LAUNCHPAD PRO

Programmer's Reference Guide

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About this Guide

Launchpad Pro communicates using MIDI over USB and MIDI jack, operating in both directions. This manual, describing the MIDI communication format, is all the information you need to be able to write software that is customised for Launchpad Pro.

This is not an exhaustive document. Certain extra System Exclusive messages are used for authentication, and for remote firmware upgrade. These are beyond the scope of this document, however, it is worth knowing that they exist in case you encounter them while you are playing with Launchpad Pro.

Number Systems and MIDI conventions

There are three ways of expressing MIDI data in this manual. The first, where appropriate, is a plain English description of the message. When we describe a musical note, middle C is deemed to be 'C3' or note 60. MIDI channel 1 is considered to be the lowest-numbered MIDI channel and channels range from 1 - 16.

MIDI messages are also expressed in plain data, with decimal and hexadecimal equivalents. The hexadecimal number will always be followed by an 'h' and the decimal equivalent given in brackets. For example a Note On message on channel 1 is signified by the status byte 90h (144).

Bootloader

Launchpad Pro has a bootloader mode that allows the user to configure and save certain settings. The bootloader is accessed by holding the **Setup** button whilst switching the device on.
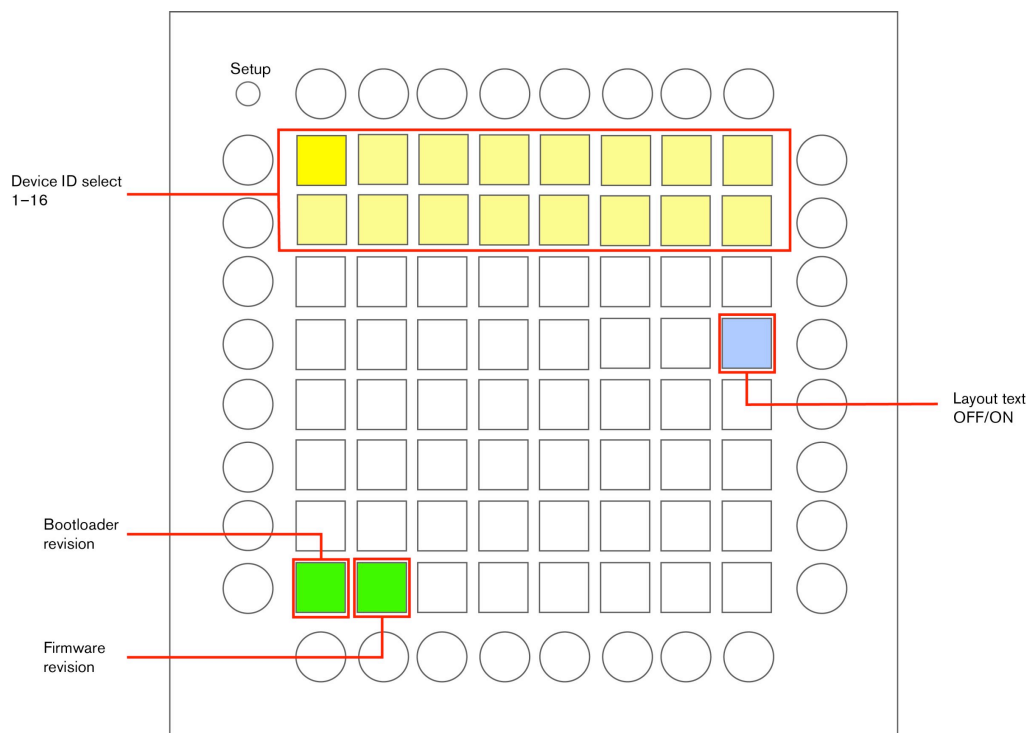

Figure 1: Bootloader display

The top two rows of square buttons can be used to set the device USB ID of Launchpad Pro. The device ID ranges from 1 – 16 and the selected ID is represented by an orange button. This also sets the USB identity, which ranges from 51h to 60h. The default ID from the factory is 1. If more

than one Launchpad Pro is to be used on USB, then each device must have a different USB ID selected.

The blue button refers to layout text, enabling the scrolling text messages when the layouts are changed. By default the button is bright blue and the scrolling text within the main firmware is enabled. Once the user is familiar with the use of the main firmware setup and layout selection, turning the layout text off in the bootloader can give more rapid layout changes in the firmware.

The light green button displays the bootloader version number, and the dark green button shows the firmware version number.

The main firmware can be started by pressing the **Setup** button again.

Basic Features

Basic Layouts

The User Guide gives a detailed description of the various layouts available in Launchpad Pro and how to select them. The Live layout is automatically selected by Ableton Live, indicated by the green side LED. There are four additional layouts available, allowing the Launchpad Pro to be used as a 'Standalone' MIDI controller without Ableton. They are Note, Drum, Fader and Programmer layout. Further detail on each layout can be found later in this document.

The different layouts may be manually selected on the Setup page, by pressing one of the five coloured square pads on the top row. (See later.) The layouts may also be selected automatically using the following message:

Host >> Launchpad Pro: F0h 00h 20h 29h 02h 10h 2Ch <Layout> F7h

                                (240, 0, 32, 41, 2, 16, 44, <Layout>, 247)

Where the <Layout> byte is: 00h – Note

                                01h – Drum

                                02h – Fader

                                03h – Programmer

The layout determines the MIDI note numbers that the buttons send and receive. Layout 0 is best for writing software that uses Launchpad Pro as an instrument. Layout 3 is best for programming light shows, as the grid is a blank canvas and is easy to navigate by adding and subtracting. Adding 1 moves to the right 1 button, adding 10 moves up one button.

Basic Communication

The communications behaviour of Launchpad Pro varies depending upon the layout. All of the Standalone layouts can be used to detect button presses and control LED colour, but the actual data values and results vary. Please refer to the following sections for specific details of each layout.

Launchpad Pro is provided with a USB interface and MIDI input/output jacks. It is usual for Launchpad Pro to connect to an Apple Mac or Windows PC using the USB lead. Once connected, the class-compliant USB driver will automatically provide communication ports to Launchpad Pro for sending and receiving note messages. These MIDI ports should be considered separately to the conventional MIDI hardware (the MIDI input/output jacks.)

There are 3 MIDI input ports and also 3 MIDI output ports. The first port pair (first input port and first output port) is usually used for communication with Ableton. (These first ports will communicate with the Live layout of Launchpad Pro.) The second port pair is used for Stand Alone mode of Launchpad Pro. Note, Drum, Fader and Programmer layouts all share these ports. The third port pair is used by the hardware MIDI interface. The output is routed from the USB, through the Launchpad Pro and out to the MIDI output jack. Similarly, the MIDI input jack is routed through the Launchpad Pro and into the third USB input port.

Set-up Screen

Each layout also has a set-up screen to give configuration options for that layout. Pressing and holding the set-up button allows the set-up screen to be viewed on Launchpad Pro. Releasing the set-up button returns the Launchpad Pro to the previous display.
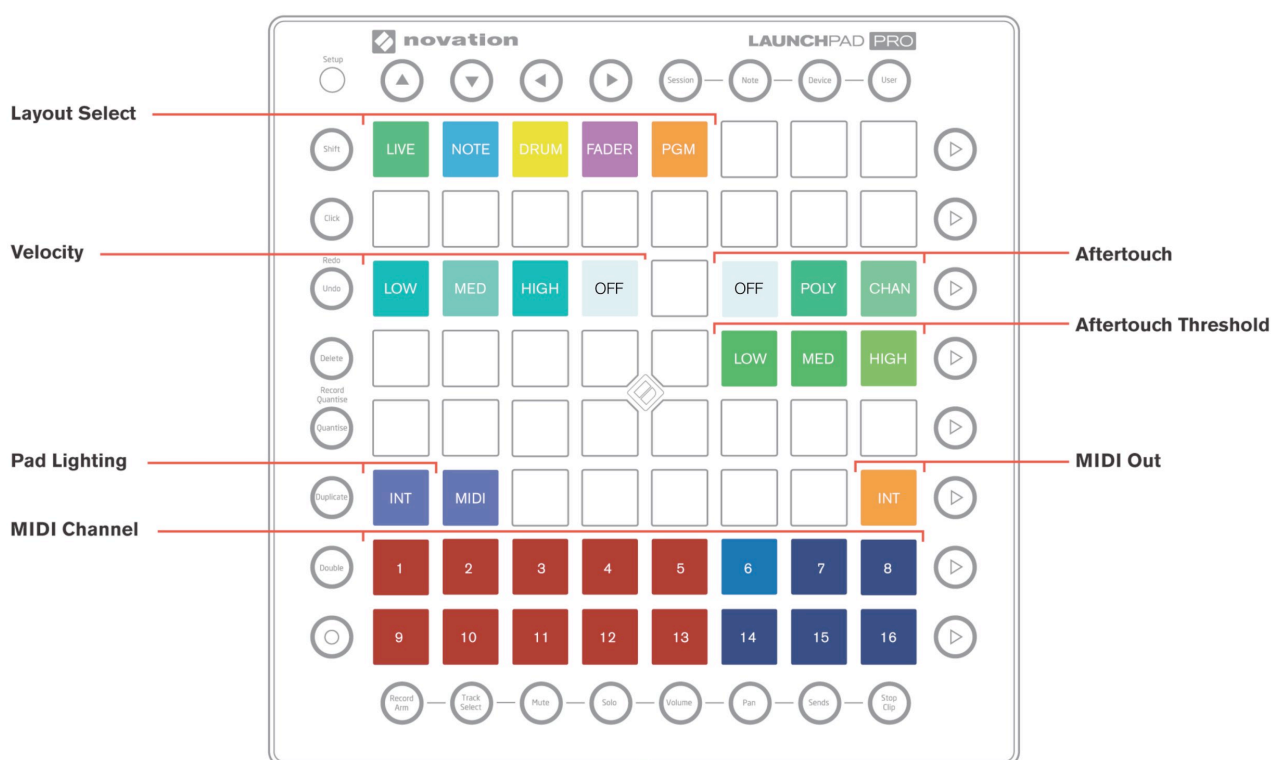
Figure 2: Typical layout setup display

Pressing one of the top coloured square pads manually changes to a different layout. These pads can be used during play to rapidly switch layouts.

