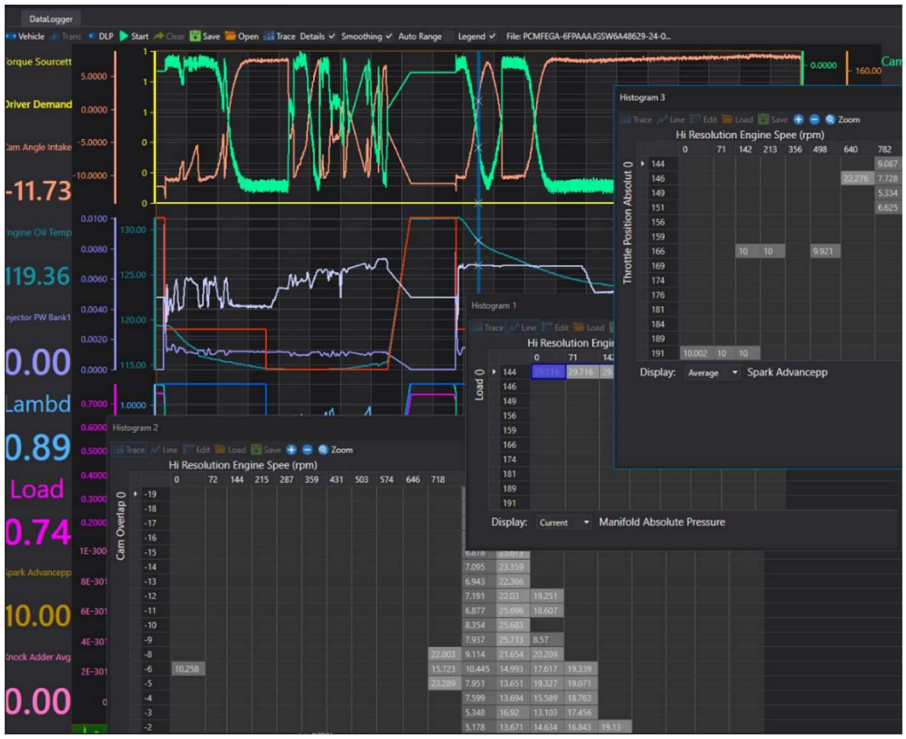
PCMTec Datalogger User Guide

BA to FG-X FALCONS
SX to SZ II TERRITORY
6th Gen MUSTANG
13th Gen F-150



VERSION 2022 / 2.1x

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When to use this guide

This manual is applicable to data logging the following vehicles:

- BA to FG-X Falcon

- SX to SZ II territory

- 6th Generation Mustang

- 13th Generation F150

The PCM's and software are very similar for all variants of these engines. Some of the channels shown may be available for some models, but not available for other models.

Please note that this manual contains some engine specific information and should acknowledged that individual circumstances may vary.

When NOT to use this guide

This guide is not applicable to any other software package other than PCMTec or vehicles not listed above.

The information in this guide MAY be suitable for engine/transmission conversions, PCMTec cannot provide support or guidance on engine swaps due to the variability and technical challenges of these applications.

How to use this guide

- Read the entire guide and understand the process.
- Make small incremental changes. Always test and validate the changes
- Never make a change if you are unsure
- This guide extensively uses text colour to identify areas of interest:

Red text: IS A WARNING MAKE NOTE OF THIS INFORMATION TO PREVENT DAMAGE

Blue text: IS INFORMATIONAL ABOUT VALUES THAT MAY VARY FROM VEHICLE TO VEHICLE

Green Text: IS GENERAL INFORMATION

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Before You Start

Make there is familiarisation with this guide, and it has been read at least once.

Make sure you have registered for PCMTec and purchased the requisite licence.

Before doing any tuning ensure the vehicle is mechanically sound without faults. It can be a losing battle tuning a vehicle with mechanical faults. It is recommended to scan the vehicle with a professional OBD scanner to verify there are no fault codes reported and perform a full mechanical inspection and service.

Example: if the ABS has a faulty sensor and cannot report back the vehicle speed then there will be no end of difficulty trying to fix torque cuts during tuning.

In lieu of a scan tool, use the free software *ForScan* which does an excellent job of reporting all the errors on all the modules and is compatible with most of the same cables as PCMTec.

OBDLINK® EX is the PCMTec recommended tool for ForScan. It is possible to use a J2534 Cable, such as OpenPort 2.0, but it will only return high-speed bus modules. Such as PCM, ABS, TCM etc.

A suitable J2534 Cable is required for PCMTec to connect to the vehicle, the following cables are recommended and preform reliably:

- Drewtech Mongoose (JLR or Ford Variant)
- Tactrix OpenPort 2.0

Before attempting to tune any vehicle always install the following equipment

- Knock detection device
- Wideband lambda gauge
- Fuel pressure gauge
- Boost gauge

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1. Overview

This document covers the use of the PCMTEC Datalogging toolkit for versions 2.xx. The datalogging toolkit is a powerful software package that can be used to real time data collection to support tuning activities.

This guide is specifically written for workshop users that have access and tune on a dyno, as well as other tools-of-the trade. While this will be of interest to end power-users it's never recommended to undertake this sort of tuning without a dyno and appropriate tools.

The data logger is built into the PCMTec editor, and allows you to seamlessly log your vehicle, and switch between the Navigator and Flashing windows during a logging session, and then continue logging after re-flashing and restarting the vehicle.

It also provides histogram and table trace functions, and customisable features which can be saved into layout files.

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2. Prerequisite Understanding

- User must possess and understand how to use a computer.
- User must have purchased and installed PCMTec edit

Interface Cables

You will need a suitable J2534 Cable to connect to the vehicle and use PCMTec Editor or Datalogger, the following cables are recommended and are tested with PCMTEC:

- Drewtech Mongoose (Ford or JLR)
- Tactrix OpenPort 2.0

You can check the PCMTEC website for links to various distributors for these cables.

Consult the manual or website for your cable to make sure you have installed the correct drivers for your system.

