



Congratulations on your purchase and welcome to the worldwide DriftBox community.

Drifting

With your DriftBox you will be able to display and log your drifting performance. DriftBox also generates a performance related Drifting Score, which you can submit to the DriftBox website for inclusion in the worldwide DriftBox drifting league tables. See how your skills compare to other DriftBox users from around the world at **www.driftbox.com**



Band km/h	Username	Score	Angle	@Speed	Car	Date
160+	Satoshi-san	8.62	48	166 kmh	Skyline GTR	15/12/2005
125 - 159	Castle68	8.99	56	133 kmh	RX7	8/11/2005
100 -124	JSmith77	9.55	64	122 kmh	M3	24/08/2005
75 - 99	MickyBb	8.22	42	88 kmh	200sx	18/11/2005
50 - 74	BillyBurs69	9.12	51	66 kmh	350z	7/10/2005

Performance

With DriftBox it is very easy to measure acceleration times, braking distances, quarter mile times and many more. There are a number of configurable screens that show specific test results such as 0-60, 0-100, 0-100-0, ½ mile and ¼ mile etc.

DriftBox is based on the Racelogic VBOX, which is used by the majority of Car Manufacturers, Tyre Manufacturers and car magazines around the world to assess performance.

Because it is very easy to edit the test ranges, DriftBox is a very powerful tool for use in many different kinds of vehicle testing.

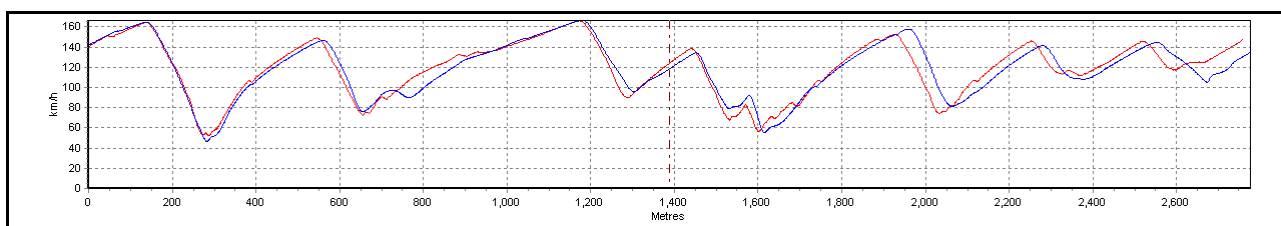


Lap timing

Displaying your Lap times as you drive around a circuit is simple with DriftBox. You can display your current, last and best Lap times, and also display split times for up to six specified split points around the lap.



Through the DriftBox website and forum you are able to download circuit overlays from around the world, compare lap times, and share lap overlay data with other users.



Speed Display

DriftBox has a display screen mode that shows a large digital speed value and compass. In open conditions, DriftBox has a velocity accuracy of 0.1km/h, which is useful for checking the accuracy of your vehicle's speedometer.

This display has a 'Point of Interest' facility, which alerts you as you approach the position of a point of interest such as a safety camera or service station. POI files can be created and edited for custom use.

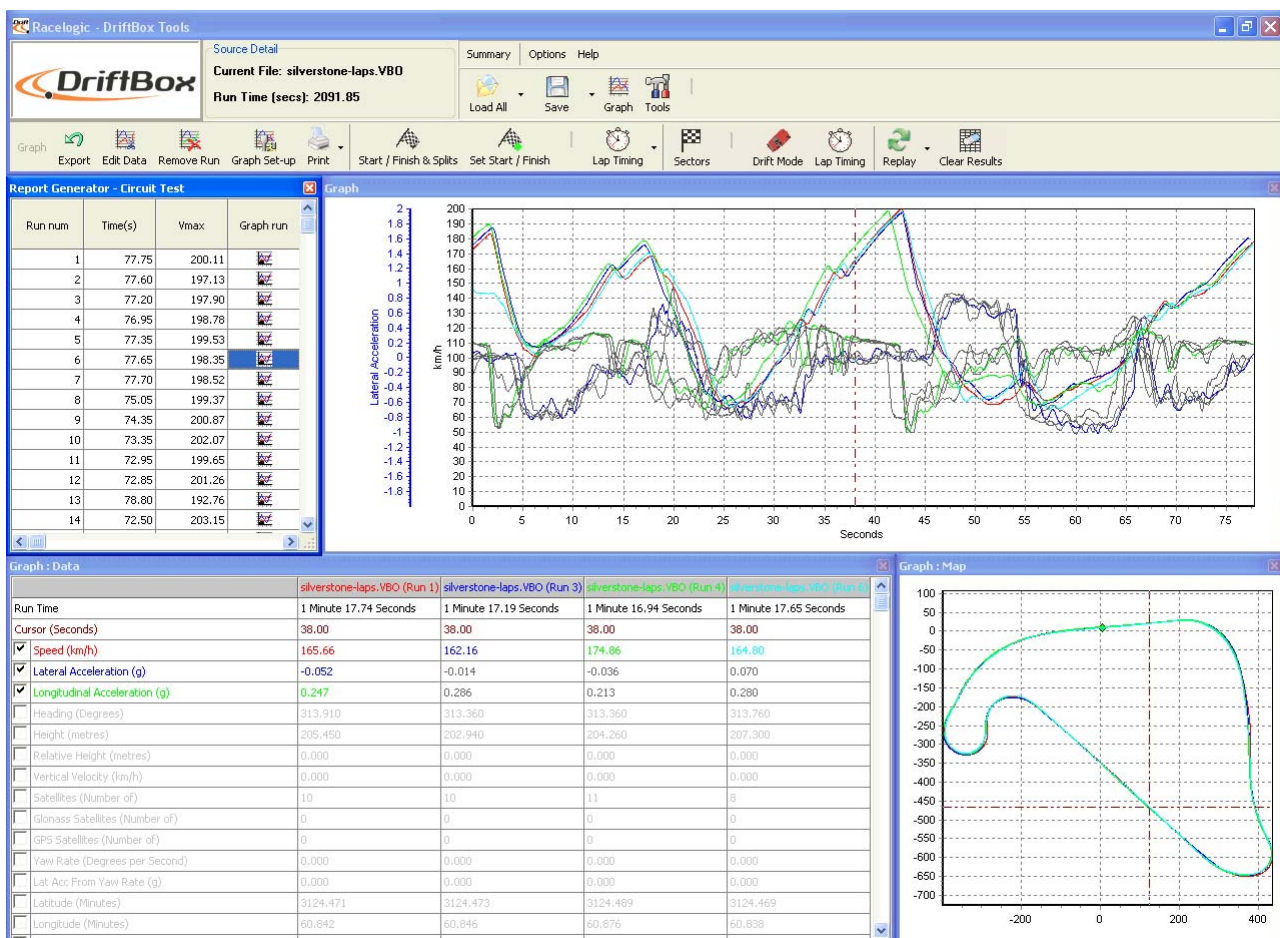
Power Calculations

DriftBox can help you to measure the power developed by your car's engine, either at the wheels or flywheel. Having set the vehicle weight, results are calculated from the measurements taken by the fast GPS engine to give you useful guidelines to the car's brake horsepower or kilowatt output. Because these calculations are made from the GPS data rather than accelerometers, your results are likely to be more consistent and accurate.

Data Logger

For drivers keen to improve their lap times and get valuable feedback on technique, DriftBox includes a sophisticated, fully functioning datalogging package. If used with a 64mb SD card, DriftBox can log up to 50 hours of continuous data, which can be analysed in great detail in the available software.

This software allows graphical analysis of acceleration, braking, cornering and lap times. You can overlay up to four files, and you get an accurate track map to compare your driving line between different laps. The software also features a graph measure tool, allowing for precise analysis of performance figures. Data-logging capabilities are further enhanced by automatically generated text data on the SD card.



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Drifting

DriftBox is the first performance meter to measure Drift Angle. A car is said to be drifting when the rear wheels have a lateral (sideways) motion in relation to the road as well as a longitudinal (fore-aft) motion. In fact, the moment a car starts to turn a corner, the rear wheels need a certain amount of side-slip to go around the corner, even if you are going very slowly.

DriftBox will measure the angle between the direction the car is pointing, and the direction the car is going.

Because the rear wheels need to slide a small amount to turn a corner, DriftBox will show a small angle (usually <5 degrees) when cornering normally, but round very tight bends this can sometimes be up to 10 degrees.



When using DriftBox, a drift is defined as anything over 5 degrees and 25kmh, but in most cases you are not really drifting unless you are showing 10 degrees or more. The very top drifters have recorded angles (using DriftBox of course!) of 65 degrees, at over 100km/h, but this requires a lot of power, sticky tyres, a modified steering rack and a large amount of skill.

NOTE: Drifting should only be carried out in a controlled environment, and under no circumstances on the public highway. Please make sure you are in a large open area, and you are wearing a suitable helmet. Drifting can be immensely rewarding when you have mastered the technique, but you run a high risk of spinning out of control every time you lose traction of the rear wheels.

Drifting techniques

There are many ways of making a car drift, here is a brief explanation of some of the more popular methods. Techniques vary depending on whether your car is Front engine Rear wheel drive (FR) or Front engine Front wheel drive (FF).

Hand Brake (FR & FF)

This is the simplest way of breaking traction on the rear wheels. Pulling on the handbrake will lock up the rear wheels, and this will cause the amount of grip at the rear end to drop very suddenly and the car will slide from the rear. The downside is the car will slow down during application of the handbrake. This technique is normally used to initiate the drift, but you cannot use this for sustained drifting.

Power Oversteer (FR)

In a powerful car, flooring the throttle whilst turning the steering will cause the rear wheels to start spinning, which will reduce the amount of grip at the rear end, causing the tail to try and overtake the front of the car. Applying opposite lock on the steering, and then modulating the throttle to keep the rear wheels spinning is the method of controlling this situation. However, the more the wheels spin, the less grip they give, so if you apply too much throttle, the car will spin out, and if you use too little, the car will stop sliding. Get the balance right, and you've cracked it!

Feint or Scandinavian Flick (FR & FF)

In a high speed corner, you can usually make the rear end start to slide by turning one way under power, lifting off, and then quickly turn the other way, so you are making a 'feint' the opposite way before you go round the corner. There is a weight transfer to the front of the car making it grip, whilst the rear becomes unloaded and should start to slide.

Clutch kick or Diff-lock (FR)

To perform a clutch kick, the throttle is floored and then the clutch is very briefly disengaged (the 'kick'). This causes the engine revs to rise suddenly and then immediately transfer the extra momentum of the engine/flywheel to the rear wheels, thereby promoting wheel spin. If you are going round a bend when you use this technique, the car should start to slide immediately.

Be prepared to wind on opposite lock very quickly, and come off the throttle because there is a very quick transition from gripping to sliding using this method. Ideally the throttle should then be re-applied to keep the car sliding.

