VBOX HD Hardware Manual

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# Contents

Quick Start Guide

As shipped, the VBOX HD can be used straight out of the box:

1. Mount the GPS antenna in the centre of the roof of the vehicle. Keep away from roof bars or radio aerials which can cause interference.

    Note: If there is no metal underneath the antenna, create a metallic 'ground plane' to get the most reliable satellite lock. Pictured is an example of an antenna mounted on a car's plastic roof, using aluminium foil underneath the antenna to block unwanted ground reflections.
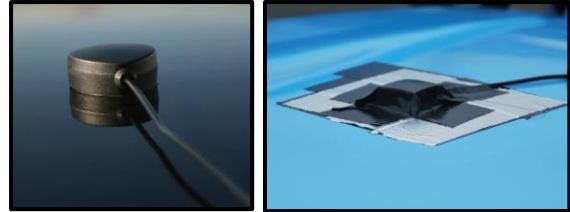
2. Push the antenna plug into the GPS socket.

3. Insert the PWR connector and screw the metal ring to lock in place.
    Then plug the cigarette lighter adapter into the vehicle 12V socket. Note: VBOX HD will take about 35 seconds to start, at which point the unit will beep to indicate it has booted up.
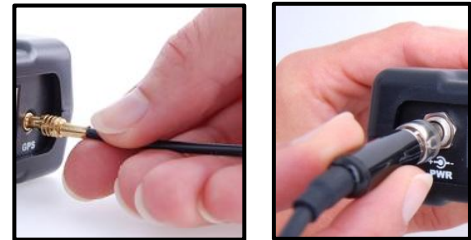
4. Securely attach the HD camera mount to the vehicles windscreen, or other desired location. Once the camera is mounted, connect it to the unit. Use the line on the top of the camera to make an approximate alignment. For better alignment, use the preview monitor included with the unit, which connects to the AUX port.

5. Position the vehicle so the antenna has a clear view of the sky. It will take up to two minutes to acquire a satellite lock, at which point the GPS LED will illuminate.
    If VBOX HD is having trouble gaining lock when in an open area, press and hold the RECORD button for 10 seconds, this will perform a GPS 'cold start'.

6. Insert the SD card – you're now ready to drive. The unit is set to 'record only when moving'. Once satellite lock has been obtained, the unit will start recording every time the vehicle speed goes above 5kph and stop when the speed has been 0kph for 5 seconds.
    The setting can be overridden by pressing the RECORD button to toggle logging on/off.

7. The REC LED will illuminate when recording, when the vehicle comes to a stop, it will flash as the file is closed.

    IMPORTANT: NEVER eject the SD card if the RECORD LED is showing, or logged data could be lost of corrupted. To stop recording, either come to a halt, press the RECORD button, or disconnect the power (the internal 'tank circuit' will stop the recording and safely shut down the file).

Logging media

SD cards

When purchasing SD cards, always buy a quality brand such as SanDisk, Kingston or Lexar.
Format: **FAT32**

USB memory sticks

If data is to be logged to a USB memory device, the optional RLCAB073 cable, or accessory RLACS164M is required. USB sticks must also be of a high quality to handle the amount of data sent from the VBOX HD.
Format: **FAT32**

VBOX HD registration

So that Racelogic can provide notifications of the latest software releases, firmware upgrades and to offer technical support, please make sure to register using the link below.

Please register your unit here: http://www.vboxmotorsport.co.uk

File formats

VBOX HD will log either to an SD card or a USB drive.

Two files will be created, an '.mp4' video file) and a synchronised '.vbo' data file which contains all of the GPS (and CAN, if applicable) data in ASCII format, recorded at 10 times a second. The files are stored within the 'media' folder.

The maximum size of files for SD cards in FAT32 format is 4Gbytes. If video file larger than this is recorded (time to reach this file size depends on video settings), a new '.mp4' file will be created. Therefore a single '.vbo' file can be associated with multiple '.mp4' files.

Video format

The high definition camera format is 720p30. The number of horizontal lines in the image is 720, and the image is progressive (not interlaced), and has a 30Hz frame rate. The aspect ratio is 16:9 which means there are 16/9*720 pixels on each horizontal line, so the images have a resolution of 1280x720 pixels.

