

# Video VBOX Setup Software Guide



---

This page intentionally left blank

---

<b>Video VBOX Setup Software Guide .....</b>	<b>1</b>
<b>Introduction.....</b>	<b>5</b>
<b>Scene Files .....</b>	<b>5</b>
Loading Scenes into a Video VBOX .....	6
Loading Multiple Scenes into a Video VBOX.....	6
<b>Fonts .....</b>	<b>6</b>
<b>Software Installation.....</b>	<b>6</b>
<b>Adding a logo or image.....</b>	<b>7</b>
<b>Track maps &amp; lap-timing.....</b>	<b>7</b>
Inserting a track map .....	7
Auto Track Map Elements.....	8
Setting the start/finish line for Lap-timing .....	9
Ignore start line count .....	9
<b>Creating your own Track map .....</b>	<b>9</b>
Creating your own start/finish line.....	9
Downloading Track maps.....	10
Creating a circuit map using Google Earth™ .....	10
Adding a lap-timing element .....	11
Predictive Lap Timing Element – for use with OLED or LapTimer .....	11
<b>Gauges .....</b>	<b>11</b>
Using a supplied gauge .....	11
Custom Gauge Creation.....	12
Creating a new Gauge.....	12
Choosing a background .....	12
Assigning a needle .....	13
Positioning the Needle .....	13
Setting the needle direction .....	14
Defining the range of the needle.....	14
Multiple Needle Rotations.....	14
Assigning a parameter to the gauge.....	15
Changing the units (e.g. from MPH to Km/h) .....	15
Setting the parameter range .....	15
Speed labels.....	15
Moving gauges around .....	15
<b>Creating an XY (G-force style) Bar Graph.....</b>	<b>17</b>
<b>Creating a circular XY (G-force style) gauge .....</b>	<b>17</b>
<b>Creating and setting up a Display Range element .....</b>	<b>18</b>
<b>Adding a Picture-in-Picture element .....</b>	<b>19</b>
Cropping a PiP Element .....	19
Flipping a PiP Element .....	19
<b>Adding text elements .....</b>	<b>19</b>
<b>Adding a static text label .....</b>	<b>20</b>
<b>Exporting and Saving Elements.....</b>	<b>20</b>
<b>Layers.....</b>	<b>21</b>
<b>Groups.....</b>	<b>21</b>
Saving a Group.....	22
<b>Video Preview via USB .....</b>	<b>22</b>

---

<b>Performance tests</b> .....	<b>23</b>
<b>Maths Channels</b> .....	<b>24</b>
<b>Scene properties</b> .....	<b>25</b>
Grid Setup .....	25
System Info .....	25
Smooth level Settings .....	25
GPS Settings .....	25
Serial Application .....	26
<b>Log settings</b> .....	<b>26</b>
Logging Modes.....	26
Geo Fencing .....	26
CAN logging control .....	26
Digital IO Event Marking .....	26
<b>Video Settings</b> .....	<b>26</b>
Video Quality storage requirements .....	26
<b>Audio Settings</b> .....	<b>27</b>
<b>Camera settings</b> .....	<b>27</b>
<b>CAN</b> .....	<b>27</b>
Defining a CAN channel .....	27
Assigning a CAN channel to an Element .....	28
Using your own database (.dbc) file .....	28
Loading a CAN Database from Element Properties .....	28
<b>Advanced CAN Options</b> .....	<b>29</b>
CAN Baud Rate.....	29
CAN Mode.....	29
Logging Raw CAN .....	29
<b>Connecting to the Vehicle CAN Bus</b> .....	<b>30</b>
Configuring the Video VBOX to use a Mini/Micro Input Module .....	30
Setting up a Video VBOX for use with other Racelogic modules .....	31
Assigning a Module channel to an Element.....	32
<b>Setting up the Mini Input Module for use with the Video VBOX</b> .....	<b>32</b>
<b>Displaying DriftBox Parameters</b> .....	<b>32</b>
<b>Recommended Software Tools</b> .....	<b>32</b>
<b>APPENDIX 1: Calculating scale and offset of an Input parameter</b> .....	<b>33</b>

## Introduction

Throughout this guide we will be referring to the following:

### Scenes

A Scene is the setup file (‘.SCN’ file) which defines the layout of the graphical overlay and sets the system parameters such as PAL/NTSC, CAN channels, lap-timing information etc.

### Elements

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

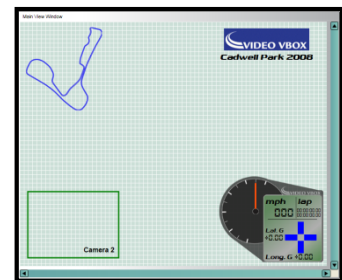


An element within a scene

## Scene Files

If you want to move Scene files around, use the **File > Export** and **File > Import** functions which package up all the image and configuration files into a single compressed folder, allowing them to be easily sent to other users or transferred to another computer.

The Scene files which come as part of the software package, and any scenes you save locally using **File > Save** in the software, are stored in the PC users program data storage area as a folder of images and configuration files.



A Typical Scene

### Location of Program data in Windows 7 and Windows 8

C:\Users\USER\_NAME\AppData\Local\Racelogic\VVB\Themes\Default\SCENES

### Location of Program data in Windows XP

C:\Documents and Settings\USER\_NAME\Application Data\Racelogic\VVB\Themes\Default\SCENES

**Note:** Some of these directories may be hidden, so you will need to change your systems settings to show hidden folders. Generally, a user will not have to do anything with this kind of file, if you want to move scenes around, **Export** and **Import** should be used instead.

## Loading Scenes into a Video VBOX

You can upload a scene to the Video VBOX by using the **Upload via SD card** button or the **Upload via USB button**. When using the SD card, simply insert the card with the scene into the Video VBOX, and it will be installed automatically.



The scene file will be deleted unless a blank text file called '**no-delete-scene.txt**' is on the card, this is to program multiple boxes with the same scene.

You can download a scene file from a Video VBOX using USB by using **File > Download scene from Video VBOX**

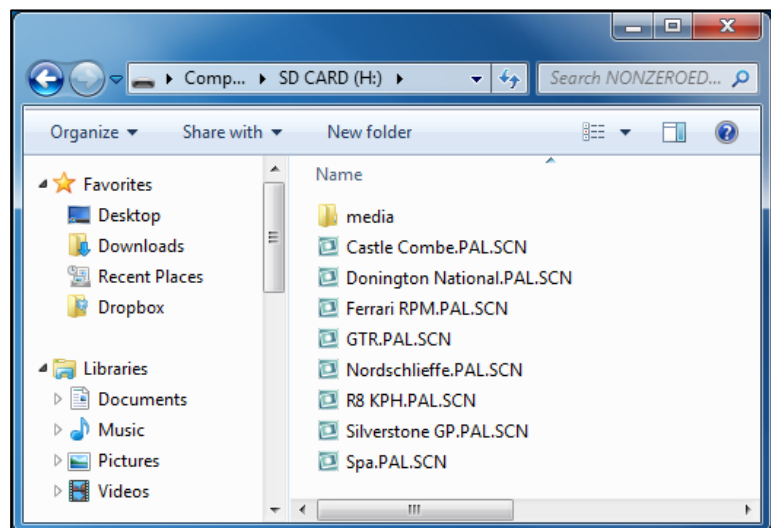
## Loading Multiple Scenes into a Video VBOX

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

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

Loading multiple scene files must be done in one single upload. The scene section cannot be added to, only replaced with one new scene or another multiple selection. A default scene will remain in the unit at all times.

Only the scene which is currently loaded into the Video VBOX can be downloaded via USB using Video VBOX setup software. If the software is used to upload a scene it will overwrite the current active scene - other scenes are not affected.



## Fonts

Some free scenes will require installation of either shareware or commercial Fonts. You can download most fonts at [www.fonts101.com](http://www.fonts101.com) (free fonts) or [www.fonts.com](http://www.fonts.com) (commercial). If you do not have the correct font, the software will substitute a default font which already exists on your PC, which may result in a compromised layout.

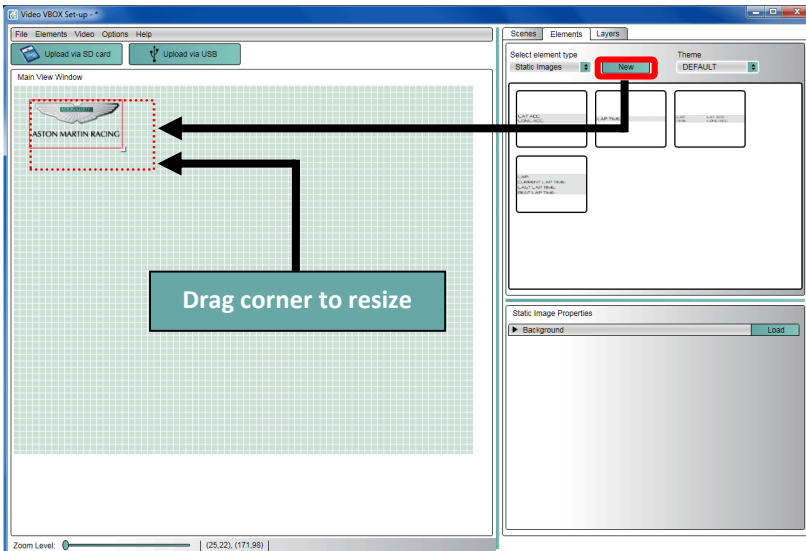
## Software Installation

Install the software using the CD provided, or download the latest version from our website: [www.vboxmotorsport.co.uk](http://www.vboxmotorsport.co.uk) under the section **Customer Area**.

## User Guide

### Adding a logo or image

To add an image (e.g. Sponsor's Logo) to the scene, select the **Elements tab > Static Image > New**. A file selection window will then appear.



To move the image, select it, then click and drag on the body of the image.

To re-size this image, click and drag the bottom right hand corner. To maintain the original aspect ratio, hold down the **SHIFT** key.

Note that if you make the image larger than the original, then the quality will suffer.

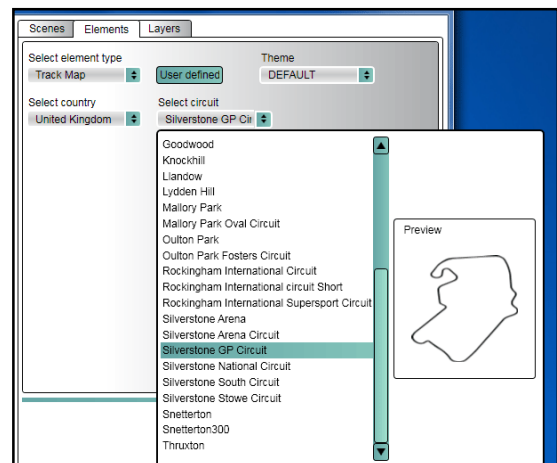
You can load in .jpg, .png, .gif or .bmp files. If you want transparent parts of the image, use a .png or a .gif.

### Track maps & lap-timing

#### Inserting a track map

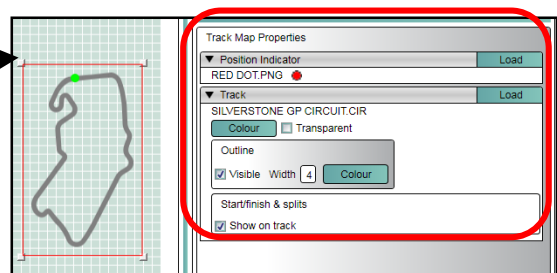
With a built-in database of almost every circuit in the world, it is very simple to display lap-times and a Track map.

To use, select **Track Map** from the **Elements** tab. Then, select the country and circuit from the list.



A track map of that circuit will then appear in the scene, which can be moved by clicking and dragging. You can also resize the track map by dragging the corners.

The track properties tab (highlighted) can also be used to change the colour, thickness and track pointer image.

