

VBOX MINI

USER GUIDE



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EC Declaration of Conformity

We declare that this product has been tested to and meet the requirements of:

EC Directive 2004/104/EC

“Adapting to Technical Progress Council directive 72/245/EEC relating to the radio interference (Electromagnetic Compatibility) of vehicles and amending directive 70/156/EEC on the approximation of the laws of the member states relating to the type-approval of motor vehicles and their trailers.”

And has also been assessed, via Technical Construction File, by an independent DTI Competent Body and found to be in conformance with the essential requirements of:

EC Directive 89/336/EEC (and amending directives)

“Council Directive of 03 May 1989 on the approximation of the laws of the member states relating to electromagnetic compatibility.”

DTI Competent Body responsible for issuing certificate of compliance:

3C Test Ltd,
Silverstone Technology Park,
Silverstone,
Northants
NN12 8GX

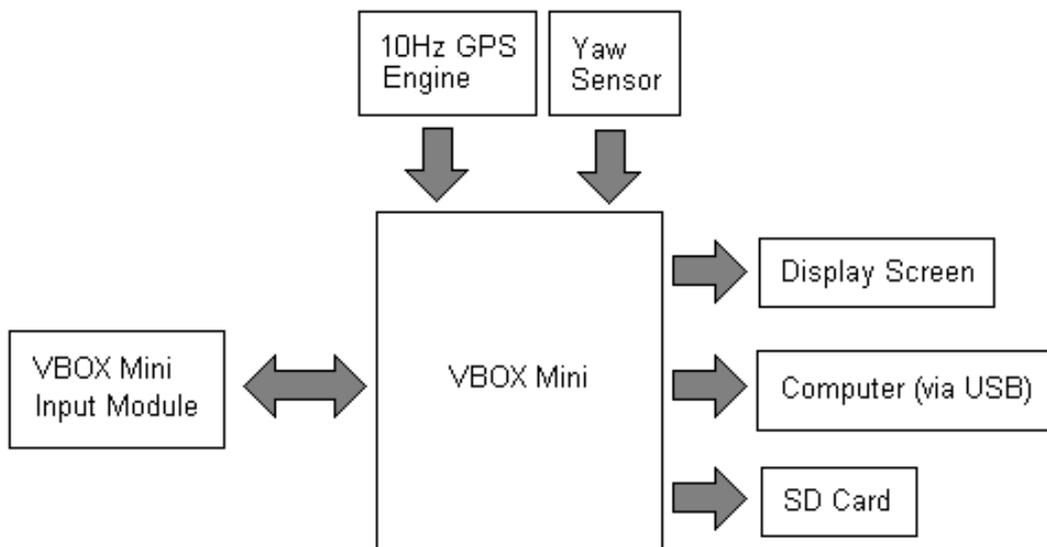
Introduction

The VBOX Mini is a self contained GPS data logger designed primarily for use in automotive testing. A 10Hz fully calibrated GPS engine is used to provide accuracy and precision and the data is stored on a removable SD flash card (max size 2GB). Real time results are displayed on the back-lit LCD display and a USB connection allows data to be streamed or downloaded to a laptop for further in-depth analysis.

External signals (such as engine rpm or throttle angle) can also be logged alongside the normal GPS parameters using the Mini Input Module, which is available as an optional extra.

Features

- Non-contact 10Hz speed and distance measurement using GPS
- Internal and external GPS antennas
- Back-lit LCD screen for viewing live data and results
- Lateral and longitudinal g-force measurement
- Internal Yaw sensor
- RS-232 socket for connection to VBOX Mini Input Module
- USB interface for reading SD card, streaming data and upgrading firmware
- 256Mbyte removable SD card (gives around 200 hours of continuous logging)



Optional Accessories / Replacement Parts

Description:	Racelogic Part Number:
VBOX Mini Input Module	RLVBMIM01
SD Card (2GB)	RLACS083
External GPS Antenna (Pack of 5)	RLACS0705
External GPS Antenna (Pack of 10)	RLACS07010
Mains Power Supply (UK / EU / US / JP / AUS)	RLACS074-UK / -EU / -US / -JP / -AUS
Windscreen Mount	RLACS071
Serial cable (for NMEA messages)	RLCAB040
Cigar Lighter Power Cable	RLCAB041
USB Lead	RLCAB042
Telemetry Module Lead	RLCAB043
Telemetry Diagnostic Cable	RLCAB044
Battery Pack with Charger	RLACS072

VBOX Mini Input Module

This multi-purpose input module allows analogue, thermocouple, engine rpm and digital input data to be logged using a VBOX. This data will be sampled at the same frequency as the GPS data.

Inputs

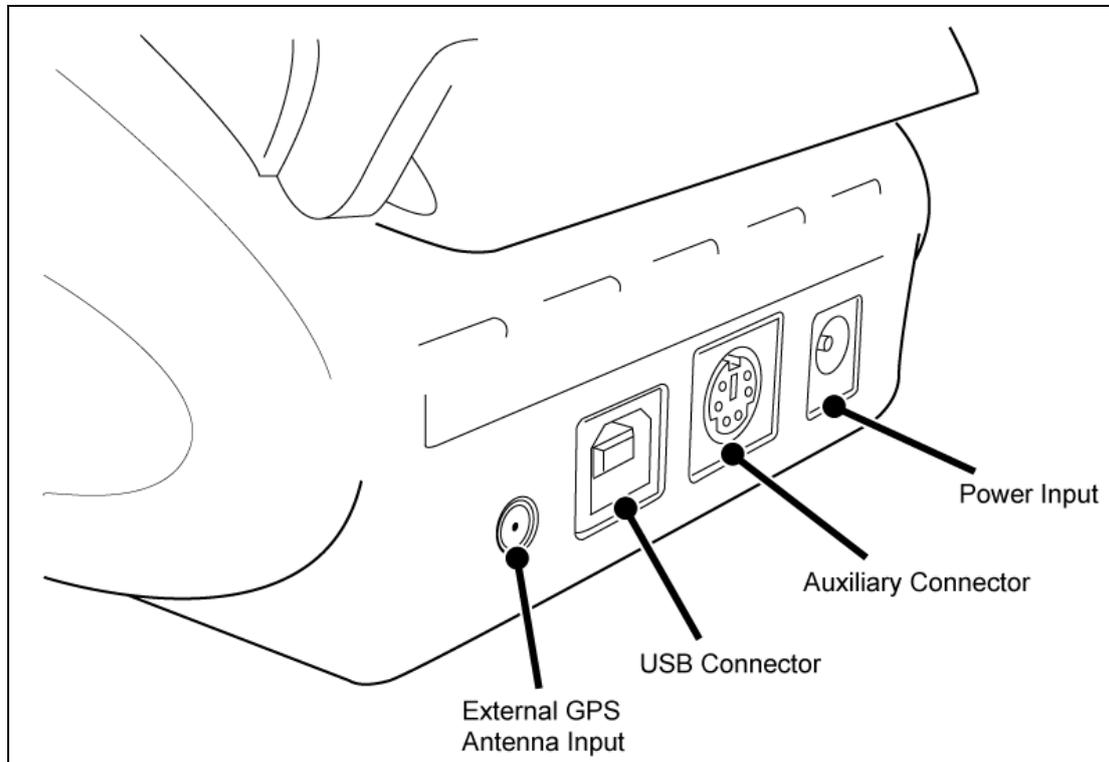
- 8 x 14-bit analogue inputs
- 1 x Low-tension RPM input
- 1 x Wheel speed input with gain control
- 1 x Digital state input for event marker
- 2 x K-type thermocouple interface

Outputs

- 1 x Digital output
- 1 x Analogue output

Basic Operation

Connections

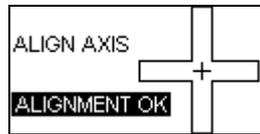


Installation

1. Connect the cigar lighter adaptor power cable to the power socket on the back of the VBOX
2. Slide the VBOX into the windscreen mounting bracket.
3. Using the suction cups of the windscreen mounting bracket, fix to a suitable place low down in the centre of your windscreen.
4. VBOX Mini has an internal GPS antenna, so try to mount the unit where it will have the largest possible view of the sky, or alternatively, use the external antenna on the roof of the vehicle.
5. Park the vehicle outside in an open area away from obstacles such as tall buildings and trees.
6. Insert the VBOX Mini power cable into the vehicle cigar lighter socket.
7. The first time the VBOX Mini is used it will need to be left for 10-15 minutes to fully acquire.
8. After this initial period, the VBOX Mini will usually only take 1-2 minutes to lock onto satellites when you use it next time.
9. Wait for the satellite image to disappear, showing that a satellite lock has been obtained.
10. If the VBOX Mini is needed for measuring slip (or drift) angle, the internal motion sensors will need to be aligned (see next section).

