ENGLISH

LAUNCHCONTROL XL

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Launch Control XL 3 programmer's reference guide

Version 1.0

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About the Launch Control XL 3 programmer's reference guide

This document provides all the information you need to be able to control the Launch Control XL 3.

The Launch Control XL 3 communicates using MIDI over USB and DIN. This document describes the MIDI implementation for the device, the MIDI events coming from it, and how the Launch Control XL 3's various features can be accessed through MIDI messages.

We've expressed MIDI data in several ways:

- A plain English description of the message.
- When we describe a musical note, middle C is ‘C3’ or note 60. MIDI channel 1 is the lowest-numbered MIDI channel; channels range from 1 to 16.
- We also express MIDI messages 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).

Entering Launch Control XL 3's bootloader

The Launch Control XL 3 has a bootloader mode that allows you to view the current FW versions, enable/disable Easy Start and set the device ID.

To enter bootloader

1. Unplug the USB cable from your Launch Control XL 3.
2. Hold both Page buttons.
3. Connect the USB cable to power it on.
4. Keep holding the Page buttons until the Launch Control XL 3 is on.

The screen displays the current Application and Bootloader version numbers.

In bootloader mode, you can change the following:

1. Easy Start on/off using the record button.
2. Device ID - using the buttons. Useful when you're using multiple Launch Control XL 3's in your DAW.

When Easy Start is on, the Launch Control XL 3 shows as a Mass Storage Device to provide a more convenient first-time experience. You can turn this off once you are familiar with the device to disable this Mass Storage Device.

To exit bootloader

- Press the Play button.

The buttons set the Device ID to 1-8. Launch Control XL 3 appears on your system with the device ID appended to the device name. This can be useful when using more than one Launch Control XL 3 simultaneously.

MIDI on Launch Control XL 3

The Launch Control XL 3 has a few MIDI interfaces, providing two pairs of MIDI inputs and outputs over USB. They are as follows:

- MIDI In/Out (or first interface on Windows): The main interface used to receive MIDI from the users Custom Modes, and to provide external MIDI input.
- DAW In/Out (or second interface on Windows): This interface is used by DAWs and similar software to interact with the Launch Control XL 3.
- To DIN Out/To DIN Out 2 (or the third and fourth interface on Windows) These interfaces are used to send MIDI from a host to the DIN outputs of the Launch Control XL 3.

When using a Custom Mode, you can enable each of the two DIN MIDI out ports and the Main USB MIDI In/Out as the output for surface-generated events, independently or all at once. Each output can also, optionally, merge the stream of the DIN MIDI in port into it's output.

If you wish to use Launch Control XL 3 as a control surface for a DAW (Digital Audio Workstation) or DAW-like software, you will want to use the DAW interface (See DAW Mode in the main user guide).

Otherwise, you may interact with the device using the MIDI interface.

SysEx message format used by Launch Control XL 3

All SysEx messages begin with the following header, regardless of direction (Host → Launch Control XL 3 or Launch Control XL 3 → Host):

Hex:	F0h	00h	20h	29h	02h	15h
Dec:	240	0	32	41	2	21

After the header is a command byte, selecting the function to use, and then whatever data is required for that function.

Launch Control XL 3 programmer's standalone (MIDI) mode

The Launch Control XL 3 powers up into Standalone mode. This mode does not provide specific functionality for interaction with DAWs, the DAW in/out (USB) interface remains unused for this purpose.

When using any of the Custom Modes available in Standalone mode, enabling the merging of incoming data and port routing noted in the MIDI on Launch Control XL 3 [5] section can be done using the Custom Mode Settings menu accessed using Shift + Mode.

The Page, Track, Record, Play, Solo/Arm and Mute/Select buttons are unused in this mode. Shift and Mode provide access to menus and extended functionality, the rest of the surface output is configurable in our online editor Components

Launch Control XL 3 programmer's DAW mode

DAW mode provides additional functionality, allowing DAWs and DAW-like software to realise intuitive user interfaces on the Launch Control XL 3's surface. The capabilities described in this chapter are only available once DAW mode is enabled.

All functionality described in this chapter is accessible through the DAW In/Out (USB) interface.

NOTE

MIDI data is not sent from the DIN outputs in this mode.

