VBOX Video HD2 User Guide

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01 - HD2 Introduction

VBOX Video HD2 is a dual camera 1080p video system including 10 Hz GPS data-logging and a live graphical overlay. The HD2 is compatible with OLED systems, as well as Racelogic modules, such as the Micro Input Module and Mini Input Module.

An HDMI variant is available which enables streaming of real-time video from the HD2 to an HDMI compatible monitor, recorder or streaming device.

The HD2 works straight out of the box with no need for configuration. **Click here** for a step by step quick start guide.

Included on the SD card are two software programs:

- **VBOX Video Software** allows you to configure and customise all areas of your VBOX Video system.
- **Circuit Tools Software** can be used to analyse video and data files, allowing customers to shave seconds off lap times in a single session.

Both of these software programs can be **downloaded from here.**

VBOX Video 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 VBOX Video.

Please register your unit here

Software Installation

Software installers for both Circuit Tools and VBOX Video Setup are both found on the SD card included with the HD2.

To install the software, insert the SD card into the SD card reader of your computer or download the software from the above link. Double click the setup.exe file and follow the steps until the software is successfully installed.

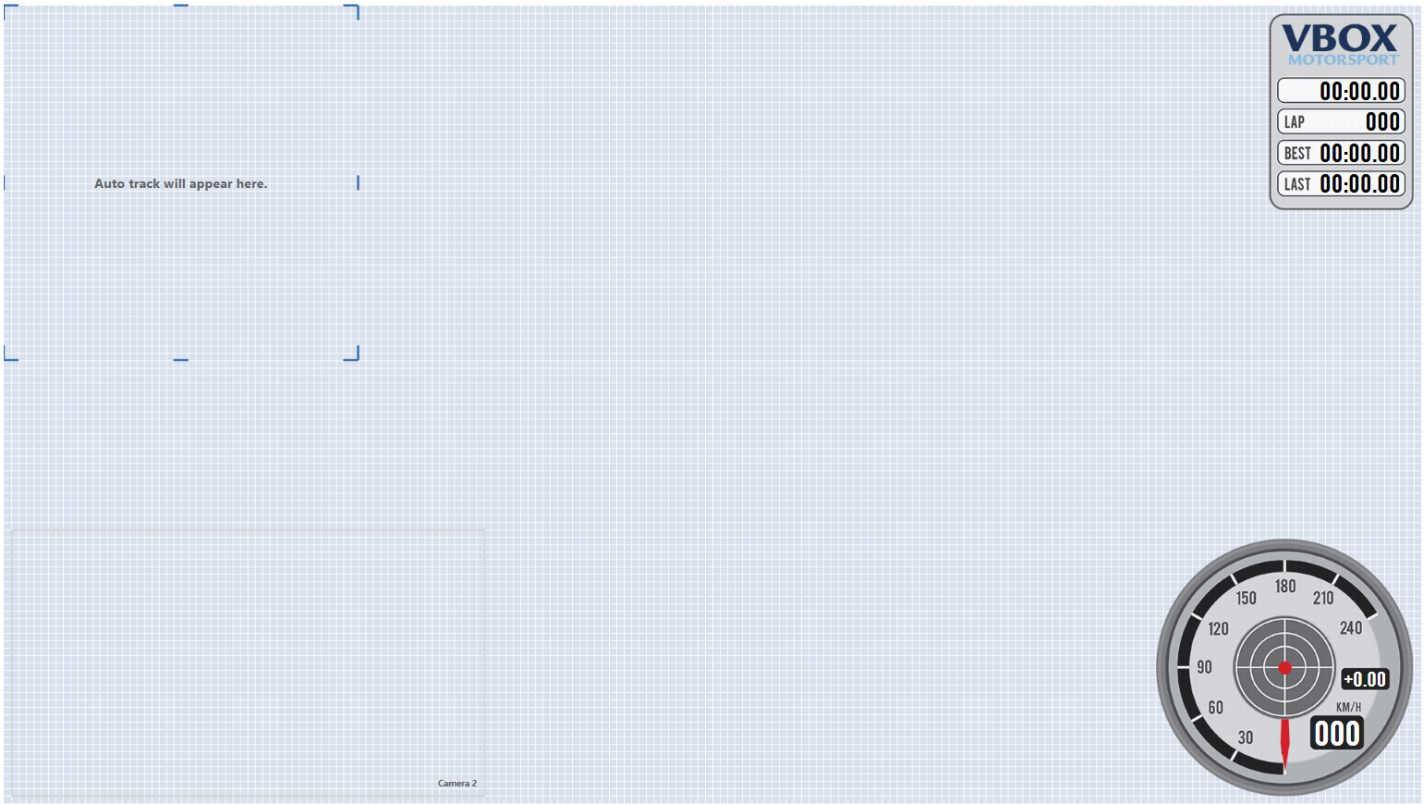
IMPORTANT – Microsoft Windows 7 SP1 and VBOX Video HD2 Firmware version V1.3.72 or newer is required

Terminology

Throughout this guide we will be referring to the following:

Scenes

A Scene is the setup file ('.VVHSN' file) which defines the layout of the graphical overlay and sets the system parameters such as logging conditions, CAN channels, lap-timing information etc. There is a default scene included within the HD2 firmware - shown in the image below. This will always remain stored on the units memory and can be loaded at any time using a OLED display.



This default scene has a speed gauge, g-ball, on screen laptiming elements and a track map all included, allowing the unit to be used straight out of the box at any circuit in our database - there is no need to change anything.

If you would like to quickly create a different simplistic scene without using Setup Software, an **Online Scene Wizard** is available, which enables you to quickly choose from a selection of template designs containing the elements included within the default scene. You can select specific car parameters from our CAN database and also add your own logo. The scene can then be uploaded on to the unit by saving to an SD card and inserting into the powered VBOX.

Instructions on how to use the Online Scene Wizard can be found here.

As well as having the ability to adjust settings within the HD2 unit, VBOX Video Setup Software provides full graphical overlay user configurability. For example, you can **create custom dials (**Windows**,** macOS**)**, choose how large/ where you would like **your logo (**Windows**,** macOS**)** to be and also change where the second **camera is located (**Windows**,** macOS**)**.

Elements

These are graphical items in the scene, such as gauges, text, picture-in-picture, bar graphs, track maps etc.

What's included in the kit

The standard inventory and optional extras available for the VBOX Video HD2 are listed below.

VBOX Video HD2 Standard Inventory

Description	Quantity	Product Code
VBOX Video HD2 Unit	1	VBVDHD2
VBOX Video 1080p Camera (3 m), IP65 Rated	1 or 2 (dependent on package)	RLACS222
Mono Microphone (2.5 m)	1	RLACS221
Lightweight Windscreen Suction Mount	2	RLACS233
Cigar Plug Power Supply (2 m)	1	RLCAB010LE
GPS/GLONASS/Galileo Low Profile Antenna (3 m)	1	RLACS262
32 GB SD Card - Including VBOX Video Software	1	RLACS231
Camera Clamp	2	RLACS269
HDMI cable with locking screws (0.9 m) **(HDMI variant only)**	1	RLCAB141

VBOX Video HD2 Optional Extras

Description	Product Code
CAN / Serial Splitter	RLCAB081
USB Logging Cable	RLCAB073
Stereo Microphone Splitter	RLCAB132
Stereo Microphones	RLACS133
OLED Laptiming Display	RLVBDSP05 / 04

Description	Product Code
Micro Input Module	RLVBMICIN01L
Mini Input Module	RLVBMIM01
CAN Gateway	RLVBCGW01
CAN Cables – OBD/Unterminated	RLCAB069L / RLCAB015L
Clip on CAN bus Interface	RLACS182-L
Bluetooth Remote Start/Stop Logging Switch	RLACS224
Heavy-Duty Camera Clamp	RLACS270
Roll Cage Mount	RLACS260
Roll Cage Bracket	RLACS267
Camera Mount Extension Bar	RLACS273
Li-ion Battery Pack	RLACS112
Bluetooth Heart Rate Monitor	RLACS227
Bluetooth OBD Module	RLACS228
Quick Release Unit Mounting Bracket	RLACS258
Roll Cage Unit Mount	RLACS268
Harsh Environment Fan	RLACS247
Second Car Kit	RLACS274
Tyre Temperature Monitoring System	RLACS272

02 - HD2 Hardware Overview

For a quick step by step guide of setting up the VBOX Video HD2 system in a vehicle, **click here to see the Quick Start Guide**.

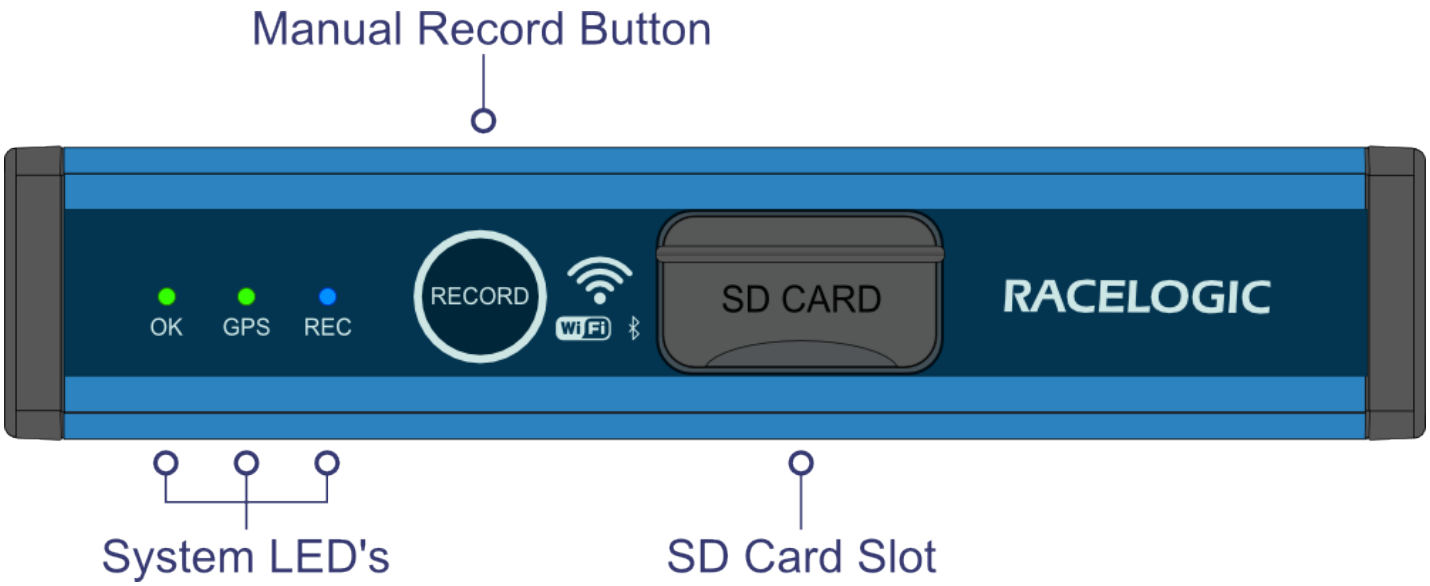
The VBOX Video HD2 is designed to disperse heat from internal components through the lid of the box, as such the unit will become hot to the touch when running.

The enclosure is designed to use airflow to cool the unit down, so do ensure that the top of the HD2 is left open to the air.

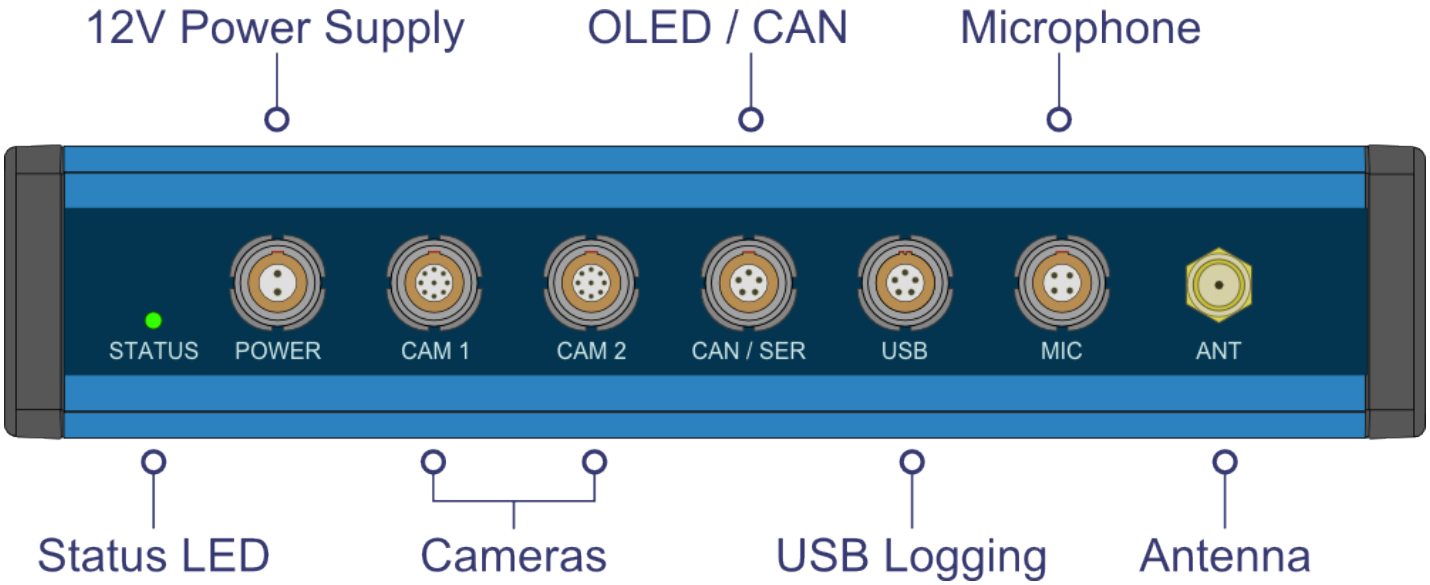
If VBOX Video HD2 is being used in extreme ambient temperatures (cabin temperature exceeding 50°C), the **Harsh Environment Fan Accessory** can be used to reduce the temperature of the unit.

IMPORTANT – If the HD2 is being used in conjunction with a driver communication radio system, ensure that there is a minimum separation distance of 20 cm between the radio system and the camera units and cables to avoid any video interference problems.

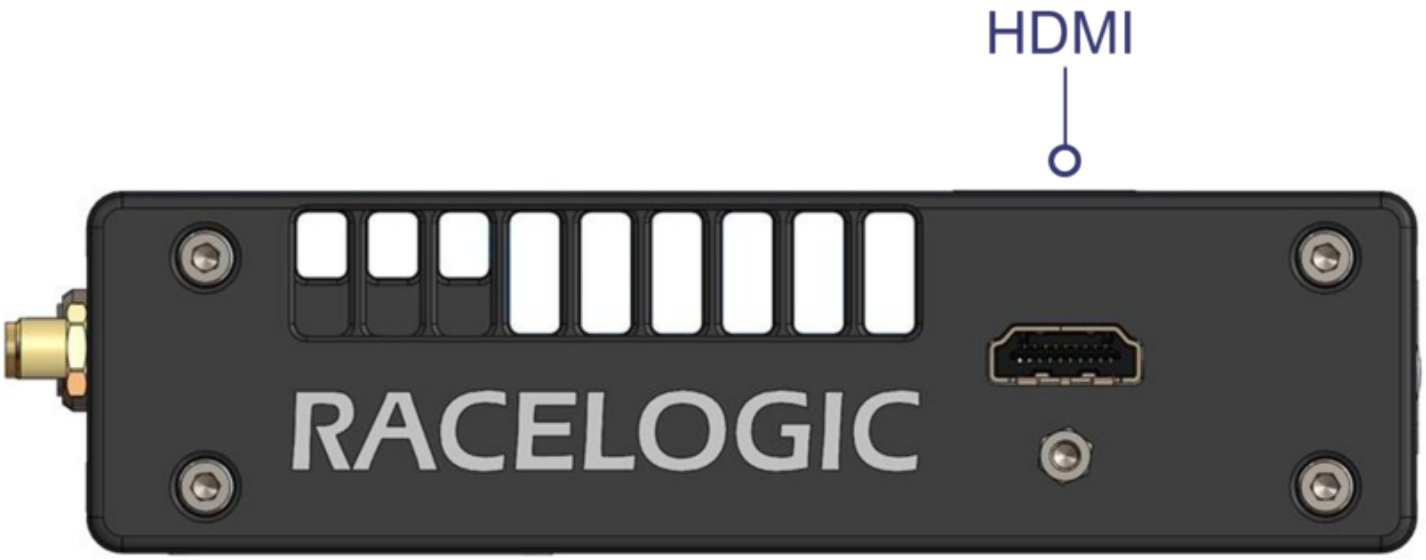
Front Panel



Rear Panel



Side Panel (V6 HDMI unit)



Inputs/ Outputs

Inputs

- **2 x Camera Inputs (CAM 1/CAM 2)**
  Resolution: 1920 x 1080p at 30 frames/second
  FOV: 148° horizontal, 86° vertical, 163° diagonal
- **2 x Audio Inputs (MIC)**
  Stereo audio recording with automatic gain control and line level input option
- **Bluetooth**
  For start/stop logging switch, heart rate monitor or OBD dongle
- **RS232 (CAN/SER)**
  For communication with OLED Display
- **CAN Bus (CAN/SER)**
  Allows user to log up to 80 CAN signals

Outputs

- **SD Card**
  Fast 32 GB card supplied with device Fast SD card required – tested up to 512 GB supported
- **USB 2.0 Host Interface (USB)**
  For recording to USB flash drives, fast USB drive required
- **WiFi**
  For camera setup/preview
- **RS232 (CAN/SER)**
  For communication with OLED Display

- **HDMI video output (side connector, V6 HDMI unit)**
  HDMI 1.3 with EIA/CEA-861-D video format support
  Maximum pixel rate of 148.5 MHz at 1080p30

LED Behaviour

If two solid green LEDs are shown, the system is ready to record.

If the system is permanently fitted to a vehicle, it should be possible to view the front panel when it is mounted. A brief overview of the LED behaviour is below.

OK LED	
Green – Fast Flash	System powering up or updating firmware/ scene
Green – Slow Flash	Fully powered - No SD Card/ USB Memory
Green – Solid	SD Card/ USB Memory OK – **READY TO LOG**
Orange – Slow Flash	Requires reboot
Red – Solid	System Error *The unit will automatically power cycle after approximately 30 seconds*

GPS LED	
Green – Slow Flash	Searching for Satellites
Green – Solid	GPS Lock OK – **READY TO LOG**

REC LED	
Blue – Solid	Recording – **DO NOT REMOVE MEDIA**
Blue – Fast Flash	Closing Files – **DO NOT REMOVE MEDIA**

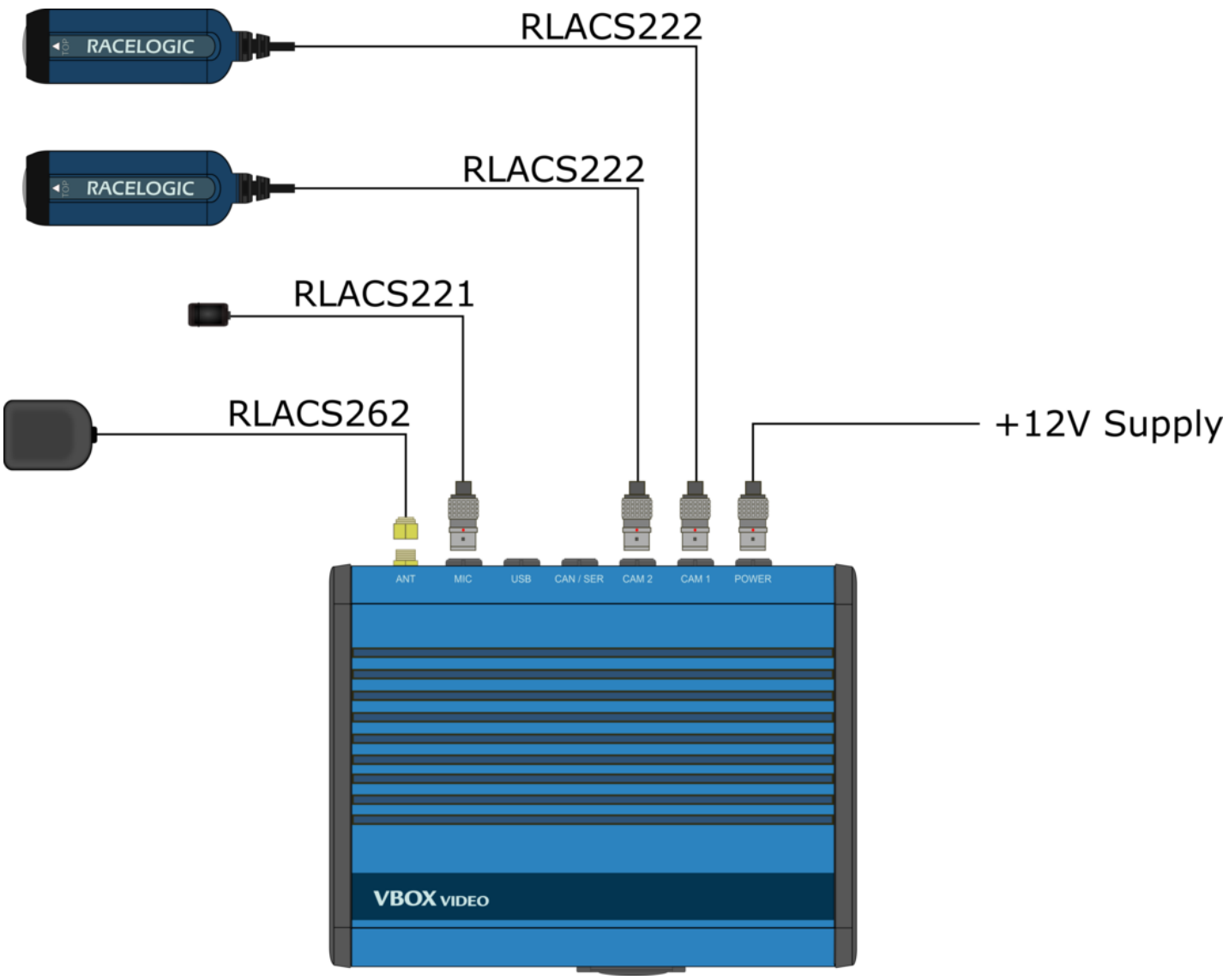
There is a fourth LED on the rear of the system. If the mounting solution only allows the back panel to be visible, this status LED works on a simple ‘traffic light’ style system.