Alignment

1. Park the vehicle on flat ground and turn the engine off.
2. Press the **MENU** button, then highlight 'SETUP' and press the **OK** button.
3. Highlight the 'ALIGNMENT' option and press **OK**
4. The following alignment screen will appear:



5. The screen shows two small lines (a horizontal line and a vertical line) within a large cross.
6. Loosen the mounting screws if required and move the suction mount position so that the two small lines align in the centre of the screen and make the shape of a cross.
7. When the alignment is correct the screen will say 'ALIGNMENT OK'; tighten the mounting screws. If the VBOX Mini needs aligning left to right, release the suction cups and rotate the unit.
8. Confirm the screen still says 'ALIGNMENT OK' then press **OK**.
9. Now press the **MENU** button to exit the menus screen and return to the main screen.

The VBOX Mini is now ready to show slip angle. Note that this alignment is only needed when using the Drift Mode.

Power

Either a mains power supply or a cigar lighter adapter can power the VBOX Mini. In applications where neither of these power supplies is suitable, any alternative supply should be in the range of 6 – 28V DC.

Navigation

The VBOX Mini is fully configurable using the six buttons and display screen on the front of the unit. The buttons operate in largely the same way in every mode, as described below:

	Shows next screen, or navigates up in menus.		Changes display mode.
	Selects the menu item that is highlighted on the screen.		Accesses the menu for the current display mode, or exits from current menu.
	Shows previous screen, or navigates down in menus.		Resets values in that screen if held for 1.5s, or all screens if held for 5s.

Each of the five operational modes (see next section) contains a context-sensitive menu. Each of these menus includes an option to enter the Setup Menu, an option to view data from a VBOX Mini Input Module data, if one is connected, and an option to switch the VBOX Mini between USB Data (for live data viewing) and USB Mass Storage (file transfer and storage) modes. A full description of the options available in each menu can be found under that mode's entry in the 'Operating Modes' section, whilst the options available in the Setup Menu are detailed below.

Setup Menu

The Setup Menu allows general configuration of the VBOX Mini, such as display screen brightness and contrast, yaw sensor alignment and GPS engine coldstarts. It also contains a diagnostic screen for monitoring the VBOX Mini's performance on-screen.

Alignment

This facility is used to align the VBOX Mini relative to flat ground. Alignment is necessary for applications that require measurement of slip angle, but is not needed otherwise. Please refer to the section 'Alignment', above, for alignment instructions.

Contrast

Allows the contrast of the VBOX Mini's display screen to be adjusted.

Brightness

Allows the brightness of the VBOX Mini's display screen to be adjusted.

Diagnostics

There are two diagnostics screens. The first displays information about the GPS data, including strength of the satellite signals on the left and satellite count, time, latitude, longitude and height on the right. When in this screen, the VBOX Mini also outputs NMEA (GPS system) data via serial that can be used by other equipment.

GPS	
SAT LEVELS	Sat 08
	Tim 112345.10
	Lat 058.988°N
	Lon 000.981°W
	Ht 135m

The second diagnostic screen shows information about the yaw sensor, including current yaw rate, yaw angle and internal temperature.

DIAGNOSTIC	
Yaw	0.15 °/s
Angle	000°
Temp	25°C

USB Mode

This option switches the VBOX Mini between its two USB modes:

- VBOX Tools – sends data to the VBOXTools software in real-time for live data viewing.
- Card Reader – allows direct access to the SD card for transfer of files, including VBOX Mini files such as logged data, sector / split locations and performance test results.

Coldstart

This option performs a GPS coldstart on the GPS engine. GPS coldstarts clear the GPS engine's list of satellite positions and configure the GPS engine for normal VBOX Mini operation. For this reason, coldstarts should be performed at the following times:

- If the VBOX Mini has not been used for more than three weeks.
- If the VBOX Mini has moved over very large distances (thousands of miles) whilst turned off.
- If the VBOX Mini's firmware has just been upgraded.

Because each of these are common during distribution, it is also recommended that the VBOX Mini is coldstarted on its first use.

Speed Buzzer

This facility causes a buzzer to sound as the vehicle crosses a configurable speed threshold. The enabling of this facility and the configuration of the threshold speed is all done from the Speed Buzzer screen in the setup menu.

Comms Menu

The Comms Mode specifies the current use and configuration of the main serial port on the Aux connector.

You are able to select the current Comms Mode in the Comms mode submenu of the Setup menu.

COMMS MENU
INPUT MODULE
LAPTIME TELEMETRY
LAPTIME PULSE
DRIFT TELEMETRY
YAW DIAGNOSTICS
EXIT

Input Module

Sends an input module firmware version request at about 1Hz until a response is received. Thereafter it sends a data request on receipt of every GPS sample.

Laptime Telemetry

Sends a telemetry message when a finish or start / finish gate is crossed. If 'Split Output' is enabled, it will send a telemetry message when a split gate is crossed.

Laptime pulse

Sets the lap time pulse for 0.25 seconds when a finish or start / finish gate is crossed. If 'Split Output' is enabled, it will set the lap time pulse for 0.25 seconds when a split gate is crossed.

Drift Telemetry

If in Drift Sectors mode and sector 1 start gate is crossed, the unit will send a telemetry message. If in Drift Seconds mode and a sector end gate is crossed;

If 'TELEM.FORMAT2' is not enabled the unit will send telemetry message 1

If 'TELEM.FORMAT2' is not enabled the unit will send telemetry message 7 and also write the information into a scores.log file.

If in Drift Practice mode (sectors not selected) the unit will output practice drift information at 10Hz shown below:

```
$DBOX,sss.s,±g.gg,±l.ll,±ddd.d,pp.pp
```

Yaw Diagnostics

Will output temperature, yaw rate and yaw calibration (offset and gain) as shown below

```
01828,01763,1766.10, 6.82545
01828,01767,1766.10, 6.82545
01828,01762,1766.10, 6.82545
01828,01767,1766.10, 6.82545
01828,01769,1766.10, 6.82545
01828,01764,1766.10, 6.82545
```

Where:

Temperature is corrected ADC count 2 + calibration MinTemperature

Yaw Rate is corrected ADC count 3

Yaw Cal offset and gain are the current gain and offset being applied to calculate the yaw.

Datalogging

Beneath the display screen is an SD card reader. Whenever an SD card is inserted and the VBOX Mini is moving, GPS and yaw sensor data will be logged to the card at 10Hz. If a VBOX Mini Input Module is connected, data from the input module will also be stored at 10Hz. The SD card can also be used to store files containing data such as start / finish / split line positions, lap times and performance results, as well as any other files you may wish to transfer between computers.

Logging Modes

The VBOXMini has two logging modes, selectable through the setup menu available from any screen.

- 1) **CONTINUOUS:** in this mode all GPS and Mini input module data is logged to the SD card (.DBN file) regardless of velocity or satellite reception.
- 2) **ONLY WHEN MOVING:** in this mode GPS and Mini input module data is only logged to an SD card (.DBN file) when velocity >0.5km/h

Connecting to a Computer

The VBOX Mini is supplied with a USB cable for connection to a computer. Connecting the VBOX Mini to a computer allows you to do the following:

- Transfer files between the SD card and the computer, either for analysis after logging data or simply to transfer files between computer.('Card Reader' mode)
- View VBOX Mini and VBOX Mini Input Module data in real time using the VBOXTools software.('VBOX Tools' mode)
- Configure the VBOX Mini and VBOX Mini Input Module, or view technical information about them.('VBOX Tools' mode)
- Upgrade the VBOX Mini firmware.('Upgrade' mode)

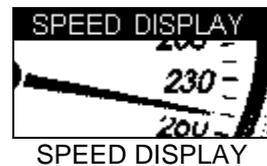
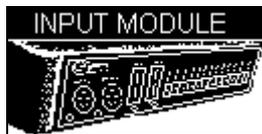
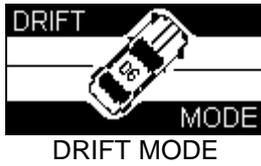
To connect the VBOX Mini to a computer, first connect the unit to a suitable power supply, then ensure that the right mode (either 'VBOX TOOLS' or 'CARD READER') is selected in the Setup Menu. If you wish to upgrade the unit, you will need to press and hold the 'Mode' button whilst connecting power to the unit to enter the upgrade mode.

Once the correct mode is enabled, connect the USB cable between the VBOX Mini and the computer. If a 'Found New Hardware' wizard appears, please consult the driver installation guide included with the VBOX Mini and also on the VBOXTools software.

