



## VBOX III

### Default CAN bus setting

- 500Kbit (125Kbit, 250Kbit and 1Mbit also available)
- CAN message type STANDARD (11-bit identifier) (Extended, 29-bit identifier also available)

### Signals available via CAN

- Satellites in view
- Time UTC (HMS.S)
- Position Latitude (MMMM.MMMMM)
- Position Longitude (MMMMM.MMMMM)
- Velocity (Knots)
- Heading (Degrees)
- Altitude (Metres)
- Vertical velocity (Metres/Second)
- Trigger Distance (Metres)
- Longitudinal acceleration (G)
- Lateral acceleration (G)
- Total Distance from reset
- Trigger Time (S)
- Trigger Velocity (Knots)

The VBOX transmits data using 5 standard CAN identifiers (default 0x301, 0x302, 0x303, 0x304 0x305). These identifiers can be changed using the VBOX output configuration software. The data is transmitted at 10 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	7
		63-----Bit position index-----0							
0x301	50ms	Sats in view	Time since midnight UTC		Position – Latitude MMMMM.MMMMM				
0x302	50ms	Position – Longitude MMMMM.MMMMM			Velocity. (Knots)		Heading. (Degrees)		
0x303	50ms	Altitude. WGS 84. (Metres)		Vertical velocity. (M/S)	Not used.		Status	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 (Knots)		

# VBOXIII CAN Output Format



## Detailed signal description

<b>Name</b>	Name of signal																																		
<b>Default Identifier</b>	Default setting of identifier used to transmit this data onto the CAN bus. This may be changed using the VBOX configuration software																																		
<b>Start Bit</b>	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 <b>MOTOROLA</b> format.  CAN Frame format <table border="1" style="margin-left: 20px;"> <tr> <td rowspan="3" 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 colspan="8" style="text-align: center;">DATA BIT INDEX</td> </tr> <tr> <td style="text-align: center;">63 .....</td> <td colspan="7"></td> <td style="text-align: center;">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																											
<b>Bit Length</b>	Number of bits used in signal data																																		
<b>Data Type</b>	Signal data type <b>Unsigned Integer, Signed integer or Float</b>																																		
<b>Byte Order</b>	Motorola or Intel. (VBOX II uses <b>MOTOROLA</b> format)																																		
<b>Factor</b>	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.																																		
<b>Offset</b>	The offset is the value by which the data must be offset to obtain the real reading																																		
<b>Units</b>	Units of measurement that the reading represents.																																		

## Sats in View

<b>Name</b>	<b>Sats</b>	Number of satellites in view. If the number of satellites is less than 3 then only the first identifier (default 0x301) is transmitted and bytes 2-8 are set to 0x00.
<b>Default Identifier</b>	<b>0x301</b>	
<b>Start Bit</b>	<b>56</b>	
<b>Bit Length</b>	<b>8</b>	
<b>Data Type</b>	<b>Unsigned Integer</b>	
<b>Byte Order</b>	<b>Motorola</b>	
<b>Scale Factor</b>	<b>1</b>	
<b>Offset</b>	<b>0</b>	
<b>Units</b>	<b>Sats</b>	
<b>Min value</b>	<b>0</b>	
<b>Max value</b>	<b>12</b>	

## Time UTC

<b>Name</b>	<b>Time</b>	Time UTC. Expressed as a count of 10 millisecond intervals since midnight UTC. For example:- 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) Resolution 0.01 seconds
<b>Default Identifier</b>	<b>0x301</b>	
<b>Start Bit</b>	<b>32</b>	
<b>Bit Length</b>	<b>24</b>	
<b>Data Type</b>	<b>Unsigned Integer</b>	
<b>Byte Order</b>	<b>Motorola</b>	
<b>Scale Factor</b>	<b>0.01</b>	
<b>Offset</b>	<b>0</b>	
<b>Units</b>	<b>Seconds</b>	
<b>Min value</b>	<b>0</b>	