Status LED	
Red	System Error
Orange	Not ready to record (either no GPS or no SD Card USB Memory OK)
Green	Ready to record – system all OK
Blue	Recording – **DO NOT REMOVE MEDIA**

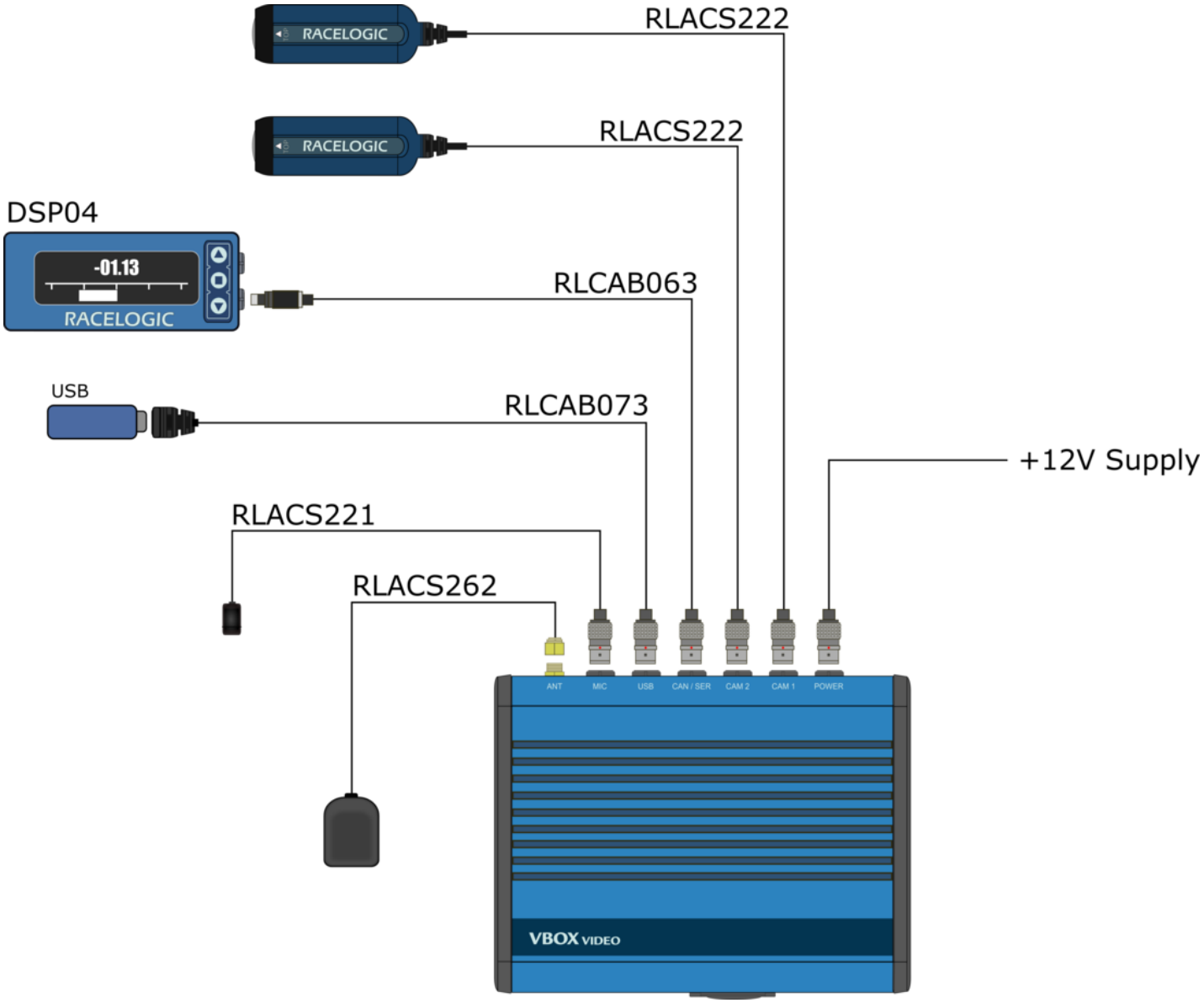
Connection Diagrams

Information on connecting different types of OLED display is available **here.**

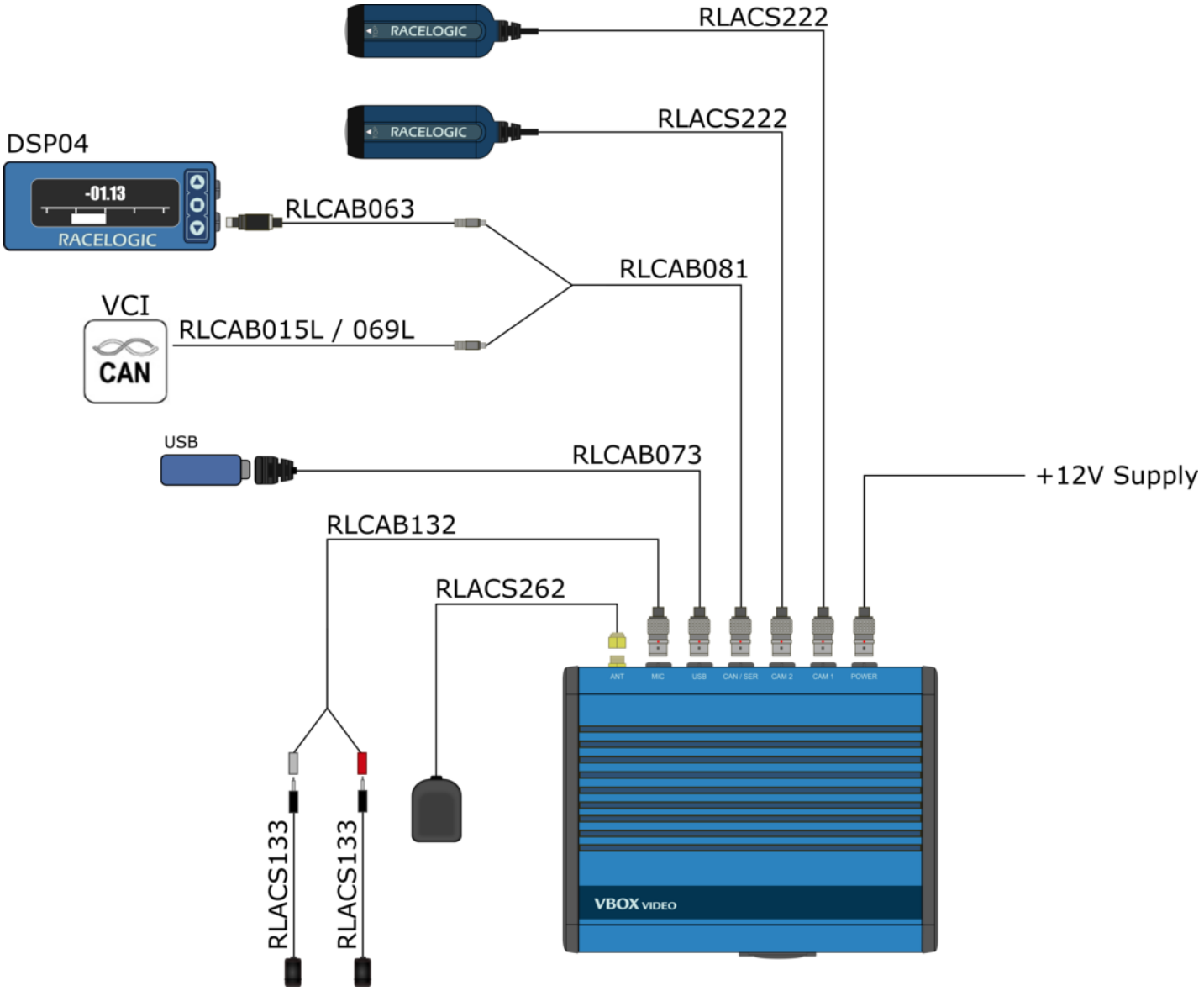
Supplied equipment



Including OLED Display and USB Logging

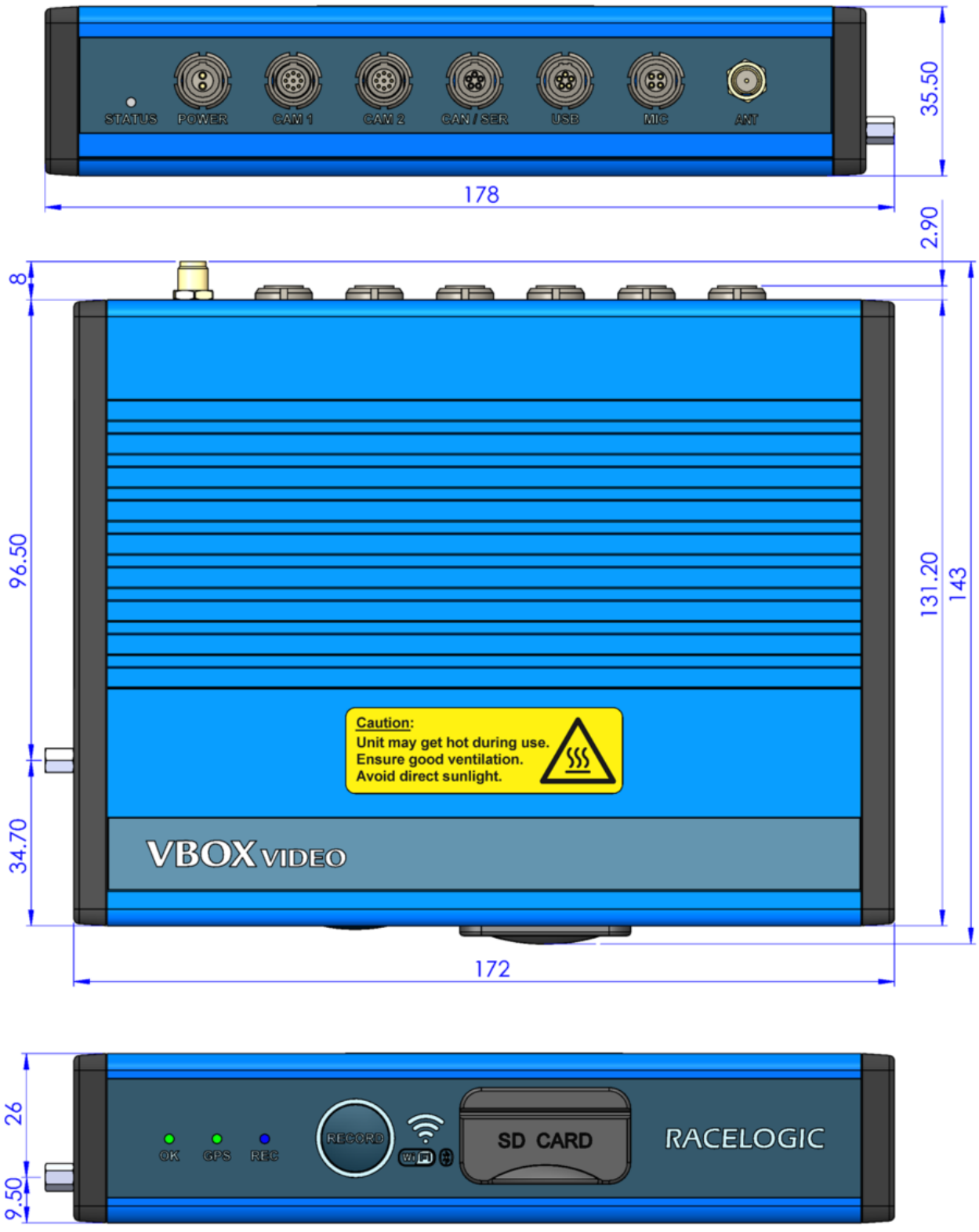


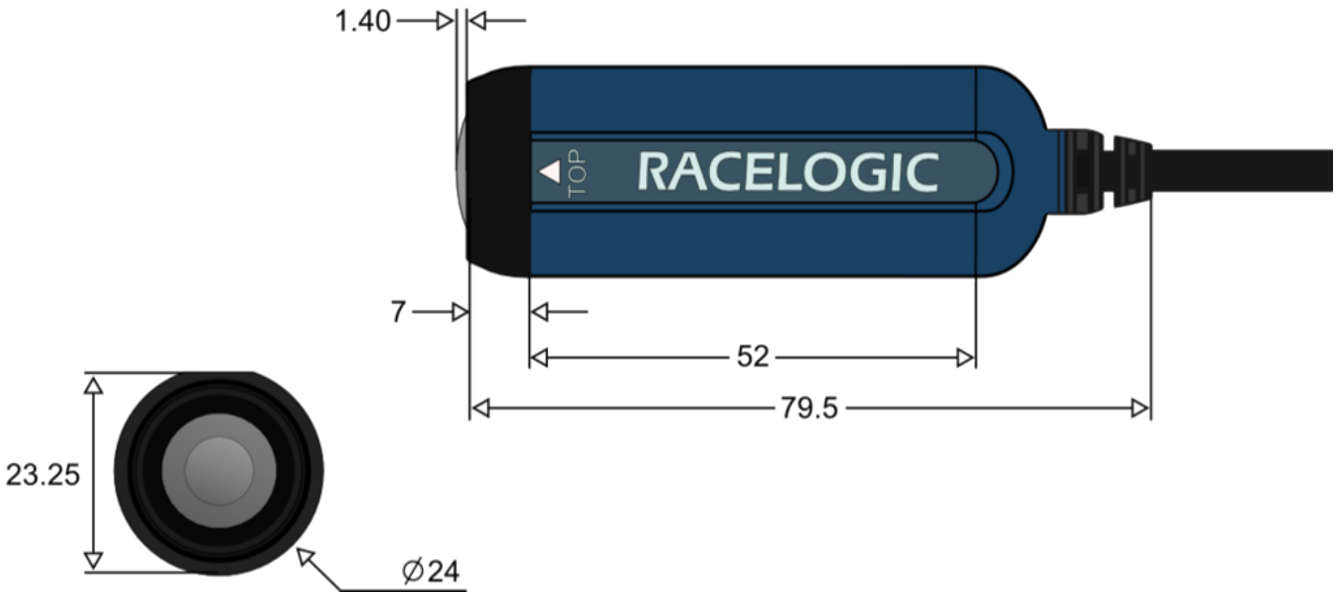
Including CAN and Stereo Microphones



Unit Dimensions

Measurements all displayed in mm.


STATUS
POWER
CAM 1
CAM 2
CAN / SER
USB
MIC
ANT
35.50
178
2.90
8
96.50
131.20
143
Caution:
Unit may get hot during use.
Ensure good ventilation.
Avoid direct sunlight.
VBOX VIDEO
34.70
172
26
9.50
OK
GPS
REC
RECORD
SD CARD
RACELOGIC


1.40
TOP
RACELOGIC
7
52
79.5
23.25
Ø24

03 - HD2 Camera Preview App

Once the HD2 system is fitted in your vehicle, the camera positions can be fine-tuned and bluetooth devices can be paired using the VBOX Video iOS/Android App, which connects to VBOX Video HD2 using a Wi-Fi connection.

Read the **Hardware Overview** for connection notes, or view the **Quick Start Guide** for a guide of fitting the system in a vehicle.

VBOX Video application can be downloaded from the **Apple App Store** or the **Google Play Store**.

Once the application is installed, a VBOX Video icon should show on the device.

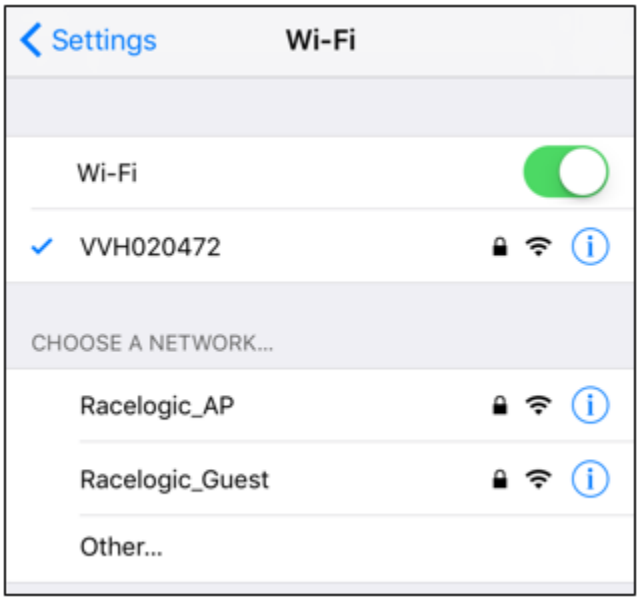
Power on the VBOX Video HD2, and wait for it to fully boot up. As soon as the HD2 is on, it will transmit a Wi-Fi signal which can be picked up by the iOS/Android device.

In order to pick up a live camera preview, open the settings area within the iOS/Android device, and navigate to the Wi-Fi settings area. There should be an option to select the detected VBOX Video unit. Note: the number listed after the device is the HD2 unit's serial number.

This will prompt the app to request a password confirmation:

The password to connect to the HD2 set as default is the serial number of the HD2 unit. In this example it is VVH020472.

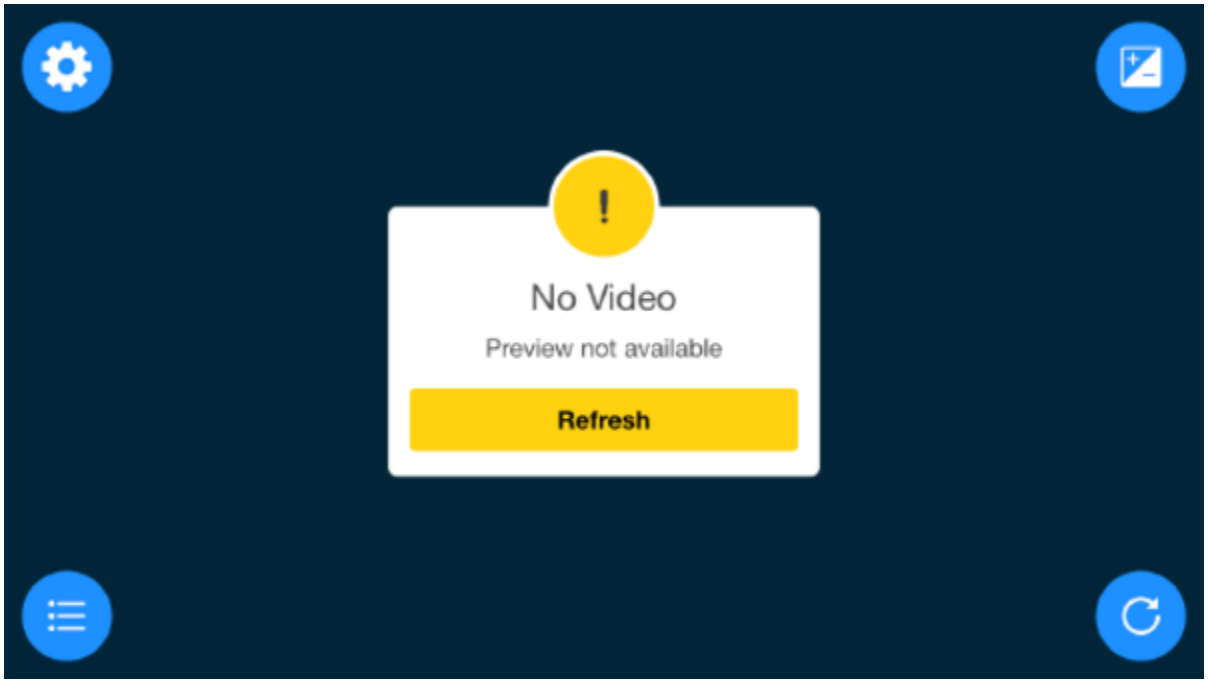
Enter this as the password and you should see the device connect to the HD2:



When there is a successful Wi-Fi connection to the HD2, open the application to view a live camera preview.

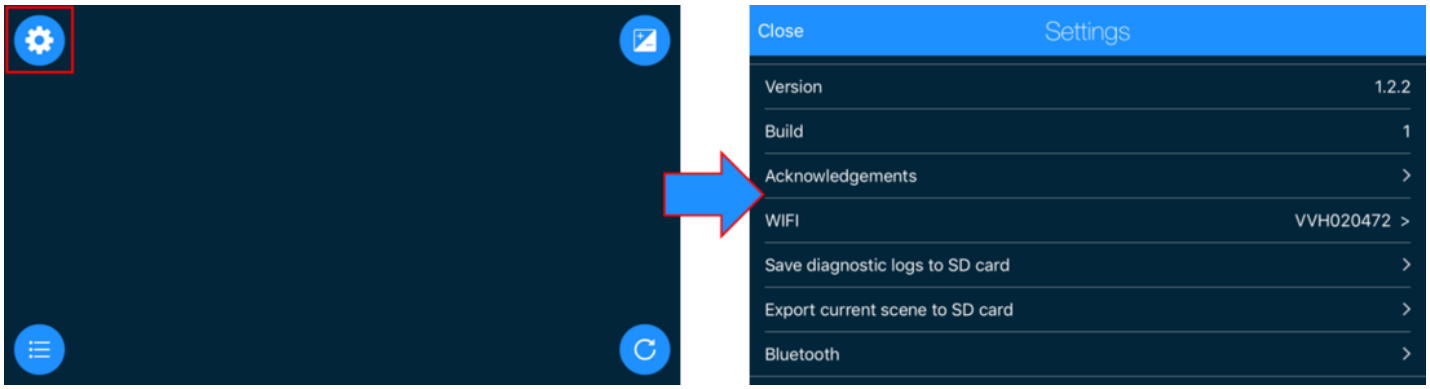
If the connection drops at any time, press the ‘refresh’ button shown below to connect to the unit again.

If the app is opened with no connection to a VBOX Video HD2, the user will see the message displayed below. Check that the Wi-Fi connection is still open in the device and that the HD2 is still powered.



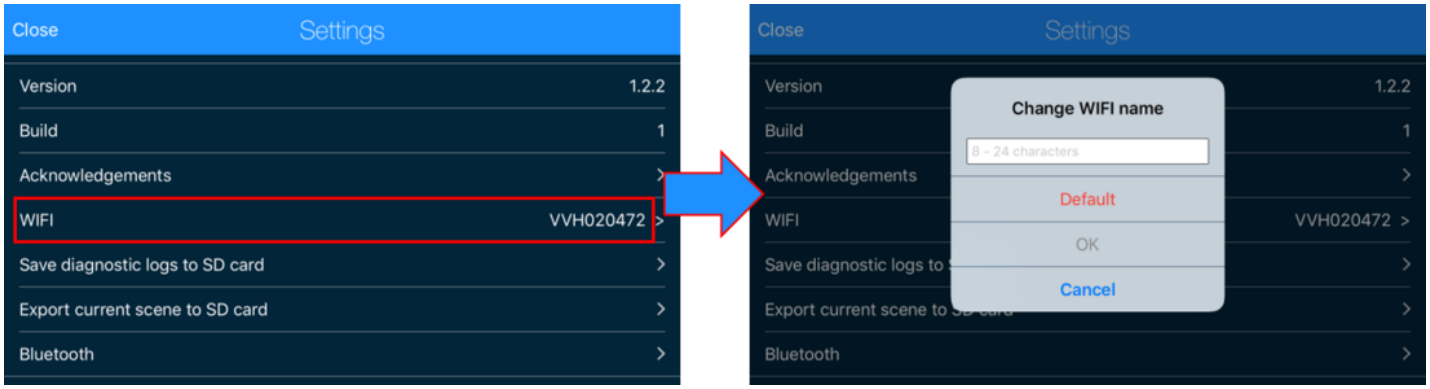
Settings Menu

The Settings icon highlighted below opens the Settings section where specification details of the HD2 unit and cameras can be found:



WIFI

Here it is possible to change the Wi-Fi SSID by tapping on the Wi-Fi name. A box will appear which allows a new Wi-Fi name to be entered and saved:



Save diagnostic logs to SD card

This instructs the HD2 to save its encrypted diagnostic log to the SD card, for use by Racelogic support when requested.