The VBOX Mini is then ready for use with the computer. Please see the section 'Firmware Upgrades' for details on how to perform a firmware upgrade, or the VBOXTools manual for instructions on the use of VBOXTools for monitoring live data, processing logged data, or configuring the VBOX Mini and VBOX Mini Input Module.

Operating Modes

There are six operating modes on the VBOX Mini Pressing the MODE button once will allow you to cycle from one mode to the next.



Performance Mode



The Performance mode is used to measure the acceleration and braking performance of a vehicle. Press the **MODE** button to scroll to the Performance Mode screen. This mode is divided into thirteen screens, each of which displays different performance data. Navigate between these screens by using the ▲▼ buttons. Each screen will automatically display the results as they happen, for example if you drive from 0 mph to 60 mph then the 0-60 section will show the time taken.

Below is a list of the available Performance Mode display screens.

<table border="1"> <tr> <td>ACCEL</td> <td>0-60</td> <td>6.1s</td> </tr> <tr> <td rowspan="4">100.1 kmh</td> <td>0-100</td> <td>10.2s</td> </tr> <tr> <td>0-100-0</td> <td>6.1s</td> </tr> <tr> <td>Vmax</td> <td>100.2</td> </tr> </table>	ACCEL	0-60	6.1s	100.1 kmh	0-100	10.2s	0-100-0	6.1s	Vmax	100.2	<p>This Acceleration screen displays a live velocity on the left, whilst on the right it shows the times of the following preset test ranges: 0 to 60, 0-100 and 0-100-0. It also shows the maximum speed.</p>										
ACCEL	0-60	6.1s																			
100.1 kmh	0-100	10.2s																			
	0-100-0	6.1s																			
	Vmax	100.2																			
	<table border="1"> <tr> <td>ACCEL₂</td> <td>30-50</td> <td>6.1s</td> </tr> <tr> <td rowspan="4">100.1 kmh</td> <td>50-70</td> <td>10.2s</td> </tr> <tr> <td>PeakG</td> <td>0.81</td> </tr> <tr> <td>Vavg</td> <td>100.2</td> </tr> </table>	ACCEL ₂	30-50	6.1s	100.1 kmh	50-70	10.2s	PeakG	0.81	Vavg	100.2	<p>By default, the Acceleration 2 screen shows the 30-50 and 50-70 times. However, these two test ranges are user-adjustable through the setup menu. Peak lateral g (cornering force) is also shown along with an average velocity value.</p>									
ACCEL ₂	30-50	6.1s																			
100.1 kmh	50-70	10.2s																			
	PeakG	0.81																			
	Vavg	100.2																			
	<table border="1"> <tr> <td>0-10</td> <td>2.0s</td> <td>0-60</td> <td>2.0s</td> </tr> <tr> <td>0-20</td> <td>2.0s</td> <td>0-70</td> <td>2.0s</td> </tr> <tr> <td>0-30</td> <td>2.0s</td> <td>0-80</td> <td>2.0s</td> </tr> <tr> <td>0-40</td> <td>2.0s</td> <td>0-90</td> <td>2.0s</td> </tr> <tr> <td>0-50</td> <td>2.0s</td> <td>0-100</td> <td>2.0s</td> </tr> </table>	0-10	2.0s	0-60	2.0s	0-20	2.0s	0-70	2.0s	0-30	2.0s	0-80	2.0s	0-40	2.0s	0-90	2.0s	0-50	2.0s	0-100	2.0s
0-10	2.0s	0-60	2.0s																		
0-20	2.0s	0-70	2.0s																		
0-30	2.0s	0-80	2.0s																		
0-40	2.0s	0-90	2.0s																		
0-50	2.0s	0-100	2.0s																		
<table border="1"> <tr> <td>0-110</td> <td>2.0s</td> <td>0-160</td> <td>2.0s</td> </tr> <tr> <td>0-120</td> <td>2.0s</td> <td>0-170</td> <td>2.0s</td> </tr> <tr> <td>0-130</td> <td>2.0s</td> <td>0-180</td> <td>2.0s</td> </tr> <tr> <td>0-140</td> <td>2.0s</td> <td>0-190</td> <td>2.0s</td> </tr> <tr> <td>0-150</td> <td>2.0s</td> <td>0-200</td> <td>2.0s</td> </tr> </table>	0-110	2.0s	0-160	2.0s	0-120	2.0s	0-170	2.0s	0-130	2.0s	0-180	2.0s	0-140	2.0s	0-190	2.0s	0-150	2.0s	0-200	2.0s	<p>This screen continues the readings of the previous screen, listing the speeds from 110 to 200 km/h / mph.</p>
0-110	2.0s	0-160	2.0s																		
0-120	2.0s	0-170	2.0s																		
0-130	2.0s	0-180	2.0s																		
0-140	2.0s	0-190	2.0s																		
0-150	2.0s	0-200	2.0s																		
<table border="1"> <tr> <td>BEST</td> <td>0-60</td> <td>6.1s</td> </tr> <tr> <td rowspan="4">0-100-0 6.1s</td> <td>0-100</td> <td>10.2s</td> </tr> <tr> <td>30-50</td> <td>6.1s</td> </tr> <tr> <td>50-70</td> <td>10.2s</td> </tr> </table>	BEST	0-60	6.1s	0-100-0 6.1s	0-100	10.2s	30-50	6.1s	50-70	10.2s	<p>This screen shows the best results of the two test ranges from each of the acceleration and acceleration 2 screens.</p>										
BEST	0-60	6.1s																			
0-100-0 6.1s	0-100	10.2s																			
	30-50	6.1s																			
	50-70	10.2s																			
	<table border="1"> <tr> <td>DECEL</td> <td>100-0</td> <td>2.4s</td> </tr> <tr> <td rowspan="4">100.1 kmh</td> <td></td> <td>37.4m</td> </tr> <tr> <td>Avg</td> <td>0.91G</td> </tr> <tr> <td>PK</td> <td>0.98G</td> </tr> </table>	DECEL	100-0	2.4s	100.1 kmh		37.4m	Avg	0.91G	PK	0.98G	<p>This screen shows the time, distance, average deceleration and peak deceleration of a user-defined deceleration range. The average is defined as $(V^2-U^2) / (2 \times S)$, where V is the final velocity, U the initial velocity and S the distance travelled.</p>									
DECEL	100-0	2.4s																			
100.1 kmh		37.4m																			
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DECEL ₂	60-0	2.4s																			
100.1 kmh		37.4m																			
	Avg	0.91G																			
	PK	0.98G																			
	<table border="1"> <tr> <td>DISTANCE</td> <td>100m</td> <td>14.5s</td> </tr> <tr> <td rowspan="4">384.2 m</td> <td>@ 98.2 kmh</td> <td></td> </tr> <tr> <td>200m</td> <td>18.2s</td> </tr> <tr> <td>@120.3 kmh</td> <td></td> </tr> </table>	DISTANCE	100m	14.5s	384.2 m	@ 98.2 kmh		200m	18.2s	@120.3 kmh		<p>This screen shows the time and end velocity of two distance tests. The first test can be configured using the 'DISTANCE TEST' option in the Performance Menu. The second distances is preset to 0-200 m, or 1/4 mile if the units are changed to feet.</p>									
DISTANCE	100m	14.5s																			
384.2 m	@ 98.2 kmh																				
	200m	18.2s																			
	@120.3 kmh																				
	<table border="1"> <tr> <td>DISTANCE₂</td> <td>400m</td> <td>14.5s</td> </tr> <tr> <td rowspan="4">384.2 m</td> <td>@ 98.2 kmh</td> <td></td> </tr> <tr> <td>1 km</td> <td>18.2s</td> </tr> <tr> <td>@120.3 kmh</td> <td></td> </tr> </table>	DISTANCE ₂	400m	14.5s	384.2 m	@ 98.2 kmh		1 km	18.2s	@120.3 kmh		<p>This screen shows the time and end velocity of two preset distances, 0-400 m and 0-1 km. If the units are changed to feet then the two test ranges are 1/2 and 1 mile.</p>									
DISTANCE ₂	400m	14.5s																			
384.2 m	@ 98.2 kmh																				
	1 km	18.2s																			
	@120.3 kmh																				



