

CAN output format

VBOX II & VBOX Pro (Version 4)

Default CAN bus setting

- 500k/Bit
- CAN message type STANDARD (11-bit identifier)

Signals available via CAN

- Satellites in view
- Time UTC (HMS.S)
- Position Latitude (DDMM.MMMMM)
- North/South
- Position Longitude (DDMMM.MMMMM)
- East/West
- Velocity (Knots)
- Heading (Degrees)
- Altitude (Metres)
- Vertical velocity (Metres/Second)
- Distance (Metres)
- Longitudinal acceleration (G)

The VBOX transmits data using 4 standard CAN identifiers (default 0x301, 0x302, 0x303, 0x304). These identifiers can be changed using the VBOX output configuration software. The data is transmitted at 50 millisecond intervals. A summary of the output format is show below.

If less than 3 satellites are in view by the VBOX then only the first identifier will be transmitted.

CAN data format								
Identifier	Update rate	Data byte position index						
		0	1	2	3	4	5	6
		63-----Bit position index-----0						
0x301	50ms	Sats in view	Time since midnight UTC		Position – Latitude DDMM.MMMMM			
0x302	50ms	Position – Longitude DDMMM.MMMMM			Velocity. (Knots)		Heading. (Degrees)	
0x303	50ms	Altitude. WGS 84. (Metres)		Vertical velocity. (M/S)		Not used.		Status
0x304	50ms	Distance from trigger (Meters)			Longitudinal Accel. (G)		Lateral Accel. (G)	
0x305	50ms	Total Distance from VBOX power-on (Meters)			Trigger time		Trigger velocity	

CAN output format

Detailed signal description

Name	Name of signal																																			
Default Identifier	Default setting of identifier used to transmit this data onto the CAN bus. This may be changed using the VBOX configuration software																																			
Start Bit	<p>Starting bit index of the data within the CAN message. This considers the CAN data to be 64 bits with bit 63 being the first bit transmitted and bit 0 the last bit transmitted. VBOX data is transmitted in MOTOROLA format.</p> <p>CAN Frame format</p> <table border="1" style="margin-left: 20px;"> <tr> <td rowspan="2" style="text-align: center;">IDENTIFIER</td> <td colspan="8" style="text-align: center;">DATA BYTE INDEX</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> <td style="text-align: center;">6</td> <td style="text-align: center;">7</td> </tr> <tr> <td></td> <td colspan="8" style="text-align: center;">DATA BIT INDEX</td> </tr> <tr> <td></td> <td colspan="8" style="text-align: center;">63 0</td> </tr> </table>	IDENTIFIER	DATA BYTE INDEX								0	1	2	3	4	5	6	7		DATA BIT INDEX									63 0							
IDENTIFIER	DATA BYTE INDEX																																			
	0	1	2	3	4	5	6	7																												
	DATA BIT INDEX																																			
	63 0																																			
Bit Length	Number of bits used in signal data																																			
Data Type	Signal data type Unsigned Integer, Signed integer or Float																																			
Byte Order	Motorola or Intel. (VBOX II uses MOTOROLA format)																																			
Factor	The scale factor is the value by which the data must be multiplied to obtain the real reading. For example the velocity signal shows a scale factor of 0.01. This means that a value of 65535 represents a velocity of 655.35 Knots.																																			
Offset	The offset is the value by which the data must be offset to obtain the real reading																																			
Units	Units of measurement that the reading represents.																																			