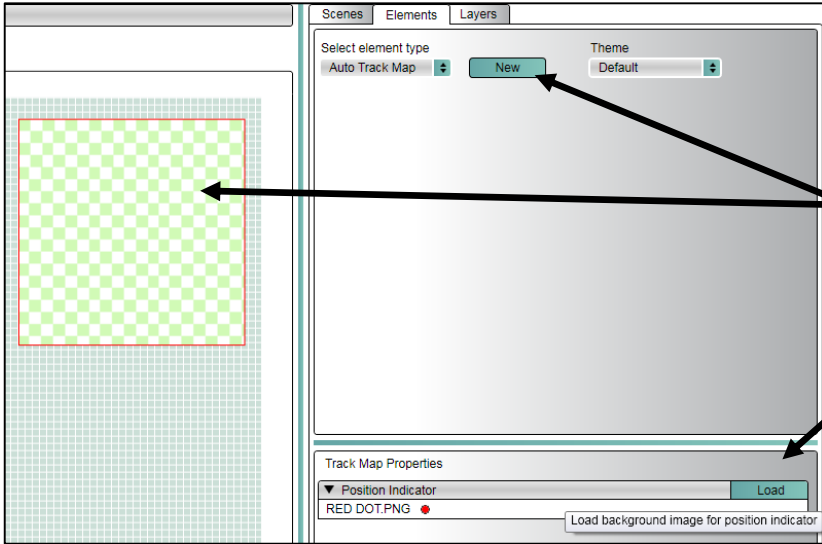




### Auto Track Map Elements

An Auto Track Map element uses the current GPS co-ordinates to search the track map database and automatically loads a circuit map and start/finish line.

If an OLED is connected to the VVB, the start/finish line will be automatically synchronised.



An 'Auto Track Map' element must be added to the Video VBOX scene and uploaded to the Video VBOX. The size of the auto track map is fixed and will appear in the centre of this box.

To add an auto track map element to your scene, select 'Auto Map' from the elements list, and then click the 'New' button.

You can specify the image used as a track position indicator. The default is a red dot.

If multiple circuit layouts are found at the current GPS location, you can select any of the matching tracks using an OLED display.



For some tracks, a 'combo' map is available which will cover all circuit layouts.

When a location is detected, the VideoVBOX will check for a 'combo' track from the database.

If there is not a 'combo' map available for the location, it will default to the first track in the list alphabetically.

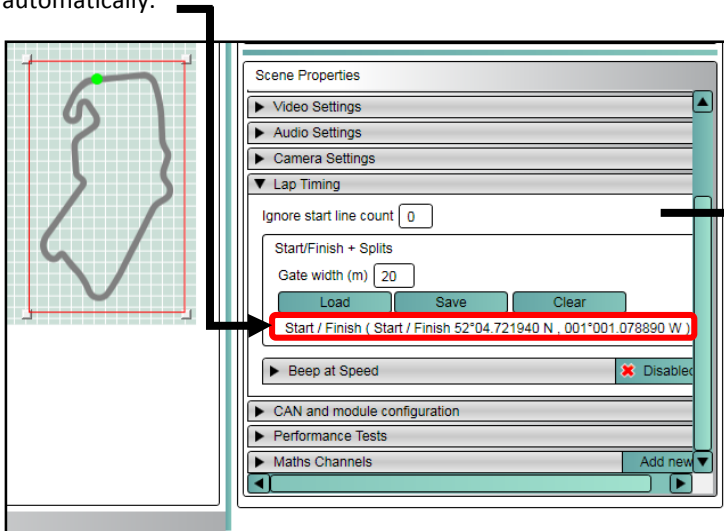


Combo Map example - Rockingham



## Setting the start/finish line for Lap-timing

If you use a Track map from the database, then the correct start/finish line from the database will be used automatically.



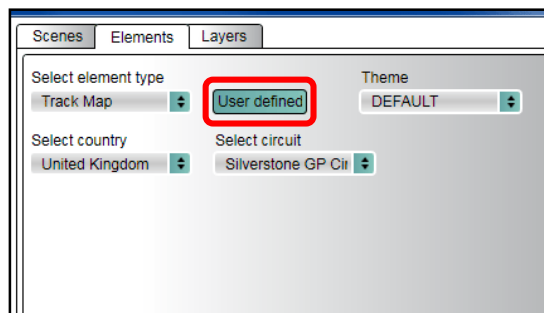
### Ignore start line count

This value allows for a parade lap or warm-up lap to be ignored in the total lap count.

## Creating your own Track map

If you want to create your own Track map, record either a small number of laps around the circuit, or drive around the inside and then the outside of the track and then save this '.vbo' file onto your PC.

Now select Track Map from the **Elements** tab, but choose **User defined** and select the file you have just created.



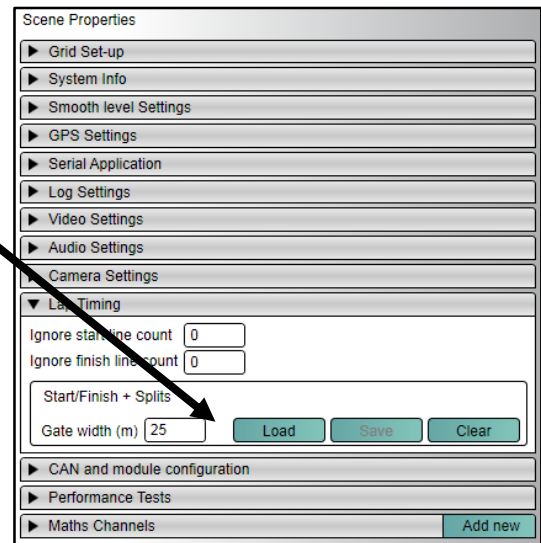
## Creating your own start/finish line

You can create your own start/finish file using the start/finish wizard in Circuit Tools, supplied with your Video VBOX. Please refer to the Circuit Tools manual for instructions on how to create a split file containing this information.



## Using your own start/finish line

In the **Video VBOX Setup** software, a user created Split file can be loaded into the Scene using the **Scene properties** tab under **Lap Timing > Load**, from there you can choose the file (either from the built-in Database or your own file).



## Downloading Track maps

Video VBOX Setup Software includes the latest Track Database available at release. Updates to this database are available from our website: [www.vboxmotorsport.co.uk](http://www.vboxmotorsport.co.uk) in the **Customer Area**.

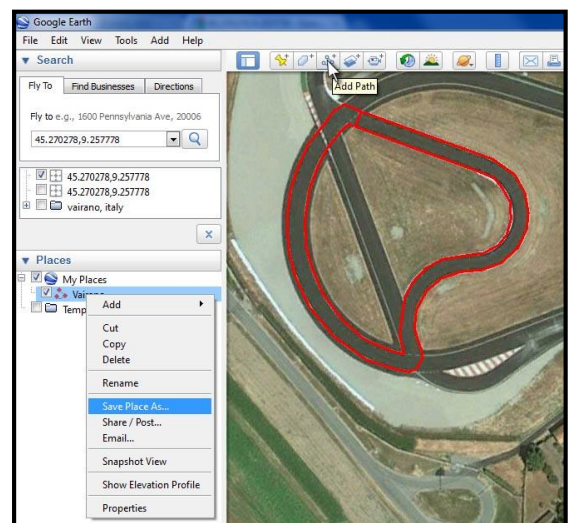
## Creating a circuit map using Google Earth™

You can use Google Earth to draw around your track using the **Add – Path** tool.

Save this path as a **‘.kml’** file by right clicking on the entry in the **‘Places’** tab, and changing from **‘.kmz’** to **‘.kml’**

Import this **‘.kml’** file into **VBOX Tools** or **Performance Tools** software using **File - Import - From Google Earth**.

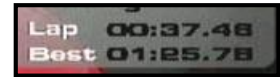
Then save this file as a **‘.vbo’** file and use this in the Video VBOX Setup software as the Track map in the same way as before.



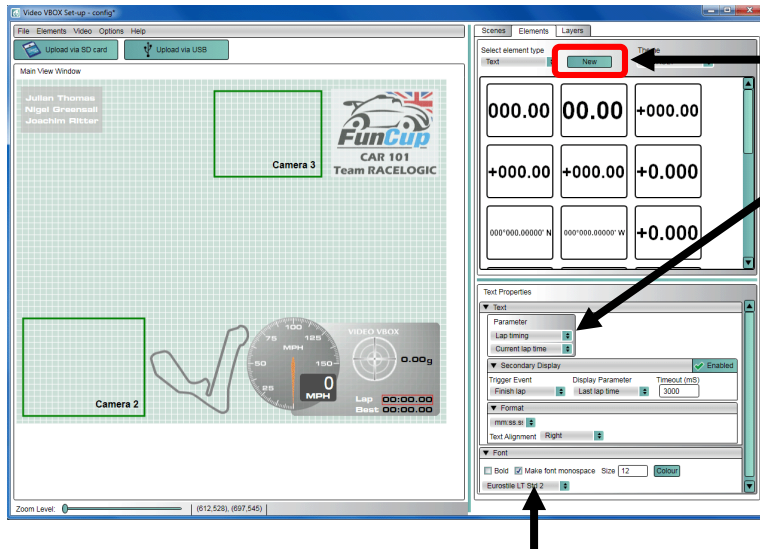
An application note describing this procedure in more detail is available from the VBOX website in the Customer Area.

## Adding a lap-timing element

**Note:** To enable lap-timing, you must first have a relevant start/finish line corresponding to your track as described previously.



(You do not need a Track map to get lap-timing to function, but this is the easiest way to use the built-in database.)



To add a lap-timing element, first insert a Text element using the **Elements tab – Text - New**

Under **Text Properties** select **Lap Timing** in the **Parameter** pull down menu, and then you can select which parameter is displayed.

- Current lap
- Current lap (media reset)
- Current lap time**
- Completed laps
- Last lap time
- Best lap (power reset)
- Best lap (media reset)
- Current split
- Current split time
- Current split, last split time
- Current split, best split time
- Last split, last split time
- Last split, best split time
- Speed
- Last split, minimum speed
- Last split, maximum speed
- Last split, average speed

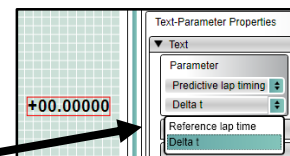
In this case we have **current lap (rolling time)** as the main display.

The font, size and colour can be selected in the same tab. If you want the main lap-timing display to hold the current lap-time as you cross the line for a short period of time, then enable the **Secondary display** with **Finish lap** as the trigger and **Last lap time** as the parameter.

If you are using an OLED display the start/finish data you have loaded into the scene will be transmitted to the display automatically, look out for the message **Start/Finish and splits synchronised OK**. If you have configured a scene with no start/finish line included, you can set one on the OLED display, which will then be imported into the scene.

## Predictive Lap Timing Element – for use with OLED or LapTimer

If an OLED display or LapTimer is connected to the Video VBOX, then the predictive lap timing calculated in the OLED can be displayed in the video overlay. This can be added in the same way as a lap-timing element, but predictive lap timing must be selected as the main parameter. There is the option of displaying the reference lap time, or the delta-t channel.

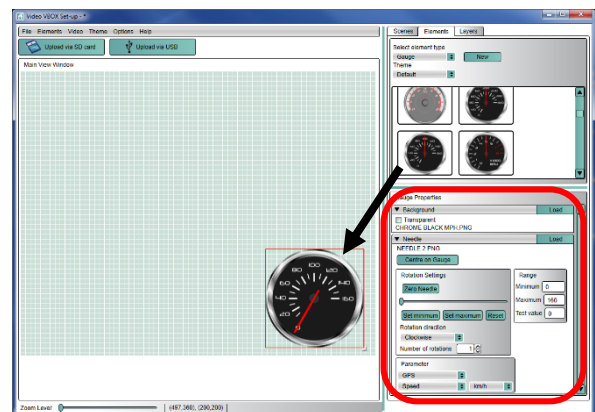


## Gauges

A Gauge can be any shape, but is typically circular with a rotating needle. Gauges can be used to display any of the available GPS or CAN/input module parameters such as speed (GPS), RPM (CAN/module) etc.

### Using a supplied gauge

There are a number of preconfigured gauges which have different ranges and styles which can be inserted into the scene by dragging and dropping.

