ALLEN&HEATH

Qu

MIDI Protocol

Issue 1

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



Contents

1. Introduction and setup 3

1.1 Connection 3

1.2 MIDI Setup 4

1.3 Types of message 5

1.4 Allen & Heath MIDI Control and DAW Control 6

2. MIDI Faders and Soft Controls 7

2.1 MIDI faders 7

2.2 Soft Keys and Footswitch 8

3. Control to and from the Mixer 9

3.1 Scene change 9

3.2 MIDI Show Control 9

3.3 Soft Keys 10

3.4 Mutes 11

3.5 Levels 12

3.6 Panning/Balance 15

3.7 Mix Assignments 17

3.8 Getting values 18

4. Reference Tables 19

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).

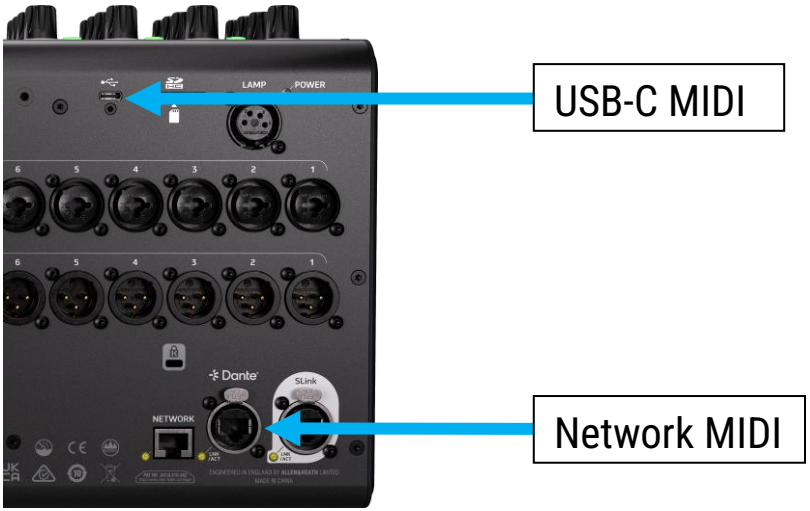
This MIDI can be broken down into two sets of bi-directional messages. Those that are used with Qu mixing parameters (i.e. level control of Qu audio channels), and those used to control external software or equipment (i.e. to control a DAW).

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.

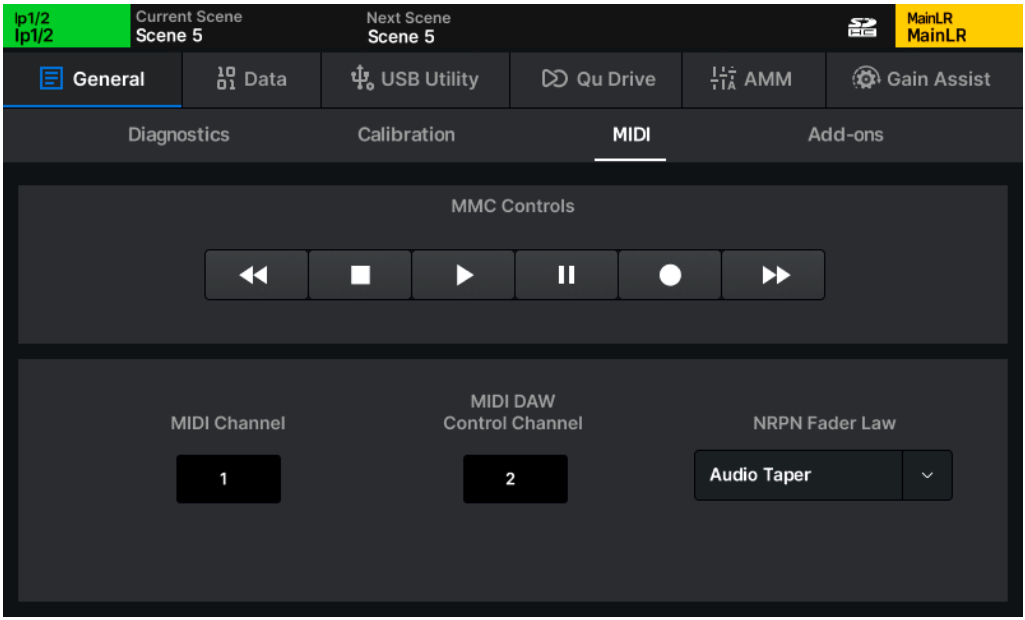
The Allen & Heath MIDI Control app can be used to manage the network MIDI connection. All other clients used for network communication should be configured to send messages to the Qu's IP address and use port `51325`.



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 (**M**IDI **M**achine **C**ontrol) 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 – **M**IDI **M**achine **C**ontrol 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 (**C**ontinuous **C**ontroller) – 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 (**N**on-**R**egistered **P**arameter **N**umber) – 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.