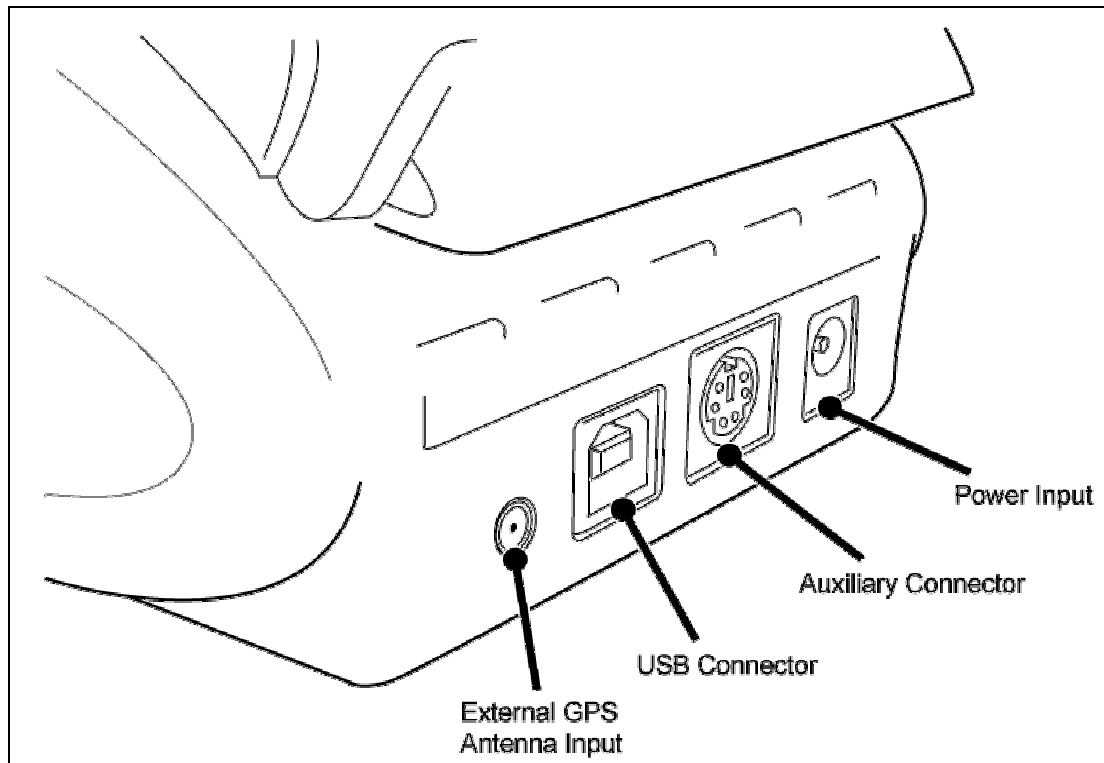
Trail Braking

This involves keeping the brakes on as you turn into a fast corner, this works best on a downhill corner as less speed is lost.

There are many ways to drift a car, and we have only covered the basics. For more detailed information please use resources such as www.drifting.com, www.dailydrifter.com, www.driftworks.co.uk, www.drift411.com and www.driftbox.com.

Quick Start Guide

Connections

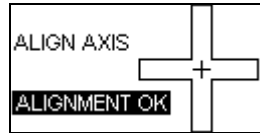


Mounting DriftBox in your car

1. Connect the cigar lighter adaptor power cable to the power socket on the back of your DriftBox.
2. Slide DriftBox into the windscreen mounting bracket.
3. Using the suction cups of the windscreen mounting bracket, fix the DriftBox assembly to a suitable place low down in the centre of your windscreen.
4. DriftBox has an internal GPS antenna, so try to mount DriftBox where it will have the largest possible view of the sky.
5. Park your vehicle outside in an open area away from obstacles such as tall buildings and trees.
6. Insert the DriftBox power cable into the vehicle cigar lighter socket. If power is not permanently available at this socket, turn on the ignition to ensure power at the socket.
7. The first time DriftBox is used it will need to be left for 10-15 minutes to acquire fully the latest satellite constellation information.
8. After this initial period, DriftBox will then only take 1-2 minutes to lock onto satellites when you use it next time.
9. Wait for the satellite image to disappear which means lock has been obtained.
10. Before using DriftBox for measuring Drift performance you will need to align the internal motion sensors.

Aligning Your DriftBox

1. Park your 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 appears :



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', then tighten up the mounting screws. If the unit needs aligning left to right, release the suction cups and rotate the DriftBox.
8. Confirm the screen still says 'Alignment OK' then press **OK**. For a more detailed instruction regarding the alignment procedure see the 'Setup Menu' section of this manual.
9. Now press the **MENU** button to exit the menus screen and return to the Drift Mode screen.

Your DriftBox is now ready to show your Drift Angle. Note that this alignment is only needed when using the Drift Mode.

Registering your DriftBox and activating all available functions.

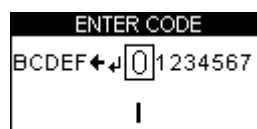
To get full DriftBox functionality including data logging, lap timing and performance mode, you need to register your DriftBox at the DriftBox website.

Registering Your DriftBox

Log onto the DriftBox website www.driftbox.com then go into Product Registration where you will be asked to input information including the serial number of the unit. The serial number is displayed when you first switch on, or alternatively you can note it from the underside of the DriftBox hardware itself. Once you have entered your details you will be given an activation code.

Activating Your DriftBox additional functions

1. Switch on DriftBox
2. Press **MENU** and select 'SETUP'
3. Select 'UPGRADE'



4. Use ▼▲ to move the alphanumerical list across the screen and then press **OK** to enter each character of your activation code. The centre character on the screen becomes larger and surrounded by a box to indicate that it is ready for selection.
5. Highlight and click on the symbol ◀ if you need to delete a character.



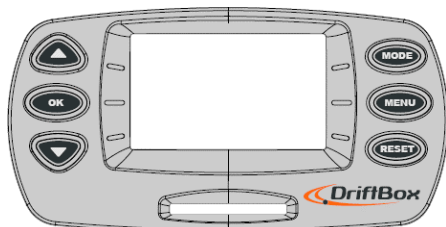
6. Then when you have entered all the characters of the activation code highlight the symbol ◀ and press **OK** to enter the activation code.
7. A confirmation screen will display 'Code OK' and then the screen will go back to SETUP MENU.
8. Now disconnect and then reconnect the power to DriftBox.







The full functionality of your DriftBox will now be available.

Using DriftBox

Your DriftBox can be used in a variety of modes, as described in this section.

DriftBox Keypad



	Used to show next screen, or to navigate menu.		Changes Mode.
	Select the menu item that is highlighted on the screen and used to show Score Code.		Accesses the relevant menu, or will exit from current menu.
	Used to show previous screen, or to navigate menu.		Resets totals, averages and peaks if held for 1.5s. Hold for 5s for global Reset.

Changing Modes

Press the **MODE** button to swap between the 5 display modes



DRIFT MODE



PERFORMANCE



LAP TIMING



SPEED



POWER

Changing the Units of Measurement

- Press the **MENU** button from any of the Display Modes.
- Highlight UNITS and press **OK**.
- Highlight SPEED and press **OK**.
- Highlight KMH or MPH and then press **OK** to tick that selection.
- Highlight EXIT and press **OK**.

To change the Distance units from metres to feet, follow the same procedure but highlight DISTANCE and press **OK**.

Satellite Reception

DriftBox calculates all of its logged data from the information it receives from GPS satellites and relies on being able to get a good lock to produce this data. So it is imperative that DriftBox (or optional external antenna) is placed in the best possible position for a clear view of the sky.

The location that you drive in can also affect data quality, if you drive in a very built up area or an area with overhanging trees then the signal quality can degrade. If the satellite reception does drop out in use, you will see the following screen and hear three quick beeps.



Searching for satellites at power up

Whilst the DriftBox is acquiring satellites it will flash the image of a satellite, the location of the flashing image depends on the screen you are in.



Drift Mode



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

On a fully activated DriftBox an SD card can be inserted to log your scores and data from your runs that can then be downloaded and viewed on your computer and in the DriftBox Tools 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.

Practice

Without Sectors enabled, the DriftBox measures a single run at a time, where a run is defined as anything larger than 5° of drift and a speed greater than 25Km/h. The run finishes when you go below these thresholds. You can then see Peak Drift angle, speed at which that drift angle occurred, the peak Lateral G during the run and the overall Score which is based on Lateral G and Drift Angle.

Sectors

When Sector Mode is selected, a run starts at one virtual gate and finishes at another, see the 'Sectors' section later on for more details.

Selecting Sector Mode


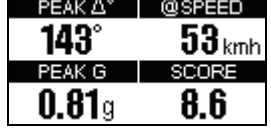
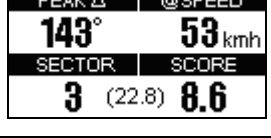

To set DriftBox to Sector mode

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

DRIFT MENU	
UNITS	
✓ SECTORS	
SET SECTORS	
LOAD SECTORS	

Drift Mode Display Screens

DriftBox has three 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 1.5s 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 DriftBox 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 DriftBox for the run, and the cumulative score in brackets.</p>
	<p>SPIN! is displayed if the drift is greater than 100 degrees, or the drift is greater than 45 degrees with the speed < 10 km/h.</p>

Resetting the screens

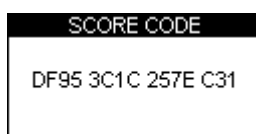
In any of the Drift mode screens, the Peak, Average, Score and Speeds can be reset by pressing the **RESET** button for 1.5 s.

Score Codes

Scores are generated by DriftBox based on the performance of a drift, you can enter the DriftBox league with your own scores, but you will need the validation code to verify your score. You can enter this validation code onto the website under My DriftBox → My high score.

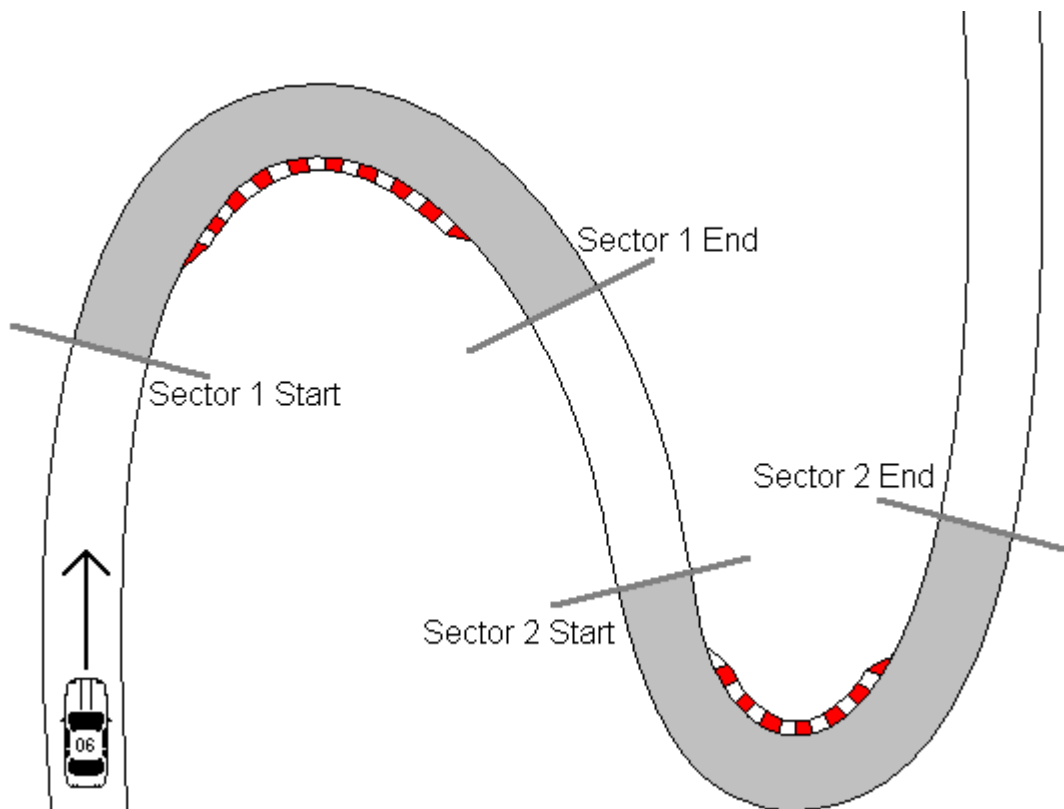
Viewing the Score Code

Validation codes are automatically saved to a file on the SD card called 'Scores.txt', but you can also press the **OK** button to display a score code on the screen of DriftBox.