DAW mode control

You can enable and disable DAW Mode using either a note, or SysEx message:

Enable DAW Mode:

```
Hex:     9Fh    0Ch    7Fh

Dec:     159    12     127

Hex:     F0h 00h 20h 29h 02h 15h 02h 7Fh F7h

Dec:     240 0   32  41  2   21  2   127 247
```

Disable DAW Mode:

```
Hex:     9Fh    0Ch    00h

Dec:     159    12     0

Hex:     F0h 00h 20h 29h 02h 15h 02h 00h F7h

Dec:     240 0   32  41  2   21  2   0   247
```

Once the DAW or DAW-like software has recognised and connected to the Launch Control XL 3, it should tell the Launch Control XL 3 to enter DAW mode (send either of the 'Enable DAW Mode' messages above), and then, if necessary, enable the feature controls (see the Launch Control XL 3 feature controls [16] section of this document).

When the DAW or DAW-like software exits, it should exit from DAW mode on the Launch Control XL 3 (send either of the 'Disable DAW Mode' messages above), to return it to Standalone (MIDI) mode.

The surface in DAW mode

In DAW mode, contrary to standalone (MIDI) mode, all buttons, and surface elements not belonging to performance features (such as the Custom Modes) can be accessed and will report on the DAW In/Out (USB) interface only. The controls are mapped to Control Change events as follows:

Decimal values

Hexadecimal values

Encoders and faders output on channel 16; the buttons output on channel 1, except Shift, which outputs on channel 7 as this is linked to its feature control [16].

The Control Change indices listed are also used for sending colour to the corresponding LEDs, see Colouring the surface [11].

Additional modes available in DAW mode

Once in DAW mode, the following additional modes become available:

- DAW Control Mode
- DAW Mixer Mode

Mode report and select

The surface mode can be controlled by MIDI events and are reported back by the Launch Control XL 3 whenever it changes mode due to user activity. These messages are important to capture, as the DAW should follow them when setting up and using the surfaces as intended based on the selected mode.

Mode changes are reported or can be changed by the following MIDI event:

- Channel 7 (MIDI status: B6h, 182), Control Change 1Eh (30)

The modes are mapped to the following values:

- 01h (1): DAW Mixer
- 02h (2): DAW Control
- 06h-09h (6-9): Custom Modes 1 - 4
- 12h - 15h (18-21) for modes 5 - 8
- 16h-1dh (22-29): Custom Modes 8 - 16

Absolute and relative encoder modes

By default encoders are in absolute mode and provide standard CCs as described above. If the DAW sends them position information, they automatically pick that up.

Each row can be independently switched into relative mode

```
Hex:    B6h <RowID> <7Fh:On/00h:Off>

Dec:    182 <RowID> <127:On/0:Off>
```

- 45h (69): Row 1
- 48h (72): Row 2
- 49h (73): Row 3

In Relative mode, the pivot value is 40h(64) (no movement). Values above the pivot point encode clockwise movements. Values below the pivot point encode anticlockwise movements. For example, 41h(65) corresponds to 1 step clockwise and 3Fh(63) corresponds to 1 step anticlockwise.

When in relative mode, the CC numbers increase by 40h(64) for each row of encoders:

Row 1: 4Dh (77) - 54h (84)

Row 2: 55h (85) - 5Ch (92)

Row 3: 5Dh (93) - 64h (100)

Continuous control touch events

```
Hex:    B6h 47h <7Fh:On/00h:Off>

Dec:    182 71 <127:On/0:Off>
```

If Continuous Control Touch events are enabled, the Touch On is sent as a Control Change event with Value 127 on Channel 15, while the Touch Off is sent as a Control Change event with Value 0 on Channel 15.

For example, the leftmost Fader would send **BEh 05h 7Fh** (190 5 127) for Touch On, and **BEh 05h 00h** (190 5 0) for Touch Off.

Colouring the surface

For all controls, or a control change matching those described in the reports can be sent to colour the corresponding LED (if the control has any).

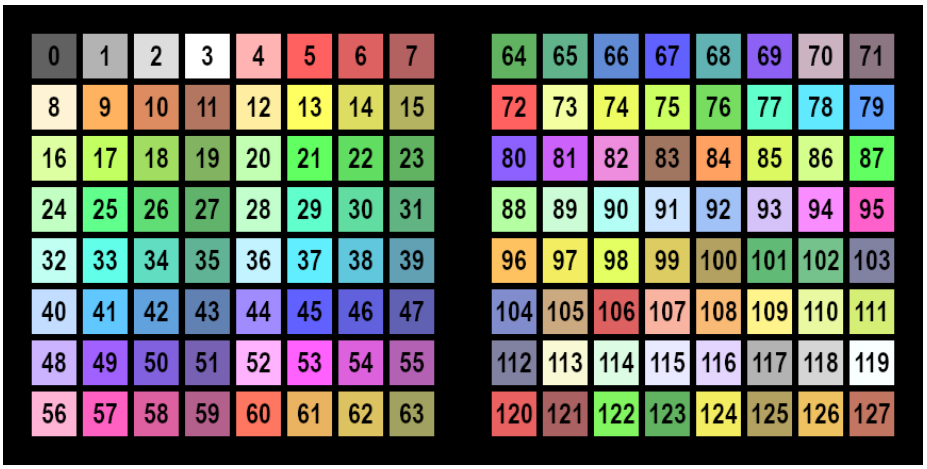
```
Hex:    B0h <control index> <colour index>

Dec:    176 <control index> <colour index>
```