Satellites in view

Name	Sats	Number of satellites in view. If the number of satellites is less than 3 then only the first identifier (default 0x301) is transmitted.
Default Identifier	0x301	
Start Bit	56	
Bit Length	8	
Data Type	Unsigned Integer	
Byte Order	Motorola	
Scale Factor	1	
Offset	0	
Units	Sats	
Min value	0	
Max value	12	

Time UTC

Name	Time	<p>Time UTC. Expressed as a count of 10 millisecond intervals since midnight UTC. For example:-</p> <p>An integer of 5383690 equates to 53836.90 seconds since midnight which in turn equates to 14 hours, 57 minutes and 16.9 seconds (14:57:16.9)</p> <p>Resolution 0.01 seconds</p>
Default Identifier	0x301	
Start Bit	32	
Bit Length	24	
Data Type	Unsigned Integer	
Byte Order	Motorola	
Scale Factor	0.01	
Offset	0	
Units	Seconds	
Min value	0	
Max value	86399.95	

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North / South hemisphere

Name	North_South	North / South hemisphere indication
Default Identifier	0x301	0 = North 1 = South
Start Bit	31	
Bit Length	1	
Data Type	Bit	
Byte Order	Motorola	
Scale Factor	1	
Offset	0	
Units	South	
Min value	0	
Max value	1	

Latitude position

Name	Latitude	Latitude position
Default Identifier	0x301	DDMM.MMMMM Example 515924579 = 51 Degrees, 59.24579 Minutes North
Start Bit	0	
Bit Length	31	
Data Type	Unsigned Integer	
Byte Order	Motorola	
Scale Factor	0.00001	
Offset	0	
Units	Degrees	
Min value	0	
Max value	90	

East / West hemisphere

Name	East_West	East / West hemisphere indication
Default Identifier	0x302	0 = West 1 = East
Start Bit	63	
Bit Length	1	
Data Type	Bit	
Byte Order	Motorola	
Scale Factor	1	
Offset	0	
Units	East	

Longitude position

Name	Longitude	Longitude position
Default Identifier	0x302	DDMMM.MMMMM Example 5882246 = 0 Degrees, 58.82246 Minutes West
Start Bit	32	
Bit Length	31	
Data Type	Unsigned Integer	
Byte Order	Motorola	
Scale Factor	0.00001	
Offset	0	
Units	Degrees	
Min value	0	
Max value	180	

Velocity in Knots

Name	Velocity	Velocity
Default Identifier	0x302	Maximum value 655.36 Knots Resolution 0.01 Knots per bit Km/h = Knots * 1.852
Start Bit	16	
Bit Length	16	
Data Type	Unsigned Integer	
Byte Order	Motorola	
Scale Factor	0.01	
Offset	0	
Units	Knots	
Min value	0	
Max value	655.36	

CAN output format

Heading

Name	Heading	Heading Maximum value 359.99 degrees Resolution 0.01° per bit
Default Identifier	0x302	
Start Bit	0	
Bit Length	16	
Data Type	Unsigned Integer	
Byte Order	Motorola	
Scale Factor	0.01	
Offset	0	
Units	Degrees	
Min value	0	
Max value	359.99	

Altitude

Name	Altitude	Altitude Ref WGS 84 Maximum value 42949672.96 Metres Resolution 0.01 metres per bit
Default Identifier	0x303	
Start Bit	40	
Bit Length	24	
Data Type	Signed Integer	
Byte Order	Motorola	
Scale Factor	0.01	
Offset	0	
Units	Metres	
Min value	-30,000	
Max value	+30,000	

Vertical velocity

Name	Vertical Velocity	Vertical velocity Maximum value 655.36 metres/second Resolution 0.01 m/s per bit
Default Identifier	0x303	
Start Bit	24	
Bit Length	16	
Data Type	Signed Integer	
Byte Order	Motorola	
Scale Factor	0.01	
Offset	0	
Units	M/s	
Min value	-327.68	
Max	327.67	

Distance from Trigger

Name	Trig_Dist	Distance in metres from trigger activation point Maximum value 335544.32 metres Resolution 0.000078125 meters per bit, unsigned.
Default Identifier	0x304	
Start Bit	32	
Bit Length	32	
Data Type	Unsigned Integer	
Byte Order	Motorola	
Scale Factor	0.000078125	
Offset	0	
Units	Metres	
Min value	0	
Max value	335544.32	