Pad velocity control, after-touch mode and threshold change the instrument playing style.

Pad lighting changes whether the pads are lit automatically by pressing them, or when receiving MIDI notes.

MIDI out enables the sending of notes to the MIDI output jack.

MIDI channel selects which of the standard 16 MIDI channels is to be used for communications. It is useful when using multiple Launchpad Pros, allowing notes to be routed to and from a specific device. Each layout can have a different MIDI channel selection, allowing the different

layouts to target specific synthesisers or settings. Any MIDI channels shown in red are not available for use and cannot be selected. Ableton reserves a number of MIDI channels for Live mode, but all MIDI channels are available in Stand Alone mode.

Currently selected options are shown in a brighter colour.

The configuration options are remembered for each layout, allowing different options to be selected and each layout to be customised. When changed the selected options are stored away and automatically recalled again when the Launchpad Pro powers up.

For more detail on the set-up screen please refer to the Launchpad Pro User Manual.

Colours

Launchpad Pro has a colour palette of 128 colours shown in figure 3. Colour 0 turns the LED off.
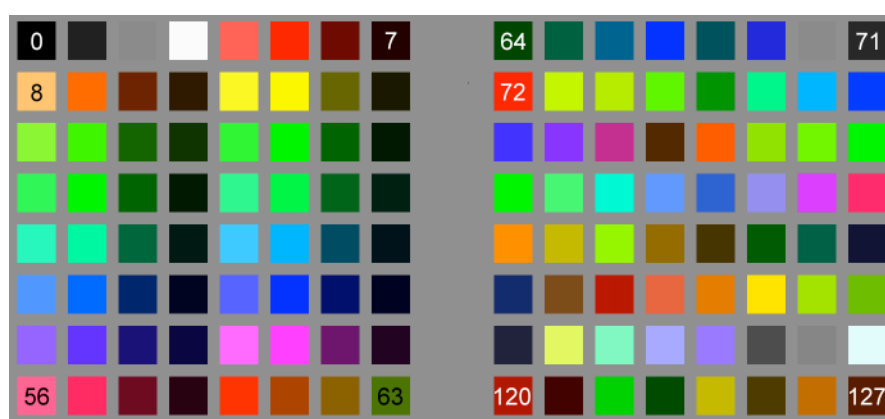

Figure 3: Launchpad Pro colour table, in decimal

Note Layout

The Note layout shows a chromatic scale with the black notes unlit (shown white in the example shown in figures 4 and 5) and the white notes lit blue. The C notes are highlighted in pink.

The central grid of 64 square buttons send Note On/Note Off messages to the host and the 32 round buttons send Control Change messages to the host. Pressing a square pad will send a Note On message with a velocity in the range 1 to 7fh (127). The actual velocity will depend upon the layout configuration and how hard the pad is pressed. Releasing the pad sends a Note Off message, with velocity 0.

In this layout, when a MIDI Note On is received by Launchpad Pro the associated square pad lights up green, returning back to the original colour when the Note Off message is received. As there is an overlap of notes in this layout, it is possible that a single Note On can light up two pads simultaneously. Pressing the pad also results in the pad lighting up green, then returning to its original colour when released.

Pressing a round button gives a MIDI Control Change message with maximum value 7fh (127), and a minimum value of 0 when released. In this layout, the round button will also light green. However, the round button can light with a different colour when a CC message is received. (The controller value determining the colour of the LED.)

The self-illumination of pads and buttons can be enabled or disabled on the set-up page.

The Up, Down, Left, Right cursor buttons are special, and used for shifting the chromatic scale display. These buttons cannot be controlled by a CC message.
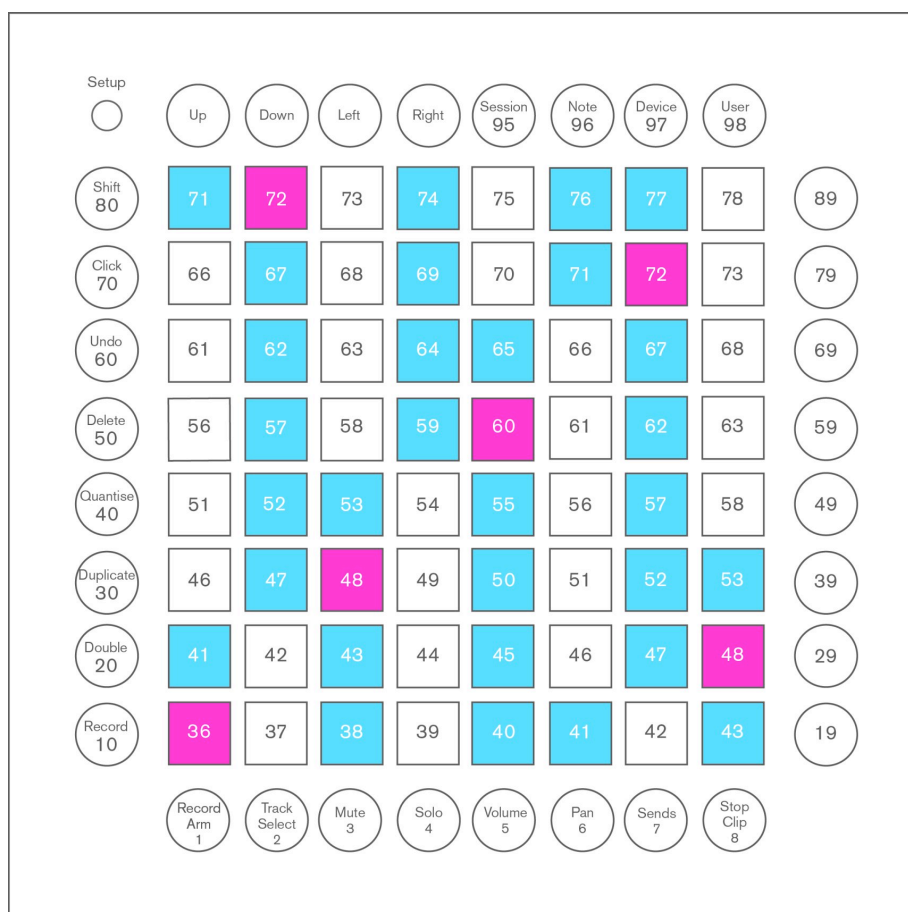
Figure 4: Note layout MIDI values, in decimal
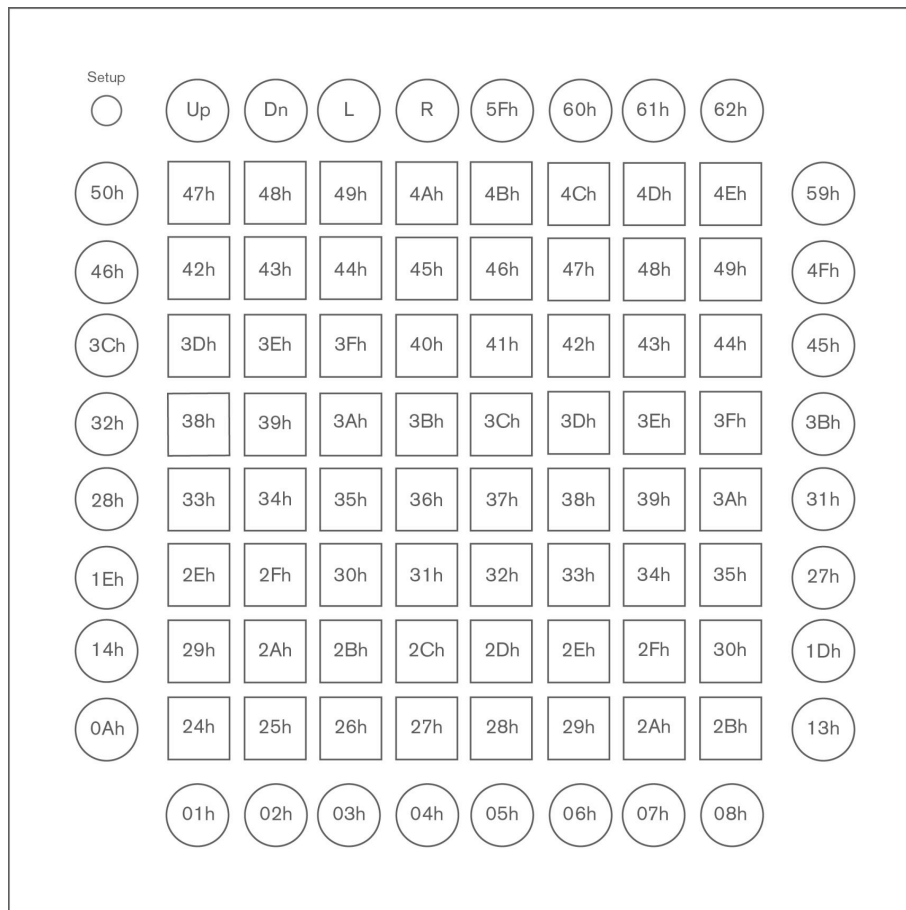
Figure 5: Note layout MIDI values, in hexadecimal

- **Example: Trigger the top left grid light, in Note layout**

Host >> Launchpad Pro: Channel 1: Note On B4/47h (71), velocity 2Dh (45)

                         90h 47h 2Dh (144, 71, 45)

- **Example: Make the round Session button light pink, in Note layout**

Host >> Launchpad Pro: Channel 1: set controller 5Fh (95) to 35h (53)

                         B0h 5Fh 35h (176, 95, 53)

Drum Layout

This layout is intended to provide a grid suitable for playing a drum rack within Ableton Live. (See figures 6 and 7.)

Rather like the Note layout, the square pads send Note On and Note Off messages. The round buttons send MIDI CCs.   They self-illuminate when pressed, unless disabled in the set-up page.

