

RACELOGIC VBOX



PRODUCT OVERVIEW

INTRODUCTION

VBOX systems are a powerful series of instruments recognised internationally as the industry standard method of measuring the speed and position of moving vehicles. Based on a new generation of high performance, fast update rate GPS receivers, **VBOX** systems can measure Acceleration, Braking distances, Slip angle, Lap times, Cornering forces and more with high accuracy. Due to the small size and simple installation procedure, they are ideally suited for use in almost any vehicle. **VBOX** units can be combined with many different input and output modules, making it a powerful and flexible data acquisition system.



VBOX DATA LOGGERS & SPEED SENSORS

VIDEO VBOX is a high quality solid-state video recorder combined with a GPS datalogger and real-time graphics engine. **VIDEO VBOX** takes multiple cameras and combines them with a graphical overlay, with the resulting video streamed onto flash card or USB stick as a DVD quality MPEG-4 file.

The GPS engine provides Speed, Lap time, Track position, G-force and more. Other inputs such as CAN bus information can also be used. All data is logged to the flash card for detailed analysis using the included software.

To produce professional looking in-car video footage with impressive graphics, simply connect your camera(s), place the GPS antenna on your roof, insert a flash card and then drive, it's that simple!

VBOX 3i is the most powerful GPS data logging system built by **RACELOGIC**. Using a fast GPS engine, **VBOX 3i** logs data 100 times a second, allowing you to perform detailed analysis of Braking, Accelerating, Handling and Circuit testing. It will fit to a vehicle in 30s, and requires no setting up or calibration. With IMU integration, USB and bluetooth connectivity, compact flash card logging, and audio functionality for voice tagging, **VBOX 3i** represents a flexible solution to a range of testing requirements.

VBOX 3i has 4x 24bit analogue input channels, 32 CAN channels (OEM Vehicle CAN data translation available) with 2 CAN Bus interfaces, two 16 bit analogue outputs and two digital outputs.

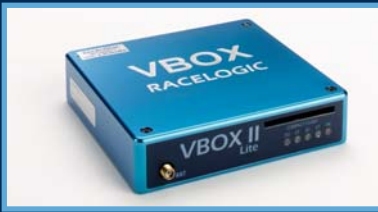
IMU INTEGRATION For accurate testing even in areas where view of the sky is obstructed, **VBOX 3i** has the ability to take the information from a **RACELOGIC** IMU (inertial measurement unit), and combine this with the GPS data in real time to improve the quality of the measured parameters. The three accelerometers and three gyros inside the IMU are used to keep track of the attitude of the vehicle and will greatly increase the velocity and position accuracy during periods when satellite visibility is poor. IMU integration realises the accuracies that **VBOX 3i** is capable of achieving even when external conditions are compromised.

HIGH ACCURACY RTK VBOX 3i is also available with hardware which allows it to be used with an RTK differential Base Station. This makes it possible to achieve positional accuracy up to $\pm 2\text{cm}$, taking **VBOX 3i** to a new level of precision.

VBOX II SX with SLIP, PITCH AND ROLL With an advanced triple-antenna 20Hz GPS engine, **VBOX II SX with SLIP, PITCH AND ROLL** allows the measurement of Speed, Distance, Acceleration, Yaw rate, True Heading, Lateral velocity, and simultaneous Slip, Pitch and Roll angles. It features a high contrast display, USB interface, dual digital and analogue outputs and SD card logging. Up to 20 additional channels can be recorded by connecting to a combination of input modules via CAN. A marine specific version supplied with a waterproof case, 3x ground plane antennae, a Bluetooth module, and 2x 12V NiMH batteries with charger is also available.

VBOX II SX with SLIP features a dual antenna GPS engine which allows the measurement of Speed, Distance, Acceleration, Slip angle, Yaw rate, True Heading, Lateral velocity, and either Pitch or Roll angle. It features a high contrast display, USB interface, dual digital and analogue outputs, and SD card logging. A version is also available without logging, for use as a sensor. Up to 20 additional channels can be recorded by connecting to a combination of input modules via CAN.