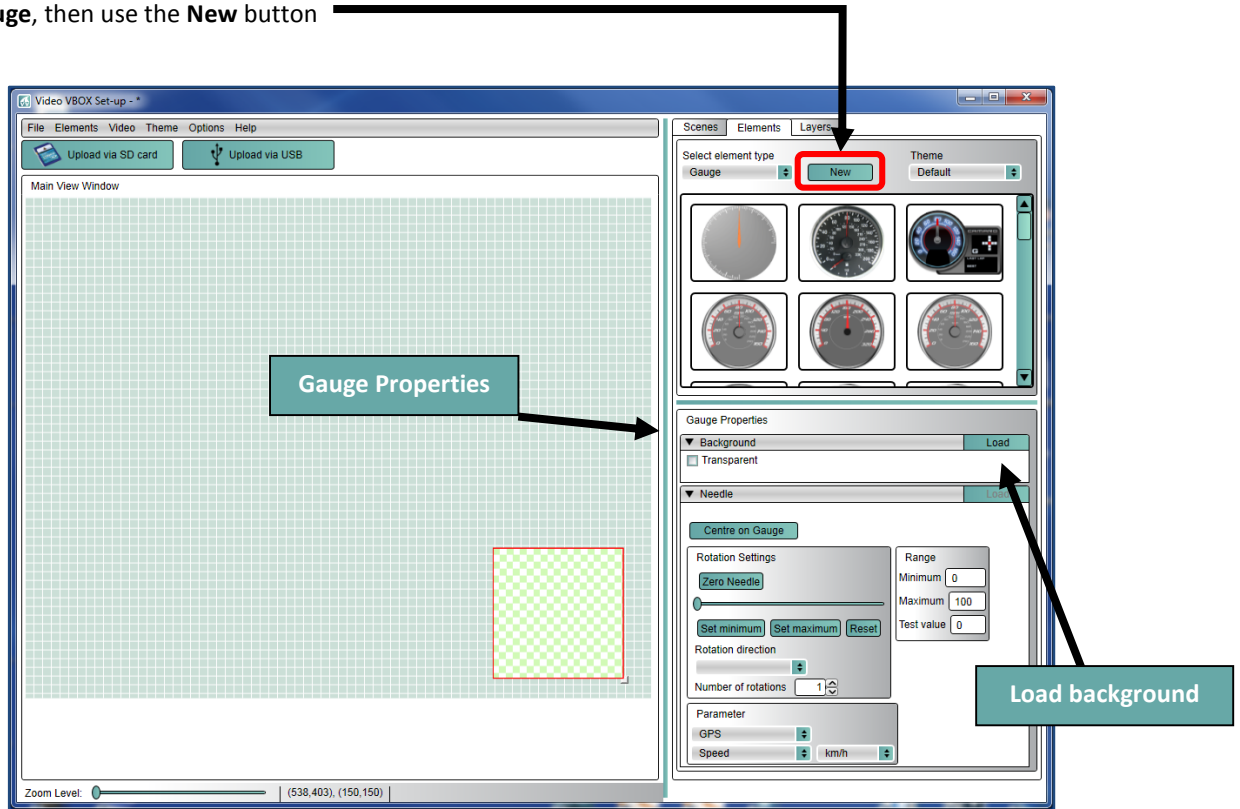


You then need to configure the parameter which is displayed, and the units using the Gauge Properties section (highlighted).

## Custom Gauge Creation

### Creating a new Gauge

Select the Elements Tab on the right hand side.  
 Select **Gauge**, then use the **New** button



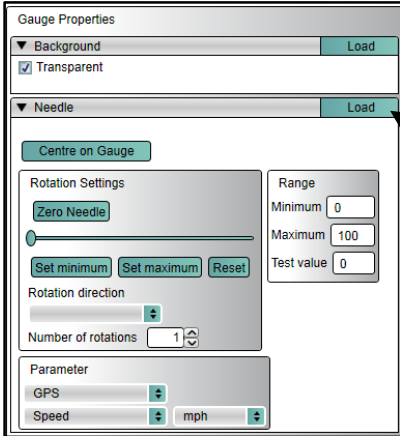
### Choosing a background

The background of the gauge is the face of the element, it can be a .bmp, .jpg or .png file. It can contain the numbers for the gauge, or it could be blank, with the numbers being added in afterwards. Examples:



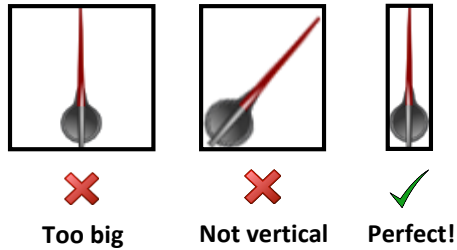
Click **Load Background** and select an image file for your gauge background. If no background is required, click the **Transparent** check-box.

### Assigning a needle

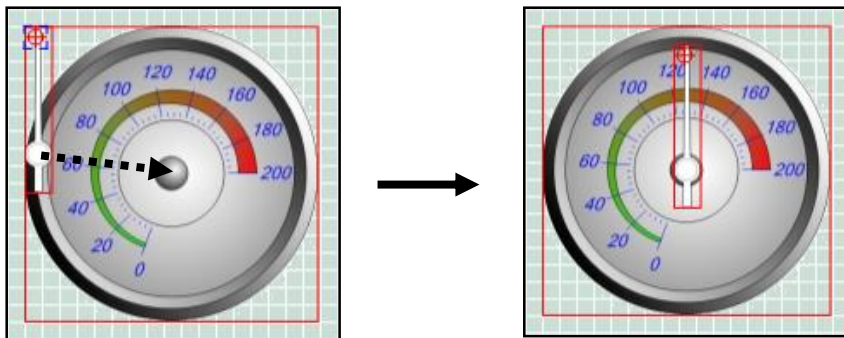


Once a background has been selected, you can now load a needle. The needle is a simple vertical image of a needle and must not have any spare space or borders around the image.

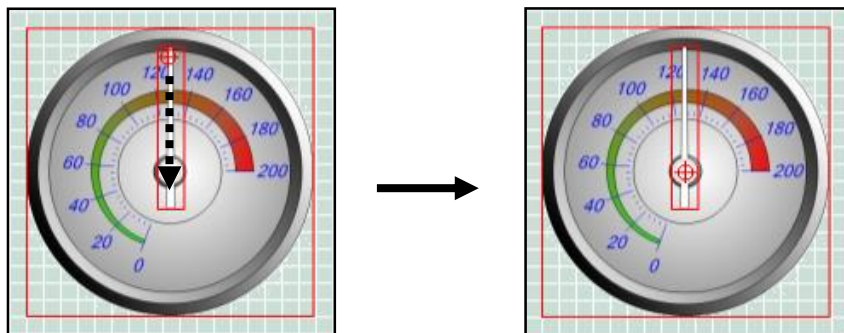
Load needle



### Positioning the Needle



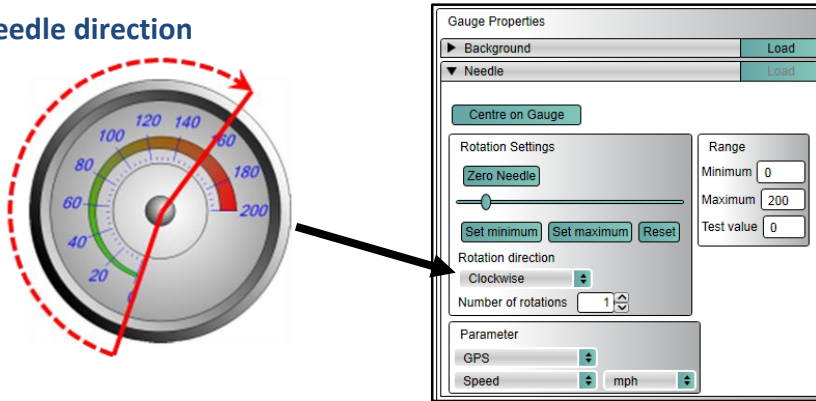
Drag the needle to the centre of the gauge



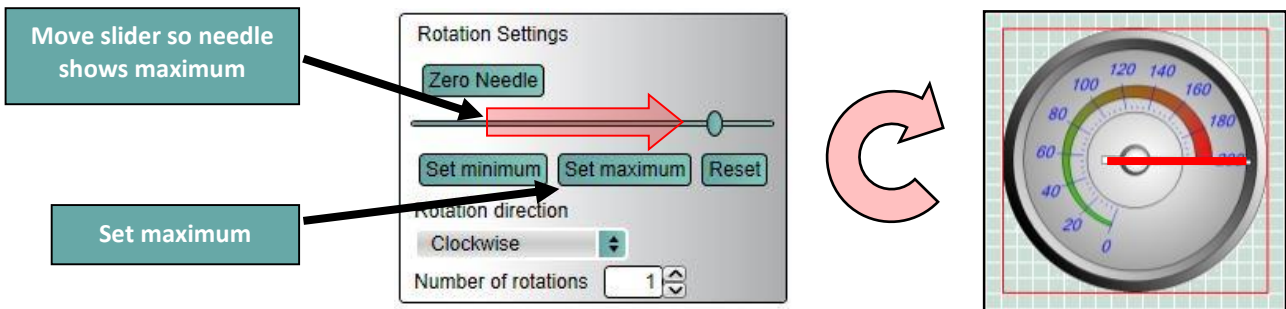
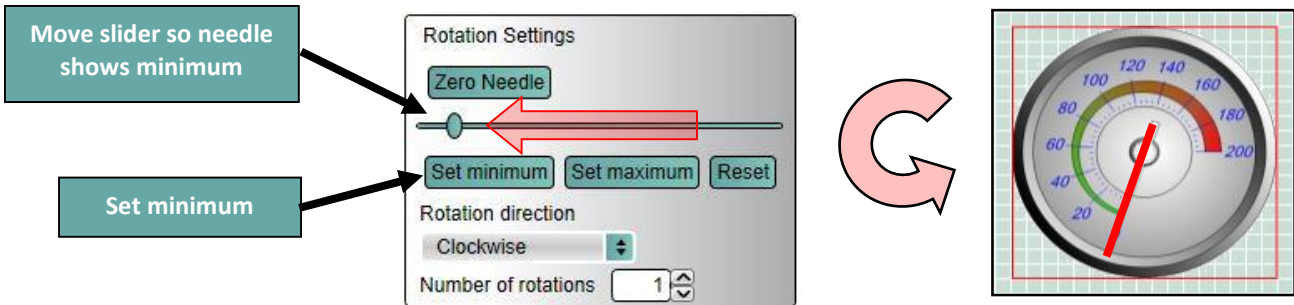
Drag the crosshair to the rotation point of the needle



### Setting the needle direction

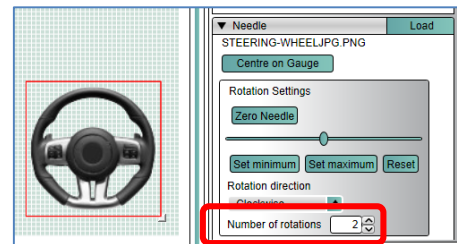


### Defining the range of the needle



### Multiple Needle Rotations

If multiple rotations of the needle are required, enter the number of full rotations required here. If partial rotations are required, the **Set Minimum** and **Set Maximum** function can be used.

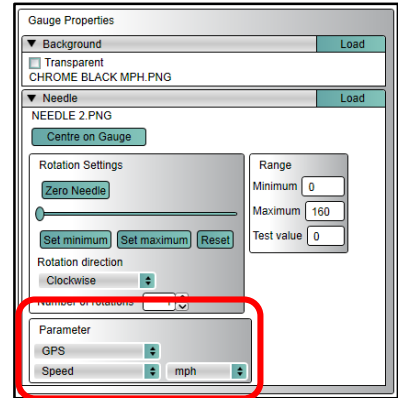


## Assigning a parameter to the gauge

You can use any logged parameter to display on the gauge, select from the **Needle** menu under **Gauge Properties**.

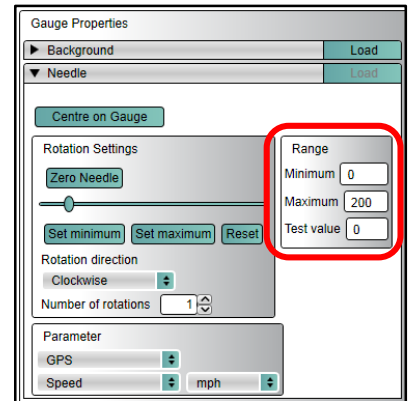
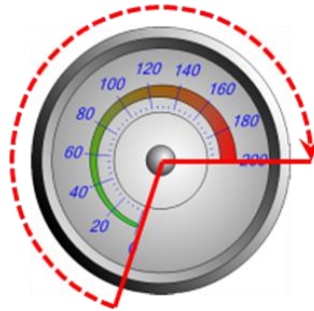
## Changing the units (e.g. from MPH to Km/h)

You can change the units of the parameter using the drop down menu.



## Setting the parameter range

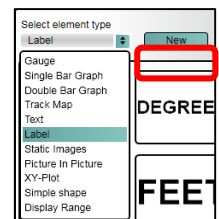
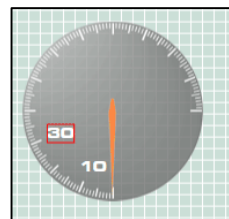
Set the maximum and minimum values to match the face of the gauge. Note you do not have to start at zero.