<table border="1"> <tr> <td>DISTANCE₃</td> <td>t-120m 14.5s</td> </tr> <tr> <td>384.2</td> <td>@ 98.2 kmh</td> </tr> <tr> <td>m</td> <td>t-100 18.2s</td> </tr> <tr> <td></td> <td>tr-spd 98.2</td> </tr> </table>	DISTANCE ₃	t-120m 14.5s	384.2	@ 98.2 kmh	m	t-100 18.2s		tr-spd 98.2	<p>The final distance screen displays information relating to tests that are started using an event trigger. This screen requires a VBOX Mini Input Module with event trigger for use.</p>
DISTANCE ₃	t-120m 14.5s								
384.2	@ 98.2 kmh								
m	t-100 18.2s								
	tr-spd 98.2								
<table border="1"> <tr> <td>ACCEL G</td> <td></td> </tr> <tr> <td>+0.81</td> <td>0.93</td> </tr> <tr> <td></td> <td>MAX</td> </tr> </table>	ACCEL G		+0.81	0.93		MAX	<p>This screen shows the current acceleration and peak acceleration achieved by the VBOX Mini. A level bar at the bottom of the screen also shows this information in graphical form. The MAX value is cleared by pressing the RESET button.</p>		
ACCEL G									
+0.81	0.93								
	MAX								
<table border="1"> <tr> <td>DECEL G</td> <td></td> </tr> <tr> <td>-0.81</td> <td>-0.93</td> </tr> <tr> <td></td> <td>MIN</td> </tr> </table>	DECEL G		-0.81	-0.93		MIN	<p>This screen shows the current deceleration and peak deceleration achieved by the VBOX Mini. A level bar at the bottom of the screen also shows this information in graphical form. The MAX value is cleared by pressing the RESET button.</p>		
DECEL G									
-0.81	-0.93								
	MIN								
<table border="1"> <tr> <td>LATERAL G</td> <td></td> </tr> <tr> <td>+0.81</td> <td>0.93</td> </tr> <tr> <td></td> <td>MAX</td> </tr> </table>	LATERAL G		+0.81	0.93		MAX	<p>This screen shows the current lateral acceleration and peak lateral acceleration achieved by the VBOX Mini. A level bar at the bottom of the screen also shows this information in graphical form. The MAX value is cleared by pressing the RESET button.</p>		
LATERAL G									
+0.81	0.93								
	MAX								

Example: Measuring the 0-60 Time of your Vehicle

1. Install the VBOX Mini into the vehicle as described in the 'Installation' section of this manual.
2. Press the **MENU** button to select the Performance Mode.
3. Now use the **▲▼** buttons to scroll to the ACCEL screen. This screen shows 0-60 in the top right hand corner:

ACCEL	0-60	----
000.0	0-100	----
mph	0-100-0	----
	Vmax	000.0

4. The left hand side of the screen shows the live velocity, unless the vehicle is in an area of poor satellite reception in which case it either shows 'LOW SATS' or the whole screen flashes an image of a satellite.
5. Now perform the 0-60 acceleration run. As the vehicle goes over 60 mph the time will be displayed instantly in the 0-60 section of the window.
6. If the vehicle comes to a stop, you will see that this time remains on the screen. The Vmax section will also show the highest speed you attained during this particular run.

ACCEL	0-60	6.1s
000.0	0-100	----
mph	0-100-0	----
	Vmax	065.4

7. You can now instantly start another 0-60 acceleration, if required. As the vehicle accelerates, the screen will reset and show the new values as the vehicle reaches 60 mph.
8. After undertaking a number of runs the best 0-60 time can be viewed by scrolling to the BEST screen.

BEST	0-60	6.1s
0-100-0	0-100	10.2s
6.1s	30-50	6.1s
BEST	50-70	10.2s

9. If an SD card had been inserted into the VBOX Mini prior to testing, the data will have been stored on the card for subsequent use. **Please note**, to record a results file, you must accelerate over at least 30 Km/H.

Changing a Performance Mode Test Range

It is possible to configure the speeds and distances of the following tests:

Test range	Configurable Elements
Accel range 1	Start and End Speed
Accel range 2	Start and End Speed
0-100-0 range	Max speed
Decel range 1	Start and End Speed
Decel range 2	Start and End Speed
Distance Tests	End distance of each of the four ranges
Trig to Speed	End speed
Trig to Distance	End distance

If you wish to change the speed or distance range over which performance is measured, press the **MENU** button from any of the performance mode screens and select the range you wish to change from the options available, then press **OK**. Below follows an example detailing how to set the first acceleration range.

PERFORMANCE MENU
UNITS
WRITE RESULTS FILE
ACCEL RANGE 1
ACCEL RANGE 2
0-100-0 RANGE

1. Highlight 'ACCEL RANGE 1' and press **OK**
2. The following screen will appear, with the start speed of ACCEL RANGE 1 highlighted:

SET ACCEL RANGE 1
START 030
END 050

3. Whilst the START speed is highlighted use the ▲ ▼ buttons to change the speed.
4. Press **OK** and repeat this procedure for the END speed:

SET ACCEL RANGE 1
START 010
END 070

5. Press **OK** again to finish setting the acceleration range.

1 Foot Rollout

The VBOX Mini normally takes the start of a performance run from the point at which the vehicle first moves, but in some applications (such as at drag strips) the vehicle starts one foot behind the timing start line. You can make the VBOX Mini start **all timing runs** from one foot by enabling this feature in the Performance Mode menu.

Enabling 1 Foot Rollout correction

- Press the **MENU** button to enter the Performance Menu.
- Highlight the 1 FOOT ROLLOUT option and press **OK**

PERFORMANCE MENU
DECEL RANGE 2
1 FOOT ROLLOUT
SETUP
EXIT

Result and Best Files

If an SD card has been inserted and the 'Write Results File' option has been enabled, the VBOX Mini will create two results files on the card. The first file, 'RESULTXX.TXT' gives the results for every performance test made using the VBOX Mini, each time appending the data onto the end of the file. The second file, 'BESTXX.TXT', displays only the best results achieved for each type of test, overwriting previous results when required. If the unit is power-cycled, two new files will be created with an incremented file name and all data will be written to the new files instead.

Results text files are only created on the SD card if the 'Write Results File' option has been chosen from the Performance Mode Menu:

PERFORMANCE MENU	
	UNITS
√	WRITE RESULTS FILE
	ACCEL RANGE 1
	ACCEL RANGE 2

Note: no results will be written to the files if the speed does not exceed 50km/h during the tests.

Example RESULTXX.TXT file:

```

----- Run 0001 -----
Time 11:07                Date 18/09/2006

Accel Distance results
Distance(m)    Time(s)  @Speed(kmh)
0-100    09.3    72.6
0-200    13.6    93.7
0-400    ----    ----
0-1000   ----    ----
Trg-120   ----    ----

Braking results
Speed(kmh)    Time(s)  Distance(m)
60-0    02.5    20.3
100-0   04.2    58.3

User range
Speed(kmh)    Time(s)
30-50    02.5
50-70    02.4
0-100-0  20.9

Misc
Vmax    64.3mph
Vavg    36.0mph
AvgLatG -0.09G
PkLatG  0.71G
PkAccelG  0.39G
PkDecelG  0.96
    
```

Example BESTXX.TXT file:

```

----- Best results -----
Time 11:14                Date 18/09/2006

Speed(kmh)    Time(s)
0-60    07.1
0-100   15.1
31-50   02.0
51-70   02.4
0-90-0  20.9
    
```

Speed Buzzer

The Speed Buzzer can be used in such tests as 0-100-0, as an audible warning when a certain speed has been reached. This means that during such testing the driver will not need to watch the display and can listen for the buzzer instead.

To change the speed at which the buzzer will sound, enter the **MENU** from any mode, scroll to Setup and click **OK**. The speed buzzer is one of the options in the Setup menu. Pressing either the **▲▼** alters the speed setting.

SETUP MENU
DIAGNOSTICS
COLDSTART
SPEED BUZZER
UPGRADE

The speed buzzer will only sound once when the set speed is reached. It will not continue to activate every time the vehicle passes through the set speed, on acceleration or deceleration. In order to arm the speed buzzer once more the vehicle must either come to a complete halt for five seconds, or VBOX Mini must be power-cycled.

SPEED BUZZER
✓ ENABLED
SPEED 100
EXIT

Note: Speed Buzzer can be set in all four main modes

Event Marking

Pressing the OK button when in any of the Performance Mode screens or the main Speed Display mode screen will create an event trigger on the brake channel. The duration of the trigger event depends upon the length of time the OK button is depressed.

Lap Timing Mode



The VBOX Mini can be used to measure lap times by storing the position of a virtual gate and using this to trigger the start and end of a lap. Further locations can be added to represent split and dedicated finish lines.

- **Start/Finish Line:** Defines the point at which one lap ends and another starts. It also defines the start of a test that ends in a different location, such as a sprint or slalom stage.
- **Split Line:** Defines a point on the track or stage at which intermediate time and speed measurements are displayed.
- **Finish Line:** Used only in point-to-point tests (such as sprint or slalom tests), to mark a finish point that is in a different location to the start point.

