

The following information is important for software vendors who wish to create a level of software integration for the Logic/Mackie Control/XT units.

This documentation covers firmware version V1.0.

Note: All numbers are in hexadecimal format.

Variable bytes are shown in *italics* and use characters other than a-f as a placeholder.

All channel messages use running status messages. Once an initial 3-byte message has been sent, the status byte is dropped from proceeding transmitted channel messages, in order to conserve bandwidth.

SysEx Message Header

The following documentation uses the place holder "<Hdr>" whenever the SysEx header is transmitted or received. It has the following form:

F0	MIDI SysEx status byte
00 00 66	Mackie 3-byte SysEx manufacturer ID
<i>ii</i>	Model ID
10	Logic Control
11	Logic Control XT

A device ID is not required, as each unit needs a dedicated MIDI cable.

Global Control Messages

Host Connection and Initialization

Received:

<Hdr> 00 F7
Device Query
<Hdr> 02 *ss ss ss ss ss ss rr rr rr rr* F7
Host Connection Reply
<Hdr> 0F 7F F7
Go Offline

Transmitted:

<Hdr> 01 *ss ss ss ss ss ss // // // //* F7
Host Connection Query
<Hdr> 03 *ss ss ss ss ss ss ss ss* F7
Host Connection Confirmation
<Hdr> 04 *ss ss ss ss ss ss ss ss* F7
Host Connection Error

ss = Serial number (7 bytes ASCII text, non null-terminated)
// = Challenge code (4 bytes)
rr = Response code (4 bytes)

Offline Mode:

Logic Control employs a query system to maintain a connection to the host software. When Logic Control is initially powered up, it defaults to Offline mode. In Offline mode, Logic Control's faders move to their lowest setting, and the LCD reads "EMAGIC LOGIC CONTROL -- by MACKIE." After power-on, Logic Control also transmits a system exclusive Host Connection Query message that is used (by the host) to detect a connection, and what type of device is connected (Logic Control/Logic Control XT).

Communications Initialization:

When the host software receives a Host Connection Query message (containing a serial number and a random challenge code), it should transmit a Host Connection Reply command within 300ms to initialize Logic Control. The command must contain the same serial number and the correct response code for the challenge code. Here is the algorithm (*l1* to *l4* = challenge code bytes 1 to 4, *r1* to *r4* = response code bytes 1 to 4):

$$\begin{aligned}r1 &= 0x7F \& (l1 + (l2 \wedge 0xa) - l4); \\r2 &= 0x7F \& ((l3 \gg 4) \wedge (l1 + l4)); \\r3 &= 0x7F \& (l4 - (l3 \ll 2) \wedge (l1 | l2)); \\r4 &= 0x7F \& (l2 - l3 + (0xF0 \wedge (l4 \ll 4))); \end{aligned}$$

Logic Control will, in turn, respond with either:

- a Host Connection Confirmation message that contains the serial number, and switch to Online mode—where it will await further instructions from the host, or
- reply with a Host Connection Error message, if the response code was wrong.

Online Mode:

Once the connection between Logic Control and the host software has been made, Logic Control stays in Online Mode until it receives a Go Offline message.

Firmware version request

Received:

<Hdr> 13 00 F7 Version request

Transmitted:

<Hdr> 14 vv vv vv vv vv F7 Version reply

vv 5 ASCII bytes containing version string, e. g. "V1.0"

Note: When Logic Control receives a version request message, it sends the version reply message.

Reset Messages

Received:

<Hdr> 61 F7 Faders to minimum
(Sends all faders to the bottom of their throw)

<Hdr> 62 F7 All LEDs off
(Turns off all LEDs on Logic Control)

<Hdr> 63 F7 Reset
(Re-Boots Logic Control into Offline mode)

Transmitted: No

Configuration Messages

Received:

<Hdr> 0A tt F7 Transport button click

<Hdr> 0B ll F7 LCD back light saver

<Hdr> 0C mm F7 Touchless movable faders

<Hdr> 0E ii ss F7 Fader touch sensitivity

Transmitted: No

tt 00 = no transport button click
 01 = transport button click (default)

ll 00 = LCD back light off
 01 to 7F = LCD back light on, with time out in minutes (default: 0F = 15 minutes)

mm 00 = fader movements are only transmitted if the fader has been recognized as touched
 01 = fader movements are also transmitted if the fader has not been recognized as touched (e. g. with fingernail or pen)

ii Fader ID (00 thru 07; Master = 08)

ss Fader touch sensitivity (00 to 05; default: 03)