You must install the cable drivers for the cable to work and have it configured for J2534 Operation. In the case of the Tactrix or Drewtech no additional configuration is required other than driver installation.

Limitations

Rates of parameter updates are dependent on vehicle being logged and number of channels selected. Select the most important channels required for tuning. Note: BA Falcon does not offer rapid logging, and BF and later offer approximately 15 rapid packet channel parameters.

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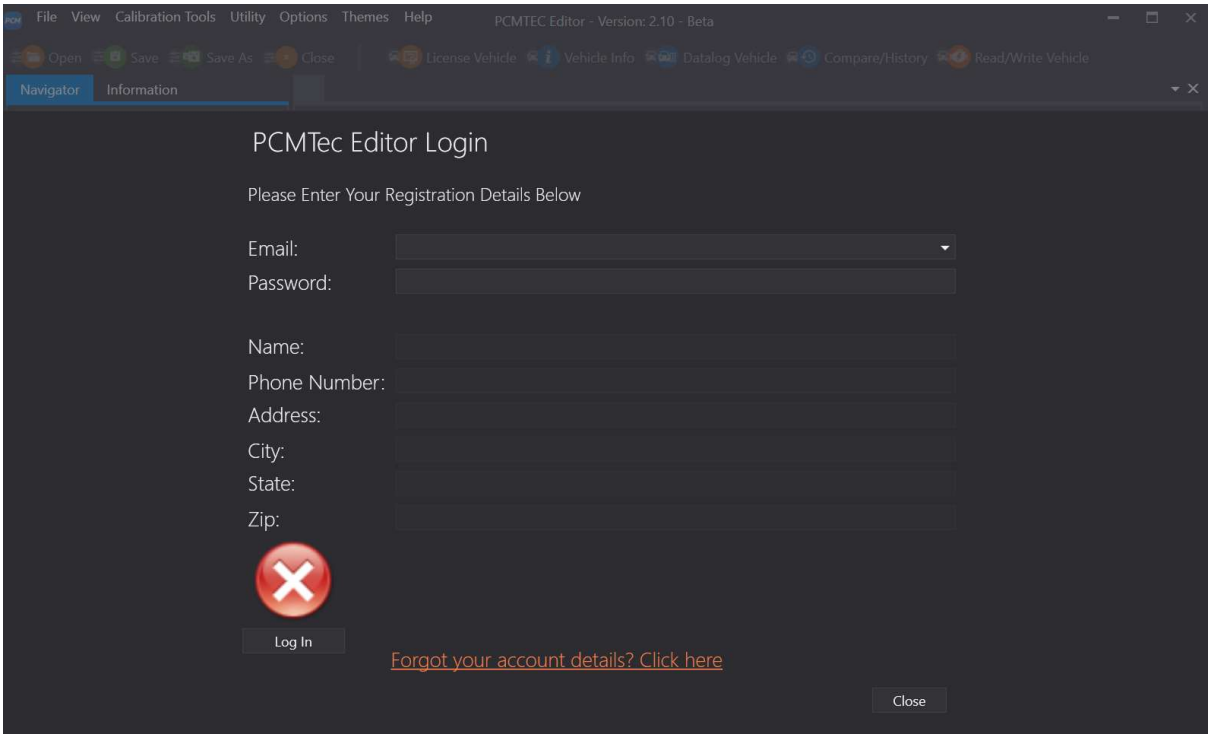
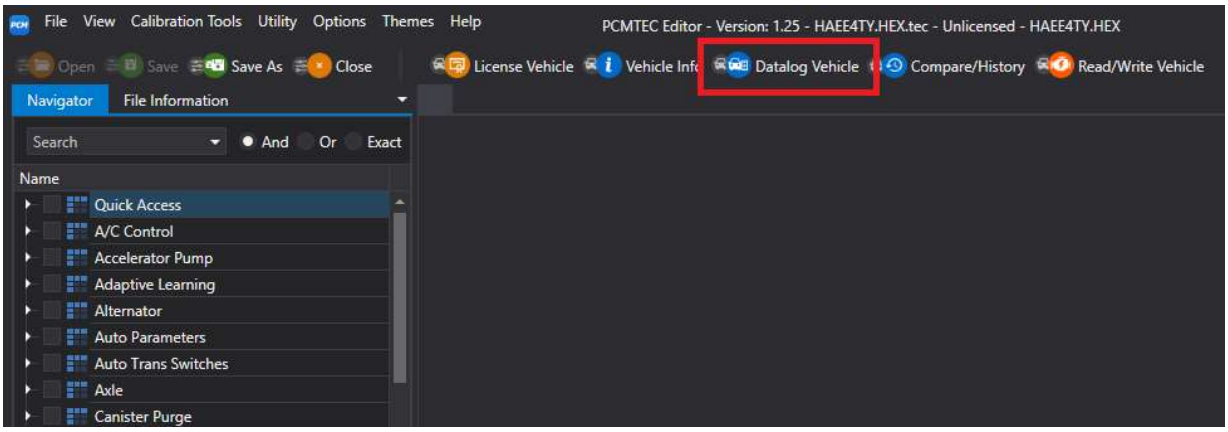
3. Introduction to PCMTec Datalogger

After installing and running the editor, you will be required to log into the PCMTEC Editor. Use the login details provided with your licence registration email.



Open data logger using the 'Datalog Vehicle' icon in the top panel of the screen



Once the Datalogger window is opened, and the vehicle ignition turned on, the data logger will automatically connect to the vehicles PCM and a set of default channels will automatically be selected.