Export current scene to SD card

This saves the current HD2 scene to the SD card.

Bluetooth

This option allows you to:

- View all devices paired and see if any are currently connected
- Remove a device from the list of paired devices
- Add a device to the list of paired devices

This allows pairing of a [Bluetooth Start/Stop Logging Switch], [Heart Rate Monitor] or [OBD Module] if for some reason they do not automatically connect with the HD2.

When '**Bluetooth**' is selected, the HD2 will scan for available devices and display them alongside previously paired devices. To pair a device, select the device you wish to connect to and confirm the prompt. Likewise, to remove a paired device, select within the paired devices section and confirm the prompt.

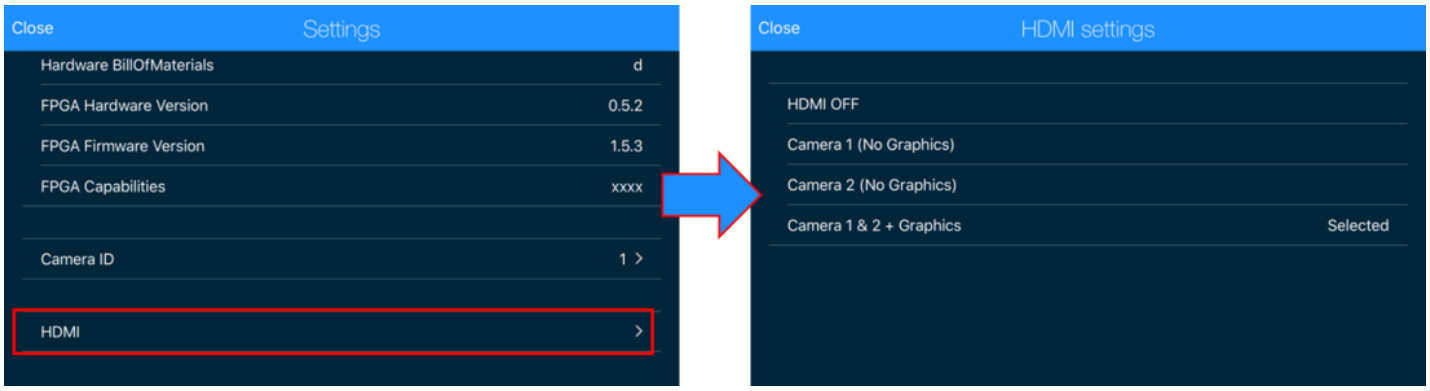
Note: The device will automatically connect to the unit when turned on as long as no other Bluetooth device of the same type (e.g. OBD dongle) is already paired with the HD2.

Note: A Bluetooth device will need to be turned off to be unpaired with the HD2 as it will constantly try to reconnect if on.

If a Bluetooth connection is active, a 'Bluetooth' icon will appear on the top right of the main app screen.

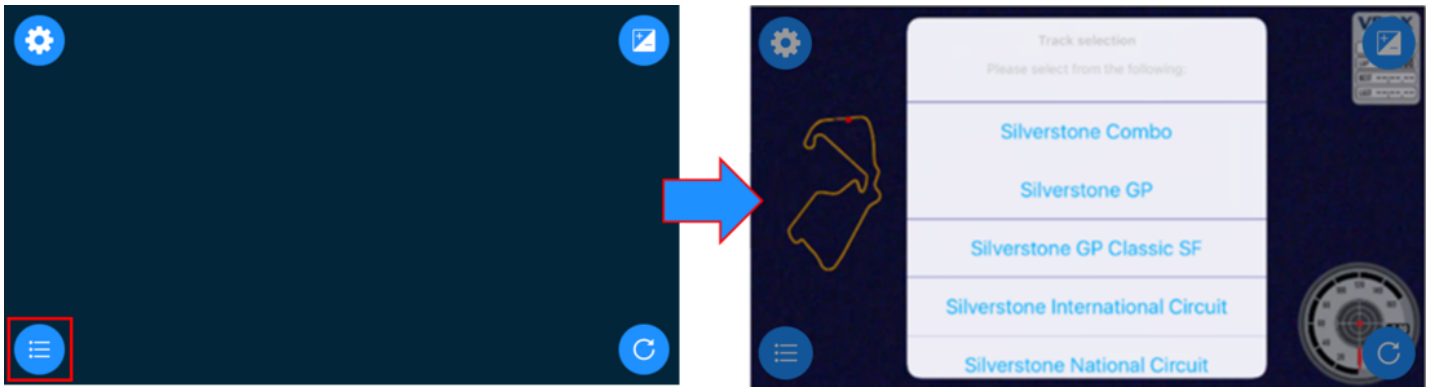
HDMI

This menu enables the VBOX Video HD2 HDMI variant (V6) to stream real time video and audio from the HD2 to an HDMI compatible monitor, recorder or streaming device. Selecting enables you to choose to output from Camera 1 (without graphics), Camera 2 (without graphics) or Camera 1 and 2 (with graphics).



Track Selection

The track selection icon is available if an auto track map element is being used in the current scene in the VBOX Video. Selecting this icon allows a specific version of the track at the current GPS location to be selected:

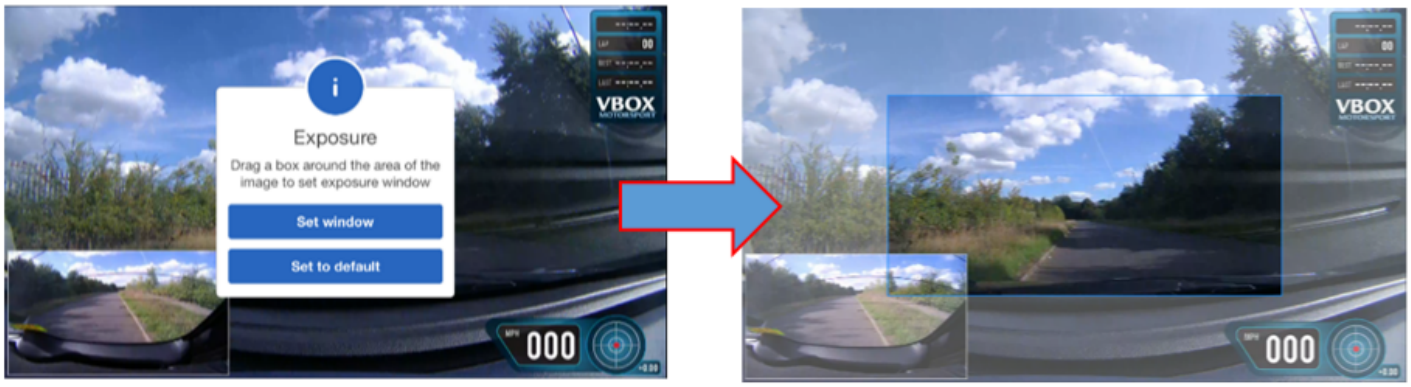

Track selection
Please select from the following:
Silverstone Combo
Silverstone GP
Silverstone GP Classic SF
Silverstone International Circuit
Silverstone National Circuit

Exposure Setting

The exposure setting icon allows the main camera exposure to be tailored to the specific light conditions and camera position. This is particularly useful if the camera is mounted a long way back in the vehicle and the view through the windscreen is washed out or over exposed.

When selecting the exposure icon a message will appear which enables the exposure window to be set manually or returned to the default setting.

Selecting '**Set window**' allows the user to drag a box around the area of the image the exposure should be set to.



04 - HD2 Logging

Logging Media

SD cards/ USB storage

- When purchasing SD cards, always buy a quality brand such as SanDisk, Kingston or Lexar.
- If data is to be logged to a USB storage device, the optional **RLCAB073** cable or the **RLACS237** start/stop logging switch with USB port is required. Racelogic recommend good quality USB storage media - write speeds above 7 MB/s (4 MB/s absolute minimum), a speed class of 10 (4 absolute minimum) and good USB chipsets are essential.

IMPORTANT – If you are logging to USB storage, do not connect the media to the VBOX Video HD2 until the unit has fully booted (OK LED changes from Green – Fast Flash to Green – Slow Flash).

Formatting

VBOX Video HD2 supports both **FAT32** and **exFAT** file formats - this means that the majority of SD cards/ USB memory of any size can be used out of the box.

File format	Supported?
FAT32	✓
exFAT	✓
NTFS	✗ (**NTFS is not supported by VBOX Video HD2**)

IMPORTANT – If an SD card/ USB storage is formatted in the NTFS file format, it will need to be reformatted into an exFAT or FAT32 file system before it will work with a VBOX Video HD2 unit.

- exFAT reformatting can be done directly within Windows by right clicking on the media and selecting '**Format**'.
- FAT32 reformatting for media with sizes up to 32 GB can be done directly within Windows by right clicking on the media and selecting '**Format**'.
- If you would like to format media with sizes above 32 GB in to a FAT32 file system, this isn't something that can be done directly within windows as it is not the standard formatting for the file. However, many third party software programs can be used to reformat media to allow them to work correctly with our products - we can recommend this tool as a free option from the SD card organisation.

SDHC cards (2 GB to 32 GB)

Supplied or purchased SDHC cards are formatted in the **FAT32** file format. This format **is supported** by the VBOX Video HD2.

Note: The 32 GB SD card supplied with the VBOX Video HD2 is formatted in the FAT32 file format.

SDXC cards (64 GB and above)

Purchased SDHC cards will be formatted in **exFAT** or **NTFS** file formats; the **exFAT** format **is supported** by the VBOX Video HD2, the **NTFS** format **is not supported** by the VBOX Video HD2 (please reformat as per instructions above).

USB storage

Purchased USB storage may be supplied in **FAT32, exFAT** or **NTFS** file formats; **FAT32 and exFAT** formats **are supported** by the VBOX Video HD2, the **NTFS** format **is not supported** by the VBOX Video HD2 (please reformat as per instructions above).

Default Logging settings

Out of the box, the VBOX Video HD2 is configured to log when movement is detected.

The minimum log speed is set to 15 km/h - when the unit detects speed values above this, logging will start.

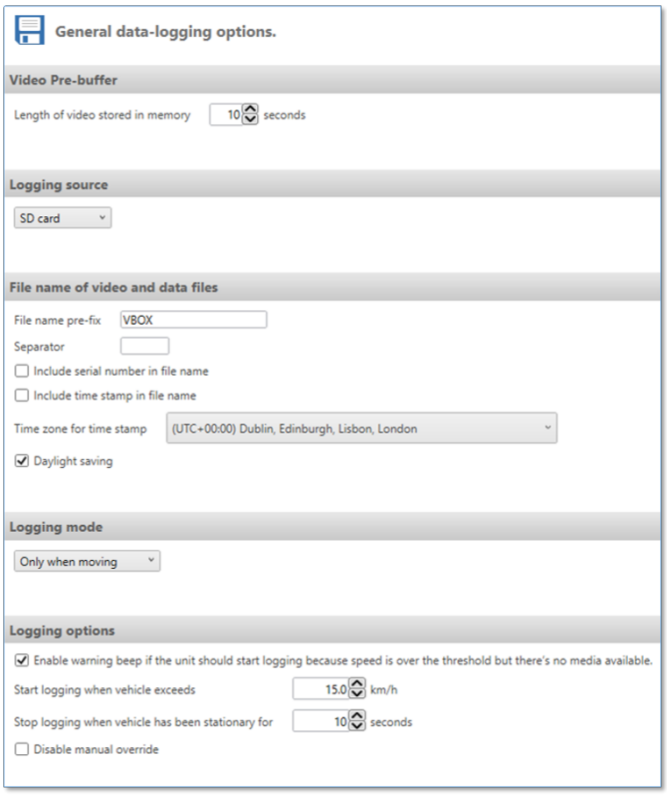
There is also a 'pre-logging buffer' configured to capture 10 seconds of video data prior to the logging start point. This means that there will be an additional 10 seconds of video captured **before** 15 km/h is reached, so standing start, or the vehicle leaving the pit lane will all be captured.

The VBOX Video HD2 will stop logging after the vehicle speed has been under 15 km/h for 10 seconds.

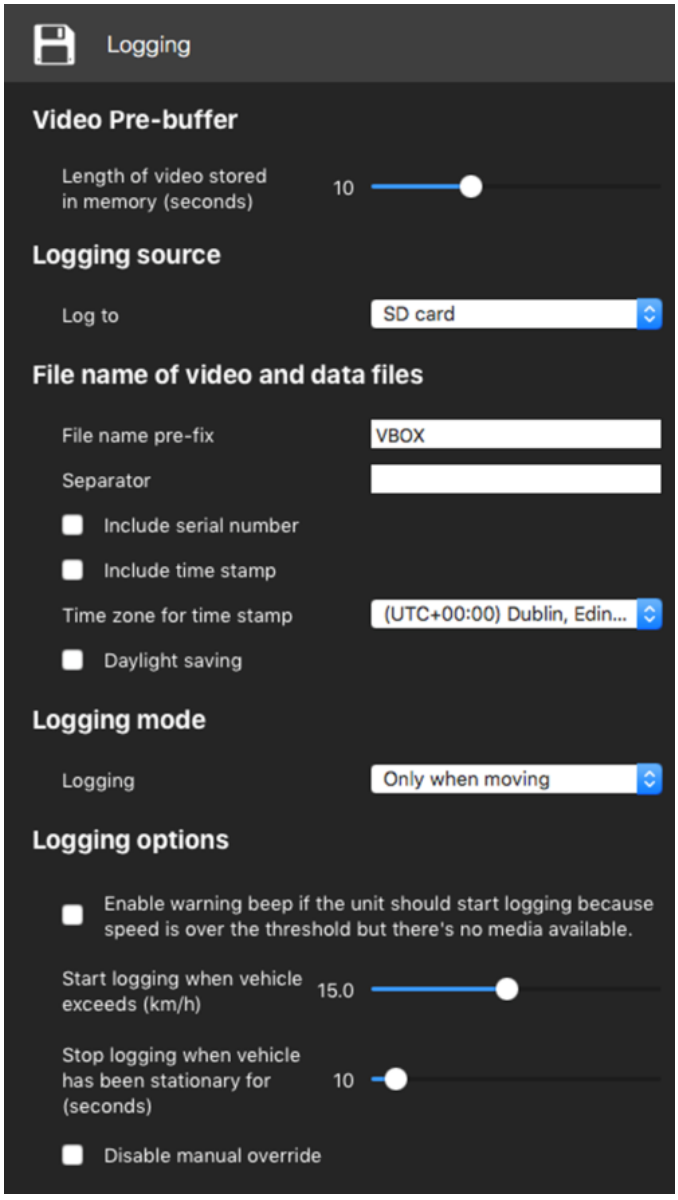
These settings have been picked to ensure that every moment of track action is captured, while eliminating small files being created from noisy GPS signals when in and around the pit lanes.

VBOX Video HD2 is set to log to SD card first if both an SD card and USB device are connected, however this can be changed if desired.

Default logging settings can be changed using VBOX Video Setup software - as shown below.



Windows



macOS

The logging behaviour of VBOX Video HD2 is totally user configurable, so can be altered to suit different requirements.

As well as logging **Only when moving**, the HD2 can also be set to log **Continuously**, **Manually** or by using **Advanced** logging options. For more information on logging settings, please **click here**.

Logging behaviour

The **Blue** Record LED will be on when recording video. When you come to a stop, it will then flash as the file is closed and will go out when it is safe to remove the SD card.

IMPORTANT – NEVER remove the SD card when the Blue Record LED is on or flashing - you will lose data/ video!

Note: *If for some reason the SD card is removed whilst still recording, it may need to be repaired using a PC before it can be reused.*

If you have come to a stop, but the LED is on, press the '**RECORD**' button to stop the video before removing the card.

Sometimes, due to poor satellite visibility in a garage or close to a building, the box may start recording, even if the car is stationary. Always check the **Blue** LED before ejecting the card.

Video Quality storage requirements

The table below shows how much space is required for each video quality setting.

Quality	Bit Rate	File Size
Low	8 Mbit/s	~ 3.5 GB/hr
Medium (default)	12 Mbit/s	~ 5.25 GB/hr
High	16 Mbit/s	~ 7 GB/hr

Note: Files will record at a slightly higher bit rate in low light conditions.

Bluetooth start/stop logging switch

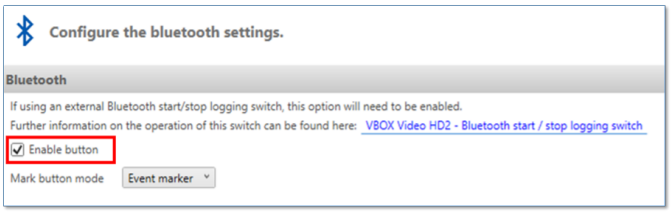
There is an optional extra Bluetooth start/stop logging switch available for use with the HD2 (RLACS224). This can be purchased from our **online store**. This button is designed for in car use, with a range of around 2 m.

The device will automatically connect to the unit when turned on. The pairing of the Bluetooth logging switch uses the button's MAC code, its own unique identifier, which is individual to that particular switch. This ensures that in busy areas, there can be no confusion or accidental pairing to an incorrect unit.

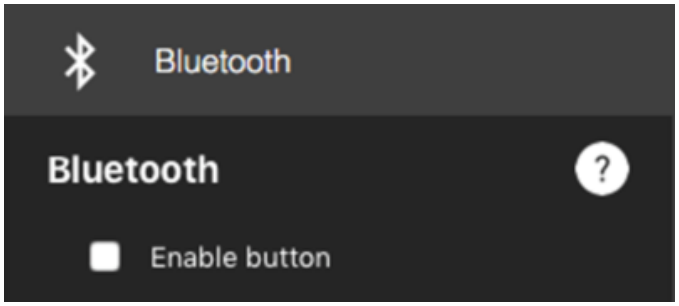
In order to pair the Bluetooth start/stop logging switch with the HD2 unit, the correct setting must be firstly selected within VBOX Video Setup software.

1. Firstly, power up VBOX Video HD2.
2. Insert the SD card in to a computer and open VBOX Video Setup software, which can be downloaded **here**.
3. Add a new scene or select a previously saved scene by selecting the '**File**' button.
4. Select '**Settings**' and click on '**General**'.

5. Select '**Bluetooth**', ensure that '**Enable button**' is ticked



Windows



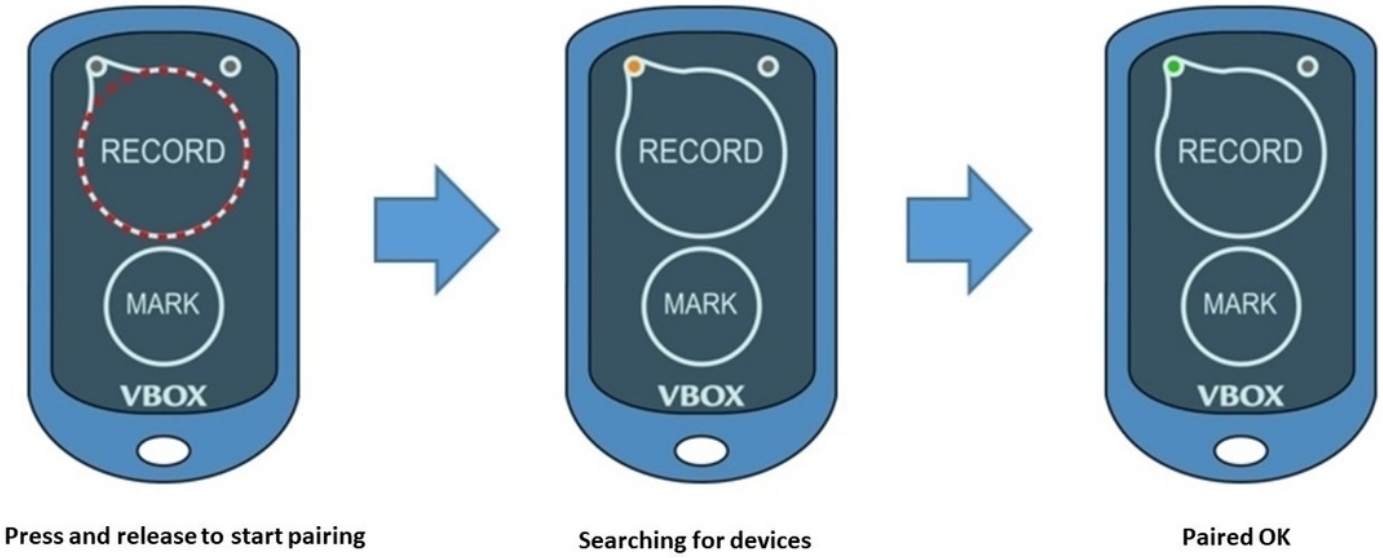
macOS

6. Save to the SD card and remove.

Pairing HD2 with a logging switch

To pair a Bluetooth logging switch, first ensure that the HD2 unit is fully powered on.

1. Insert the SD card in to the fully booted VBOX Video HD2.
2. Pair the switch with the HD2.
3. If no other Bluetooth start/stop logging switch is paired with the HD2 and the unit is running **Firmware Version V1.3.72** or later, the switch will automatically connect to the unit when turned on.
4. If another Bluetooth switch is paired with the HD2, the existing paired switch will need to be removed using **button commands** or the **Camera Preview App**.
5. To turn on, hold the Bluetooth switch within 1 m of the HD2 and press the '**Record**' button – You should see the Record LED flashing **orange** while it searches for VBOX Video HD2.
6. Once connected, the Bluetooth Record LED will display a single **green** flash. You can start/stop recordings and event mark files at the touch of a button.



Note: Only one logging switch can be paired to a VBOX Video HD2 at any time.
Note: The Bluetooth logging switch will go into 'sleep' mode after 1 minute of no activity.

If for some reason the Bluetooth switch does not automatically connect with the unit, a pairing file can be installed on to the HD2 using the method below:

- Once the scene has loaded, remove the card and insert the SD card provided with the switch*.
  Note: If the switch was not supplied with an SD card, remove the card used for recording, upload the file to it from a computer and insert it back in to VBOX Video HD2.
- Within a few seconds, the HD2 will beep and the OK light will slowly flash **orange**.
- Power cycle the unit.
- Remove the SD card provided with the switch and reinsert the SD card used for recording.