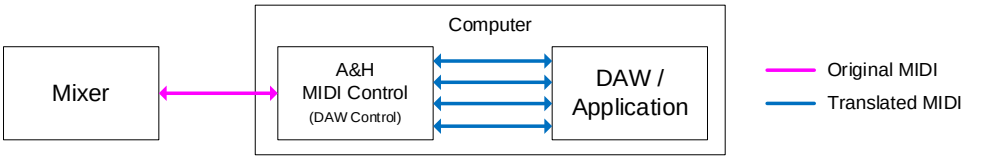
NRPNs can be used to set the absolute value of a parameter or to increment/decrement a parameter value.

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

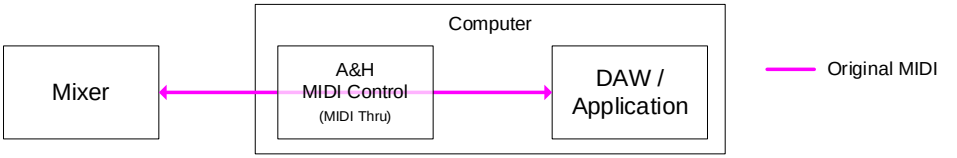
1.4 Allen & Heath MIDI Control and DAW Control

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.

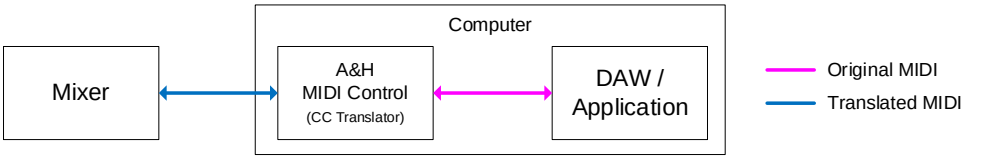
This enables MIDI channel strips and Soft Key options on the Qu to control DAW software on Mac OS or Windows by emulating popular HUI or Mackie Control protocols.



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) 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:

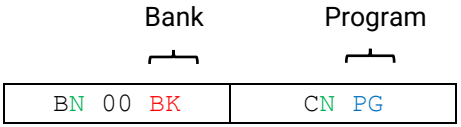
Type	Sub Type	Value
MMC	-	Rewind, Play, Pause, Stop, Fastforward, Record
DAW Control	-	Bank Up, Bank Down
MIDI note On/Off	MIDI Channel 1 to 16	C-1 (0) to G9 (127)
Program Change	MIDI Channel 1 to 16	0 to 127

ⓘ 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.

ⓘ 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
1	C3	30
2	C#3	31
3	D3	32
4	D#3	33

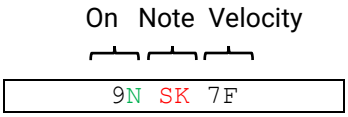
SoftKey	Note	HEX
5	E3	34
6	F3	35
7	F#3	36
8	G3	37

SoftKey	Note	HEX
9	G#3	38
10	A3	39
11	A#3	3A
12	B3	3B

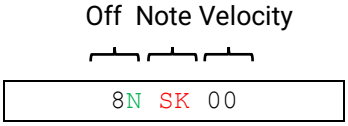
SoftKey	Note	HEX
13	C4	3C
14	C#4	3D
15	D4	3E
16	D#4	3F

ⓘ 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.

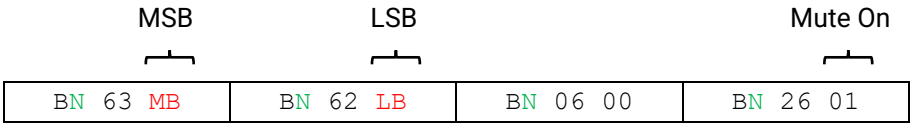
ⓘ MSB/LSB parameter numbers are shown in the reference tables section.

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

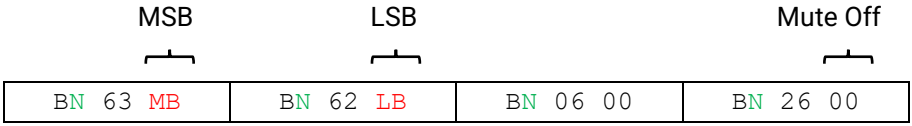
Stereo Channels

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



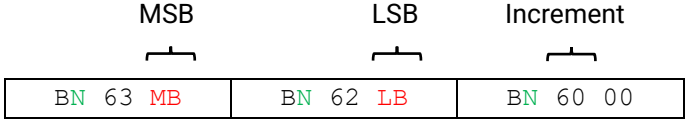
Mute Off



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.

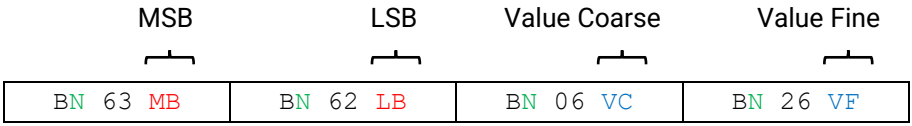
ⓘ MSB/LSB parameter numbers are shown in the reference tables.