VBOX II SX Available with a 20Hz or 10Hz update rate, **VBOX II SX** features a high contrast screen display, SD card logging, and a USB interface. When used in conjunction with a **DGPS BASE STATION**, **VBOX II SX** can achieve positional accuracy of 40cm; an upgrade can see this improved to 20cm. Both versions feature a CAN interface for connection to all **VBOX** modules, along with a digital input, analogue and digital outputs and a serial interface. Up to 24 additional channels can be recorded by connecting to a combination of input modules via CAN. **VBOX II SX** is also available as a 20Hz Speed Sensor with no logging facilities, allowing data to be sent to an external data acquisition system.



VBOX II LITE has a 5Hz update rate, an internal memory of 1Mb and Compact Flash logging. The CAN interface can be used to connect to a number of input and output modules. Up to 16 additional channels can be recorded by connecting to a combination of input modules via CAN.

VBOX II SPEED SENSORS are available in 100Hz and 20Hz format, and feature CAN, analogue and digital outputs for data capture by external acquisition systems.

VBOX MINI A truly versatile product, **VBOX MINI** features a 10Hz GPS log rate to SD card, and a back-lit LCD screen for real-time analysis in four modes: Lap timing, Performance, Drift, and Speed. Incorporated into **VBOX MINI** is a temperature calibrated yaw sensor allowing for measurement of vehicle drift accurate to one degree. The Performance mode includes a large array of standard and configurable tests, whilst the Lap timing mode allows for immediate display of split and lap times. An average speed function is included in the speed display mode.

Data is logged in binary format to the supplied 256Mb SD card which can provide up to 200 hours of continuous data acquisition. In addition to the data recorded onto the memory card, data from **VBOX MINI** can be output via USB in real-time for live viewing in the included **VBOX TOOLS SOFTWARE**.

To further enhance **VBOX MINI**, an optional Input/Output module is available for collection of data from external signal sources such as throttle position or engine RPM.

VBOX 10Hz SPEED SENSOR is sealed to a rating of IP66 and features a 10Hz GPS engine together with user-configurable digital and analogue outputs. NMEA messages are available from the RS-232 serial output, together with a virtual lap beacon output. Data output on the CAN Bus of Position, Velocity and Time allows for easy integration into most motor sport and testing applications.

VBOX DGPS BASE STATION is a complete differential correction system designed to provide local corrections for improved GPS accuracy. A radio link is used to send correction information to **VBOX** where it is processed and used to improve the positional accuracy. This is dependent upon **VBOX** being used – standard accuracy is 40cm, with a 20cm upgrade option (**BASE STATION 2** only, with **VBOX II SX**) and 2cm RTK option (**BASE STATION 3** only, with **VBOX 3i RTK**). The 2cm RTK option tracks both GPS and GLONASS satellite systems to improve the robustness of the satellite lock, whilst also minimising start-up and re-acquisition times.

VBOX TELEMETRY SYSTEM uses high power radio modems capable of transmitting and receiving RS232 data at distances of up to 3.5km. Two radio telemetry modules may be used to transmit **VBOX** serial data from a remote unit to a laptop PC at a maximum rate of up to 20Hz. Modules can also be used to receive differential correction information (DGPS) from a **RACELOGIC BASE STATION** for local position correction. Each radio is supplied with a magnetic mounting antenna, and is connected simply to the **VBOX** via one cable.

VBOX BLUETOOTH MODULE is a general purpose Bluetooth adapter designed as an alternative to using a hard-wired serial connection between **VBOX** and either a Q1 display or Laptop PC equipped with a Bluetooth interface, allowing for increased flexibility of set-up by removing any cabling restrictions. With a range of up to 30m, the unit incorporates a KC-22 Bluetooth OEM Micro Module, designed for maximum performance in a minimal space. The module offers serial communications at 115K baud rate, ensuring full data capture and transfer.