CAN channels

VBOX HD units can log up to 32 channels from a connected CAN bus system. Note that the unit must be set up to read set parameters using VBOX HD Setup software (see software manual for more details).

Logging modes

The Blue LED will come on when the unit is recording video, this LED will flash when the unit is closing the file. **DO NOT REMOVE** the SD card if the Record LED is on or is flashing, as this could lead to data loss.

VBOX HD has three logging modes:

Log only when moving (default)

The unit automatically starts logging data when the vehicle speed goes above 2.5km/h, and stops when it goes below this value. This speed is configurable; see 'Scene properties' in Video VBOX Setup software. Pressing the **REC** button will stop the recording and close the file.

Manual logging

To set this logging mode, changes must be made to the HD unit's setup in VBOX HD Setup software.
When VBOX HD is in manual logging mode, it will never automatically start or stop logging. It must be controlled by the user to open each file before driving off, and close each file before the logging media is removed from the box.
Important note: removing the logging media while the unit is still logging can cause data to become corrupt or lost.

Continuous logging

To set this logging mode, changes must be made to the HD unit's setup in VBOX HD Setup software.
When using continuous logging, VBOX HD will start logging as soon as power and logging media is present. The unit will start to log on these two conditions only, and is not affected at all by speed or GPS lock. Note that the file must also be closed manually in this mode.

LED functions

LED	COLOUR	INDICATES
PWR	Green	Power on and supply OK.
PWR	Red	No power input – running off tank battery.
STATUS	Green	i) Solid indicates that the unit is ready to log – media inserted ii) Flashing indicates uploading of either a scene or firmware is taking place
GPS	Green	i) Flashing indicates searching for satellites after GPS cold start ii) Solid indicates SAT lock achieved
RECORD	Blue	Data being recorded to logging media

Tank circuit

Every VBOX HD logger contains a small internal battery to prevent loss of video or data should the power supply be interrupted or lost. This battery is continually recharged during normal operation.

If power is lost while the unit is logging, the unit will start a 25 second timeout. After this, the unit will beep for five seconds before closing the file currently being logged. When the file has been closed successfully, the unit will shut down.

If power is removed when the unit is not logging, it will start a 35s timeout while the unit shuts down.

Lap timing

Using the OLED display

When setting up the DSP04 OLED display with a VBOX HD, it is important to connect to the correct port of the OLED display. The OLED display only has a serial connection on the lower connector, with the buttons on the right hand side - as shown in this picture.

The configuration is indicated on a label on the rear of the OLED display.

To connect either a DSP04 or DSP05 OLED to VBOX HD, connect the OLED cable into the 'AUX' port.

Auto track map – Once a GPS location is detected, the VBOX HD will load a start/ finish line for that location in order to allow a connected OLED to detect it without any other setup. The desired layout being used can then be defined through the OLED main menu.
e.g. If Silverstone location is detected, Combo, GP, GP Classic SF, National, International and Stowe SF lines will be available to select.

Upgrading firmware

Occasionally Racelogic will release new versions of firmware (internal code) for the VBOX HD, often to introduce or support new features. New firmware is loaded into the VBOX using an SD card.

The latest file is always on our website: www.vboxmotorsport.co.uk (firmware can be found under 'customer area').

Copy this file onto an SD card (**not** into the 'media' folder), and insert into a powered unit. As the update progresses, the Status LED will flash. After a period of up to two minutes, the unit will beep twice and resume operation. The unit should then be power cycled, note that the upgrade file will have been deleted from the SD card.

Troubleshooting guide

Trouble Locking onto Satellites

- Place the antenna where it has an unobstructed view of the sky. (See 'GPS Antenna Placement' below)
- Perform a GPS Coldstart by pressing and holding the **REC** button for 5 seconds until the unit beeps 5 times. Then leave the unit powered up in an open static position for at least 15 minutes
- Check the antenna connection is very clean; small amounts of dirt in the socket can cause a significant reduction in signal strength
- Try another antenna

GPS Antenna Placement

For optimum GPS signal reception, make sure that the antenna is fitted to the **highest point** of the vehicle away from any obstructions that may block satellite reception. The GPS antenna works best with a metal ground plane underneath. Silver foil, or a metal plate beneath the antenna can improve reception significantly if the antenna is not fitted to a large metal roof.