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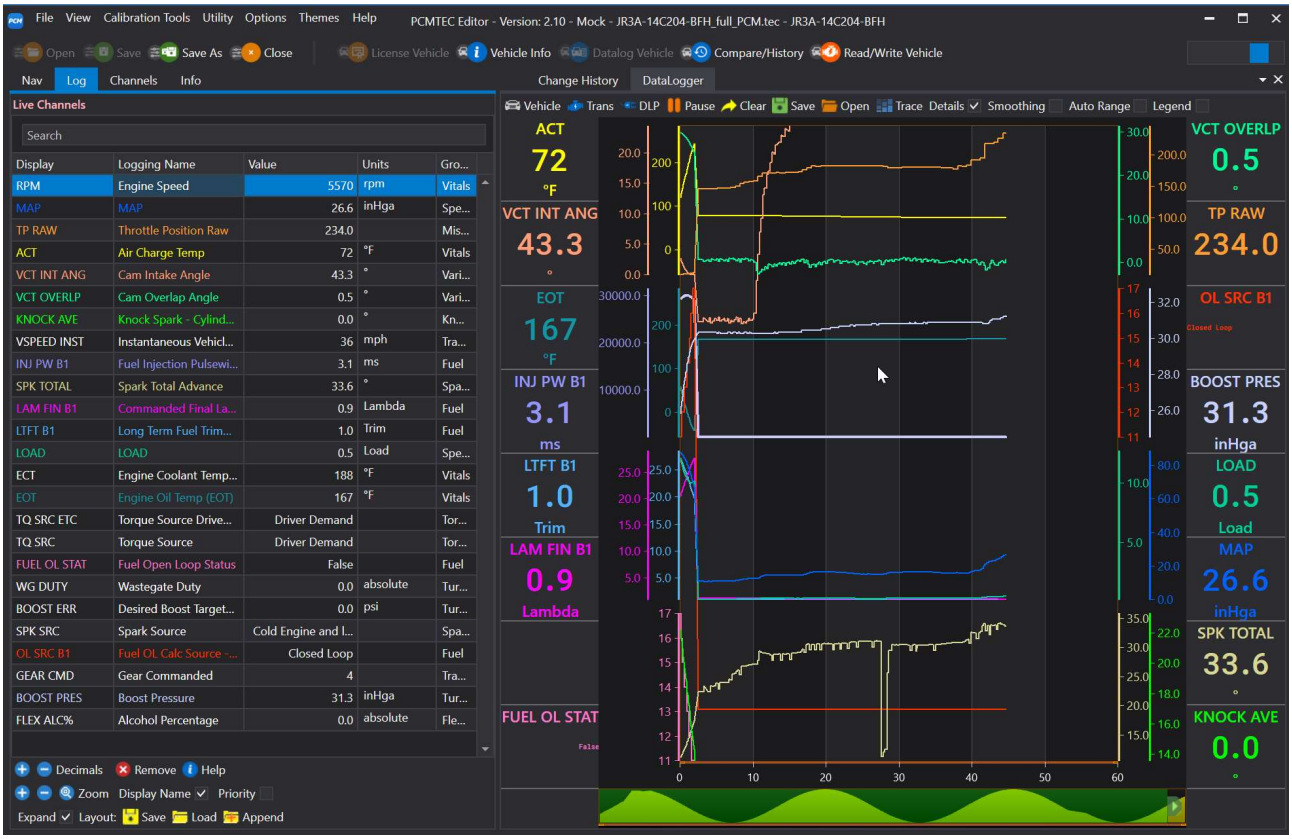
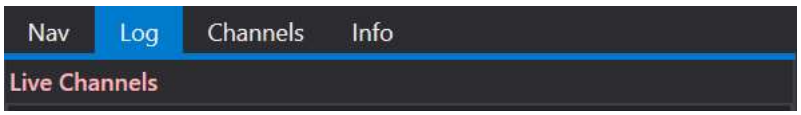
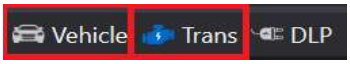


Log Channels will display as Live Channels when connected to the PCM

Playback / Live Channels displayed, depending on if a log file is opened or connected to the PCM



Vehicles with a ZF automatic transmission can also connect to the transmission, using the 'Trans' button.



Similarly, the icons can be used to connect and disconnect from the Vehicle, Transmission or DLP AD converter.

Note: Once a PCM is manually disconnected, auto connect is disabled until the data logger is restarted

External logging for recording AFRs, boost pressure or other user defined variables can be done using the DLP IO8-G Analogue/Digital converter. This is covered in section *External Voltage Inputs (DLP-8)*

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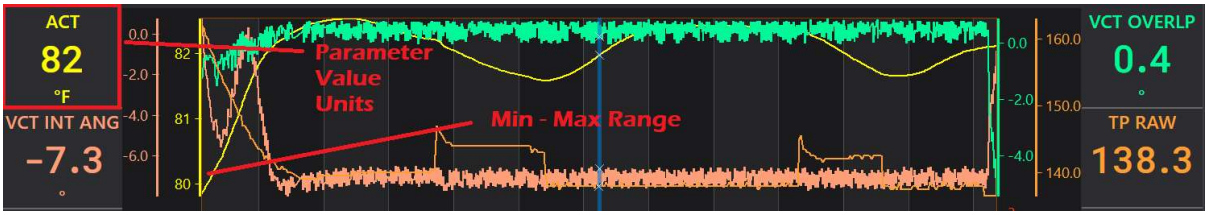
4. Graph Display

The logger allows up to 16 channels (or slots) to be displayed. They can be swapped with other channels from the log list on the left-hand panel.

