



## Video VBOX Hardware Manual

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## Introduction

The Video VBOX is a multi-camera, solid state video recorder with GPS data-logging and graphical overlay.

Included are three software packages:

Circuit Tools	- Lap analysis
Video VBOX Setup	- Graphics and logging control
Performance tools	- Detailed performance analysis

**Note: This manual is based on the latest firmware and software releases which are available for download from our website:**

[www.videovbox.co.uk](http://www.videovbox.co.uk) under 'Support'

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## Quickstart Guide

As shipped, the Video VBOX 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



2. Connect the antenna to the Video VBOX



3. Connect the power connector, it takes about 35s to start



4. Attach the camera to the windscreen using the forward facing camera mount, keep the camera level using the markings on the camera



5. Connect the camera to CAM1



- 6. The best way of aligning the camera is to use the optional Racelogic Preview monitor, which is plugged into AVOUT

Alternatively you can use a Laptop connected via USB to get a live view



- 7. Take the car outside and wait for the Green GPS LED to illuminate

- 8. Insert the SD card and you are now ready to drive, Video VBOX will start to record Video automatically over 2.5kmh.



- 9. The REC LED will illuminate when recording, and when you come to a stop, it will flash as the file is closed.

**IMPORTANT** - **NEVER** remove the SD card when this light is on or flashing – you will lose video. If you have come to a stop, but the REC LED is on, press the **REC** button to stop the video before removing the card.



## Trackmaps and Lap-timing

To have lap-timing information or a circuit map shown on the video, the default internal 'Scene' needs to be modified. To do this, you can use the **Video VBOX Setup** software, see separate manual for more details.

## Notes on using USB

### Always use the Supplied USB Cable

When connecting the Video VBOX to your computer, make sure you are using the USB cable supplied.

Some 'standard' USB leads do not have a full length USB connector and will disable communication between your PC and the Video VBOX LITE.

### Mobile Phone Software

Ensure that you shut down any mobile phone software running on your computer before connecting. We are aware of conflicts which can arise when using this kind of software.

## 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 is required.

## Software Installation

To install the software insert the CD into the CD drive of your computer.

**NB:** The software requires Microsoft .NET Framework 3.5 Service Pack 1 or higher to run. The installation CD contains the required .NET installation package.

**NB:** In order to play back the AVI Video files, the XVID Codec pack must also be installed. The installation CD contains the required installation package.

## Video VBOX Registration

So that Racelogic can continue to provide you with notification of the latest software releases, firmware upgrades and to offer technical support, please register your Video VBOX.

**Please register your unit here: [www.videovbox.co.uk/register](http://www.videovbox.co.uk/register)**

Alternatively, simply fill out the registration form supplied with the unit, and return to Racelogic.

## Getting Started with your Video VBOX

### 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.

The Video VBOX has three 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

By pressing the **REC** button on the front of the unit, the user may override the Automatic logging function. The unit will then record until the card is full, the power is removed, or until the user presses the **REC** button once more.

Note : to prevent potential loss of video, the unit will revert back to automatic logging after the car has been stationary for over 30 seconds and then starts to move again, or if the SD card is changed.

#### CAN activated logging

Logging can be controlled when a CAN channel is in (or out) of a certain value. More information on this can be found of page 22 of the Video VBOX Setup Software manual.

### LED functions – PRO 4 CAM

LED	COLOUR	INDICATES
PWR	Red	Power on
CAMERAS	Green	A camera is connected
CAN	Red	Correctly connected to a device and receiving CAN signals. Note, must be configured to receive in VVB setup software.
SER	Green	Recognised serial information is being received. E.g. From a connected DriftBox
USB	Red	USB logging media is connected
GPS	Red / Green	i) Red indicates no satellite lock held ii) Green indicates SAT lock achieved
MEMORY	Red	i) Amount of memory used in the attached logging media (incrementing sequence) ii) Status of scene upload or firmware upgrade (incrementing sequence) iii) Searching for media (in/out sequence)
REC	Blue	Data being recorded to media.
REC Button	Blue	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



## LED functions – Lite / Waterproof

LED	COLOUR	INDICATES
PWR	Green	Power on
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	Green	Data being recorded to logging media

## Tank circuit

Every Video VBOX contains a small internal battery to prevent loss of video should the power supply be interrupted for any reason. This battery is continually recharged during normal operation.

When the power is interrupted, the unit will start to beep, and the symbol on the right will appear on the video.



If after 5 seconds the power is still not present, the unit will close the Video file and shut the box down safely.