When a MIDI Note On is received the associated pad lights up green, returning back to the original colour when the Note Off message is received.

MIDI Note C1 = 36 (24h), which is the starting point for the Ableton drum rack.
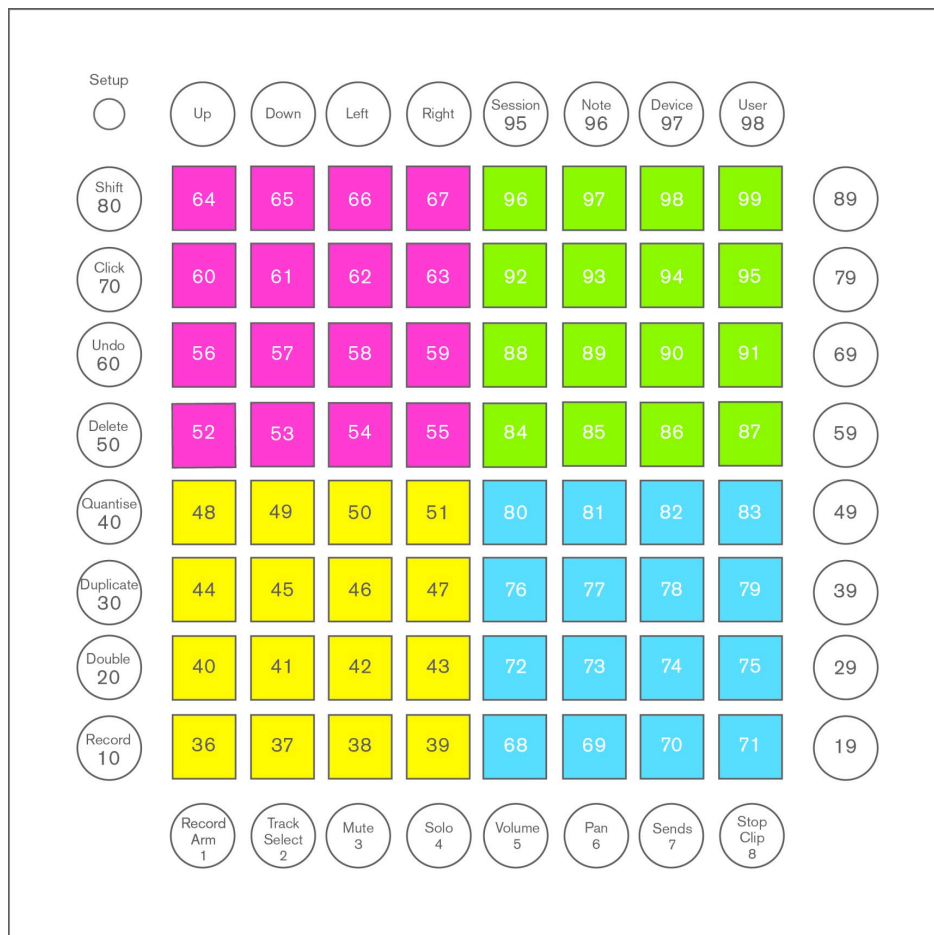
Figure 6: Drum layout MIDI values, in decimal

Note the round buttons send MIDI CCs.

Setup	Up	Down	Left	Right	5Fh	60h	61h	62h	
50h	40h	41h	42h	43h	60h	61h	62h	63h	59h
46h	3Ch	3Dh	3Eh	3Fh	5Ch	5Dh	5Eh	5Fh	4Fh
3Ch	38h	39h	3Ah	3Bh	58h	59h	5Ah	5Bh	45h
32h	34h	35h	36h	37h	54h	55h	56h	57h	3Bh
28h	30h	31h	32h	33h	50h	51h	52h	53h	31h
1Eh	2Ch	2Dh	2Eh	2Fh	4Ch	4Dh	4Eh	4Fh	27h
14h	28h	29h	2Ah	2Bh	48h	49h	4Ah	4Bh	1Dh
0Ah	24h	25h	26h	27h	44h	45h	46h	47h	13h
	01h	02h	03h	04h	05h	06h	07h	08h	

Figure 7: Drum layout MIDI values, in hexadecimal

▪ **Example: Trigger the bottom left grid light, in Drum layout**

Host >> Launchpad Pro: Channel 1: Note On C1/24h (36), velocity 0Fh (15)

90h 24h 0Fh (144, 36, 15)

▪ **Example: Make the round Sends button purple, in Drum layout**

Host >> Launchpad Pro: Channel 1: set controller 07h (7) to 33h (51)
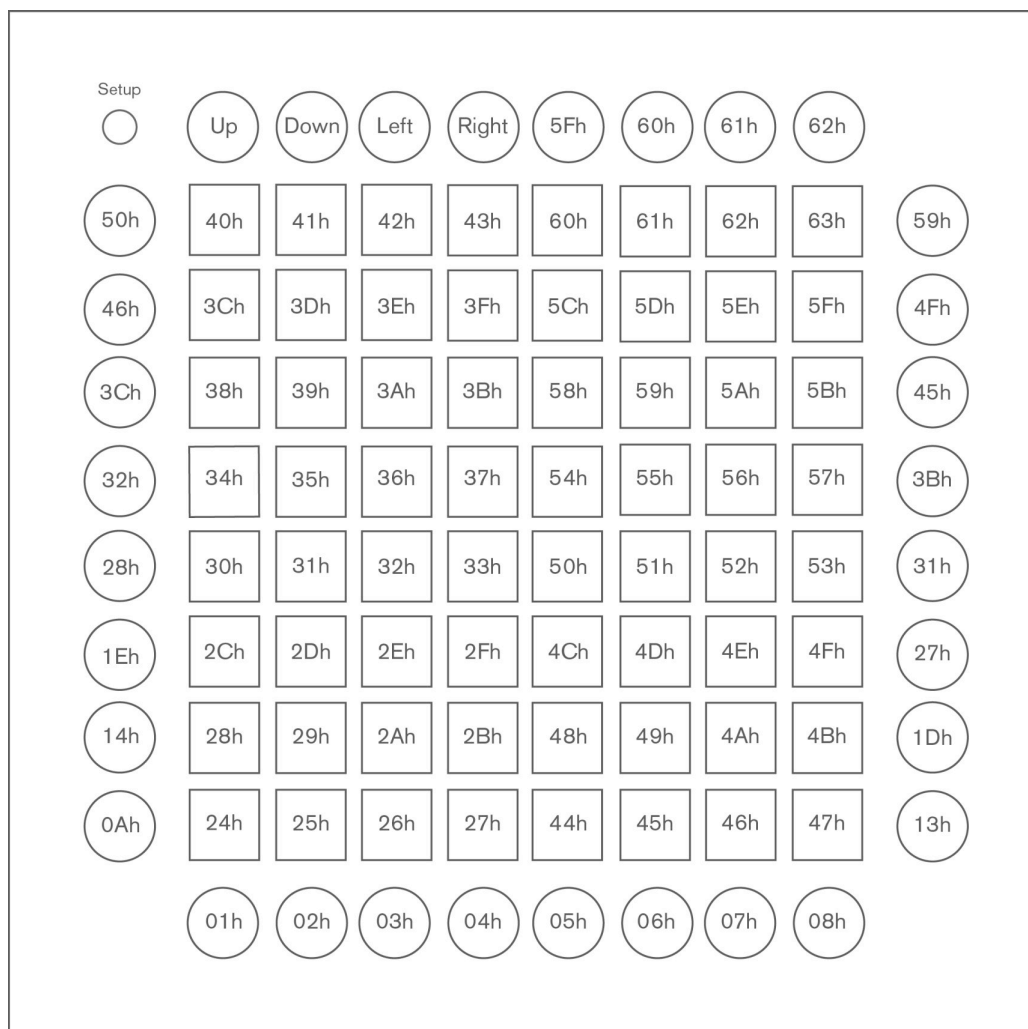
B0h 07h 33h (176, 7, 51)

Fader Layout

▪ **Virtual Fader Controls**

Each column outputs a MIDI CC with the number shown in the bottom row and the value as shown in the grid. (See figures 8 and 9.) Essentially this creates 8 faders with static values that can then be used in any way you might use a standard MIDI fader.

