1 Note ON/OFF	D#2 Note ON/OFF	B4 Note ON/OFF	CC#7
9	G#-1 Note ON/OFF	E2 Note ON/OFF	C5 Note ON/OFF	CC#8
10	A-1 Note ON/OFF	F2 Note ON/OFF	C#5 Note ON/OFF	CC#9
11	A#-1 Note ON/OFF	F#2 Note ON/OFF	D5 Note ON/OFF	CC#10
12	B-1 Note ON/OFF	G2 Note ON/OFF	D#5 Note ON/OFF	CC#11
13	C0 Note ON/OFF	G#2 Note ON/OFF	E5 Note ON/OFF	CC#12
14	C#0 Note ON/OFF	A2 Note ON/OFF	F5 Note ON/OFF	CC#13
15	D0 Note ON/OFF	A#2 Note ON/OFF	F#5 Note ON/OFF	CC#14
16	D#0 Note ON/OFF	B2 Note ON/OFF	G5 Note ON/OFF	CC#15
17	E0 Note ON/OFF	C3 Note ON/OFF	G#5 Note ON/OFF	CC#16
18	F0 Note ON/OFF	C#3 Note ON/OFF	A5 Note ON/OFF	CC#17
19	F#0 Note ON/OFF	D3 Note ON/OFF	A#5 Note ON/OFF	CC#18
20	G0 Note ON/OFF	D#3 Note ON/OFF	B5 Note ON/OFF	CC#19
21	G#0 Note ON/OFF	E3 Note ON/OFF	C6 Note ON/OFF	CC#20
22	A0 Note ON/OFF	F3 Note ON/OFF	C#6 Note ON/OFF	CC#21
23	A#0 Note ON/OFF	F#3 Note ON/OFF	D6 Note ON/OFF	CC#22
24	B0 Note ON/OFF	G3 Note ON/OFF	D#6 Note ON/OFF	CC#23
25	C1 Note ON/OFF	G#3 Note ON/OFF	E6 Note ON/OFF	CC#24
26	C#1 Note ON/OFF	A3 Note ON/OFF	F6 Note ON/OFF	CC#25
27	D1 Note ON/OFF	A#3 Note ON/OFF	F#6 Note ON/OFF	CC#26
28	D#1 Note ON/OFF	B3 Note ON/OFF	G6 Note ON/OFF	CC#27
29	E1 Note ON/OFF	C4 Note ON/OFF	G#6 Note ON/OFF	CC#28
30	F1 Note ON/OFF	C#4 Note ON/OFF	A6 Note ON/OFF	CC#29
31	F#1 Note ON/OFF	D4 Note ON/OFF	A#6 Note ON/OFF	CC#30
32	G1 Note ON/OFF	D#4 Note ON/OFF	B6 Note ON/OFF	CC#31

## 2.2 Soft Keys and Footswitch

The Qu features 8 assignable Soft Keys on the surface, with another 8 assignable through the Qu-MixPad app, there is also a dual footswitch connection. Any of these can be assigned the following MIDI functions:

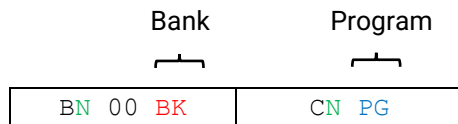
Type	Sub Type	Value
MMC	-	Rewind, Play, Pause, Stop, Fastforward, Record
DAW Control	-	Bank Up, Bank Down
MIDI note On/Off	MIDI Channel 1 to 16	C-1 (0) to G9 (127)
Program Change	MIDI Channel 1 to 16	0 to 127

 Refer to the Qu User Guide for information on assigning Soft Key and Footswitch functions.

## 3. Control to and from the Mixer

### 3.1 Scene change

A scene change uses a bank change followed by a program change.



Where: **N**= MIDI Channel, **BK** = Bank, **PG** = Program

The bank change (**BK**) selects between three ranges of scenes:

Scenes 1 to 128 = Bank 1 = 00

Scenes 129 to 256 = Bank 2 = 01

Scenes 257 to 300 = Bank 3 = 02

The program change (**PG**) is then a value between 00 and 7F (decimal 0-127), which selects a scene in that range.

**i** Note that there is an offset of -1 between the Qu values and the MIDI values due to the Qu counting from 1 to 128 and MIDI counting from 0 to 127.

So scene 96 is bank change 00 (1) and program change 5F (95) and scene 264 is bank change 02 (3) and program change 07 (8).

The scene being recalled must exist as a saved scene in the Qu, blank scenes cannot be recalled.

Examples:

Scene, MIDI Ch	Message
Scene 7, Ch1	B0 00 00 C0 06
Scene 120, Ch1	B0 00 00 C0 77
Scene 156, Ch1	B0 00 01 C0 1B
Scene 156, Ch3	B2 00 01 C2 1B

### 3.2 MIDI Show Control

When the Qu's **Scene Manager** is in **Cue List** mode, it utilises MIDI Show Control Cue numbering and can be controlled using standard MIDI Show Control messages to recall specific Cues, or with Previous, Next, Load and Go commands.

Nothing needs to be set up in the Qu for this, though note that MSC can only be used when in Cue List mode, and that Scenes can be recalled at any time (from the **All Scenes** list) using bank/program change messages.

## 3.3 Soft Keys

The Qu Soft Keys can be controlled using standard MIDI Note On/Off messages, allowing the control of many more internal functions of the Qu by proxy.

- ❗ The Qu does not send note on/off messages when a Soft Key is pressed unless the Soft Key is set to a MIDI note on/off function. See the [Soft Keys and Footswitch](#) section for more details.

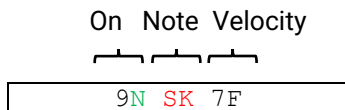
A key press is triggered with note on, and a release is triggered separately with a note off, this means it is possible to replicate a held key (i.e. for use with the talkback function).

Each Soft Key is controlled with a different sequential note starting at C3 (30) and although there are only 8 physical Soft Keys on the Qu surface, another 8 (Soft Keys 9-16) are available for use via the Qu-MixPad app. These extra Soft Keys can also be controlled via MIDI, but must be assigned functions via the app.

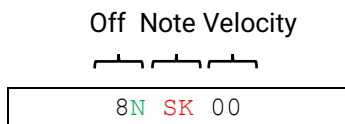
SoftKey	Note	HEX	SoftKey	Note	HEX	SoftKey	Note	HEX	SoftKey	Note	HEX
1	C3	30	5	E3	34	9	G#3	38	13	C4	3C
2	C#3	31	6	F3	35	10	A3	39	14	C#4	3D
3	D3	32	7	F#3	36	11	A#3	3A	15	D4	3E
4	D#3	33	8	G3	37	12	B3	3B	16	D#4	3F

- ❗ The HEX values shown here are accurate, but some applications and hardware use different octave designations. e.g. If C3 is not controlling Soft Key 1, try C2 or C4.

### Note On (Soft Key press)



### Note Off (Soft Key release)



Both where: **N** = MIDI Channel, **SK** = Soft Key Note

- ❗ The Qu will respond to both MIDI note off standards, i.e. a specific note off message or a note on message with zero velocity.

Examples:

Soft Key, MIDI Ch	Message (Press)	Message (Release)
Soft Key #1, Ch1	90 30 7F	80 30 00
Soft Key #7, Ch5	94 36 7F	84 36 00

## 3.4 Mutes

The Qu sends and receives absolute On or Off mute messages. It will also toggle the mute state when either an increment or decrement message is received.

MSB and LSB are a parameter number for the channel you wish to mute or unmute.

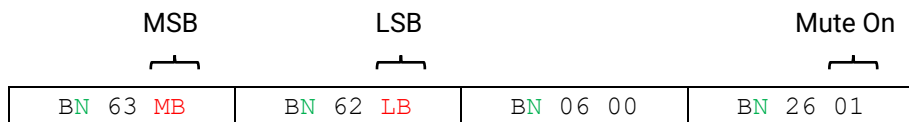
❗ MSB/LSB parameter numbers are shown in the [reference tables](#) section.

The last byte of the full message then represents a mute on or off.

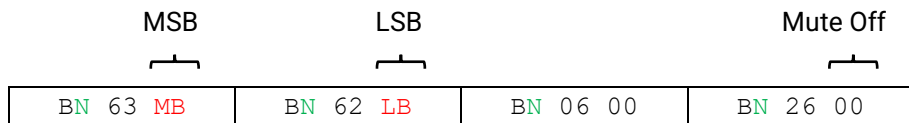
### Stereo Channels

Where source (e.g. Input) or destination (e.g. Mix) channels are stereo, use the MSB/LSB parameter number for the left/odd channel for control.