VBOX DATA LOGGER & SPEED SENSOR OPTIONS

System	Product Code	Live Software Interface	USB Interface	Serial Interface	CAN Output	CAN Input	Compact Flash/SD Card Logging	Analogue Input	Analogue Output	Digital Output	DGPS	RTK (2cm)	Output
VBOX 3i	RLVB3i	✓		✓	✓	✓	✓	X4	X2	✓	✓		100Hz
VBOX 3i with RTK	RLVB3R2G2	✓		✓	✓	✓	✓	X4	X2	✓	✓	✓	100Hz / 20Hz
VBOX III SPEED SENSOR	RLVB3SPS			✓	✓				X2	✓	✓		100Hz
VIDEO VBOX	RLBVID102C	✓	✓	✓	✓	✓	✓			✓	✓		10Hz
VBOX II SX	RLVB2SX/RLVB2SX10	✓	✓	✓	✓		✓		X2	X2	✓		20Hz / 10Hz
VBOX II SX SPEED SENSOR	RLVB2SX20SPS		✓	✓	✓				X2	X2	✓		20Hz
VBOX II SX with SLIP ANGLE	RLVB20SL	✓	✓	✓	✓		✓		X2	X2	✓		20Hz
VBOX II SX with SLIP, PITCH & ROLL	RLVB20SL3	✓	✓	✓	✓		✓		X2	X2	✓		20Hz
VBOX II SX SLIP ANGLE SENSOR	RLVBS20SL		✓	✓	✓				X2	X2	✓		20Hz
VBOX II 100Hz SPEED SENSOR	RLVB2SPSD1			✓					✓	✓	✓		100Hz
VBOX II LITE	RLVB2L	✓		✓	✓		✓				✓		5Hz
VBOX MINI	RLVBM01-UK/US/EU	✓	✓	✓			✓						10Hz
VBOX 10Hz SPEED SENSOR	RLVB10SPS			✓	✓				✓	✓			10Hz



VBOX DISPLAYS

OLED DISPLAY is fully waterproof, and features sharp graphics and simple operation for quick and easy in-vehicle use. It has the ability to show a range of parameters, including live and max speed, g-force, and lap times, and can quickly switch between display modes using the Up and Down buttons.

The display has the capacity to start and stop logging in conjunction with some **VBOX** models, and can also report logging status. The unit has an internal accelerometer that flips the screen in accordance with the way it is mounted, and the option to invert screen colours or display the font as a high contrast outline to match lighting conditions makes it very flexible.

Q1 ULTRA DISPLAY SYSTEM is supplied preloaded with a tablet PC specific version of the **VBOX TOOLS** analysis software for instant, in-vehicle viewing of the acquired data. The unit features the full functionality of **VBOX TOOLS** with the added benefit of a "button text on/off" option to maximise screen space and comes supplied with a mounting cradle to affix the unit to the vehicle windscreen for ease of viewing.

MULTIFUNCTION DISPLAY Large character **VBOX** LCD data display with integral backlight. Up to four user-configurable **VBOX** CAN parameters can be displayed on screen at one time. Supports display of the parameters from CAN based **VBOX** modules. Also includes brake test functions such as MFDD, distance from brake trigger activation and lap timing functions. There is also a target screen indicating how far the vehicle is from a user defined parameter. A thermal printer is available (RLVBACS026) which can produce hard copy results.

LED DISPLAY can be used to show either velocity, lateral acceleration, longitudinal acceleration, height or number of satellites in view. The product features a bright, daylight readable 4-digit display and two rubber mounting cups for flexibility and ease of installation.

FILE MANAGER is designed to enhance the use of the **VBOX 3i** data logging system by giving user control of file names and file creation. User control is via a push-button rotary adjuster, and the system can be used in left hand or right hand operation (screen can be flipped). **FILE MANAGER** can also be used to carry out configuration of the **VBOX 3i**.

VBOX INPUT MODULES



INERTIAL MEASUREMENT UNIT The **RACELOGIC** IMU contains three accelerometers and three gyros, which provide accurate information on roll, pitch, and yaw rates. This can be used as standalone data for use with other systems, or seamlessly integrated with a **VBOX 3i** to complement GPS data, providing smooth, noiseless data channels even in poor satellite conditions such as near trees, buildings, or under bridges. The IMU uses synchronous 24 bit sampling for each of the internal sensors to provide a high degree of accuracy, with yaw rate resolutions typically better than 0.5°/s and acceleration resolution down to 0.002g. The unit is precisely temperature calibrated prior to leaving **RACELOGIC** and is constructed with an IP66 splash-proof casing, making it ideal for use on boats or in harsh environments.