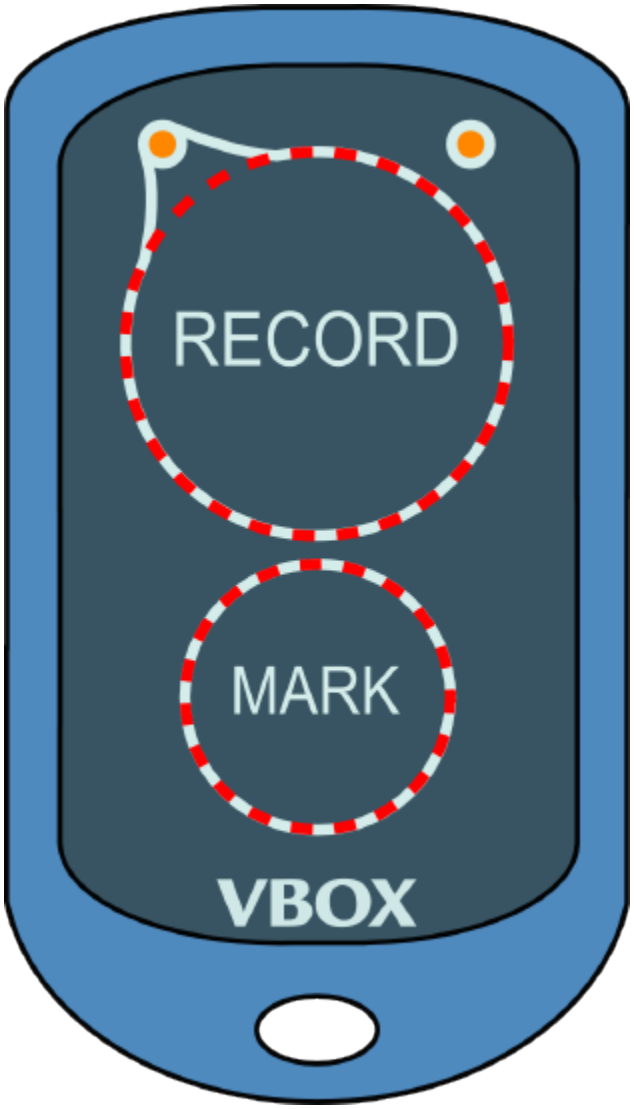
*Bluetooth logging buttons purchased before the release of Firmware version 1.2.45 (prior to October '16) would not have been supplied with an SD card and will require a pairing file, obtainable from Racelogic, when upgrading to Firmware version 1.2.45 or later. To do this, please remove the rear cover of the Bluetooth switch, on the inside of the rear cover you should then see a 12 digit code written on a silver sticker (MAC Code), as seen below:

Please email this code along with a request for a Bluetooth switch pairing file to **support@racelogic.co.uk** or give us a call and we can quickly and easily make a file and send this via email.

The pairing file is deleted from the card once installed onto VBOX Video HD2, we suggest you back up a copy ***before*** loading into the unit, in case for any reason you need to re-pair the Bluetooth switch. Should you not have a backup and require a new file to pair, please contact **support@racelogic.co.uk.**

Un-pairing HD2 with a logging switch

To un-pair an HD2 unit with a specific Bluetooth logging switch, press and hold both buttons on the logging switch until both LEDs show **orange**.



Bluetooth button operation

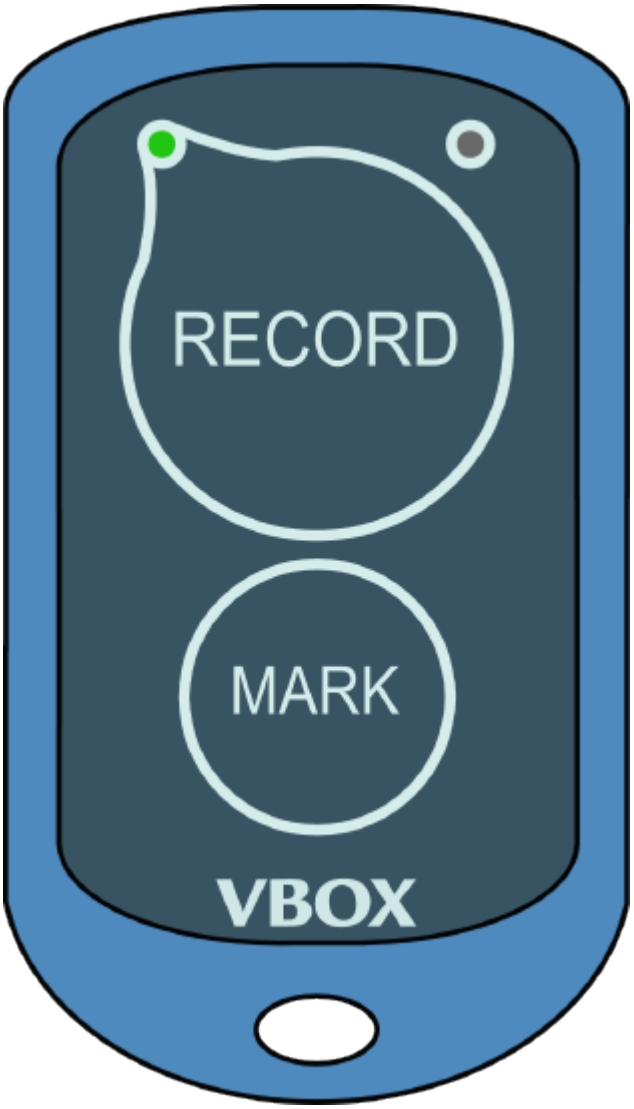
Logging control

Once pairing has been successful, the Bluetooth button will control logging of the connected HD2.

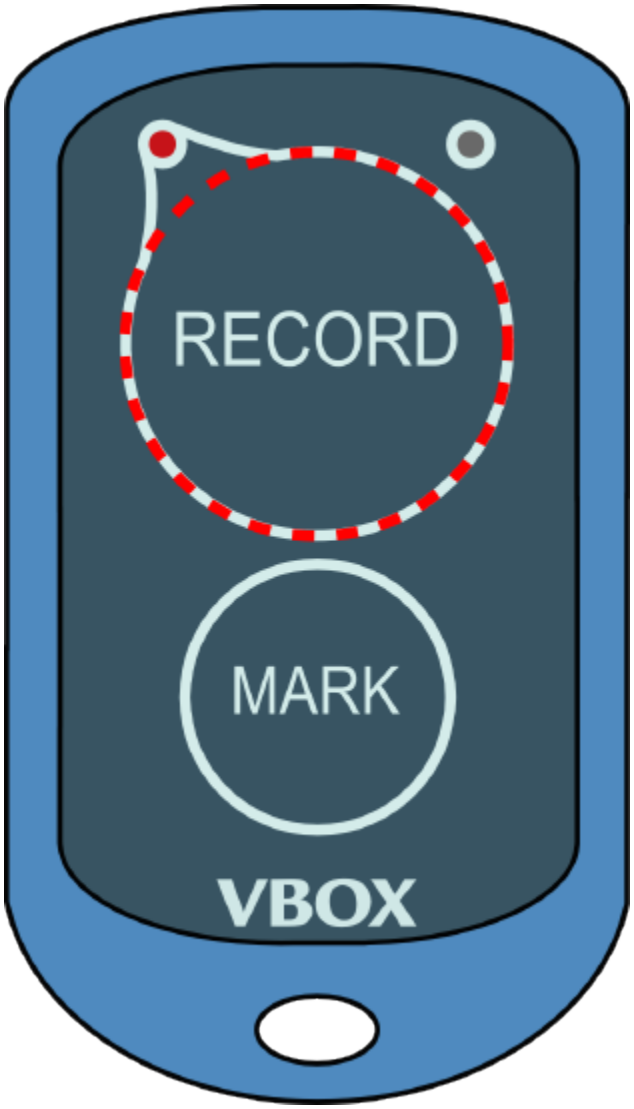
*Note: The HD2 will still follow the set logging conditions. **Click here** for more information on logging settings.*

Pressing '**RECORD**' on the Bluetooth button should always act as a manual override to control the logging of the HD2, in exactly the same way as pressing the button on the front panel of the HD2 box itself.

- If the paired HD2 is recording, the RECORD LED on the Bluetooth button will flash **green** regularly.
- If the paired HD2 has no logging media fitted, and the manual logging control is activated, the RECORD LED on the Bluetooth button will flash **red** regularly.



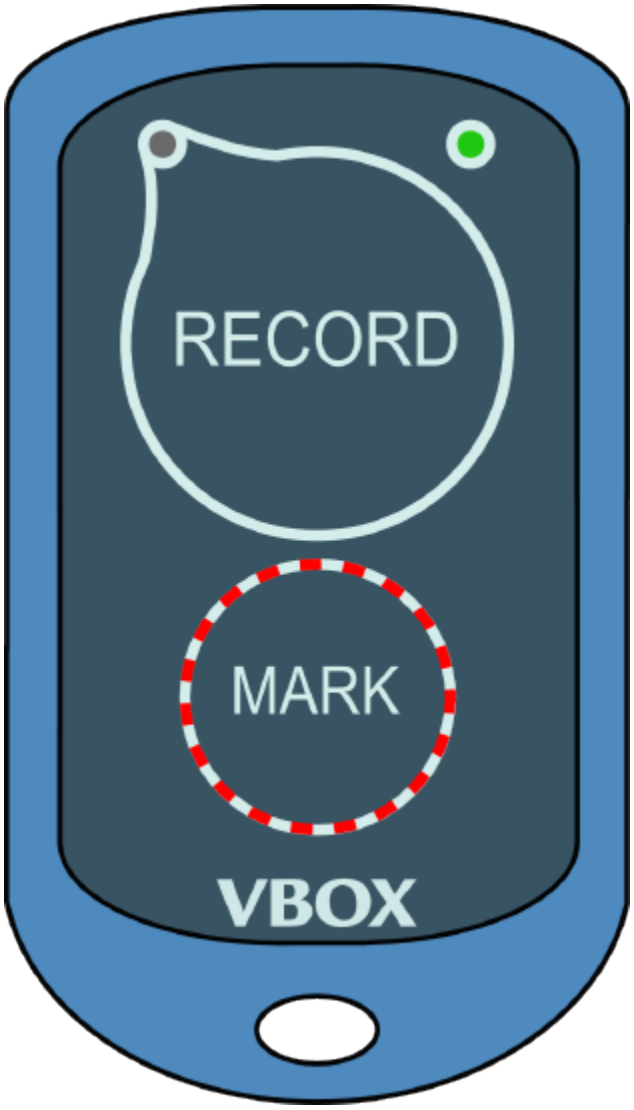
HD2 unit recording



No media fitted to HD2 – unable to record

Event Marking

To mark an event, press '**MARK**' on the Bluetooth button. This will cause the MARK LED to flash **green** once, and an event marker to be logged within the VBO data file.



Bluetooth switch technical information

Battery Type	CR2032
Battery life – continuous use*	Approx. 900 hours
Battery life – standby use**	Approx. 3 years
Bluetooth range	Approx. 2 m

*Continuous use means that the Bluetooth button is displaying a logging state, so the logging LED would be illuminated and a there would be a live Bluetooth link to the VBOX Video.

**Standby use means that the button has no live Bluetooth link, is not searching for any devices and is essentially ‘asleep’. The button can be ‘woken up’ at any time via a button press.

Battery replacement

Click case apart using bottom indent. Allow the battery to slide out by gently pulling the two tabs highlighted below forwards. Insert the new battery and snap the case shut.

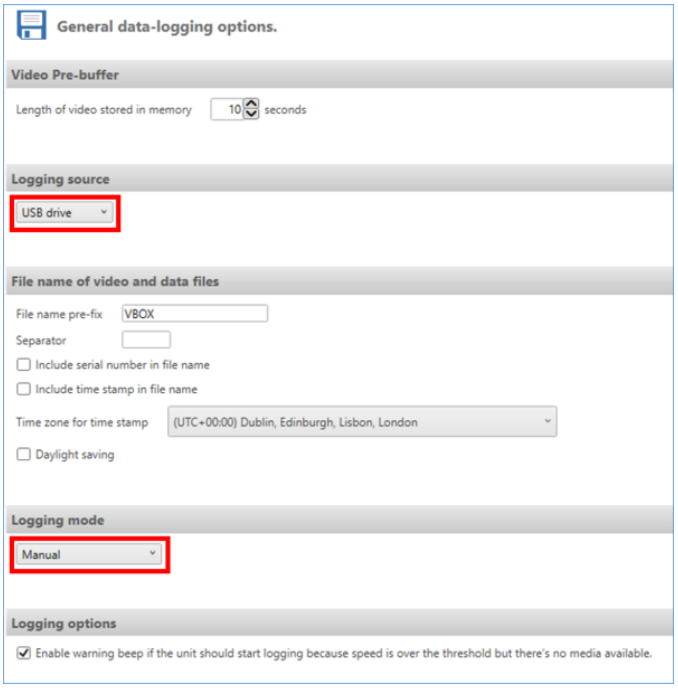
Wired start/stop logging switch with USB port

There is an optional wired start/stop logging switch, with USB port, available for use with the HD2 (RLACS237). This can be purchased from our **online store**.

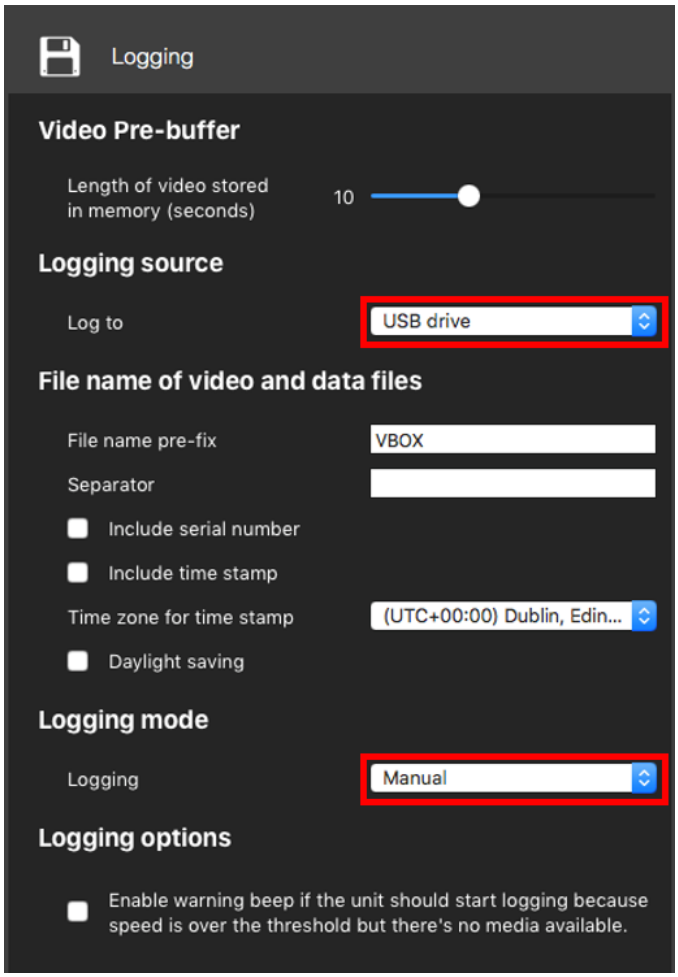
The logging switch has a record button and LED, this replicates the behavior of the 'Record' LED on the front panel of the HD2 unit. This allows the HD2 to be fitted in the vehicle without the need for the Record LED on the box to be visible, and has a 3 m long cable giving greater flexibility for fitting options.

To use the USB function on the wired start/stop logging switch, the scene stored in the HD2 unit will need to be edited. The '**Logging source**' option found within the **General settings (Windows, macOS)** area will need to be set to '**USB drive**' in the drop down list and the '**Logging mode**' set to '**Manual**', as shown below. If the '**Logging mode**' is not set to '**Manual**', the wired start/stop logging switch will act as an override to the selected mode.

Note: As an extra feature, if there is an SD card present in the unit, the HD2 will revert logging back to the SD card should the USB stick become full during use or if the USB stick is absent/missing and recording is initiated.



Windows



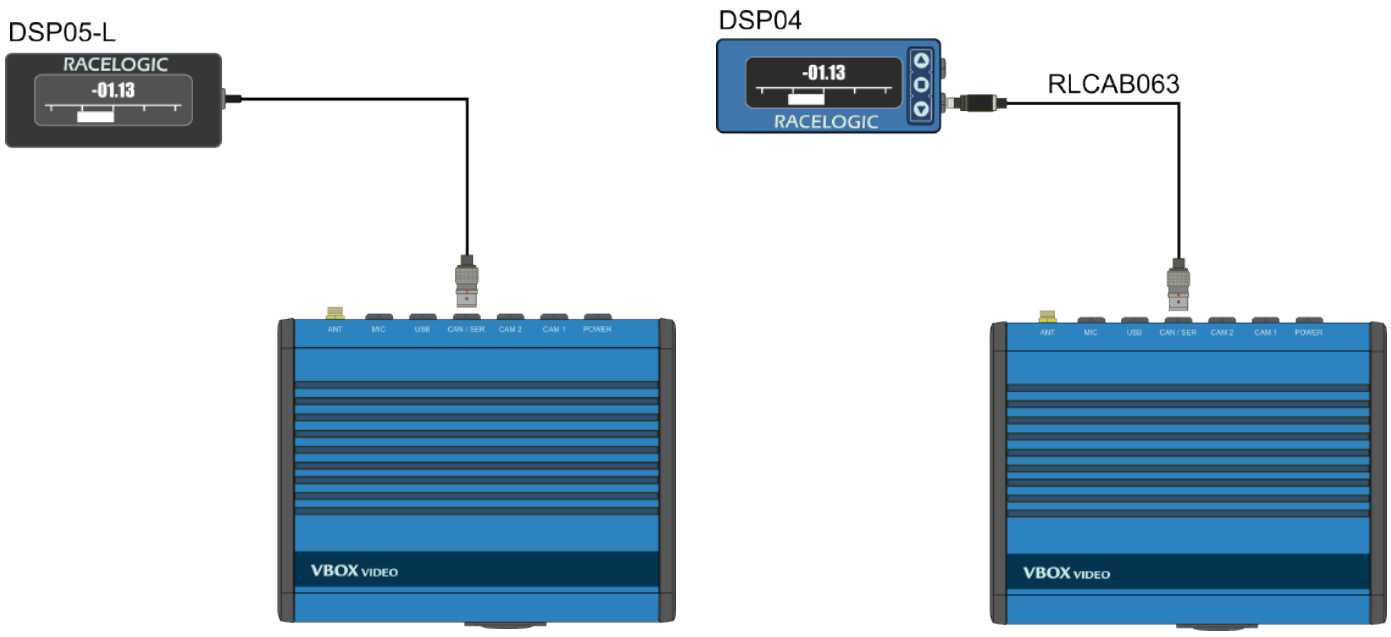
macOS

05 - HD2 Using with OLED display

These notes are specifically for OLED use with VBOX Video HD2. The full OLED manual can be accessed **here.**

Hardware connection

The OLED display uses a serial connection to display information from the VBOX Video HD2, so the CAN/SER ports on both the HD2 and the OLED must be used.



Automatic track recognition

This feature allows the HD2 to search through a built in circuit database of over **500 circuits** and load all layouts from the detected GPS location.

Using an OLED display, a specific layout can be selected when at a location with multiple circuits. After arriving at a circuit and allowing the HD2 to gain a GPS lock, the desired circuit layout can be selected, as shown below.

When a track is chosen, the start/finish line will be automatically synchronised.

Multiple scene selection

The VBOX Video HD2 can store up to eight user defined scenes. They are loaded by placing all files in the root directory of logging media (SD Card or USB stick) and inserting them into the HD2 unit when it is powered on. The HD2 will load all scenes from the media device and save them to its internal memory.

The user can select the scene using an OLED display as shown below.

Notes:

- If the user tries to load more than eight scenes, the HD2 will reject all the scene files and write an error message to the SD card.

- Scene selections cannot be added to with single scene files. The whole group of scenes must be loaded at a single time.

Serial settings

By default, VBOX Video HD2 is set up to work with the OLED display. There is a serial application setting within **General settings (Windows, macOS)** which can be set to 'none', which will stop all data being sent to the OLED and cause a 'communication error' to be displayed on the OLED screen.

06 - HD2 Connecting to the Vehicle CAN Bus

VBOX Video HD2 has the ability to capture up to 80 CAN channels from Racelogic modules and/or from a vehicle CAN bus system.

Along with a **Software Configuration (Windows, macOS)**, a hardware connection must be made to the vehicle's CAN bus system.

This can be done into some vehicles OBDII (On-Board Diagnostics) port, or directly into the CAN bus wires using a bare wire connection, depending on the vehicle make/model.

Racelogic provide details of vehicle connection points including images, descriptions and wire colours whenever this information is known. As well displaying this information within the software, vehicle information is also available on our **website**.

HD2 Hardware connections – Vehicle CAN

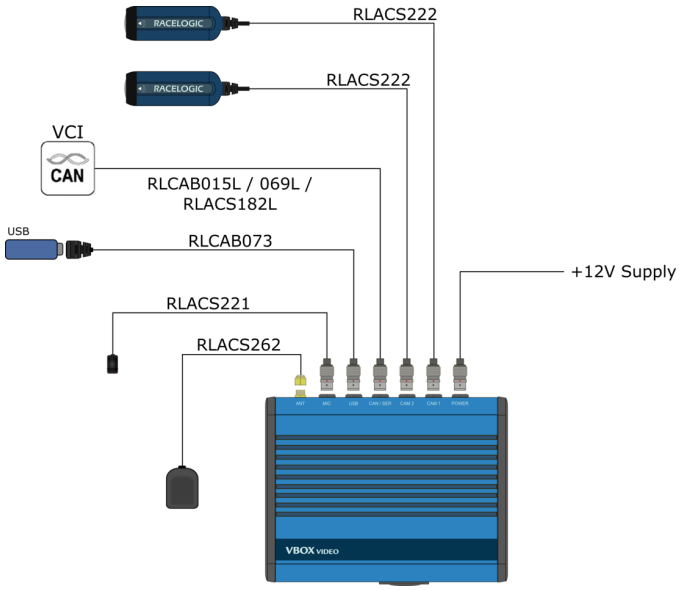
- To connect the HD2 system to an OBDII port, a **RLCAB069L** cable must be used.
  Click here for a cable drawing including PIN outs for the **RLCAB069L**.

- To connect the HD2 system to a vehicle CAN bus system using a bare wire, a **RLCAB015L** cable must be used.
  Click here for a cable drawing including PIN outs for the **RLCAB015L**.

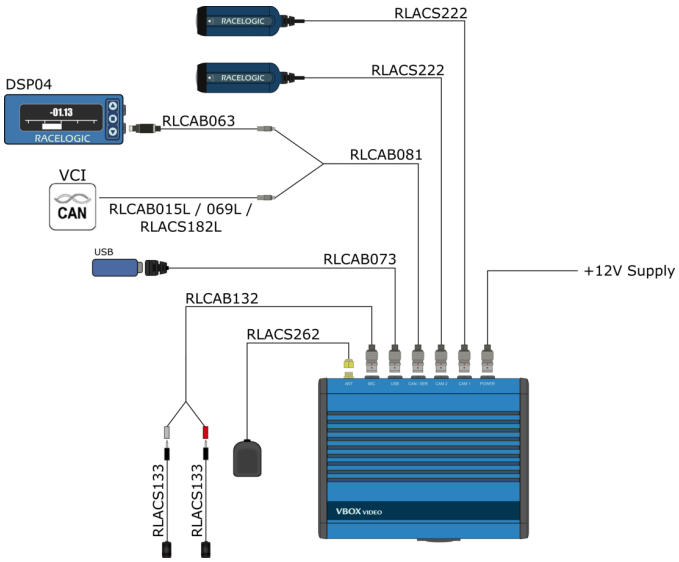
- To connect the HD2 system to a vehicle CAN bus system by clipping on to the wires, a **RLACS182L** cable must be used.

Note: If the connection needs to be made using a bare wire interface with the CAN Hi and Lo outputs of the vehicle, we strongly recommend contacting a qualified auto-electrician to perform the fitting.

Setup diagrams are below for HD2 units with and without an OLED display.



Without OLED Display



With OLED Display (and stereo microphones)

OBDII Port Location

The exact location of the OBDII connector varies from vehicle to vehicle, but it will be within a few feet of the driver and it will have easy access. Most often you can find the OBDII connector somewhere below the steering column, either above the pedals or perhaps inside a fuse box by the driver's knee. The OBDII connector will probably be in plain view, but some connectors are covered.