NOTE

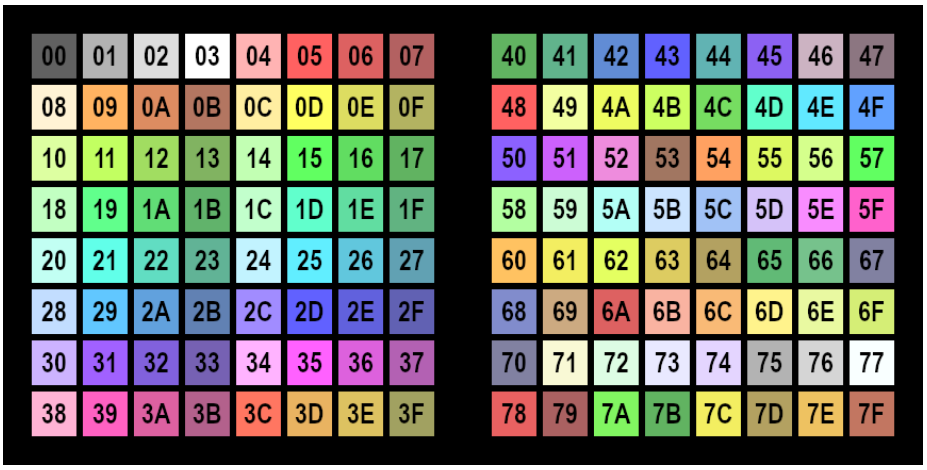
The Shift button is excluded as it is tied to a Feature Control message. See Launch Control XL 3 feature Controls [16] section for further information.

Colour palette

When providing colours by MIDI notes or control changes, the colours are chosen according to the following table, decimal:



The same table with hexadecimal indexing:



RGB Colour

Buttons and encoder LEDs can also be set to a custom colour using the following SysEx:

```
Hex:    F0h 00h 20h 29h 02h 15h 01h 53h <control index> <R> <G> <B> F7h

Dec:    240 0   32  41  2   21  1   83  <control index> <R> <G> <B> 247
```

Encoder LEDs can be addressed using the absolute mode control indices when encoders are in either absolute or relative mode.

Controlling the screen

- Stationary display: A default display which is shown unless any event requires a different display to be temporarily shown above it.
- Temporary display: A display triggered by an event, persisting for the length of the display timeout user setting.
- Parameter name: Used in association with a control, showing what it is controlling. Unless provided by messages (SysEx), typically this is the MIDI entity (such as note or CC).
- Parameter value: Used in association with a control, showing the current value of it. Unless provided by messages (SysEx), this is the raw value of the MIDI entity controlled (such as a number in range 0 - 127 in case of a 7-bit CC).

Configure displays

```
Hex:    F0h 00h 20h 29h 02h 15h 04h <target> <config> F7h

Dec:    240 0   32  41  2   21  4   <target> <config> 247
```

Once a display is configured for a given target, it can be triggered.

Targets

- 05h (5) - 24h (36): Temporary display for Analogue controls (same as CC indices, 05h (5) - 0Ch (12): Faders, 0Dh (13) - 24h (36): Encoders)
- 35h (53): Permanent/Stationary display
- 36h (54): Overlay/Temporary display

Config

The <config> byte sets up the arrangement and operation of the display. 00h and 7Fh are special values: they cancel (00h) or bring up (7Fh) the display with its current contents (as MIDI Event, it is a compact way to trigger display).

- Bit 6: Allow Launch Control XL 3 to generate temporary display automatically on Change (default: Set).
- Bit 5: Allow Launch Control XL 3 to generate temporary display automatically on Touch (default: Set; this is the Shift + rotate).
- Bit 0-4: Display arrangement

Display arrangements:

- 0: Special value for cancelling display.
- 1-30: Arrangement IDs, see table below.
- 31: Special value for triggering display.

ID	Description	Num	Fields	F0	F1	F2
1	2 lines: Parameter Name and Text Parameter Value	No	2	Name	Value	-
2	3 lines: Title, Parameter Name and Text Parameter Value	No	3	Title	Name	Value
3	1 line + 2x4: Title and 8 names (for encoder designations)	No	9	Title	Name	...
4	2 lines: Parameter Name and Numeric Parameter Value (default)	Yes	1	Name	-	-

NOTE

The arrangement is ignored for targets only setting names (22h(34) – 28h(40)), however for changing triggerability, it needs to be set non-zero (since the value 0 for these still acts for cancelling the display).

