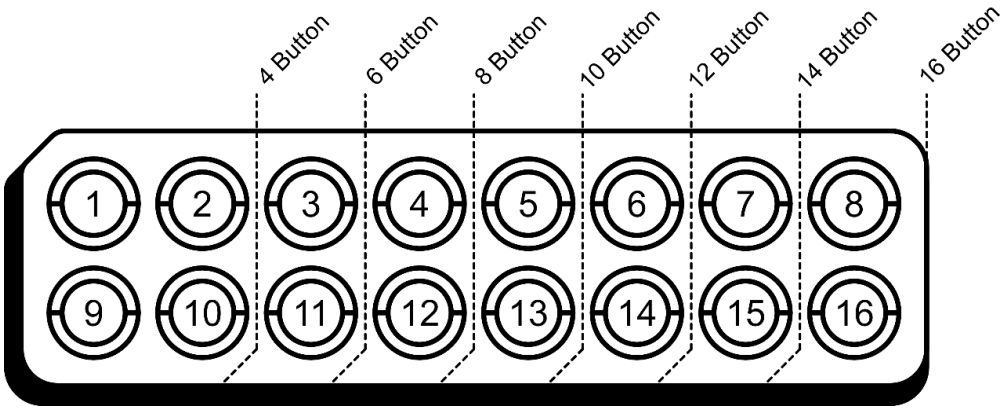
Overview

The M-Flex Legends Keypads are designed to communicate key press status over a Controller Area Network (CAN) bus using the J1939 messaging protocol. The LED indicators built into the keypad are controlled via CAN messages from a connected device (such as an M-Flex Digital Switcher).

Key Orientation

To support different keypad configurations, the keys are numbered between 1 and 16 starting from the upper-left key. Note the key number schema for keypads with fewer than 16 buttons, shown below. The LEDs for each key are divided into "top" and "bottom" sections, each of which can be controlled separately.



Addressing

When used with an M-Flex Digital Switcher, up to 6 keypads can be used; however, each keypad has a type numbered 1 through 4. All keypads with matching type will have the same state with regards to day/night mode, high/low state, and color commands. This allows for greater flexibility in configuring multiple and/or redundant keypads.

The keypad type is documented and configured in the XML specification (13838S)

Baud Rate

The keypad will automatically determine the correct CAN baud rate on start-up using an automatic baud rate detection sequence. Acceptable CAN baud rates are 250k/500k/1M.

CREATED	E. FIERST	DATE	06/23/23
CHECKED	J. COOPER	DATE	10/26/23
APPROVED	J. COOPER	DATE	10/26/23
ECN	13829E	DATE	10/04/21

Transmitted Messages

Button Status

The keypad module transmits keypress status as a broadcast message. The message data field contains the state of each of the keys, in addition to the system battery voltage.

Key Status Message

PGN: 61439
hex: EFFF

Description	This message is broadcast periodically or on change of state to indicate the status of the keys
PGN	61439
Priority	6
Destination	Global
DLC	8
Direction	Transmit
Update Rate	100ms periodic and upon change of state

Start	Bits	Name	Notes
1.1	8	Not Used	
2.1	8	Not Used	
3.1	1	Key 1 Status	0 - Not Pressed 1 - Pressed Any bits representing keys not present on the keypad will be set to 0
3.2	1	Key 2 Status	
3.3	1	Key 3 Status	
3.4	1	Key 4 Status	
3.5	1	Key 5 Status	
3.6	1	Key 6 Status	
3.7	1	Key 7 Status	
3.8	1	Key 8 Status	
4.1	1	Key 9 Status	
4.2	1	Key 10 Status	
4.3	1	Key 11 Status	
4.4	1	Key 12 Status	
4.5	1	Key 13 Status	
4.6	1	Key 14 Status	
4.7	1	Key 15 Status	
4.8	1	Key 16 Status	
5.1	8	Not Used	
6.1	8	Keypad Type	
7.1	8	Number of Buttons	
8.1	8	Battery Voltage	0.196V/bit

Received Messages

Day/Night/High/Low Command

This message configures the brightness levels for keypad day and night modes as well as high and low brightness values. This message also commands the state of each key between day and night mode as well as high or low mode.