Note that the top 4 values of the fader table correspond to specific positions on Ableton Live's volume faders.
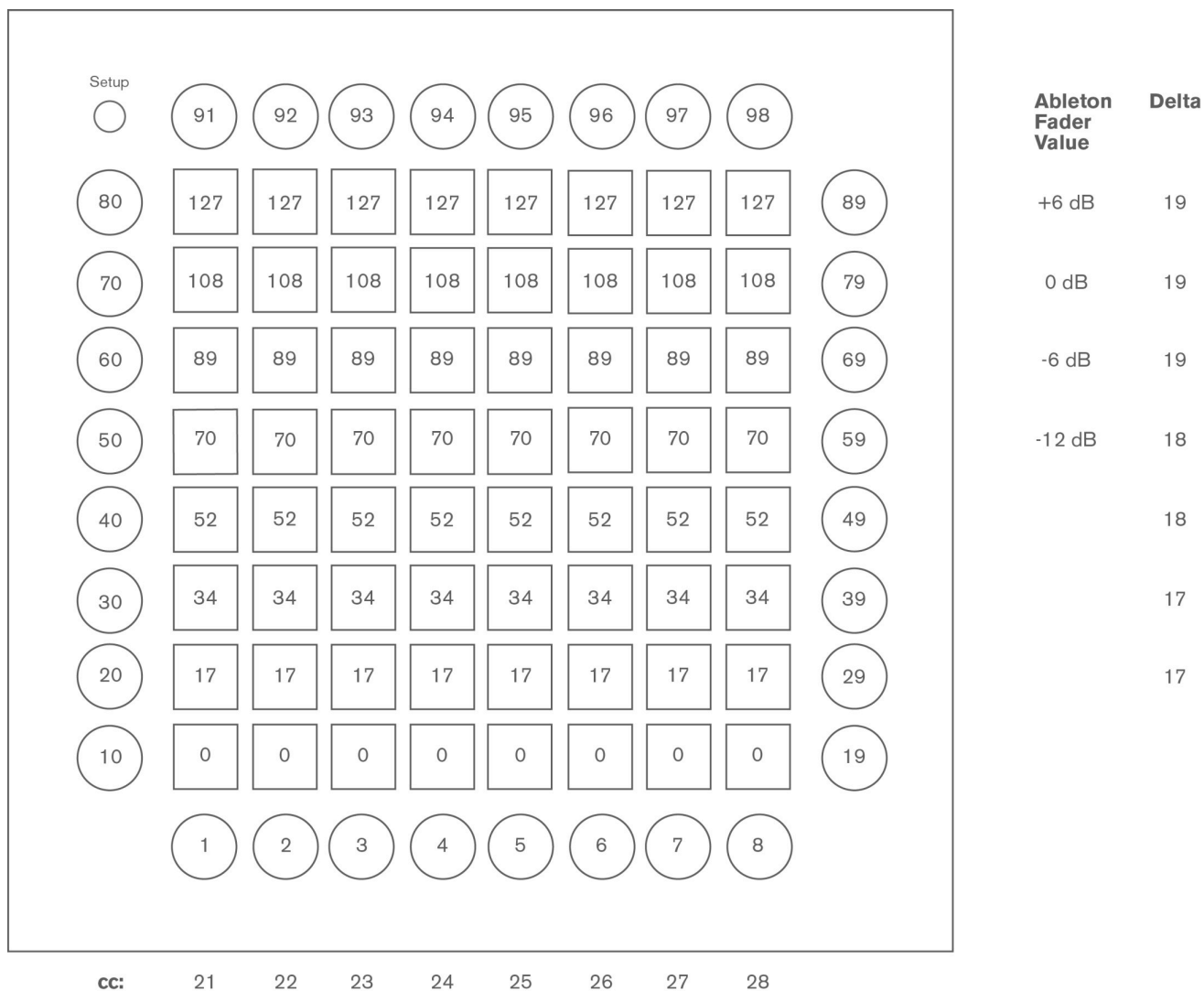
Figure 8: Fader layout MIDI values, in decimal

The figure shows a fader layout grid. Top row of circles: 91, 92, 93, 94, 95, 96, 97, 98. A "Setup" button is above circle 80.

Left column of circles (top to bottom): 80, 70, 60, 50, 40, 30, 20, 10.

Right column of circles (top to bottom): 89, 79, 69, 59, 49, 39, 29, 19.

Bottom row of circles: 1, 2, 3, 4, 5, 6, 7, 8.

Grid of square values (8 columns):

127	127	127	127	127	127	127	127
108	108	108	108	108	108	108	108
89	89	89	89	89	89	89	89
70	70	70	70	70	70	70	70
52	52	52	52	52	52	52	52
34	34	34	34	34	34	34	34
17	17	17	17	17	17	17	17
0	0	0	0	0	0	0	0

CC: 21, 22, 23, 24, 25, 26, 27, 28

Ableton Fader Value	Delta
+6 dB	19
0 dB	19
-6 dB	19
-12 dB	18
	18
	17
	17

Setup

	5Bh	5Ch	5Dh	5Eh	5Fh	60h	61h	62h		Ableton Fader Value	Delta
50h	7Fh	7Fh	7Fh	7Fh	7Fh	7Fh	7Fh	7Fh	59h	+6 dB	19
46h	6Ch	6Ch	6Ch	6Ch	6Ch	6Ch	6Ch	6Ch	4Fh	0 dB	19
3Ch	59h	59h	59h	59h	59h	59h	59h	59h	45h	-6 dB	19
32h	46h	46h	46h	46h	46h	46h	46h	46h	3Bh	-12 dB	18
28h	34h	34h	34h	34h	34h	34h	34h	34h	31h		18
1Eh	22h	22h	22h	22h	22h	22h	22h	22h	27h		17
14h	11h	11h	11h	11h	11h	11h	11h	11h	1Dh		17
0Ah	00h	00h	00h	00h	00h	00h	00h	00h	13h		
	01h	02h	03h	04h	05h	06h	07h	08h			

CC: 15h   16h   17h   18h   19h   1Ah   1Bh   1Ch

Figure 9: Fader layout MIDI values, in hexadecimal

The Launchpad Pro lights up to indicate the current setting for each fader. If it receives a CC message greater than or equal to the values in the table, it will show additional lights to indicate the new virtual fader's position. Similarly, receiving a CC message below the current fader position will lower the fader, turning lights off. When the bottom row of pads are pressed, they will send a value of zero, turning all the fader lights off. If a value of 1 or greater is received, then the bottom pad will light up.

When hitting a pad to turn a 'fader' up or down, the device sends out interim values to smooth the transitions. The faders therefore move over time. These times depend on how hard you hit the pad. Incoming CC values are ignored during a transition.

The transition time between values is proportional to how fast (the velocity) the pads are struck. Therefore if you were to hit the top row of pads with a velocity of 127 for example all the 'faders' would move to send 127 in value and arrive at the same time regardless of starting position and sending interim values during the transition period.

When the device receives a velocity of 1, the transition time will be 2 seconds. When a velocity of 127 is received, the transition time is 20ms and in that time 10 values will be sent. Fewer values than this will be sent if the difference between the current value and the target value is less than 10.

Pressing a pad that corresponds to the current (i.e. last transmitted) value of a fader will cause that same value to be sent again, and any currently-in-progress transition will be aborted.

The message to select Faders layout has to set them to colour 0 (off) to maintain compatibility with Ableton Live. (Colours can subsequently be set with a Fader Setup sysex message.)

When a layout change request is received while a fader is still moving, the Launchpad stops the fader movement and selects the new layout.

In the case of the round buttons, the Fader layout is like the Note layout, sending MIDI CC messages.   The round buttons also self-illuminate when pressed, unless disabled in the set-up page.

▪ **Virtual Pan Controls**

A virtual pan control is similar to the virtual fader control. A pan lights both the fourth and fifth pads (counting from the bottom) i.e. the two middle pads when a value of 63 or 64 is received. Their operation will be similar to that of the faders, however pads will light outwards from the centre, e.g. if the value is 0, then the bottom four pads will be lit. If the value is 127 then the top four pads will be lit. If the pan control is in the centred position then both middle pads will be lit. (See figures 10 and 11.)
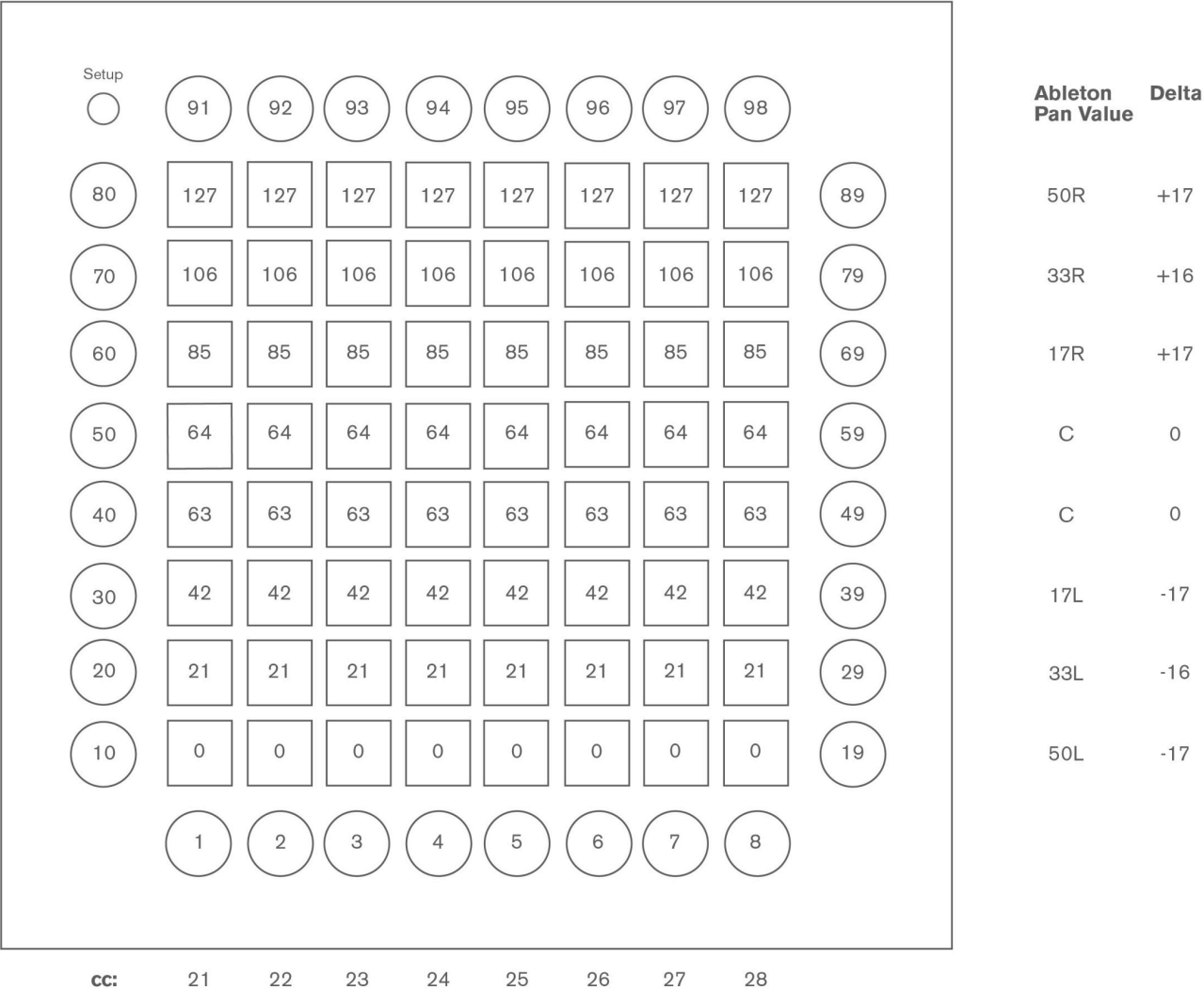