Common Control Messages

Faders

Received: *Ei, ll, hh* Move fader to position
Transmitted: *Ei, ll, hh* Fader moved by user
i Fader ID (00 thru 07; Master = 08)
ll Fader position value low 7 bits (00–7F)
hh Fader position value high 7 bits (00–7F)
Example: E0, 40, 55 = Fader Ch. 1, position (55 << 7) + 40

Note: Message format for transmitted fader position is the same as for received position. Only the top (high) 10 of the 14 transmitted bits are required. Positions 0 to 1023 (decimal) are transmitted as 0000 to 03FF (*Ei* 00 00 to *Ei* 7F 7F).

Switches

Received: None
Transmitted: 90, *ii, ss* Switch pressed/released by user
ii Switch ID (See “Logic Control—Control Surface Layout and IDs” on page 251.)
ss Switch State
 00 = switch or fader relead
 7F = switch pressed or fader touched
Example: 90, 0F, 7F = SOLO Ch. 8 is pressed
 90, 0F, 00 = SOLO Ch. 8 is released

Note: LEDs and switches use the same control message. This approach means that an LED has the same ID as its corresponding switch.

LEDs

Received: 90, *ii, ss* Set LED status
Transmitted: None
ii LED ID (See “Logic Control—Control Surface Layout and IDs” on page 251.)
ss LED State (7F = on, 00 = off, 01 = flashing)
Example: 90, 08, 7F = Turn LED 08 on
 90, 08, 00 = Turn LED 08 off

Note: Switches and LEDs use the same control message. This ensures that an LED always shares an ID with its corresponding switch.

V-Pots

Received: None
Transmitted: B0, 1*i*, XX V-POTs turned by user
i V-POT ID (00–07)
XX delta value in the form of (0 *s* *v* *v* *v* *v* *v* *v*)
 s direction bit:
 0 = clockwise,
 1 = counter clockwise
 vv number of ticks

Examples:

- B0, 10, 01 = V-POT Ch. 1 is being turned clockwise by one tick.
- B0, 17, 47 = V-POT Ch. 8 is being turned counter-clockwise by 7 ticks.

V-Pot LED ring

Received: B0, 3*i*, XX Set LED ring display
Transmitted: None
i V-POT number (0 thru 7)
XX V-POT display control byte in the form of
 (0 *p* *xx* *v* *v* *v* *v*):
 p V-POT display center LED state
 (1 = on, 0 = off)
 xx V-POT mode (00 thru 03; see diagrams below)
 vv V-POT display position value
 00 = all LEDs in ring off;
 01 thru 0B see diagrams below

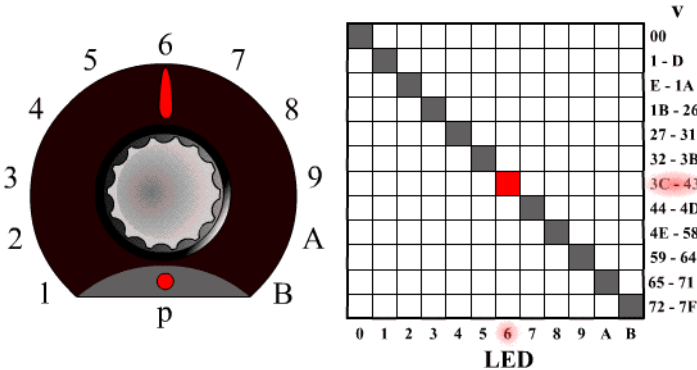
Example:

- B0, 31, 06 = V-POT 2 display shows LEDs at position 6.

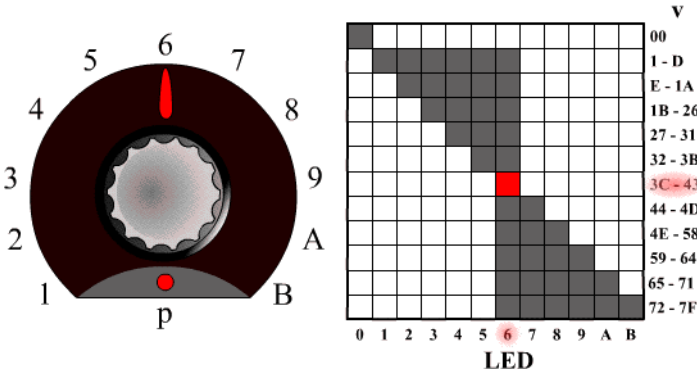
Note: In any V-POT display mode, a received LED position value of 00 will turn off all of the V-POT LEDs.