## Speed labels

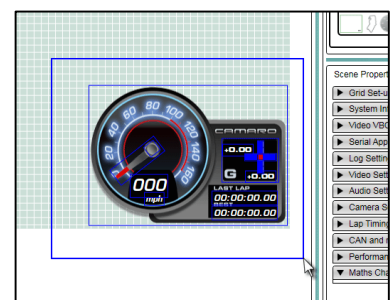
The most flexible gauge to use is a blank gauge without any numbers. To use this element, just drag and drop this gauge from the Elements tab onto your scene. Then you can add the speed labels around the gauge using the **Label** element type.

The speed range does not have to start from zero, it can go from 25 to 125 for example, but make sure you set the Min (25) Max (125) range under **Background** for this element. Note that the needle will always be drawn over the top of any other element.



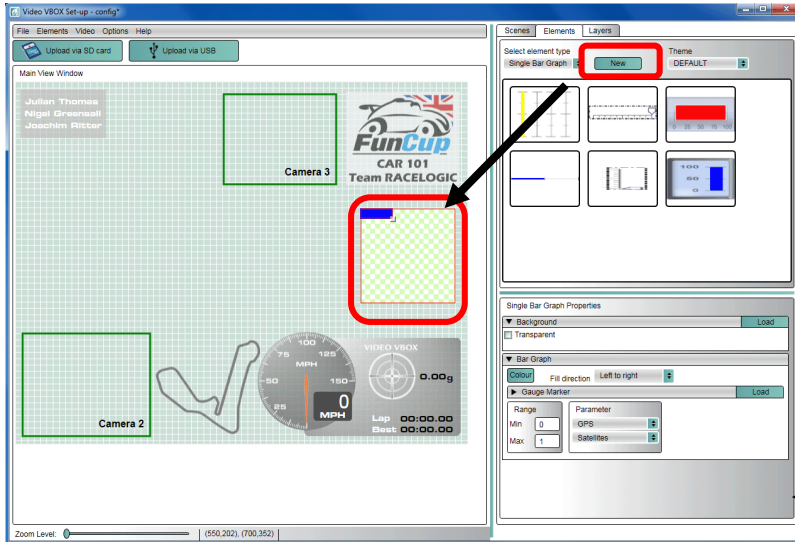
## Moving gauges around

By clicking and dragging a selection box around a number of elements you can create a temporary group, which can then be dragged anywhere on the scene as one item. You can also copy and delete multiple items using this method, just right click over the grouped elements to bring up a menu of functions.





## Creating a Single Bar Graph



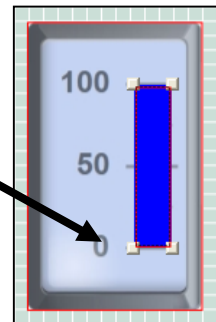
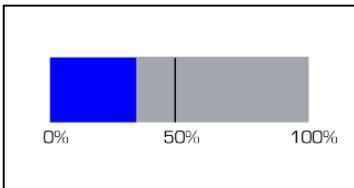
A Single Bar Graph is a rectangular gauge with an expanding bar which can be used to display any data available from GPS or CAN such as Lateral Acceleration (GPS), Engine Temp (CAN) etc.

To create a single bar graph, use the **Elements tab -> Single bar graph -> New**

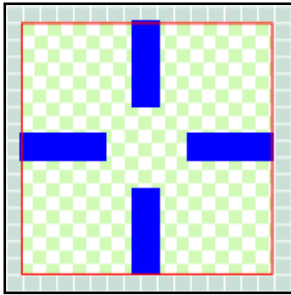
The bar graph element consists of two items, the background containing the scale and outline, and the parameter associated with the bar graph.

The direction, colour, range and marker (moving pointer), can all be changed using the **Gauge Properties** tab.

To change the position, height and width of the fill, simply click and drag the corners of the coloured bar.

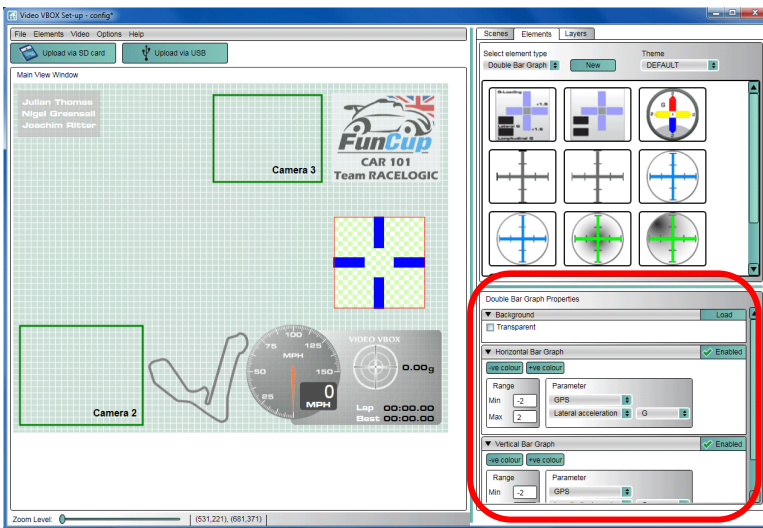
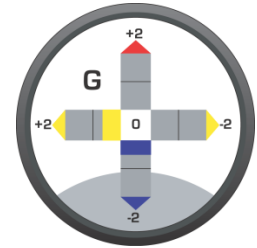


## Creating an XY (G-force style) Bar Graph



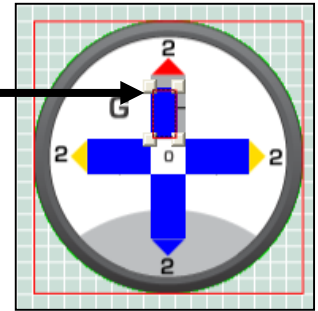
A Double Bar Graph is created in a similar way to the single bar graph using the **Elements tab -> Double bar graph -> New**

The default parameters for this element are **Lateral acceleration** on the X axis and **Longitudinal acceleration** on the Y axis.



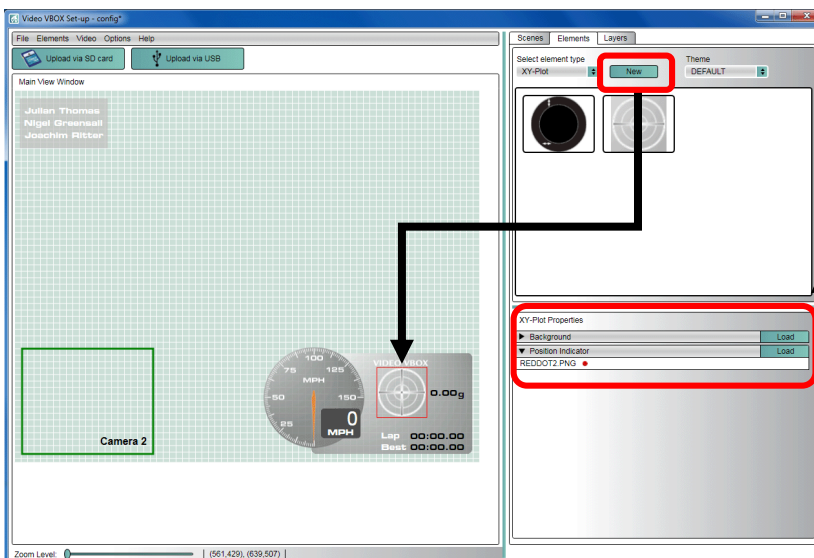
The direction, individual axis colours, associated parameters and ranges are all adjustable using the **Double Bar Graph properties tab** (highlighted).

To change the position, height and width of the fill, simply click and drag the corners of the coloured bar.



## Creating a circular XY (G-force style) gauge

A circular XY Gauge can be used to show G-force as a moving dot. It is created in the same way as the Double Bar Graph but using **Elements tab - XY Plot - New**

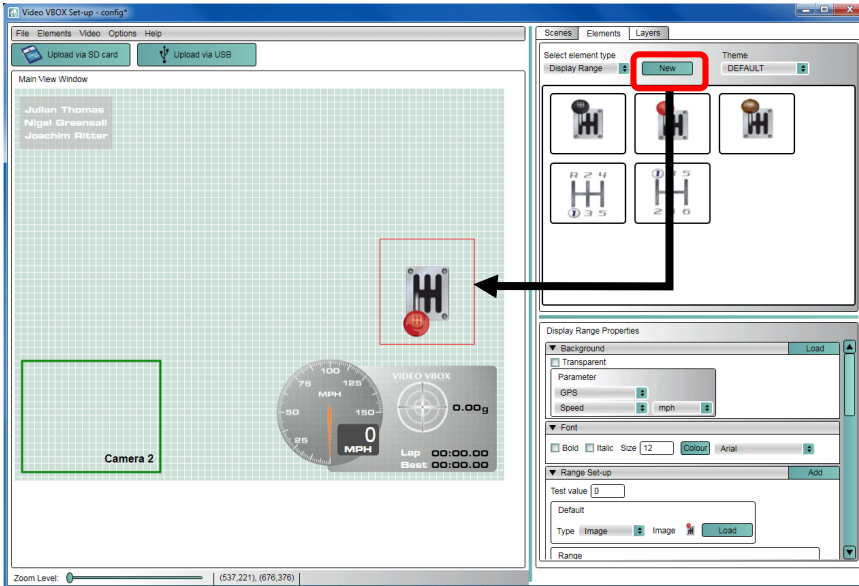


The displayed parameters, ranges and dot type are all adjustable using the **XY Plot properties tab**.

## Creating and setting up a Display Range element

The display range element can be used to show changing text or images depending on the value of a parameter. One example use for this element is to display which Gear is being used. To create a new Display Range, use the **Elements tab > Display Range > New**. This will give you a blank element.

### Example - Showing current gear from RPM and Speed



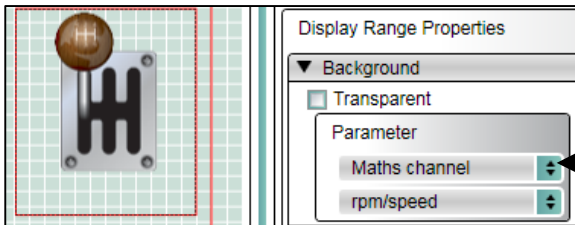
Setting this up is a two stage process.

First, create a Maths channel to calculate RPM divided by Speed. Add this to a text element on the video and record a short journey using every gear.

Review the video and identify ranges for each gear.

For example, you may find 1<sup>st</sup> gear gives a value of 0.1, 2<sup>nd</sup> gear gives a value of 0.2.

This defines the ranges to use for your gear selection.

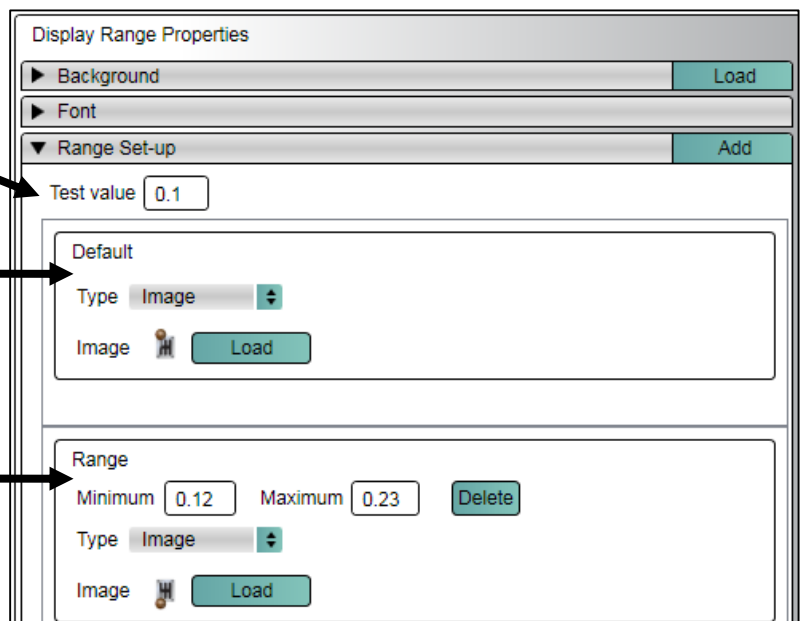


The maths channel must now be assigned to the display range element. This is done in the **Background** section and altering **Parameter** to the maths channel.

A value can be entered to test how the element will work.

Default image/text - this will display when none of the range values are true, e.g. neutral for a stationary vehicle.

The calculated range values for each gear must be entered here along with the image/text chosen to be shown when the specified range value is true.