YAW RATE SENSOR With a yaw rate (Z-axis) sensor with integral X and Y-axis accelerometers for measurement of lateral and longitudinal acceleration, the Yaw Rate Sensor is ideal for carrying out tests on vehicle manoeuvrability. The unit uses synchronous 24 bit sampling for each of the internal sensors to provide a high degree of accuracy, with yaw rate resolutions typically better than 0.5°/s and acceleration resolution down to 0.002g. The sensor is precisely temperature calibrated prior and is constructed with an IP66 splash-proof casing, making it ideal for use on boats or in harsh environments.



MINI INPUT MODULE is a versatile unit that enables a **VBOX** to log a number of analogue, digital and thermocouple input signals. The module can accept eight analogue, two digital and two thermocouple inputs. When used in conjunction with a **VBOX MINI**, the MIM can also output one digital and one analogue signal. The MIM is fully compatible with **VIDEO VBOX**. Connections are via a removable screw terminal.



FREQUENCY INPUT MODULE A 4-channel frequency capture and pulse counter unit, the FIM accepts frequencies in the range of 1Hz to 20KHz. The input circuit for each channel can accept a wide signal amplitude range from TTL sensors up to the higher voltages created by inductive sensors. This means that direct connection to ABS wheel speed sensors, RPM sources or fuel flow sensors is possible.



16-BIT ANALOGUE INTERFACE The Analogue Interface is an 8-channel analogue voltage input module designed for use with **VBOX** data loggers. Each channel is electrically isolated and provides bipolar voltage measurement up to $\pm 50v$ with a DC accuracy of 400 μV . Isolated, regulated 5v and 12v supplies are available on the main 25-way connector in addition to a supply voltage connection.



VEHICLE CAN INTERFACE Designed to allow logging of vehicle CAN bus data by **VBOX** data loggers, the Vehicle CAN Interface acts as a gateway to collect user defined CAN messages from the vehicle Bus, and transfers them to a **VBOX**. Special **RACELOGIC** researched CAN data sets are available for a wide range of vehicles, allowing easy logging of RPM, Wheelspeeds, and Throttle Angle amongst other parameters.



THERMOCOUPLE INTERFACE The Thermocouple Interface is an 8-channel K-type thermocouple input module. Standard accuracy is $\pm 0.3^{\circ}C$ using the supplied terminal connector block with integral cold junction compensation. Also available is a dynamic cold junction interface to provide optimum performance of $\pm 0.1^{\circ}C$.

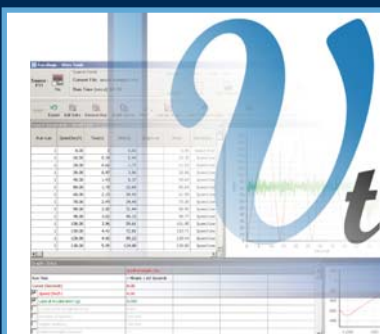


VBOX OUTPUT MODULES

CAN TO ANALOGUE OUTPUT MODULE is designed to convert CAN Bus data into voltage form. In this way it is possible to log data from a CAN Bus with data logging equipment not incorporating a CAN interface. Four analogue voltage outputs are available and these can be mapped using the supplied configuration software.

VBOX SOFTWARE

VBOX TOOLS is a powerful software package for analysing **VBOX** data. The software is designed to be easy to use, with standard templates provided for popular tests. You can also perform complex custom tests using the Report Generator section of the software, and all tests can be run in real time connected to a **VBOX** or in post processing. Various export options are available including an export to Google Earth™ for route analysis.





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VBOX

Exclusively designed and built in the UK by **RACELOGIC**, experts in vehicle testing, automotive electronics and GPS.

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