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

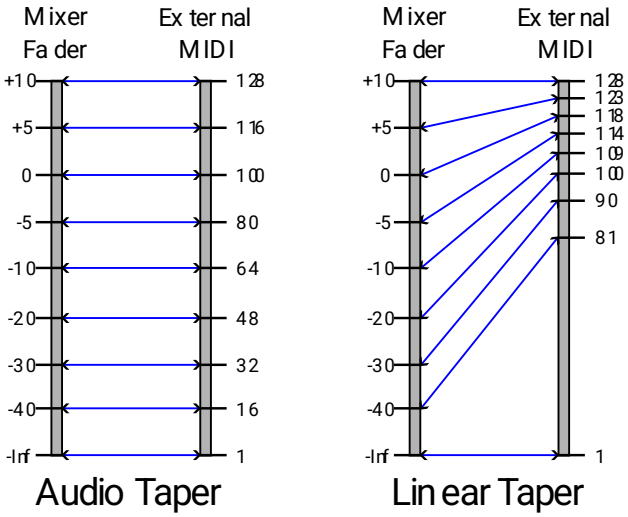
NRPN Fader Law

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 3rd 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
Ip1 to LR, 0dB, Ch1	B0 63 40 B0 62 00 B0 06 62 B0 26 00
Ip1 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
Ip30 to FX3, -12dB, Ch14	BD 63 4D BD 62 0A BD 06 3B BD 26 00

Linear Taper Examples:

Address, Value, MIDI Ch	Message
Ip1 to LR, 0dB, Ch1	B0 63 40 B0 62 00 B0 06 76 B0 26 5C
Ip1 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
Ip30 to FX3, -12dB, Ch14	BD 63 4D BD 62 0A BD 06 6B BD 26 06

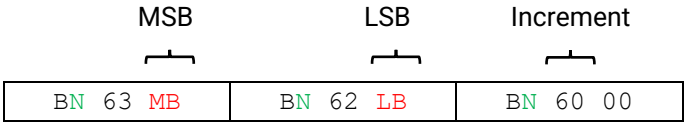
Relative Level Control

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

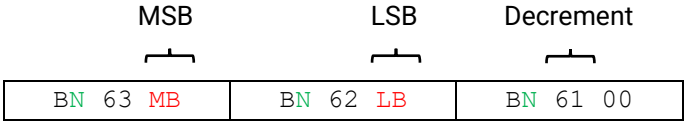
This raises or lowers a level in 1dB steps.

ⓘ 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
Ip1 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.

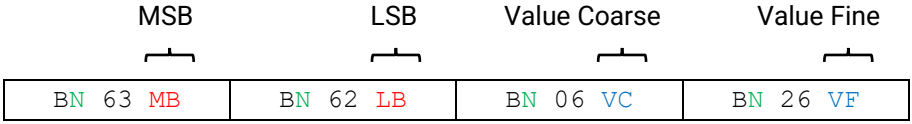
Stereo Channels

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

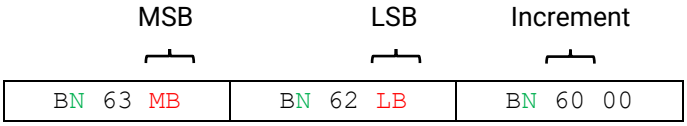
Examples:

Address, Value, MIDI Ch	Message
Ip1 to LR, L100%, Ch1	B0 63 50 B0 62 00 B0 06 00 B0 26 00
Ip1 to LR, CTR, Ch1	B0 63 50 B0 62 00 B0 06 3F B0 26 7F
Ip24 to LR, R20%, Ch1	B0 63 50 B0 62 17 B0 06 4C B0 26 65
Ip24 to Aux5&6, R20%, Ch1	B0 63 52 B0 62 5C B0 06 4C B0 26 65
Ip24 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

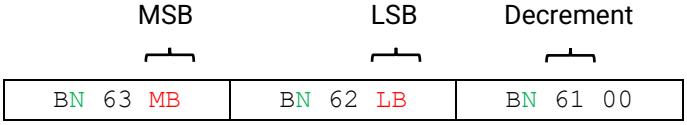
Relative Panning Control

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.

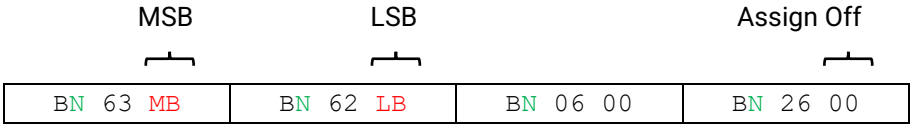
Stereo Channels

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



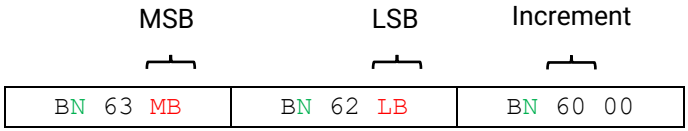
Assign Off



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:

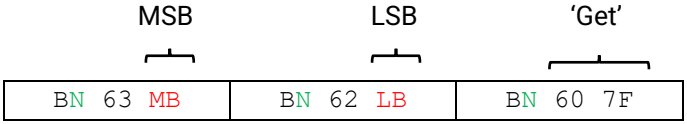
Channel, Cmnd, MIDI Ch	Message
Ip1 to LR, On, Ch1	B0 63 60 B0 62 00 B0 06 00 B0 26 01
Ip1 to LR, Off, Ch1	B0 63 60 B0 62 00 B0 06 00 B0 26 00
FX1Rtn to Aux 7, On, Ch1	B0 63 66 B0 62 1A B0 06 00 B0 26 01
Grp2 to Mtx1&2, Toggle, Ch4	B3 63 6E B3 62 2A B3 60 00

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.



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

Examples:

Parameter Requested, MIDI Ch	Message
LR Mute, Ch1	B0 63 00 B0 62 00 B0 60 7F
Ip1 to LR Level, Ch1	B0 63 40 B0 62 00 B0 60 7F
Ip30 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
1	00	C-1
2	01	C#-1
3	02	D-1
4	03	D#-1
5	04	E-1
6	05	F-1
7	06	F#-1
8	07	G-1
9	08	G#-1
10	09	A-1
11	0A	A#-1
12	0B	B-1
13	0C	C0
14	0D	C#0
15	0E	D0
16	0F	D#0
17	10	E0
18	11	F0
19	12	F#0
20	13	G0
21	14	G#0
22	15	A0
23	16	A#0
24	17	B0
25	18	C1
26	19	C#1
27	1A	D1
28	1B	D#1
29	1C	E1
30	1D	F1
31	1E	F#1
32	1F	G1

VAL	HEX	Note
33	20	G#1
34	21	A1
35	22	A#1
36	23	B1
37	24	C2
38	25	C#2
39	26	D2
40	27	D#2
41	28	E2
42	29	F2
43	2A	F#2
44	2B	G2
45	2C	G#2
46	2D	A2
47	2E	A#2
48	2F	B2
49	30	C3
50	31	C#3
51	32	D3
52	33	D#3
53	34	E3
54	35	F3
55	36	F#3
56	37	G3
57	38	G#3
58	39	A3
59	3A	A#3
60	3B	B3
61	3C	C4
62	3D	C#4
63	3E	D4
64	3F	D#4

VAL	HEX	Note
65	40	E4
66	41	F4
67	42	F#4
68	43	G4
69	44	G#4
70	45	A4
71	46	A#4
72	47	B4
73	48	C5
74	49	C#5
75	4A	D5
76	4B	D#5
77	4C	E5
78	4D	F5
79	4E	F#5
80	4F	G5
81	50	G#5
82	51	A5
83	52	A#5
84	53	B5
85	54	C6
86	55	C#6
87	56	D6
88	57	D#6
89	58	E6
90	59	F6
91	5A	F#6
92	5B	G6
93	5C	G#6
94	5D	A6
95	5E	A#6
96	5F	B6

VAL	HEX	Note
97	60	C7
98	61	C#7
99	62	D7
100	63	D#7
101	64	E7
102	65	F7
103	66	F#7
104	67	G7
105	68	G#7
106	69	A7
107	6A	A#7
108	6B	B7
109	6C	C8
110	6D	C#8
111	6E	D8
112	6F	D#8
113	70	E8
114	71	F8
115	72	F#8
116	73	G8
117	74	G#8
118	75	A8
119	76	A#8
120	77	B8
121	78	C9
122	79	C#9
123	7A	D9
124	7B	D#9
125	7C	E9
126	7D	F9
127	7E	F#9
128	7F	G9

Soft Key Notes and Hexadecimal Values (SK)

SoftKey	Note	HEX
1	C3	30
2	C#3	31
3	D3	32
4	D#3	33

SoftKey	Note	HEX
5	E3	34
6	F3	35
7	F#3	36
8	G3	37

SoftKey	Note	HEX
9	G#3	38
10	A3	39
11	A#3	3A
12	B3	3B

SoftKey	Note	HEX
13	C4	3C
14	C#4	3D
15	D4	3E
16	D#4	3F

Approximate Audio Taper Level Values (VC/VF)

dB	VC	VF
-inf	00	00
-89	01	40
-85	02	00
-80	02	40
-75	03	40
-70	04	00
-65	05	00
-60	06	00
-55	07	00
-50	08	00