07 - HD2 HDMI Output

VBOX Video HD2 is available with an HDMI video output, located on the side of the unit, which allows users to stream real-time video from the HD2 to an HDMI compatible monitor, recorder or streaming device.

VBOX Video HDMI can be used to give live coverage of motorsport events for TV or social media, provide race teams with the ability to give instant driver feedback, or act as a rear-view camera.

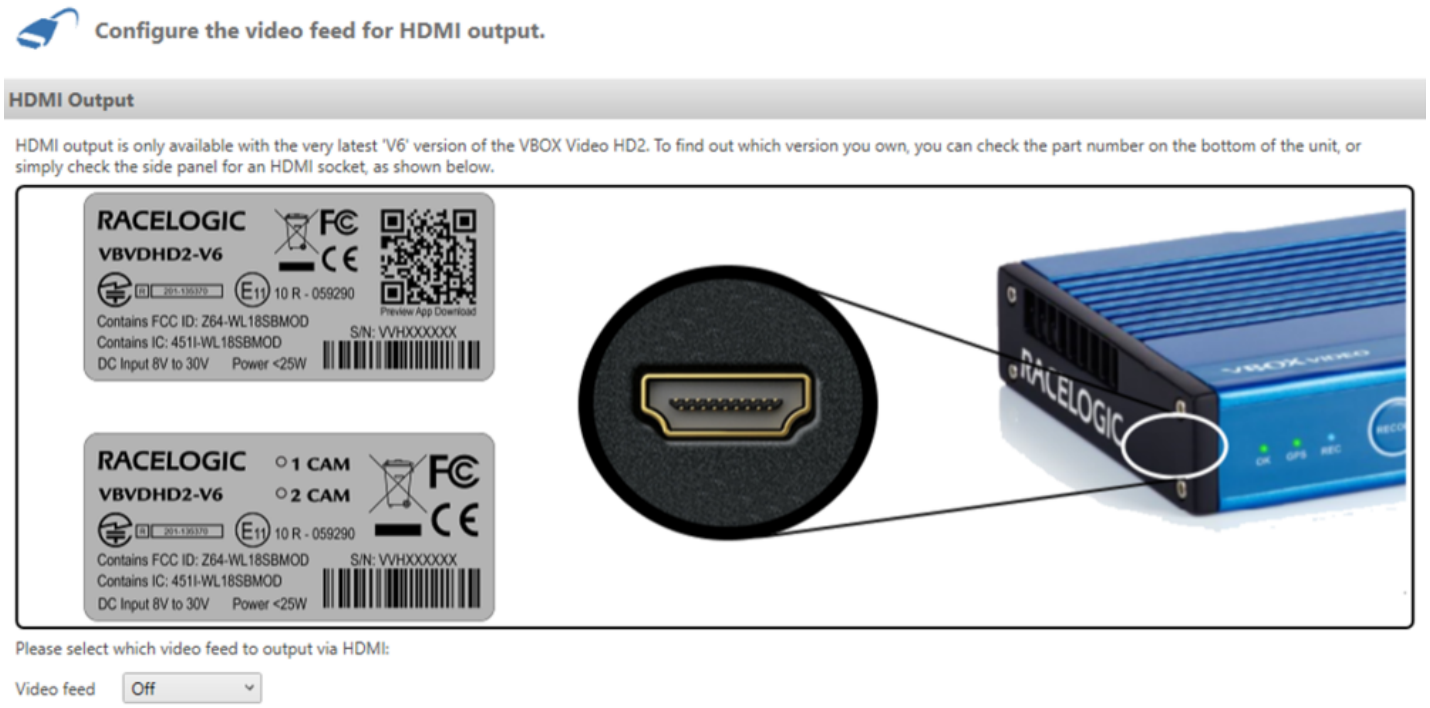
The system (RLVBVDHD2-H) comes with an HDMI port and locking pin to make sure the provided cable (RLCAB141) has a secure connection. VBOX Video HDMI will only run with the latest version of HD2 firmware (1.3.76 and higher) and setup software (1.4.259 and higher).

To output video via the HDMI port, the setting must be enabled within **VBOX Video Setup Software** or the **VBOX Video App**.

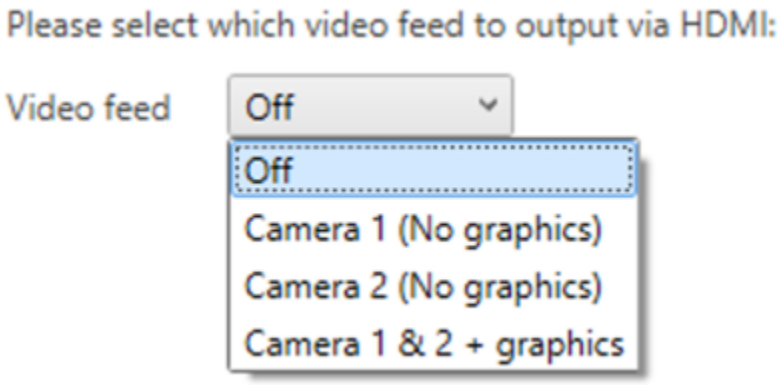
Software Setup

The HDMI video output settings are accessible within the **VBOX Video Setup Software** via the **Settings** button at the top left of the screen.

This menu enables the VBOX Video HD2 HDMI variant (V6) to stream real time video and audio from the HD2 to an HDMI compatible monitor, recorder or streaming device.



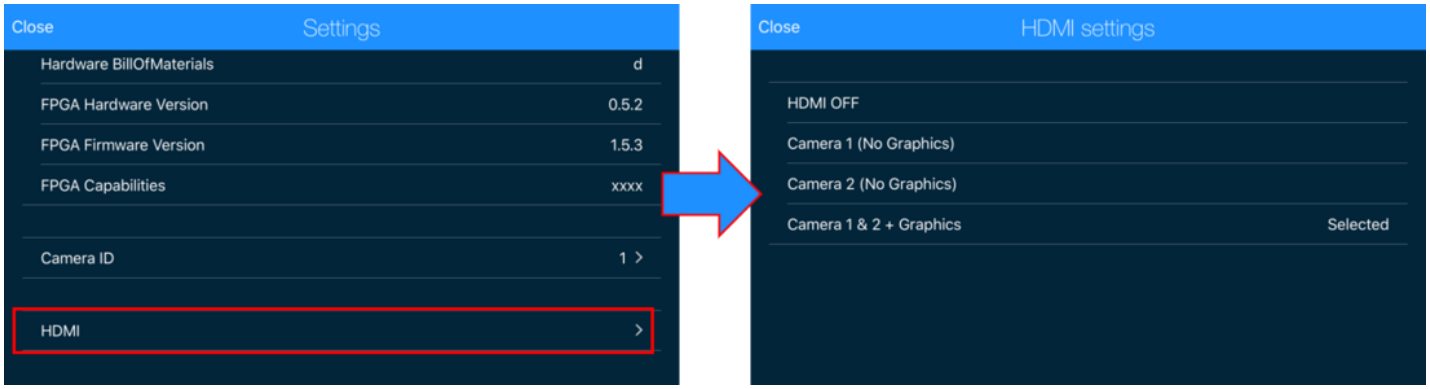
The dropdown menu at the bottom of the screen allows you to choose to output from Camera 1 (without graphics), Camera 2 (without graphics) or Camera 1 and 2 (with graphics).



App Setup

The HDMI video output settings are accessible within the **VBOX Video App** via the **Settings** button at the top left of the screen.

This menu enables the VBOX Video HD2 HDMI variant (V6) to stream real time video and audio from the HD2 to an HDMI compatible monitor, recorder or streaming device. Selecting enables you to choose to output from Camera 1 (without graphics), Camera 2 (without graphics) or Camera 1 and 2 (with graphics).



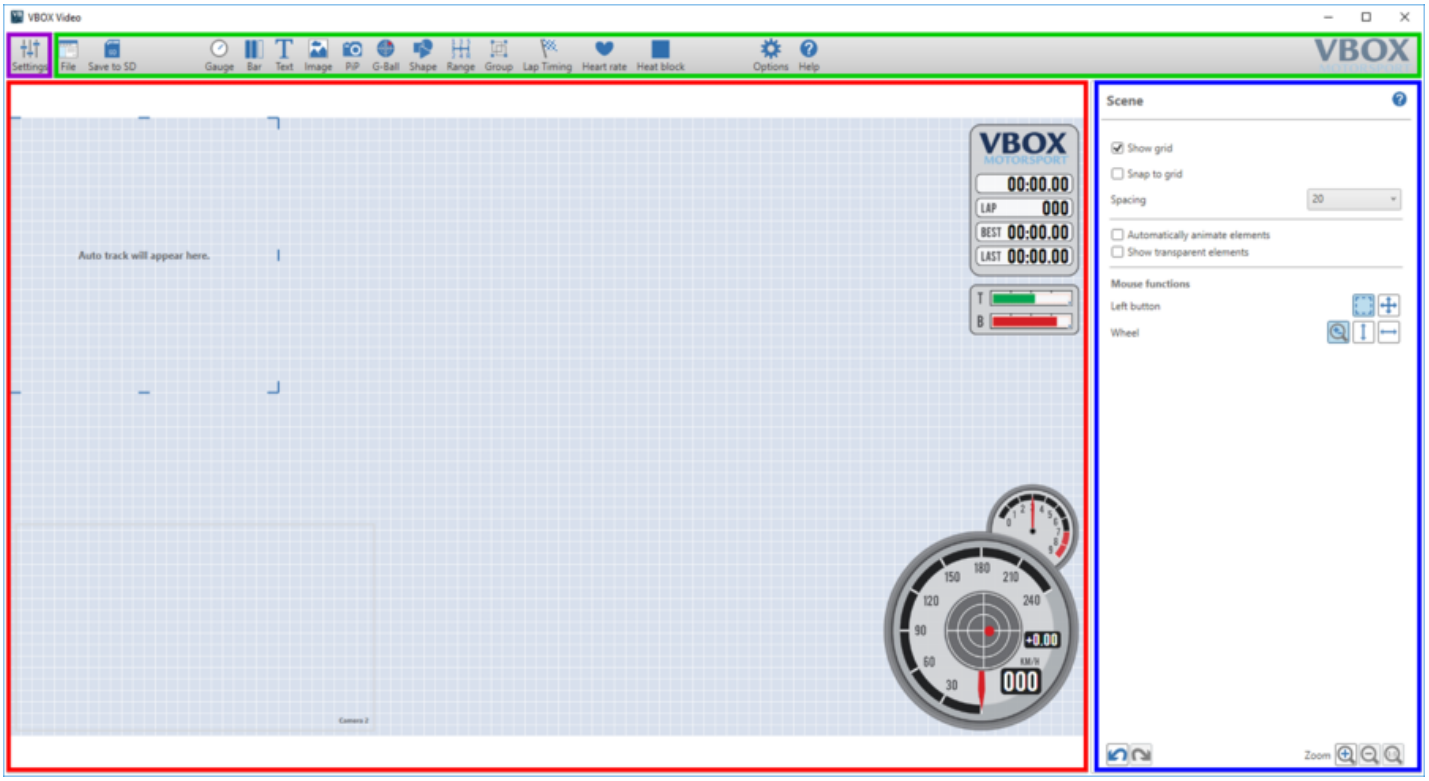
08 - HD2 Setup Software Overview - Windows

The full VBOX Video HD2 Setup Software Guide for Microsoft Windows can be viewed here.

As well as having the ability to adjust settings within the HD2 unit, **VBOX Video Setup Software** provides full graphical overlay user configurability. For example, you can **create custom dials**, choose how large/ where you would like **your logo** to be and also change where the second **camera is located**. The scene can then be uploaded on to the unit by saving to an SD card or USB memory and inserting into the powered VBOX.

IMPORTANT – Microsoft Windows 7 SP1 and VBOX Video HD2 Firmware version V1.3.72 or newer is required.

The main areas of the software are shown below:

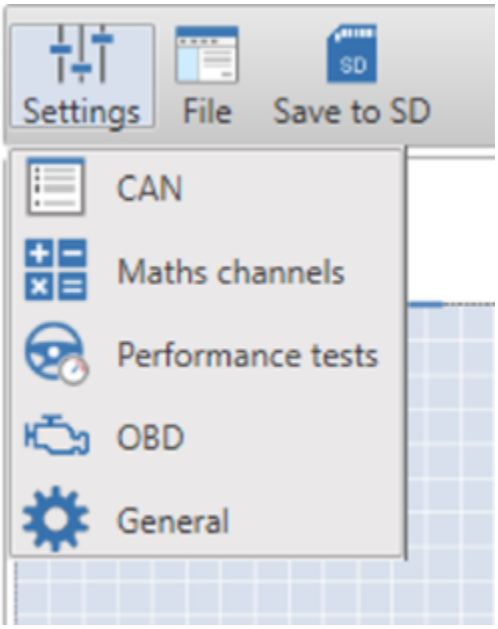


- The button highlighted in **purple** is the **main settings button**. This allows different screens to be accessed for CAN, Maths Channels, Performance Tests and General Settings.
- The **green** box highlights the **top panel buttons** which allow access to the supplied library of elements and scene files, as well as saving and uploading scene files.
- The **red** box highlights the **main view area**. This shows the current layout for all elements which will appear in the video overlay.
- The **blue** box highlights the **dynamic settings panel**. This will change depending on what is selected within the software, allowing different elements to be configured easily within one screen.

*Note: Any changes made to the general scene settings within the '**dynamic settings panel**' on the right will be saved by the software when it is closed.*

Settings button

The settings button in the top left hand corner of the software allows the user to move between the main setup screens within VBOX Video Software. Clicking on any of the options here will clear the scene designer and populate the screen with settings options.

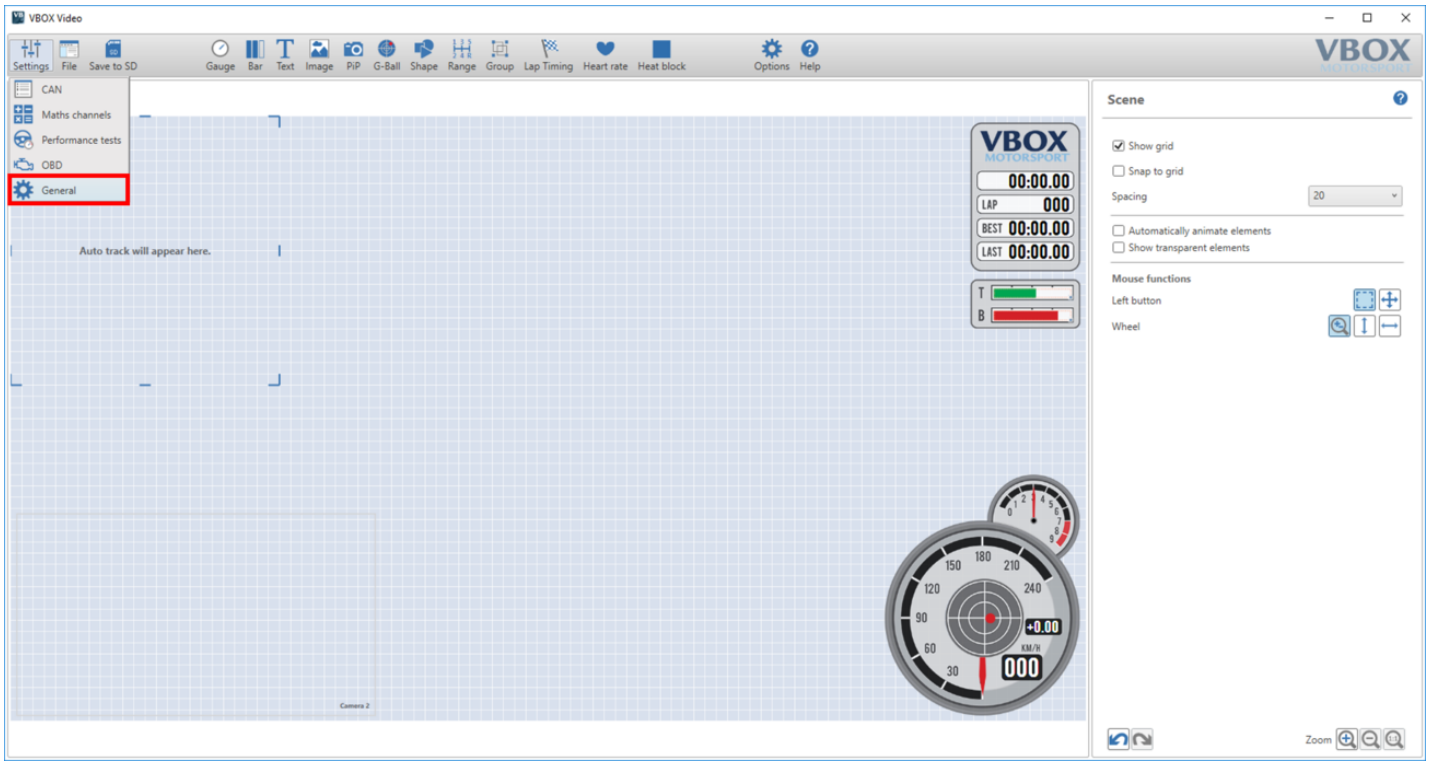


For more information on each of these settings windows, click on the relevant options below:

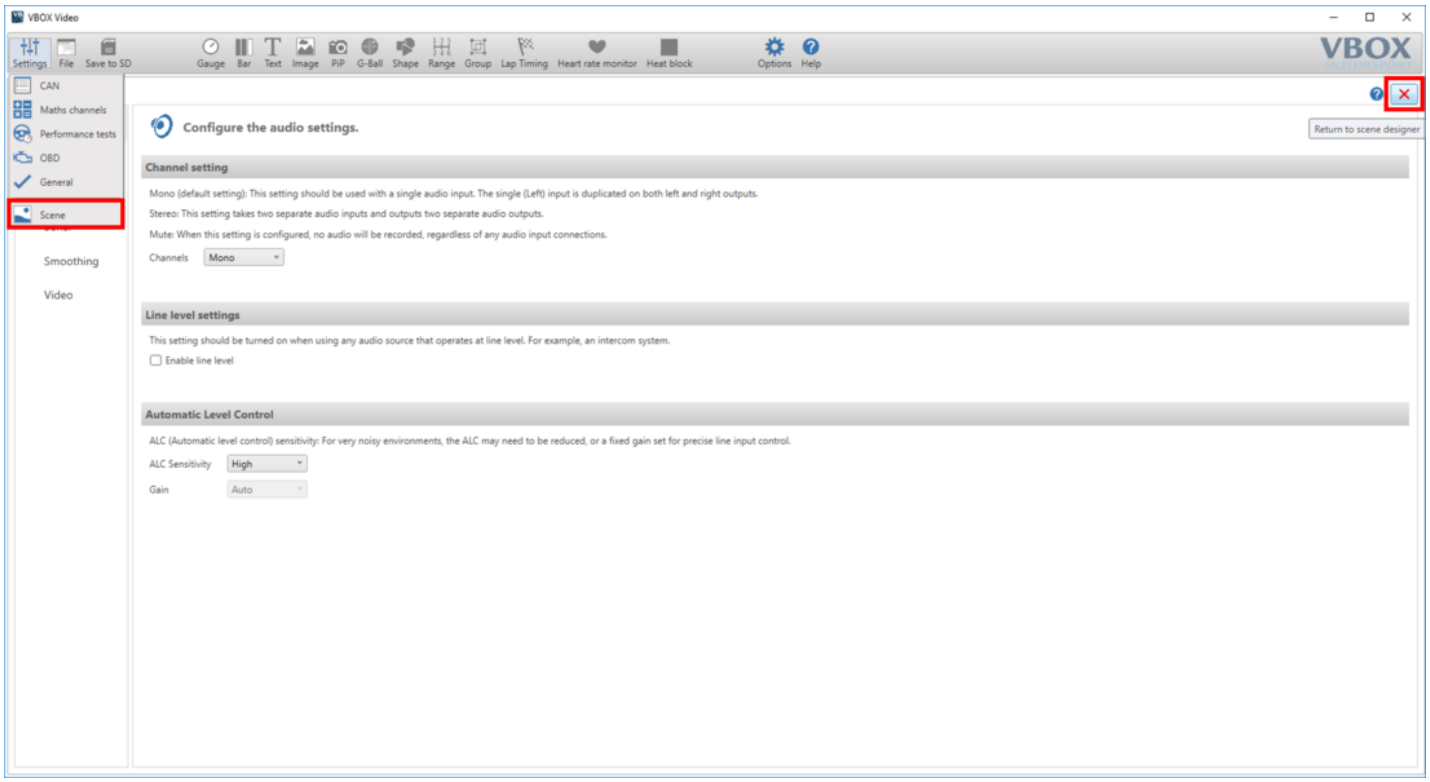
- CAN
- Maths Channels
- Performance Tests
- OBD
- General

Navigating between settings options

Clicking on the setting button will show the different settings windows. Select the settings option of interest.

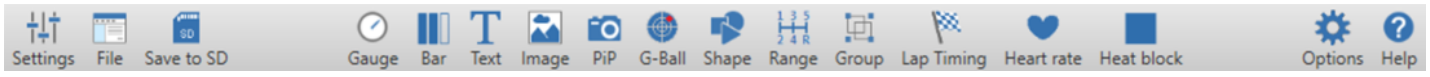


This will change the screen layout to display the selected settings options. To return to the scene designer, the settings button can be used again, or the quick access button, highlighted below.



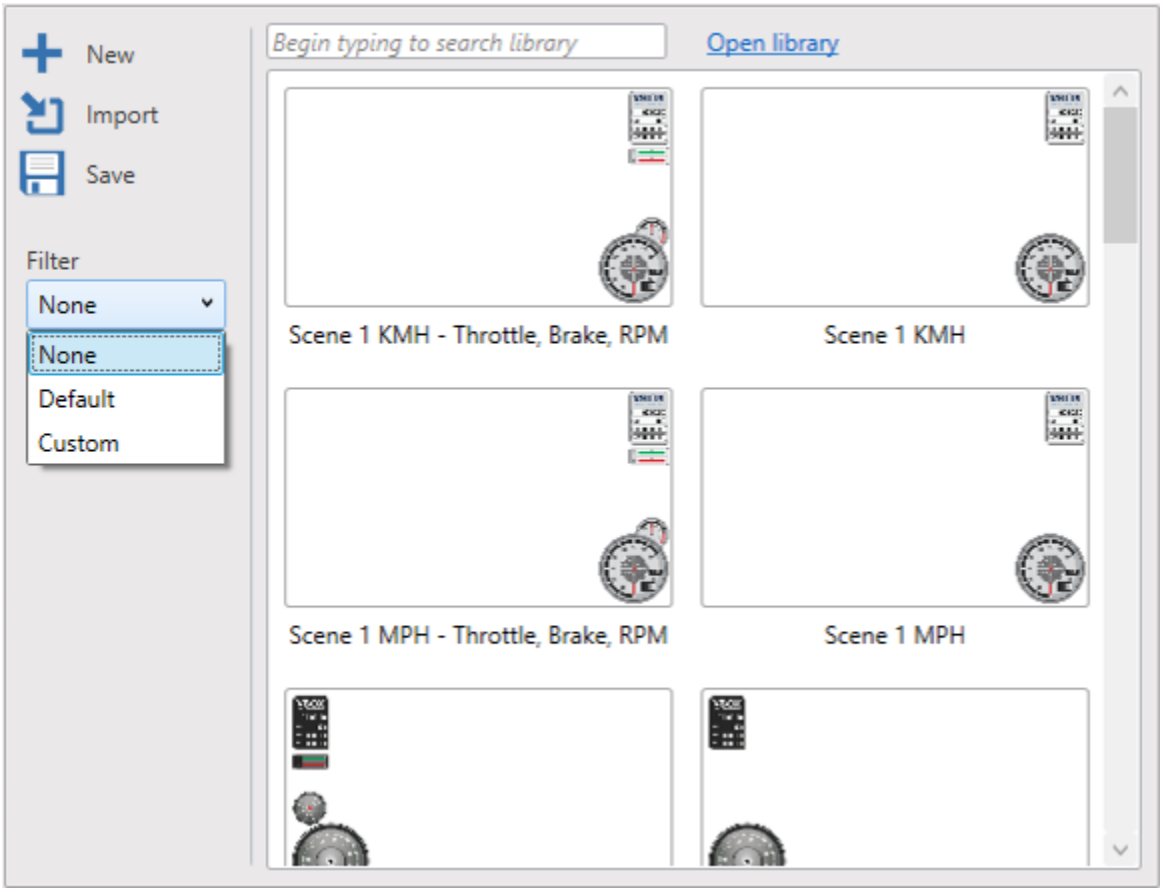
Top panel buttons

These buttons are used to save and load scene files, access the library of scenes and elements, as well as set up lap timing, access online help and set the software language.