### Mute On



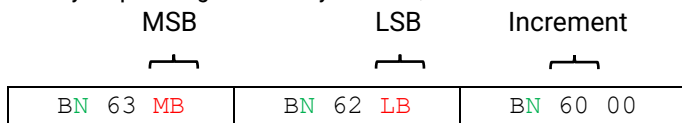
### Mute Off



Both where: N= MIDI Channel, MB/LB = MSB/LSB Parameter number

### Mute Toggle (increment)

When either a data increment or decrement message is received, the Qu will toggle between states, in the same way as pressing a mute key on the Qu does.



Where: N= MIDI Channel, MB/LB = MSB/LSB Parameter number

Examples:

Channel, Cmnd, MIDI Ch	Message
Ip1, Mute On, Ch1	B0 63 00 B0 62 00 B0 06 00 B0 26 01
LR mix, Mute Off, Ch1	B0 63 00 B0 62 44 B0 06 00 B0 26 00
Mute Grp 4, Mute On, Ch7	B6 63 04 B6 62 03 B6 06 00 B6 26 01
Ip1, Mute Toggle, Ch1	B0 63 00 B0 62 00 B0 60 00

## 3.5 Levels

Levels can be set using either absolute values or in relative 1dB increments/decrements.

MSB and LSB are a parameter number showing where the signal is being sent from and where it is being sent to.

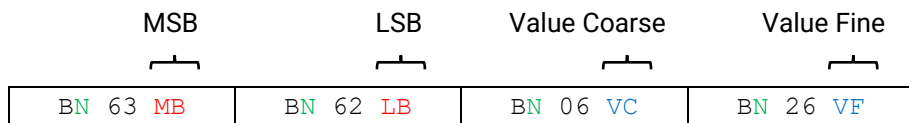
❗ MSB/LSB parameter numbers are shown in the [reference tables](#).

### Stereo Channels

Where source (e.g. Input) or destination (e.g. Mix) channels are stereo, use the MSB/LSB parameter number for the left/odd channel for control.

### Absolute Level Control

An absolute level is represented with a combination of course and fine values.



Where: N= MIDI Channel, MB/LB = MSB/LSB Parameter number, VC/VF = Value

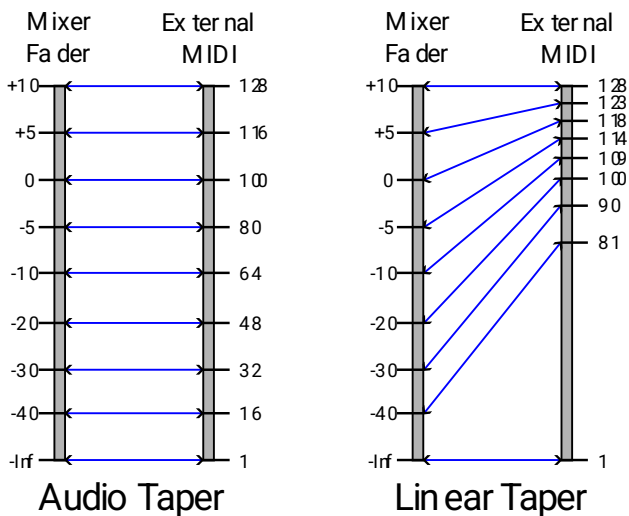
### NRPN Fader Law

The way the Qu responds to and sends level messages using MIDI can be switched between two modes.

Navigate to **UTILITY > General > MIDI** to view and adjust all Qu MIDI settings, including the NRPN Fader Law.

**Audio taper** - Lower resolution, but allows mapped external linear controls (e.g. MIDI faders or pots) to work in a similar way to the Qu faders, with more control about the unity gain (0dB) position.

**Linear Taper** - High-resolution control with 16384 possible values and intended for use with 3<sup>rd</sup> party control or for automation recording and playback.



See 'Example Linear Taper Level Values' and 'Approximate Audio Taper Level Values' in the [reference tables](#).

#### Audio Taper Examples:

Address, Value, MIDI Ch	Message
lp1 to LR, 0dB, Ch1	B0 63 40 B0 62 00 B0 06 62 B0 26 00
lp1 to LR, -20dB, Ch1	B0 63 40 B0 62 00 B0 06 2E B0 26 40
USB to LR, -20dB, Ch1	B0 63 40 B0 62 27 B0 06 2E B0 26 40
USB to Aux5, -20dB, Ch1	B0 63 43 B0 62 78 B0 06 2E B0 26 40
USB to Aux5, -12dB, Ch4	B3 63 43 B3 62 78 B3 06 3B B3 26 00
Grp4 to Aux8, -24dB, Ch4	B3 63 45 B3 62 2F B3 06 28 B3 26 40
lp30 to FX3, -12dB, Ch14	BD 63 4D BD 62 0A BD 06 3B BD 26 00

#### Linear Taper Examples:

Address, Value, MIDI Ch	Message
lp1 to LR, 0dB, Ch1	B0 63 40 B0 62 00 B0 06 76 B0 26 5C
lp1 to LR, -20dB, Ch1	B0 63 40 B0 62 00 B0 06 63 B0 26 49
USB to LR, -20dB, Ch1	B0 63 40 B0 62 24 B0 06 63 B0 26 49
USB to Aux5, -20dB, Ch1	B0 63 43 B0 62 78 B0 06 63 B0 26 49
USB to Aux5, -12dB, Ch4	B3 63 43 B3 62 78 B3 06 6B B3 26 06
Grp4 to Aux8, -24dB, Ch4	B3 63 45 B3 62 2F B3 06 5F B3 26 57
lp30 to FX3, -12dB, Ch14	BD 63 4D BD 62 0A BD 06 6B BD 26 06

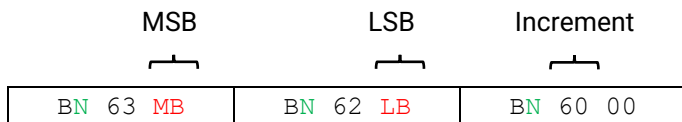
## Relative Level Control

A relative level message uses the same parameter number, but with an increment or decrement byte.

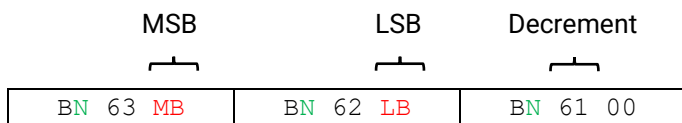
This raises or lowers a level in 1dB steps.

❗ The **NRPN Fader Law** setting has no effect on relative control.

### +1dB (increment)



### -1dB (decrement)



Both where: N= MIDI Channel, MB/LB = MSB/LSB Parameter number

Examples:

Address, Inc/Dec, MIDI Ch	Message
lp1 to LR, Increment, Ch1	B0 63 40 B0 62 00 B0 60 00
Grp5 to LR, Decrement, Ch5	B4 63 40 B4 62 34 B4 61 00
FX2Rtn to Aux3, Increment, Ch12	BB 63 46 BB 62 22 BB 60 00

## 3.6 Panning/Balance

Panning (mono sources) or balance (stereo sources) can be set using either absolute values or in relative increments/decrements.

They can only be controlled when the destination (Mix) is stereo.

MSB and LSB represent a parameter number showing where the signal is being sent from and where it is being sent to.

❗ MSB/LSB parameter numbers are shown in the [reference tables](#).

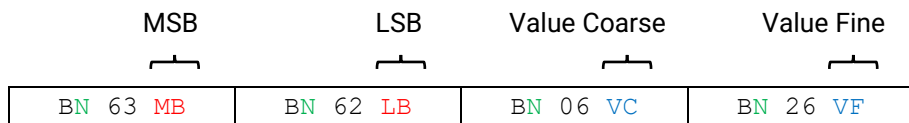
### Stereo Channels

Where source (e.g. Input) or destination (e.g. Mix) channels are stereo, use the MSB/LSB parameter number for the left/odd channel for control.

### Absolute Panning Control

Absolute values are set with a combination of coarse and fine values. Ranging from 00 00 (full left) to 7F 7F (full right), with centre being 3F 7F.

❗ See 'Example Pan/Balance Values' in the [reference tables](#).