Each channel displays sidebars displaying

- Channel short name
- Channel value
- Units of measurement

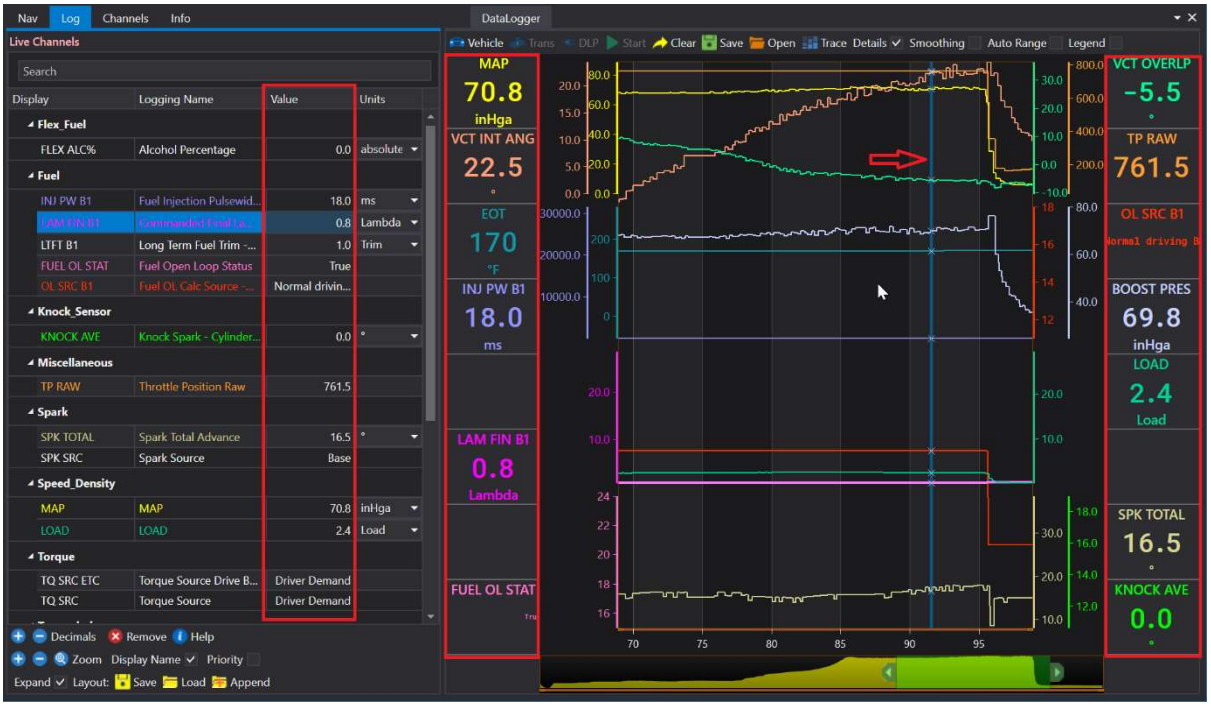


Navigation

To view the data there are several ways to navigate, the light blue vertical line is the reference point and data will be displayed from the point at which the line is placed. To move the line, left mouse click on the line and you can drag it left or right with the mouse, you can also use the left and right arrows on your keyboard once the line has been selected.

This will also scroll through the data log to the left or right.

As you move the blue line the data will automatically update and be displayed in the scalars screen and legend fly-box.



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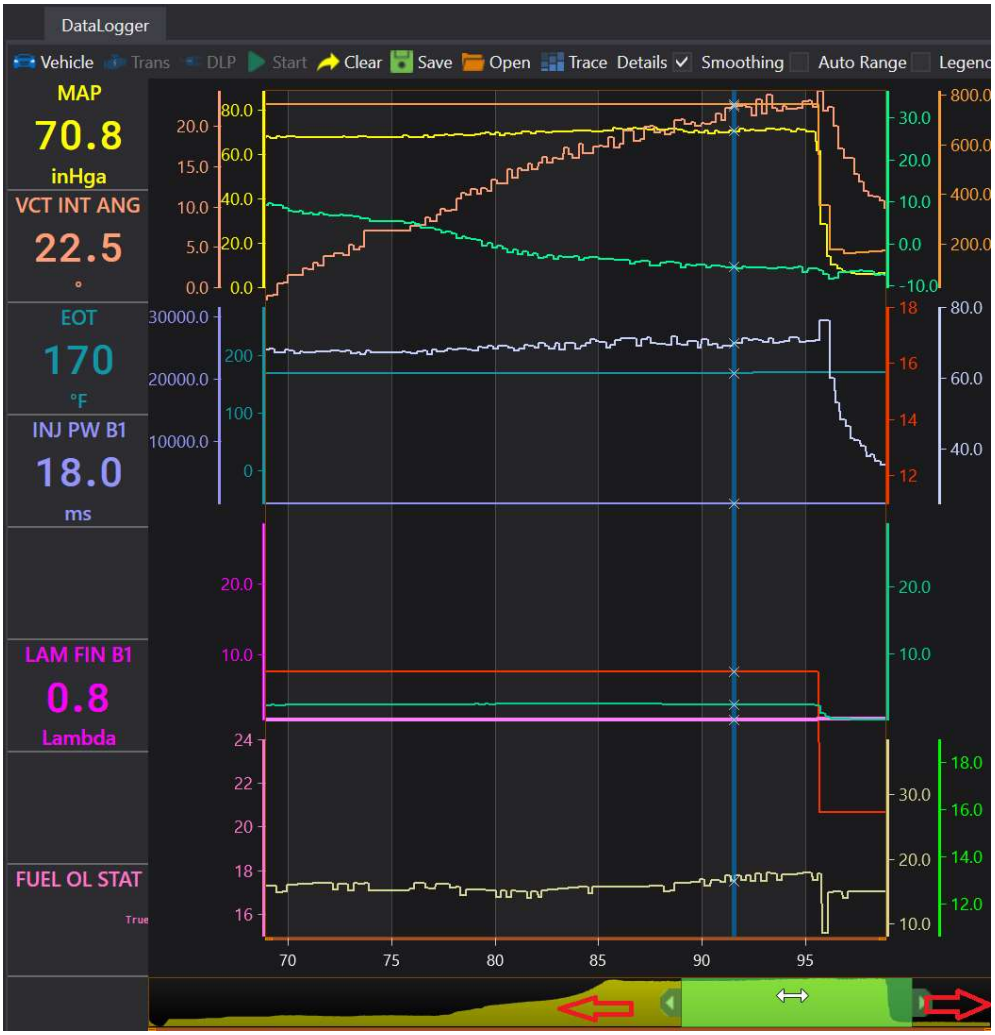
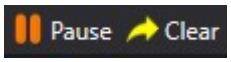
By selecting the slider tab in the time area, you can move the area of data you are viewing.