# VBOXIII CAN Output Format



Max value	86399.95	
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## Latitude position

Name	Latitude	<b>Latitude position</b> <b>MMMM.MMMMM</b> Example 3115924579 = 51 Degrees, 59.24579 Minutes North
Default Identifier	0x301	
Start Bit	0	
Bit Length	32	
Data Type	Signed Integer	
Byte Order	Motorola	
Scale Factor	0.00001	
Offset	0	
Units	Minutes	
Min value	0	
Max value	90	

## Longitude position

Name	Longitude	<b>Longitude position</b> <b>MMMMM.MMMMM</b> Example 11882246 = 1 Degrees, 58.82246 Minutes West
Default Identifier	0x302	
Start Bit	32	
Bit Length	32	
Data Type	Signed Integer	
Byte Order	Motorola	
Scale Factor	0.00001	
Offset	0	
Units	Minutes	
Min value	0	
Max value	180	

## Velocity in Knots

Name	Velocity	<b>Velocity</b> Maximum value 655.36 Knots Resolution 0.01 Knots per bit <b>Km/h = Knots * 1.852</b>
Default Identifier	0x302	
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	

## Heading

Name	Heading	<b>Heading</b> 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	

# VBOXIII CAN Output Format



Max value	359.99	
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## Altitude

Name	Altitude	<b>Altitude Ref WGS 84</b> 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	<b>Vertical velocity</b> 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	<b>Distance in metres from trigger activation point</b> 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	

## Longitudinal acceleration

Name	Long_Acc	<b>Longitudinal acceleration</b> 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	

# VBOXIII CAN Output Format



Max value	327.67	
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## Lateral acceleration

Name	Lat_Acc	<b>Lateral acceleration</b> 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	<b>DGPS indication</b> 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	<b>Brake trigger indication</b> 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	<b>Distance in metres. This value is re-set to 0000 when the VBOX is first switched on.</b> 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	

# VBOXIII CAN Output Format



## Trigger Time

Name	Distance	Time from Last GPS sample to brake trigger event
Default Identifier	<b>0x305</b>	0.01 seconds per bit.
Start Bit	<b>16</b>	
Bit Length	<b>16</b>	
Data Type	<b>Unsigned Integer</b>	
Byte Order	<b>Motorola</b>	
Scale Factor	<b>0.01</b>	
Offset	<b>0</b>	
Units	<b>Seconds</b>	
Min value	<b>0</b>	
Max value	<b>655.36</b>	

## Trigger Velocity

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

# VBOXIII CAN Output Format



## CAN Database File (VBOX\_III.DBC)

VERSION"HIPBNYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYNNNNNNNNNN/4/%%%/4/!"%\*\*4NNN//!"

NS\_ :

NS\_DESC\_  
CM\_  
BA\_DEF\_  
BA\_  
VAL\_  
CAT\_DEF\_  
CAT\_  
FILTER  
BA\_DEF\_DEF\_  
EV\_DATA\_  
ENVVAR\_DATA\_  
SGTYPE\_  
SGTYPE\_VAL\_  
BA\_DEF\_SGTYPE\_  
BA\_SGTYPE\_  
SIG\_TYPE\_REF\_  
VAL\_TABLE\_  
SIG\_GROUP\_  
SIG\_VALTYPE\_  
SIGTYPE\_VALTYPE\_  
BO\_TX\_BU\_  
BA\_DEF\_REL\_  
BA\_REL\_  
BA\_DEF\_DEF\_REL\_  
BU\_SG\_REL\_  
BU\_EV\_REL\_  
BU\_BO\_REL\_

BS\_ :