## Adding a Picture-in-Picture element

A second camera can be used to display an additional image. In this example on the right, the driver is shown. To add a Picture-in-Picture element to the scene, use **Elements tab > Picture in Picture > New**



To adjust the size of the element, click and drag the corners. To change position, click and drag the whole element. To keep the aspect ratio correct, either mark the tick box under PIP properties, or hold down the **SHIFT** key whilst re-sizing the window.

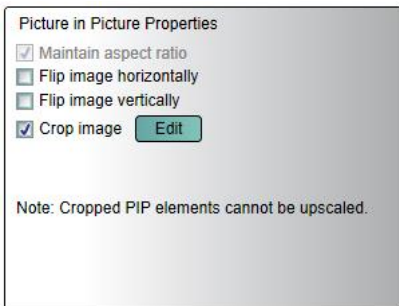
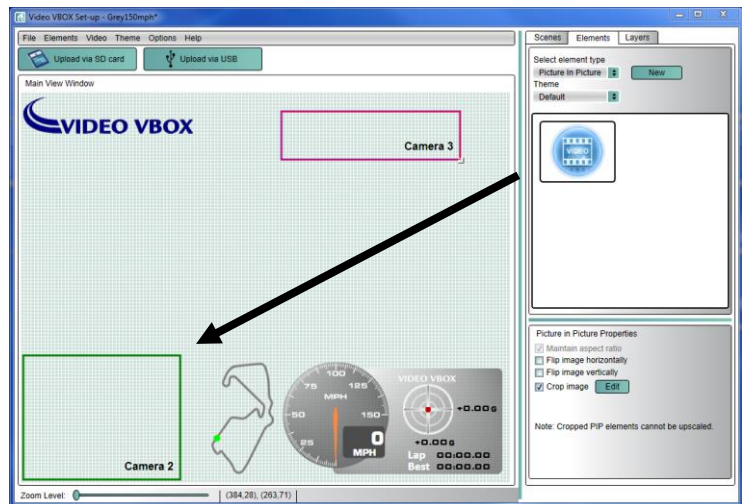
## Cropping a PiP Element

Connect the Video VBOX via USB to the PC.

Select the PiP Element to be cropped and check the **Crop Image** box in PiP Properties.

Connect the camera that feeds the PiP to CAM1 port on the Video VBOX and select **EDIT**.

An Output Preview window will launch with the image feed from the camera. Drag a box across the area to be cropped and click **OK**.



## Flipping a PiP Element

To flip a PiP element select the element and click the relevant checkbox in **Picture in Picture Properties**.

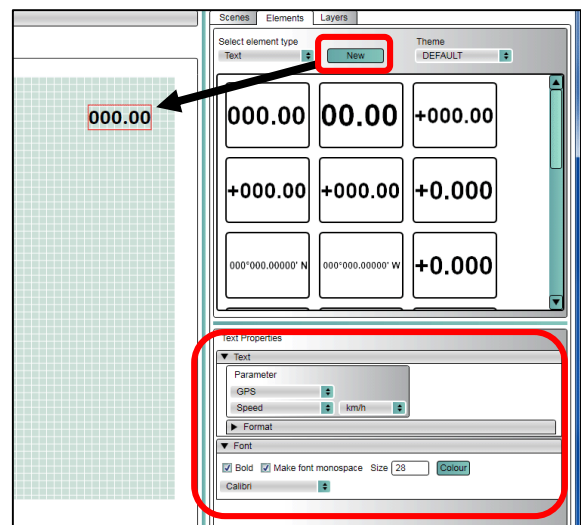
## Adding text elements

Text elements can be used to display any GPS or CAN parameter. To create a new text element use **Elements tab -> Text -> New**.

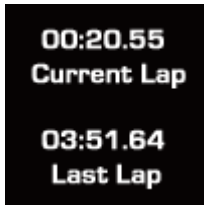
Under the **Text Properties** tab, (highlighted) you can select the associated parameter.

The font, colour and size can be also be changed this tab.

Using a Mono-spaced font stops keeps the numbers neatly aligned as they change value. Keep the size 16 or above so it can be seen clearly on the video.

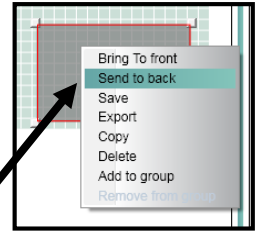


## Adding a solid background to text using the Simple Shape element



With the 'Simple Shape' element, you can easily add a coloured background to make text more visible over the video. This element has a selectable transparency.

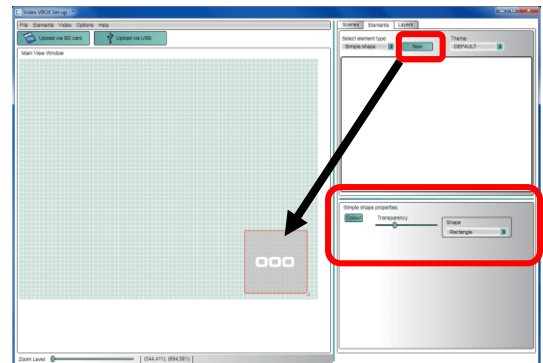
So that the shape does not cover the text element completely, it needs to be behind any text, and this is done by right clicking the Shape element and selecting **Send to back**.



To create a new simple shape element, use the **Elements tab > Simple shape > New**

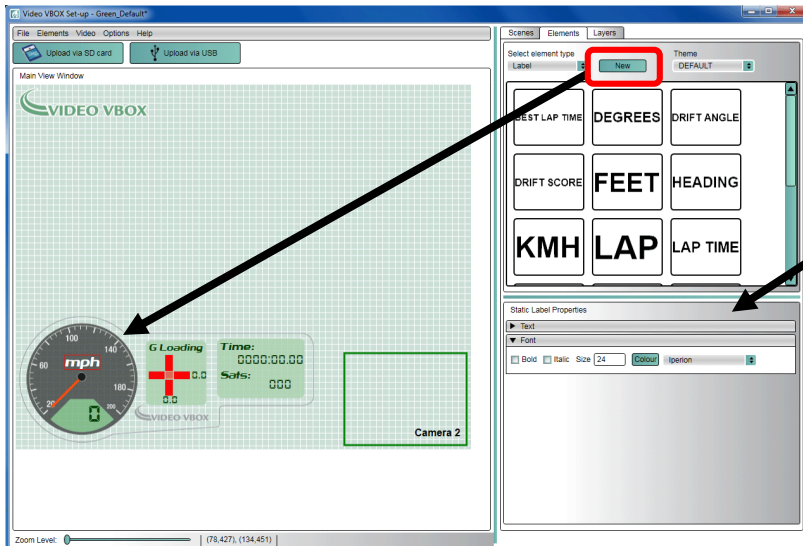
The transparency level and shape can be altered in the **Simple shape properties** tab.

The dimensions of the shape can be altered by clicking and dragging the bottom right hand corner of the element.



## Adding a static text label

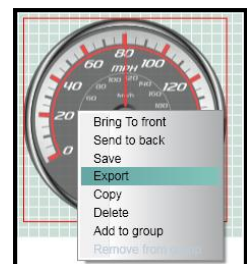
To add non-changing text to the scene, select **Elements tab - Static Label – New**



The text, font, size, appearance and colour can be changed using the **Static Label properties** tab.

## Exporting and Saving Elements

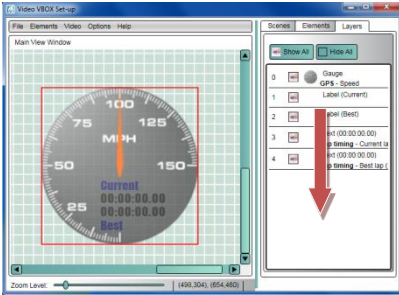
Once an element has been created, such as a gauge, bar graph, Track map etc., you can save this element for use in a different scene. To do this, select the element and right click the mouse button and select **Save**. To share the element with someone else, then use **Export** as this packages all of the files into a single '.ELM' file.





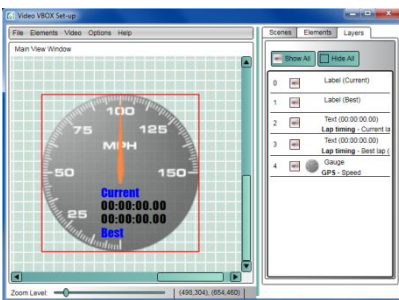
## Layers

Each element that is added to the scene is put on a new layer and each new layer appears above the previous layer. You can change the order of the layers using the **Layers** tab.



In this example, four Lap-timing elements have been created first, followed by a gauge. The gauge now obscures the text elements (even though it is slightly transparent).

To correct this, select the **Layers** tab and click and drag the **Gauge layer 0** to a point past layer 4.

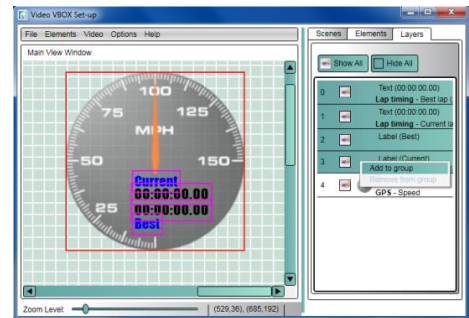


With the gauge now occupying layer 4, the lap-timing elements are now more visible.

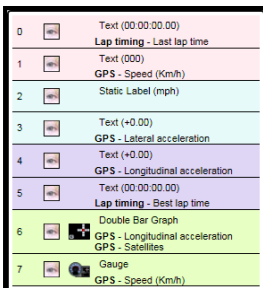
## Groups

If you have multiple elements which are part of one item, then you can group them together which makes moving, deleting, copying and pasting much easier.

Using the previous example, you can group all of the lap-timing elements into one group. To do this, select the **Layers** tab and hold the CTRL key down and select the layers you wish to group. Once they are selected, right click and select **Add to group**. You will then be prompted for a name for this group.

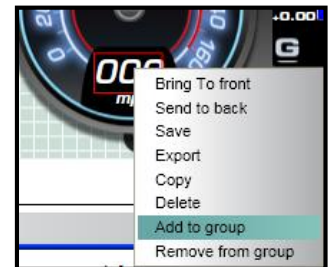


You can now select any element of this group and move them all at once.



Groups are represented in different colours in the **Layers** tab.

It is also possible to add/remove an element to/from a group by right clicking on an element in the preview window.



To create a temporary group, simply hold down the left hand mouse button and drag around multiple elements. They will then be locked together until another item is selected.

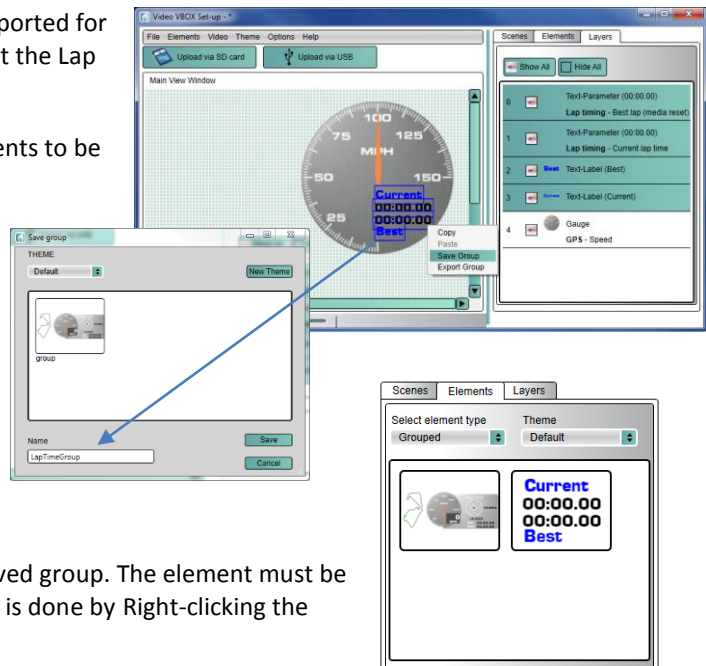
## Saving a Group

Once a group has been created, it can be Saved or Exported for use in other Scenes. In this example we are saving just the Lap Timing Elements.

To Save a Group of Elements, first select all the Elements to be saved and right-click on this selection.

Select **Save Group**, name your Group and select **Save**.

This saved Group will now be available to import from the Elements tab by selecting **Grouped** from the **Select Element type** dropdown.



**Note:** it is not possible to edit an element within a saved group. The element must be removed from the group before it can be edited. This is done by Right-clicking the element and selecting **Remove from group**.