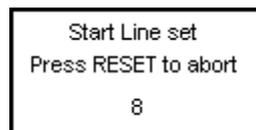
Measuring Lap Times

There are three ways of measuring lap times as you drive round a circuit: by using the 'Simple Lap Timing' option, the 'One Shot Mode' option, or by setting the start/finish and split points through the VBOX Mini menu screens. The simple lap-timing option is useful if the user is in a situation where several button presses are difficult to achieve, such as during a qualifying run.

Simple Lap Timing

This method of lap timing requires just one button push to set up a start/finish line.

1. With the VBOX Mini in Lap Timing mode, press either the up or down arrow key as you drive over the desired start/finish point. The screen will then display the following message:



2. The screen will then count down to 0 and revert to the normal lap timing screen, and start timing immediately. As soon as the start/finish line is crossed again the lap time will be displayed along with the current best.



If the button has been pressed in error this count down allows you to abort the setting of the start finish line, whereupon the lap times will be calculated according to any previous start/finish points that may have been set.

One Shot Mode

By default, the lap timing on the VBOX Mini starts from a start / finish line. However, the VBOX Mini can also be set to start lap timing from the moment the vehicle starts moving. To do this, set the unit to 'One Shot Mode' by ticking that option in the Lap Timing menu.

One Shot Mode is used as follows:

1. Bring the car to a halt at the required start point.
2. After two seconds, the following screen will appear:



3. The screen will count down from 5 to 1. After reaching 1, the following screen will appear:

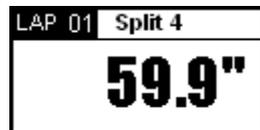


4. When this screen appears, the unit is ready and lap timing will commence as soon as the vehicle starts moving. Timing will end when the vehicle crosses the start / finish line.

Lap Timing Including Split Points

This method allows for the setting of a start/finish line, up to six split points, and a separate finish line if the course being driven is of a sprint or hill-climb type. Due to the fact that it requires several button pushes it is best employed in a non-race session.

1. Firstly set the start/finish line and splits or load a previously saved set from the SD card (see Setting Start/finish and Split Lines below).
2. If you want to save your lap times to a file, insert an SD card.
3. Drive around the circuit, your times will automatically appear on the VBOX Mini display:



Setting Start / Finish and Split Lines

This method records laptimes and split times as you drive around a circuit. Before the VBOX Mini can measure and display times, start / finish and split lines will need to be created or loaded from a previously defined set.

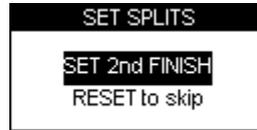
1. Press the **MENU** button to display the Lap Timing Menu.
2. Highlight 'SET START & SPLITS' and press **OK**:



3. Press **OK** as the vehicle crosses the start / finish line.
4. The start / finish line will now be stored and the screen will now show the SET SPLIT1 screen:



5. To set the first Split, press **OK** when the vehicle passes this point, or press **RESET** to skip setting of this line. Repeat this for each of the split lines.
6. If no split lines are required, press **RESET** on each screen until the SET 2nd FINISH screen appears:



7. If a separate finish line is required, press **OK** when the vehicle crosses the line. Otherwise, press **RESET** to exit to the Lap Timing Menu.

Note: you must be moving to be able to set virtual lines.

Saving Start / Finish and Split Lines

After creating start / finish, Splits or Finish lines you can save them to a file on the SD card which can be loaded back into VBox Mini at a later stage, or used in the VBox Tools software. The file created is called DBOX.DSF and is saved into the 'DATA' directory on the SD card. If a DBOX.DSF already exists the file will not be created; this is to prevent existing start and split lines being accidentally overwritten.

To Save the lines you have created:

1. Ensure the SD card is inserted.
2. Press the **MENU** button to enter the Lap Timing Menu.
3. Enter Starts & Splits option then highlight **SAVE SPLITS** and press **OK**.

Loading Start / Finish and Split Lines

You can load start and split line information from a file stored on the SD card into your VBox Mini. By default the VBox Mini looks for a file it has saved out; DBOX.DSF in the 'DATA' directory. If no DBOX.DSF file is found the VBox Mini will look for a 'DSF' directory and display a list of all *.DSF files in that directory. This facility allows you to keep a library of split lines files on the VBox Mini from multiple test areas or circuits.

To Load a split line file:

1. Press the **MENU** button to enter the Lap timing menu.
2. Enter the Starts & Splits option then highlight **LOAD SPLITS** and press **OK**.

Clearing Start / Finish and Split Lines

This option will erase any split line information from the VBOX Mini's memory, not from the SD card inside the VBOX Mini. Simply press the **MENU** button to enter the Lap timing menu, select Starts & Splits then highlight the 'CLEAR' option and press **OK**.

Changing the Width of Start / Finish and Split Lines

The 'SPLIT WIDTHS' option allows you to change the width (in metres) of split lines. This can be useful in ensuring that split lines are wide enough on larger courses, or not too large to accidentally cross other parts of the track on smaller tighter courses. The default value is 25m (12.5m either side of the vehicle when the line is set).

Big Speed @ Split display

Displaying the exit speed is very easy way to help you improve your speed out of a particular corner. To display the exit speed at the last split instead of the time, highlight 'BIG SPEED @ SPLIT' under display options in the Laptiming menu.

DISPLAY OPTIONS
SPLIT DISPLAY TIME
SPLIT TO SPLIT TIME
✓ BIG SPEED @ SPLIT
ROLLING LAP TIME
EXIT

The exit speed of the last split will be displayed in the main window with the current lap in the upper left and the split time in the upper right window:



Split to Split time

There are two different ways of measuring split times, the default is from the start of the lap to the split, the other way is from one split to another. You can change the method of calculating split times by using the option 'SPLIT TO SPLIT TIME' in DISPLAY OPTIONS in the LAPTIMING MENU.

DISPLAY OPTIONS
SPLIT DISPLAY TIME
✓ SPLIT TO SPLIT TIME
BIG SPEED @ SPLIT
ROLLING LAP TIME
EXIT

Split Widths

When setting a start / finish or split line, VBOX Mini will set the width of the line at a default value of 25m (12.5m either side of the point at which the OK button was pressed.) However this can be changed by selecting the Split Widths function and altering the value using the ▲▼ buttons. This feature is useful if VBOX Mini is being used on a track where separate sections pass closely by each other, and eliminates the possibility of going through a split line in the wrong direction.

Clearing your Best Lap time

Press and hold the **RESET** button for 1.5s.



Laptime Telemetry

COMMS MENU	
INPUT MODULE	
<input checked="" type="checkbox"/> LAPTIME TELEMETRY	
LAPTIME PULSE	
DRIFT TELEMETRY	
YAW DIAGNOSTICS	
EXIT	

The Laptime Telemetry option makes VBOX Mini send lap time data via the telemetry serial port whenever a start/finish, split line or dedicated finish line is crossed. The lap time serial stream has the following format, sent at a baud rate of 115200 bit/sec, no parity, 8 data bits and 1 stop bit.

Word No.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
24	24	00	10	00	10	33	34	34	08	12	76	90	14	E1	B4	22	17	85	9D
24	24	00	10	00	0A	33	34	34	06	99	32	C0	3E	D9	B8	08	BD	49	8E
24	24	00	10	00	0B	33	34	34	06	08	B2	90	3E	EF	FC	07	51	B6	E7
24	24	00	10	00	0C	33	34	34	06	0B	23	90	3F	0C	80	08	C6	6B	17
24	24	00	10	00	0D	33	34	34	05	07	7A	10	3F	1F	A4	09	EB	1B	7F
24	24	00	10	00	0E	33	34	34	06	0F	B7	70	3F	47	E0	06	B1	FE	57
24	24	00	10	00	0F	33	34	34	07	09	75	E0	3F	60	18	08	A4	45	85

ASCII Header	Message Length	Message Type	Unit Serial No.	Sat	Laptime (Secs)	UTC (Secs)	Speed	Checksum
--------------	----------------	--------------	-----------------	-----	----------------	------------	-------	----------

Field	Value	Output	Conversion
ASCII Header:	0x2424	\$\$	ASCII
Message Length:	0x0010	16 (No of 16 bits Words)	Hex2Dec
Message Type:	0x0010	Laptime	Hex
	0x000A	Split 1	
	0x000B...	Split 2	
	...0x000F	Split 6	
Last 3 Digits of Unit Serial No:	0x333434	344	ASCII
No. of Sats in View:	0x07	7	Hex2Dec
Laptime (Secs) * 100000:	0x0975E0	62000/100000 = 6.2	Hex2Dec
UTC Time (Secs) * 100:	0x3F6018	4153368/100 = 41533.68	Hex2Dec
Speed at this point * 100:	0x08A4	2212/100 = 22.12 mph or kmh*	Hex2Dec
Checksum:	0x4585	0x4585	Hex

*Speed output depends on units selected

Each telemetry message will be sent twelve times unless an acknowledge message is received.