Where: N= MIDI Channel, MB/LB = MSB/LSB Parameter number, VC/VF = Value

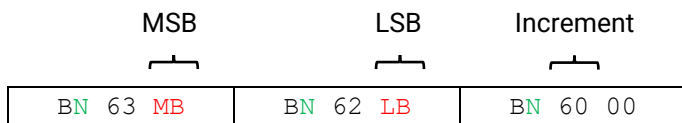
Examples:

Address, Value, MIDI Ch	Message
lp1 to LR, L100%, Ch1	B0 63 50 B0 62 00 B0 06 00 B0 26 00
lp1 to LR, CTR, Ch1	B0 63 50 B0 62 00 B0 06 3F B0 26 7F
lp24 to LR, R20%, Ch1	B0 63 50 B0 62 17 B0 06 4C B0 26 65
lp24 to Aux5&6, R20%, Ch1	B0 63 52 B0 62 5C B0 06 4C B0 26 65
lp24 to Aux5&6, L50%, Ch4	B3 63 52 B3 62 5C B3 06 1F B3 26 7F
Grp3 to Aux7, L50%, Ch4	B3 63 55 B3 62 22 B3 06 1F B3 26 7F
LR to Mtx3&4, R100%, Ch11	BA 63 5E BA 62 26 BA 06 7F BA 26 7F

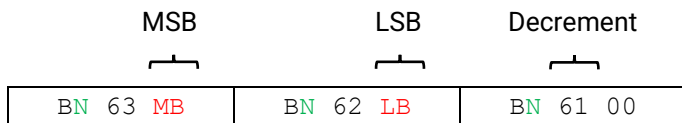
## Relative Panning Control

A relative pan/balance message uses the same parameter number, but with an increment or decrement byte. Incrementing moves to the right and decrementing moves to the left.

### Right one step (increment)



### Left one step (decrement)



Both where: N= MIDI Channel, MB/LB = MSB/LSB Parameter number

Examples:

Address, Left/Right, MIDI Ch	Message
Ip1 to LR, Right, Ch1	B0 63 50 B0 62 00 B0 60 00
Ip1 to LR, Left, Ch1	B0 63 50 B0 62 00 B0 61 00
ST2 to Aux8, Right, Ch1	B0 63 53 B0 62 63 B0 60 00
Aux5 to Mtx1&2, Right, Ch3	B2 63 5E B2 62 33 B2 60 00

## 3.7 Mix Assignments

The Qu sends and receives absolute On or Off assign messages. It will also toggle the assign state when either an increment or decrement message is received.

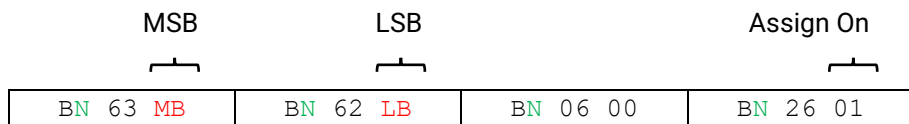
MSB and LSB represent a parameter number showing where the signal is being sent from and where it is being sent to. The last byte of the full message then represents assignment on or off.

❗ MSB/LSB parameter numbers are shown in the [reference tables](#) section.

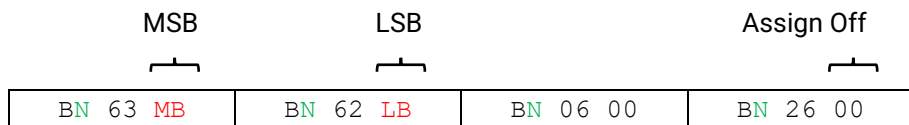
### Stereo Channels

Where source (e.g. Input) or destination (e.g. Mix) channels are stereo, use the MSB/LSB parameter number for the left/odd channel for control.

### Assign On



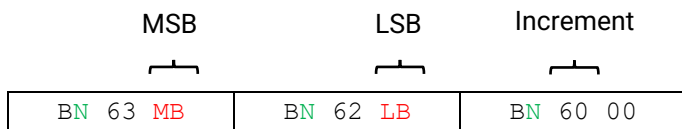
### Assign Off



Both where: N = MIDI Channel, MB/LB = MSB/LSB Parameter number

When either a data increment or decrement message is received, the Qu will toggle between assign states, in the same way as holding the Assign key and pressing a Sel key on the Qu does.

### Assign Toggle (increment)



Where: N = MIDI Channel, MB/LB = MSB/LSB Parameter number

Examples:

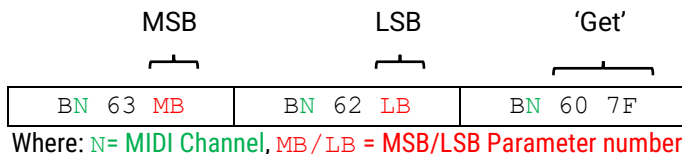
Channel, Cmnd, MIDI Ch	Message
lp1 to LR, On, Ch1	B0 63 60 B0 62 00 B0 06 00 B0 26 01
lp1 to LR, Off, Ch1	B0 63 60 B0 62 00 B0 06 00 B0 26 00
FX1Rtn to Aux 7, On, Ch1	B0 63 66 B0 62 1A B0 06 00 B0 26 01
Grp2 to Mtx1&2, Toggle, Ch4	B3 63 6E B3 62 2A B3 60 00

## 3.8 Getting values

A 'get' command can be sent to the Qu in order to return the current value of any mute, level, pan/balance or assignment parameter listed in this document.

MSB and LSB represent the parameter number of the value being requested, followed by a data increment with value 7F (i.e. the same as a standard increment message but with a value of 7F instead of 00).

- ⓘ All MSB/LSB parameter numbers are shown in the [reference tables](#), be sure to use the correct parameter number for either mute, level, panning/balance or assignments.



Examples:

Parameter Requested, MIDI Ch	Message
LR Mute, Ch1	B0 63 00 B0 62 00 B0 60 7F
lp1 to LR Level, Ch1	B0 63 40 B0 62 00 B0 60 7F
lp30 to Aux5&6 Pan, Ch1	B0 63 53 B0 62 24 B0 60 7F
Aux7 to Mtx1&2 Balance, Ch5	B4 63 5E B4 62 39 B4 60 7F
FX2Rtn to FX3Snd Assign, Ch12	BB 63 6E BB 62 0A BB 60 7F

## 4. Reference Tables

### MIDI channels 1 to 16 (N)

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

### Qu Value to Hexadecimal to Note (PG and other values from 1-128)

VAL	HEX	Note	VAL	HEX	Note	VAL	HEX	Note	VAL	HEX	Note
1	00	C-1	33	20	G#1	65	40	E4	97	60	C7
2	01	C#-1	34	21	A1	66	41	F4	98	61	C#7
3	02	D-1	35	22	A#1	67	42	F#4	99	62	D7
4	03	D#-1	36	23	B1	68	43	G4	100	63	D#7
5	04	E-1	37	24	C2	69	44	G#4	101	64	E7
6	05	F-1	38	25	C#2	70	45	A4	102	65	F7
7	06	F#-1	39	26	D2	71	46	A#4	103	66	F#7
8	07	G-1	40	27	D#2	72	47	B4	104	67	G7
9	08	G#-1	41	28	E2	73	48	C5	105	68	G#7
10	09	A-1	42	29	F2	74	49	C#5	106	69	A7
11	0A	A#-1	43	2A	F#2	75	4A	D5	107	6A	A#7
12	0B	B-1	44	2B	G2	76	4B	D#5	108	6B	B7
13	0C	C0	45	2C	G#2	77	4C	E5	109	6C	C8
14	0D	C#0	46	2D	A2	78	4D	F5	110	6D	C#8
15	0E	D0	47	2E	A#2	79	4E	F#5	111	6E	D8
16	0F	D#0	48	2F	B2	80	4F	G5	112	6F	D#8
17	10	E0	49	30	C3	81	50	G#5	113	70	E8
18	11	F0	50	31	C#3	82	51	A5	114	71	F8
19	12	F#0	51	32	D3	83	52	A#5	115	72	F#8
20	13	G0	52	33	D#3	84	53	B5	116	73	G8
21	14	G#0	53	34	E3	85	54	C6	117	74	G#8
22	15	A0	54	35	F3	86	55	C#6	118	75	A8
23	16	A#0	55	36	F#3	87	56	D6	119	76	A#8
24	17	B0	56	37	G3	88	57	D#6	120	77	B8
25	18	C1	57	38	G#3	89	58	E6	121	78	C9
26	19	C#1	58	39	A3	90	59	F6	122	79	C#9
27	1A	D1	59	3A	A#3	91	5A	F#6	123	7A	D9
28	1B	D#1	60	3B	B3	92	5B	G6	124	7B	D#9
29	1C	E1	61	3C	C4	93	5C	G#6	125	7C	E9
30	1D	F1	62	3D	C#4	94	5D	A6	126	7D	F9
31	1E	F#1	63	3E	D4	95	5E	A#6	127	7E	F#9
32	1F	G1	64	3F	D#4	96	5F	B6	128	7F	G9