dB	VC	VF
-45	0C	00
-40	0F	40
-38	12	40
-36	15	40
-35	17	00
-34	19	00
-33	1A	40
-32	1C	00
-31	1D	40
-30	1F	00

dB	VC	VF
-29	20	40
-28	22	00
-27	23	40
-26	25	00
-25	26	40
-24	28	40
-23	2A	00
-22	2B	40
-21	2D	00
-20	2E	40

dB	VC	VF
-19	30	00
-18	31	40
-17	33	00
-16	34	40
-15	36	00
-14	38	00
-13	39	40
-12	3B	00
-11	3C	40
-10	3E	00

dB	VC	VF
-9	41	40
-8	44	40
-7	48	00
-6	4B	00
-5	4E	40
-4	52	40
-3	56	40
-2	5A	00
-1	5E	00
0	62	00

dB	VC	VF
+1	65	40
+2	69	00
+3	6C	40
+4	70	00
+5	73	40
+6	75	40
+7	78	00
+8	7A	40
+9	7D	00
+10	7F	40

Example Linear Taper Level Values (VC/VF)

dB	VC	VF
-inf	00	00
-89	24	16
-85	27	71
-80	2C	42
-75	31	14
-70	35	65
-65	3A	37
-60	3F	09
-55	43	5A
-50	48	2C

dB	VC	VF
-45	4C	7D
-40	51	4F
-38	53	3C
-36	55	2A
-35	56	21
-34	57	17
-33	58	0E
-32	59	05
-31	59	7C
-30	5A	72

dB	VC	VF
-29	5B	69
-28	5C	60
-27	5D	56
-26	5E	4D
-25	5F	44
-24	60	3B
-23	61	31
-22	62	28
-21	63	1F
-20	64	16

dB	VC	VF
-19	65	0C
-18	66	03
-17	66	7A
-16	67	70
-15	68	67
-14	69	5E
-13	6A	55
-12	6B	4B
-11	6C	42
-10	6D	39

dB	VC	VF
-9	6E	2F
-8	6F	26
-7	70	1D
-6	71	14
-5	72	0A
-4	73	01
-3	73	78
-2	74	6F
-1	75	65
0	76	5C

dB	VC	VF
+1	77	53
+2	78	49
+3	79	40
+4	7A	37
+5	7B	2E
+6	7C	24
+7	7D	1B
+8	7E	12
+9	7F	08
+10	7F	7F

Example Pan/Balance Values (VC/VF)

L/R	VC	VF
L100%	00	00
L90%	06	33
L80%	0C	66
L70%	13	19
L60%	19	4C

L/R	VC	VF
L50%	1F	7F
L40%	26	32
L30%	2C	65
L20%	33	18
L15%	36	32

L/R	VC	VF
L10%	39	4B
L5%	3C	65
CTR	3F	7F
R5%	43	18
R10%	46	32

L/R	VC	VF
R15%	49	4B
R20%	4C	65
R30%	53	18
R40%	59	4B
R50%	5F	7F

L/R	VC	VF
R60%	66	32
R70%	6C	65
R80%	73	18
R90%	79	4B
R100%	7F	7F

In the following tables, the source is shown on the left and the destination is shown at the top.

Each parameter number includes one MSB (MB) and one LSB (LB).

Mute Parameter Numbers (MB/LB)

	MUTE	
	MSB	LSB
Ip1	00	00
Ip2	00	01
Ip3	00	02
Ip4	00	03
Ip5	00	04
Ip6	00	05
Ip7	00	06
Ip8	00	07
Ip9	00	08
Ip10	00	09
Ip11	00	0A
Ip12	00	0B
Ip13	00	0C
Ip14	00	0D
Ip15	00	0E
Ip16	00	0F
Ip17	00	10
Ip18	00	11
Ip19	00	12
Ip20	00	13
Ip21	00	14
Ip22	00	15
Ip23	00	16
Ip24	00	17

	MUTE	
	MSB	LSB
Ip25	00	18
Ip26	00	19
Ip27	00	1A
Ip28	00	1B
Ip29	00	1C
Ip30	00	1D
Ip31	00	1E
Ip32	00	1F
ST1	00	20
ST2	00	22
USB	00	24

	MUTE	
	MSB	LSB
FX1Snd	00	51
FX2Snd	00	52
FX3Snd	00	53
FX4Snd	00	54

	MUTE	
	MSB	LSB
FX1Rtn	00	3C
FX2Rtn	00	3D
FX3Rtn	00	3E
FX4Rtn	00	3F
FX5Rtn	00	40
FX6Rtn	00	41

	MUTE	
	MSB	LSB
LR	00	44
MIX1	00	45
MIX2	00	46
MIX3	00	47
MIX4	00	48
MIX5	00	49
MIX6	00	4A
MIX7	00	4B
MIX8	00	4C
MIX9	00	4D
MIX10	00	4E
MIX11	00	4F
MIX12	00	50