Sectors

A sector is made up of two virtual gates. If you have enabled Sectors Mode, the measurement process starts at the first gate, and ends at the second. You can have up to 6 sectors defined, and you will be awarded a score for each sector along with a cumulative score. You do not have to have all 6 sectors defined, you can use just one if required. Note that to score in a sector you have to be drifting continuously, if you straighten up at some point, your score is zero'd at that point.



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

Creating Sectors

- Press the **MENU** button to enter the Drift menu.
- Highlight the option 'SET SECTORS' and press **OK**.
- Drive the towards the start of the first sector and press **OK**.
- Carry on driving to the end of the first sector and then press **OK**.
- The screen will now highlight 'Start2' and you can continue to set up to six sectors in the same manner. If you want to skip over any sectors, press **RESET**
- When you have completed the setting of your sectors press the **MENU** button to return to the Drift screen.

Loading and Saving Sectors

After creating sector information in your DriftBox you can then save this information to a sector file on the SD card. This allows the sector information to be copied onto your computer and used in the DriftBox software when you analyse your logged data.

Saving a sector file

- Press the **MENU** button to enter the Drift Menu
- Highlight the 'Save Sectors' option and press **OK**



Loading a sector file

- Press the **MENU** button to enter the Drift menu
- Highlight the 'Load Sectors' option and press **OK**



Performance Mode






The Performance mode is used to measure the acceleration and braking performance of your vehicle. Press the **MODE** button to scroll to the Performance Mode screen. This mode is divided into six 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, e.g. 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><tr><td>ACCEL</td><td>0-60</td><td>6.1s</td></tr><tr><td rowspan="3">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 in the left half and in 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><tr><td>ACCEL₂</td><td>30-50</td><td>6.1s</td></tr><tr><td rowspan="3">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>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><tr><td>BEST</td><td>0-60</td><td>6.1s</td></tr><tr><td rowspan="2">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>BEST</td><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	BEST	50-70	10.2s	<p>This screen shows the best results of the two test ranges from each of the acceleration screens.</p>
BEST	0-60	6.1s										
0-100-0 6.1s	0-100	10.2s										
	30-50	6.1s										
BEST	50-70	10.2s										
<table><tr><td>DECEL</td><td>100-0</td><td>2.4s</td></tr><tr><td rowspan="3">100.1 kmh</td><td></td><td>37.4m</td></tr><tr><td>60-0</td><td>1.9s</td></tr><tr><td></td><td>28.3m</td></tr></table>	DECEL	100-0	2.4s	100.1 kmh		37.4m	60-0	1.9s		28.3m	<p>This screen shows the time and distance of two user adjustable deceleration ranges. These test ranges can be configured in the setup menu.</p>	
DECEL	100-0	2.4s										
100.1 kmh		37.4m										
	60-0	1.9s										
		28.3m										
<table><tr><td>DECEL₂</td><td>60-0</td><td>2.4s</td></tr><tr><td rowspan="3">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 ₂	60-0	2.4s	100.1 kmh		37.4m	Avg	0.91G	PK	0.98G	<p>This screen shows the same information as the previous Deceleration screen, but for a different user-defined speed range.</p>	
DECEL ₂	60-0	2.4s										
100.1 kmh		37.4m										
	Avg	0.91G										
	PK	0.98G										
<table><tr><td>DISTANCE</td><td>100m</td><td>14.5s</td></tr><tr><td rowspan="3">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 preset distances, i.e. 0-100m. If the units are changed to feet then the two test ranges are 1/8 and 1/4mile.</p>	
DISTANCE	100m	14.5s										
384.2 m	@ 98.2 kmh											
	200m	18.2s										
	@120.3 kmh											
<table><tr><td>DISTANCE₂</td><td>400m</td><td>14.5s</td></tr><tr><td rowspan="3">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, i.e. 0-400m. 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											

	This screen shows the current acceleration and peak acceleration achieved by DriftBox. 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.
	This screen shows the current deceleration and peak deceleration achieved by DriftBox. 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.
	This screen shows the current lateral acceleration and peak lateral acceleration achieved by the DriftBox. 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.

Measuring the 0-60 time of your vehicle

1. Install DriftBox into your vehicle as described in the 'Quick Start Guide' 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 your live velocity unless you are in an area of poor satellite reception in which case it flashes an image of a satellite.
5. Now perform your 0-60 acceleration run. As your vehicle goes over 60 mph the time will instantly show in the 0-60 section of the window.
6. If you come to a stop you will see that this time remains on view. 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, as you pull away the screen will reset and show your new values as you cross 60 mph.
8. After doing a number of runs you can view your best 0-60 time 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 you have your SD card inserted then your run data will be stored.

Editing a Performance mode Test Range

You can configure the two speed ranges of the Accel2 and Decel screen to your own custom tests.

If you wish to change the speed 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 'Performance Menu' and press **OK**

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

Example: Editing ACCEL RANGE 1

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

1 Foot Rollout

The DriftBox normally takes the start of a performance run at the point at which the vehicle moves, but at drag strips the vehicle starts 1 foot behind the timing start line. You can make the DriftBox start **all timing runs** from 1 foot by enabling this feature.

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

Results Files

If an SD card has been inserted, DriftBox will create two results files on the card. The first file, 'results.txt' gives the results for every performance test made using DriftBox. The second file, 'best.txt', displays only the best results achieved for each type of test. 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

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 DriftBox must be power-cycled.

SPEED BUZZER
✓ENABLED
SPEED 100
EXIT

Lap Timing Mode



The DriftBox can measure your lap time by storing the position of a virtual gate and using this to trigger the start and end of a lap.

- **Start/Finish Line:** Defines the point at which one lap ends and another starts. It also defines the start of 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 sprint or slalom (point-to-point) tests, to mark a finish point that is in a different location to the start point.

Measuring Lap times

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

LAPTIMING	LAST 1'25.6"
1'24.3"	BEST 1'23.3"
	SPL1 23.2"
	@ 98.2 mph

Big Speed @ Split display

There is a choice of what is displayed on the Lap Timing screen, either your current lap time, or the exit speed of the last split:

LAPTIMING	LAST 19'59.5"
19'59.9"	BEST 19'59.5"
	SPL1 19'59.5"
	@ 98.2 mph

LAPTIMING	LAST 19'59.5"
98.2 mph	BEST 19'59.5"
	SPL1 19'59.5"
	@ 98.2 mph

Displaying this exit speed is very easy way to help you improve your speed out of a particular corner. To change between these two displays, press the **MENU** button and change the 'BIG SPEED @ SPLIT' option.

LAPTIMING MENU
UNITS
SET START & SPLITS
CLEAR ALL
LOAD SPLITS
SAVE SPLITS
ONE SHOT MODE
SPLIT TO SPLIT TIME
√ BIG SPEED @ SPLIT

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 the LAPTIMING MENU.

Split Widths

When setting a start / finish or split line, DriftBox 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 DriftBox 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

LAPTIMING MENU
ONE SHOT MODE
SPLIT TO SPLIT TIME
BIG SPEED @SPLIT
SPLIT WIDTHS
SPLIT OUTPUT
LAPTIME PULSE
<input checked="" type="checkbox"/> LAPTIME TELEMETRY
SETUP

The Laptime Telemetry option makes DriftBox 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.

\$\$l|ttnnnlluuusscc

- ll: length of message
- tt: message type (type 10 - LapTime)
- nnn: serial number
- s: number of sats currently in view
- ll: laptime(seconds) * 100000
- uu: UTC time(seconds) * 100
- ss: speed at this point*100 (kph or mph, depending on the units selected)
- cc: checksum

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.

Start / finish and split lines

Before DriftBox can measure and display times, you will need to either load previously recorded start / finish lines or create new ones in your DriftBox.

Setting start / finish lines

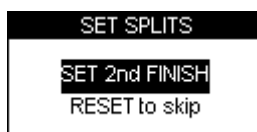
- Press the **MENU** button to display the Lap Timing Menu.
- Highlight 'SET START & SPLITS' and press **OK**



- As you drive across the start / finish line press **OK**
- This will set the start / finish line and the screen will now show the SET SPLIT1 screen.



- To set the first Split, press **OK** when you pass this point or press **RESET** to skip.
- If you wish just to place a separate Finish line, press the '**RESET**' button to skip all the split points and scroll to the SET 2nd FINISH screen.



- Press **OK** to set a separate finish line as you drive over it.

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 DriftBox at a later stage, or used in the DriftBox Tools software. The file created on the SD card is an '.dsf' file.

To Save the lines you have created:

- Ensure the SD card is inserted.

- Press the **MENU** button to enter the Lap timing menu.
- Highlight the SAVE SPLITS option and press **OK**

Loading start / finish and split Lines

You can load the split line information from a previously stored file on the SD card into your DriftBox. This facility allows you to keep a library of split lines files on your computer from each circuit you have driven around.

To Load a split line file:

- Press the **MENU** button to enter the Lap timing menu.
- Highlight the 'LOAD SPLITS' option and press **OK**

Note: only a split file with the correct name can be loaded. When you use DriftBox to save a split file it is called DBOX.dsf and it is only this filename that DriftBox recognises and will load. If you have several split files stored on your computer you will need to rename the one you wish to use to the default filename, prior to transferring it to the SD card.

Clearing start / finish and split Lines

This option will erase the split line information from the DriftBox memory, not from the SD card.

- Press the **MENU** button to enter the Lap timing menu.
- Highlight the 'CLEAR ALL' option and press **OK**

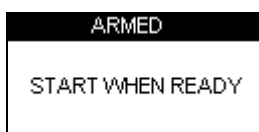
One Shot Mode

By default, DriftBox starts the lap time from a start / finish line. If you want to start the lap time from the moment you start moving, then you need to select 'One Shot Mode'. To set this mode:

- Press the **MENU** button to enter the LAP TIMING menu.
- Highlight 'ONE SHOT MODE' and press **OK** to activate.
- Bring the car to a halt at the start point.
- After two seconds the following screen will appear:



- The screen will count down from 5 to 1 after it reaches 1 the following screen will appear:



- When this screen shows you can then start your lap. Timing of your lap will start as soon as you pull away and will then stop as you cross the start / finish line at the end of your flying lap.

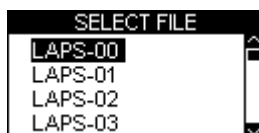
Recording and Reviewing Lap and Split Times

To record your run data and lap and split times, simply insert a SD card into DriftBox, the run data will be recorded in a '.dbn' file on the SD card and the Lap Time information will be recorded in a text file e.g. 'Laps-01'.txt'

Using DriftBox to review lap times

To review a 'Laps-xx.txt' file with lap and split time data:

- Enter Lap Timing Mode and then press the **OK** button.
- DriftBox will then display any Lap Timing files stored on the card:



- Press the ▲ ▼ buttons to scroll to the required file, then press the **OK** button to select it. The file will then be displayed in DriftBox:

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"

In each file, the best lap is indicated with an asterisk. To change the lap for which split times are displayed, use the ▲ ▼ buttons to scroll between the laps; the split times will update automatically. Pressing the **OK** button in this screen will return you to the Lap Timing Mode's main screen.