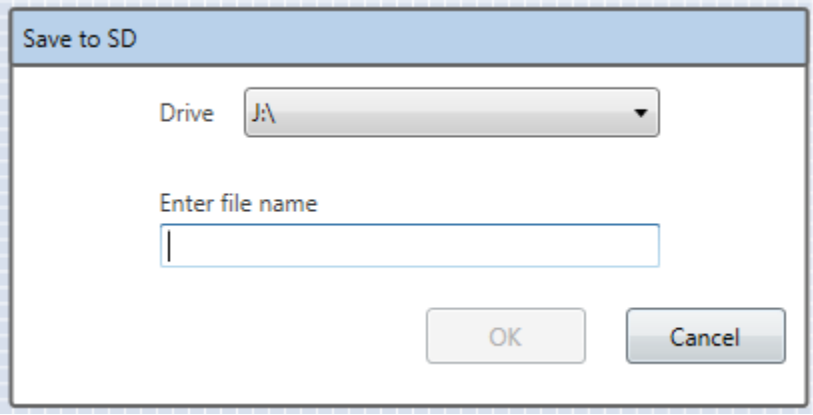
File menu

This menu is focussed around saving and loading scene files. **Click here** for more information on loading and saving scene files.



Save to SD

This allows the user to save a scene file to an SD card or USB stick, to allow it to be uploaded to the VBOX Video HD2.



IMPORTANT – Scenes cannot be named as 'default'.

*Note: If a scene is saved and a file with the same name exists on the card/stick, the original will automatically have the file type suffix changed from '**.vvhsn**' to '**.bak**' and the new one will be saved as normal. To open the old one, manually change the file type suffix back to '**.vvhsn**' and it will work as normal.*

Uploading a scene

Once a scene file has been saved to the SD card or USB stick using the 'Save to SD' button:

- Power up the VBOX Video HD2 unit with cameras connected.
- Load the SD card or USB stick into the front panel - the OK LED will flash **green** fast as the scene is loaded.
- The HD2 will double beep when the upgrade is complete - the OK LED will change to solid **green**.

Element buttons

These buttons access the library of default and saved gauges allowing them to be easily added to any scene.

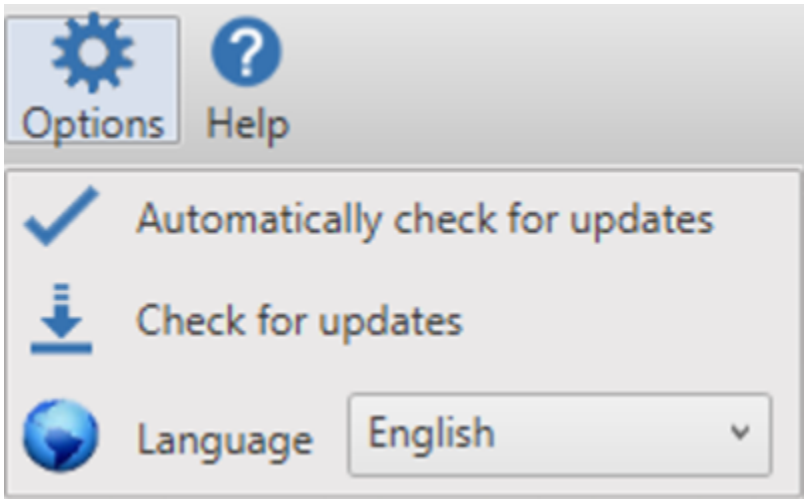
Click below for more information on each specific element:

- **Elements**
- **Lap Timing**

Options

VBOX Video software will automatically check for any updates every time it is started up on a PC with an internet connection. This feature can be disabled here – we would recommend keeping this turned on.

If '**Automatically check for updates**' has been disabled, you can manually check for updates by clicking on '**Check for updates**'.

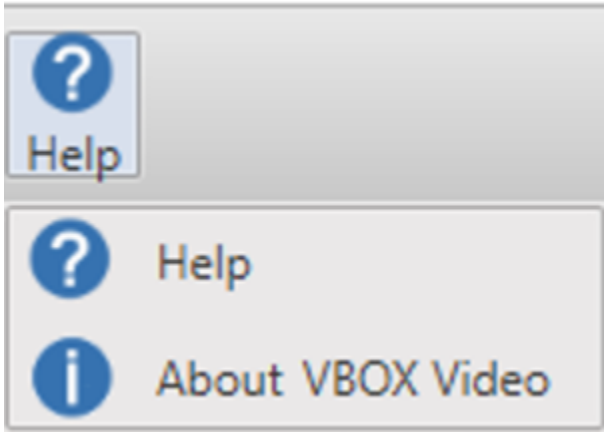


The software language to be displayed can also be changed here.

*Note: The language cannot be changed once a **Maths channel** has been added.*

Help

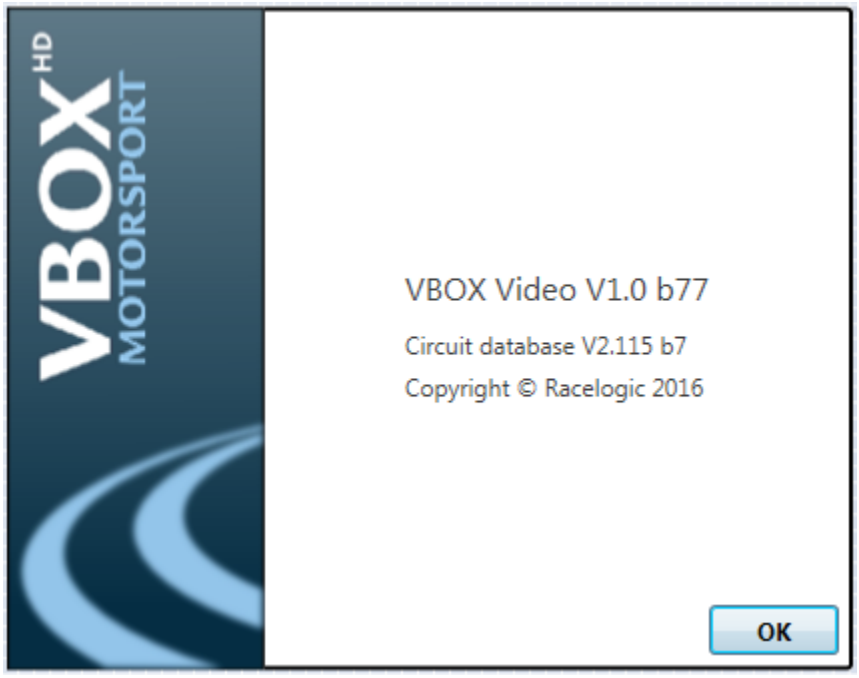
Access the main online help manual here.



Contextual help access is also available in different areas of the software – clicking on the

icon anywhere in the software will take you to the help page for the currently selected item.

The about option listed within the help menu will display the current software version and circuit database version being used.



Main view area/ Dynamic settings panel

Mouse navigation

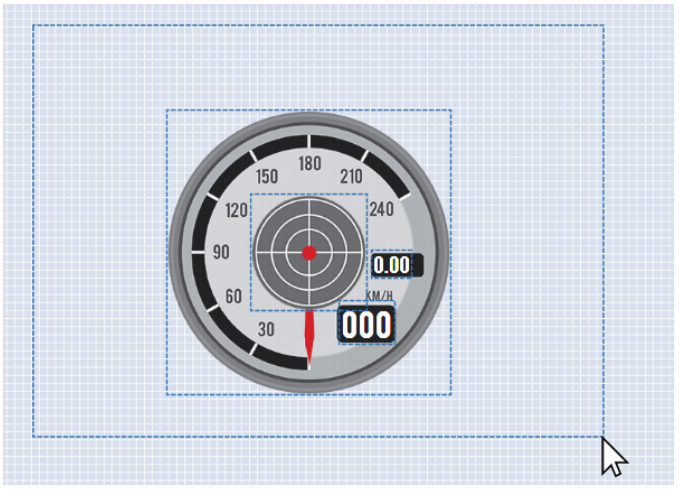
When no element is selected, the dynamic settings panel will show settings for mouse navigation. See the **'hotkeys' table** below for all mouse functions.

Left mouse button options

By default, the left mouse button is set to 'select' mode. This allows for easy selection of multiple elements when creating a **temporary or fixed group.**

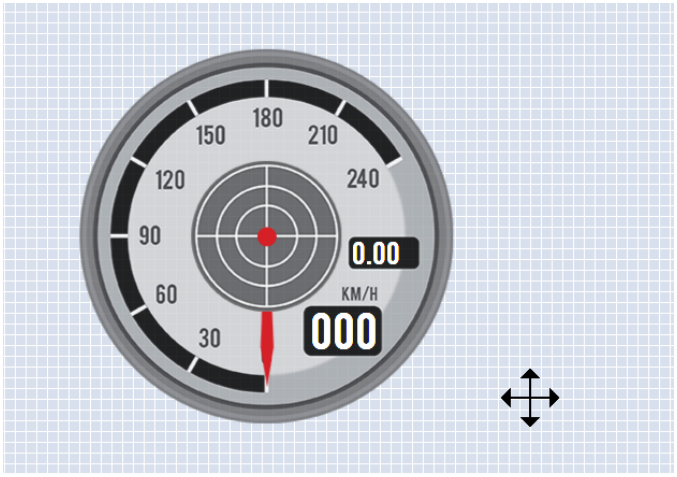
'Select' mode (default)

Click and dragging the left mouse button will select elements.



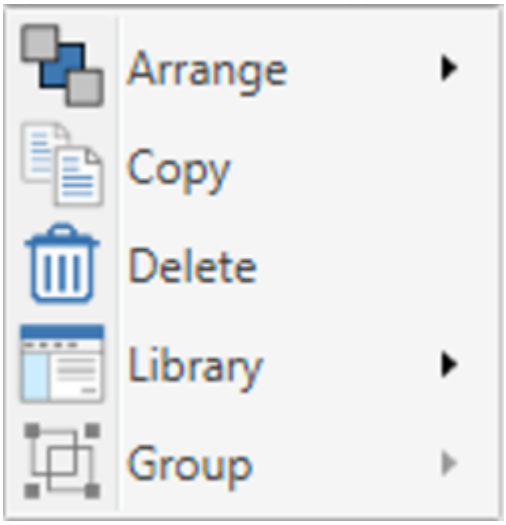
'Pan' mode

This allows the user to click and drag to pan around the scene.



Right mouse button options

Right clicking within the scene will open an Options menu which will vary depending on whether you have clicked on an element or within an empty area. Available options include Arrange, Copy, Delete, Library, Group, Undo, Redo and Paste.



Element options

Empty area options

Mouse Wheel options

There are three options with regards to the mouse wheel function. The default setting is ‘zoom’ – this is highlighted in the image below.

Allows the mouse wheel to zoom in/out on the main view window.

Allows the mouse wheel to move the main view window up and down when zoomed.

Allows the mouse wheel to move the main view window left and right when zoomed.

Additionally, clicking the mouse wheel at any time will return the screen to fully zoomed out.

Manual Zoom controls

As well as the mouse wheel options shown above, there are manual zoom options available at all times in the bottom right hand corner of the software.

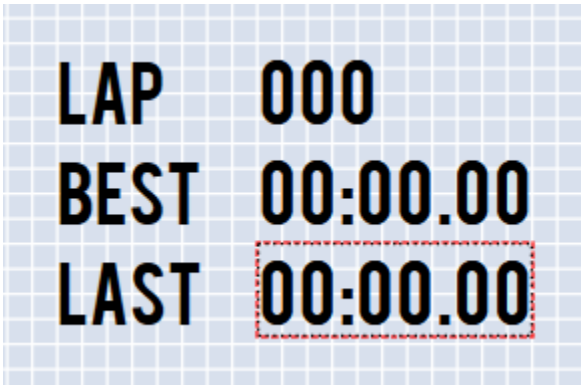
Here, the user is able to zoom in, zoom out, or return to full screen mode at any time.

Grid Settings

The background grid is useful when aligning elements. When no element is selected, the dynamic settings panel will show settings for the grid.

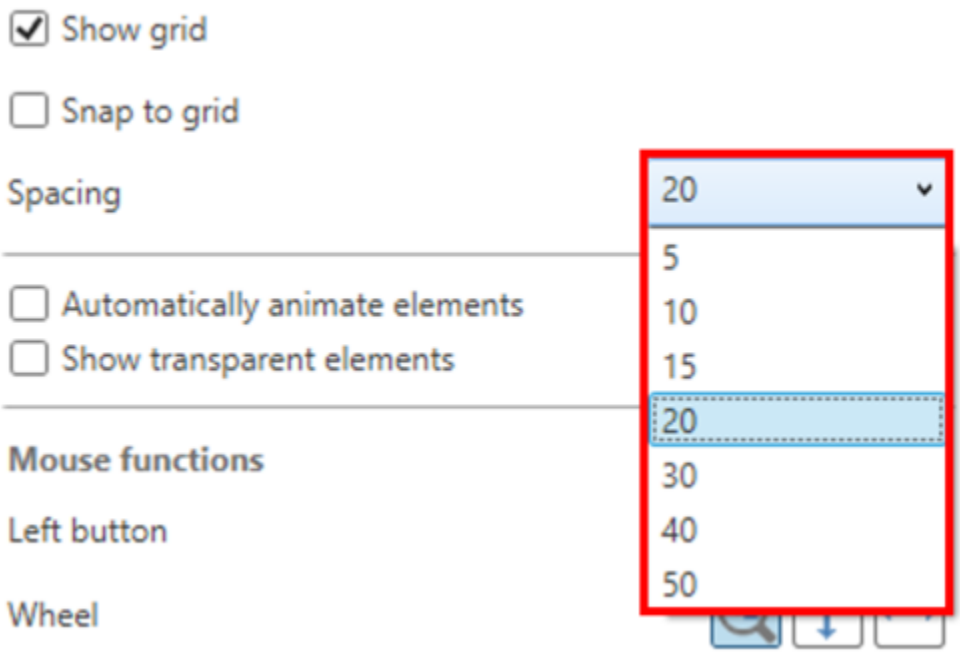
Snap to grid

This setting can be turned on to aid with aligning text elements more easily. It is not recommended to leave this setting on all the time, as it will move elements slightly to snap to the grid every time they are re-located.



Grid spacing

Grid spacing can be changed to suit the user's preference or monitor.



Automatically animate elements

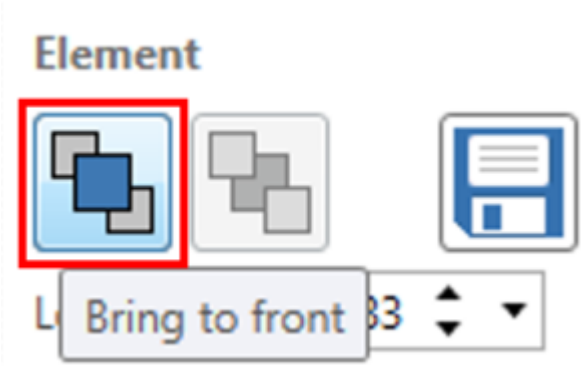
Selecting this option will animate elements such as Gauge needles, G-Ball, Range, etc, so that you can see the expected output within the video.

Show transparent elements

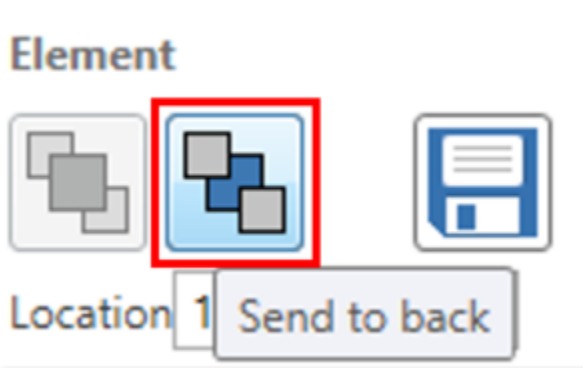
This option shows/hides the border around elements that have been set as transparent, enabling you to see either the position of the elements within the scene or how the scene will be viewed within the video.

Order Elements

When elements are included within the scene, you can use the '**Bring to front**' or '**Send to back**' buttons to arrange the order in which they are viewed when overlapping each other.

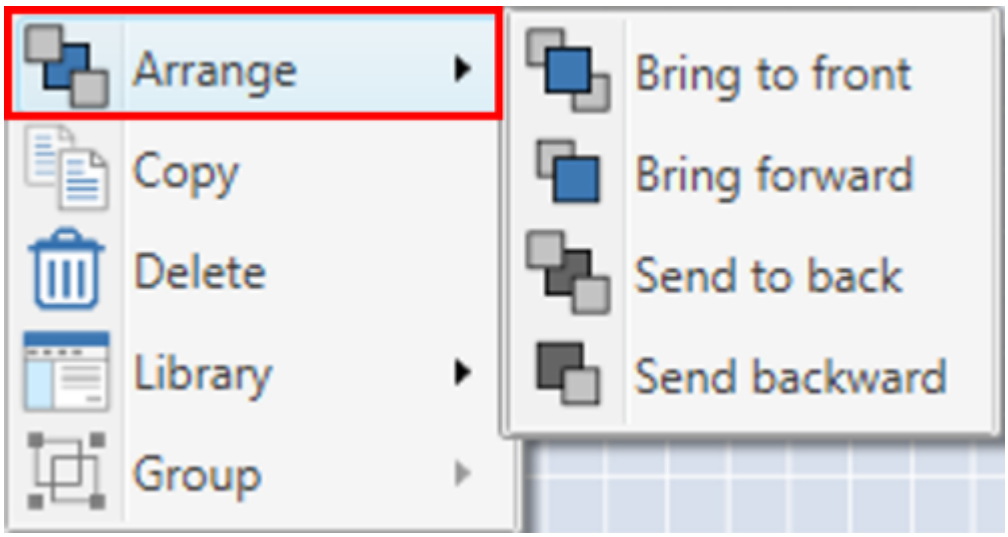


Bring to front button



Send to back button

Elements can also be ordered by right clicking on the element(s) and selecting from the '**Arrange**' menu.

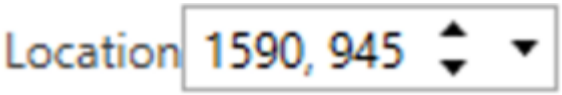


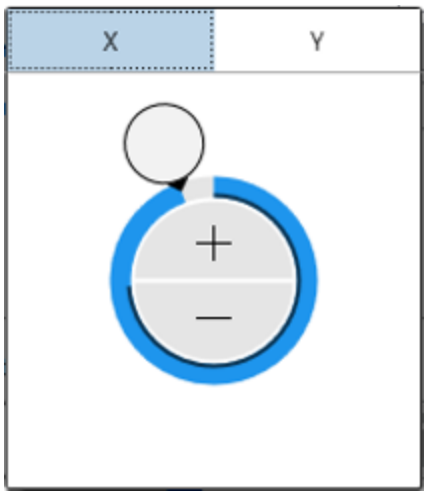
Right click Arrange options

Element Location

Along with being able to manually drag an element using the mouse, the location of an element can also be modified by either selecting the '**Location**' text box and typing in a new location in the format x,y and pressing enter to accept the changes, by double clicking on either side of the comma to select either x or y component and manually entering text or using the up/down arrows, or by expanding the control to show a wheel that allows for faster positioning. This fine tuning is particularly useful when you are looking to align elements.

Note: If snap to grid is on and the user manually enters the new location, the location will snap to the nearest value below the entered value that aligns to the grid. For example a grid spacing of 20 will snap to 0 for any value below 20, it will snap to 20 for any value greater than or equal to 20 but less than 40, etc.





Undo/Redo

The '**Undo**' (Ctrl + Z) and '**Redo**' (Ctrl + Y or Ctrl + shift + Z) buttons allow you to undo or redo any scene element changes you have made within the software.

Changes can also be undone/ redone by right clicking on an empty area within the scene and selecting either '**Undo**' or '**Redo**'.

Note: These options will not undo or redo any configuration settings changes made.

Live camera preview

If a PC has a WiFi adapter installed, a WiFi live camera preview is available within the Setup Software. This gives a video preview like within the **Camera Preview App**, and can be used to download a screenshot from the camera to use as a background.

