CAN Bus ICD

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This document describes how the CAN Bus worked in the LFEV car.

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Overview

The CAN Bus network is used to talk between all sensors and VSCADA. Devices jabber on the network with each sensor having a unique ID. VSCADA accepts sensor packets and decodes the raw bytes into useful values. The largest ID can be 0x7FF.

Hardware interface

There are 2 hardware connection options; a 6-pin and a 9-pin connector. These are documented in the appendix. Any traces on a PCB should be 120 ohms and differentially routed. The cable should be twisted pair.

ID allocation by subsystem

Tractive System Voltage sensors

IDs

Device ID	Description
0x100	Pack 1 state
0x101	Pack 1 voltage
0x102	Pack 1 current
0x103	Pack 1 SOC
0x104	Pack 1 Coulombs
0x110	Pack 1 cell status 1
0x111	Pack 1 cell status 2
0x112	Pack 1 cell status 3
0x113	Pack 1 cell status 4
0x114	Pack 1 cell status 5
0x115	Pack 1 cell status 6
0x116	Pack 1 cell status 7
0x120	Pack 1 cell voltage 1
0x121	Pack 1 cell voltage 2
0x122	Pack 1 cell voltage 3
0x123	Pack 1 cell voltage 4
0x124	Pack 1 cell voltage 5
0x125	Pack 1 cell voltage 6
0x126	Pack 1 cell voltage 7
0x130	Pack 1 cell temp 1
0x131	Pack 1 cell temp 2
0x132	Pack 1 cell temp 3
0x133	Pack 1 cell temp 4
0x134	Pack 1 cell temp 5
0x135	Pack 1 cell temp 6

0x136	Pack 1 cell temp 7
0x200	Pack 2 state
0x201	Pack 2 voltage
0x202	Pack 2 current
0x203	Pack 2 SOC
0x204	Pack 2 Coulombs
0x210	Pack 2 cell status 1
0x211	Pack 2 cell status 2
0x212	Pack 2 cell status 3
0x213	Pack 2 cell status 4
0x214	Pack 2 cell status 5
0x215	Pack 2 cell status 6
0x216	Pack 2 cell status 7
0x220	Pack 2 cell voltage 1
0x221	Pack 2 cell voltage 2
0x222	Pack 2 cell voltage 3
0x223	Pack 2 cell voltage 4
0x224	Pack 2 cell voltage 5
0x225	Pack 2 cell voltage 6
0x226	Pack 2 cell voltage 7
0x230	Pack 2 cell temp 1
0x231	Pack 2 cell temp 2
0x232	Pack 2 cell temp 3
0x233	Pack 2 cell temp 4
0x234	Pack 2 cell temp 5
0x235	Pack 2 cell temp 6
0x236	Pack 2 cell temp 7
0x300	Pack 3 state
0x301	Pack 3 voltage
0x302	Pack 3 current
0x303	Pack 3 SOC
0x304	Pack 3 Coulombs
0x310	Pack 3 cell status 1
0x311	Pack 3 cell status 2
0x312	Pack 3 cell status 3
0x313	Pack 3 cell status 4
0x314	Pack 3 cell status 5
0x315	Pack 3 cell status 6
0x316	Pack 3 cell status 7
0x320	Pack 3 cell voltage 1
0x321	Pack 3 cell voltage 2
0x322	Pack 3 cell voltage 3
0x323	Pack 3 cell voltage 4
0x324	Pack 3 cell voltage 5

0x325	Pack 3 cell voltage 6
0x326	Pack 3 cell voltage 7
0x330	Pack 3 cell temp 1
0x331	Pack 3 cell temp 2
0x332	Pack 3 cell temp 3
0x323	Pack 3 cell temp 4
0x324	Pack 3 cell temp 5
0x325	Pack 3 cell temp 6
0x326	Pack 3 cell temp 7
0x400	Pack 4 state
0x401	Pack 4 voltage
0x402	Pack 4 current
0x403	Pack 4 SOC
0x404	Pack 4 Coulombs
0x410	Pack 4 cell status 1
0x411	Pack 4 cell status 2
0x412	Pack 4 cell status 3
0x413	Pack 4 cell status 4
0x414	Pack 4 cell status 5
0x415	Pack 4 cell status 6
0x416	Pack 4 cell status 7
0x420	Pack 4 cell voltage 1
0x421	Pack 4 cell voltage 2
0x422	Pack 4 cell voltage 3
0x423	Pack 4 cell voltage 4
0x424	Pack 4 cell voltage 5
0x425	Pack 4 cell voltage 6
0x426	Pack 4 cell voltage 7
0x430	Pack 4 cell temp 1
0x431	Pack 4 cell temp 2
0x432	Pack 4 cell temp 3
0x433	Pack 4 cell temp 4
0x434	Pack 4 cell temp 5
0x435	Pack 4 cell temp 6
0x436	Pack 4 cell temp 7

Data packet formats

Sensor	Buffer(7)	6	5	4	3	2	1	Buffer(0)
0x100 0x200 0x300 0x400								Pack state

0x101 0x201 0x301 0x401							Pack voltage [15:8] (Volts)	Pack voltage [7:0] (Volts)
0x102 0x202 0x302 0x402					Pack Current [31:24] (Amps)	Pack Current [23:16] (Amps)	Pack Current [15:8] (Amps)	Pack Current [7:0] (Amps)
0x104 0x204 0x304 0x404					Pack coulombs [31:24] (coulombs)	Pack coulombs [23:16] (coulombs)	Pack coulombs [15:8] (coulombs)	Pack coulombs [7:0] (coulombs)
[0x110: 0x116] [0x210: 0x216] [0x310: 0x316] [0x410: 0x416]								Cell State
[0x120: 0x126] [0x220: 0x226] [0x320: 0x326] [0x420: 0x426]							Cell Voltage [15:8] (Volts)	Cell Voltage [7:0] (Volts)
[0x130: 0x136] [0x230: 0x236] [0x330: 0x336] [0x430: 0x436]							Cell Temp [15:8] (°C)	Cell Temp [7:0] (°C)

Tractive System Interface sensors

Device ID	Description
0x070	TSI state
0x071	IMD
0x072	Brake
0x073	Throttle position

0x074	TSV Voltage
0x075	TSV Current

Cooling sensors

Device ID	Description
0x0F0	Cooling state
0x0F1	outlet fluid temp
0x0F2	fluid flow rate
0x0F3	inlet fluid temp

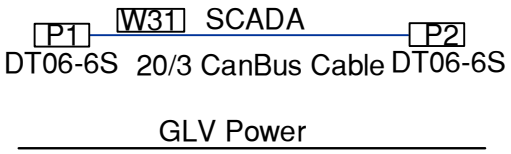
Grounded Low Voltage

GLV does not use the CAN Bus for data. The Raspberry Pi can connect directly to sensors and parse information as required.

Appendix A - Hardware Interfaces

6 pin connector

1	GRN	CAN H
2	YEL	CAN L
3	BARE	SHIELD
4	BRN	CHGND
5	RED	24VDC
6	BLK	24V RTN

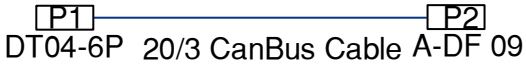


1	GRN	CAN H
2	YEL	CAN L
3	BARE	SHIELD
4	BRN	CHGND
5	RED	24VDC
6	BLK	24V RTN

Figure 1 - 6 pin connector

9 pin connector

YEL	CAN H
GRN	CAN L
BARE	SHIELD



7	YEL	CAN H
2	GRN	CAN L
3	BARE	SHIELD