## Video Preview via USB

By connecting the Video VBOX to your PC via the USB cable, you can preview the video output to allow you to check and align your cameras to make sure they are straight. To do this, select **Video – Download output preview from Video VBOX**.



This will cause a floating window to appear with a video snapshot. You must have installed the software USB drivers in order for this function to operate.

Note that the preview updates every few seconds, it is not live video.

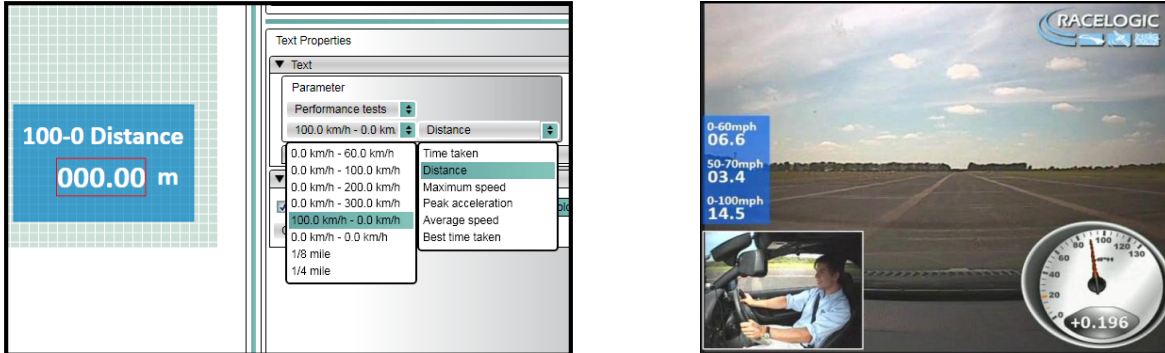
You can load this image into the background of the scene to check the best placement of the gauges, this is done using **Video - Download preview into background**.



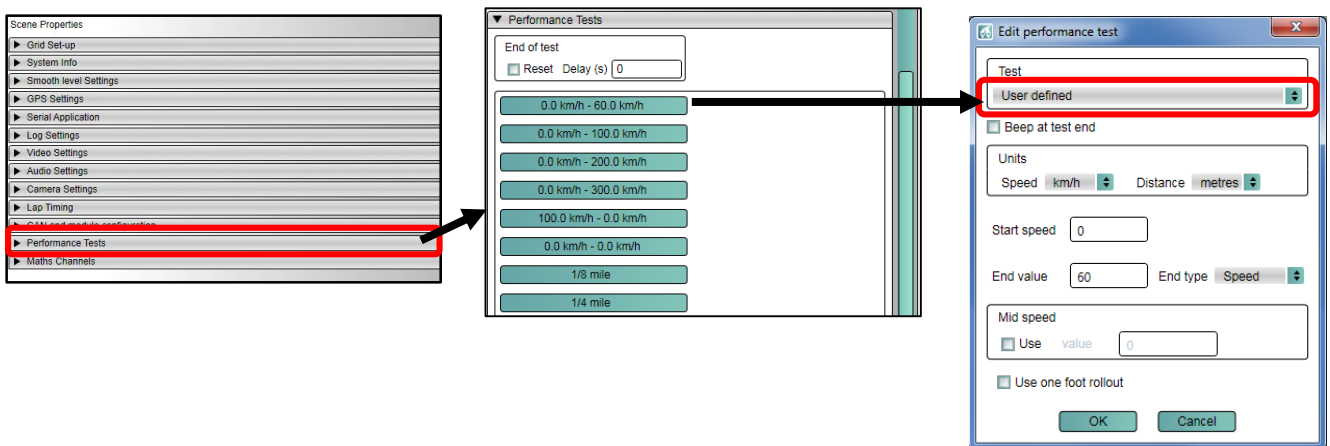
## Performance tests

Performance tests can be displayed live on the Video Overlay showing acceleration times, Vmax and braking times.

To display a performance test result, place a **Text element** on the scene and under **Text Properties**, select **Performance tests** from the **Parameter** drop down box:



There are a number of pre-defined tests already included, you can edit these and create your own in the **Scene Properties** tab under **Performance Tests**:



The type of test and the value displayed (Time taken, distance etc.) can then be chosen from drop down menus. The font, colour, size and format can all be changed from the same **Text Properties** tab.

**Mid Speed** allows you to create a two part test, such as a 0-100-0.

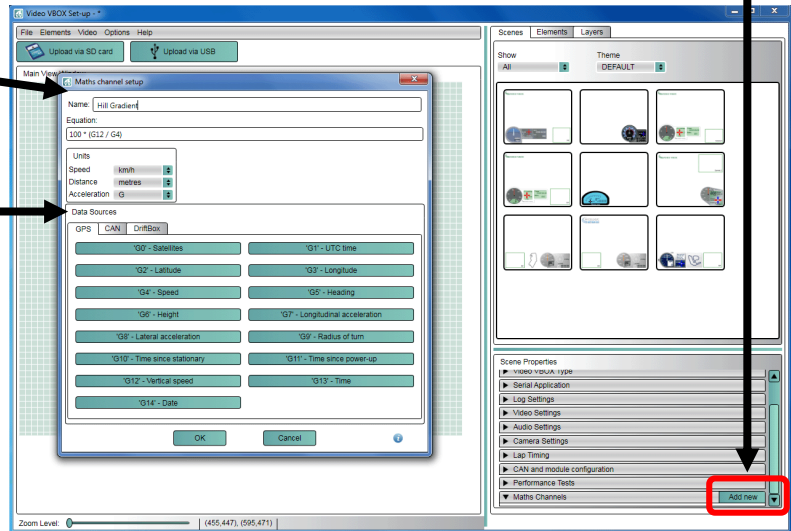
## Maths Channels

Maths Channels can be used to create a new channel to be displayed using a combination of the existing parameters. An example may be hill gradient which can be calculated from the horizontal speed and the vertical speed.

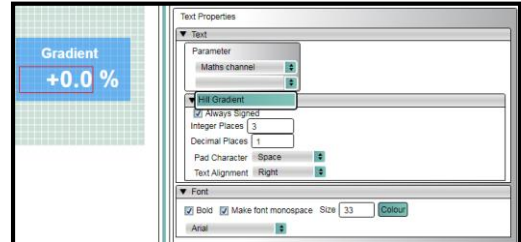
Click on **Add new** under Maths Channel in the scene Properties tab

The equation is then entered into the **Maths Channel setup** window.

Select parameters by clicking on the relevant button in the **Data Sources** tab.

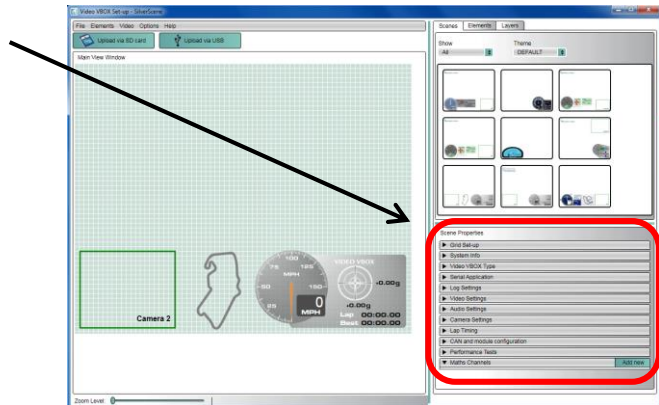


Once a Maths Channel has been defined, you can assign a Text element to use this Maths Channel in the **Parameters** drop down menu in the **Text Properties** tab:



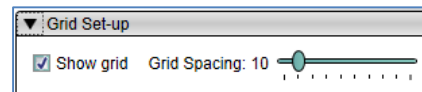
## Scene properties

There are a number of additional parameters in the **Scene Properties** tab which are described below.



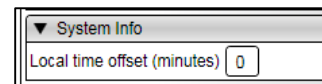
## Grid Setup

This allows you to change the spacing on the grid shown in the main view window.



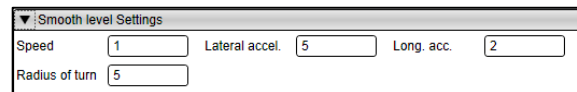
## System Info

By default, the Video VBOX uses UTC time which is Greenwich Mean Time. You can adjust for your local time by changing the Local time offset. Values can be +ve or -ve, and this applies to the file time, displayed local time and filename (if you use time and date for naming of your files).



## Smooth level Settings

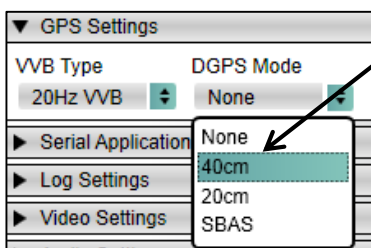
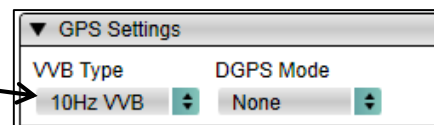
Here you can set levels of smoothing to selected channels to help reduce noise. This smoothing is applied to the channels before they are logged to the VBO data file or displayed in the scene.



## GPS Settings

These are the correct settings when using a standard 10Hz VVB unit.

To use DGPS modes, 20Hz VVB Pro hardware is required.



To use the setting for 40cm accuracy, a Base Station is required.

To use the setting for 20cm accuracy, a firmware upgrade is required as well as a Base Station.

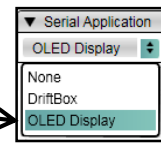
If the SBAS setting is selected, the VVB unit will use GPS and SBAS. No additional hardware is required.

Setting the DGPS mode to 'None' will set the VVB to use GPS signals only.

If any of the incorrect settings are entered, or a Base Station is not detected when required, only GPS signals will be used.

## Serial Application

By default, the Video VBOX is setup to communicate with an OLED display via the Serial Port. You can change this to work with the DriftBox using this option.

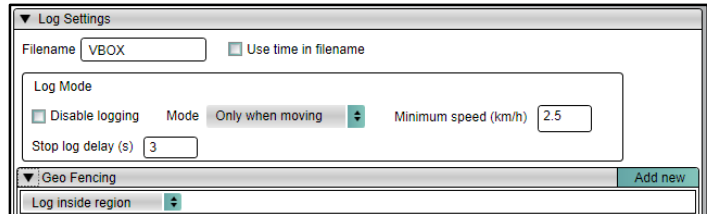


## Log settings

The default filename for Videos and '.vbo' files is VBOX0001.avi and VBOX0001.vbo. You can change this prefix using the Log Settings tab, or choose to use the Time and Date instead.

e.g.VBOX\_20100803153038\_0001.vbo

Which is [Year][Month][Day][Hour][Minute][Second].



## Logging Modes

**Only when moving:** Logging will commence when speed exceeds a configured value and cease when the vehicle has remained stationary for a configured value. Default setting is 2.5km/h and a Stop log delay of 3 seconds.

**Continuous:** the Video VBOX will commence logging as soon as media becomes available.

**Manual:** Logging will only start/stop by pressing the REC button.

**CAN:** Logging will be controlled by a set of configured CAN parameters.

## Geo Fencing

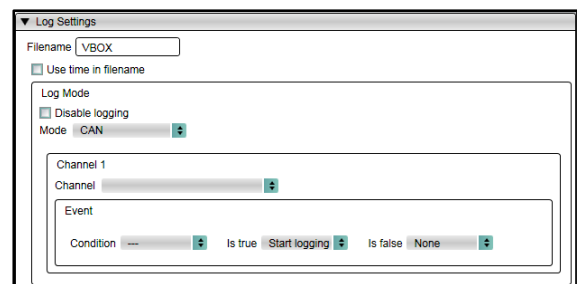
This allows the logging function of the Video VBOX to be linked to a defined geographic location. A Google Earth KML file (with a maximum number of 50 points) can be loaded here. This will set the Video VBOX to only log inside or outside the defined area.

If the region conditions are not met, the Video VBOX will not log at all – it will **not** respond to the REC button on the front panel. Once the geo-fencing conditions are OK, then the unit will use the logging settings as set and operate as normal.

## CAN logging control

Logging can be controlled over the CAN bus using this setup screen. Firstly setup a CAN channel in the CAN and module configuration tab, and then select this channel in the logging control.

The conditions for starting and stopping the logging can then be defined.



## Digital IO Event Marking

By default, the **Digital IO** mode is set to control logging from a Remote Start/Stop switch. This can also be configured so that instead of controlling logging, an Event Marker will be set in the .vbo file whenever the button is pressed.