Hotkeys and shortcuts

Controls	Function
Left click	Select
Left click + drag	Multi-select / temporary group*
Left click + shift	Multi-select / temporary group
Right click	Right click menu access
Right click + drag	Pan
Mouse wheel	Zoom in/out*
Mouse wheel + shift	Scroll up/down
Mouse wheel + Ctrl	Scroll left/right
Ctrl + C	Copy selected element
Ctrl + V	Paste copied element
Ctrl + Y / Ctrl + shift + Z	Redo
Ctrl + Z	Undo
Delete key	Delete selected element

***Configurable**

09 - HD2 Setup Software Overview - macOS

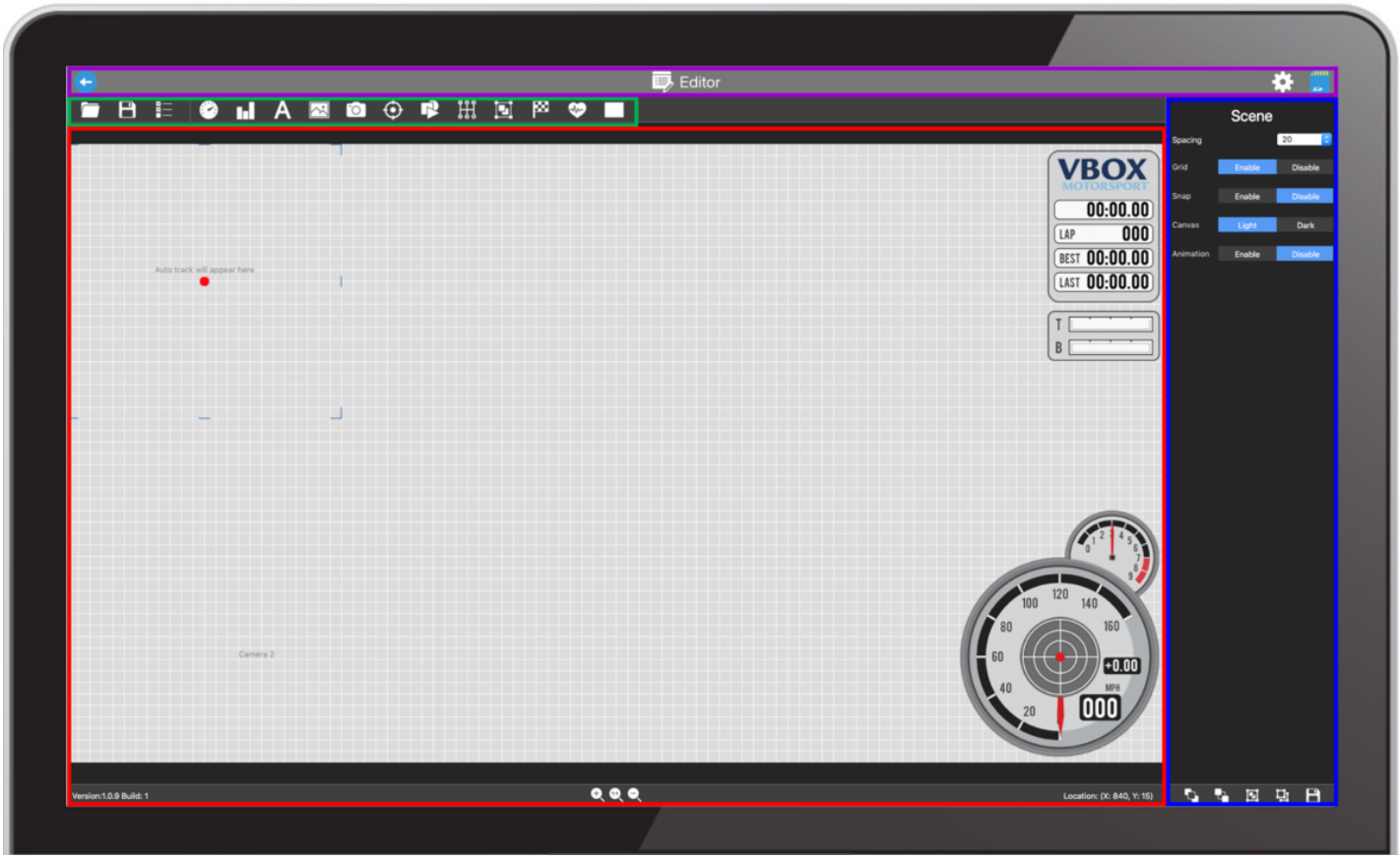
The full VBOX Video HD2 Setup Software Guide for Apple macOS can be viewed here.

As well as having the ability to adjust settings within the HD2 unit, **VBOX Video Setup Software** provides full graphical overlay user configurability. For example, you can **create custom dials**, choose how large/ where you would like **your logo** to be and also change where the second **camera is located**. The scene can then be uploaded on to the unit by saving to an SD card or USB memory and inserting into the powered VBOX.

IMPORTANT – macOS version 10.11 or later is required.

When the software is loaded, the first screen that is presented is the **Scene Selector**. Here you can choose a default, custom or new scene to be loaded in to the Scene Editor area.

Once a scene has been loaded, the main areas of the software are shown below:



- The **purple box** is the **settings bar**. This allows access to the General Settings, to the supplied library of scene files and to save the scene to the SD card or USB stick.
- The **green** box highlights the **top panel buttons** which allow access to the CAN and OBD settings, the supplied library of elements, as well as saving and uploading scene files.
- The **red** box highlights the **main view area**. This shows the current layout for all elements which will appear in the video overlay.
- The **blue** box highlights the **dynamic settings panel**. This will change depending on what is selected within the software, allowing different elements to be configured easily within one screen.

*Note: Any changes made to the general scene settings within the '**dynamic settings panel**' on the right will be saved by the software when it is closed.*

Settings bar

Back

Pressing the

button on the left of the settings bar will return to the Scene Selector, more information on this is available **here**.

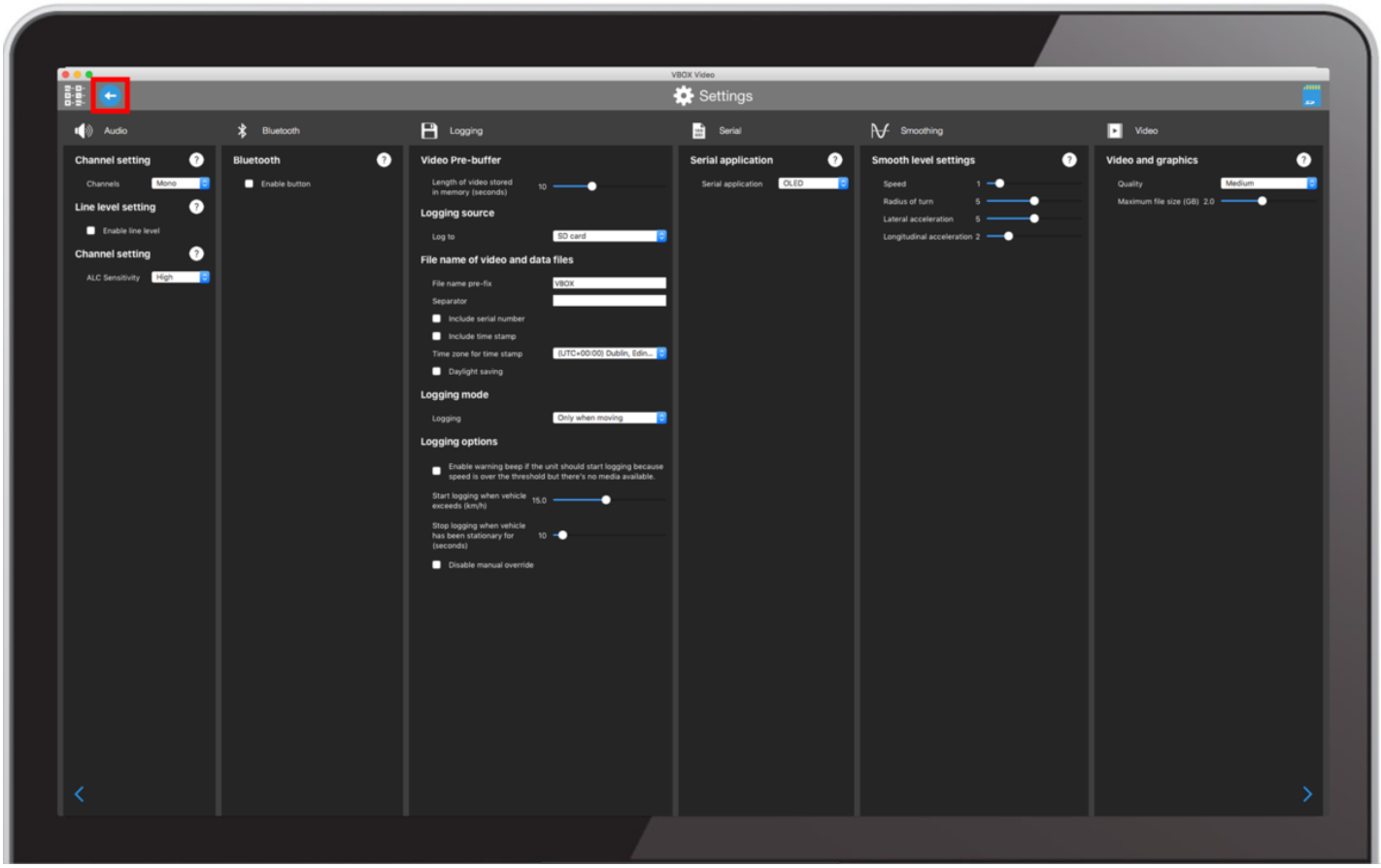
General Settings

The

button will take you to the General Settings area, enabling you to define logging conditions, filenames, smoothing, video quality, audio behaviour, serial and Bluetooth settings. More information on this can be found **here**.

To return to the scene designer, press the

button in the top left corner of the General Settings area.



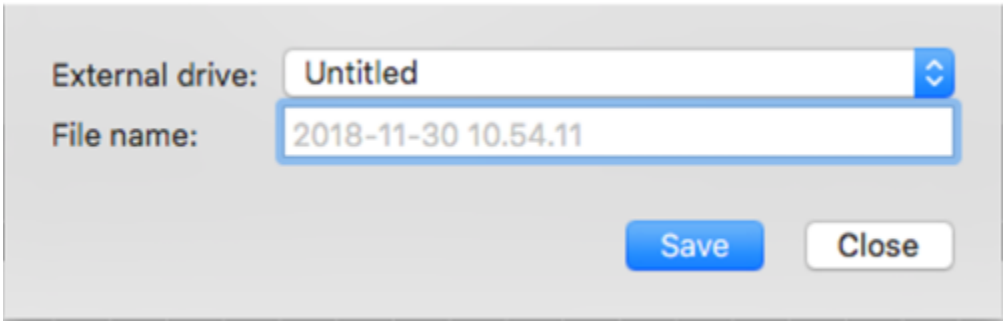
Selecting the

button in the top left corner will take you back to the Scene Selector. If you have made any changes within your current scene, a popup will urge you to save any unsaved changes.

Save to SD

The

button allows you to save a scene file to an SD card or USB stick, which can then be uploaded to the VBOX Video HD2.



IMPORTANT – Scenes cannot be named as 'default'.

*Note: If a scene is saved and a file with the same name exists on the card/stick, the original will automatically have the file type suffix changed from '**.vvhsn**' to '**.bak**' and the new one will be saved as normal. To open the old one, manually change the file type suffix back to '**.vvhsn**' and it will work as normal.*

Uploading a scene

Once a scene file has been saved to the SD card or USB stick using the '**Save to SD**' button:

- Power up the VBOX Video HD2 unit with cameras connected.
- Load the SD card or USB stick into the front panel - the OK LED will flash **green** fast as the scene is loaded.
- The HD2 will double beep when the upgrade is complete - the OK LED will change to solid **green**.

Top panel buttons

These buttons are used to load scene files, view CAN and OBD settings, access the library of elements as well as set up lap timing.

Open new file

The

button enables you to load a new scene file. **Click here** for more information on importing a scene.

Save scene to library

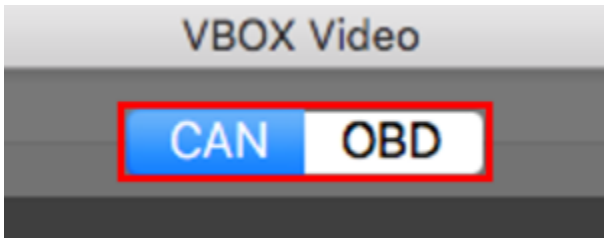
Selecting the

button will save the new or edited scene to the software scene library, more information on this is available **here**.

Channel settings

The

button opens up a Channel Settings window where you can configure CAN and OBD channels.



For more information on each of these settings area, click on the relevant options below:

- **CAN**
- **OBD**

Element buttons

These buttons access the library of default and saved gauges allowing them to be easily added to any scene.

Click below for more information on each specific element:

- **Elements**
- **Lap Timing**

Main view area/ Dynamic settings panel

Mouse navigation

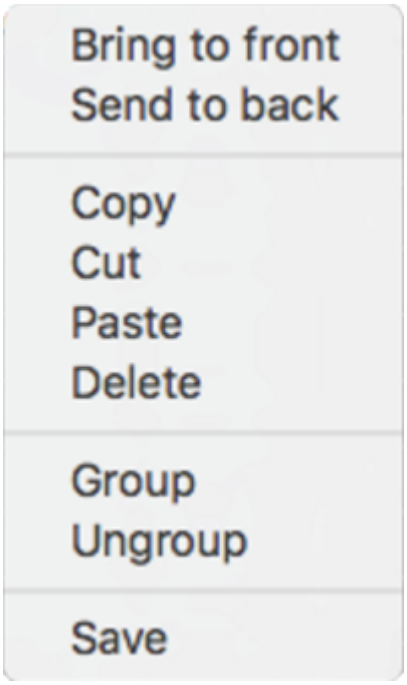
When no element is selected, the dynamic settings panel will show settings for mouse navigation. See the **'hotkeys' table** below for all mouse functions.

Left mouse button

Elements can be selected by clicking and dragging the left mouse button. Once selected, they can also be moved by holding the left mouse button and manually dragging to a new location, or by using the keyboard arrow keys as explained **below**.

Right mouse button options

Right clicking within the scene will open an Options menu which will vary depending on whether you have clicked on an element or within an empty area. Available options include element order, Copy, Cut, Paste, Delete, Group, Save, Undo and Paste.



Element options

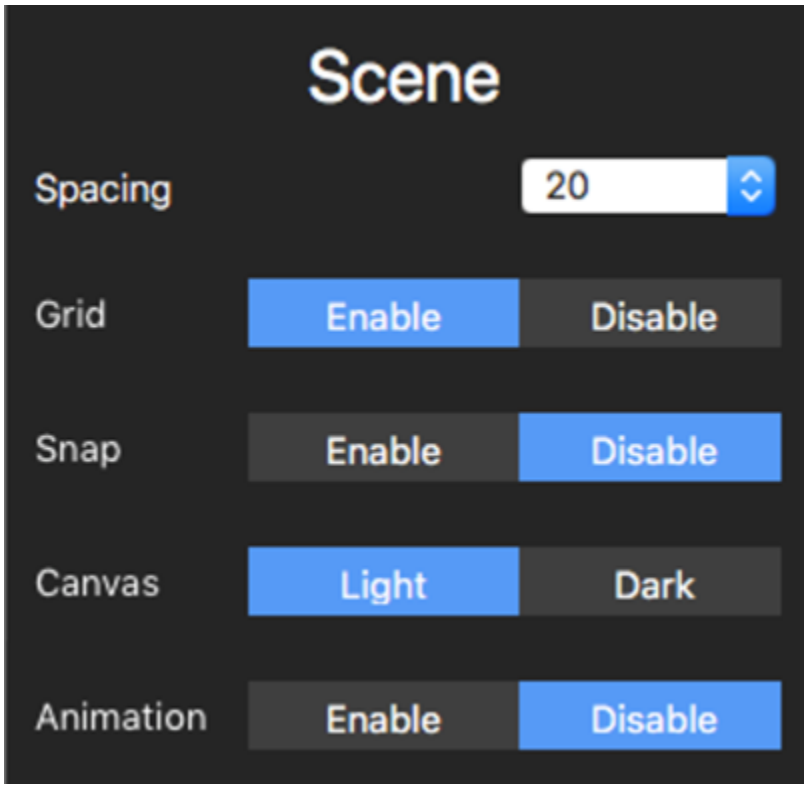
Empty area options

Manual zoom controls

There are manual zoom options available at all times at the bottom of the software. Here, you are able to zoom in, zoom out, or return to full screen mode at any time.

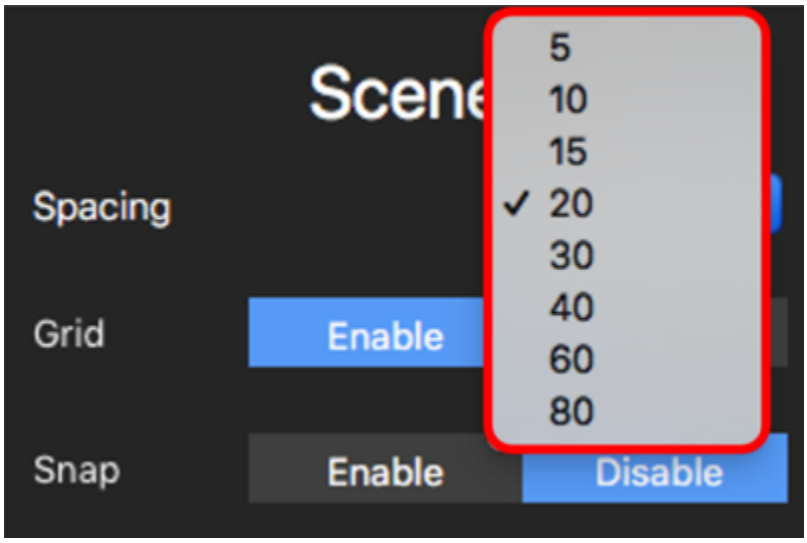
Scene settings

When no element is selected, the dynamic settings panel will show general settings for the scene editor.



Spacing

Grid spacing can be changed to suit your preference or screen.

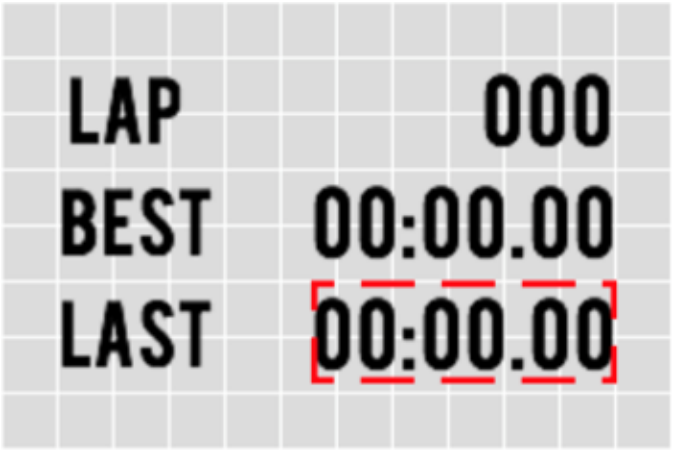


Grid

The background grid can be enabled or disabled, it is useful when aligning elements.

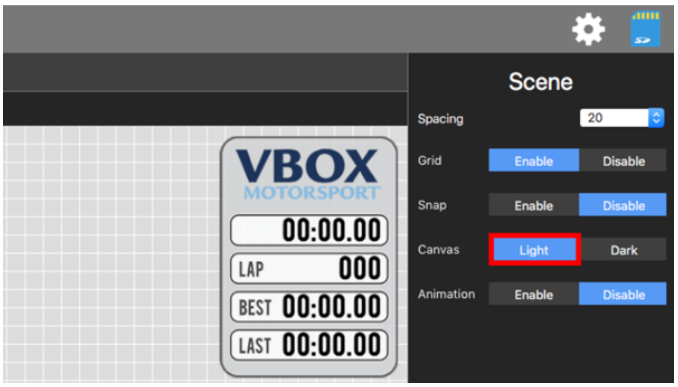
Snap

This setting can be turned on to aid with aligning text elements more easily. It is not recommended to leave this setting on all the time, as it will move elements slightly to snap to the grid every time they are re-located.

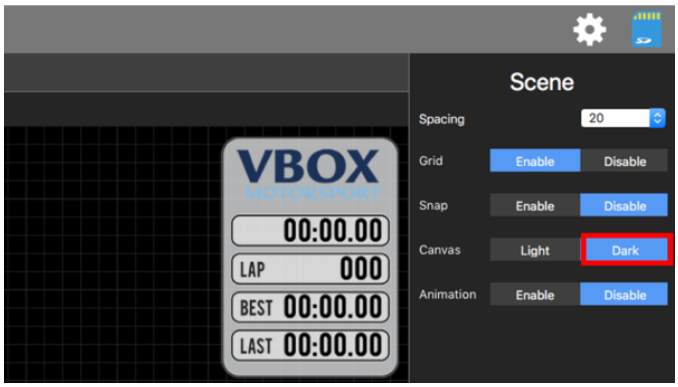


Canvas

This setting enables you to choose between a light (default) and dark canvas scene editor background.



Light canvas



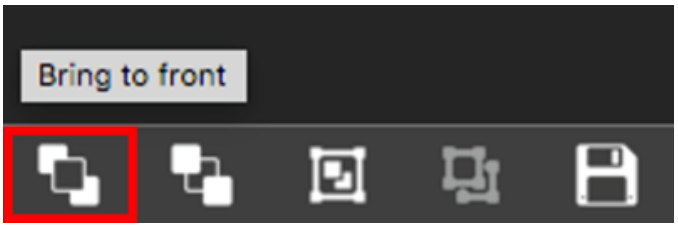
Dark canvas

Animation

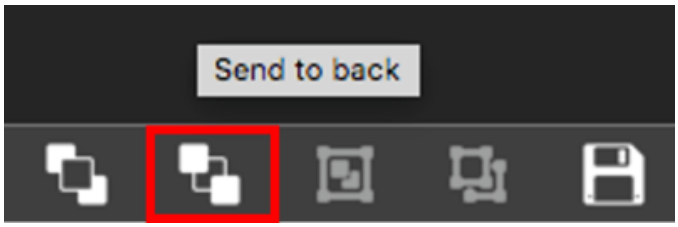
Selecting this option will animate elements such as Gauge needles, G-Ball, Range, etc, so that you can see the expected output within the video.

Order Elements

When elements are included within the scene, you can use the '**Bring to front**' or '**Send to back**' buttons at the bottom of the settings bar to arrange the order in which they are viewed when overlapping each other.

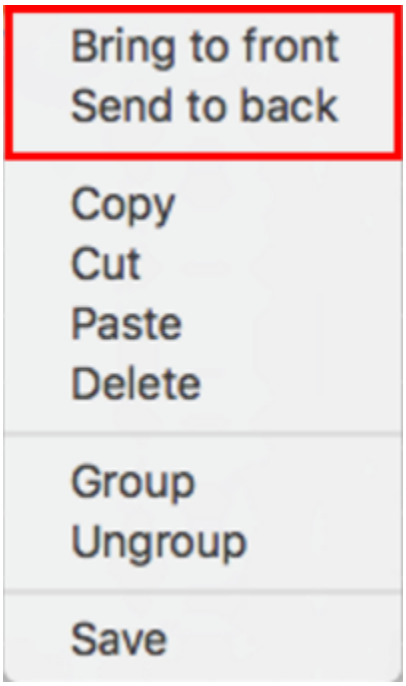


Bring to front button



Send to back button

Elements can also be ordered by right clicking on the element(s).

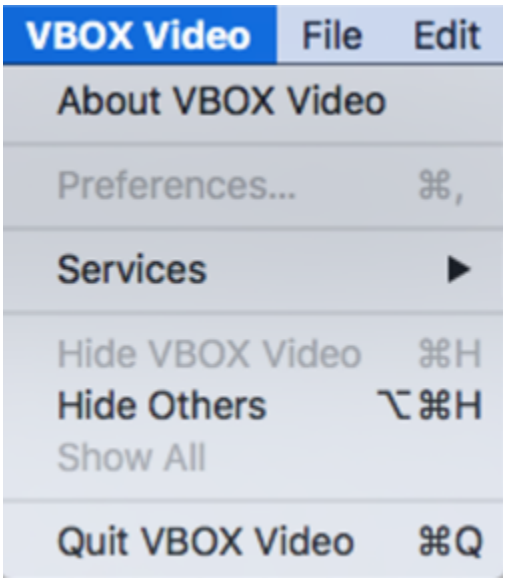


Right click order options

Menu bar

The Apple menu bar contains software version information and a list of software functions.