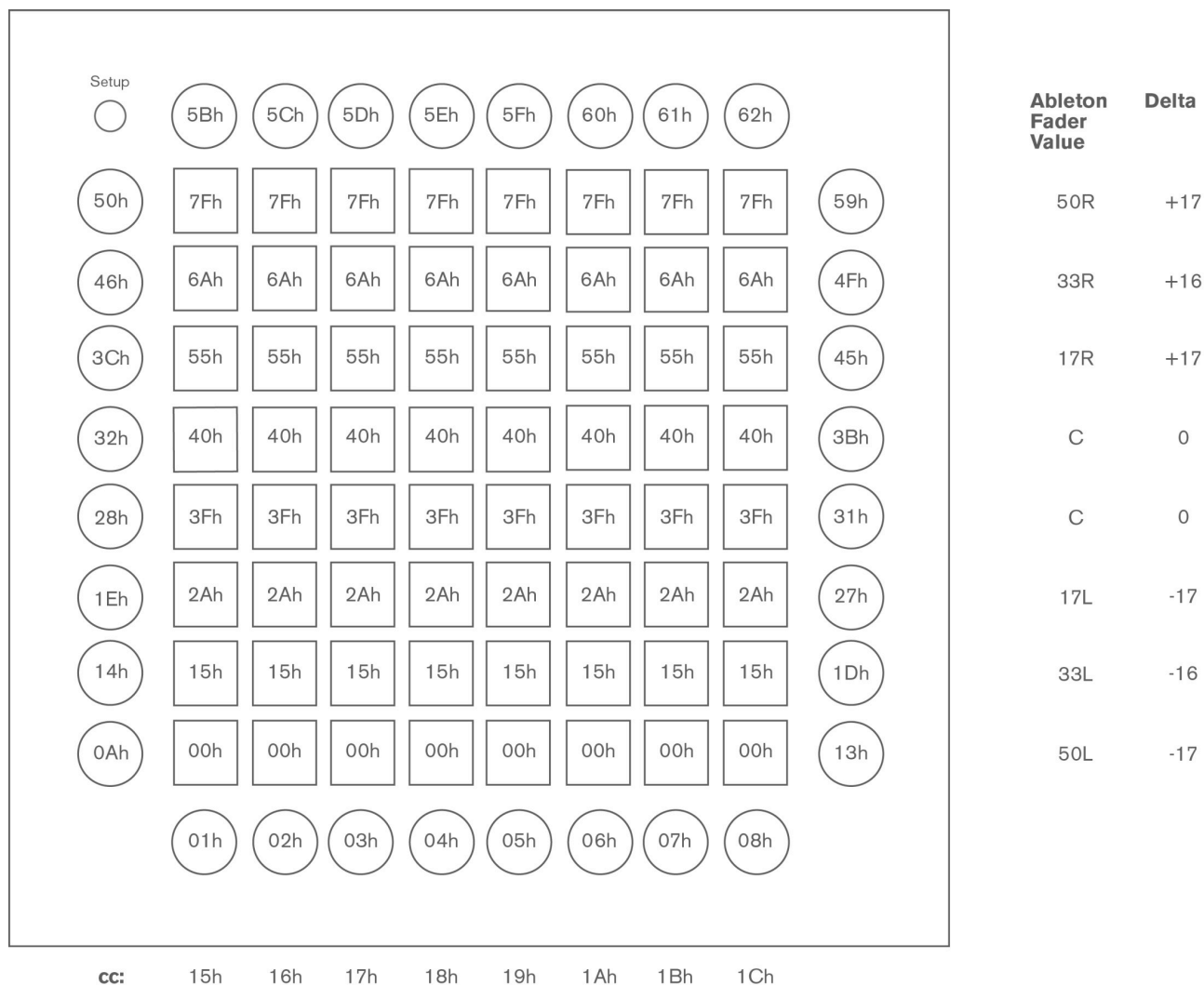**Figure 10: Pan layout MIDI values, in decimal**

Setup

| | 5Bh | 5Ch | 5Dh | 5Eh | 5Fh | 60h | 61h | 62h | |

										Ableton Fader Value	Delta
50h	7Fh	7Fh	7Fh	7Fh	7Fh	7Fh	7Fh	7Fh	59h	50R	+17
46h	6Ah	6Ah	6Ah	6Ah	6Ah	6Ah	6Ah	6Ah	4Fh	33R	+16
3Ch	55h	55h	55h	55h	55h	55h	55h	55h	45h	17R	+17
32h	40h	40h	40h	40h	40h	40h	40h	40h	3Bh	C	0
28h	3Fh	3Fh	3Fh	3Fh	3Fh	3Fh	3Fh	3Fh	31h	C	0
1Eh	2Ah	2Ah	2Ah	2Ah	2Ah	2Ah	2Ah	2Ah	27h	17L	-17
14h	15h	15h	15h	15h	15h	15h	15h	15h	1Dh	33L	-16
0Ah	00h	00h	00h	00h	00h	00h	00h	00h	13h	50L	-17

| | 01h | 02h | 03h | 04h | 05h | 06h | 07h | 08h | |

| cc: | 15h | 16h | 17h | 18h | 19h | 1Ah | 1Bh | 1Ch |

Figure 11: Pan layout MIDI values, in hexadecimal

- Initialise a fader or pan control

Host >> Launchpad Pro: F0h 00h 20h 29h 02h 10h 2Bh <Number> <Type> <Colour> <Value> F7h

(240,0,32,41,2,16,43,<Number>, <Type>, <Colour>, <Value>, 247)

<Number> <Type> <Colour> <Value> sets may be repeated up to 8 times in a message.

<Number>   - Index of the fader, numbered left to right, 00h – 07h (0 – 7)
<Type>   - Fader (00h) or Pan (01h).
<Colour>   - 00h – 7Fh (0 – 127)
<Value>   - Initial value for the fader 00h – 7Fh (0 – 127)

- Example: Set-up 4 fader controls, in Fader layout

Host >> Launchpad Pro: F0h 00h 20h 29h 02h 10h 2Bh 02h 00h 05h 7fh 03h 00h 15h 46h 04h 00h 2dh 22h 05h ..
                         .. 00h 35h 00h F7h
                         (240, 0, 32, 41, 2, 16, 43, 2, 0, 5, 127, 3, 0, 21, 70, 4, 0, 45, 34, 5, 0, 53, 0, 247)

This message looks complicated but can be broken down into the following sections:

| F0h 00h 20h 29h 02h 10h 2Bh | - SysEx header for fader set-up message |
| (240, 0, 32, 41, 2, 16, 43) | |

| 02h 00h 05h 7fh | - 3rd fader along, in red, at +6dB (value 127) |
| (2, 0, 5, 127) | |

| 03h 00h 15h 46h | - 4th fader along, in green, at -12dB (value 70) |
| (3, 0, 21, 70) | |

| 04h 00h 2dh 22h | - 5th fader along, in blue, even lower (value 34) |
| (4, 0, 45, 34) | |

| 05h 00h 35h 00h | - 6th fader along, in pink, at off (value 0) |
| (5, 0, 53, 0) | |

| F7h | - end of SysEx message |
| (247) | |

This example will then look like the following figure 12:
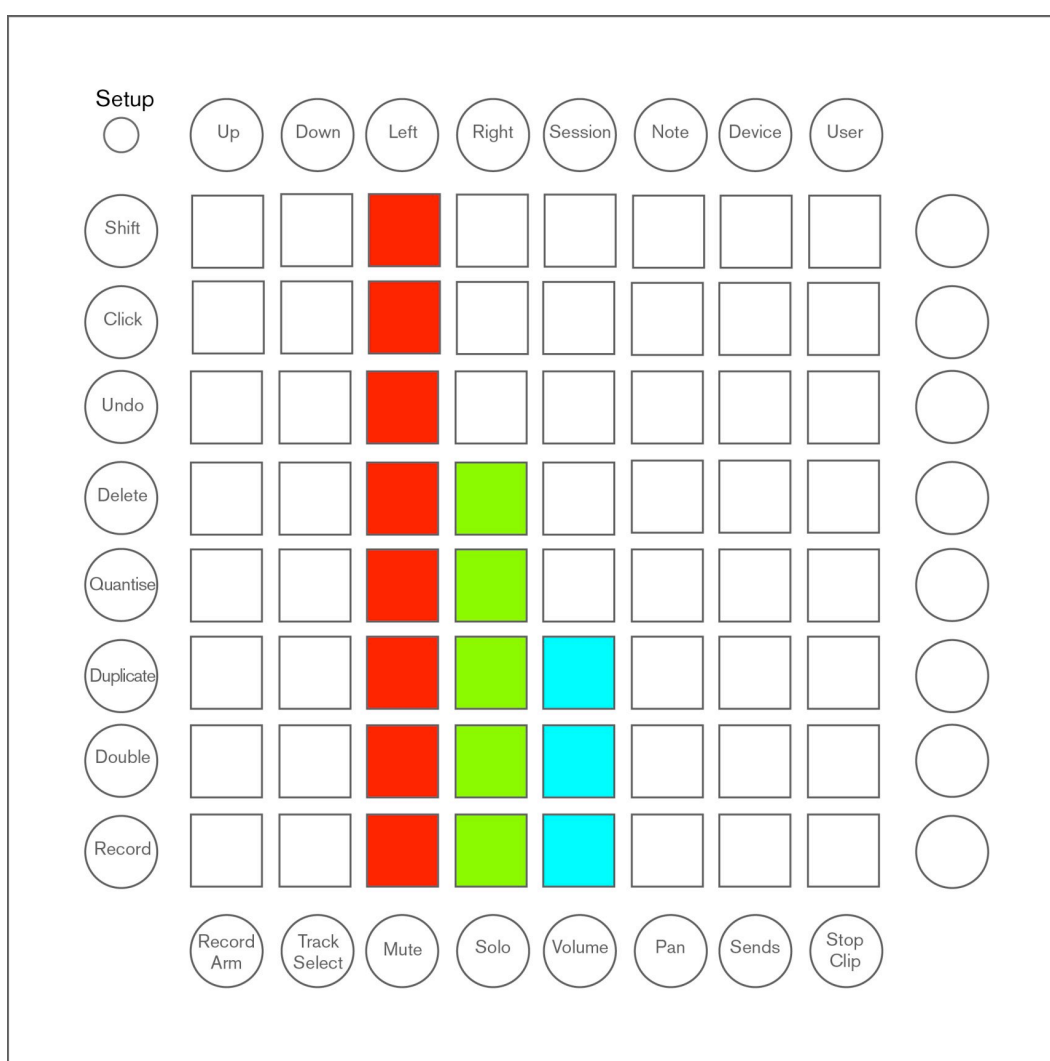
Figure 12: Fader layout example

Note that the pink fader is not visible, as it is off.