Laptime Pulse

If the Laptime Pulse option is enabled, a 250ms pulse is output on the serial port instead.

Note that selecting either of these two options disables the other option. It is possible to deactivate both modes by un-ticking whichever option is currently ticked, if any.

Split Output

Similar to the Laptime Telemetry option, this enables split time data or a 250ms pulse to be output via the telemetry serial port whenever a split line is crossed. The output given will be the same type as the lap timing output, so if you have enabled Laptime Telemetry the split output will be in the Telemetry format; if you have enabled Laptime Pulse the split output will be in the Laptime Pulse format. If this option is disabled, no output will be given.

Recording and Reviewing Lap and Split Times

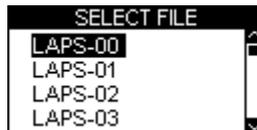
Recording Lap and Split Times

To record your data, including lap and split times, simply insert an SD card into VBOX Mini. The data will be recorded in a '.dbn' file on the SD card and the Lap Timing information will be recorded in a text file, such as 'Laps-01.txt'.

Reviewing Lap and Split Times on the VBOX Mini

To review lap and split time data from a logged laps file:

1. Enter Lap Timing Mode.
2. Press **OK** to make the VBOX Mini display a list of all Lap Timing files stored on the card:



3. Press the **▲▼** buttons to scroll to the required file, then press the **OK** button to select it. The file will then be displayed on the VBOX Mini:

LAP	SPLIT
1 19'59.95"	1 19'59.95"
2 19'59.95"	2 19'59.95"
3*19'59.95"	3 19'59.95"
4 19'59.95"	4 19'59.95"
5 19'59.95"	5 19'59.95"
	6 19'59.95"

4. The laps times are shown on the left, with the split times for the highlighted lap on the right. In each file, the best lap is indicated with an asterisk. To change which lap has its split times displayed on-screen, use the **▲▼** buttons to scroll between the laps; the split times will update automatically.
5. When finished, pressing the **OK** button again return to the Lap Timing Mode main screen.

Reviewing Lap and Split Times on a Computer

Any of the logged laps files can be opened using a text editor program such as notepad. The files have the following format:

Time : 13:22:33			
Date : 18/7/05			
Lap	Lap Time	Split	Split Time
01		1	0' 10.20"
01		2	0' 11.45"
01		3	0' 22.50"
01		4	0' 8.30"
01		5	0' 19.25"
01		6	0' 8.70"
01	1' 28.35"		
02		1	0' 10.20"
02		2	0' 11.45"

Note that the lap times are shown after the split times for that lap.

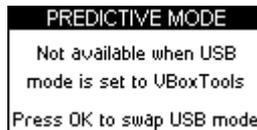
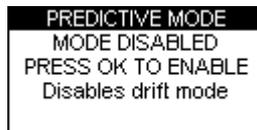
It is also possible to view lap timing information from a logged '.dbn' file using the VBOXTools software. Please refer to the VBOXTools software manual for more information.

Predictive Mode

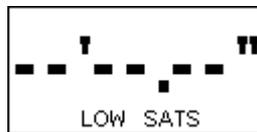


Predictive mode enables you to graphically view your predicted lap time. Predictive lap timing works by saving your position around a circuit, every second. If the current lap is the fastest so far, then this positional data is saved as a reference.

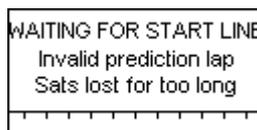
By default, Predictive Mode is disabled. However, the user can enable Predictive mode via the setup menu or pressing 'OK' while viewing the mode screen.



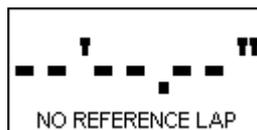
This screen is shown when comms mode is set to VBox Tools. Pressing the **OK** button changes the comms mode to Mass Storage which enables predictive mode.



This message on screen means the Drift Box is receiving positional data from less than three satellites.



If the VBox Mini loses satellite lock while predicting, this screen will appear. The user will have wait until the start finish line is crossed before predicting again.



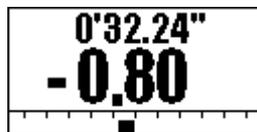
Before Predictive mode can operate, you will need a reference lap. If a reference lap file is found on the SD card as the Drift Box boots up, it will be automatically be loaded. A reference lap file can be loaded from the SD card at any time using the **Load Reference** menu option. The VBOX Mini will display this screen when no reference lap is available. Once a Reference lap has been set, the VBox Mini will start predicting when the start line has been crossed.



If you do not have a reference lap file, you will have to wait until a full lap of the circuit has been completed. This screen will be displayed while the drift box is creating a reference lap.



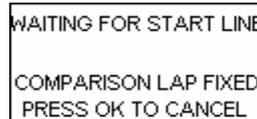
Once a valid reference lap has been created or loaded, the VBOX Mini will begin predicting. The prediction is shown in text and graph format which is a graphical representation of the amount of time gained or lost around the lap.



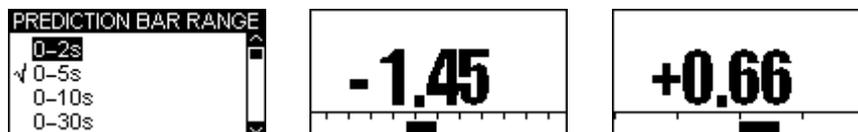
When a lap has been completed this screen is displayed for five seconds before reverting back to the prediction screen.

Fixed Lap

In predictive mode your reference lap will change if it is faster than the previous. Pressing the OK button will fix your current lap, preventing it from changing. Pressing OK again on the same lap, cancels the fixing. Pressing OK on a later lap will cause that one to be fixed. If you decide to load a lap file from the SD card, it will automatically become the fixed reference lap.



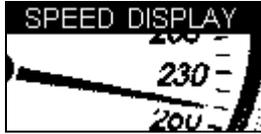
Anything that resets predictive mode will put the unit back in to normal non fixed predictive mode. This includes pressing the reset button, clearing splits or performing a power cycle.



You are able to set the scale of the bar display with each gradation representing a set number of seconds. The options available are 0-2s, 0-5s, 0-10s and 0-30s. This can be changed by selecting **MENU** and then **BAR RANGE**.

To save a reference lap, Press **MENU** and then select **SAVE REFERENCE**. If you wish to clear your reference lap to enable you to create a new one, holding down the **RESET** button will allow you to do so. Clearing the split points on Laptiming mode will also reset the reference lap. Please note, once you create a new reference lap, the previously saved one will be overwritten.

Speed Display Mode



The Speed Display Mode consists of four screens. The first displays the current speed in a very large font. The second screen is used for calibrating speedometers. Odometer and Altimeter screens are also available. Switch between the screens by using the ▲ ▼ buttons.

Speedometer Calibration Mode



This screen can be used to average a vehicle's speed between two locations, allowing calibration of a speedometer or other velocity-measuring such equipment. The start point can be either of the following:

- A pre-defined Start / Finish line.
- The point at which the **OK** button is pressed.
- The point at which the brake trigger is pressed (requires a VBOX Mini Input Module with brake trigger).

The end point can be either of the following:

- A Split line.
- The point at which the **OK** button is pressed, when averaging is in progress.
- The point at which the brake trigger is pressed, when averaging is in progress (requires a VBOX Mini Input Module with brake trigger).

Odometer

In the Speed Display Mode pressing the ▼ button selects Odometer Mode. The total distance travelled in feet or metres (depending on units selected) will be displayed in the main window. Pressing the **RESET** button resets the Odometer back to zero.



Altimeter

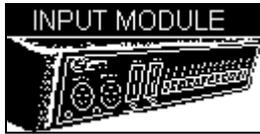
In the Speed Display Mode pressing the ▲ button selects Altimeter Mode. The current altitude in feet or metres (depending on units selected) will be displayed in the main window.



Event Marking:

Pressing the OK button when in any of the Speed Mode screens will create an event trigger on the brake channel

Input Module Screen



The Input Module screen provides the ability to configure the input and output channels of a connected Mini or Micro Input Module and view the data on each of the input module channels.