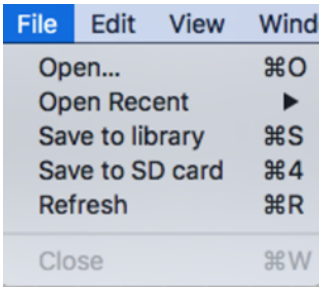
VBOX Video

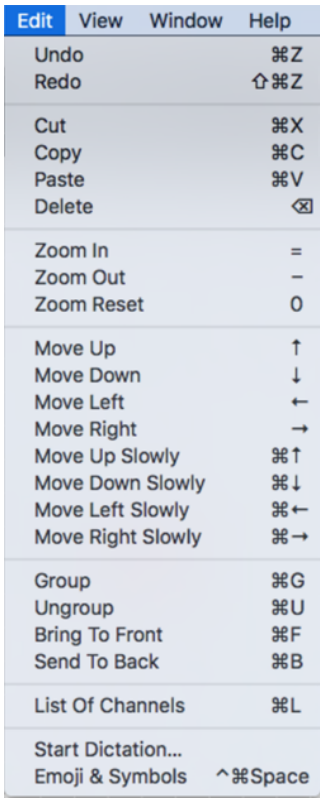


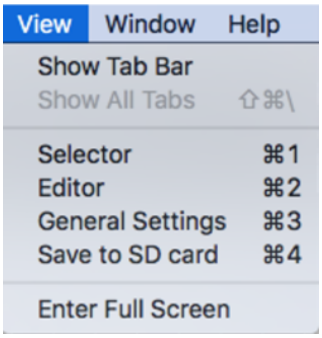
This menu contains an '**About**' option which will display the current software version being used.

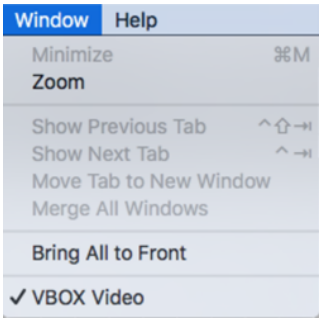
File, Edit, View and Window

These menus contain a list of functions and their corresponding hotkeys/ shortcuts that can be used within the software. More information on these can be found here.

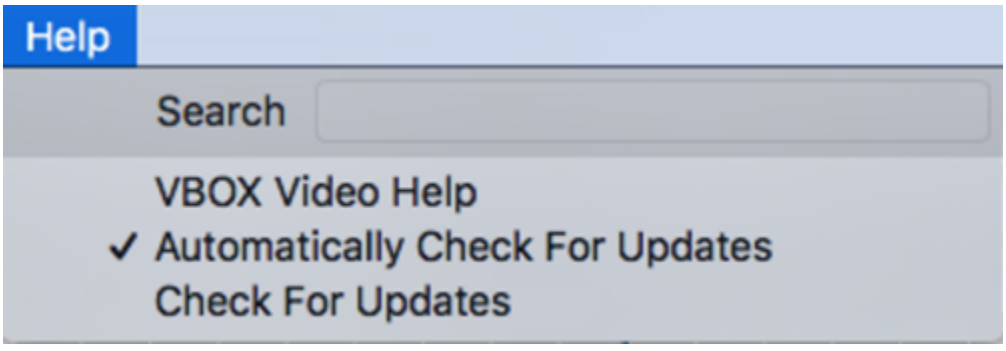






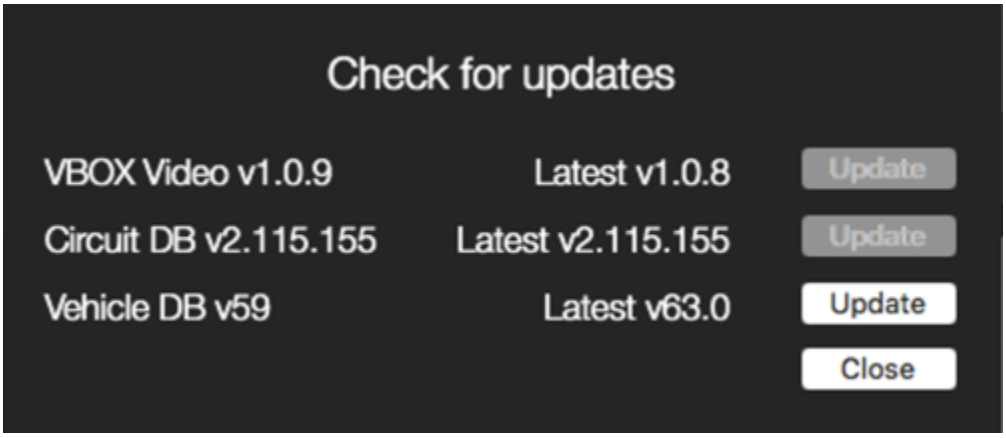


Help



VBOX Video software will automatically check for any updates every time it is started up on a computer with an internet connection. This feature can be disabled here – however we would recommend keeping this turned on.

Selecting '**Check for updates**' will open a new window which displays the currently installed software version, circuit database and vehicle database version being used. Providing there is a valid internet connection, clicking on '**Update**' next to any of these will manually check to see if any updates are available.



Hotkeys and shortcuts

Controls	Function
Left click	Select
Left click + drag	Multi-select/ temporary group*
Left click + shift	Multi-select/ temporary group
Right click	Right click menu access
Left arrow ←	Move selected element left
Right arrow →	Move selected element right
Up arrow ↑	Move selected element up
Down arrow ↓	Move selected element down
Command + Left arrow ←	Move selected element left slowly
Command + Right arrow →	Move selected element right slowly
Command + Up arrow ↑	Move selected element up slowly
Command + Down arrow ↓	Move selected element down slowly

Controls	Function
0	Zoom reset
=	Zoom in
-	Zoom out
Backspace	Delete selected element
Command + 1	Switch to the scene selector window
Command + 2	Switch to the scene editor window
Command + 3	Switch to the general settings window
Command + 4	Save scene to SD card/ USB stick
Command + B	Send selected element to back
Command + C	Copy selected element
Command + F	Bring selected element to front
Command + G	Group selected elements
Command + L	Open channel selector window
Command + O	Open scene file
Command + Q	Quit VBOX Video
Command + S	Save scene to library
Command + U	Ungroup selected elements
Command + V	Paste copied element
Command + X	Cut selected element
Command + Z	Undo
Command + Shift + Z	Redo
Magic mouse double tap	Zoom in/ out

Controls	Function
Magic mouse swipe	• Swipe left/ right through general settings • Pan when zoomed in

10 - HD2 Technical Properties

HD2 - CAN Output Format

HD2 - PIN OUTS

HD2 - Technical Specification

HD2 - Upgrading firmware and software

HD2 - CAN Output Format

Data format: Motorola

Baud rate: 500 kbit/s

ID*	Update Rate	Data Bytes							
		1	2	3	4	5	6	7	8
0x301	100 ms	(1) Sats	(2) Time since midnight UTC			(3) Position – Latitude MMMM.MMMMM			
0x302	100 ms	(4) Position – Longitude MMMM.MMMMM				(5) Velocity (kts)		(6) Heading (°)	
0x303	100 ms	(7) Altitude. WGS 84. (m)			(8) Vertical velocity (m/s)		(9) Media free (%)	(10) Status	(11) Status
0x304	100 ms	Unused				(12) Long Accel. (g)		(13) Lateral Accel. (g)	
0x305	100 ms	(14) Distance since reset (m)				Unused		Unused	
0x7E0	100 ms	(15) OLED lap time*				(16) OLED reference to current lap time			
0x7E1	100 ms	(17) Session	(18) Session lap	(19) Lap		(20) Last lap time			
0x7E2	100 ms	Lap beacon (21)							
0x7F0	100 ms	(22) Video file primary Number		(23) Video file fragment Number		(24) Video time			

1. The number of satellites used in the navigation solution.

2. Time since midnight. This is a count of 10 ms 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 32 bit signed integer, North being positive.
4. Position, Longitude * 100,000 (11882246 = 0 Degrees, 58.82246 Minutes West). This is a true 32 bit signed integer, West being positive.
5. Ground speed, 0.01 kts per bit.
6. 2-D heading, 0.01° per bit.
7. Altitude above mean sea level based on the **WGS 84** model of the earth, 0.01 m per bit, signed.
8. Vertical Velocity, 0.01 m/s per bit, signed.
9. The percentage of free space available on the media.
10. First status flags (see table below).
11. Second status flags (see table below).
12. Longitudinal Acceleration, 0.01 g per bit, signed.
13. Lateral Acceleration, 0.01 g per bit, signed.
14. Distance travelled since VBOX reset, 0.01 m per bit.
15. Lap time from the OLED in milliseconds.
16. The delta-t value from the OLED in milliseconds.
17. The lap timing session index.
18. The lap number during this session.
19. The lap number since start-up.
20. The last lap time in milliseconds.
21. Single byte lap timing beacon; typically 0x00 but will be 0x01 for the first frame after starting a lap (i.e. crossing a start line).
22. Video file primary number is the number which matches the .vbo file number.
23. Video file fragment number is the number of video files since logging started.
24. Video time is the number of milliseconds since the video file started.

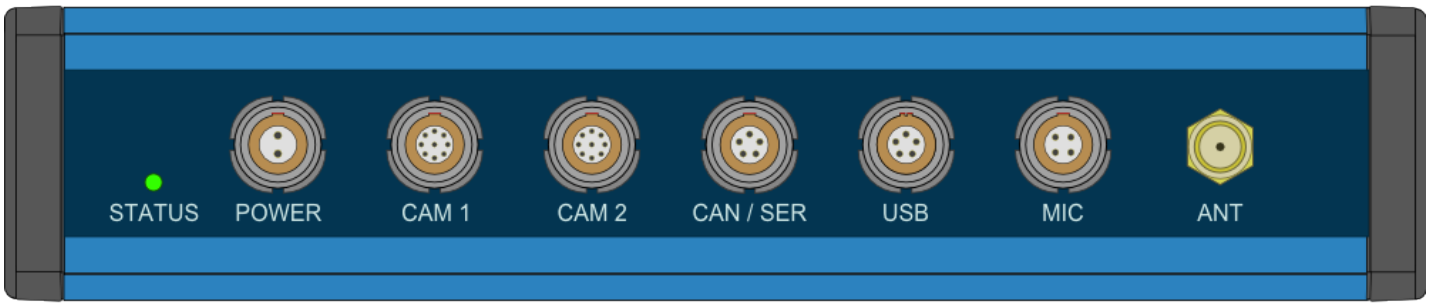
First Status Flags (9)

Bit	Mask	HD2	Description
0	0x01	No	N/A
1	0x02	No	N/A
2	0x04	Yes	New position (latitude and longitude) format
3	0x08	Yes	File open (set when a file is open i.e. when logging or synching)
4	0x10	Yes	Logging (set when logging)
5	0x20	No	N/A
6	0x40	Yes	Memory full (set when the currently active media is too full for logging)
7	0x80	Yes	Media fitted (set when there is at least one media device available, even if it's full)

Second Status Flags (10)

Bit	Mask	HD2	Description
0	0x01	Yes	Alive (always set)
1	0x02	No	N/A
2	0x04	No	N/A
3	0x08	No	N/A
4	0x10	No	N/A
5	0x20	Yes	DGPS corrections active
6	0x40	Yes	Eastern hemisphere
7	0x80	Yes	Southern hemisphere

HD2 - PIN OUTS



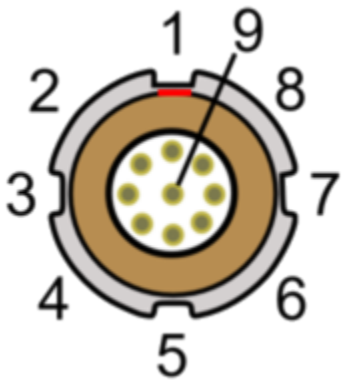
Rear View of VBOX Video HD2

Connector 1 - POWER (Lemo 2 PIN)

PIN	I/O	Function
1	I	Power+
2	I	Ground

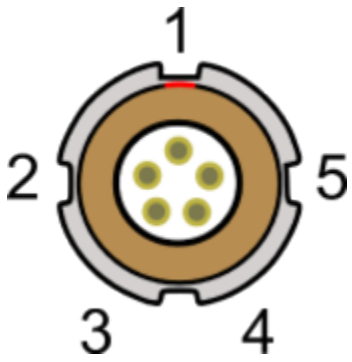
PIN	I/O	Function
Chassis	I	Ground

Connector 2 / 3 - Camera Inputs (Lemo 9 PIN)



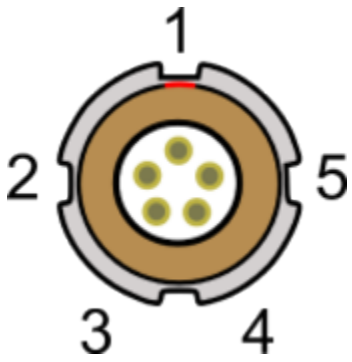
PIN	I/O	Function
1	I	Ground
2	I	Data
3	I	Data
4	O	Ground
5	O	Camera Power (4V)
6	O	Chassis
7	I	Data
8	I	Data
9	O	Camera Power (4V)

Connector 4 - CAN / SER (Lemo 5 PIN)



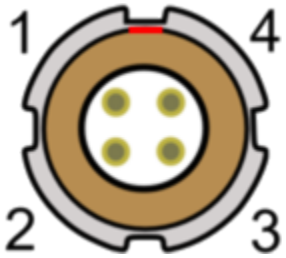
PIN	I/O	Function
1	-	RS232 Tx
2	-	RS232 Rx
3	I/O	CAN High
4	I/O	CAN Low
5	O	+V Power

Connector 5 - USB (Lemo 5 PIN)



PIN	I/O	Function
1	I	USB - ID
2	I/O	DP
3	O	Ground
4	I/O	USB 5 V
5	I/O	DM

Connector 6 - MIC (Lemo 4 PIN)



PIN	I/O	Function
1	I	Microphone - left channel
2	O	Ground
3	O	Ground
4	I	Microphone - right channel

Connector 7 - GPS Antenna

PIN	I/O	Function
Centre	I	RF Signal
Chassis	I	Ground

HD2 - Technical Specification

Camera specifications are available **here**.

GPS Specification

Velocity	
Accuracy	0.1 km/h (averaged over 4 samples)
Units	km/h or mph
Update Rate	10 Hz
Maximum Velocity	1000 mph
Minimum Velocity	0.5 km/h
Resolution	0.01 km/h

Distance	
Accuracy	0.05 % (<50 cm per km)
Units	m or ft
Resolution	1 cm

Position	
2D Position	±3 m (95 % CEP*)
Height	10 m (95 % CEP*)

Acceleration	
Accuracy	1 %
Maximum	4 g
Resolution	0.01 g

Heading	
Accuracy	0.3°
Resolution	0.01°

Lap Timing (OLED / Circuit Tools)	
Accuracy	0.01 s**
Resolution	0.01 s

Definitions

* Circle of Error Probable (CEP): 95 % of the time the position readings will fall within a circle of the stated diameter

** Not using DGPS and crossing the start/finish line at 100 km/h

Graphics, Sound and Storage

Recording Options
Record only when moving (default); Continuous record; Manual record via front button or Bluetooth remote start/stop button

Video Buffering
Up to 30 seconds of video pre-buffering provided, configurable in software (10 seconds by default)

Graphics
24 bit colour plus 256 levels of alpha transparency
Virtually unlimited number of gauges, g-plots, bar graphs, track maps, text and images
Choose from the internal GPS parameters or external CAN/Serial parameters
Standard library of gauges, fonts etc
User definable gauges, fonts etc
Alerts: Text and images can change when a parameter is over / under a desired limit

Resolution
1920 x 1080p at 30 frames per second

Field of view
Horizontal: 148°; Vertical: 86°; Diagonal: 163°

Compression Options
3 levels of quality - high (default), medium and low
Bit rates: 16 MB/s (high); 12 MB/s (medium); 8 MB/s (low). Typical values - can vary according to conditions

Memory Usage
7 GB per hour (high); 5.25 GB per hour (medium); 3.5 GB per hour (low). Typical values - can vary according to conditions

Storage Options
SD card (Fast SD card required) - up to 512 GB supported
Optional USB adaptor for USB flash drives (fast USB drive required)

HDMI Output (V6 HDMI unit)	
Version	HDMI 1.3 with EIA/CEA-861-D video format support
Maximum Pixel Rate	148.5 MHz at output resolution of 1920 x 1080 30 Hz

Environmental and Physical

Input Voltage	8 – 30 V DC
Power	25 W (maximum)
Size	172 mm x 132 mm x 36 mm
Weight	870 g (approximate)
IP rating (main unit)	IP50
Operating Temperature	• Recorder: 0 – 65°C (for temperatures of 50 – 65°C, the **Harsh Environment Fan Accessory** is recommenced) • Camera: -10°C to +60°C **IMPORTANT - The ambient operating temperature should not exceed 65°C**
Storage Temperature	-20°C to +85°C

HD2 - Upgrading firmware and software

Upgrading HD2 Firmware

Occasionally Racelogic will release new versions of firmware (internal code) for the HD2, often to introduce new features, information about the newest firmware update can be found **here**.

New firmware is loaded into the HD2 using an SD card.

Download the latest '.vvhfw' file here

How do you run the update?

- Download the upgrade file from the link above.
- Place the .VVHFW file on the root directory of an SD card (not in the media or any other folder).
- Power up the VBOX Video HD2 unit.
- Load the SD card into the front panel.
- The HD2 will double beep when the upgrade is complete (may take up to 5 minutes).
- Turn the unit off and on again to complete the upgrade.

Notes:

- *When upgrading an HDMI output enabled HD2 (V6),* ***firmware version 1.3.76 or later must be used****!*
- *From Firmware update 1.3.58 onwards, no power cycle is required to complete the upgrade.*

IMPORTANT INFORMATION

When upgrading to the latest firmware, the cameras must be connected to the unit as they included as part of the upgrade. However, this makes the cameras incompatible with units running older release firmware. If you have more than one unit, it is highly recommended to upgrade all units in one go or isolate upgraded units and cameras to ensure compatibility.

If you own more than one set of cameras, e.g. as part of a 2nd car HD2 accessory kit, you will have to update the firmware with each set of cameras plugged into the unit, using the same firmware upgrade file.

Upgrading the OLED display

If you are using an OLED display, this should also be upgraded after new Video VBOX firmware is loaded.

Click here for information on how to upgrade your display.

Upgrading the track map database

Occasionally Racelogic will release new versions of the track map database in order to introduce new circuit maps and start/finish lines - and also to update any older tracks with new layouts.

The track map database stored within the VBOX Video HD2 is updated within a Firmware Upgrade, however the database can also be updated independently of the main unit firmware.

The latest database file can be downloaded from here.

To update your VBOX Video HD2 with the latest track database, please download the file and install it by following this procedure:

- Download the latest track database file from the link above.
- Place the **Database_Hd.vvhdb** file on the root directory of an SD card (not in the media or any other folder).
- Power up the VBOX Video HD2 unit.
- Load the SD card into the front panel.
- The HD2 will double beep when the upgrade is complete (may take up to 5 minutes).
- Turn the unit off and on again to complete the update.

To view the latest track list, click on the image below.

Upgrading VBOX Video HD2 Setup Software

The latest VBOX Video HD2 Setup Software can be downloaded here.

You will be asked to specify where to save the installer; you should select your desktop.

Allow the installer to download.

If you open this ZIP file, and select ‘extract all files’ from the top left corner of the window, you can then save this to your desktop.

Now open this ‘unzipped’ folder, and click on the ‘setup.exe’ icon. This will then run through the installer – you will have to click ‘next’ a couple of times and agree to some terms and conditions.

Note: *HD2 Setup software does have an auto-update functionality, however the software will detect and notify if there is a new version available. It will then give the option to download and install the update.*

IMPORTANT – Microsoft Windows 7 SP1 and VBOX Video HD2 Firmware version V1.3.72 or newer is required

Upgrading Circuit Tools Software

For information on upgrading Circuit Tools software, **click here.**

11 - HD2 Troubleshooting

Camera specific issues can be found here.

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 once. 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.

Click here for more information on antenna placement.

Scene does not upload to the HD2

- Try a **re-installation of the firmware** on the HD2 and try to upload the scene again.

HD2 won't record when REC button is pushed

- Ensure the unit has a good 12 V source (10 V is not enough to power recording, although the unit will turn on).
- Ensure there is logging media present.
- Ensure the logging media is correctly formatted in FAT32 or exFAT - try reformatting the card if the unit is not detecting it correctly.

HD2 beeps continuously

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

No speed shown on video

- Check GPS reception.

Graphics in video updating slowly

- Reduce the number and/or size of graphics used within the scene. This is most likely due to the CPU being overloaded and therefore reducing the graphics update rate.

HD2 crashes on startup when logging to USB storage

- If you are using the optional **RLCAB073** cable or the **RLACS237** start/stop logging switch to record to USB storage, **do not connect** the USB media to the VBOX Video HD2 until the unit has fully booted (OK LED changes from **Green – Fast Flash** to **Green – Slow Flash**).

Simultaneous solid (or flashing) OK, GPS and REC lights

If the HD2 unit displays simultaneous solid (or flashing) **Red OK**, **Green GPS** and **Blue REC** lights and is non responsive, the issue is most likely due to the power supply within the vehicle. The HD2 will draw an initial current of approximately 2 A on start-up, for the unit to function correctly, please ensure that your power supply can provide this.

HD2 not responding

If VBOX Video HD2 has become non responsive, there are a number of steps that can be taken to try and rectify the problem.

Firmware version V1.3.72 introduced a solid **Red** OK / Status LED light signifying a rare system failure. The unit should automatically power cycle after approximately 30 seconds, which will hopefully fix the issue.

In the event that your unit has not restarted and fixed the issue or you are on an earlier Firmware version, please follow the steps outlined below.

Front panel showing Red OK LED

Rear panel showing Red Status LED

IMPORTANT – Before you carry out these steps, please ensure that the unit is connected to a good, stable 12 V power source and that everything else apart from the cameras has been disconnected.

Please try each step in turn, stopping if the issue has been resolved:

1. Firstly, try and perform a GPS Engine Coldstart - Hold the **REC** button on the front of the unit for **5 seconds** (the unit should beep once)
2. Next, try power cycling the unit (withdraw power and reapply)
3. Next, try reloading the **Latest Firmware File** via the SD card. This file should be placed on the root directory of the card and inserted in to the unit (the unit should double beep when completed), more information on how to do this can be found **here**
   Note: This may require the unit to be turned off when the SD card is inserted for it to recognise the file once power is applied
4. Next, load the **clearscenes file** into the unit via the SD card. This process is the same as the firmware upload step described above. It will remove the current scene from the unit and restore the factory default scene
   Note: This may require the unit to be turned off when the SD card is inserted for it to recognise the file once power is applied

If these steps have not resolved your issue, please load the **getlogs file** into the unit via the SD card**.** This process is the same as the firmware upload step described above. It will create a text file on the SD card called '**vvboxhd2-logs.log.txt**'. Please email this text log file to Racelogic Support at **support@racelogic.com**, we will then

open this file and investigate your issues further.

If none of these steps have helped and you have been unable to obtain a text log file, then please contact **Racelogic Support** for further assistance.