

Overview

This document contains the message format details required for communication between the ECU and the keypad under the J1939 protocol.

J1939 CAN Messages

1.1 Switch Status (transmitted)

The J1939 Aux I/O 1 message contains the current status of each button on the keypad. This message is broadcast at a periodic rate of 250ms, as well as any time the keypad button(s) are pressed.

Auxiliary Input / Output Status 1					
Description	This message shall be broadcast periodically or upon change of state to the rest of the CAN network to indicate the state of the switches				
PGN	0x00FED9				
Default Priority	6				
Source Address	Source Address configurable				
DLC	8				
Update Rate	250 mS periodically and upon change of state (no faster than 20 mS)				
Direction	Keypad → CAN Network				
Start	Bits	Name	SPN	Notes	
1.1	2	Auxiliary I/O #04	704	00 ₂	Auxiliary Channel is OFF
1.3	2	Auxiliary I/O #03	703	01 ₂	Auxiliary Channel is ON
1.5	2	Auxiliary I/O #02	702	10 ₂	Error
1.7	2	Auxiliary I/O #01	701	11 ₂	Not Available
2.1	2	Auxiliary I/O #08	708		
2.3	2	Auxiliary I/O #07	707		
2.5	2	Auxiliary I/O #06	706		
2.7	2	Auxiliary I/O #05	705		
3.1	2	Auxiliary I/O #12	712		
3.3	2	Auxiliary I/O #11	711		
3.5	2	Auxiliary I/O #10	710		
3.7	2	Auxiliary I/O #09	709		
4.1	2	Not Used	N/A		
4.3	2	Not Used	N/A		
4.5	2	Not Used	N/A		
4.7	2	Not Used	N/A		
5.1	32	Not Used	N/A	All bits set to 1's	

Below shows how the above J1939 Aux I/O 1 channels map to the physical 12-key keypad.

Note: The orientation of each unit may vary according to the product configuration - Landscape orientation shown



1.2 LED Function Lights Status (received)

LED Function Lights are controlled independently from the switch status(s). The 36 function lights are controlled through messages AUX I/O 2 & AUX I/O 3 as detailed in the below tables and figure.

Default Priority	6
Source Address	Source Address configurable
DLC	8
Update Rate	Variable
Direction	Control Node -> CAN Network

Auxiliary Input / Output Status 2			
Description	Message will control indicator state of first 32 indicators. SPN 3840 will control 1 st indicator, SPN 3871 will control 32 nd indicator		
PGN	42752 (0x00A7xx) xx=keypad source address)		
Start	Bits	Name	SPN
1.1	2	Auxiliary I/O #20	3843
1.3	2	Auxiliary I/O #19	3842
1.5	2	Auxiliary I/O #18	3841
1.7	2	Auxiliary I/O #17	3840
2.1	2	Auxiliary I/O #24	3847
2.3	2	Auxiliary I/O #23	3843
2.5	2	Auxiliary I/O #22	3845
2.7	2	Auxiliary I/O #21	3844
3.1	2	Auxiliary I/O #28	3851
3.3	2	Auxiliary I/O #27	3850
3.5	2	Auxiliary I/O #26	3849
3.7	2	Auxiliary I/O #25	3848
4.1	2	Auxiliary I/O #32	3855
4.3	2	Auxiliary I/O #31	3854
4.5	2	Auxiliary I/O #30	3853
4.7	2	Auxiliary I/O #29	3852
5.1	2	Auxiliary I/O #36	3859
5.3	2	Auxiliary I/O #35	3858
5.5	2	Auxiliary I/O #34	3857
5.7	2	Auxiliary I/O #33	3856
6.1	2	Auxiliary I/O #40	3863
6.3	2	Auxiliary I/O #39	3862
6.5	2	Auxiliary I/O #38	3861
6.7	2	Auxiliary I/O #37	3860
7.1	2	Auxiliary I/O #44	3867
7.3	2	Auxiliary I/O #43	3866
7.5	2	Auxiliary I/O #42	3865
7.7	2	Auxiliary I/O #41	3864
8.1	2	Auxiliary I/O #48	3871
8.3	2	Auxiliary I/O #47	3870
8.5	2	Auxiliary I/O #46	3869
8.7	2	Auxiliary I/O #45	3868

Auxiliary Input / Output Status 3			
Description	Message will control indicator state of last 4 indicators. SPN 3872 will control 33 rd Indicator, SPN 3875 will control 36 th Indicator. Remaining SPN's in message are unused		
PGN	42496 (0x00A6xx) xx=keypad source address)		
Start	Bits	Name	SPN
1.1	2	Auxiliary I/O #52	3875
1.3	2	Auxiliary I/O #51	3874
1.5	2	Auxiliary I/O #50	3873
1.7	2	Auxiliary I/O #49	3872
2.1	2	Auxiliary I/O #56	3879
2.3	2	Auxiliary I/O #55	3878
2.5	2	Auxiliary I/O #54	3877
2.7	2	Auxiliary I/O #53	3876
3.1	2	Auxiliary I/O #60	3883
3.3	2	Auxiliary I/O #59	3882
3.5	2	Auxiliary I/O #58	3881
3.7	2	Auxiliary I/O #57	3880
4.1	2	Auxiliary I/O #64	3887
4.3	2	Auxiliary I/O #63	3886
4.5	2	Auxiliary I/O #62	3885
4.7	2	Auxiliary I/O #61	3884
5.1	2	Auxiliary I/O #68	3891
5.3	2	Auxiliary I/O #67	3890
5.5	2	Auxiliary I/O #66	3889
5.7	2	Auxiliary I/O #65	3888
6.1	2	Auxiliary I/O #72	3895
6.3	2	Auxiliary I/O #71	3894
6.5	2	Auxiliary I/O #70	3893
6.7	2	Auxiliary I/O #69	3892
7.1	2	Auxiliary I/O #76	3899
7.3	2	Auxiliary I/O #75	3898
7.5	2	Auxiliary I/O #74	3897
7.7	2	Auxiliary I/O #73	3896
8.1	2	Auxiliary I/O #80	3903
8.3	2	Auxiliary I/O #79	3902
8.5	2	Auxiliary I/O #78	3901
8.7	2	Auxiliary I/O #77	3900