V-POT Display modes available:

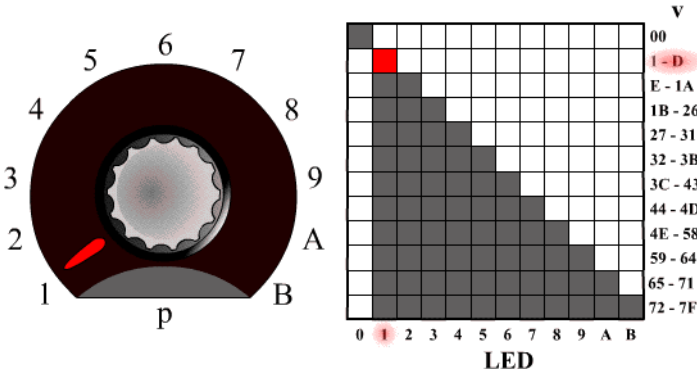
Mode 0 - Single Dot



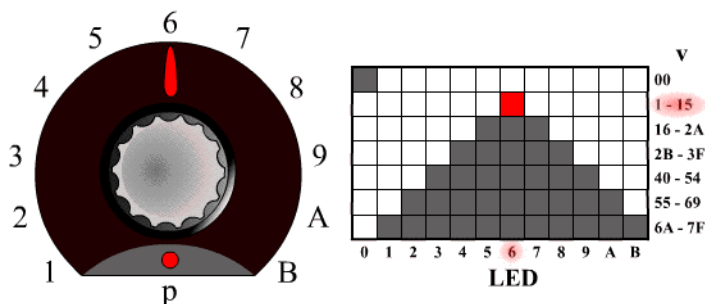
Mode 1 - Boost/Cut



Mode 2 - Wrap



Mode 3 - Spread



External Controller

Received: None

Transmitted: B0, 2E, vv External Controller changed

vv External Controller position value (00–7F)

Example:

- B0, 2E, 07 = External Controller value = 07

Jog Wheel

Received: None

Transmitted: B0, 3C, XX Jog wheel turned by user

XX delta value in the form of (0 s v v v v v v)

s direction bit: 0 = clockwise, 1 = counter clockwise

vv number of ticks

Examples:

- B0, 3C, 01 = Jog forward.
- B0, 3C, 41 = Jog reverse.

LCD

Received: <Hdr>, 12, oo, yy, ..., F7 Update LCD

Transmitted: None

oo Display offset to write from:
00 thru 37 for upper line,
38 thru 6F for lower line.

yy Data: ASCII equivalents for display characters—written from left to right—
and including line wrapping between upper and lower lines. Up to 100 data
bytes may be sent in one message.

Example:

- The following message writes “Hello” to the top left of the LCD on a Logic Control master section.

F0 00 00 66 10 12 00 48 65 6C 6C 6F F7

Notes:

- There are 7 displayed characters per channel, with the exception of channel 8, which is limited to displaying the first 6 characters. Internally however, the LCD stores 2 x 56 characters.
- In most cases, you will use the LCD in a scribble-strip fashion (text above each channel). In this scenario, you should only use the first six characters per channel, thus allowing for spaces between the text of each channel.
- The lower line can be switched into meter mode. See “Metering” on page 249 for further details.
- While the LCD switches between horizontal and vertical metering modes, it ignores LCD messages. You should delay LCD messages for at least 600 ms after sending an LCD metering mode change message.

Time Code/BBT Display

Received:

<Hdr>, 10, yy, ..., F7 Update multiple characters
B0, 4i, yy Update single character

Transmitted: None

i Digit ID: 0 = right-most, 9 = left-most

yy Data bytes representing character to be written (See "7-Segment Display Character Table" on page 248). Up to ten characters can be sent in the SysEx message.

Examples:

- The following message writes "109.02.01.126" to the Time Code display (note decimal points).
F0 00 00 66 10 10 36 32 31 71 30 72 30 79 30 31 F7
- B0 40 30 41 31 = writes "10" into the last two digits.