We do a larger antenna with a very good internal ground plane which can operate perfectly without the need for mounting on a metal surface (part number RLVBACS065) which also gives superior position accuracy.

Video Data is Corrupt

- The storage media may have been removed from the unit before the file is closed. It can be possible to recover corrupted video files using DivFix++ (http://www.divfix.org/) If unsure how to recover corrupted video files contact support@racelogic.co.uk.
- Most problems with lost files can be fixed by right clicking on the card in Windows explorer and selecting 'Properties' – 'Tools' – 'Error checking' tick both boxes, and click 'Check now'

Always wait for the logging light to stop flashing before removing the SD card or USB device. Pressing the **REC** button will force the box to close the file at any time.

VBOX HD Beeps continuously

- The SD card may be full.
- The scene may be corrupt, try re-uploading the scene.
- Try to re-flash the firmware.

VBOX HD not responding - GPS Coldstart

- The GPS engine has locked up, perform a GPS Engine Coldstart – hold **REC** button for 5 seconds.

CAN output

The VBOX HD has a CAN output which is present on the 5-way connector output.

Data format: Motorola
Baud rate: 500Kb/s

ID*	Update Rate	Data Bytes							
		1	2	3	4	5	6	7	8
0x301	100ms	(1) Sats in view	(2) Time since midnight UTC			(3) Position – Latitude MMMM.MMMMM			
0x302	100ms	(4) Position – Longitude MMMM.MMMMM				(5) Velocity. (Knots)		(6) Heading (Degrees)	
0x303	100ms	(7) Altitude. WGS 84. (Metres)			(8) Vertical velocity. (M/S)		Unused	(9) Status	(10) Status
0x304	100ms	Unused				(11) Longitudinal Accel. (G)		(12) Lateral Accel. (G)	
0x305	100ms	(13) Distance travelled since VBOX reset (Metres)				Unused		Unused	

1) If Satellites in view < 3 then only Identifier 0x301 transmitted and bytes 2 to 8 are set to 0x00.
2) Time since midnight. This is a count of 10ms intervals since midnight UTC. (5383690 = 53836.90 seconds since midnight or 14 hours, 57 minutes and 16.90 seconds).
3) Position, Latitude * 100,000 (311924579 = 51 Degrees, 59.24579 Minutes North). This is a true 32bit signed integer, North being positive.
4) Position, Longitude * 100,000 (11882246 = 0 Degrees, 58.82246 Minutes West). This is a true 32bit signed integer, West being positive.
5) Velocity, 0.01 knots per bit.
6) Heading, 0.01^o per bit.
7) Altitude, 0.01 meters per bit, signed.
8) Vertical Velocity, 0.01 m/s per bit, signed.
9) Status, unused.
10) Status, unused.
11) Longitudinal Acceleration, 0.01G per bit, signed.
12) Lateral Acceleration, 0.01G per bit, signed.
13) Distance travelled in meters since VBOX reset.

Connector assignments

Connector 1 – PWR			
Pin	I/O	Function	
1	I	Power + (9 to 15V)	
2	I	Ground (0V)	

Connector 2 – CAM1			
Pin	I/O	Function	
1	I	Camera Data +	
2	I/O	Ground	
3	O	Camera Power (3.3V)	
4	I	Camera Data -	

Connector 4 – CAN			
Pin	I/O	Function	
1	O	Digital Output	
2	I/O	CAN High	
3	I/O	CAN Low	
5	I/O	Ground	
6	I	Digital Input	
8	O	Power	

Connector 5 – AUX			
Pin	I/O	Function	
1	I	RS232 TxD	
3	O	RS232 RxD	
5	I/O	Ground	
6	O	Video Out	
8	I	Power +12V (1A Max)	

Connector 7 – GPS (GPS Antenna)			
Pin	I/O	Function	
1	I	Signal	
Chassis	I	Ground	

Connector 6 – USB			
Pin	I/O	Function	
1	I	USB – 5V	

Contact details

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Product website

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