Using a computer to review lap times

Any of the 'Laps-xx.txt' files can be opened using a text editor program such as notepad. The files have the following example 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"

Speed Display Mode



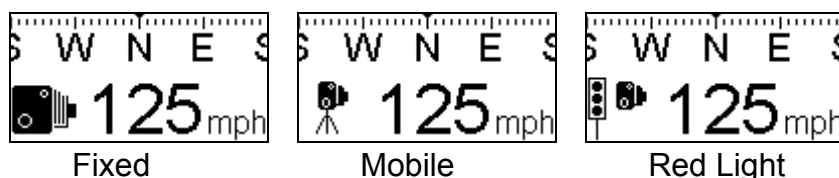
The Speed Display Mode consists of one screen with a compass and current speed in a large font, and will also give on-screen and audible notification of Points of Interest.

Points of Interest (POI)

In the Speed Display Mode, there is a 'Points of Interest' (POI) facility that can be used to indicate when the vehicle is near to a pre-determined geographical position. This option is active whenever the inserted SD card contains a valid.ov2 POI file. A common use of POI files is to store the location of safety cameras, but custom POI files can also be created to give locations of any other points that might be useful for testing purposes.

DriftBox will beep and display an icon on-screen whenever the vehicle moves within 250 meters of a POI, unless the vehicle is moving away from the POI. DriftBox can display different icons for different locations, even within the same POI file, according to the settings within the file.

The Points of Interest feature will only function if the relevant POI files are present on the SD card. These files can be downloaded from various websites such as www.poihandler.com. The only file format recognised by DriftBox is the .ov2 type.



Warning:

If DriftBox is being used as a Safety Camera detector, note that this option is designed to make you aware of potentially dangerous areas where they may be in force. We do not guarantee that all of these areas are listed in any file you download. We accept NO liability whatsoever in the event that you receive a speeding fine through not being warned by this option on DriftBox. Nor do we guarantee the accuracy of the data either expressed or implied.

Power Mode



Your car's power output can be measured using the Power Mode. There are two parts to this process: the acceleration run, which gives you the power at the wheels minus the losses caused by tyre and air resistance. The second part of the test measures these losses and also estimates gearbox losses. The Power Mode is also an additional tool for car tuning, where access to a chassis dynamometer is not possible.

Note that this is an estimation of power, and as such when carried out correctly will probably be within 5% of the true figure. It is very important that the test is carried out on a completely flat road and the correct procedure is followed very carefully.

Power Testing

Please note that due to the nature of this test and the amount of space required, it is strongly recommended that such measurements are conducted on private roads.

Setting the Vehicle Weight

In order for accurate measurements to be made, the vehicle weight must first be entered via the Power Menu:

POWER MENU
UNITS
SET WEIGHT
SETUP
EXIT

The weight you enter must be as accurate as possible - for best results have the car weighed prior to carrying out any tests as even a small inaccuracy will not give correct power figures, a 10% error in weight will give a 10% error in power. Use the ▲ ▼ buttons to increase or decrease the weight value. Altering the units from the menu will change the weight values from lbs to kg, and the power values from bhp to kw.

ENTER VALUE
2420 lbs

Power and losses runs should be carried out on level ground and always in the same direction, and it is recommended that power runs are conducted with the car in second gear.

Power Runs

Once the vehicle weight has been set, a simple power run can be carried out to give engine output at the wheels. Put the car into second gear at a low RPM, 2000 RPM or less.

POWER	
20 MPH	PRESS OK TO PRIME POWER RUN

Press **OK**, the next screen indicates that DriftBox is ready to record the run:

POWER	
20 MPH	POWER RUN BEGINS ON ACCEL

Once the car begins to accelerate, the power is being recorded:

POWER	
25 MPH	RECORDING POWER RUN ENDS ON DECEL

Accelerate to the top of the engine's rev range, disengage the clutch and coast for a few seconds. DriftBox will record the amount of power as soon as it recognises deceleration:

POWER	
75 MPH	203 BHP WHEELS

Calculating Losses

So as to estimate power output figures at the flywheel, you will need to configure the amount of loss generated by tyre and air resistance. To do this requires a 'coast-down' test. It is recommended that this is carried out in third gear.

With the weight correctly entered, switch from the Power Run screen to the Losses Run screen using the ▲ ▼ buttons. The screen will display a similar initial instruction to the Power Run:

POWER	
20 MPH	PRESS OK TO PRIME LOSSES RUN

Begin to accelerate, and press **OK**. Continue to accelerate to the top of the engine rev range.

POWER	LOSSES RUN
75 MPH	BEGINS ON DECEL

At the top of the rev range, disengage the clutch and put the gearbox into neutral. Once deceleration has begun the screen will display the recording information:

POWER	RECORDING
95 MPH	LOSSES RUN ENDS ON ACCEL

Let the vehicle coast down to a speed a long way below the speed at which maximum power is likely to occur, then accelerate briefly to finish the run:

POWER	LOSSES RECORDED
25 MPH	OK - SAVE RESET - EXIT

Press **OK** to save the losses; pressing **RESET** will cancel the recorded losses so that you can start the process again. Losses are permanently saved, but you should generally carry this out on the same piece of road in the same direction as your acceleration runs. Note any small gradient can have a large affect on the measurement.

If you have not carried out any power tests at this point then accessing the Power Run screen will simply display the priming instructions. If you have already carried out power runs the results will now be displayed as output from the flywheel rather than the wheels. Any further power runs will display the results at the flywheel, until the **RESET** button is pressed when in the Losses Run screen.

POWER	235 BHP FLYWHEEL
75 MPH	

Pressing the **RESET** button when in the Power Run screen will clear the result in order for a new run to commence.

Data Logging

Providing that you have registered your DriftBox (see Quick Start Guide) then it will be capable of logging data to an SD card.

Using the SD card

Files logged by DriftBox are named 'DBOX_001.dbn', where 001 increments when a new file is created. A new file is created every time DriftBox is powered up, or when the card is re-inserted. If you wish to log data to the SD card then simply insert the card into the slot in the front of DriftBox. DriftBox will log vehicle position, speed and acceleration into a binary '.dbn' file which can be opened in DriftBoxTools software for analysis. This data is logged when velocity is above 0.5Km/h.

Because DriftBox is writing to the SD card whenever you are moving, ***only ever remove the SD card when you are stationary***, otherwise you will risk losing data or corrupting the card (which would require a re-format).

To read data from the card either insert the card into a SD card reader connected to your computer or connect your computer directly to DriftBox via the supplied USB cable to read the data from the card. DriftBox must not be writing to the card when you connect to your PC, so you must be stationary. To ensure Windows recognises a DriftBox, ***power up your DriftBox before connecting the USB cable to your PC***.

File types

Below is a list of the file suffix's and definitions that are used by DriftBox and DriftBoxTools Software:

Type	Definition
*.dbn	Binary format file containing logged Position, Speed, Acceleration data
*.txt	Drift Scores and Lap times are stored in text format
*.dsf	Split files containing Start/finish and Split line locations
*.sct	DriftBox sector position information
*.cir	Circuit overlay file for track mapping
*.dat	Binary Points of Interest file

Connecting the DriftBox to external devices

Drift Data output

The DriftBox transmits live data on its serial port at the rear of the DriftBox when it is in Drift Mode. Any other devices with a serial input, such as a video overlay unit, can use this data. A serial output cable will be required, please see the DriftBox website or contact your local supplier for details.

In Drift Mode, the RS232 serial port outputs the following message at 57600bps at 10Hz intervals:

\$DBOX,sss.s,±gg.g,±ll.l,±ddd.d,pp.p<CR><LF>

sss.s	= speed in kmh
±gg.g	= g-force in g (lateral)
±ll.l	= g-force in g (longitudinal)
±ddd.d	= drift angle
pp.p	= points

NMEA data output

When DriftBox diagnostic mode is active the DriftBox serial port outputs NMEA standard format GPS information. This makes it directly compatible for use as GPS input to mapping software programs for navigation use, such as Microsoft's Streets and Trips, Route 66 or similar software.

Setup Menu

There is a single Setup Menu that is accessible in all of the DriftBox's modes.

To access the Setup Menu, press the MENU button in any mode and select the 'SETUP' option and press OK

The Setup Menu contains the following options:

SETUP MENU
ALIGNMENT
CONTRAST
BRIGHTNESS
DIAGNOSTICS
COLDSTART
SPEED BUZZER
UPGRADE
EXIT

Alignment

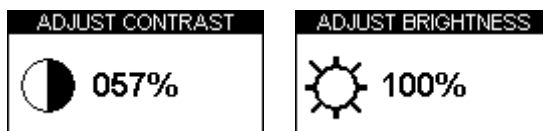
The alignment option allows you to perform a physical alignment of the internal motion sensors. It is important that you align DriftBox correctly whenever it is moved to a new position in your car or even to another car. To do this, park the vehicle on level ground and turn the engine off and select 'ALIGNMENT' from the SETUP MENU. Reposition DriftBox so that the two cursors form a small cross at the centre of the larger cross.



The two cursors do not have to line up perfectly, just make sure 'ALIGNMENT OK' appears.

Contrast & Brightness

Use these to adjust the Brightness & Contrast of the screen, **OK** to return.



Diagnostic Screens

DriftBox has two different diagnostic screens, use ▲ ▼ to swap between the two.

GPS Diagnostic Screen

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

This screen allows you to view the following basic GPS information:

- Number of satellites being used by DriftBox.
- Signal strength of each satellite.
- Satellite time (UTC)
- Latitude.
- Longitude.
- Height (with respect to sea-level at Greenwich).

Note: In this screen data is logged to the SD card at 1Hz not 10Hz

Yaw-rate Sensor Diagnostic Screen

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

This screen displays the following information relating to the internal YAW sensor

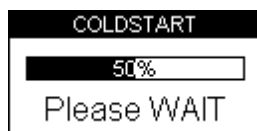
- YAW rate in degrees per second.
- Angle (calculated from Yaw Rate)
- Temperature of the YAW rate sensor

Cold Start

A cold start completely re-initialises the GPS engine and after performing a Cold Start the vehicle to which DriftBox is connected should be left in an open area for at least 15 minutes, to re-acquire. You should only need to do a cold start when you first receive your DriftBox, or you are experiencing poor satellite reception in an open area.

Performing a Coldstart

- Press the **MENU** button from any Display mode.
- Highlight the Setup option and press **OK**
- Select COLDSTART
- The following screen appears and a coldstart is performed



When it is finished DriftBox will automatically go back to the Setup Menu.

Speed Buzzer

The speed buzzer is generally for use whilst in Performance Mode, during 0-100-0 style tests. The speed is configurable from this menu option – see the Speed Buzzer section under Performance Mode.

Upgrading the DriftBox firmware

It may be necessary in the future for you to perform an upgrade to the firmware inside your DriftBox to add new features. Connect your DriftBox to the computer onto which you have installed the DriftBox software.