Important: The digits in the Time Code and Assignment displays are written RIGHT-TO-LEFT, which helps to conserve bandwidth.

Assignment 7-segment display

Received:

<Hdr>, 11, yy, yy, F7 Update multiple characters
B0, 4i, yy Update single character

Transmitted: None

i Digit ID: A= right, B = left

yy Data bytes representing character to be written (See "7-Segment Display Character Table" on page 248). Two characters can be sent in the SysEx message.

Example:

- B0 4B 10 4A 4E = writes "Pn." to the Assignment display.

Important: The digits in the Time Code and Assignment displays are written RIGHT-TO-LEFT, to help conserve bandwidth.

7-Segment Display Character Table

	0x	1x	2x	3x
x0	@	P	0	0
x1	A	Q	!	1
x2	B	R	"	2
x3	C	S	#	3
x4	D	T	\$	4
x5	E	U	%	5
x6	F	V	&	6
x7	G	W	'	7
x8	H	X	(8
x9	I	Y)	9
xA	J	Z	*	:
xB	K	[+	;
xC	L	\	,	<
xD	M]	-	=
xE	N	^	.	>
xF	O	_	/	?

Hint:

- Characters @ (40h) thru ` (60h) = (ASCII value) – 40h
- Characters ! (21h) thru ? (3Fh) = ASCII value

Note: The decimal point on each 7-segment character can be lit by adding 40 Hex to the value of the data.

Metering

Received:

D0, XX	Peak level
<Hdr>, 20, ii, mm, F7	Channel meter mode
<Hdr>, 21, yy, F7	Global LCD meter mode

Transmitted: None

XX Meter level in the form of (0 h h h l l l):

hh Channel to be addressed (0 thru 7)

ll Meter level:

0 thru C = level meter 0% to 100%

 Overload not cleared!

E = set overload

F = clear overload

ii Channel ID (0 to 7)

mm mode bit map in the form of (0 0 0 0 0 l p s):

l Enable level meter on LCD

p Enable peak hold display (horizontal only)

s Enable Signal LED

yy 00 = horizontal; 01 = vertical

Notes:

- There is only one level meter per channel. For stereo tracks, use the maximum of left and right levels.
- Only transmit peak levels. Logic Control automatically decreases the level meter bars, and switches off the Signal Present LED (over time). This approach ensures that MIDI bandwidth takes only a fraction of that required by implementations where the current level (and peak level) is transmitted constantly.
- Decay rate is approximately 300ms per meter division (1.8 seconds to fall from 100% to 0%).
- The LCD meter value and the duration of the Signal Present LED are controlled by the same data byte.
- While the LCD switches between horizontal and vertical metering mode, it ignores LCD messages. You should delay LCD messages for at least 600 ms after sending an LCD metering mode change message.

Logic Control— Control Surface Layout and IDs

C

ID	Switch	LED	Function
00	•	•	REC/RDY Ch. 1
01	•	•	REC/RDY Ch. 2
02	•	•	REC/RDY Ch. 3
03	•	•	REC/RDY Ch. 4
04	•	•	REC/RDY Ch. 5
05	•	•	REC/RDY Ch. 6
06	•	•	REC/RDY Ch. 7
07	•	•	REC/RDY Ch. 8
08	•	•	SOLO Ch. 1
09	•	•	SOLO Ch. 2
0A	•	•	SOLO Ch. 3
0B	•	•	SOLO Ch. 4
0C	•	•	SOLO Ch. 5
0D	•	•	SOLO Ch. 6
0E	•	•	SOLO Ch. 7
0F	•	•	SOLO Ch. 8
10	•	•	MUTE Ch. 1
11	•	•	MUTE Ch. 2
12	•	•	MUTE Ch. 3
13	•	•	MUTE Ch. 4
14	•	•	MUTE Ch. 5
15	•	•	MUTE Ch. 6
16	•	•	MUTE Ch. 7
17	•	•	MUTE Ch. 8
18	•	•	SELECT Ch. 1
19	•	•	SELECT Ch. 2