Brightness Levels and State Command	**PGN:**	**61200 / 61204 / 612108 / 61212**
	Hex:	**EF10 / EF14 / EF18 / EF1C**

Description	This message sets brightness levels and state of each button for day/night mode as well as high/low state
PGN	61200 for Keypad 1, 61204 for Keypad 2, 61208 for Keypad 3, 61212 for Keypad 4
Priority	6
Destination	Keypad
DLC	8
Direction	Receive
Update Rate	N/A

Start	Bits	Name	Notes
1.1	8	Daytime High Brightness	0-255 (0.39125%/bit)
2.1	8	Daytime Low Brightness	
3.1	8	Nighttime High Brightness	
4.1	8	Nighttime Low Brightness	
5.1	16	Key 1-16 Hi/Lo Cmd	0 - Low, 1 - High, Key1 = LSB
7.1	16	Key 1-16 Day/Night Cmd	0 - Day, 1 - Night, Key1 = LSB

Button Top/Full Color

The keypad receives messages via CAN that set the color of each LED section from a list of both pre-defined and user-programmable colors. If the message for setting the bottom button color has been received by the keypad, this message only sets the color of the top LED section of the key. Otherwise, this message sets the color of both top and bottom sections.

LED Color – Top/Full	PGN:	61201 / 61205 / 612109 / 61213
	Hex:	EF11 / EF15 / EF19 / EF1D

Description	This message sets the color for either the top section of LEDs or all of the LEDs, per button, depending on whether the Bottom Color command has been received
PGN	61201 for Keypad 1, 61205 for Keypad 2, 61209 for Keypad 3, 61213 for Keypad 4
Priority	6
Destination	Keypad
DLC	8
Direction	Receive
Update Rate	N/A

Start	Bits	Name	Notes
1.1	4	Button 2 Color	0 - Black (off) 1 - Blue 2 - Green 3 - Cyan 4 - Red 5 - Magenta 6 - Yellow 7 - White 8 - Orange 9 - Pink 10-15 - User Colors 1-6
1.5	4	Button 1 Color	
2.1	4	Button 4 Color	
2.5	4	Button 3 Color	
3.1	4	Button 6 Color	
3.5	4	Button 5 Color	
4.1	4	Button 8 Color	
4.5	4	Button 7 Color	
5.1	4	Button 10 Color	
5.5	4	Button 9 Color	
6.1	4	Button 12 Color	
6.5	4	Button 11 Color	
7.1	4	Button 14 Color	
7.5	4	Button 13 Color	
8.1	4	Button 16 Color	
8.5	4	Button 15 Color	

Button Bottom Color

This message sets the bottom color of each LED. This message is optional, and if it is never received by the keypad, the LED color is only set by the Top/Full color command detailed previously.

LED Color - Bottom	PGN:	61202 / 61206 / 61210 / 61214
	Hex:	EF12 / EF16 / EF1A / EF1E

Description	This message sets the color for the bottom section of the LEDs, per button. If this message is never received, color is dictated by Top/Full Color cmd
PGN	61202 for Keypad 1, 61206 for Keypad 2, 61210 for Keypad 3, 61214 for Keypad 4
Priority	6
Destination	Keypad
DLC	8
Direction	Receive
Update Rate	N/A

Start	Bits	Name	Notes
1.1	4	Button 2 Color	0 - Black (off) 1 - Blue 2 - Green 3 - Cyan 4 - Red 5 - Magenta 6 - Yellow 7 - White 8 - Orange 9 - Pink 10-15 - User Colors 1-6
1.5	4	Button 1 Color	
2.1	4	Button 4 Color	
2.5	4	Button 3 Color	
3.1	4	Button 6 Color	
3.5	4	Button 5 Color	
4.1	4	Button 8 Color	
4.5	4	Button 7 Color	
5.1	4	Button 10 Color	
5.5	4	Button 9 Color	
6.1	4	Button 12 Color	
6.5	4	Button 11 Color	
7.1	4	Button 14 Color	
7.5	4	Button 13 Color	
8.1	4	Button 16 Color	
8.5	4	Button 15 Color	