- Download the upgrade file from the website and save it to your computer.
- Press and hold the **MODE** button whilst you connect power to your DriftBox.
- This will force the DriftBox into Upgrade mode.
- Connect the USB lead from DriftBox to your computer.
- Double click on the upgrade file, this will auto run the upgrader software.
- If this doesn't happen automatically, run the 'Upgrader.exe' software, which should have been installed when the installation CD was used, and load in the relevant file.
- If you want to read your SD card through USB directly after this upgrade you will need to disconnect then reconnect power.

Troubleshooting

My DriftBox does not pick up or lock onto satellites

Some modern cars are fitted with a special windscreen that cuts down the amount of UV (Ultra Violet) rays that will be transferred through the windscreen which help cut down on glare. These windscreens are called Athermic, or UV Coated and will dampen/reduce GPS signals coming through the windscreen, so if you have an Athermic windscreen, it means you will not receive the same quality of signal as you would do by taking the DriftBox outside of the car.

How do I know if I have an Athermic Windscreen ?

You can either contact the manufacturer of your vehicle, or talk to the main authorised dealer who may be able to tell you. If you cannot receive a firm yes or no, then another way to check is to power up the DriftBox and hold it outside of the vehicle, receive a satellite fix and use the GPS diagnostic screen to see how many satellites you can see. Once you have noted this down, move the GPS inside the car and see if the GPS signal drops by 2-4 sats. If it does immediately then you probably have an Athermic windscreen.

There is list of cars in the table below that we believe have had Athermic windscreens fitted throughout part of their history. Please note that manufacturers don't always use the same windscreens through the life of a car model, so even though a model may be listed below, it does not necessarily mean that the current model that you have may have an Athermic windscreen. If you are unsure, try the above test or talk to your car manufacturer/dealership.

BMW 3 Series	Ford Mondeo	Renault Laguna
BMW 5 Series	Fiat Multipla	Renault Clio
BMW 7 Series	Mercedes W220-S Class	Renault Master
BMW X5	Mercedes Vaneo	Renault Kangoo
Citreon Picasso	Peugeot 206	Renault Scenic
Citreon C5	Peugeot 306	Renault Espace
Citreon Xsara	Peugeot 307	Renault Megane
Citreon Xantia	Peugeot 607	Renault Safrane
Ford Galaxy	Renault Traffic	Vauxhall Zafira

If your car does have this type of windscreen you will need to use an external GPS antenna that magnetically fixes to the roof of your car. An external antenna is available, see the website for details.

If you still have reception problems:

- Obstructions to the open sky will reduce GPS performance. Try to ensure placement of DriftBox is away from the windscreen edges so it has the widest view of the skies possible. With an external antenna place it away from roof bars and at least 10 cm way from any other roof mounted items.
- Driving in built up areas and close to tall trees reduces satellite reception.
- DriftBox may require a Coldstart, see the DriftBox setup section of this manual for more information.

DriftBox displays an drift angle when the vehicle is not drifting

- Values of Drift up to 10° can be expected on a normal corner without drifting.

DriftBox displays an angle > 10° when the vehicle is not drifting

- Check the 'Alignment' of the DriftBox; see the alignment section of Setup Menu in this manual for further information.
- If the road has a severe camber / gradient this will slightly affect the Drift angle calculation.
- If you are in an area of poor reception quality then this will affect the Drift angle calculation.

The Drift angle reading appears too big or too small

- Check the 'Alignment' of DriftBox; see the alignment section of Setup Menu in this manual for further information.
- If the road has a severe camber or gradient this will affect the Drift angle calculation.
- If you are in an area of poor reception quality then this will affect the Drift angle calculation.
- If the Drift angle is consistently incorrect in good conditions then the YAW sensor may need to be zero'd, but this is very unusual.

To check whether you need to zero the YAW sensor:

Use the Yaw sensor diagnostic screen and sit DriftBox very still on a flat surface. The angle reading will change slowly over time. If the angle changes every three seconds or less, go to the Diagnostic screen press and hold the **RESET** button for two seconds then follow the on-screen instructions. The process will take thirty seconds, during which the unit must be kept very still. If the sensor is subjected to a sudden movement, the procedure will be cancelled.

Note: If you wish to cancel the procedure, press any key other than **OK** to return to the diagnostic screen.

No data files are appearing on the SD card

Make sure the SD card is not full. If your DriftBox does not beep twice when you insert the card, then you may have to re-format the card, you should use the utility in DriftBox Tools.

DriftBoxTools Software

The DriftBoxTools software allows you to view the driving data recorded by DriftBox in a '.dbn' file. The software also allows you to display Lap times and Drift results.

Installation

Each DriftBox is supplied with a CD containing the DriftBoxTools software. Insert the CD into your computer, the installation should then auto run. The Installation will place a shortcut onto your desktop for the main analysis software, and also install USB drivers for upgrading your DriftBox.

Overview

Graph Screen

The DriftBoxTools Graph Screen allows DriftBox files to be viewed and compared in three main display windows: a main graph window, a data table window and a map window. In the graph window different channels can be plotted, either against time or against distance. There is a facility to extract minimum, maximum, average and delta values between points in the viewed data. Up to four '.dbn' files can be overlaid on the graph.

The map window shows the path of the vehicle, calculated from the latitude and longitude data. A circuit overlay can be applied to the map window, allowing you to see the position of the vehicle in relation to the edges of the track

The Data window shows a table of the data of following the available channels:

- | | |
|-----------------------------|------------------|
| • No. of SATs | • Height |
| • Time | • Yaw Rate |
| • Velocity | • Distance |
| • Lateral Acceleration | • Slip Angle |
| • Longitudinal Acceleration | • Radius of Turn |
| • Heading | • UTC Time |

There are a number of other channels which are shown, but these are not relevant to the DriftBox and will be blank. For reference, these channels are: Vertical velocity, Glonass Satellites, GPS Satellites, Lat Acc from Yaw rate sensor, Brake Trigger and DGPS.

Each of the three display windows can be resized by stretching the window, and all of these windows can be printed.

All of the parameters logged by DriftBox can be displayed, and the colours of each line can be customised. In addition to the logged parameters, a number of calculated channels (such as lateral acceleration and longitudinal acceleration) can be displayed.

Graph Screen Basics

Loading Files

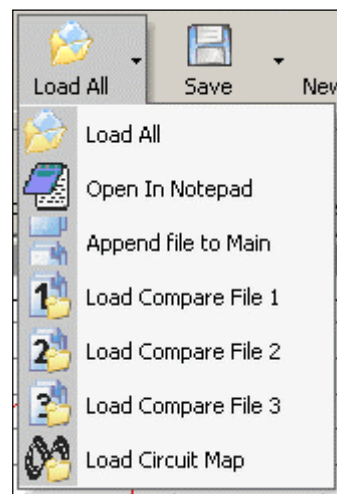
Load a file into the Graph Screen by clicking on the 'Load All' icon in the main toolbar.

Loading Compare Files

The Graph screen also has the facility to load up to three more files for comparison. Click on the small down arrow to the side of the 'Load All' icon to expand a drop down menu. Then select one of the 'Load Compare File x' items.

Removing Compare Runs

Click on the 'Remove Run' icon in the Graph screen (second) toolbar and then select the relevant file to remove.



Appending Files

DriftBox files can be joined together using the 'Append file to Main' option, found by clicking the arrow next to the 'Load All' icon.

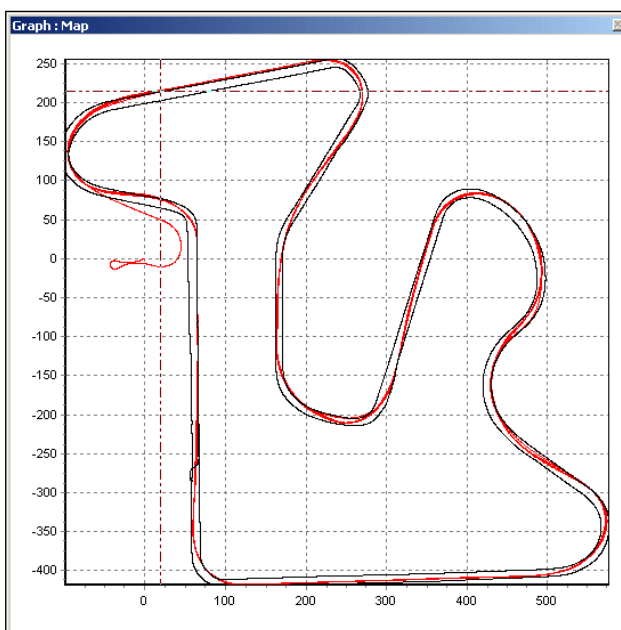
Viewing a Text File

A DriftBox file can be opened in Notepad by selecting the 'Open In Notepad' option from the 'Load All' drop down list. Note that for large files, it may take some time for Notepad to load all of the lines of data.

This function can also be used to open the other text files on your SD card such as the lap time results files.

Loading a Circuit Overlay

A circuit overlay is a template that can be placed on the circuit map, over which the vehicle position data can be overlaid. A circuit overlay file can be loaded into the map window using the 'Load Circuit Map' option from the Load All drop down menu. A circuit overlay file is a standard DriftBox file, but saved with the suffix '.cir' instead of '.dbn'. Any file can be loaded in as an overlay file, just change the default 'Files of type' to '.cir' when loading it in. For more details on how to create a circuit overlay, see 'Creating a Circuit Overlay' later in this chapter.



Circuit files may be exchanged between DriftBox owners and may be available on the DriftBox website and/or forums.

Removing a Circuit Overlay

To remove a circuit overlay, click on the 'Remove Run' icon in the Graph screen toolbar, and then click on the 'Remove Circuit Map' option.

Moving Around the Graphs

Once a file is displayed the data from the file can be examined more closely using the following basic functions: zoom, pan and cursor movement.

Zoom

Zooming in on the data in the graph or map window can be done three ways.

- Use the **left mouse button** to click and drag a window from **left to right** around the area of interest. Click and drag from **right to left** to zoom out.
- Use the **up and down** arrow keys on the keyboard to zoom in around the current cursor position. Pressing the shift key at the same time makes the zoom happen in bigger steps.
- If your mouse has a scroll ball then this can be used to zoom in around the current cursor position. Pressing the shift key before using the mouse roller ball will make the zoom occur in bigger steps.

Pan

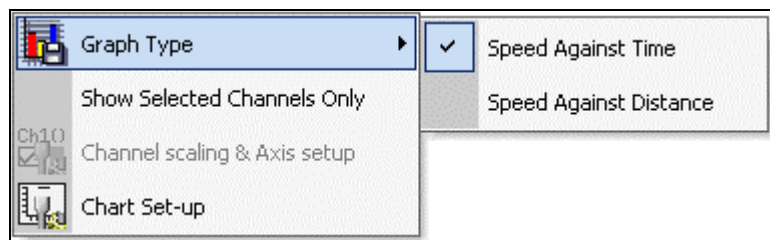
To pan the view in the graph or map window, put the mouse over the area you wish to pan then click and hold the **right mouse button** and move the mouse in the direction that you wish to pan.

Cursor

The position of the cursors in the graph and map windows are linked and move together. The left and right arrow keys control the movement of the cursor. If the shift key is pressed then it moves faster across the screen. The cursor can also be placed in the graph window by left-clicking the mouse button at the desired cursor position.