	MUTE	
	MSB	LSB
Mtx1	00	55
Mtx2	00	56
Mtx3	00	57
Mtx4	00	58

	MUTE	
	MSB	LSB
DCA1	02	00
DCA2	02	01
DCA3	02	02
DCA4	02	03
DCA5	02	04
DCA6	02	05
DCA7	02	06
DCA8	02	07

	MUTE	
	MSB	LSB
MGRP1	04	00
MGRP2	04	01
MGRP3	04	02
MGRP4	04	03
MGRP5	04	04
MGRP6	04	05
MGRP7	04	06
MGRP8	04	07

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
Ip1	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
Ip2	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
Ip3	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
Ip4	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
Ip5	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
Ip6	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
Ip7	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
Ip8	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
Ip9	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
Ip10	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
Ip11	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
Ip12	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
Ip13	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
Ip14	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
Ip15	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
Ip16	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
Ip17	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
Ip18	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
Ip19	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
Ip20	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
Ip21	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
Ip22	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
Ip23	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
Ip24	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
Ip25	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
Ip26	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
Ip27	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
Ip28	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
Ip29	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
Ip30	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
Ip31	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
Ip32	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	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	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
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	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	
	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB
Ip1	4C	14	4C	15	4C	16	4C	17
Ip2	4C	18	4C	19	4C	1A	4C	1B
Ip3	4C	1C	4C	1D	4C	1E	4C	1F
Ip4	4C	20	4C	21	4C	22	4C	23
Ip5	4C	24	4C	25	4C	26	4C	27
Ip6	4C	28	4C	29	4C	2A	4C	2B
Ip7	4C	2C	4C	2D	4C	2E	4C	2F
Ip8	4C	30	4C	31	4C	32	4C	33
Ip9	4C	34	4C	35	4C	36	4C	37
Ip10	4C	38	4C	39	4C	3A	4C	3B
Ip11	4C	3C	4C	3D	4C	3E	4C	3F
Ip12	4C	40	4C	41	4C	42	4C	43
Ip13	4C	44	4C	45	4C	46	4C	47
Ip14	4C	48	4C	49	4C	4A	4C	4B
Ip15	4C	4C	4C	4D	4C	4E	4C	4F
Ip16	4C	50	4C	51	4C	52	4C	53
Ip17	4C	54	4C	55	4C	56	4C	57
Ip18	4C	58	4C	59	4C	5A	4C	5B
Ip19	4C	5C	4C	5D	4C	5E	4C	5F
Ip20	4C	60	4C	61	4C	62	4C	63
Ip21	4C	64	4C	65	4C	66	4C	67
Ip22	4C	68	4C	69	4C	6A	4C	6B
Ip23	4C	6C	4C	6D	4C	6E	4C	6F
Ip24	4C	70	4C	71	4C	72	4C	73

	FX1Snd		FX2Snd		FX3Snd		FX4Snd	
	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB
Ip25	4C	74	4C	75	4C	76	4C	77
Ip26	4C	78	4C	79	4C	7A	4C	7B
Ip27	4C	7C	4C	7D	4C	7E	4C	7F
Ip28	4D	00	4D	01	4D	02	4D	03
Ip29	4D	04	4D	05	4D	06	4D	07
Ip30	4D	08	4D	09	4D	0A	4D	0B
Ip31	4D	0C	4D	0D	4D	0E	4D	0F
Ip32	4D	10	4D	11	4D	12	4D	13
ST1	4D	14	4D	15	4D	16	4D	17
ST2	4D	1C	4D	1D	4D	1E	4D	1F
USB	4D	24	4D	25	4D	26	4D	27

Grp1	4D	54	4D	55	4D	56	4D	57
Grp2	4D	58	4D	59	4D	5A	4D	5B
Grp3	4D	5C	4D	5D	4D	5E	4D	5F
Grp4	4D	60	4D	61	4D	62	4D	63
Grp5	4D	64	4D	65	4D	66	4D	67
Grp6	4D	68	4D	69	4D	6A	4D	6B
Grp7	4D	6C	4D	6D	4D	6E	4D	6F
Grp8	4D	70	4D	71	4D	72	4D	73
Grp9	4D	74	4D	75	4D	76	4D	77
Grp10	4D	78	4D	79	4D	7A	4D	7B
Grp11	4D	7C	4D	7D	4D	7E	4D	7F
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	
	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB
LR	4E	24	4E	25	4E	26	4E	26
MIX1	4E	27	4E	28	4E	29	4E	29
MIX2	4E	2A	4E	2B	4E	2C	4E	2C
MIX3	4E	2D	4E	2E	4E	2F	4E	2F
MIX4	4E	30	4E	31	4E	32	4E	32
MIX5	4E	33	4E	34	4E	35	4E	35
MIX6	4E	36	4E	37	4E	38	4E	38
MIX7	4E	39	4E	3A	4E	3B	4E	3B
MIX8	4E	3C	4E	3D	4E	3E	4E	3E
MIX9	4E	3F	4E	40	4E	41	4E	41
MIX10	4E	42	4E	43	4E	44	4E	44
MIX11	4E	45	4E	46	4E	47	4E	47
MIX12	4E	48	4E	49	4E	4A	4E	4A

	Output	
	MSB	LSB
LR	4F	00
MIX1	4F	01
MIX2	4F	02
MIX3	4F	03
MIX4	4F	04
MIX5	4F	05
MIX6	4F	06
MIX7	4F	07
MIX8	4F	08
MIX9	4F	09
MIX10	4F	0A
MIX11	4F	0B
MIX12	4F	0C