- **Example: Set-up 5 pan controls, in Fader layout**

Host >> Launchpad Pro: F0h 00h 20h 29h 02h 10h 2Bh 00h 01h 05h 7fh 01h 01h 15h 40h 02h 01h 2dh 00h ..

.. 03h 01h 35h 49h 04h 01h 35h 15h F7h

(240, 0, 32, 41, 2, 16, 43, 0, 1, 5, 127, 1, 1, 21, 64, 2, 1, 55, 0, 3, 1, 53, 73, 4, 1, 53, 21, 247)

This message looks complicated but can be broken down into the following sections:

F0h 00h 20h 29h 02h 10h 2Bh (240, 0, 32, 41, 2, 16, 43)	- SysEx header for fader set-up message
00h 01h 05h 7fh (0, 1, 5, 127)	- 1st fader is a pan control in red, at 50R (value 127)
01h 01h 15h 40h (1, 1, 21, 64)	- 2nd fader is a pan control in green, at C (value 64)
02h 01h 2dh 00h (2, 1, 55, 0)	- 3rd fader is a pan control in blue, at 50L (value 0)
03h 01h 35h 49h (3, 1, 53, 73)	- 4th fader is a pan control in pink, just above C (value 73)
04h 01h 35h 15h (4, 1, 53, 21)	- 5th fader is a pan control in pink, at 33L (value 21)
F7h (247)	- end of SysEx message

This example will then look like the following figure 13:

Figure 13: Pan layout example
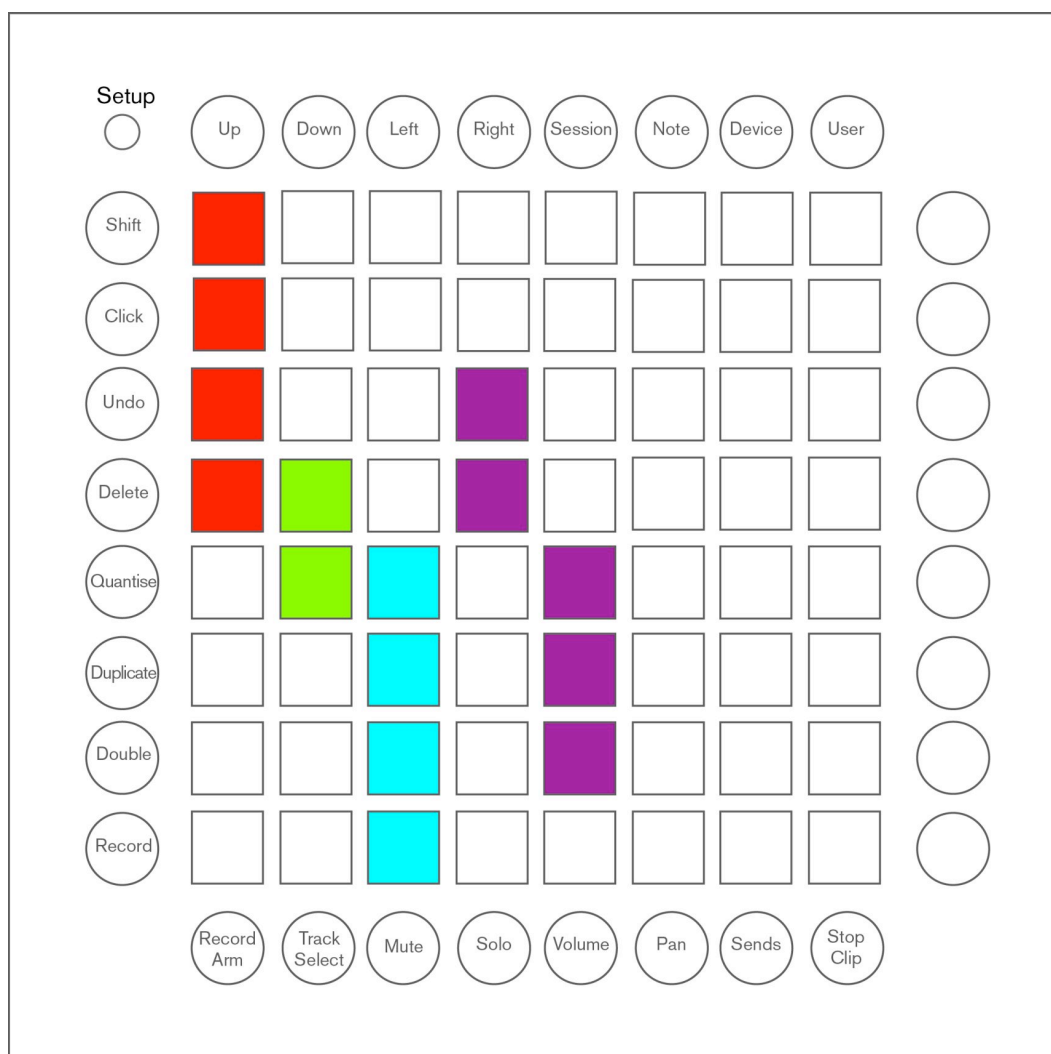
Programmer Layout

In the Programmer layout, the Launchpad Pro is essentially a blank canvas, with the controls and LEDs all available for use. It is the best layout to use for light displays.

Square pads send Note On and Note Off messages. The round buttons send MIDI CCs.

Note On messages can also be used to light the LED behind each button. The velocity of the Note On message determines the colour of the LED. A Note On message with velocity 0, or a Note Off message of any velocity will turn the LED off.

Pressing a round button gives a CC message with maximum value 7fh (127), and a minimum value 0 when released. Similarly, the round button will light when a MIDI CC message is received, with the controller value determining the colour of the LED.

The Programmer layout does not use the enable/disable self-illumination options on the set-up page. It will only illuminate when a message is sent to the LED.