## Soft Key Notes and Hexadecimal Values (SK)

SoftKey	Note	HEX	SoftKey	Note	HEX	SoftKey	Note	HEX	SoftKey	Note	HEX
1	C3	30	5	E3	34	9	G#3	38	13	C4	3C
2	C#3	31	6	F3	35	10	A3	39	14	C#4	3D
3	D3	32	7	F#3	36	11	A#3	3A	15	D4	3E
4	D#3	33	8	G3	37	12	B3	3B	16	D#4	3F

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## Approximate Audio Taper Level Values (VC/VF)

dB	VC	VF	dB	VC	VF	dB	VC	VF	dB	VC	VF	dB	VC	VF	dB	VC	VF
-inf	00	00	-45	0C	00	-29	20	40	-19	30	00	-9	41	40	+1	65	40
-89	01	40	-40	0F	40	-28	22	00	-18	31	40	-8	44	40	+2	69	00
-85	02	00	-38	12	40	-27	23	40	-17	33	00	-7	48	00	+3	6C	40
-80	02	40	-36	15	40	-26	25	00	-16	34	40	-6	4B	00	+4	70	00
-75	03	40	-35	17	00	-25	26	40	-15	36	00	-5	4E	40	+5	73	40
-70	04	00	-34	19	00	-24	28	40	-14	38	00	-4	52	40	+6	75	40
-65	05	00	-33	1A	40	-23	2A	00	-13	39	40	-3	56	40	+7	78	00
-60	06	00	-32	1C	00	-22	2B	40	-12	3B	00	-2	5A	00	+8	7A	40
-55	07	00	-31	1D	40	-21	2D	00	-11	3C	40	-1	5E	00	+9	7D	00
-50	08	00	-30	1F	00	-20	2E	40	-10	3E	00	0	62	00	+10	7F	40

## Example Linear Taper Level Values (VC/VF)

dB	VC	VF	dB	VC	VF	dB	VC	VF	dB	VC	VF	dB	VC	VF	dB	VC	VF
-inf	00	00	-45	4C	7D	-29	5B	69	-19	65	0C	-9	6E	2F	+1	77	53
-89	24	16	-40	51	4F	-28	5C	60	-18	66	03	-8	6F	26	+2	78	49
-85	27	71	-38	53	3C	-27	5D	56	-17	66	7A	-7	70	1D	+3	79	40
-80	2C	42	-36	55	2A	-26	5E	4D	-16	67	70	-6	71	14	+4	7A	37
-75	31	14	-35	56	21	-25	5F	44	-15	68	67	-5	72	0A	+5	7B	2E
-70	35	65	-34	57	17	-24	60	3B	-14	69	5E	-4	73	01	+6	7C	24
-65	3A	37	-33	58	0E	-23	61	31	-13	6A	55	-3	73	78	+7	7D	1B
-60	3F	09	-32	59	05	-22	62	28	-12	6B	4B	-2	74	6F	+8	7E	12
-55	43	5A	-31	59	7C	-21	63	1F	-11	6C	42	-1	75	65	+9	7F	08
-50	48	2C	-30	5A	72	-20	64	16	-10	6D	39	0	76	5C	+10	7F	7F

## Example Pan/Balance Values (VC/VF)

L/R	VC	VF	L/R	VC	VF	L/R	VC	VF	L/R	VC	VF	L/R	VC	VF
L100%	00	00	L50%	1F	7F	L10%	39	4B	R15%	49	4B	R60%	66	32
L90%	06	33	L40%	26	32	L5%	3C	65	R20%	4C	65	R70%	6C	65
L80%	0C	66	L30%	2C	65	CTR	3F	7F	R30%	53	18	R80%	73	18
L70%	13	19	L20%	33	18	R5%	43	18	R40%	59	4B	R90%	79	4B
L60%	19	4C	L15%	36	32	R10%	46	32	R50%	5F	7F	R100%	7E	7E



## Level Parameter Numbers – Inputs to LR/Aux (MB/LB)

	LR	Aux1	Aux2	Aux3	Aux4	Aux5	Aux6	Aux7	Aux8	Aux9	Aux10	Aux11	Aux12
	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB
lp1	40 00	40 44	40 45	40 46	40 47	40 48	40 49	40 4A	40 4B	40 4C	40 4D	40 4E	40 4F
lp2	40 01	40 50	40 51	40 52	40 53	40 54	40 55	40 56	40 57	40 58	40 59	40 5A	40 5B
lp3	40 02	40 5C	40 5D	40 5E	40 5F	40 60	40 61	40 62	40 63	40 64	40 65	40 66	40 67
lp4	40 03	40 68	40 69	40 6A	40 6B	40 6C	40 6D	40 6E	40 6F	40 70	40 71	40 72	40 73
lp5	40 04	40 74	40 75	40 76	40 77	40 78	40 79	40 7A	40 7B	40 7C	40 7D	40 7E	40 7F
lp6	40 05	41 00	41 01	41 02	41 03	41 04	41 05	41 06	41 07	41 08	41 09	41 0A	41 0B
lp7	40 06	41 0C	41 0D	41 0E	41 0F	41 10	41 11	41 12	41 13	41 14	41 15	41 16	41 17
lp8	40 07	41 18	41 19	41 1A	41 1B	41 1C	41 1D	41 1E	41 1F	41 20	41 21	41 22	41 23
lp9	40 08	41 24	41 25	41 26	41 27	41 28	41 29	41 2A	41 2B	41 2C	41 2D	41 2E	41 2F
lp10	40 09	41 30	41 31	41 32	41 33	41 34	41 35	41 36	41 37	41 38	41 39	41 3A	41 3B
lp11	40 0A	41 3C	41 3D	41 3E	41 3F	41 40	41 41	41 42	41 43	41 44	41 45	41 46	41 47
lp12	40 0B	41 48	41 49	41 4A	41 4B	41 4C	41 4D	41 4E	41 4F	41 50	41 51	41 52	41 53
lp13	40 0C	41 54	41 55	41 56	41 57	41 58	41 59	41 5A	41 5B	41 5C	41 5D	41 5E	41 5F
lp14	40 0D	41 60	41 61	41 62	41 63	41 64	41 65	41 66	41 67	41 68	41 69	41 6A	41 6B
lp15	40 0E	41 6C	41 6D	41 6E	41 6F	41 70	41 71	41 72	41 73	41 74	41 75	41 76	41 77
lp16	40 0F	41 78	41 79	41 7A	41 7B	41 7C	41 7D	41 7E	41 7F	42 00	42 01	42 02	42 03
lp17	40 10	42 04	42 05	42 06	42 07	42 08	42 09	42 0A	42 0B	42 0C	42 0D	42 0E	42 0F
lp18	40 11	42 10	42 11	42 12	42 13	42 14	42 15	42 16	42 17	42 18	42 19	42 1A	42 1B
lp19	40 12	42 1C	42 1D	42 1E	42 1F	42 20	42 21	42 22	42 23	42 24	42 25	42 26	42 27
lp20	40 13	42 28	42 29	42 2A	42 2B	42 2C	42 2D	42 2E	42 2F	42 30	42 31	42 32	42 33
lp21	40 14	42 34	42 35	42 36	42 37	42 38	42 39	42 3A	42 3B	42 3C	42 3D	42 3E	42 3F
lp22	40 15	42 40	42 41	42 42	42 43	42 44	42 45	42 46	42 47	42 48	42 49	42 4A	42 4B
lp23	40 16	42 4C	42 4D	42 4E	42 4F	42 50	42 51	42 52	42 53	42 54	42 55	42 56	42 57
lp24	40 17	42 58	42 59	42 5A	42 5B	42 5C	42 5D	42 5E	42 5F	42 60	42 61	42 62	42 63
lp25	40 18	42 64	42 65	42 66	42 67	42 68	42 69	42 6A	42 6B	42 6C	42 6D	42 6E	42 6F
lp26	40 19	42 70	42 71	42 72	42 73	42 74	42 75	42 76	42 77	42 78	42 79	42 7A	42 7B
lp27	40 1A	42 7C	42 7D	42 7E	42 7F	43 00	43 01	43 02	43 03	43 04	43 05	43 06	43 07
lp28	40 1B	43 08	43 09	43 0A	43 0B	43 0C	43 0D	43 0E	43 0F	43 10	43 11	43 12	43 13
lp29	40 1C	43 14	43 15	43 16	43 17	43 18	43 19	43 1A	43 1B	43 1C	43 1D	43 1E	43 1F
lp30	40 1D	43 20	43 21	43 22	43 23	43 24	43 25	43 26	43 27	43 28	43 29	43 2A	43 2B
lp31	40 1E	43 2C	43 2D	43 2E	43 2F	43 30	43 31	43 32	43 33	43 34	43 35	43 36	43 37
lp32	40 1F	43 38	43 39	43 3A	43 3B	43 3C	43 3D	43 3E	43 3F	43 40	43 41	43 42	43 43
ST1	40 20	43 44	43 45	43 46	43 47	43 48	43 49	43 4A	43 4B	43 4C	43 4D	43 4E	43 4F
ST2	40 22	43 5C	43 5D	43 5E	43 5F	43 60	43 61	43 62	43 63	43 64	43 65	43 66	43 67
USB	40 24	43 74	43 75	43 76	43 77	43 78	43 79	43 7A	43 7B	43 7C	43 7D	43 7E	43 7F