X-Axis

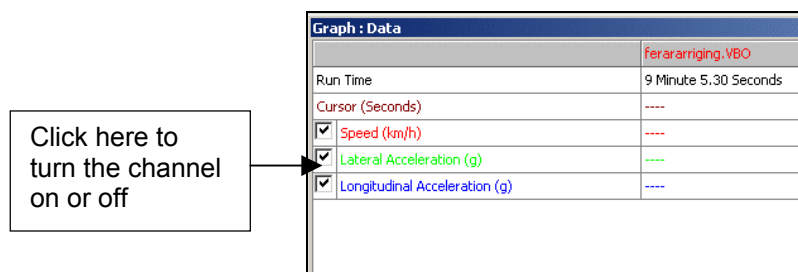
To swap the X axis from Time to Distance either press the right mouse button anywhere on the screen or click the 'Graph Set-up' icon, then select 'Graph Type', then choose one of the two options, 'Speed Against Time' or 'Speed Against Distance'.



Speed against distance is useful for overlaying laps with different lap times around the same circuit (eg. different time, but same distance)

Selecting Channels

All channels logged by DriftBox appear in the data window; all except speed are initially greyed out, but the data can still be seen. To enable a particular channel and make it visible in the Graph window, click in the tick box to the left of the channel name. For example, to display lateral acceleration:



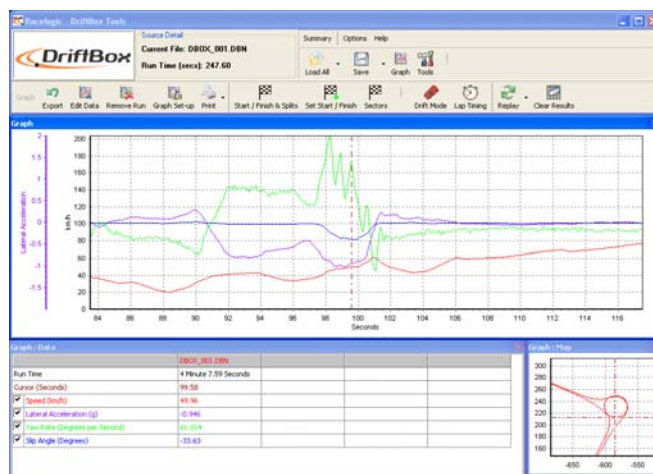
DriftBoxTools will automatically scale the channel to its minimum and maximum values and show it in the graph window. The enabled channel will then be highlighted in its display colour.

The data table contains all of the logged channels from the DriftBox file plus Lateral and Longitudinal Acceleration and Radius of Turn channels, calculated when the file is first loaded. Scroll up and down the channel list to find the desired channel.

A channel can also be found by typing the first letter of the channel, for example 'S' for Satellites, providing that the data table is the currently active window. If there is more than one channel that starts with the same letter then press the key again until the software stops on your desired channel.

Show Selected Channels Only

The data table channel list can be reduced to show only the ticked channels, as in the example above, by clicking the right mouse button when the mouse pointer is in the data table, then selecting 'Show Selected Channels Only'. This is very useful when you are moving the cursor through the graph window and wish to see the displayed channels data at the cursor point.

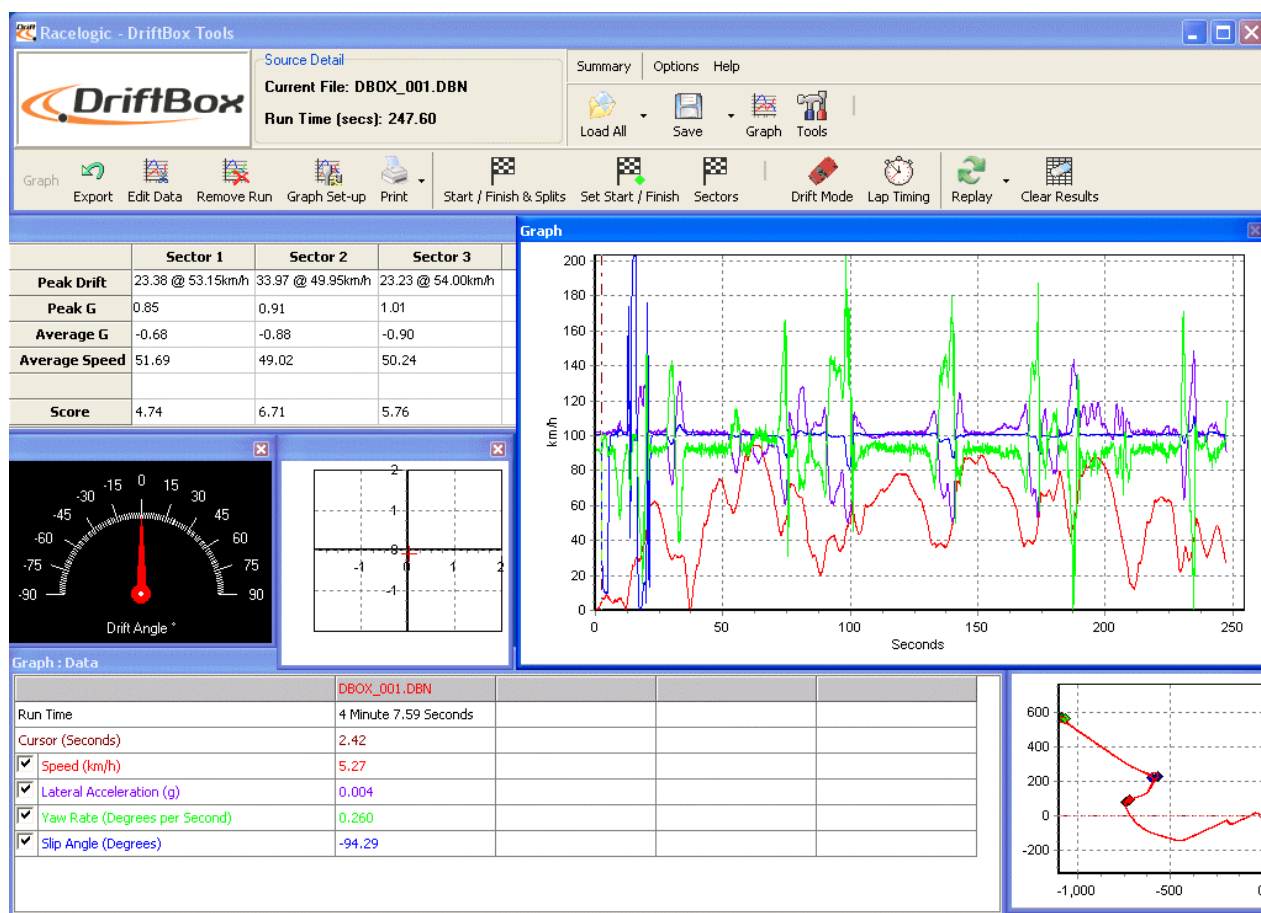


Drift Results

Pressing the Drift Mode button in the Graph Screen toolbar causes the software to scan the loaded file and apply loaded sector file information to produce a Drifting data:

- Peak Drift angle
- Peak G
- Average G
- Average Speed

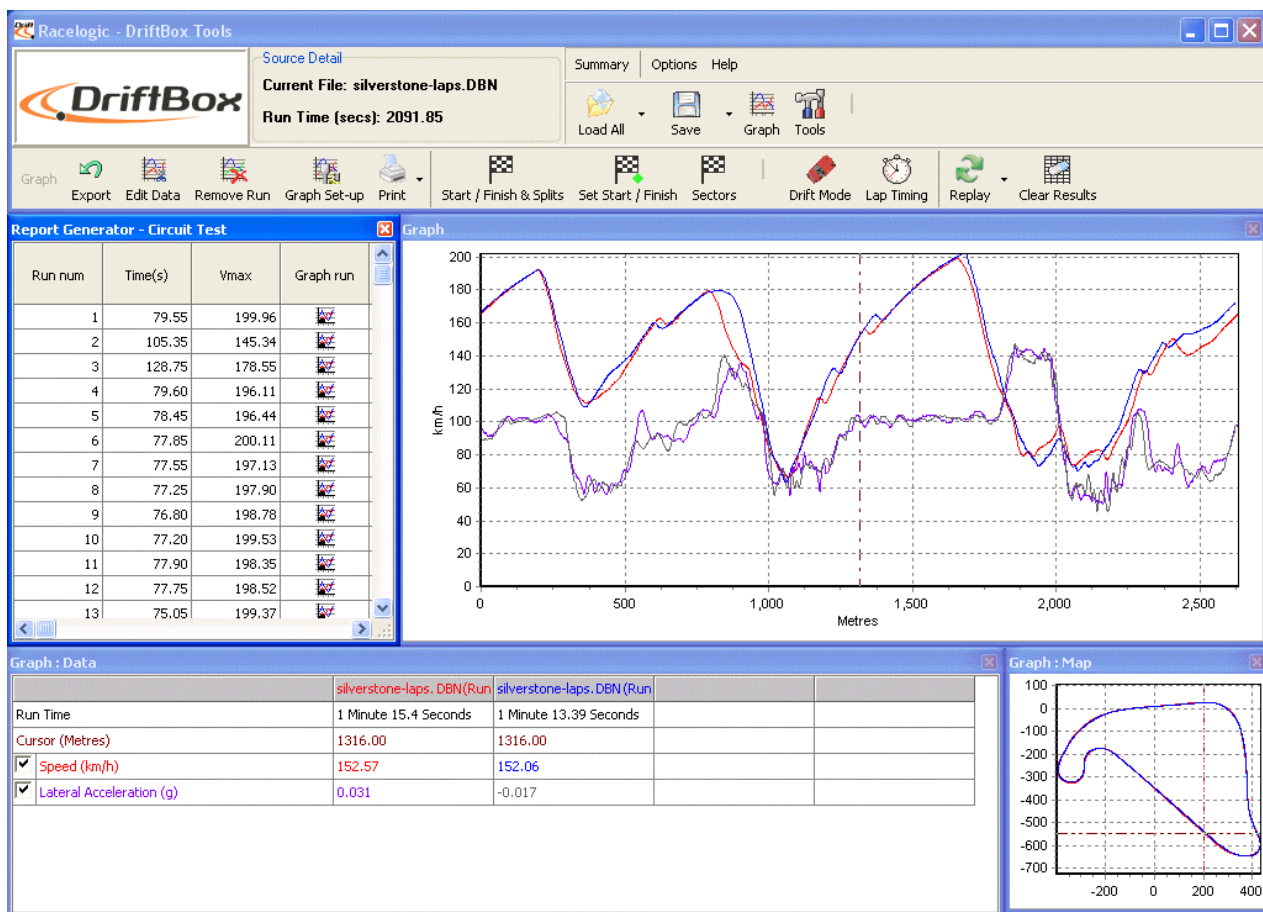
A G meter and Drift meter window also appear when the Drift Mode button is pressed.



Lap timing results

Pressing the Lap timing button in the Graph Screen toolbar causes the software to scan the loaded file and apply loaded split file information to produce a table of Lap times with a V Max for each lap of the loaded file.