Pause / Start and Clear buttons



During logging you can pause the live log updates (logging will still happen in the background) and then review your current log by moving the blue cursor

You can drag the cursor with the LHS mouse button and moving the mouse or using the LEFT / RIGHT cursor keys. Holding the cursor keys will flip through the log page by page as it scrolls through the log. The legend/scalar values will update showing the current values at the cursor, even during a live logging session.

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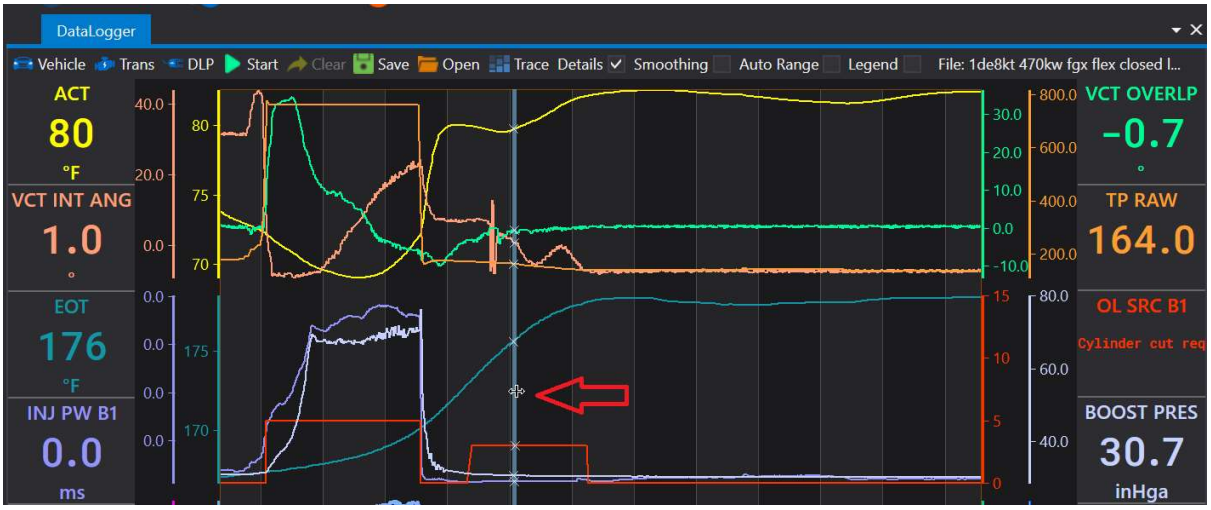
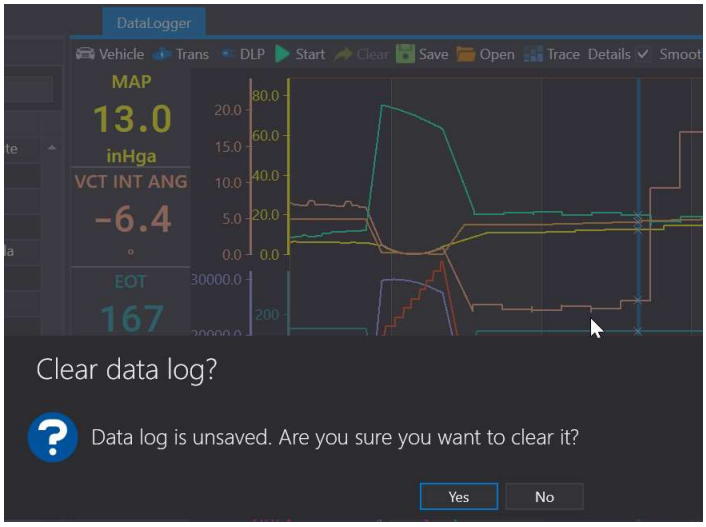


Clear button will clear out the current log. If the logging is over 10 seconds, then you will be prompted if you want to keep the log. Logs are auto saved in case you wish to retrieve something later, then check out the auto save folder



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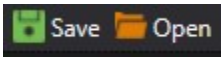
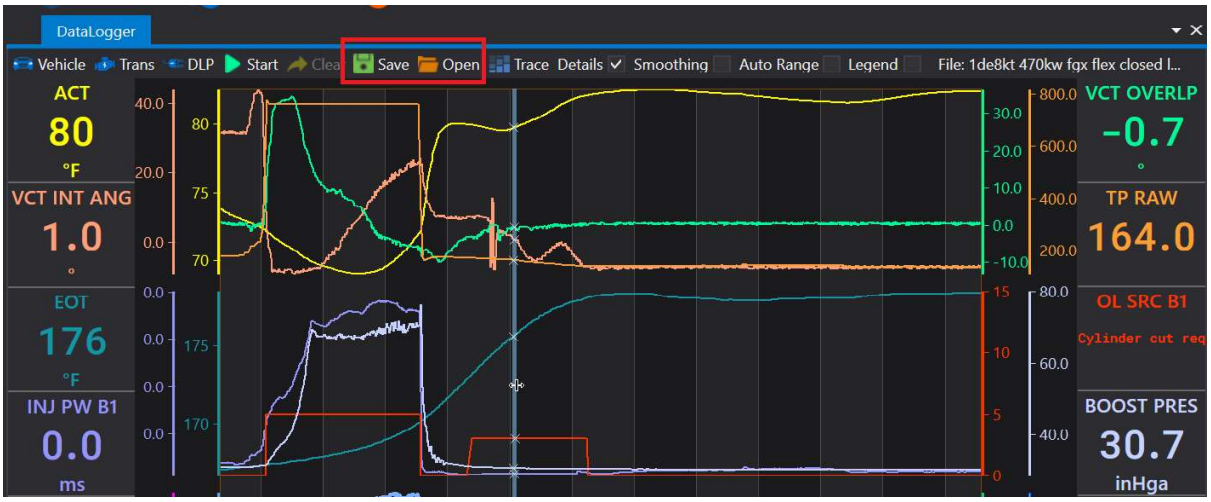
Loading and Saving Logs

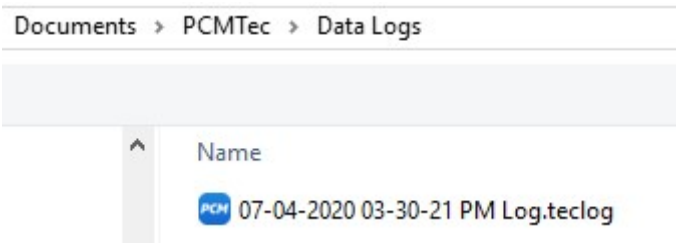
Use the Save icon to save your log as a TECLOG or CSV file (for loading into other software like MegaLogViewer for example)



The Save and Open icons located in the data logging area must be used to save and open data logs, the similar icons located in the scalars area and at the top left of the screen do not save or open data logs.