## Level Parameter Numbers – Groups to LR/Aux (MB/LB)

	LR		Aux1	Aux2	Aux3	Aux4	Aux5	Aux6	Aux7	Aux8	Aux9	Aux10	Aux11	Aux12												
	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB												
Grp1	40	30	-	-	45 05	45 06	45 07	45 08	45 09	45 0A	45 0B	45 0C	45 0D	45 0E	45 0F											
Grp2	40	31	45	10	-	-	45 12	45 13	45 14	45 15	45 16	45 17	45 18	45 19	45 1A	45 1B										
Grp3	40	32	45	1C	45	1D	-	-	45 1F	45 20	45 21	45 22	45 23	45 24	45 25	45 26	45 27									
Grp4	40	33	45	28	45	29	45	2A	-	-	45 2C	45 2D	45 2E	45 2F	45 30	45 31	45 32	45 33								
Grp5	40	34	45	34	45	35	45	36	45	37	-	-	45 39	45 3A	45 3B	45 3C	45 3D	45 3E	45 3F							
Grp6	40	35	45	40	45	41	45	42	45	43	45	44	45	44	-	-	45 46	45 47	45 48	45 49	45 4A	45 4B				
Grp7	40	36	45	4C	45	4D	45	4E	45	4F	45	50	45	51	-	-	45 53	45 54	45 55	45 56	45 57	45 58				
Grp8	40	37	45	58	45	59	45	5A	45	5B	45	5C	45	5D	45	5E	-	-	45 60	45 61	45 62	45 63				
Grp9	40	38	45	64	45	65	45	66	45	67	45	68	45	69	45	6A	45	6B	-	-	45 6D	45 6E	45 6F			
Grp10	40	39	45	70	45	71	45	72	45	73	45	74	45	75	45	76	45	77	45	78	-	-	45 7A	45 7B		
Grp11	40	3A	45	7C	45	7D	45	7E	45	7F	46	00	46	01	46	02	46	03	46	04	46	05	-	-	46 07	
Grp12	40	3B	46	08	46	09	46	0A	46	0B	46	0C	46	0D	46	0E	46	0F	46	10	46	11	46	12	-	-

## Level Parameter Numbers – FX Returns to LR/Aux (MB/LB)

	LR		Aux1	Aux2	Aux3	Aux4	Aux5	Aux6	Aux7	Aux8	Aux9	Aux10	Aux11	Aux12												
	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB												
FX1Rtn	40	3C	46	14	46	15	46	16	46	17	46	18	46	19	46	1A	46	1B	46	1C	46	1D	46	1E	46	1F
FX2Rtn	40	3D	46	20	46	21	46	22	46	23	46	24	46	25	46	26	46	27	46	28	46	29	46	2A	46	2B
FX3Rtn	40	3E	46	2C	46	2D	46	2E	46	2F	46	30	46	31	46	32	46	33	46	34	46	35	46	36	46	37
FX4Rtn	40	3F	46	38	46	39	46	3A	46	3B	46	3C	46	3D	46	3E	46	3F	46	40	46	41	46	42	46	43
FX5Rtn	40	40	46	44	46	45	46	46	46	47	46	48	46	49	46	4A	46	4B	46	4C	46	4D	46	4E	46	4F
FX6Rtn	40	41	46	50	46	51	46	52	46	53	46	54	46	55	46	56	46	57	46	58	46	59	46	5A	46	5B

## Level Parameter Numbers – Inputs/Groups to FX Sends (MB/LB)

	FX1Snd		FX2Snd		FX3Snd		FX4Snd			FX1Snd		FX2Snd		FX3Snd		FX4Snd	
	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB		MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB
lp1	4C	14	4C	15	4C	16	4C	17	lp25	4C	74	4C	75	4C	76	4C	77
lp2	4C	18	4C	19	4C	1A	4C	1B	lp26	4C	78	4C	79	4C	7A	4C	7B
lp3	4C	1C	4C	1D	4C	1E	4C	1F	lp27	4C	7C	4C	7D	4C	7E	4C	7F
lp4	4C	20	4C	21	4C	22	4C	23	lp28	4D	00	4D	01	4D	02	4D	03
lp5	4C	24	4C	25	4C	26	4C	27	lp29	4D	04	4D	05	4D	06	4D	07
lp6	4C	28	4C	29	4C	2A	4C	2B	lp30	4D	08	4D	09	4D	0A	4D	0B
lp7	4C	2C	4C	2D	4C	2E	4C	2F	lp31	4D	0C	4D	0D	4D	0E	4D	0F
lp8	4C	30	4C	31	4C	32	4C	33	lp32	4D	10	4D	11	4D	12	4D	13
lp9	4C	34	4C	35	4C	36	4C	37	ST1	4D	14	4D	15	4D	16	4D	17
lp10	4C	38	4C	39	4C	3A	4C	3B	ST2	4D	1C	4D	1D	4D	1E	4D	1F
lp11	4C	3C	4C	3D	4C	3E	4C	3F	USB	4D	24	4D	25	4D	26	4D	27
lp12	4C	40	4C	41	4C	42	4C	43									
lp13	4C	44	4C	45	4C	46	4C	47	Grp1	4D	54	4D	55	4D	56	4D	57
lp14	4C	48	4C	49	4C	4A	4C	4B	Grp2	4D	58	4D	59	4D	5A	4D	5B
lp15	4C	4C	4C	4D	4C	4E	4C	4F	Grp3	4D	5C	4D	5D	4D	5E	4D	5F
lp16	4C	50	4C	51	4C	52	4C	53	Grp4	4D	60	4D	61	4D	62	4D	63
lp17	4C	54	4C	55	4C	56	4C	57	Grp5	4D	64	4D	65	4D	66	4D	67
lp18	4C	58	4C	59	4C	5A	4C	5B	Grp6	4D	68	4D	69	4D	6A	4D	6B
lp19	4C	5C	4C	5D	4C	5E	4C	5F	Grp7	4D	6C	4D	6D	4D	6E	4D	6F
lp20	4C	60	4C	61	4C	62	4C	63	Grp8	4D	70	4D	71	4D	72	4D	73
lp21	4C	64	4C	65	4C	66	4C	67	Grp9	4D	74	4D	75	4D	76	4D	77
lp22	4C	68	4C	69	4C	6A	4C	6B	Grp10	4D	78	4D	79	4D	7A	4D	7B
lp23	4C	6C	4C	6D	4C	6E	4C	6F	Grp11	4D	7C	4D	7D	4D	7E	4D	7F
lp24	4C	70	4C	71	4C	72	4C	73	Grp12	4E	00	4E	01	4E	02	4E	03

## Level Parameter Numbers – FX Returns to FX Sends (MB/LB)

	FX1Snd	FX2Snd	FX3Snd	FX4Snd
	MSB LSB	MSB LSB	MSB LSB	MSB LSB
FX1Rtn	4E 04	4E 05	4E 06	4E 07
FX2Rtn	4E 08	4E 09	4E 0A	4E 0B
FX3Rtn	4E 0C	4E 0D	4E 0E	4E 0F
FX4Rtn	4E 10	4E 11	4E 12	4E 13
FX5Rtn	4E 14	4E 15	4E 16	4E 17
FX6Rtn	4E 18	4E 19	4E 1A	4E 1B

## Level Parameter Numbers – Mix Sends (MB/LB)

	Mtx1	Mtx2	Mtx3	Mtx4		Output		Output		Control
	MSB LSB	MSB LSB	MSB LSB	MSB LSB		MSB LSB		MSB LSB		MSB LSB
LR	4E 24	4E 25	4E 26	- -	LR	4F 00	FX1Snd	4F 0D	DCA1	4F 20
MIX1	4E 27	4E 28	4E 29	- -	MIX1	4F 01	FX2Snd	4F 0E	DCA2	4F 21
MIX2	4E 2A	4E 2B	4E 2C	- -	MIX2	4F 02	FX3Snd	4F 0F	DCA3	4F 22
MIX3	4E 2D	4E 2E	4E 2F	- -	MIX3	4F 03	FX4Snd	4F 10	DCA4	4F 23
MIX4	4E 30	4E 31	4E 32	- -	MIX4	4F 04	Mtx1	4F 11	DCA5	4F 24
MIX5	4E 33	4E 34	4E 35	- -	MIX5	4F 05	Mtx2	4F 12	DCA6	4F 25
MIX6	4E 36	4E 37	4E 38	- -	MIX6	4F 06	Mtx3	4F 13	DCA7	4F 26
MIX7	4E 39	4E 3A	4E 3B	- -	MIX7	4F 07	Mtx4	- -	DCA8	4F 27
MIX8	4E 3C	4E 3D	4E 3E	- -	MIX8	4F 08				
MIX9	4E 3F	4E 40	4E 41	- -	MIX9	4F 09				
MIX10	4E 42	4E 43	4E 44	- -	MIX10	4F 0A				
MIX11	4E 45	4E 46	4E 47	- -	MIX11	4F 0B				
MIX12	4E 48	4E 49	4E 4A	- -	MIX12	4F 0C				

❗ For protocol cross-compatibility with SQ, **Mtx4** cannot currently be controlled via MIDI.