CAN output format

Longitudinal acceleration

Name	Long_Acc	Longitudinal acceleration Maximum value +327.67 G Minimum value -327.68 G Resolution 0.01G per bit, signed
Default Identifier	0x304	
Start Bit	16	
Bit Length	16	
Data Type	Signed Integer	
Byte Order	Motorola	
Scale Factor	0.01	
Offset	0	
Units	G	
Min value	-327.68	
Max value	327.67	

Lateral acceleration

Name	Lat_Acc	Lateral acceleration Maximum value +327.67 G Minimum value -327.68 G Resolution 0.01G per bit, signed
Default Identifier	0x304	
Start Bit	0	
Bit Length	16	
Data Type	Signed Integer	
Byte Order	Motorola	
Scale Factor	0.01	
Offset	0	
Units	G	
Min value	-327.68	
Max value	327.67	

DGPS Status

Name	DGPS	DGPS indication 0 = DGPS not active 1 = DGPS active
Default Identifier	0x303	
Start Bit	5	
Bit Length	1	
Data Type	Bit	
Byte Order	Motorola	
Scale Factor	1	
Offset	0	
Units	DGPS	

Brake trigger status

Name	Brake	Brake trigger indication 0 = trigger not active 1 = trigger active
Default Identifier	0x303	
Start Bit	4	
Bit Length	1	
Data Type	Bit	
Byte Order	Motorola	
Scale Factor	1	
Offset	0	
Units	Brake	

Distance

Name	Distance	Distance in metres. This value is re-set to 0000 when the VBOX is first switched on. Maximum value 335544.32 metres Resolution 0.000078125 meters per bit, unsigned.
Default Identifier	0x305	
Start Bit	32	
Bit Length	32	
Data Type	Unsigned Integer	
Byte Order	Motorola	
Scale Factor	0.000078125	
Offset	0	
Units	Metres	
Min value	0	
Max value	335544.32	

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Trigger Time

Name	Trig_Time	Time from trigger
Default Identifier	0x305	
Start Bit	16	
Bit Length	16	
Data Type	Unsigned Integer	
Byte Order	Motorola	
Scale Factor	0.050	
Offset	0	
Units	Seconds	
Min value	0	
Max value	3276.75	

Trigger Velocity

Name	Trig_Vel	Velocity at trigger
Default Identifier	0x305	
Start Bit	0	
Bit Length	16	Maximum value 655.36 Knots Resolution 0.01 Knots per bit
Data Type	Unsigned Integer	
Byte Order	Motorola	
Scale Factor	0.01	Km/h = Knots * 1.852
Offset	0	
Units	Knots	
Min value	0	
Max value	655.36	

CAN output format

CAN Database file (.DBC)

VERSION "HIPBNYYYYYYYYYYYYYYYYYYYYYYYYYYYYNNNNNNNNNN/4!%%%/4!%**4NNN!/"

NS_ :

CM_
BA_DEF_
BA_
VAL_
CAT_DEF_
CAT_
FILTER
BA_DEF_DEF_
EV_DATA_
SGTYPE_
SGTYPE_VAL_
BA_DEF_SGTYPE_
BA_SGTYPE_
SIG_TYPE_REF_
VAL_TABLE_

BS_ :

BU_ : VBOX_II

BO_ 773 VBOX_5: 8 VBOX_II
SG_ Trig_Vel : 55|16@0+ (0.01,0) [0|655.35] "Knots" Vector__XXX
SG_ Trig_time : 39|16@0+ (0.05,0) [0|3276.75] "Secs" Vector__XXX
SG_ Distance : 7|32@0+ (7.8125E-05,0) [0|335544] "Metres" Vector__XXX

BO_ 772 VBOX_4: 8 VBOX_II
SG_ Lateral_acceleration : 55|16@0- (0.01,0) [-327.68|327.67] "G" VBOX_II
SG_ Longitudinal_acceleration : 39|16@0- (0.01,0) [-327.68|327.67] "G" VBOX_II
SG_ Trig_Dist : 7|32@0+ (7.8125E-05,0) [0|335544] "metres" VBOX_II