## Video Settings

If **No camera no video** is enabled, disconnecting all cameras stops the '.avi' video file from being created, but the '.vbo' data-logging file is still written. This tab also allows you to change between **NTSC** and **PAL** (default) and also set the Video Quality (default high).



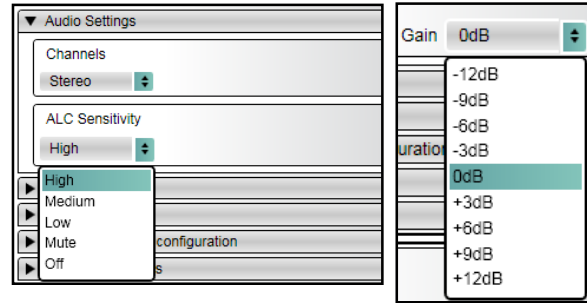
## Video Quality storage requirements

- High: ~2Gb per hour
- Medium: ~1.8Gb per hour**
- Low: ~ 1Gb per hour

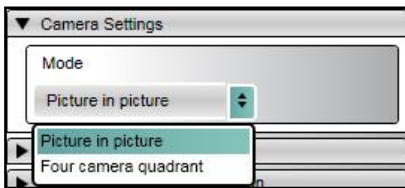
## Audio Settings

By default two channels are enabled for Audio, but if you only have one microphone, then set audio to **Mono**, and the sound will then be recorded on both channels.

**ALC Sensitivity**, this is the Auto Level Control and by default it is set to high. By setting to **Off** you can then manually adjust the gain, which is useful for more precise line input control.



## Camera settings



By default the unit works with Camera 1 as the main picture, and additional cameras appear as picture in pictures.

By setting **Four camera quadrant** mode, all four cameras are divided up equally in a square.

CAM 1	CAM 2
CAM 3	CAM 4

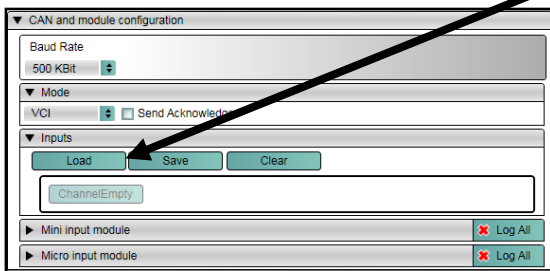
**Floating camera** option allows for all camera inputs to be assigned to a Picture in Picture element, opposed to one main shot with secondary PiPs on layered on top.

## CAN

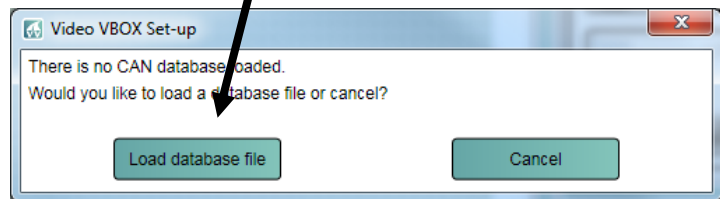
### Defining a CAN channel

Video VBOXs can connect to the CAN bus of your vehicle to log and display additional parameters such as RPM, Throttle angle and Brake pressure. In order to do this, the protocol for the particular vehicle must be entered into the **Scene Properties** under **CAN and module configuration**.

If you wish to connect to your vehicles CAN bus system, please download the relevant CAN file from the Racelogic website. Once you have the correct CAN file, to setup a CAN channel for your vehicle, click on **Load** under **Inputs**.

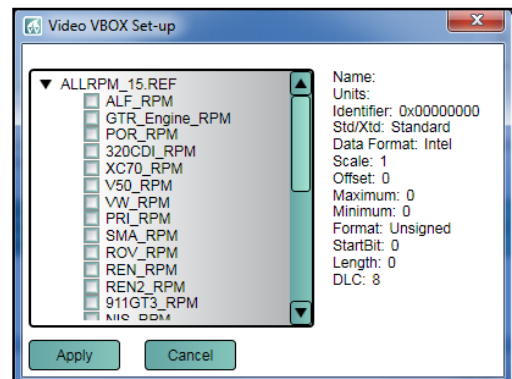


Now click on **Load database file** and select the file for your vehicle.



Some CAN files available are for multiple vehicles. By selecting the RPM only list, the number of options is vastly reduced, and the vehicle make is defined in the first 3 characters of the parameter, such as POR for Porsche, REN for Renault etc. Some cars are listed by the model.

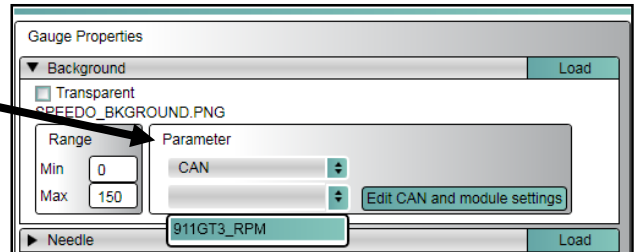
Select the closest match to your vehicle and click **Apply**. A Can channel will then be assigned to this CAN message.



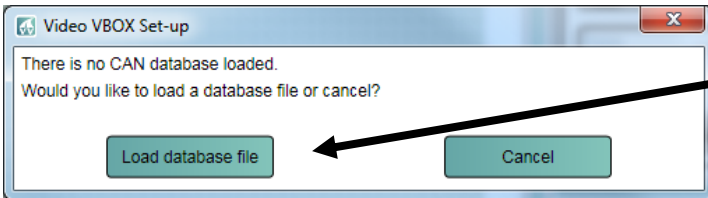
### Assigning a CAN channel to an Element

To display a CAN channel, select the chosen Element, Open the Element’s properties and select **CAN** from the pull down list under **Parameter**.

A list of all the defined CAN channels should then appear below, select the channel you wish to display.



### Using your own database (.dbc) file

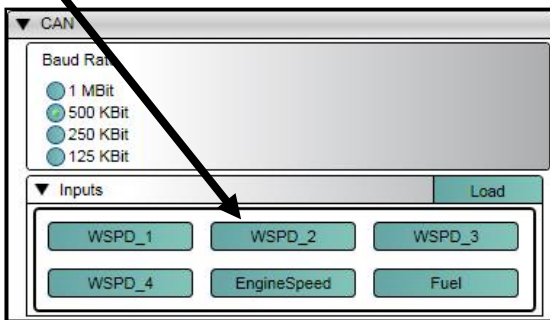
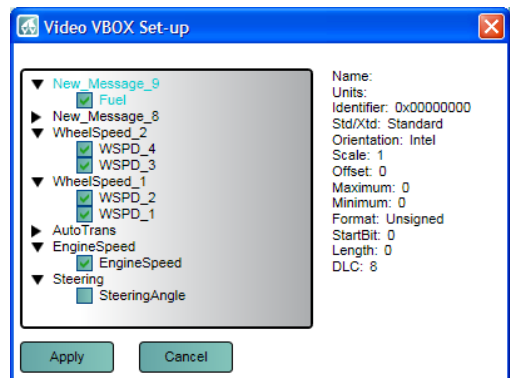


Under **CAN and module configuration**, select **Load**, and then **Load database file**.

Your Database file will then be displayed and you can tick the boxes alongside the message you wish to assign to a CAN channel. If you tick multiple boxes, then multiple CAN channels will be assigned.

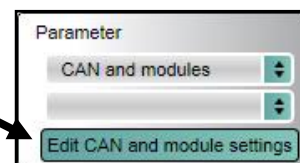
The CAN channel can then be assigned to an Element in the same way as described in the previous section under ‘Assigning a CAN channel to an Element’.

You can change the CAN channel by clicking on the channel in the CAN tab.



### Loading a CAN Database from Element Properties

The database file can also be loaded by selecting **CAN and Modules** from the Parameter drop-down in the element’s **Properties** tab.

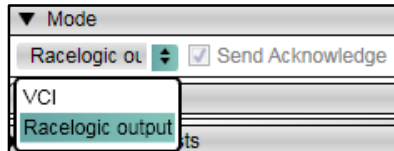
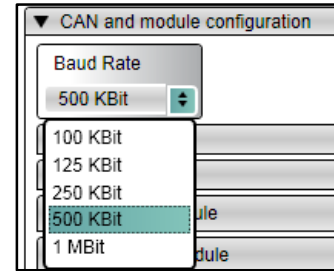




## Advanced CAN Options

### CAN Baud Rate

The default Baud rate of the Video VBOX is set at 500 KBit, the user has the option of selecting 100, 125, 250 or 500 KBit, and 1MBit.



### CAN Mode

The **VCI** CAN mode should be selected if the Video VBOX is to be connected to a vehicle CAN bus.

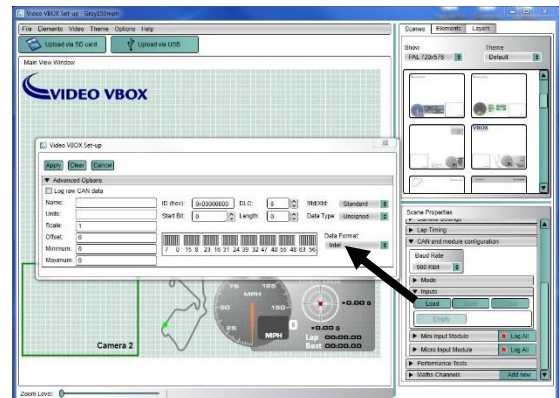
The **VCI** CAN mode + Send acknowledge box should be selected if the Video VBOX is to be connected to any modules such as the ADC03.

The Racelogic Output mode should be selected if the Video VBOX is to be connected to a CAN logging device. If this mode is selected, the Video VBOX will transmit GPS channel data onto the CAN bus.

**Send Acknowledge** – Racelogic modules and other CAN data-loggers and sensors require an acknowledge pulse to be sent. However, it is not recommended to send these messages when connected to a vehicle’s CAN bus.

### Manual Editing of CAN Parameter Fields

If you know the format of the CAN messages you wish to log, then click on the CAN channel that is to be modified and click **Advanced Options**.

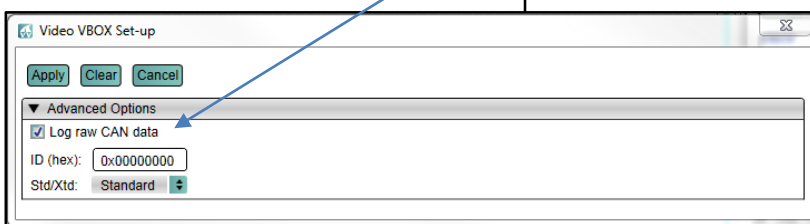
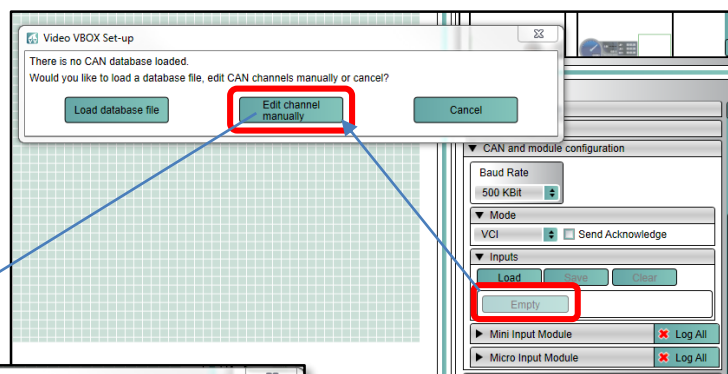


### Logging Raw CAN

Raw CAN data can be logged and assigned to a Text Parameter element. A CAN database is not required.

To set up a Raw CAN channel, ensure that VCI mode is selected, Send Acknowledge is unchecked and Baud Rate correctly set. Select an **Empty** Input Channel and then **Edit channel manually**.

Check the **Log raw CAN data** check-box and enter the **ID** to be logged. Click **Apply** and the channel will be available to assign to a Text Parameter element.



**Note:** Raw CAN data will only be displayed on the overlay. The Raw CAN channels are not compatible with VBOX Tools Software.



## Connecting to the Vehicle CAN Bus

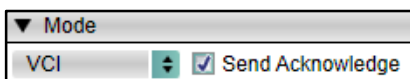
If the Video VBOX is to be used to log and display CAN data from the vehicle, the Video VBOX needs to be connected to the vehicle's OBD (On-Board Diagnostics) port or directly into the CAN bus depending on the model. Most vehicles have an OBD connector which provides this interface.