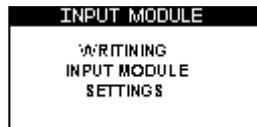
Input module connection

The VBOX Mini is able to connect to a Mini input module using an RLCAB045 and Micro Input module using an RLCAB094 cable plugged into the Auxiliary connector on the back of the VBOX Mini to socket DATA2 on the Mini Input module, and the Data socket on the Micro Input Module.

If an input module is connected to a VBOXMini and it has been initialised then the VBOXMini will automatically log all of the input module channels to the SD card.

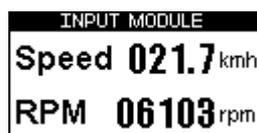
Initialising the Mini Input module.

In order for the VBOXMini to log the input module data channels, the Input Module screen must be accessed whilst the input module is connected and the VBOXMini has satellite lock. After the Input Module screen has been accessed the screen will briefly display the following message.



Then the screen will display the data output diagnostic screen. Once this has happened the VBOXMini will log the input module data.

In firmware revision 1.4.76 and above a new display can be accessed by pressing down in this mode.



This screen displays Speed and a selected Mini input module channel. To select a MIM channel press the MENU button then navigate through the list to select display channel. From this screen any one of the MIM channels can be selected.

NOTE: After each power up, the Input Module Screen on the VBOXMini must be accessed in order for the VBOXMini to recognise the presence of the MIM01. After this has been done, then any of the VBOXMini screens can be used, but this must be done or the MIM01 channels will not be logged.

Configuring the Inputs and Outputs

See the Mini or Micro Input Module user guide for a full explanation of configuring the inputs and outputs of a Mini/Micro input Module.

Drift Mode



In order to maintain the full functionality of Racelogic's VBOX Mini product, the VBOX Mini contains a Drift Mode. This feature is aimed primarily at fans and competitors in the sport of drifting.

Drift Mode is used to measure drifting ability, showing current and maximum drift angles along with a grading of performance as a score between 0 and 10 points. Scores can be sent to the VBOX Mini website for publishing on the Top Scores database.

An SD card can be inserted to log scores and data from drifting runs that can then be downloaded and viewed on a computer in the VBOXTools PC software.

The Drift Mode can be used in two different ways: Sectors and Practice. The default is Practice, but you can turn on Sectors in the Drift Menu.

By default, Drift Mode is enabled. However, if the user enables Predictive Mode, Drift Mode becomes disabled.



Practice Mode

Without Sectors enabled, the VBOX Mini measures a single run at a time, where a run is defined as anything larger than 5° of drift and a speed greater than 25 Km/h. The run finishes when the vehicle goes below these thresholds. The VBOX Mini then displays peak drift angle, speed at which that drift angle occurred, the peak lateral acceleration during the run and the overall score, which is based on lateral acceleration and drift angle.

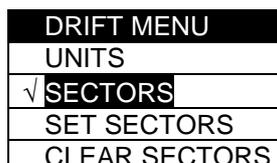
Sectors Mode

When Sector are enabled, a run starts at one virtual gate and finishes at another, see the 'Sectors' section below for more details. Note that if no sector start and sector finish lines are set, no scores will be given.

Selecting Sectors Mode

To set the VBOX Mini to Sectors mode:

1. In Drift Mode, press **MENU**.
2. Select 'Sectors', then press the **OK** button.



Drift Mode Display Screens

VBOX Mini has two different screens, available in each mode, which are selected by using the ▲▼ buttons.

	<p>This screen shows speed and drift-angle in real-time, as well as the peak drift angle achieved. Holding the reset button for 1.5 seconds will reset the peak drift angle.</p>
	<p>Practice Mode Only This screen shows the peak drift angle, the speed at which it was achieved, the maximum lateral acceleration achieved, and the score awarded by VBOX Mini for the run.</p>
	<p>Sectors Mode Only Shows the peak drift angle, the speed at which it was achieved, the sector number, the score awarded by VBOX Mini for the run, and the cumulative score in brackets.</p>
	<p>SPIN! is displayed if the drift is greater than 100 degrees, or if the drift is greater than 45 degrees with the speed less than 10 Km/h.</p>

Resetting Screens

In any of the Drift Mode screens, the Peak, Average, Score and Speeds can be reset by pressing the **RESET** button for 1.5 seconds.

Score Codes

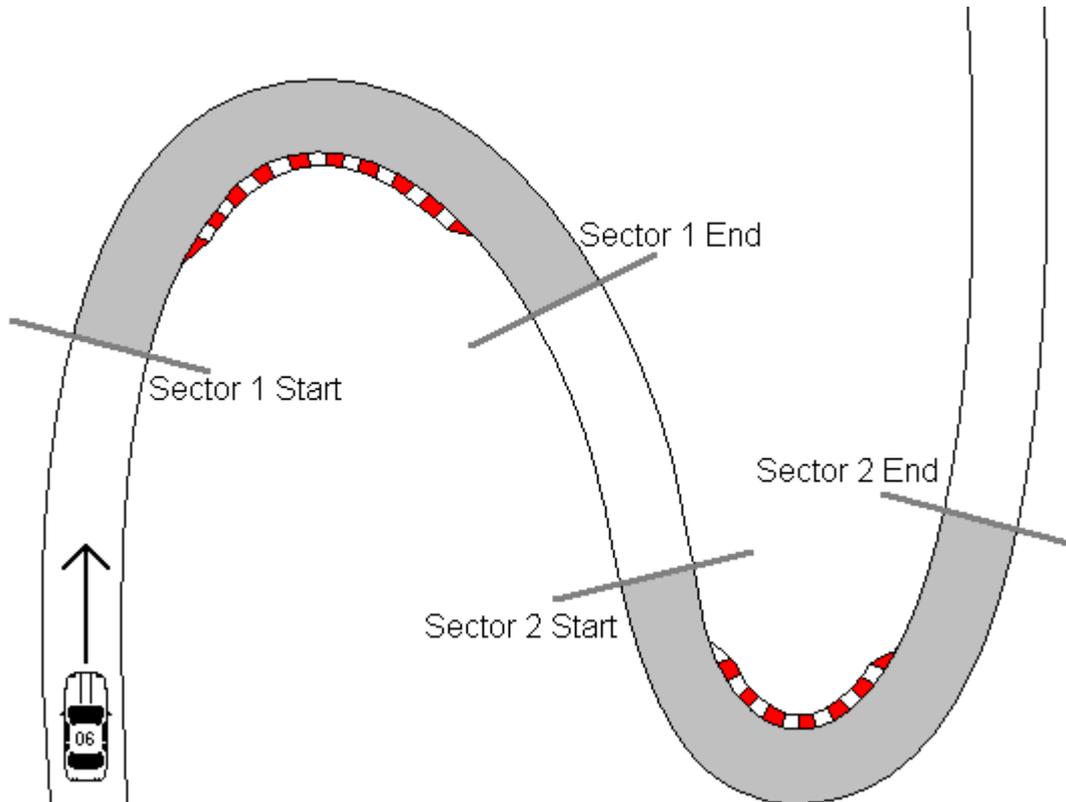
Scores are generated by the VBOX Mini based on the performance of a drift. Scores can be entered on the DriftBox league on the DriftBox website (www.DriftBox.com), but the validation code generated by the VBOX Mini will be needed to verify the score. This code can be entered on the website under 'My DriftBox' → 'My high score'.

Validation codes are automatically saved to a file on the SD card called 'Scores.txt'. They can also be viewed on the VBOX Mini by pressing the **OK** button.

SCORE CODE
DF95 3C1C 257E C31

Setting Sectors

A sector is made up of two virtual gates. If Sectors Mode is enabled, the measurement process starts at the first gate and ends at the second. Up to 6 sectors can be defined; a score will be awarded for each sector along with a cumulative score. It is not necessary to have all 6 sectors defined, for example just one can be used if required. Note that to score in a sector the vehicle has to be drifting continuously; if it straightens up at any point, the score is reset to zero at that point.



Sectors are defined separately from Splits because they come in pairs.

Sectors can be created either by driving through them with the VBOX Mini or by setting them in the VBOXTools software. VBOXTools is supplied on the installation CD and is available as a free download from the support section of the <http://www.racelogic.co.uk/?show=VBOX> website. Sector files can be saved to and loaded from an SD card by the software or VBOX Mini, allowing sector files to be transferred between different computers and VBOX Minis.

Changing the Width of Sector Lines

The 'SECTOR WIDTH' option allows you to change the width (in metres) of sector start and end lines. This can be useful in ensuring that sector lines are wide enough on larger courses, or not too large to accidentally cross other parts of the track on smaller courses. The default value is 25m (12.5m either side of the vehicle when set).