## Panning/Balance Parameter Numbers – Inputs to LR (+Groups) and Aux (MB/LB)

	LR	Aux1&2	-	Aux3&4	-	Aux5&6	-	Aux7	Aux8	Aux9	Aux10	Aux11	Aux12
	MSB LSB	MSB LSB	- -	MSB LSB	- -	MSB LSB	- -	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB
lp1	50 00	50 44	- -	50 46	- -	50 48	- -	50 4A	50 4B	50 4C	50 4D	50 4E	50 4F
lp2	50 01	50 50	- -	50 52	- -	50 54	- -	50 56	50 57	50 58	50 59	50 5A	50 5B
lp3	50 02	50 5C	- -	50 5E	- -	50 60	- -	50 62	50 63	50 64	50 65	50 66	50 67
lp4	50 03	50 68	- -	50 6A	- -	50 6C	- -	50 6E	50 6F	50 70	50 71	50 72	50 73
lp5	50 04	50 74	- -	50 76	- -	50 78	- -	50 7A	50 7B	50 7C	50 7D	50 7E	50 7F
lp6	50 05	51 00	- -	51 02	- -	51 04	- -	51 06	51 07	51 08	51 09	51 0A	51 0B
lp7	50 06	51 0C	- -	51 0E	- -	51 10	- -	51 12	51 13	51 14	51 15	51 16	51 17
lp8	50 07	51 18	- -	51 1A	- -	51 1C	- -	51 1E	51 1F	51 20	51 21	51 22	51 23
lp9	50 08	51 24	- -	51 26	- -	51 28	- -	51 2A	51 2B	51 2C	51 2D	51 2E	51 2F
lp10	50 09	51 30	- -	51 32	- -	51 34	- -	51 36	51 37	51 38	51 39	51 3A	51 3B
lp11	50 0A	51 3C	- -	51 3E	- -	51 40	- -	51 42	51 43	51 44	51 45	51 46	51 47
lp12	50 0B	51 48	- -	51 4A	- -	51 4C	- -	51 4E	51 4F	51 50	51 51	51 52	51 53
lp13	50 0C	51 54	- -	51 56	- -	51 58	- -	51 5A	51 5B	51 5C	51 5D	51 5E	51 5F
lp14	50 0D	51 60	- -	51 62	- -	51 64	- -	51 66	51 67	51 68	51 69	51 6A	51 6B
lp15	50 0E	51 6C	- -	51 6E	- -	51 70	- -	51 72	51 73	51 74	51 75	51 76	51 77
lp16	50 0F	51 78	- -	51 7A	- -	51 7C	- -	51 7E	51 7F	52 00	52 01	52 02	52 03
lp17	50 10	52 04	- -	52 06	- -	52 08	- -	52 0A	52 0B	52 0C	52 0D	52 0E	52 0F
lp18	50 11	52 10	- -	52 12	- -	52 14	- -	52 16	52 17	52 18	52 19	52 1A	52 1B
lp19	50 12	52 1C	- -	52 1E	- -	52 20	- -	52 22	52 23	52 24	52 25	52 26	52 27
lp20	50 13	52 28	- -	52 2A	- -	52 2C	- -	52 2E	52 2F	52 30	52 31	52 32	52 33
lp21	50 14	52 34	- -	52 36	- -	52 38	- -	52 3A	52 3B	52 3C	52 3D	52 3E	52 3F
lp22	50 15	52 40	- -	52 42	- -	52 44	- -	52 46	52 47	52 48	52 49	52 4A	52 4B
lp23	50 16	52 4C	- -	52 4E	- -	52 50	- -	52 52	52 53	52 54	52 55	52 56	52 57
lp24	50 17	52 58	- -	52 5A	- -	52 5C	- -	52 5E	52 5F	52 60	52 61	52 62	52 63
lp25	50 18	52 64	- -	52 66	- -	52 68	- -	52 6A	52 6B	52 6C	52 6D	52 6E	52 6F
lp26	50 19	52 70	- -	52 72	- -	52 74	- -	52 76	52 77	52 78	52 79	52 7A	52 7B
lp27	50 1A	52 7C	- -	52 7E	- -	53 00	- -	53 02	53 03	53 04	53 05	53 06	53 07
lp28	50 1B	53 08	- -	53 0A	- -	53 0C	- -	53 0E	53 0F	53 10	53 11	53 12	53 13
lp29	50 1C	53 14	- -	53 16	- -	53 18	- -	53 1A	53 1B	53 1C	53 1D	53 1E	53 1F
lp30	50 1D	53 20	- -	53 22	- -	53 24	- -	53 26	53 27	53 28	53 29	53 2A	53 2B
lp31	50 1E	53 2C	- -	53 2E	- -	53 30	- -	53 32	53 33	53 34	53 35	53 36	53 37
lp32	50 1F	53 38	- -	53 3A	- -	53 3C	- -	53 3E	53 3F	53 40	53 41	53 42	53 43
ST1	50 20	53 44	- -	53 46	- -	53 48	- -	53 4A	53 4B	53 4C	53 4D	53 4E	53 4F
ST2	50 22	53 5C	- -	53 5E	- -	53 60	- -	53 62	53 63	53 64	53 65	53 66	53 67
USB	50 24	53 74	- -	53 76	- -	53 78	- -	53 7A	53 7B	53 7C	53 7D	53 7E	53 7F

## Panning/Balance Parameter Numbers – Groups to LR/Aux (MB/LB)

	LR	Aux1&2	-	Aux3&4	-	Aux5&6	-	Aux7	Aux8	Aux9	Aux10	Aux11	Aux12
	MSB LSB	MSB LSB	- -	MSB LSB	- -	MSB LSB	- -	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB
Grp1	50 30	- -	- -	55 06	- -	55 08	- -	55 0A	55 0B	55 0C	55 0D	55 0E	55 0F
Grp2	50 31	55 10	- -	55 12	- -	55 14	- -	55 16	55 17	55 18	55 19	55 1A	55 1B
Grp3	50 32	55 1C	- -	- -	- -	55 20	- -	55 22	55 23	55 24	55 25	55 26	55 27
Grp4	50 33	55 28	- -	55 2A	- -	55 2C	- -	55 2E	55 2F	55 30	55 31	55 32	55 33
Grp5	50 34	55 34	- -	55 36	- -	- -	- -	55 3A	55 3B	55 3C	55 3D	55 3E	55 3F
Grp6	50 35	55 40	- -	55 42	- -	55 44	- -	55 46	55 47	55 48	55 49	55 4A	55 4B
Grp7	50 36	55 4C	- -	55 4E	- -	55 50	- -	- -	55 53	55 54	55 55	55 56	55 57
Grp8	50 37	55 58	- -	55 5A	- -	55 5C	- -	55 5E	- -	55 60	55 61	55 62	55 63
Grp9	50 38	55 64	- -	55 66	- -	55 68	- -	55 6A	55 6B	- -	55 6D	55 6E	55 6F
Grp10	50 39	55 70	- -	55 72	- -	55 74	- -	55 76	55 77	55 78	- -	55 7A	55 7B
Grp11	50 3A	55 7C	- -	55 7E	- -	56 00	- -	56 02	56 03	56 04	56 05	- -	56 07
Grp12	50 3B	56 08	- -	56 0A	- -	56 0C	- -	56 0E	56 0F	56 10	56 11	56 12	- -