BU\_ : VBOX\_III

BO\_ 773 VBOX\_5: 8 VBOX\_III

SG\_ Trig\_Vel\_Mph : 55|16@0+ (0.0115078,0) [0|754.163673] "Mph" Vector\_\_XXX  
SG\_ Trig\_Vel\_Kmh : 55|16@0+ (0.01852,0) [0|1213.7082] "Km/h" Vector\_\_XXX  
SG\_ Trig\_time : 39|16@0+ (0.01,0) [0|655.35] "Secs" Vector\_\_XXX  
SG\_ Distance : 7|32@0+ (7.8125E-005,0) [0|335544] "Metres" Vector\_\_XXX

BO\_ 772 VBOX\_4: 8 VBOX\_III

SG\_ Lateral\_acceleration : 55|16@0- (0.01,0) [-327.68|327.67] "G" VBOX\_III  
SG\_ Longitudinal\_acceleration : 39|16@0- (0.01,0) [-327.68|327.67] "G" VBOX\_III  
SG\_ Trig\_Dist : 7|32@0+ (7.8125E-005,0) [0|335544] "Metres" VBOX\_III

BO\_ 771 VBOX\_3: 8 VBOX\_III

SG\_ DGPS : 61|1@0+ (1,0) [0|0] "On" VBOX\_III  
SG\_ Brake\_trigger : 60|1@0+ (1,0) [0|0] "On" VBOX\_III  
SG\_ Vertical\_Velocity : 31|16@0- (0.01,0) [0|655.36] "m/s" VBOX\_III  
SG\_ Altitude\_WGS84 : 7|24@0- (0.01,0) [0|42949700] "metres" VBOX\_III

BO\_ 770 VBOX\_2: 8 VBOX\_III

# VBOXIII CAN Output Format



SG\_Velocity\_Mph : 39|16@0+ (0.0115078,0) [0|754.163673] "Mph" Vector\_\_XXX  
SG\_Heading : 55|16@0+ (0.01,0) [0|359.99] "Degrees" VBOX\_III  
SG\_Velocity\_Kmh : 39|16@0+ (0.01852,0) [0|1213.7082] "Km/h" VBOX\_III  
SG\_Longitude : 7|32@0- (1E-005,0) [-21474.83648|21474.83647] "Minutes" VBOX\_III

BO\_769 VBOX\_1: 8 VBOX\_III

SG\_Latitude : 39|32@0- (1E-005,0) [-21474.83648|21474.83647] "Minutes" VBOX\_III  
SG\_Time\_Since\_Midnight : 15|24@0+ (0.01,0) [0|0] "Seconds" VBOX\_III  
SG\_Sats : 7|8@0+ (1,0) [0|12] "Sats" VBOX\_III

CM\_ "Racelogic VBOX III";

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";

CM\_SG\_771 Altitude\_WGS84 "Altitude in metres

ref WGS84

","

CM\_SG\_770 Velocity\_Mph "Velocity (Knots)

1 Knot = 1.852 Km/h

","

CM\_SG\_770 Heading "Heading in degrees";

CM\_SG\_770 Velocity\_Kmh "Velocity (Knots)

1 Knot = 1.852 Km/h

","

CM\_SG\_770 Longitude "Longitude

MMMMM.MMMMM

Example 5882246 = 58.82246 minutes";

CM\_BO\_769 "VBOX Message 1";

CM\_SG\_769 Latitude "Latitude MMMM.MMMMM

Example 311924579 = 3119.24579 Minutes";

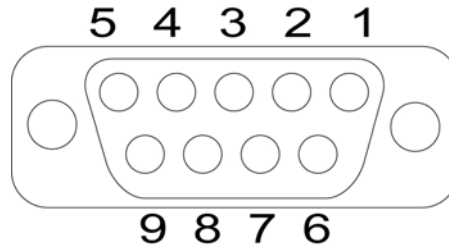
CM\_SG\_769 Time\_Since\_Midnight "Time UTC";

CM\_SG\_769 Sats "Satellites in view";

# VBOXIII CAN Output Format



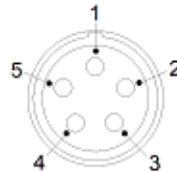
Standard for CAN Bus on 9 Way Sub D connector



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