	Output	
	MSB	LSB
FX1Snd	4F	0D
FX2Snd	4F	0E
FX3Snd	4F	0F
FX4Snd	4F	10
Mtx1	4F	11
Mtx2	4F	12
Mtx3	4F	13
Mtx4	4F	14

	Control	
	MSB	LSB
DCA1	4F	20
DCA2	4F	21
DCA3	4F	22
DCA4	4F	23
DCA5	4F	24
DCA6	4F	25
DCA7	4F	26
DCA8	4F	27

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
Ip1	50	00	50	44	–	–	50	46	–	–	50	48	–	–	50	4A	50	4B	50	4C	50	4D	50	4E	50	4F
Ip2	50	01	50	50	–	–	50	52	–	–	50	54	–	–	50	56	50	57	50	58	50	59	50	5A	50	5B
Ip3	50	02	50	5C	–	–	50	5E	–	–	50	60	–	–	50	62	50	63	50	64	50	65	50	66	50	67
Ip4	50	03	50	68	–	–	50	6A	–	–	50	6C	–	–	50	6E	50	6F	50	70	50	71	50	72	50	73
Ip5	50	04	50	74	–	–	50	76	–	–	50	78	–	–	50	7A	50	7B	50	7C	50	7D	50	7E	50	7F
Ip6	50	05	51	00	–	–	51	02	–	–	51	04	–	–	51	06	51	07	51	08	51	09	51	0A	51	0B
Ip7	50	06	51	0C	–	–	51	0E	–	–	51	10	–	–	51	12	51	13	51	14	51	15	51	16	51	17
Ip8	50	07	51	18	–	–	51	1A	–	–	51	1C	–	–	51	1E	51	1F	51	20	51	21	51	22	51	23
Ip9	50	08	51	24	–	–	51	26	–	–	51	28	–	–	51	2A	51	2B	51	2C	51	2D	51	2E	51	2F
Ip10	50	09	51	30	–	–	51	32	–	–	51	34	–	–	51	36	51	37	51	38	51	39	51	3A	51	3B
Ip11	50	0A	51	3C	–	–	51	3E	–	–	51	40	–	–	51	42	51	43	51	44	51	45	51	46	51	47
Ip12	50	0B	51	48	–	–	51	4A	–	–	51	4C	–	–	51	4E	51	4F	51	50	51	51	51	52	51	53
Ip13	50	0C	51	54	–	–	51	56	–	–	51	58	–	–	51	5A	51	5B	51	5C	51	5D	51	5E	51	5F
Ip14	50	0D	51	60	–	–	51	62	–	–	51	64	–	–	51	66	51	67	51	68	51	69	51	6A	51	6B
Ip15	50	0E	51	6C	–	–	51	6E	–	–	51	70	–	–	51	72	51	73	51	74	51	75	51	76	51	77
Ip16	50	0F	51	78	–	–	51	7A	–	–	51	7C	–	–	51	7E	51	7F	52	00	52	01	52	02	52	03
Ip17	50	10	52	04	–	–	52	06	–	–	52	08	–	–	52	0A	52	0B	52	0C	52	0D	52	0E	52	0F
Ip18	50	11	52	10	–	–	52	12	–	–	52	14	–	–	52	16	52	17	52	18	52	19	52	1A	52	1B
Ip19	50	12	52	1C	–	–	52	1E	–	–	52	20	–	–	52	22	52	23	52	24	52	25	52	26	52	27
Ip20	50	13	52	28	–	–	52	2A	–	–	52	2C	–	–	52	2E	52	2F	52	30	52	31	52	32	52	33
Ip21	50	14	52	34	–	–	52	36	–	–	52	38	–	–	52	3A	52	3B	52	3C	52	3D	52	3E	52	3F
Ip22	50	15	52	40	–	–	52	42	–	–	52	44	–	–	52	46	52	47	52	48	52	49	52	4A	52	4B
Ip23	50	16	52	4C	–	–	52	4E	–	–	52	50	–	–	52	52	52	53	52	54	52	55	52	56	52	57
Ip24	50	17	52	58	–	–	52	5A	–	–	52	5C	–	–	52	5E	52	5F	52	60	52	61	52	62	52	63
Ip25	50	18	52	64	–	–	52	66	–	–	52	68	–	–	52	6A	52	6B	52	6C	52	6D	52	6E	52	6F
Ip26	50	19	52	70	–	–	52	72	–	–	52	74	–	–	52	76	52	77	52	78	52	79	52	7A	52	7B
Ip27	50	1A	52	7C	–	–	52	7E	–	–	53	00	–	–	53	02	53	03	53	04	53	05	53	06	53	07
Ip28	50	1B	53	08	–	–	53	0A	–	–	53	0C	–	–	53	0E	53	0F	53	10	53	11	53	12	53	13
Ip29	50	1C	53	14	–	–	53	16	–	–	53	18	–	–	53	1A	53	1B	53	1C	53	1D	53	1E	53	1F
Ip30	50	1D	53	20	–	–	53	22	–	–	53	24	–	–	53	26	53	27	53	28	53	29	53	2A	53	2B
Ip31	50	1E	53	2C	–	–	53	2E	–	–	53	30	–	–	53	32	53	33	53	34	53	35	53	36	53	37
Ip32	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	–	–