Open the file will start in the PCMTec/Data logs folder, where your save files are located



CSV files from PCMTEC as well as other Ford tuning software export CSV format, are supported by the data logger for playback mode

The mode type is indicated at the top of the Log list

In playback mode, you can press Start to begin playback, and pause to stop. This will automatically move the blue line through the data log and display the corresponding data.

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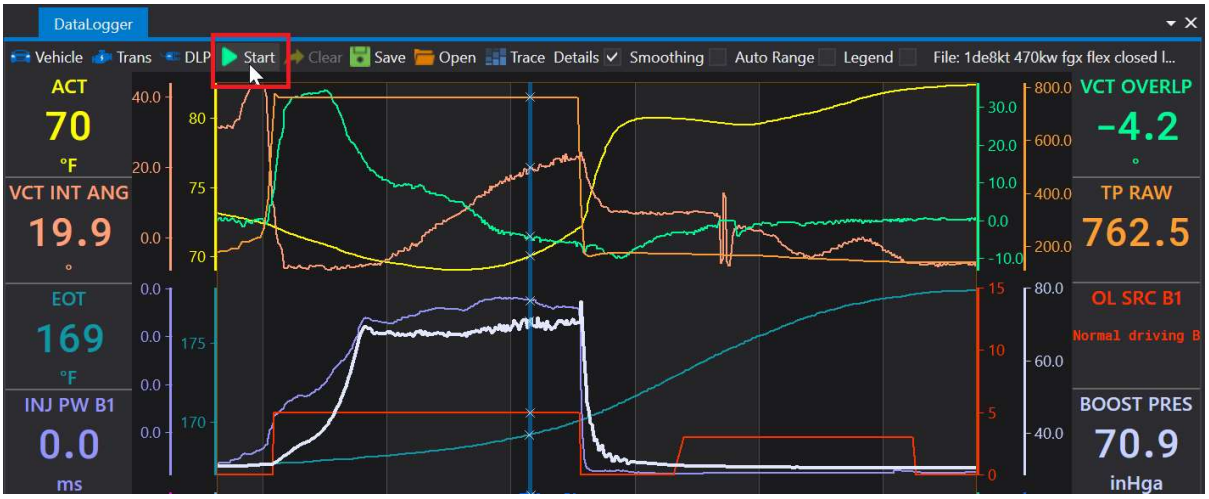
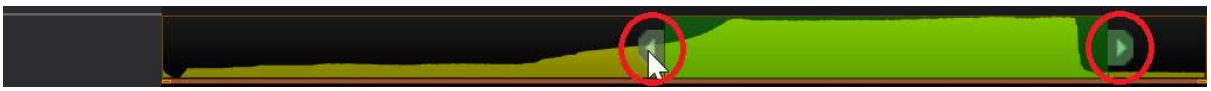

DataLogger
Vehicle
Trans
DLP
Start
Clear
Save
Open
Trace
Details
Smoothing
Auto Range
Legend
File: 1de8kt 470kw fgx flex closed l...
ACT
70
°F
VCT INT ANG
19.9
°
EOT
169
°F
INJ PW B1
0.0
ms
VCT OVERLP
-4.2
°
TP RAW
762.5
OL SRC B1
Normal driving B
BOOST PRES
70.9
inHga

Zooming

The time axis can be zoomed in and out using the scroll wheel on the mouse, when hovered over the main chart. Zoom will operate from where the blue cursor is located, as to keep the current position in the log.

You can also grab the sides of the zoom slide bar and adjust its position

By default, the zoom bar will display the Engine Speed (RPM). If this is not found, then the first available slot will be displayed instead.



Using the keyboard, using UP and DOWN arrow keys will also perform similar zoom functions.

The below data is the zoomed in version of the above data.

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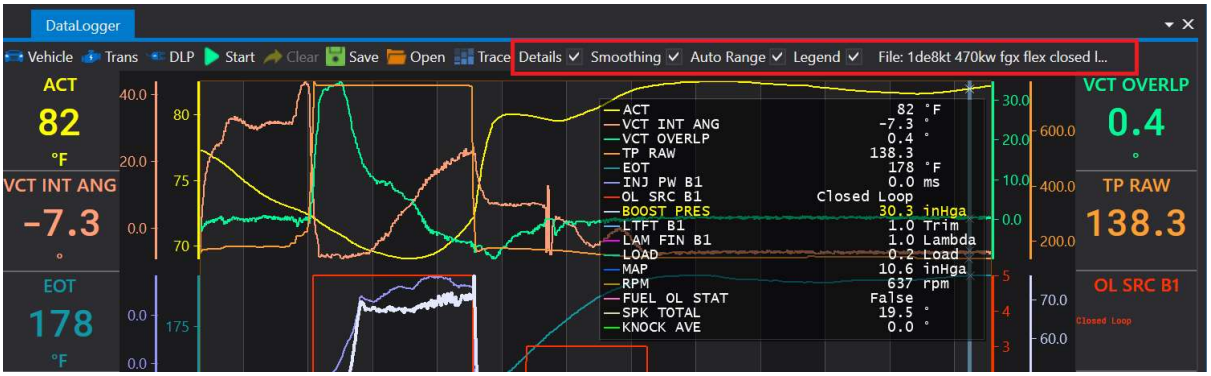
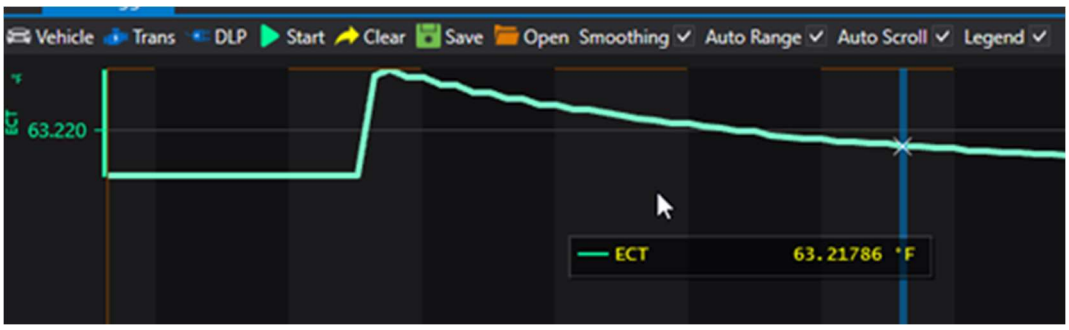
Display Options