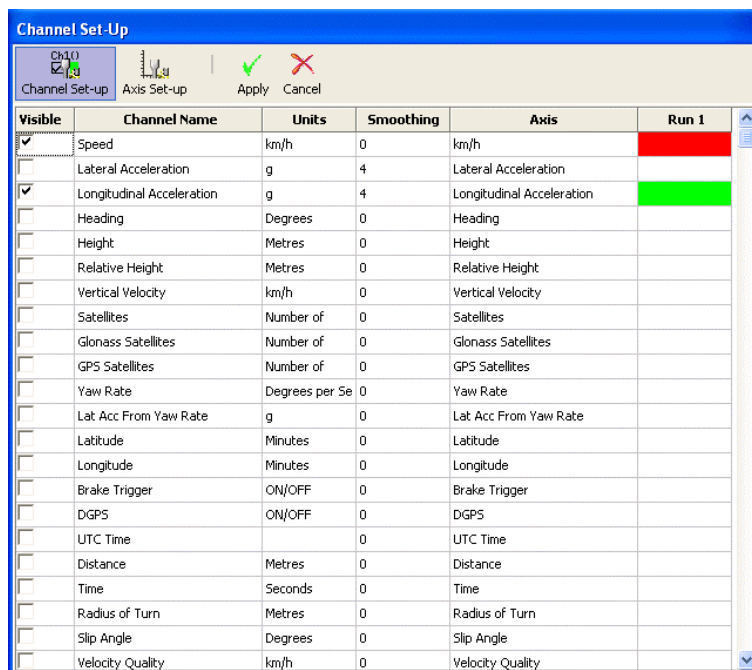
This facility also allows individual laps from the loaded file to be loaded and compared in the main Graph window



Channel and Axis Setup

For each channel there are a number of attributes that can be configured, including those relating to the y-axis. These are set up in the Channel Set-up and Axis Set-up screen, which are accessed by double-clicking on any of the channels in the data table or by right clicking the mouse button and selecting the 'Channel scaling & Axis setup' option, or by clicking the 'Graph Set-up' icon.

Channel Setup



Column descriptions:

Visible

The tick boxes in this column switch individual channels on or off in the graph window.

Channel Name

This column contains the names of the available channels in this file.

Units

Shows the units of each of the available channel.

Smoothing

In this column a smoothing level can be applied to each channel individually. This can be useful for the Acceleration channels. The smoothing level number directly relates to the number of samples used in the smoothing routine (moving window).

Axis

Displays which axis the channel is associated with. To change the associated axis, click the mouse in the right hand end of the axis box once the channel has been made visible.

Run 1

This column shows the selected colour for each active channel. To change the colour click on the colour box of the channel and select a new colour from the colour selection box that appears.

If compare files are also loaded then Run2, Run3 etc columns will be present in which the colours of these compare file channels can be set.

Axis Setup

The Axis Setup window contains all the controls needed for assigning and configuring the y-axis of the Graph screen:

Visible	Axis Title	Min	Max	AutoScale	Symmetrical	Position
<input checked="" type="checkbox"/>	km/h	0.0	43.5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Lateral Acceleration	-2.0	2.0	<input type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Longitudinal Acceleration	-2.0	2.0	<input type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Heading	0.0	360.0	<input type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Height	0.0	0.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Relative Height	0.0	0.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Vertical Velocity	0.0	0.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Satellites	0.0	15.0	<input type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Glonass Satellites	0.0	15.0	<input type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	GPS Satellites	0.0	15.0	<input type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Yaw Rate	0.0	0.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Lat Acc From Yaw Rate	-2.0	2.0	<input type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Latitude	0.0	0.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Longitude	0.0	0.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Brake Trigger	-0.5	1.5	<input type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	DGPS	-0.5	1.5	<input type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	UTC Time	0.0	0.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Distance	0.0	0.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Time	0.0	0.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Radius of Turn	0.0	0.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Slip Angle	0.0	0.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left
<input type="checkbox"/>	Velocity Quality	0.0	0.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left

Column descriptions:

Visible

Each tick box in this column switches an individual **axis** on or off in the graph window.

Axis Title

Shows the title of each available **axis**. The axis title is edited by clicking on the box and entering a new name.

Min / Max

The Min and Max boxes allow the scale ranges for each axis to be set.

Autoscale

The autoscale option causes the axis scales to automatically fit the minimum and maximum values of the loaded channel.

Symmetrical

This option will cause the positive and negative maximum values on the axis to be the same magnitude. The magnitude of these will be determined by the largest positive or negative value of the channel.

Position

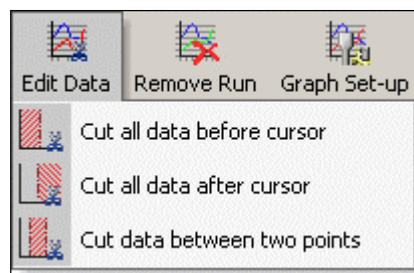
This option controls whether the channel axis appears at the left or right of the Graph window.

Editing a DriftBox File

Sections of a DriftBox file can be removed using basic editing commands accessed through the 'Edit Data' icon in the Graph screen toolbar.

Cut All Data before Cursor

This feature removes the entire file up to the cursor position in the main memory only. You can use this to select an area of the graph you are interested in and then save just a portion.



Cut All Data after Cursor

This feature removes the main memory file from the point of the cursor onwards.

Cut Data between Two Points

This feature removes the main memory file between two specified cursor points.

Saving a DriftBox File

Save a file by clicking on the 'Save' icon in the main toolbar. If you have made changes or edited your DriftBox file it is wise to save this file to a new name so that you do not lose the original file.

Printing Graph Data

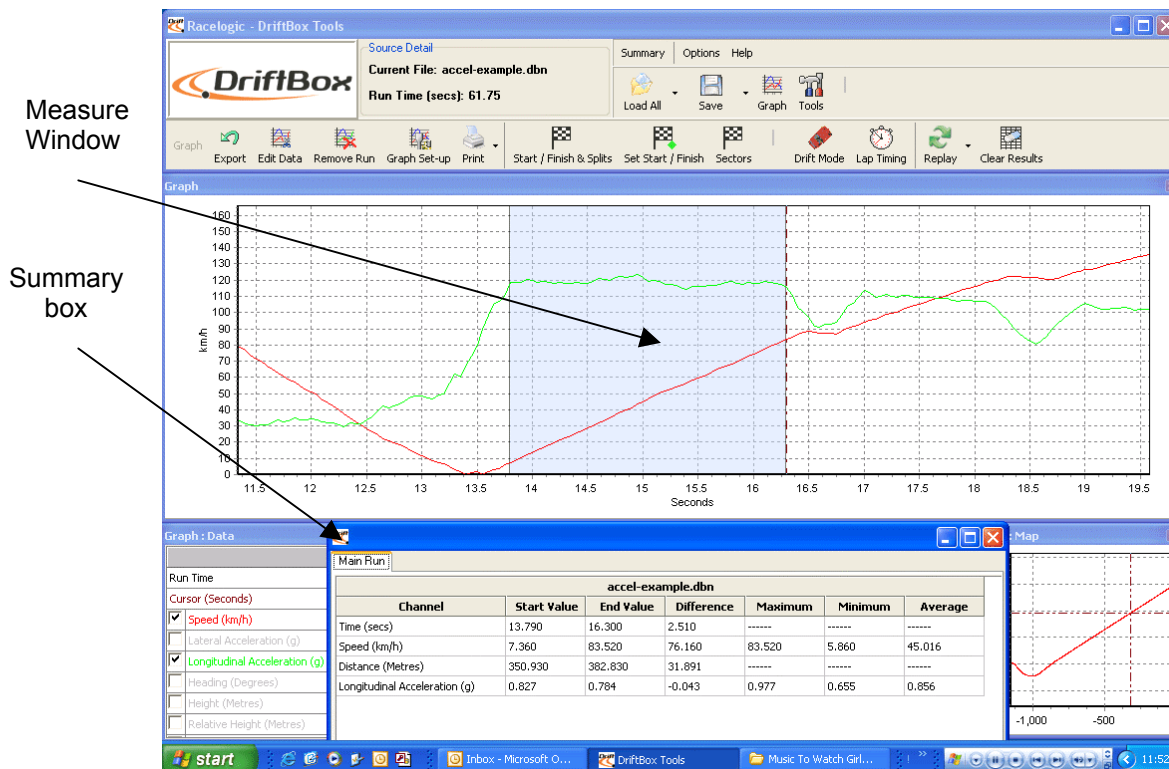
You may print out the graph data currently being displayed by selecting an option from the 'Print' icon's drop-down list. It is possible to print a single window (Graph, Data or Map) by selecting the relevant options, or all three by selecting the 'Print' option (or by clicking the 'Print' icon itself, rather than its arrow).

Exporting Graph Data

It is possible to export the graph or map as a picture file, which can either be saved or copied onto the computer's clipboard for use with other software. Simply click the 'Export' icon and then choose the image to export. A dialogue box will appear that will allow you to choose several factors, including the format in which you wish to export the file.

Graph Measure Tool

This tool can be used to highlight a section of data in the Graph window and produce a table that summarises the data captured in the window:



Hold shift down whilst clicking and dragging to use the Measure Tool

The area of data that is displayed in the table is highlighted in blue in the Graph window. This is often useful for quickly establishing average values between two points in a file. In the screen shot example above the first gear section of the acceleration curve has been highlighted and it can be seen from the table that an average Longitudinal Acceleration during first gear is easily seen.

Creating a Measure Tool Window

To highlight a section in the graph window, move the cursor to the start of the section you wish to highlight. Then place the mouse pointer over the cursor position and press and hold the '**Shift**' key, then click and hold the left mouse button. Keep the left mouse button pressed and move the mouse cursor right to drag out a blue highlighted area. At the end of the area you wish to highlight, release the left mouse button. On release of the left mouse button a table of results for all channels in the highlighted area appears as in the screenshot above.

Saving and Printing the Measure Tool Data Table

Click the 'Save to file' icon in the Measure Tool toolbar to save the data in the table in one of two formats, .csv or '.txt'. Click the 'Print' icon in the Measure Tool toolbar to print the table.

Start / finish lines and Splits

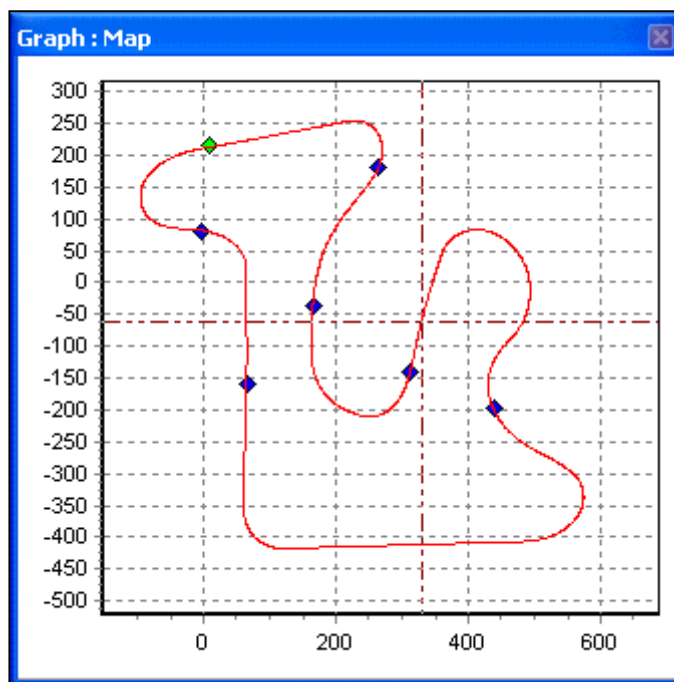
Defining start / finish lines and splits in the DriftBox software

To define a start / finish line, move the cursor in the Graph window to the desired point, then press the **SPACEBAR** to mark a start / finish point, or press the Set start / finish button in the Toolbar.