Notes: 00₂ - Auxiliary Channel is OFF; 01₂ - Auxiliary Channel is ON; 10₂ - Error; 11₂ - Not Available



1.3 Diagnostic Reporting – DM1 (transmitted)

Active Diagnostic Trouble Codes					
Description	Message is broadcast from the keypad and contains details of any problems within the unit. If more than one problem exists it will be transmitted using the multi-packet protocol. SPN 1215, through 1706 are repeated for each problem.				
PGN	65226 (0x00FECA)				
Default Priority	7				
Source Address	Variable				
DLC	8				
Update Rate	1 Hz				
Direction	Keypad → Network				
Start	Bits	Name	SPN	Notes	
1.1	2	Protect Lamp	987	00 ₂	Auxiliary Channel is OFF
1.3	2	Amber Warning Lamp	624	01 ₂	Auxiliary Channel is ON
1.5	2	Red Stop Lamp	623	10 ₂	Error
1.7	2	Malfunction Indicator Lamp	1213	11 ₂	Not Available
2.1	2	Flash Protect Lamp	3041		
2.3	2	Flash Amber Warning Lamp	3040		
2.5	2	Flash Red Stop Lamp	3039		
2.7	2	Flash Malfunction Indicator Lamp	3038		
3 - 4, 5.6	19	Suspect Parameter Number (SPN)	1214		
5.1	5	Failure Mode Identifier (FMI)	3883		
6.1	7	Occurrence Count	1216		
6.8	2	SPN Conversion Method	1706		

Diagnostic Trouble Code Name	SPN	FMI	Lamp
Protect Lamp	516984	31 ¹	–
Button 1 Stuck	516252	7 ⁴	Amber
Button 2 Stuck	516253	7	Amber
Button 3 Stuck	516254	7	Amber
Button 4 Stuck	516255	7	Amber
Button 5 Stuck	516256	7	Amber
Button 6 Stuck	516257	7	Amber
Button 7 Stuck	516258	7	Amber
Button 8 Stuck	516259	7	Amber
Button 9 Stuck	516260	7	Amber
Button 10 Stuck	516261	7	Amber
Button 11 Stuck	516262	7	Amber
Button 12 Stuck	516263	7	Amber
V _{REF} Voltage Low	520794	4	–
V _{REF} Voltage High	520794	3	–
EEPROM Corruption	516982	31	Amber
Microcontroller Reset	516980	31	–
LED Error	516984	31	–

Notes:

FMI 31 = Condition Exists

FMI 4 = Voltage Below Normal or Shorted to Low Source

FMI 3 = Voltage Above Normal or Shorted to High Source

FMI 7 = Mechanical System Not Responding

1.4 Common CAN Messages

This document contains the J1939 interface for the keypad, including all transmitted messages and which messages it must receive from a master ECU to operate properly.

Cab Illumination Message				
Description	The keypad shall adjust the indicator and backlight brightness based on the standard J1939 Cab Illumination Message.			
PGN	53248 (0x00D0xx where xx=keypad source address)			
Default Priority	6			
Source Address	Source Address of control node			
DLC	8			
Update Rate	5 seconds periodically or upon change (no faster than 100 mS).			
Direction	Control Node → Keypad			
Start	Bits	Name	SPN	Notes
1.1	8	Illumination Brightness Percent	1487	Range: 0% to 100% Resolution: 0.4% per bit Offset: 0
2.1	8	Switch Backlight Illumination Brightness Percent	5532	Range: 0% to 100% Resolution: 0.4% per bit Offset: 0

Address Claim				
Description	The keypad shall transmit an address claim at start-up.			
PGN	60928 (0x00EE00)			
Default Priority	6			
Source Address	Source Address of control node			
DLC	8			
Update Rate	Variable			
Direction	Keypad → Network			
Start	Bits	Name	Notes	
1.1 - 3.5	21	Unique Number	Varies	
3.6 - 4.8	11	Manufacturer Code	J1939: 741	
5.1	3	Device Instance Lower – ECU Instance	As configured	
5.4	5	Device Instance Upper– Function Instance	As configured	
6.1	8	Device Function	135	
7.1	1	Dominant bit	0	
7.2	7	Device Class	0	
8.1	4	Generic Instance	0	
8.5	3	Industry Group	J1939: Global (0)	
8.8	1	Self-configurable	Always 1	

1.5 Low-Power Sleep Mode

All three of the following need to be in place for the keypad to sleep:

- Ignition signal OFF
- No CAN communication on the vehicle
- No keys pressed

Any one of the above three conditions will wake the keypad.