## Balance Parameter Numbers – FX Returns to LR/Aux (MB/LB)

	LR	Aux1&2	-	Aux3&4	-	Aux5&6	-	Aux7	Aux8	Aux9	Aux10	Aux11	Aux12
	MSB LSB	MSB LSB	- -	MSB LSB	- -	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB
FX1Rtn	50 3C	56 14	- -	56 16	- -	56 18	- -	56 1A	56 1B	56 1C	56 1D	56 1E	56 1F
FX2Rtn	50 3D	56 20	- -	56 22	- -	56 24	- -	56 26	56 27	56 28	56 29	56 2A	56 2B
FX3Rtn	50 3E	56 2C	- -	56 2E	- -	56 30	- -	56 32	56 33	56 34	56 35	56 36	56 37
FX4Rtn	50 3F	56 38	- -	56 3A	- -	56 3C	- -	56 3E	56 3F	56 40	56 41	56 42	56 43
FX5Rtn	50 40	56 44	- -	56 46	- -	56 48	- -	56 4A	56 4B	56 4C	56 4D	56 4E	56 4F
FX6Rtn	50 41	56 50	- -	56 52	- -	56 54	- -	56 56	56 57	56 58	56 59	56 5A	56 5B

## Panning/Balance Parameter Numbers – Mixes to Matrices (MB/LB)

	Mtx1&2	-	Mtx3&4	-
	MSB LSB	MSB LSB	MSB LSB	MSB LSB
LR	5E 24	- -	5E 26	- -
MIX1	5E 27	- -	5E 29	- -
MIX2	5E 2A	- -	5E 2C	- -
MIX3	5E 2D	- -	5E 2F	- -
MIX4	5E 30	- -	5E 32	- -
MIX5	5E 33	- -	5E 35	- -
MIX6	5E 36	- -	5E 38	- -
MIX7	5E 39	- -	5E 3B	- -
MIX8	5E 3C	- -	5E 3E	- -
MIX9	5E 3F	- -	5E 41	- -
MIX10	5E 42	- -	5E 44	- -
MIX11	5E 45	- -	5E 47	- -
MIX12	5E 48	- -	5E 4A	- -

❗ For protocol cross-compatibility with SQ, **Mtx4** cannot currently be controlled via MIDI.

## Assignment Parameter Numbers – Inputs to LR/Aux (MB/LB)

	LR	Aux1	Aux2	Aux3	Aux4	Aux5	Aux6	Aux7	Aux8	Aux9	Aux10	Aux11	Aux12
	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB
lp1	60 00	60 44	60 45	60 46	60 47	60 48	60 49	60 4A	60 4B	60 4C	60 4D	60 4E	60 4F
lp2	60 01	60 50	60 51	60 52	60 53	60 54	60 55	60 56	60 57	60 58	60 59	60 5A	60 5B
lp3	60 02	60 5C	60 5D	60 5E	60 5F	60 60	60 61	60 62	60 63	60 64	60 65	60 66	60 67
lp4	60 03	60 68	60 69	60 6A	60 6B	60 6C	60 6D	60 6E	60 6F	60 70	60 71	60 72	60 73
lp5	60 04	60 74	60 75	60 76	60 77	60 78	60 79	60 7A	60 7B	60 7C	60 7D	60 7E	60 7F
lp6	60 05	61 00	61 01	61 02	61 03	61 04	61 05	61 06	61 07	61 08	61 09	61 0A	61 0B
lp7	60 06	61 0C	61 0D	61 0E	61 0F	61 10	61 11	61 12	61 13	61 14	61 15	61 16	61 17
lp8	60 07	61 18	61 19	61 1A	61 1B	61 1C	61 1D	61 1E	61 1F	61 20	61 21	61 22	61 23
lp9	60 08	61 24	61 25	61 26	61 27	61 28	61 29	61 2A	61 2B	61 2C	61 2D	61 2E	61 2F
lp10	60 09	61 30	61 31	61 32	61 33	61 34	61 35	61 36	61 37	61 38	61 39	61 3A	61 3B
lp11	60 0A	61 3C	61 3D	61 3E	61 3F	61 40	61 41	61 42	61 43	61 44	61 45	61 46	61 47
lp12	60 0B	61 48	61 49	61 4A	61 4B	61 4C	61 4D	61 4E	61 4F	61 50	61 51	61 52	61 53
lp13	60 0C	61 54	61 55	61 56	61 57	61 58	61 59	61 5A	61 5B	61 5C	61 5D	61 5E	61 5F
lp14	60 0D	61 60	61 61	61 62	61 63	61 64	61 65	61 66	61 67	61 68	61 69	61 6A	61 6B
lp15	60 0E	61 6C	61 6D	61 6E	61 6F	61 70	61 71	61 72	61 73	61 74	61 75	61 76	61 77
lp16	60 0F	61 78	61 79	61 7A	61 7B	61 7C	61 7D	61 7E	61 7F	62 00	62 01	62 02	62 03
lp17	60 10	62 04	62 05	62 06	62 07	62 08	62 09	62 0A	62 0B	62 0C	62 0D	62 0E	62 0F
lp18	60 11	62 10	62 11	62 12	62 13	62 14	62 15	62 16	62 17	62 18	62 19	62 1A	62 1B
lp19	60 12	62 1C	62 1D	62 1E	62 1F	62 20	62 21	62 22	62 23	62 24	62 25	62 26	62 27
lp20	60 13	62 28	62 29	62 2A	62 2B	62 2C	62 2D	62 2E	62 2F	62 30	62 31	62 32	62 33
lp21	60 14	62 34	62 35	62 36	62 37	62 38	62 39	62 3A	62 3B	62 3C	62 3D	62 3E	62 3F
lp22	60 15	62 40	62 41	62 42	62 43	62 44	62 45	62 46	62 47	62 48	62 49	62 4A	62 4B
lp23	60 16	62 4C	62 4D	62 4E	62 4F	62 50	62 51	62 52	62 53	62 54	62 55	62 56	62 57
lp24	60 17	62 58	62 59	62 5A	62 5B	62 5C	62 5D	62 5E	62 5F	62 60	62 61	62 62	62 63
lp25	60 18	62 64	62 65	62 66	62 67	62 68	62 69	62 6A	62 6B	62 6C	62 6D	62 6E	62 6F
lp26	60 19	62 70	62 71	62 72	62 73	62 74	62 75	62 76	62 77	62 78	62 79	62 7A	62 7B
lp27	60 1A	62 7C	62 7D	62 7E	62 7F	63 00	63 01	63 02	63 03	63 04	63 05	63 06	63 07
lp28	60 1B	63 08	63 09	63 0A	63 0B	63 0C	63 0D	63 0E	63 0F	63 10	63 11	63 12	63 13
lp29	60 1C	63 14	63 15	63 16	63 17	63 18	63 19	63 1A	63 1B	63 1C	63 1D	63 1E	63 1F
lp30	60 1D	63 20	63 21	63 22	63 23	63 24	63 25	63 26	63 27	63 28	63 29	63 2A	63 2B
lp31	60 1E	63 2C	63 2D	63 2E	63 2F	63 30	63 31	63 32	63 33	63 34	63 35	63 36	63 37
lp32	60 1F	63 38	63 39	63 3A	63 3B	63 3C	63 3D	63 3E	63 3F	63 40	63 41	63 42	63 43
ST1	60 20	63 44	63 45	63 46	63 47	63 48	63 49	63 4A	63 4B	63 4C	63 4D	63 4E	63 4F
ST2	60 22	63 5C	63 5D	63 5E	63 5F	63 60	63 61	63 62	63 63	63 64	63 65	63 66	63 67
USB	60 24	63 74	63 75	63 76	63 77	63 78	63 79	63 7A	63 7B	63 7C	63 7D	63 7E	63 7F

## Assignment Parameter Numbers – Groups to LR/Aux (MB/LB)

	LR	Aux1	Aux2	Aux3	Aux4	Aux5	Aux6	Aux7	Aux8	Aux9	Aux10	Aux11	Aux12
	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB
Grp1	60 30	- -	65 05	65 06	65 07	65 08	65 09	65 0A	65 0B	65 0C	65 0D	65 0E	65 0F
Grp2	60 31	65 10	- -	65 12	65 13	65 14	65 15	65 16	65 17	65 18	65 19	65 1A	65 1B
Grp3	60 32	65 1C	65 1D	- -	65 1F	65 20	65 21	65 22	65 23	65 24	65 25	65 26	65 27
Grp4	60 33	65 28	65 29	65 2A	- -	65 2C	65 2D	65 2E	65 2F	65 30	65 31	65 32	65 33
Grp5	60 34	65 34	65 35	65 36	65 37	- -	65 39	65 3A	65 3B	65 3C	65 3D	65 3E	65 3F
Grp6	60 35	65 40	65 41	65 42	65 43	65 44	- -	65 46	65 47	65 48	65 49	65 4A	65 4B
Grp7	60 36	65 4C	65 4D	65 4E	65 4F	65 50	65 51	- -	65 53	65 54	65 55	65 56	65 57
Grp8	60 37	65 58	65 59	65 5A	65 5B	65 5C	65 5D	65 5E	- -	65 60	65 61	65 62	65 63
Grp9	60 38	65 64	65 65	65 66	65 67	65 68	65 69	65 6A	65 6B	- -	65 6D	65 6E	65 6F
Grp10	60 39	65 70	65 71	65 72	65 73	65 74	65 75	65 76	65 77	65 78	- -	65 7A	65 7B
Grp11	60 3A	65 7C	65 7D	65 7E	65 7F	66 00	66 01	66 02	66 03	66 04	66 05	- -	66 07
Grp12	60 3B	66 08	66 09	66 0A	66 0B	66 0C	66 0D	66 0E	66 0F	66 10	66 11	66 12	- -