Creating Sectors

1. Press the **MENU** button to enter the Drift menu.
2. Enable Sectors then highlight the option 'SET SECTORS' and press **OK**.
3. Drive towards the start of the first sector and press **OK** when crossing the sector start.
4. Carry on driving, then press **OK** again when crossing the sector end.
5. The screen will now highlight 'Start2'; up to six sectors may be in the same manner. To skip a sector, press **RESET**.
6. When all required sectors have been set, press the **MENU** button to return to the Drift screen.

Saving a Sector file

1. Press the **MENU** button to enter the Drift Menu.
2. Highlight the 'SAVE SECTORS' option and press **OK**.



Loading a Sector file

1. Press the **MENU** button to enter the Drift menu.
2. Highlight the 'LOAD SECTORS' option and press **OK**.



Sector Telemetry

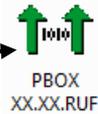
If a VBOX Mini is being used in conjunction with a radio telemetry system, drifting data such as score and peak angle can be transmitted to a computer at the end of each sector. The computer can display this performance data in real-time using software available from Racelogic.

Firmware Upgrades

1. You must have either: **Performance Tools, Drift Tools or VBOX Tools** software on your computer.

These can be downloaded from her website if required.

2. You will also need to download the correct firmware file for your unit from our website. Click '**Save**' and save this firmware file to your desktop.



3. The next step is to make sure you have the correct drivers installed.

Download and save the file from the link below, then extract and run the executable inside the folder. It should be very straightforward – note that you may need to authorize a couple of windows security warnings.

Driver Installation Program - <http://www.racelogic.co.uk/downloads/misc/drivers.zip>



4. Now you need to connect your VBM unit to your PC. Firstly, power up your unit, making sure to put the unit into Upgrader mode by holding the **mode** button down while applying power. The unit will show 'Upgrader' and '**Connect USB cable**' on the screen. When you have seen this screen, connect to your PC.

5. Now connect your unit via USB cable to your PC –When it is physically connected, you should see the display screen on the VBM change to '**Waiting to Connect**'. You should also see a window appear in the corner of your PC screen saying '**Your device is ready to use**'. You are now ready to run the upgrade.

**If you see an error message, or a message telling you to restart your PC, just disconnect the PB/DB/VBM and turn it off and then repeat steps 4 and 5. If you are still having problems, you may need to restart your PC.*

6. To start the upgrade, simply double click on the .RUF firmware file to begin.

The Upgrader software should appear. This will now automatically upgrade the firmware.

**Note, if an error occurs saying 'Unable to find usbser.sys' then you should contact Racelogic for the latest version of Upgrader software.*

7. When you have successfully carried out the firmware upgrade, go outside and leave the unit with a clear view of the sky. Select: MENU, SETUP then COLDSTART.

This will carry out a GPS cold start on the unit and allow it to search for satellites without using any stored previous satellite locations.

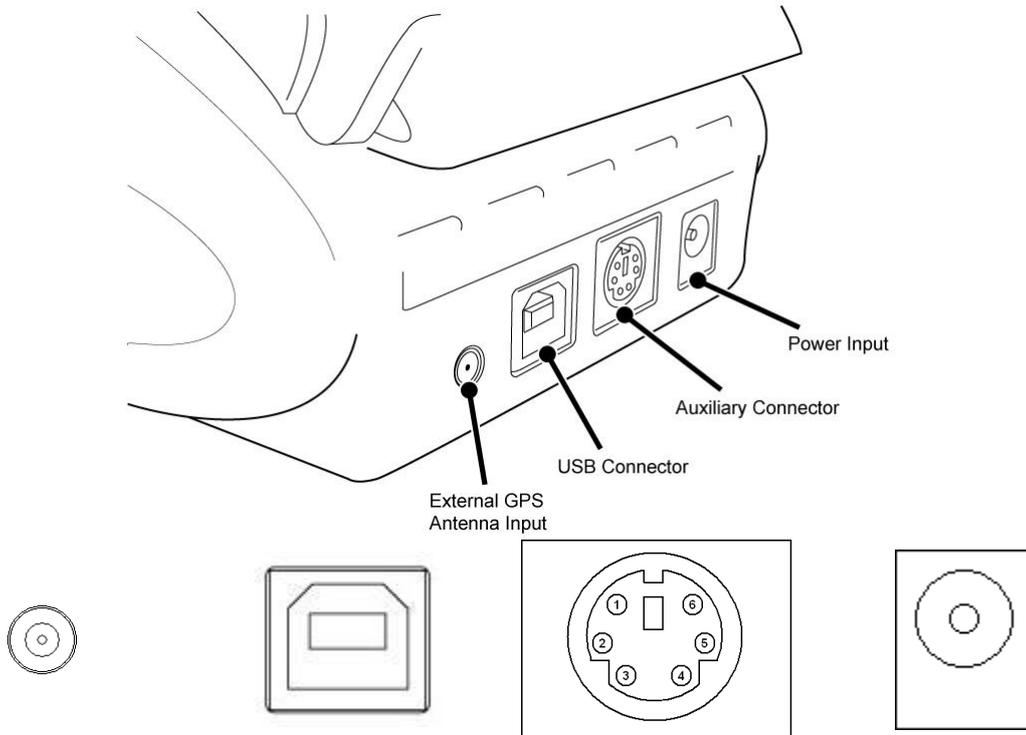
If you have any issues with doing this then do not hesitate to contact support@racelogic.co.uk for further assistance.

Specification

GPS			
Velocity		Distance	
Accuracy	0.2 Km/h	Accuracy	0.05% (<50 cm per Km)
Units	Km/h or Mph	Units	Metres / Feet
Update rate	10 Hz	Update rate	10 Hz
Maximum velocity	1000 Mph	Resolution	1 cm
Minimum velocity	0.1 Km/h	Height accuracy	10 metres 95% CEP**
Resolution	0.01 Km/h		
Absolute Positioning		Time	
Accuracy	5m 95% CEP**	Resolution	0.1 s
Update rate	10 Hz	Accuracy	0.1 s
Resolution	1 cm		
Heading		Power	
Resolution	0.01°	Input voltage range	6 – 28 V DC
Accuracy	0.2°	Current	Typically 100 mA
Acceleration		Environmental and Physical	
Accuracy	1%	Weight	225 grams
Maximum	4 G	Size	113 mm x 63 mm x 93 mm
Resolution	0.01 G	Operating temperature	-20°C to +50°C
Update rate	10 Hz	Storage temperature	-30°C to +80°C
Memory		Definitions	
Type	SD Card	** CEP = Circle of Error Probable	
Recording time	Dependent on card capacity*	95% CEP (Circle Error Probable) means that 95% of the time the position readings will fall within a circle of the stated diameter	

* Approximately 1.3Mb per hour used

Connection Data



Connector	1 GPS	Type	MCX Female
PIN	In/Out	Description	Range
Centre	-	RF Signal / Power for active antenna	-
Chassis	-	Ground	-

Connector	2 USB (Setup / Data / Upgrade)	Type	USB B
PIN	In/Out	Description	Range
1	-	-	-
2	I/O	USB-	-
3	I/O	USB+	-
4	-	Ground	-

Connector	3 AUX (Serial Comms)	Type	6-pin Mini Din (PS/2)
PIN	In/Out	Description	Range
5	I	RS232 Rx (NMEA / GPS engine)	±12v
3	O	RS232 Tx (NMEA / GPS engine)	±12v
1	-	V _{raw}	(As power supply)
2	-	Ground	0v
4	O	RS232 Tx (Telemetry / Processor / Lap-Timing Pulse)	±12v
6	I	RS232 Rx (Telemetry/Processor)	±12v
Chassis	-	Ground	0V

Connector	4 POWER (Power)	Type	2.1 x 9mm Socket
PIN	In/Out	Description	Range
Centre	-	+V Power	6V to 28V
Chassis	-	Ground	0V

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Rev	Date	Description	Author
1	06/06/2006	Initial Release	JH
2	07/06/2006	Minor amends	JT
3	31/07/2006	Auxiliary Connector pin out amendment	KB
4	22/09/2006	Addition of results text file and speed buzzer, split widths.	KB
5	28/09/2006	Correction to Lap time telemetry message format	KB
6	07/11/2006	Addition of Mini input module info	KB
7	05/06/2007	Inclusion of Declaration of Conformity Statement	CAS
8	28/06/2007	Amendment to manual in accordance with firmware V1.04 b54	KB
9	29/04/2008	Change to Lap timing screen, plus new Lap timing features.	AM
10	22/08/2008	Changed 2.5m 95%CEP to 5m 95% CEP in specification P.28	NT
11	27/06/2011	Predictive Mode and menu changes added plus minor changes.	JH
12	15/07/2011	Firmware upgrade section improved	LN