The top panel provides options to adjust the display and chart, as well as the playback filename:



Details: is on by default. When unticked, the side bars will be hidden, proving more chart space

Smoothing: is on by default and will remove some of "stair casing" of the chart data



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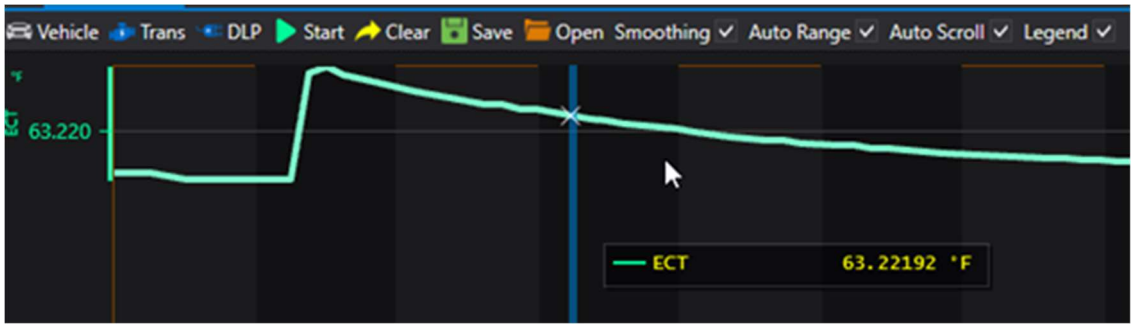
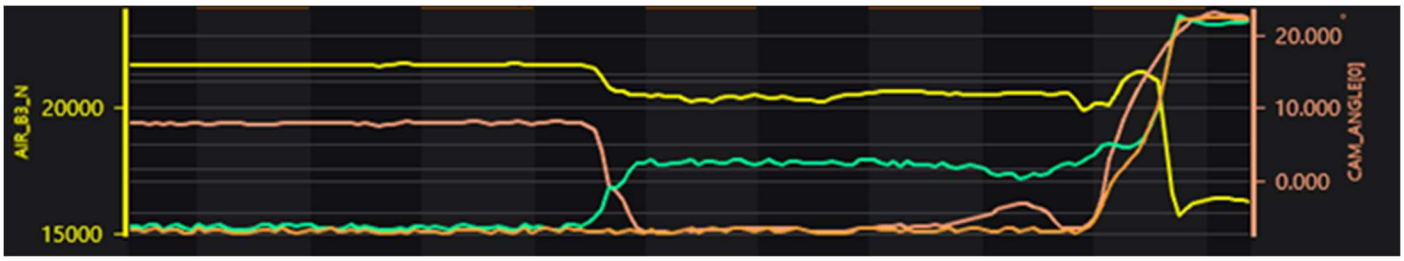
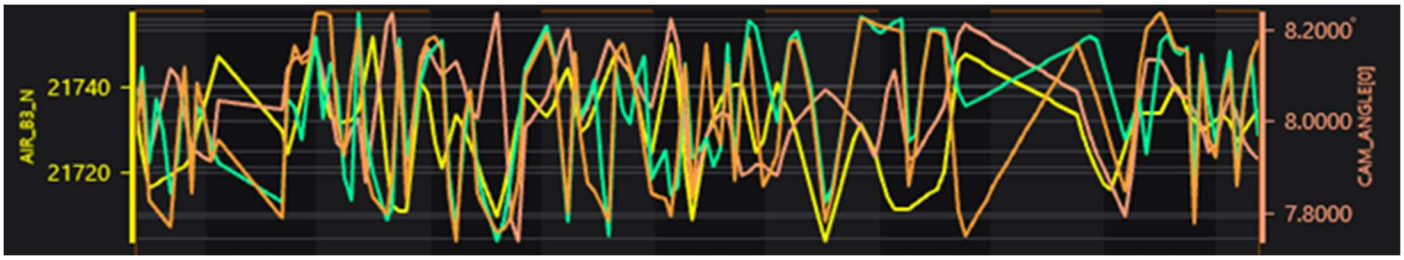


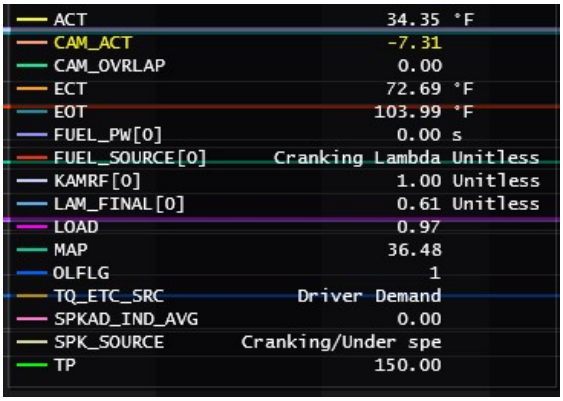
Auto range: is off by default. This will adjust the chart range based on what has been logged so far (or the range during playback).