## Assignment Parameter Numbers – FX Returns to Groups (MB/LB)

	Grp1	Grp2	Grp3	Grp4	Grp5	Grp6	Grp7	Grp8	Grp9	Grp10	Grp11	Grp12
	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB
FX1Rtn	6B 34	6B 35	6B 36	6B 37	6B 38	6B 39	6B 3A	6B 3B	6B 3C	6B 3D	6B 3E	6B 3F
FX2Rtn	6B 40	6B 41	6B 42	6B 43	6B 44	6B 45	6B 46	6B 47	6B 48	6B 49	6B 4A	6B 4B
FX3Rtn	6B 4C	6B 4D	6B 4E	6B 4F	6B 50	6B 51	6B 52	6B 53	6B 54	6B 55	6B 56	6B 57
FX4Rtn	6B 58	6B 59	6B 5A	6B 5B	6B 5C	6B 5D	6B 5E	6B 5F	6B 60	6B 61	6B 62	6B 63
FX5Rtn	6B 64	6B 65	6B 66	6B 67	6B 68	6B 69	6B 6A	6B 6B	6B 6C	6B 6D	6B 6E	6B 6F
FX6Rtn	6B 70	6B 71	6B 72	6B 73	6B 74	6B 75	6B 76	6B 77	6B 78	6B 79	6B 7A	6B 7B

## Assignment Parameter Numbers – FX Returns to LR/Aux (MB/LB)

	LR	Aux1	Aux2	Aux3	Aux4	Aux5	Aux6	Aux7	Aux8	Aux9	Aux10	Aux11	Aux12
	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB
FX1Rtn	60 3C	66 14	66 15	66 16	66 17	66 18	66 19	66 1A	66 1B	66 1C	66 1D	66 1E	66 1F
FX2Rtn	60 3D	66 20	66 21	66 22	66 23	66 24	66 25	66 26	66 27	66 28	66 29	66 2A	66 2B
FX3Rtn	60 3E	66 2C	66 2D	66 2E	66 2F	66 30	66 31	66 32	66 33	66 34	66 35	66 36	66 37
FX4Rtn	60 3F	66 38	66 39	66 3A	66 3B	66 3C	66 3D	66 3E	66 3F	66 40	66 41	66 42	66 43
FX5Rtn	60 40	66 44	66 45	66 46	66 47	66 48	66 49	66 4A	66 4B	66 4C	66 4D	66 4E	66 4F
FX6Rtn	60 41	66 50	66 51	66 52	66 53	66 54	66 55	66 56	66 57	66 58	66 59	66 5A	66 5B

## Assignment Parameter Numbers – Inputs/Groups to FX Sends (MB/LB)

	FX1Snd		FX2Snd		FX3Snd		FX4Snd			FX1Snd		FX2Snd		FX3Snd		FX4Snd	
	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB		MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB
lp1	6C	14	6C	15	6C	16	6C	17	lp25	6C	74	6C	75	6C	76	6C	77
lp2	6C	18	6C	19	6C	1A	6C	1B	lp26	6C	78	6C	79	6C	7A	6C	7B
lp3	6C	1C	6C	1D	6C	1E	6C	1F	lp27	6C	7C	6C	7D	6C	7E	6C	7F
lp4	6C	20	6C	21	6C	22	6C	23	lp28	6D	00	6D	01	6D	02	6D	03
lp5	6C	24	6C	25	6C	26	6C	27	lp29	6D	04	6D	05	6D	06	6D	07
lp6	6C	28	6C	29	6C	2A	6C	2B	lp30	6D	08	6D	09	6D	0A	6D	0B
lp7	6C	2C	6C	2D	6C	2E	6C	2F	lp31	6D	0C	6D	0D	6D	0E	6D	0F
lp8	6C	30	6C	31	6C	32	6C	33	lp32	6D	10	6D	11	6D	12	6D	13
lp9	6C	34	6C	35	6C	36	6C	37	ST1	6D	14	6D	15	6D	16	6D	17
lp10	6C	38	6C	39	6C	3A	6C	3B	ST2	6D	1C	6D	1D	6D	1E	6D	1F
lp11	6C	3C	6C	3D	6C	3E	6C	3F	USB	6D	24	6D	25	6D	26	6D	27
lp12	6C	40	6C	41	6C	42	6C	43									
lp13	6C	44	6C	45	6C	46	6C	47	Grp1	6D	54	6D	55	6D	56	6D	57
lp14	6C	48	6C	49	6C	4A	6C	4B	Grp2	6D	58	6D	59	6D	5A	6D	5B
lp15	6C	4C	6C	4D	6C	4E	6C	4F	Grp3	6D	5C	6D	5D	6D	5E	6D	5F
lp16	6C	50	6C	51	6C	52	6C	53	Grp4	6D	60	6D	61	6D	62	6D	63
lp17	6C	54	6C	55	6C	56	6C	57	Grp5	6D	64	6D	65	6D	66	6D	67
lp18	6C	58	6C	59	6C	5A	6C	5B	Grp6	6D	68	6D	69	6D	6A	6D	6B
lp19	6C	5C	6C	5D	6C	5E	6C	5F	Grp7	6D	6C	6D	6D	6D	6E	6D	6F
lp20	6C	60	6C	61	6C	62	6C	63	Grp8	6D	70	6D	71	6D	72	6D	73
lp21	6C	64	6C	65	6C	66	6C	67	Grp9	6D	74	6D	75	6D	76	6D	77
lp22	6C	68	6C	69	6C	6A	6C	6B	Grp10	6D	78	6D	79	6D	7A	6D	7B
lp23	6C	6C	6C	6D	6C	6E	6C	6F	Grp11	6D	7C	6D	7D	6D	7E	6D	7F
lp24	6C	70	6C	71	6C	72	6C	73	Grp12	6E	00	6E	01	6E	02	6E	03

## Assignment Parameter Numbers – FX Returns to FX Sends (MB/LB)

	FX1Snd		FX2Snd		FX3Snd		FX4Snd	
	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB
FX1Rtn	6E	04	6E	05	6E	06	6E	07
FX2Rtn	6E	08	6E	09	6E	0A	6E	0B
FX3Rtn	6E	0C	6E	0D	6E	0E	6E	0F
FX4Rtn	6E	10	6E	11	6E	12	6E	13
FX5Rtn	6E	14	6E	15	6E	16	6E	17
FX6Rtn	6E	18	6E	19	6E	1A	6E	1B

## Assignment Parameter Numbers – Mixes to Matrices (MB/LB)

	Mtx1		Mtx2		Mtx3		Mtx4	
	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB
<b>LR</b>	6E	24	6E	25	6E	26	-	-
<b>MIX1</b>	6E	27	6E	28	6E	29	-	-
<b>MIX2</b>	6E	2A	6E	2B	6E	2C	-	-
<b>MIX3</b>	6E	2D	6E	2E	6E	2F	-	-
<b>MIX4</b>	6E	30	6E	31	6E	32	-	-
<b>MIX5</b>	6E	33	6E	34	6E	35	-	-
<b>MIX6</b>	6E	36	6E	37	6E	38	-	-
<b>MIX7</b>	6E	39	6E	3A	6E	3B	-	-
<b>MIX8</b>	6E	3C	6E	3D	6E	3E	-	-
<b>MIX9</b>	6E	3F	6E	40	6E	41	-	-
<b>MIX10</b>	6E	42	6E	43	6E	44	-	-
<b>MIX11</b>	6E	45	6E	46	6E	47	-	-
<b>MIX12</b>	6E	48	6E	49	6E	4A	-	-

**i** For protocol cross-compatibility with SQ, **Mtx4** cannot currently be controlled via MIDI.

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