## File formats

The Video VBOX will log either to an SD card or a USB drive (requiring cable RLCAB073).

Two files are logged, an '.avi' Video File (compatible with the Xvid codec which is installed with the software package), and a synchronised '.vbo' data file which contains all of the GPS (and CAN, if applicable) data in ASCII format, recorded 10 times a second (or 20 if you are using a VVB Pro 20Hz unit). The files are stored under the 'media' folder.

The maximum size of files for SD cards in FAT32 format is 2Gbytes. If you record for more than 50 minutes, a new '.avi' file is created. Therefore a single '.vbo' file can be associated with multiple '.avi' files.

## Video format

Standard definition uses 720x576 pixels at 25 frames per second for PAL and 720x480 pixels at 30 frames per second for NTSC. All video is interlaced, this is the DVD standard as it was originally designed for a scanning line TV set. When replayed on a Computer screen instead of a TV, you may see 'motion artefacts' which are the result of the interlaced format. When you upload your content to YouTube, or display on a normal television, the interlacing is removed.

Windows Media Player does not render the video as well as other media players, so for better quality, Racelogic recommend the free, but excellent, VLC player (<http://www.videolan.org/vlc/>) which has a de-interlacing filter (Video - De-Interlace - Blend).

For a detailed explanation of interlacing also see here: [www.100fps.com](http://www.100fps.com)

## CAN Channels

All units can log parameters from the CAN bus, basic units can log a single channel, 'VCI' enabled units can log up to 32 channels.

## Using the OLED display

When setting up the **DSP04** OLED display with a Video VBOX, 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 to a Video VBOX Lite, you should connect the cable into the 'AUX' port.



To connect to a Video VBOX Pro, you should connect the cable into the 'SER' port.

To connect to a Video VBOX Waterproof, you should connect the cable into the 'SER' port.



**Auto Track Map elements** – If an Auto Track Map element has been added to the scene currently loaded in the Video VBOX, the OLED can be used to specify which track layout to display.

Once a GPS location is detected, the VideoVBOX will display a circuit layout for that location – e.g. If Silverstone location detected, Silverstone GP, National and International layouts will be displayed.

**Multiple scene selection** – The Video VBOX can store up to eight scenes. They are loaded by placing them in the root folder of an SD card and inserting them into a VVB. The user can select the scene using an OLED display.

**Note**, if the user tries to load more than eight scenes, the Video VBOX will reject **all the scene files** and write an error message to the SD card.

## Upgrading firmware

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

Download the latest '.vidup' file from our website: [www.videovbox.co.uk](http://www.videovbox.co.uk) (Found under 'Support')

Copy this file onto an SD card (**not** into the 'media' folder), and insert into a powered unit. The memory LEDs will light up in turn as the update progresses (2CAM/ Pro) or the Status LED will flash (Lite). After a period of up to two minutes, the unit will beep twice and resume operation. The unit should then be power cycled. The upgrade file will have been deleted from the SD card.

## Upgrading multiple units

To prevent the Video VBOX from deleting the firmware file, create an empty text file called '**no-delete-vidup.txt**' on the SD card in the same directory as the upgrade file, the upgrade file will then remain on the card following a successful upgrade.

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## 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 you don't have 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.

### No Communication with PC

- Check power
- In the case of the Video VBOX Lite, only use the USB cable (CAB066-2) supplied with the unit, as other cables such as those supplied with card readers may not have a long enough plug to fit into the recessed socket on the front of the box
- Try disconnecting then reconnecting the USB cable with the Video VBOX powered
- Check that no other programs are using the same COM port
- Shut down any Mobile Phone software running on your PC
- Disconnect the power to the Video VBOX then reconnect it

### COM Port Unavailable

- Disconnect the Video VBOX, restart the computer then reconnect the Video VBOX
- Another software package installed on your computer may have reserved the COM port

### Video Data is Corrupt

- The storage media may have been removed from the unit before the file is closed. It is possible to recover corrupted video files using either DivFix (<http://divfix.maxeline.com>) or VirtualDubMod (<http://virtualdubmod.sourceforge.net>)
- If unsure how to recover corrupted video files contact [support@racelogic.co.uk](mailto:support@racelogic.co.uk)
- You can fix most problems with lost files 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. You can force the box to close the file using the **REC** button.