When the cursor is moved in the Graph window the cursor in the Map window follows this movement so you can see where the cursor point relates to on the track. After setting a start / finish line a green dot will then appear in the Map window at the corresponding cursor position.

Up to 20 split points can also be set in the software. However if you save this file to the DriftBox only the first six will be saved and used by the DriftBox

To define the split points, press the 'S' key at the desired cursor location or select the 'Set split' option from the 'start / finish & splits' drop down menu.



A separate finish line can be placed when the start line is not also the finish line. This is used in situations such as hill climbs or data analysis along a stretch of track that does not end where it starts.

Create a finish line by holding the **SHIFT** + **SPACEBAR** at the desired cursor location or by selecting the 'Set finish' button from the 'start / finish & splits' menu.

Note: It is important to try to place the start / finish line at a fast part of the circuit to reduce the effects of positional error and to get the best lap timing accuracy.

Loading and Saving start / finish line and split data

Click on the 'Save' option from the start/finish drop down menu to save to the start / finish and split line information created in the Graph screen to a '.dsf' file. If you want to save more than six splits for software use only then choose the file type '.spl' instead which is only compatible with the software and not DriftBox itself.

Click on the 'Load' button in the Start/finish drop down menu to load in a '.dsf' or '.spl' file.

Clearing start / finish line and split data

If the current start / finish and split file information needs to be cleared from the DriftBoxTools background memory and display screens, select 'Clear All' from the 'Start / Finish & Splits' menu in the Graph screen toolbar, or from the main 'Tools' menu.

Moving Splits

Splits can be moved by pressing 'M' in the Graph window and entering the number of the split to be moved, or by selecting 'Move split' from the menu.

Sectors

Defining Drifting Sectors in DriftBox Tools

Each sector that you set requires that you define a start line and an end line. Each sector is numbered from 1-6.

Setting sector Start

- Move the cursor in the Graph window to the start point of the sector.
- Press the key '1'
- A green dot will appear at this position in the Map window

Setting sector End

- Move the cursor in the Graph window to the end point of the sector.
- Press SHIFT + '1'
- A red dot will appear at this position in the Map window.

To define other sectors use the '2', '3' etc. buttons.

Loading and Saving Sectors

Saving

Click on the 'Save' option in the Sectors drop down menu to save to the sectors created in the Graph screen to a '.sct' file.

Loading

Click on the 'Load' button in the Sectors drop down menu. You can then browse for a previously generated sector file containing sector information.

Clearing Sectors

If the current sector information in the graph screen needs to be cleared from the background memory and display screens, select 'Clear All' from the 'Sectors' menu in the Graph screen toolbar, or press SHIFT + 'C'.

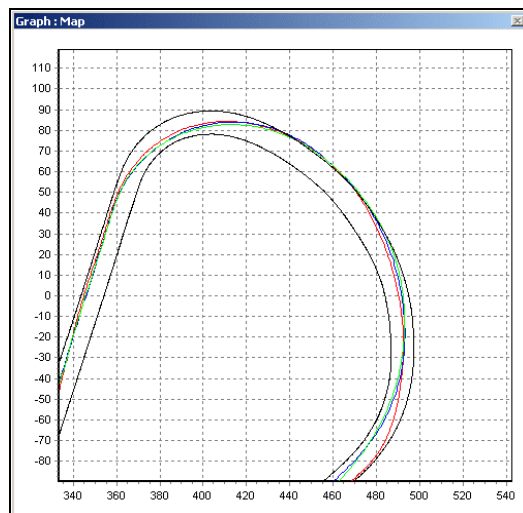
Creating a Circuit Overlay

A circuit overlay is a file created to map the outer and inner bounds of a circuit.

Note: It is best to use an external aerial to get maximum position accuracy

- Power up DriftBox and let it acquire satellites for at least 5 minutes.
- Drive to the left hand side of the start of the circuit.
- Place the antenna on the left hand side of the roof.
- Insert the SD card, ready for logging.
- Drive round the left hand side of the circuit.
- Stop back at the place you started.
- Move the aerial from the left hand side of the roof to the right hand side slowly, being careful not to cover the aerial – let it see the sky at all times.
- Drive at right angles across the track to the opposite side.
- Drive round the right hand side of the circuit.
- Load the logged file from the SD card using 'File' -> 'Load All'
- Save using 'Save', select 'Save as type' and pick 'Circuit file' ('.cir').

The .cir file can now be loaded into the Graph screen and viewed in the Map window:



Aligning Circuit Overlays and Laps

The standard positional accuracy of DriftBox is 3M 95% CEP for Longitude and Latitude. CEP = circle error probable.

95% CEP means 95% of the time the position readings will be within a 3M diameter circle of the true position. This error is due to the changing state of the ionosphere, constantly changing the time taken for the satellite signals to reach the earth.

This means that overlaid laps may appear to miss the edges of the track, especially if the laps or overlay were logged several hours apart. In order to be able to view true drive lines, right-click on the Graph Map. The option to align either the lap data or overlay appears – using the keyboard cursor keys the runs can be correctly aligned.

Displaying Drifting results

To extract and display Drifting results from a file press the Drift Mode button in the Graph screen toolbar. This causes the software to scan the loaded file and apply loaded sector file information to produce a Drifting data grid showing the following data:



- Peak Drift angle
- Peak G
- Average G
- Average Speed

A G meter and Drift meter window also appear when the Drift Mode button is pressed. When the replay facility is used to replay the loaded file, the G and Drift angle windows display data from the file that corresponds to the cursor position as it moves through the replaying data.

Displaying Drifting Data from a Logged file.

- Click the Load all button to load a DriftBox file into the DriftBoxTools software.
- If you don't have a sector file relevant to the logged data then you will need to create one. See the Graph screen chapter for full instruction of this process.
- Press the Drift Mode button to scan the file and display results.

Displaying Lap Times

To display the lap times press the Lap Timing button in the Graph screen toolbar. The software scans the currently loaded file and extracts lap times and Vmax for each logged lap and displays the data in a Lap timing window. Make sure you have already defined a start / finish line.
















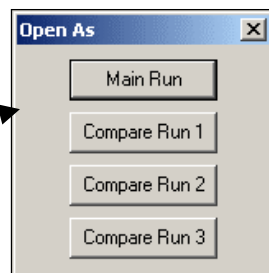
Including Split times

Click on the right hand arrow on the Lap timing button, then from the drop down menu select 'Lap timing with Splits'. Then if you have split lines defined the table will show the split times as well as the Lap times for you file.

Loading and comparing individual laps in the Graph screen

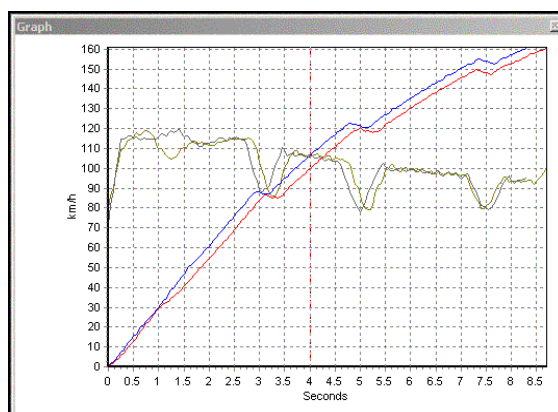
Individual laps from the loaded file can be compared to each other in the graph screen windows. Each lap shown in the Lap timing table has a Graph Icon associated with it in the right hand column. Clicking one of these buttons allows that run to be graphed:

Run num	Time(s)	Vmax	Graph run
1	79.55	199.96	
2	105.35	145.34	
3	128.75	178.55	
4	79.60	196.11	
5	78.45	196.44	
6	77.85	200.11	
7	77.55	197.13	
8	77.25	197.90	
9	76.80	198.78	
10	77.20	199.53	
11	77.90	198.35	
12	77.75	198.52	
13	75.05	199.37	



To compare another run from the Lap timing results in the Graph screen, click on the 'Graph' icon of the chosen run. Then in the 'Open As' window press one of the 'Compare Run' buttons. The run to be compared will now appear alongside the original run in the Graph screen, as shown in the example screen below.

The main run is shown in red and the compare run in blue:



Replaying DriftBox Data

A DriftBox file can be replayed at real time speed, or at 2 x or 5x real time speed.

Replaying a file:

- Load the file into the DriftBoxTools software using the 'Load All' button.
- Then click the right arrow of the Replay button on the Graph screen toolbar to view and select one of the replay speed options.
- Click on the Replay button to start the replay at the chosen speed.

Replaying data with the drifting table active

When the Drift Mode facility is active and the replay facility is used, the Drift results table updates as the cursor passes through the sectors in the file.

Replaying data with the Lap timing table active

When the Lap timing facility is active and the replay facility is used, the Lap time data table updates automatically.

Tools

Clicking on the 'Tools' icon will reveal a drop-down list containing a number of useful features, such as formatting SD cards and the Exporting Data to Mapping Software facility.

Formatting SD Cards

Any new SD card is formatted in the correct format suitable for DriftBox and there is no need to format the card. You can delete any files created on the card by DriftBox through your computer when connected to DriftBox or when the card is inserted in a card reader connected to your computer.

However if your card has a problem and the card needs to be formatted it is best to do this through the DriftBoxTools software SD card formatting facility.

Note: that the card will need to be inserted into a suitable card reader in order to format it; it cannot be formatted through the DriftBox and USB cable.

Exporting Data to Mapping Software

This option allows the location data stored on a '.dbn' file to be converted into a '.txt' file that may be used with Google Earth Plus, Microsoft AutoRoute and Microsoft Streets & Trips, to show the vehicle's path in the mapping software.

Exporting a Mapping Software Text File

Load the '.dbn' file into DriftBoxTools using the 'Load All' button from the main toolbar, then click on the 'Export Data To Mapping Software' option in the 'Tools' menu.

A small selection box will appear, in which the export rate can be chosen.

Exporting to Google Earth

Data can be exported to Google Earth by selecting the Tools menu and choosing the Google Earth option. The resultant file .kml is recognised by the Google Earth software and allows data to be viewed on the satellite images.

Exporting to AutoRoute or Streets & Trips

Open AutoRoute or Street & Trips. Click on 'Data' and then select 'Import Data Wizard'. When prompted, browse for the '.txt' file you have just created with DriftBoxTools and open it, then select 'Comma' as the delimiter and click 'Next'. In column F2 select Latitude as the column name from the drop down menu. In column F3 select Longitude as the column name from the drop down menu and then click 'Finish'. The program then generates a map of your data location and places markers on the map at every data point that was specified when the output file was, for example once every second.

There are no limits on the number of imported points in AutoRoute or Streets and Trips.

File Repair

If the file being loaded into the software contains dropped sample data (caused by travelling under a bridge, for example) then DriftBoxTools will prompt you to repair the file. This can be done by clicking on the Tools menu and choosing File Repair. Areas of dropped samples can then be repaired.

Other Features

Some useful features that apply to the whole of the DriftBoxTools software have been included above the main toolbar. These are described in the following section.

Summary

You can view basic but important information about the main '.dbn' file loaded into the DriftBoxTools software by selecting Summary from the menu. The information displayed includes basic information such as the time at which the file was logged and its duration, as well as any errors, such as loss of satellites during the file.

This summary may be printed or e-mailed using the icons at the top of the window.

Units of Measurement

The 'Units of Measurement' menu allows you to set the velocity units to km/h or mph and the distance units to metres or feet.

Help

This menu allows you to view basic information about the DriftBoxTools software. It also provides a quick link to the user manual.

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