Setting text

Once a display is configured, the following message can be used to fill in the text fields.

```
Hex:    F0h 00h 20h 29h 02h 15h 06h <target> <field> <text…> F7h

Dec:    240 0   32  41  2   21  6   <target> <field> <text…> 247
```

The text uses the standard ASCII character mapping in the range 20h (32) – 7Eh (126) with the addition of the below control codes, which have been reassigned to provide additional non-ASCII characters.

- Empty Box - 1Bh (27)
- Filled Box - 1Ch (28)
- Flat Symbol - 1Dh (29)
- Heart - 1Eh (30)

Other control characters should not be used as their behaviour may change in the future.

Bitmap

The screen can also display custom graphics by sending a bitmap to the device.

```
Hex:    F0h 00h 20h 29h 02h 15h 09h <target> <bitmap_data> 7Fh

Dec:    240 0   32  41  2   21  9   <target> <bitmap_data> 127
```

The <target> can be either the Stationary display (20h(32)) or the Global temporary display (21h(33)). There is no effect on other targets.

The <bitmap_data> is of fixed 1216 bytes, 19 bytes for each pixel row, for a total of 64 rows (19 × 64 = 1216). The 7 bits of the SysEx byte encode pixels from left to right (highest bit corresponding to the leftmost pixel), the 19 bytes covering the 128 pixels width of the display (with five unused bits in the last byte).

Upon success, there is a response to this message, which is suitable for timing fluid animations (once receiving it, the Launch Control XL 3 is ready to accept a next Bitmap message):

```
Hex:    F0h 00h 20h 29h 02h 15h 09h 7Fh

Dec:    240 0   32  41  2   21  9   127
```

The display can be cancelled by either cancelling it explicitly (using the Configure Display SysEx or MIDI Event), or triggering the normal display (whose parameters are preserved while the bitmap is displaying).

IMPORTANT

The firmware can only hold one bitmap in its memory at once.

Launch Control XL 3 feature Controls

Many of the Launch Control XL 3's features can be controlled by MIDI CC messages sent to the Launch Control XL 3's DAW in port on channel 7 and queried by sending the same message to channel 8. Reply messages confirming changes or answering queries will always be sent on channel 7.

To enable or disable these controls in standalone mode, use the below messages.

Enable feature controls:

```
Hex:    9Fh 0Bh 7Fh

Dec:    159 11  127
```

Disable feature controls:

```
Hex:    9Fh 0Bh 00h

Dec:    159 11  0
```

- In DAW mode, all feature controls are listening, but will not send the confirmation reply except for a few essential ones.
- In DAW mode, the above messages can be used to enable all of them or revert to the DAW set.
- The CC messages must be sent to the Launch Control XL 3's DAW in MIDI port.
- Features marked with (*) are non-volatile, persisting across power cycles.
- Features marked with (#) are always fully enabled in DAW mode.

CC Number		Feature	Control type
Hex	Decimal		
1Eh (#)	30 (#)	Surface mode select	DAW Mixer: 01h (1) DAW Control: 02h (2) Custom Modes 1-4: 06h-09h (6-9) Custom Modes 5-16: 12h-1Dh (18-29)
3Fh (#)	63 (#)	Shift	On/Off
45h (#)	69 (#)	DAW Encoder, Row 1 Relative output	On/Off
48h (#)	72 (#)	DAW Encoder, Row 2 Relative output	On/Off
49h (#)	73 (#)	DAW Encoder, Row 3 Relative output	On/Off
46h (#)	70 (#)	DAW Fader Pickup	On/Off
47h (#)	71 (#)	DAW Touch events	On/Off
6Fh (*)	111 (*)	LED brightness level	00h - 7Fh (0 – 127) where 0 is min, 7Fh/127 is max.
70h (*)	112 (*)	Screen brightness level	00h - 7Fh (0 – 127) where 0 is min, 7Fh/127 is max.
71h (*)	113 (*)	Temporary display timeout	00h - 63h (0 - 99) 1/10 sec units, minimum of 1 sec at 0.
78h (*)	120 (*)	Out2 MIDI Thru Enable/Disable	On/Off
64h (*)	100 (*)	Global MIDI channel	00h - 0eh (0 - 15) where 00h (0) is channel 1 and 0Eh (15) is channel 16.
Hex - 79h (*)	Dec - 121 (*)	Encoder Curve	Slow 00h (0) Medium 01h (1) Fast 02h (2)