In this layout, the Up, Down, Left, Right arrow buttons also generate MIDI CC messages, and are available for programmer use. See figures 14 and 15.
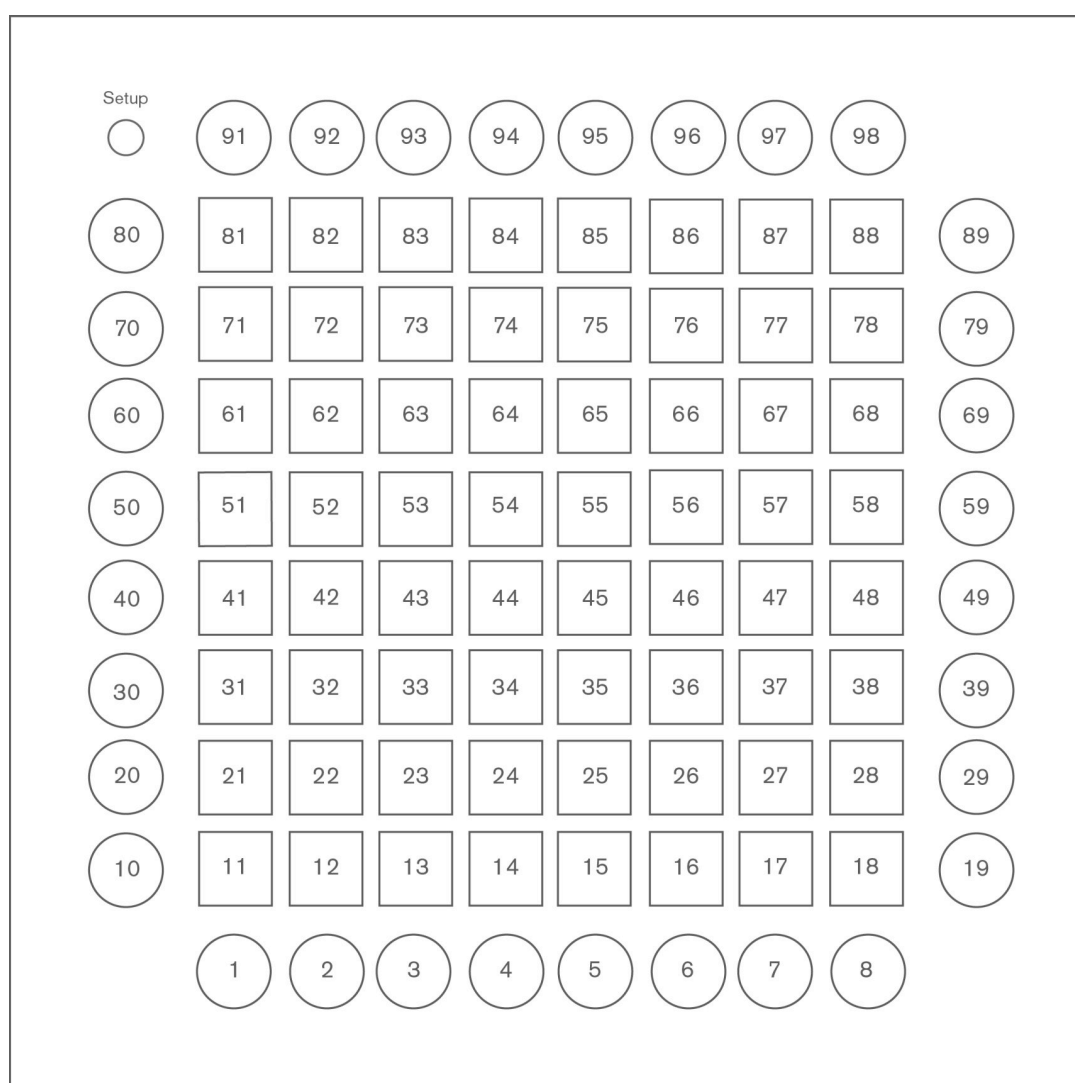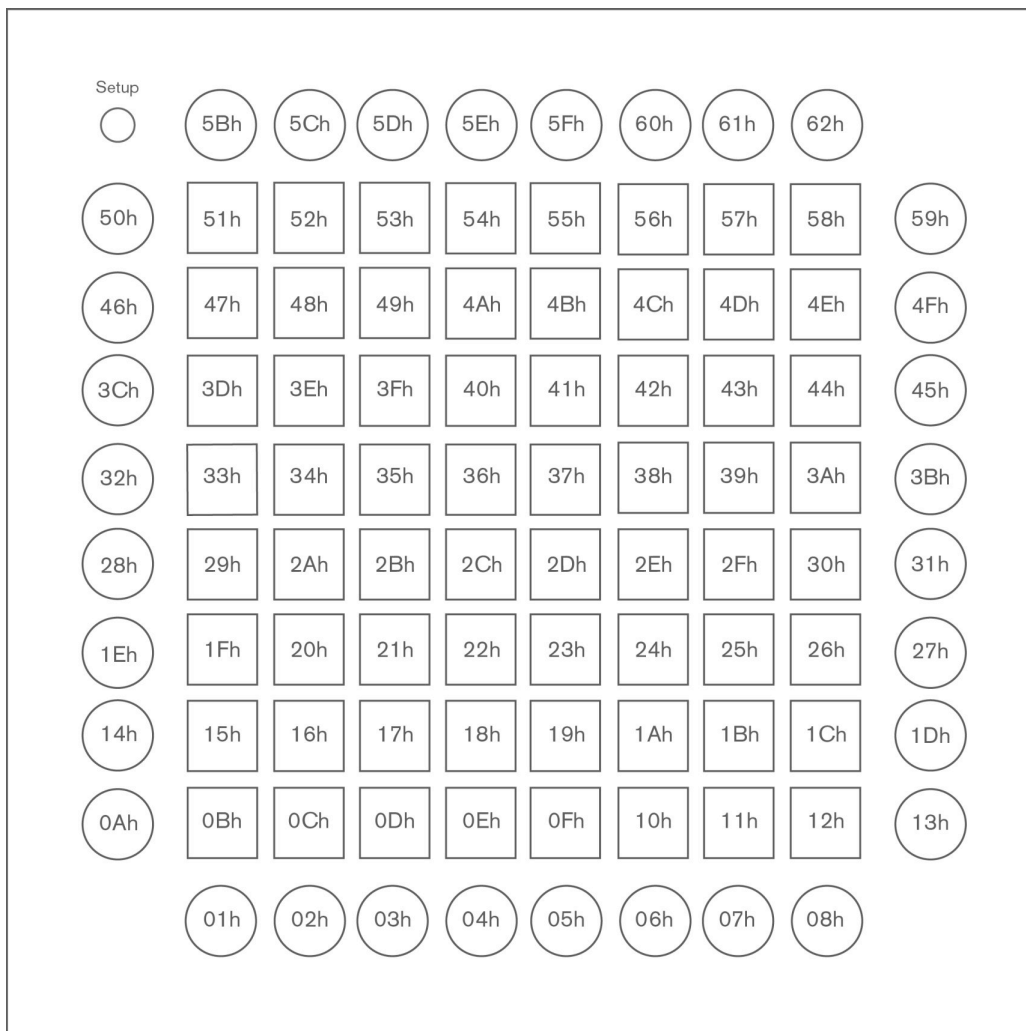

Figure 14: Programmer layout MIDI values, in decimal

Figure 15: Programmer layout MIDI values, in hexadecimal

- **Example: light top left grid LED blue, in Programmer layout**

Host >> Launchpad Pro: Channel 1: Note On A5/51h (81), velocity 2Dh (45)

90h 51h 2Dh (144, 81, 45)

- **Example: light the cursor left LED pink, in Programmer layout on MIDI channel 8**

Host >> Launchpad Pro: Channel 8: set controller 5Dh (93) to 35h (53)

B7h 5Dh 35h (183, 93, 53)

Device Inquiry

Launchpad Pro responds to the MIDI specification's Device Inquiry message.

- **Device Inquiry**

Host >> Launchpad Pro: F0h 7Eh 7Fh 06h 01h F7h
(240,126,127,6,1,247)

Launchpad Pro will respond:

Launchpad Pro >> Host:

>F0h 7Eh <device ID> 06h 02h 00h 20h 29h 51h 00h 00h 00h <firmware revision 4 Bytes> F7h
>
>(240,126, <device ID>, 6, 2, 0, 32, 41, 81, 0, 0, 0, <firmware revision 4 Bytes>, 247)

The firmware revision number is represented by four bytes, where revision 138 would be given as 00h, 01h, 03h, 08h.

Advanced Features

Lighting LEDs Using SysEx Messages

It is possible to control Launchpad Pro's LEDs using SysEx messages. This allows a number of LEDs to be updated quickly in a single message. In this SysEx message, the index of the LED is taken to be the same as Programmer layout, regardless of the currently selected layout. This is also applicable to the round buttons, with the LED index using the same value defined in the Programmer layout. Please refer to figures 14 and 15.

Note that the SysEx LED message will override the colour of the specific pad LED, regardless of the previous colour (including the special round cursor buttons.) However, if those buttons are subsequently pressed and released, the LEDs will return to the official colour of that button. (i.e. The SysEx message LED colour will be overridden by the default colour for that specific button on that layout.)

- **Light LED using SysEx**

The side LED can also be updated by this message. It has an LED index of 99 (63h).

Host >> Launchpad Pro: F0h 00h 20h 29h 02h 10h 0Ah <LED> <Colour> F7h

(240,0,32,41,2,16,10,<LED>,<Colour>,247)

<LED> <Colour> pairs may be repeated up to 97 times in the message.

- **Light a column of LEDs using SysEx**

Columns are numbered left to right, 0 – 9, with 0 and 9 referring to the round buttons. The sequence of LED colours starts at the lowest LED, with the next colour referring to the next higher LED in the same column. However, the LEDs that are missing from the corners (in the columns of round buttons) still occupy a position in the message. They just cannot be seen. Also, the side LED cannot be updated by this message.

Host >> Launchpad Pro: F0h 00h 20h 29h 02h 10h 0Ch <Column> <Colour> F7h

(240,0,32,41,2,16,12, <Column>, <Colour>, 247)

The <Colour> parameter may be repeated within the message up to 10 times.

- **Light a row of LEDs using SysEx**

Rows are numbered bottom to top, 0 - 9, with 0 and 9 referring to the round buttons. The sequence of LED colours starts at the most left LED, with the next colour referring to the next LED to the right in the same row. However, the LEDs that are missing from the corners (in the rows of round buttons) still occupy a position in the message. They just cannot be seen. Also, the side LED cannot be updated by this message.

Host >> Launchpad Pro: F0h 00h 20h 29h 02h 10h 0Dh <Row> <Colour> F7h

(240,0,32,41,2,16,13,<Row>,<Colour>,247)

The <Colour> parameter may be repeated within the message up to 10 times.

▪ **Light all LEDs using SysEx**

The side LED cannot be updated by this message.

Host >> Launchpad Pro: F0h 00h 20h 29h 02h 10h 0Eh <Colour> F7h

(240,0,32,41,2,16,14,<Colour>,247)

The <Colour> parameter cannot be repeated in this message.

Flashing

Launchpad Pro supports flashing between two colours on Programmer layout and Ableton Live mode, but implemented quite differently. In Ableton Live mode, the flash colour is set by sending a Note On message (or CC for the round buttons) to the device on channel 2. When a message is received on channel 2, Launchpad Pro will then begin to flash between the flash colour (B) and the current colour of the LED (A), with a 50% duty cycle. See figure 16.

Programmer mode does not reserve the MIDI channels for flashing, instead it uses a SysEx message to implement flashing.

Flashing (and pulsing) happens in time with MIDI beat clock (see 'MIDI Clock' below), the last known tempo or will default to 120 bpm. Flashing can be stopped by sending the LED a message on channel 1.
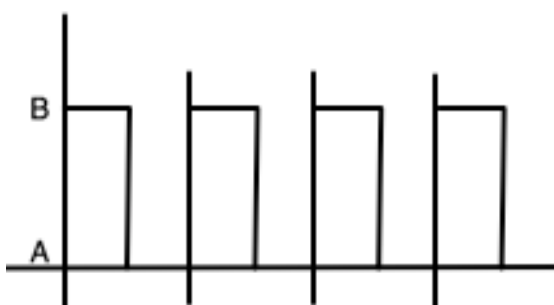

Figure 16: The flashing waveform

▪ **Flash LED using SysEx**

The LED will flash between the chosen colour and its current colour. The side LED can also be updated by this message. It has an LED index of 99 (63h).

Host >> Launchpad Pro: F0h 00h 20h 29h 02h 10h 23h <LED> <Colour> F7h

(240,0,32,41,2,16,35, <LED>, <Colour>, 247)

The <LED> <Colour> parameter pair may be repeated in the message up to 97 times.

To stop flashing just send a standard Note On message or SysEx message to the same pad and it will be cancelled.

Pulsing

Launchpad Pro supports pulsing between two colours in Programmer layout and Ableton Live mode, but implemented quite differently. In Ableton Live mode, pulsing is started by sending the LED a Note On message (or CC message for the round buttons) on channel 3 and can be stopped by sending a message to the LED on channel 1.