ID	Switch	LED	Function
1A	•	•	SELECT Ch. 3
1B	•	•	SELECT Ch. 4
1C	•	•	SELECT Ch. 5
1D	•	•	SELECT Ch. 6
1E	•	•	SELECT Ch. 7
1F	•	•	SELECT Ch. 8
20	•		V-Select Ch. 1
21	•		V-Select Ch. 2
22	•		V-Select Ch. 3
23	•		V-Select Ch. 4
24	•		V-Select Ch. 5
25	•		V-Select Ch. 6
26	•		V-Select Ch. 7
27	•		V-Select Ch. 8
28	•	•	ASSIGNMENT: TRACK
29	•	•	ASSIGNMENT: SEND
2A	•	•	ASSIGNMENT: PAN/SURROUND
2B	•	•	ASSIGNMENT: PLUG-IN
2C	•	•	ASSIGNMENT: EQ
2D	•	•	ASSIGNMENT: INSTRUMENT
2E	•		FADER BANKS: BANK Left
2F	•		FADER BANKS: BANK Right
30	•		FADER BANKS: CHANNEL Left
31	•		FADER BANKS: CHANNEL Right
32	•	•	FLIP
33	•	•	GLOBAL VIEW
34	•		NAME/VALUE
35	•		SMPTE/BEATS
36	•		F1
37	•		F2
38	•		F3
39	•		F4
3A	•		F5
3B	•		F6
3C	•		F7
3D	•		F8

ID	Switch	LED	Function
3E	•		GLOBAL VIEW: MIDI TRACKS
3F	•		GLOBAL VIEW: INPUTS
40	•		GLOBAL VIEW: AUDIO TRACKS
41	•		GLOBAL VIEW: AUDIO INSTRUMENT
42	•		GLOBAL VIEW: AUX
43	•		GLOBAL VIEW: BUSSES
44	•		GLOBAL VIEW: OUTPUTS
45	•		GLOBAL VIEW: USER
46	•		SHIFT
47	•		OPTION
48	•		CONTROL
49	•		CMD/ALT
4A	•	•	AUTOMATION: READ/OFF
4B	•	•	AUTOMATION: WRITE
4C	•	•	AUTOMATION: TRIM
4D	•	•	AUTOMATION: TOUCH
4E	•	•	AUTOMATION: LATCH
4F	•	•	GROUP
50	•	•	UTILITIES: SAVE
51	•	•	UTILITIES: UNDO
52	•		UTILITIES: CANCEL
53	•		UTILITIES: ENTER
54	•	•	MARKER
55	•	•	NUDGE (Logic Pro only)
56	•	•	CYCLE
57	•	•	DROP
58	•	•	REPLACE
59	•	•	CLICK
5A	•	•	SOLO
5B	•	•	REWIND
5C	•	•	FAST FWD
5D	•	•	STOP
5E	•	•	PLAY
5F	•	•	RECORD
60	•		Cursor Up
61	•		Cursor Down

ID	Switch	LED	Function
62	•		Cursor Left
63	•		Cursor Right
64	•	•	Zoom
65	•	•	Scrub
66	•		User Switch A
67	•		User Switch B
68	•		Fader Touch Ch. 1
69	•		Fader Touch Ch. 2
6A	•		Fader Touch Ch. 3
6B	•		Fader Touch Ch. 4
6C	•		Fader Touch Ch. 5
6D	•		Fader Touch Ch. 6
6E	•		Fader Touch Ch. 7
6F	•		Fader Touch Ch. 8
70	•		Fader Touch Master
71		•	SMPTE LED
72		•	BEATS LED
73		•	RUDE SOLO LIGHT
76		•	Relay click

Logic Control— MIDI Implementation Chart

Function	Transmitted	Recognized	Remarks
Channel, Default:	1	1	Each Logic Control unit should be installed on a separate MIDI port.
Changed:	1	1	
Mode, Default:	X	X	
Messages:	X	X	
Altered:	X	X	
Note Number	O 0–127	O 0–127	
True Voice:	X	X	
Velocity, Note On:	O v = 1–127	O v = 1–127	
Note Off:	X v = 00	X v = 00	
After Touch, Keys:	X	X	
Chan's:	X	O	
Pitch Bend	O	O	Used for motor faders
Control Change	O	O	
Program Change	X	X	
True #:			
SYSTEM EXCLUSIVE:	O	O	
SYSTEM COMMON:	X	X	

Mode 1: OMNI ON, POLY, Mode 2: OMNI ON, MONO, O: Yes
Mode 3: OMNI OFF, POLY, Mode 4: OMNI OFF, MONO, X: No