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
Ip1	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
Ip2	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
Ip3	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
Ip4	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
Ip5	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
Ip6	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
Ip7	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
Ip8	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
Ip9	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
Ip10	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
Ip11	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
Ip12	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
Ip13	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
Ip14	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
Ip15	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
Ip16	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
Ip17	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
Ip18	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
Ip19	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
Ip20	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
Ip21	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
Ip22	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
Ip23	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
Ip24	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
Ip25	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
Ip26	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
Ip27	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
Ip28	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
Ip29	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
Ip30	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
Ip31	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
Ip32	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	
	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB
Ip1	6C	14	6C	15	6C	16	6C	17
Ip2	6C	18	6C	19	6C	1A	6C	1B
Ip3	6C	1C	6C	1D	6C	1E	6C	1F
Ip4	6C	20	6C	21	6C	22	6C	23
Ip5	6C	24	6C	25	6C	26	6C	27
Ip6	6C	28	6C	29	6C	2A	6C	2B
Ip7	6C	2C	6C	2D	6C	2E	6C	2F
Ip8	6C	30	6C	31	6C	32	6C	33
Ip9	6C	34	6C	35	6C	36	6C	37
Ip10	6C	38	6C	39	6C	3A	6C	3B
Ip11	6C	3C	6C	3D	6C	3E	6C	3F
Ip12	6C	40	6C	41	6C	42	6C	43
Ip13	6C	44	6C	45	6C	46	6C	47
Ip14	6C	48	6C	49	6C	4A	6C	4B
Ip15	6C	4C	6C	4D	6C	4E	6C	4F
Ip16	6C	50	6C	51	6C	52	6C	53
Ip17	6C	54	6C	55	6C	56	6C	57
Ip18	6C	58	6C	59	6C	5A	6C	5B
Ip19	6C	5C	6C	5D	6C	5E	6C	5F
Ip20	6C	60	6C	61	6C	62	6C	63
Ip21	6C	64	6C	65	6C	66	6C	67
Ip22	6C	68	6C	69	6C	6A	6C	6B
Ip23	6C	6C	6C	6D	6C	6E	6C	6F
Ip24	6C	70	6C	71	6C	72	6C	73

	FX1Snd		FX2Snd		FX3Snd		FX4Snd	
	MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB
Ip25	6C	74	6C	75	6C	76	6C	77
Ip26	6C	78	6C	79	6C	7A	6C	7B
Ip27	6C	7C	6C	7D	6C	7E	6C	7F
Ip28	6D	00	6D	01	6D	02	6D	03
Ip29	6D	04	6D	05	6D	06	6D	07
Ip30	6D	08	6D	09	6D	0A	6D	0B
Ip31	6D	0C	6D	0D	6D	0E	6D	0F
Ip32	6D	10	6D	11	6D	12	6D	13
ST1	6D	14	6D	15	6D	16	6D	17
ST2	6D	1C	6D	1D	6D	1E	6D	1F
USB	6D	24	6D	25	6D	26	6D	27

Grp1	6D	54	6D	55	6D	56	6D	57
Grp2	6D	58	6D	59	6D	5A	6D	5B
Grp3	6D	5C	6D	5D	6D	5E	6D	5F
Grp4	6D	60	6D	61	6D	62	6D	63
Grp5	6D	64	6D	65	6D	66	6D	67
Grp6	6D	68	6D	69	6D	6A	6D	6B
Grp7	6D	6C	6D	6D	6D	6E	6D	6F
Grp8	6D	70	6D	71	6D	72	6D	73
Grp9	6D	74	6D	75	6D	76	6D	77
Grp10	6D	78	6D	79	6D	7A	6D	7B
Grp11	6D	7C	6D	7D	6D	7E	6D	7F
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
LR	6E	24	6E	25	6E	26	6E	26
MIX1	6E	27	6E	28	6E	29	6E	29
MIX2	6E	2A	6E	2B	6E	2C	6E	2C
MIX3	6E	2D	6E	2E	6E	2F	6E	2F
MIX4	6E	30	6E	31	6E	32	6E	32
MIX5	6E	33	6E	34	6E	35	6E	35
MIX6	6E	36	6E	37	6E	38	6E	38
MIX7	6E	39	6E	3A	6E	3B	6E	3B
MIX8	6E	3C	6E	3D	6E	3E	6E	3E
MIX9	6E	3F	6E	40	6E	41	6E	41
MIX10	6E	42	6E	43	6E	44	6E	44
MIX11	6E	45	6E	46	6E	47	6E	47
MIX12	6E	48	6E	49	6E	4A	6E	4A

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