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

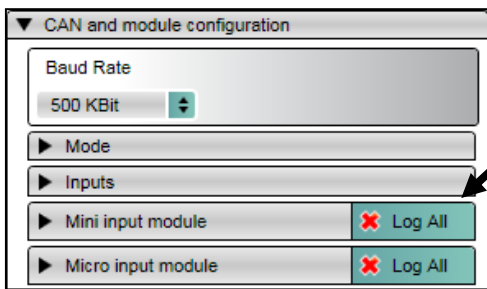
**Note:** If a connection needs to be made to the Vehicle CAN Bus, we strongly recommend contacting a qualified auto-electrician to perform the fitting.

## Configuring the Video VBOX to use a Mini/Micro Input Module

You can also use a Racelogic Input module to log external signals such as RPM, Throttle angle etc.

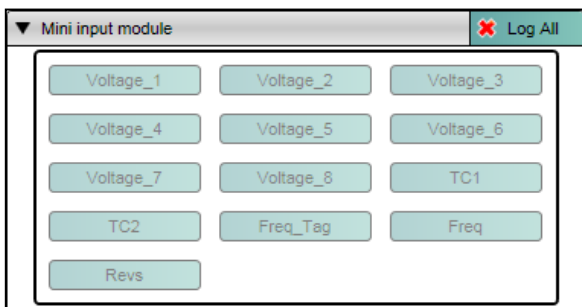


To work with a Mini/Micro Input Module, set CAN mode to VCI.



Under **CAN and module configuration**, the quickest method is now to enable **Log All** in the relevant tab. **This will now log every channel in the module in the default units (volts and Hz).**

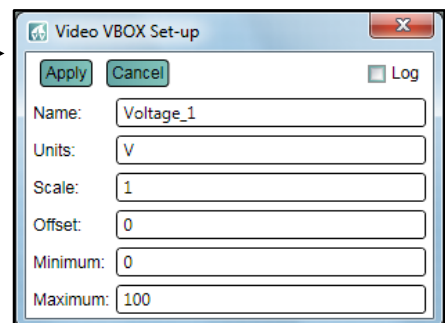
However, if you want to configure the module in more detail (i.e. change units and scaling) then open up the relevant tab, either **Mini input module** or **Micro input module**.



You can now configure each channel by clicking on the button.

The name, units, scale, offset, maximum and minimum can then be defined.

Click on button



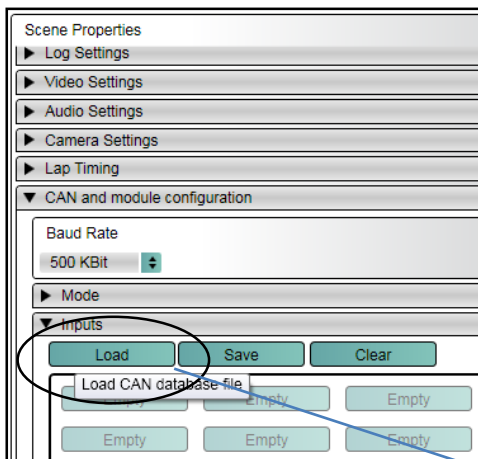
**PLEASE NOTE: You cannot log from the vehicle CAN Bus at the same time as using a Micro or Mini Input Module.**

## Setting up a Video VBOX for use with other Racelogic modules

Compatible Modules: ADC03, ADC02, IMU02, IMU03, YAW02, YAW03, FIM02, FIM03, TC8, IMU04.

**Note:** We recommend using terminating resistors with Racelogic modules. Lemo connectors with built in terminating resistors can be purchased from Racelogic. (**RLACS165** – Standard Lemo, **RLACS165-S** – Splash-proof Lemo)

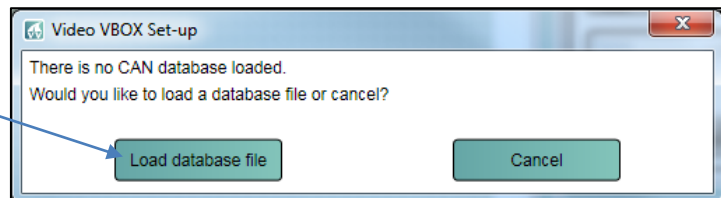
To log data from a module, you need to load in the CAN module database.



In Scene Properties expand **CAN and module configuration** then **Inputs**.

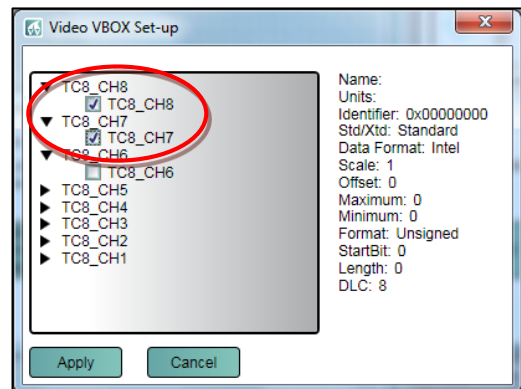
Please download the relevant CAN file for your Racelogic module from the Racelogic website.

Once you have the correct CAN file, to setup a CAN channel for your vehicle, click on **Load** under **Inputs**.



When you have opened the relevant .dbc file, you have to select the channels you wish to log.

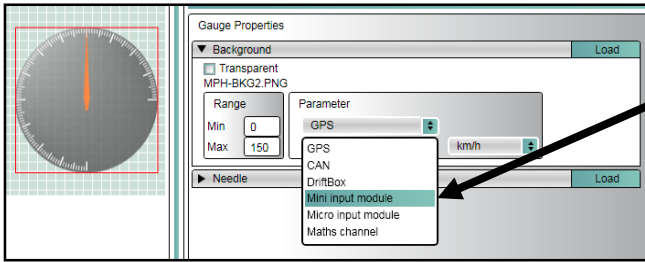
To do this, you simply expand and then tick the desired channels. When you have selected all the channels you need click **'Apply'**.



You will now see the selected channels appear under the 'Inputs' section under the 'CAN and module configuration' in scene properties. These are now loaded and will be logged to the VBO file. They can also now be assigned to an element.

**PLEASE NOTE: You cannot log from the vehicle CAN Bus at the same time as using a Racelogic Input Module.**

## Assigning a Module channel to an Element



To use an Input Module channel with an element, select Mini input module from the **Parameter** list when creating the element. The list of Input Module channels will then become available for selection in the parameter drop down list.

## Setting up the Mini Input Module for use with the Video VBOX

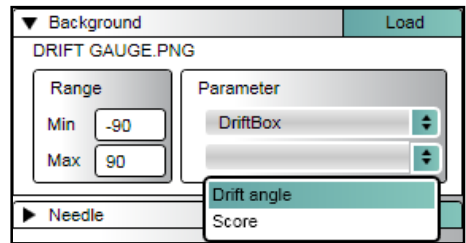
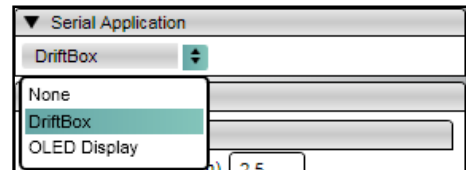
To ensure the Mini Input Module has the correct settings for use with the Video VBOX the correct settings may have to be uploaded into the MIM using the [Stand Alone Setup Software](#) and loading in the 'vbmim01\_vvb.rms' configuration file available from the software download section of the [VBOX website](#).

## Displaying DriftBox Parameters

The Video VBOX does not produce Drift Angle or Score, you must have a Racelogic DriftBox and a CAB045 (Pro) or CAB098 (Lite) serial-to LEMO Cable to provide the Drift Angle and Score data to the Video VBOX.

To select either Drift Angle or Score for use as an Element data source:

1. First select **DriftBox** in the **Serial Application** dropdown under **Scene properties**
2. Select the relevant element in the scene
3. In the **Parameter** Selection dropdown select **DriftBox**
4. Select **Angle** or **Score**



## Recommended Software Tools

Listed below are a few suggestions for some software packages/tools that can be used in conjunction with the Video VBOX setup software.

### Video Players:

VLC player	Free	Video player of most video formats.
Irfanview	Free	Image editing and video utility.

### Design Tools:

Adobe Illustrator	££	Vector graphics creation and editing tool.
Adobe Photoshop	££	Image editing Software.
Gimp	Free	Vector graphics creation and editing tool.
Inkscape	Free	Vector graphics creation and editing tool.

### Video Repair Tools:

DivFix++	Free	Tool for fixing corrupt or damaged AVI files.
----------	------	---

### Codec packs:

Xvid	Free	XVid Codec pack is installed with video VBOX setup software, but is available for download off the web.
------	------	---

## APPENDIX 1: Calculating scale and offset of an Input parameter

This article shows how to convert the data from a Mini/Micro input module into a more meaningful format, for example converting a voltage from a throttle or brake pedal into something more useful like a throttle pedal percentage 0-100%.

It should be noted that this calculation only works for linear data where the plot of the data produces a straight line.

We have a 'scale and offset calculator' on our website at [www.vboxmotorsport.co.uk](http://www.vboxmotorsport.co.uk).

### 1: Obtain zero and full scale voltage values

For example, say the throttle position sensor gives 0.5 volts on closed throttle, and 5 volts at full throttle.

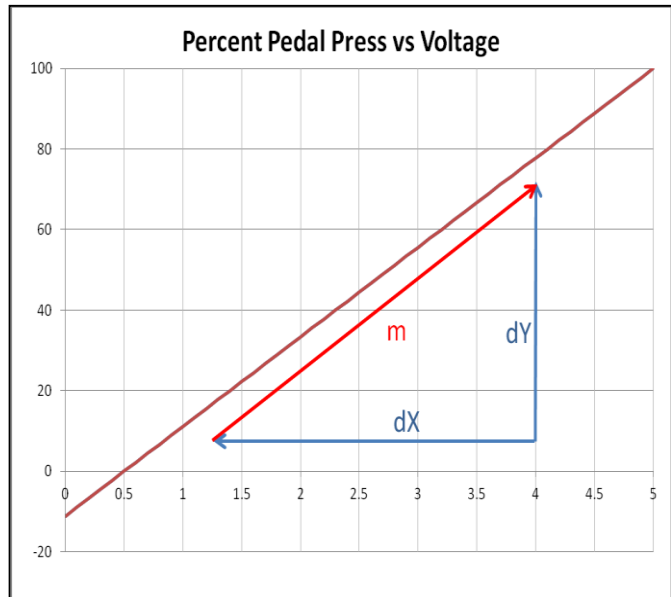
To convert this into a percentage, the equation of the straight line needs to be calculated.

The equation describing a straight line is as follows:

$$Y = mX + c$$

Where;

- Y = The Y values (% pedal press)
- X = The X values (sensor voltage)
- m = scale (gradient of the line)
- c = offset (intercept with the Y-axis)



### 2: Calculate the gradient of the line

The gradient of a line is the change in Y divided by the change in X which gives:

$$m \text{ (gradient)} = dY/dX \quad (\text{change in Y}) / (\text{change in X})$$

$$dY = 100 - 0 = 100 \quad \text{change in Y} = 100\% - 0\% = 100$$

$$dX = 5 - 0.5 = 4.5 \quad \text{change in X} = 5 \text{ volts} - 0.5 \text{ volts} = 4.5$$

Therefore the gradient of the line is:

$$dY/dX = 100 / 4.5 = 22.22 \quad \text{The Scale is 22.22}$$

### 3: Calculate the offset

To find the offset value, substitute the known values at zero throttle, back into the equation:

$$Y = \text{percent} = 0, X = \text{Voltage} = 0.5 \text{ V}$$

$$Y = mX + c \quad \text{Therefore}$$

$$0 = (22.22 * 0.5) + c \quad \text{Zero throttle\%} = \text{gradient} \times 0.5 \text{ volts} + \text{Offset}$$

$$0 = 11.11 + c$$

$$C = -11.11 \quad \text{The Offset is -11.11}$$

**4: The full equation for the line**

Substituting these values back into the equation again gives us the full equation of the line which passes through our two points.

$$Y = 22.22X - 11.11$$

**5: Checking the equation**

We can double check our equation is correct by calculating a percentage value for a known voltage output. We know that:

Voltage (x)	Percent Pedal Press (y)
0.5	0
5	100

Using the equation we have just derived produces the following results:

$$Y = 22.22X - 11.11$$

$$Y = (22.22 * 0.5) - 11.11 = 0\%$$

$$Y = (22.22 * 5.0) - 11.11 = 99.99\%$$

This is correct, as 0.5 volts is equal to a 0% pedal press.

This is also correct as we know that 5 volts = 100% pedal press.

**8: Plotting the full line**

The graph below illustrates the calculated scale and offset values.