### Cannot Open Video File

- The XVID Codec may need to be re-installed (<http://www.xvid.org>)

### Video VBOX LITE Beeps continuously

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

**Only Audio is present during playback.**

- The XVID Codec may need to be re-installed (<http://www.xvid.org>)

**No speed shown on video**

- Check GPS reception

**Video Overlay is missing some or all Elements**

- Scene should not be larger than 12 Mb due to space limitation in the unit

**Scene does not upload to the Video VBox**

- Try a re-installation of the firmware on the Video VBox and try to upload the scene again

**Video VBOX not responding - GPS Coldstart**

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

## CAN Output

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

Data format: Motorola

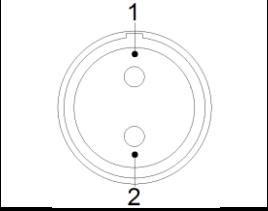
Baud rate: 500Kb/s

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	

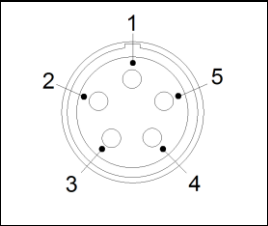
- 1) If Satellites in view < 3 then only Identifier 0x301 transmitted and bytes 2 to 8 are set to 0x00.
- 2) Time since midnight. This is a count of 10ms intervals since midnight UTC. (5383690 = 53836.90 seconds since midnight or 14 hours, 57 minutes and 16.90 seconds).
- 3) Position, Latitude \* 100,000 (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° 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 – Video VBOX Pro

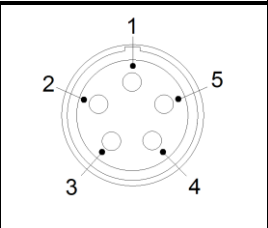
Connector 1 – Power (Dedicated 9V to 15V DC Power Connector)		
Pin	I/O	Function
1	I	Power +
2	I	Ground
Chassis	I	Ground



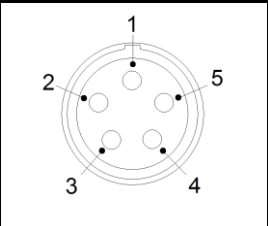
Connector 2 – Camera 1		
Pin	I/O	Function
1	O	Audio Ground
2	I	Video Input
3	O	Camera Power
4	O	Camera Ground
5	I	Audio Input (Left)



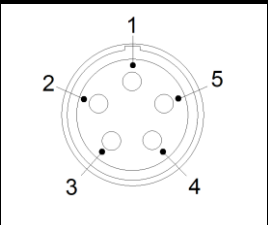
Connector 3 – Camera 2		
Pin	I/O	Function
1	O	Audio Ground
2	I	Video Input
3	O	Camera Power
4	O	Camera Ground
5	I	Audio Input (Right)



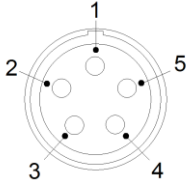
Connector 4 – Camera 3		
Pin	I/O	Function
1	-	-
2	I	Video Input
3	O	Camera Power
4	O	Camera Ground
5	-	-



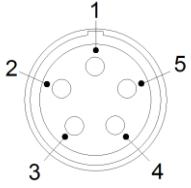
Connector 5 – Camera 4		
Pin	I/O	Function
1	-	-
2	I	Video Input
3	O	Camera Power
4	O	Camera Ground
5	-	-



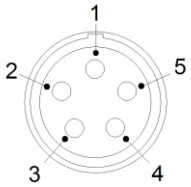
Connector 6 – CAN		
Pin	I/O	Function
1	-	-
2	-	-
3	I/O	CAN High
4	I/O	CAN Low
5	O	Power



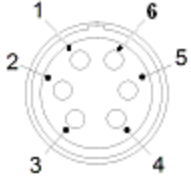
Connector 7 – SER		
Pin	I/O	Function
1	O	Tx-RS232
2	I	Rx-RS232
3	I/O	CAN High
4	I/O	CAN Low
5	O	Power



Connector 8 – USB		
Pin	I/O	Function
1	I	USB - ID
2	I/O	DP
3	O	Ground
4	I/O	USB 5V
5	I/O	DM

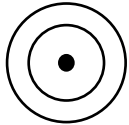


Connector 9 – AUX Out		
Pin	I/O	Function
1	O	Ground
2	O	Video Output
3	I	Digital Input
4	O	Digital Output
5	O	Audio Output
6	O	Power (1A Max)




Connector 10 – MIC		
Pin	I/O	Function
1	O	Ground
2	-	-
3	I	Audio –right channel
4	I	Audio –left channel
5	O	Power