Programmer mode does not reserve the MIDI channels for pulsing, instead it uses a SysEx message to implement pulsing.

For pulsing, the colour of the LED rhythmically increases and decreases in brightness, shown in figure 17.
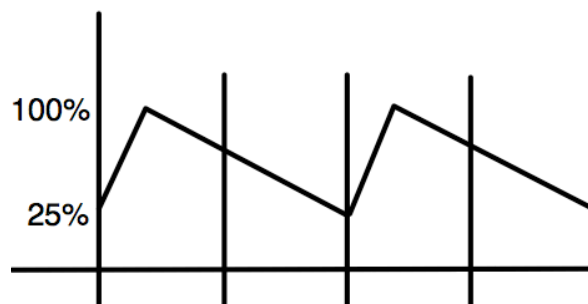

Figure 17: The pulsing waveform

- **Pulse LED using SysEx**

The LED will pulse between the chosen colour and its current colour. The side LED can also be updated by this message. It has an LED index of 99 (63h).

Host >> Launchpad Pro: F0h 00h 20h 29h 02h 10h 28h <LED> <Colour> F7h

(240, 0,32,41,2,16,40,<LED>, <Colour>, 247)

The <LED> <Colour> parameter pair may be repeated in the message up to 97 times.

To stop pulsing just send a standard Note On message or SysEx message to the same pad and it will be cancelled.

RGB Mode

The brightness of the individual red, green and blue elements of the LED can be controlled to create any colour. Each element has a brightness value from 00h – 3Fh (0 – 63), where 0 is off and 3Fh is full brightness.

- **Light LED using SysEx (RGB mode)**

The side LED can also be updated by this message. It has an LED index of 99 (63h).

Host >> Launchpad Pro: F0h 00h 20h 29h 02h 10h 0Bh <LED> <Red> <Green> <Blue> F7h

(240, 0, 32, 41, 2, 16, 11, <LED>, <Red>, <Green>, <Blue>, 247)

The <LED> <Red> <Green> <Blue> group may be repeated in the message up to 78 times.

Note that there is insufficient space in the SysEx message to light the entire surface. In this case, the separate RGB grid light should be used. (See below.) However, the above SysEx message is useful to update blocks of the display in one go.

- ▪ **Light LED grid using SysEx (RGB)**

This SysEx message provides a more efficient solution to updating the entire display (or just the central square pad core) in a single message. The grid starts at the bottom most left LED, with the following group of parameters referring to the next LED to the right. Once a row has been filled, the sequence moves to the beginning of the row above (at the left most LED again). In this way, the entire grid can be built up into a single message. However, the LEDs that are missing from the corners (in the rows of round buttons) still occupy a position in the message. They just cannot be seen. The side LED cannot be updated by this message.

Host >> Launchpad Pro: F0h 00h 20h 29h 02h 10h 0Fh <Grid Type> <Red> <Green> <Blue> F7h

(240, 0, 32, 41, 2, 16, 15, <Grid Type>, <Red>, <Green>, <Blue>, 247)

The <Red> <Green> <Blue> group may be repeated in the message up to 100 times.

<Grid Type>   - 0 for 10 by 10 grid, 1 for 8 by 8 grid (central square pads only)

MIDI Clock

By default, Launchpad Pro will flash and pulse at 120 BPM. This can be altered by sending Launchpad Pro F8h (248) messages (MIDI clock), which should be sent at a rate of 24 per beat. To set a tempo of 100 BPM, 2400 MIDI clock messages should be sent each minute, or with a time interval of 25ms.

Launchpad Pro supports tempos between 40 and 240 BPM.

Text scrolling

Launchpad Pro natively supports scrolling text. ASCII text can be embedded in a System Exclusive message. Additional bytes are reserved to change the colour, whether it loops and the scroll speed.

- ▪ **Start text scrolling**

Host >> Launchpad Pro: F0h 00h 20h 29h 02h 10h 14h <Colour> <Loop> <Text> F7h

(240, 0, 32, 41, 2, 16, 20, <Colour>, <Loop>, <Text>, 247)

<Colour>   - Scroll text colour 00h – 7Fh (0 – 127)

<Loop>   - Set to 01h (1) to loop the message

In addition to the standard ASCII characters, Launchpad Pro recognises plain values 1 – 7 as speed commands (where 1 is the slowest and 7 is fastest). This allows the scrolling speed to be manipulated mid-text. The default speed is 4.

When the text ends, Launchpad Pro restores the LEDs to their previous settings. As the text either ends or loops, a SysEx message will be sent back to the host.

Launchpad Pro >> Host: F0h 00h 20h 29h 02h 10h 15h F7h

(240,0,32,41,2,16,21,247)

- **Example: hello world**

Start the text scrolling.

Host >> Launchpad Pro:

F0h 00h 20h 29h 02h 10h 14h 7Ch 01h 05h 48h 65h 6Ch 6Ch 6Fh 20h 02h 77h 6Fh 72h 6Ch 64h 21h F7h

(240,0,32,41,2,4,16,124,1,5,72,101,108,108,111,32,2,119,111,114,108,100,33,247)

This loops the text in yellow, playing "Hello" quickly and "world!" slowly. To stop it, send an empty scroll command.

Host >> Launchpad Pro: F0h 00h 20h 29h 02h 10h 14h F7h

(240,0,32,41,2,16,20,247)

System Exclusive Messages

Each of the following SysEx messages have the same header

F0h 00h 20h 29h 02h 10h

(240,0,32,41,2,16)

The header includes the 0th byte to the 5th byte. Following is the 6th byte and any further values depending on the message. All SysEx messages are terminated by:

F7h (247)

Parameter Name	6th Byte	Value 1	Value 2	Value 3	Value 4	Repeatable?	Notes
Set LEDs (standard colour mode)	0Ah (10)	LED 01h - 63h (1-99)	Colour 00h - 7Fh (0-127)	--	--	Yes, up to 97 times	
Set LEDs (RGB mode)	0Bh (11)	LED 01h - 63h (1-99)	Red 00h - 3Fh (0-63)	Green 00h - 3Fh (0-63)	Blue 00h - 3Fh (0-63)	Yes, up to 78 times	
Set LEDs by column	0Ch (12)	Column number (0-9)	Colour 00h - 7Fh (0-127)	--	--	Yes, up to 10 times	Columns are numbered from left to right
Set LEDs by row	0Dh (13)	Row number (0-9)	Colour 00h - 7Fh (0-127)	--	--	Yes, up to 10 times	Rows are numbered from bottom to top
Set all LEDs	0Eh (14)	Colour 00h - 7Fh (0-127)	--	--	--	No	A colour value of 0 switches off all LEDs
Set LEDs in grid (RGB)	0Fh (15)	Grid Type 00h - 01h (0-1)	Red 00h - 3Fh (0-63)	Green 00h - 3Fh (0-63)	Blue 00h - 3Fh (0-63)	Yes, up to 100 times	LEDs assumed in sequence, so only Red Green Blue values are repeated for each LED. Type 0 = 10 by 10 grid, 1 = 8 by 8 grid.

Parameter Name	6th Byte	Value 1	Value 2	Value 3	Value 4	Repeatable?	Notes
Flash LED	23h (35)	LED 01h - 63h (1-99)	Colour 00h - 7Fh (0-127)	--	--	Yes, up to 97 times	Selected LED flashes between current lit colour and colour specified in value 2. If selected LED is not lit then it will flash between off and the colour specified in value 2.
Pulse LED	28h (40)	LED 01h - 63h (1-99)	Colour 00h - 7Fh (0-127)	--	--	Yes, up to 97 times	Selected LED pulses with the colour specified in value 2.
Scroll text across pads	14h (20)	Colour 00h - 7Fh (0-127)	Loop 0 = loop off 1 = loop on	Text	--	No	Text can be standard ASCII characters or plain values 1 - 7 to change speed
Mode selection	21h (33)	Mode (0-1)	--	--	--	No	00 = Ableton mode 01 = Standalone mode (default)
Mode status	2Dh (45)	Mode (0-1)	--	--	--	No	Status returned by Launchpad Pro 00 = Ableton mode 01 = Standalone mode
Live Layout selection	22h (34)	Layout 00h – 0Dh (0-13)	--	--	--	No	For Ableton Live mode only. 00 = Session 01 = Drum Rack 02 = Chromatic Note 03 = User (Drum) 04 = Audio (Blank) 05 = Fader 06 = Record Arm (Session) 07 = Track Select (Session) 08 = Mute (Session) 09 = Solo (Session) 0A = Volume (Fader)

Parameter Name	6th Byte	Value 1	Value 2	Value 3	Value 4	Repeatable?	Notes
							0B = Pan (Fader) 0C = Sends (Fader) 0D = Stop Clip (Session)
Live Layout status	2Eh (46)	Layout 00h – 0Dh (0 – 13)	--	--	--	No	As above
Standalone Layout select	2Ch (44)	Layout (0 – 3)	--	--	--	No	For Standalone mode only. 0 = Note 1 = Drum 2 = Fader 3 = Programmer
Standalone Layout status	2F (47)	Layout (0 – 3)	--	--	--	No	As above.
Fader Setup	2Bh (43)	Fader number (0-7)	Fader type 0=volume 1=pan	Colour 00h - 7Fh (0-127)	Initial Value 00h - 7Fh (0-127)	Yes, up to 8 times	Final 4 parameters can be repeated for each fader.

Other SysEx Messages

Launchpad Pro responds to 3 further SysEx messages.

Device Inquiry	F0h 7Eh 7F 06h 01h F7h (240, 126, 127, 6, 1, 247)	Read information about the connected device.
Version Inquiry	F0h 00h 20h 29h 00h 70h F7h (240, 0, 32, 41, 0, 112, 247)	Returns the current bootloader and firmware versions and size of bootloader in KB
Set to bootloader	F0h 00h 20h 29h 00h 71h 00h 69h F7h (240, 0, 32, 41, 0, 113, 0, 105, 247)	Force the Launchpad Pro into bootloader mode