BO_ 771 VBOX_3: 8 VBOX_II
SG_ DGPS : 61|1@0+ (1,0) [0|0] "On" VBOX_II
SG_ Brake_trigger : 60|1@0+ (1,0) [0|0] "On" VBOX_II
SG_ Vertical_Velocity : 31|16@0- (0.01,0) [0|655.36] "m/s" VBOX_II
SG_ Altitude : 7|24@0- (0.01,0) [0|42949700] "metres" VBOX_II

BO_ 770 VBOX_2: 8 VBOX_II
SG_ Heading : 55|16@0+ (0.01,0) [0|359.99] "Degrees" VBOX_II
SG_ Velocity : 39|16@0+ (0.01,0) [0|655.36] "Knots" VBOX_II
SG_ East_West : 7|1@0+ (1,0) [0|0] "East" VBOX_II
SG_ Longitude : 6|31@0+ (1E-05,0) [0|180] "Degrees" VBOX_II

BO_ 769 VBOX_1: 8 VBOX_II
SG_ North_South : 39|1@0+ (1,0) [0|0] "South" VBOX_II
SG_ Latitude : 38|31@0+ (1E-05,0) [0|90] "Degrees" VBOX_II
SG_ Time : 15|24@0+ (1,0) [0|0] "UTC" VBOX_II
SG_ Sats : 7|8@0+ (1,0) [0|12] "Sats" VBOX_II

CM_ "Racelogic VBOX II";

CM_ SG_ 772 Lateral_acceleration "Lateral acceleration in G";
CM_ SG_ 772 Longitudinal_acceleration "Longitudinal acceleration in G";
CM_ SG_ 772 Trig_Dist "Distance in metres";
CM_ SG_ 771 DGPS "DGPS lock status

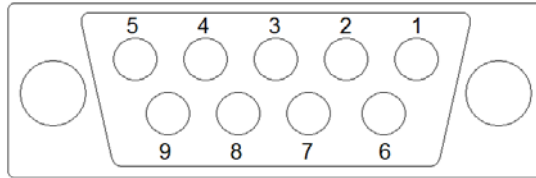
1 = DGPS active
0 = DGPS not active";
CM_ SG_ 771 Brake_trigger "Brake trigger switch status";
CM_ SG_ 771 Vertical_Velocity "Vertical velocity in metres/sec";

CAN output format

CM_SG_771 Altitude "Altitude in metres"
ref WGS84
";
CM_SG_770 Heading "Heading in degrees";
CM_SG_770 Velocity "Velocity (Knots)"
1 Knot = 1.852 Km/h
";
CM_SG_770 East_West "Hemisphere"
West = 0
East = 1
";
CM_SG_770 Longitude "Longitude"
DDMM.MMMMM
Example 5882246 = 0 Degrees 58.82246 minutes";
CM_BO_769 "VBOX Message 1";
CM_SG_769 North_South "Hemisphere"
North = 0
South = 1";
CM_SG_769 Latitude "Latitude DDMM.MMMMM"
Example 515924579 = 51 Degrees, 59.24579 Minutes";
CM_SG_769 Time "Time UTC";
CM_SG_769 Sats "Satellites in view";

CAN output format

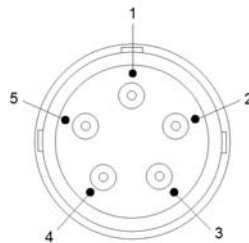
Standard for CAN Bus on 9 Way Sub D connector



Female Sub-D connector (CANalyser has Male)

Pin	Function
1	
2	CAN low
3	GND
4	
5	Shield
6	
7	CAN high
8	
9	+V

RLVBCAB15 – 5pin LEMO to bare wire



5 PIN LEMO PLUG

VIEW FACING PINS

LEMO PART NO. FGG.0B.305 CLAD52Z

Pin	Wire Colour	VBOX CAN Connector function
1	Yellow	*** No Connect ***
2	Green	*** No Connect ***
3	Blue	CAN high
4	White	CAN low
5	Red	+12 V power
Chassis	Black	Ground