Connector 11 – GPS (GPS Antenna)		
Pin	I/O	Function
1	I	Signal
Chassis	I	Ground

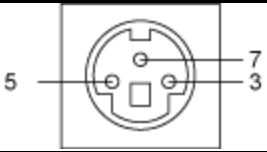


## Connector Assignments – Video VBOX Lite

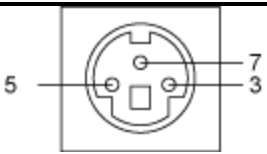
Connector 1 – PWR		
Pin	I/O	Function
1	I	Power + (9 to 15V)
2	I	Ground (0V)



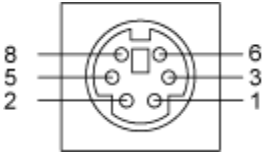
Connector 2 – CAM1		
Pin	I/O	Function
5	I/O	Ground
7	I	Video input
3	O	Camera Power (8 – 18V)



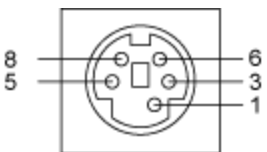
Connector 3 – CAM2		
Pin	I/O	Function
5	I/O	Ground
7	I	Video input
3	O	Camera Power (8 – 18V)



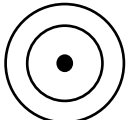
Connector 4 – CAN		
Pin	I/O	Function
1	O	Digital Output
2	I/O	CAN High
3	I/O	CAN Low
5	I/O	Ground
6	I	Digital Input
8	O	Power




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





## Connector Assignments – Video VBOX Waterproof

<b>Connector 1 – Power (Dedicated 9V to 15V DC Power Connector)</b>			
Pin	I/O	Function	
1	I	Power	
2	I	Ground	
3	-	N/C	

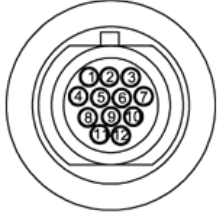
<b>Connector 2 – Camera 1</b>			
Pin	I/O	Function	
1	O	Power	
2	O	Ground	
3	I	Video Input	

<b>Connector 3 – Camera 2</b>			
Pin	I/O	Function	
1	O	Power	
2	O	Ground	
3	I	Video Input	

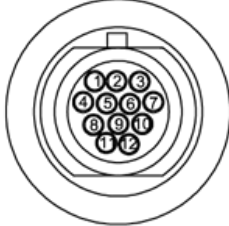
<b>Connector 4 – MIC</b>			
Pin	I/O	Function	
1	I	Mic In Right	
2	-	Reserved	
3	O	AV Ground	
4	O	Power	
6	I	Mic In Left	
6	-	Reserved	

<b>Connector 5 – USB</b>			
Pin	I/O	Function	
1	I/O	Data Positive	
2	I/O	Data Minus	
3	I/O	VBUS	
4	I/O	Shield	
5	I/O	Ground	
6	I	ID	

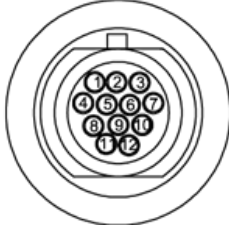
Connector 6 – CAN		
Pin	I/O	Function
1	-	N/C
2	-	N/C
3	-	N/C
4	-	N/C
5	-	N/C
6	I/O	CAN High
7	I/O	CAN Low
8	-	N/C
9	-	Reserved
10	-	Reserved
11	O	Power
12	O	Ground



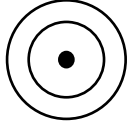
Connector 7 – SER		
Pin	I/O	Function
1	-	N/C
2	-	N/C
3	-	N/C
4	-	N/C
5	-	N/C
6	I/O	CAN High
7	I/O	CAN Low
8	-	N/C
9	I	RxD
10	O	TxD
11	O	Power
12	O	Ground



Connector 8 – AUX		
Pin	I/O	Function
1	O	Video Out
2	O	Audio Out
3	O	AV Ground
4	O	Digital Out
5	I	Digital In
6	I/O	CAN High
7	I/O	CAN Low
8	-	N/C
9	-	N/C
10	-	N/C
11	O	Power (1A Max)
12	O	Ground



Connector 9 – GPS (GPS Antenna)		
Pin	I/O	Function
1	I	Signal
Chassis	I	Ground



## Contact Details

Racelogic  
Unit 10  
Swan Business Centre  
Osier Way  
Buckingham  
Bucks  
MK18 1TB  
United Kingdom

Email: [support@racelogic.co.uk](mailto:support@racelogic.co.uk)

Web: [www.racelogic.co.uk](http://www.racelogic.co.uk)