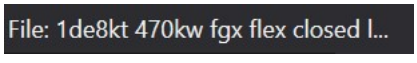
Turning on will adjust the range to fit the current screen you see:



Legend: To hide the legend fly-box simply untick the legend icon



Last opened TECLOG file: Displays a truncated part of the last opened TECLOG file



Selecting Channels

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5. Channel Operations

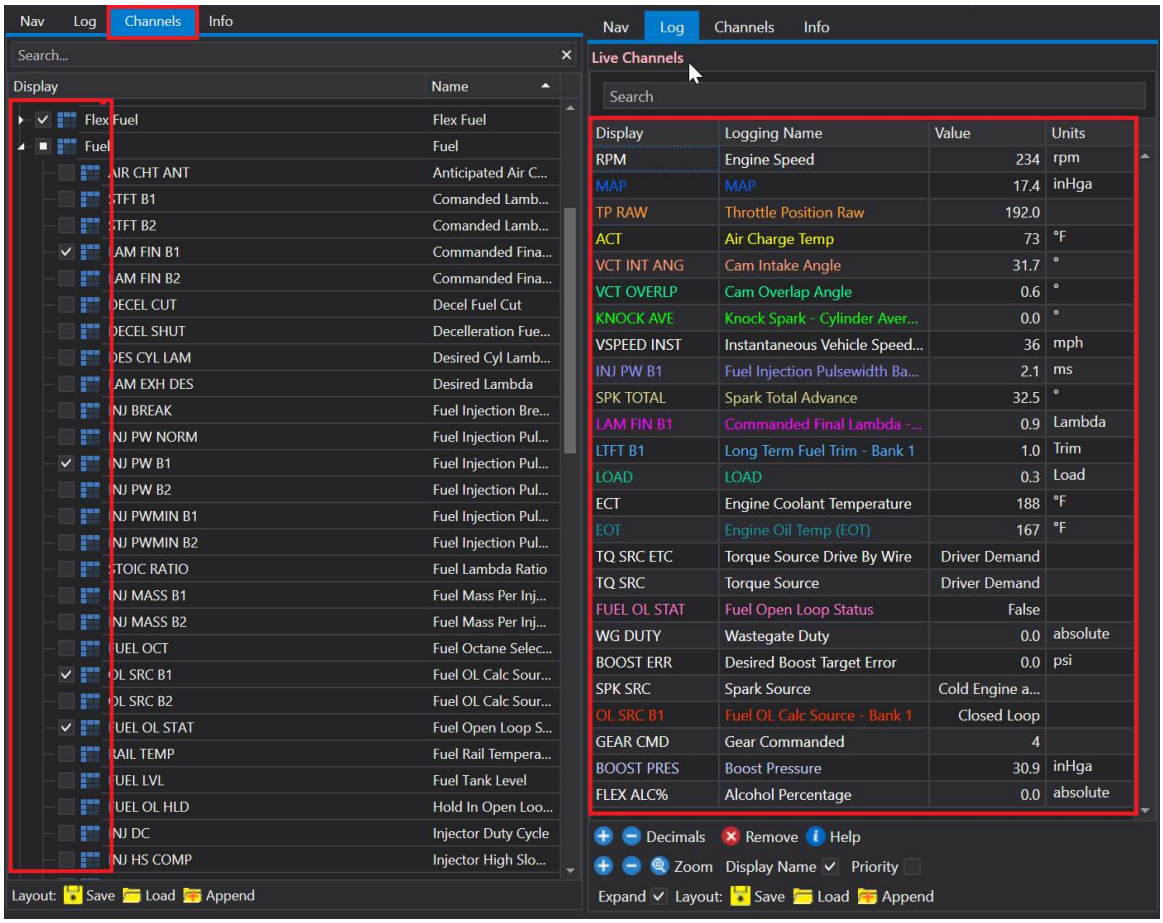
PCMTEC data logger allows selecting PCM channels parameters. These relate to parts of data you can read out of the ecu at runtime. PCMTec maintains a database of channels for each vehicle OSID. The channel information includes Display name, Logging Name, decription and units.

Sometimes a PCM can have several variants of the same channel data, which may result in the same channel information being duplicated, due to the nature of the PCM processing sensor and calculated information.

Selecting Channels

By clicking on the Channels tab in the fly-box, you can select which Scalars you wish to view in the chart. Whilst the chart itself can display up to 16 channels (comprised of 4 charts, with 4 slots per chart), extra channels can be logged and saved and reviewed later.

These can be selected live whilst connected to the PCM and TCM (ZF) and are then added to the logging session.



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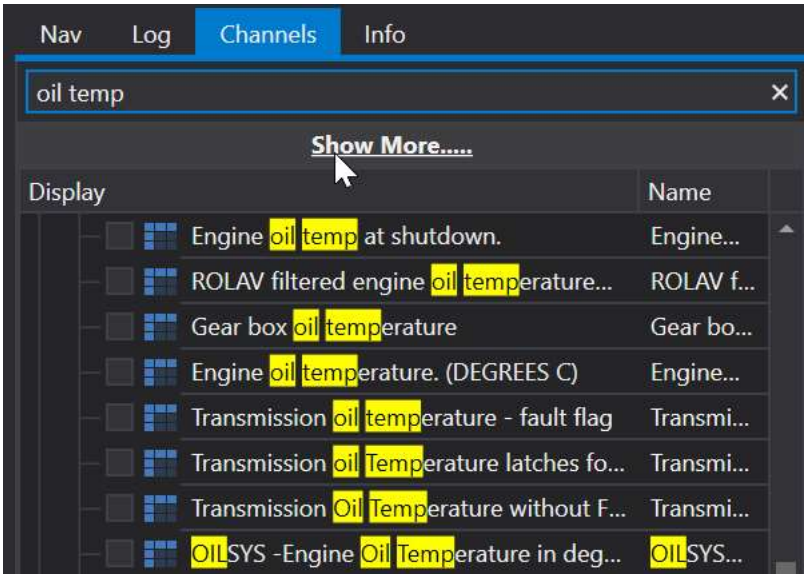
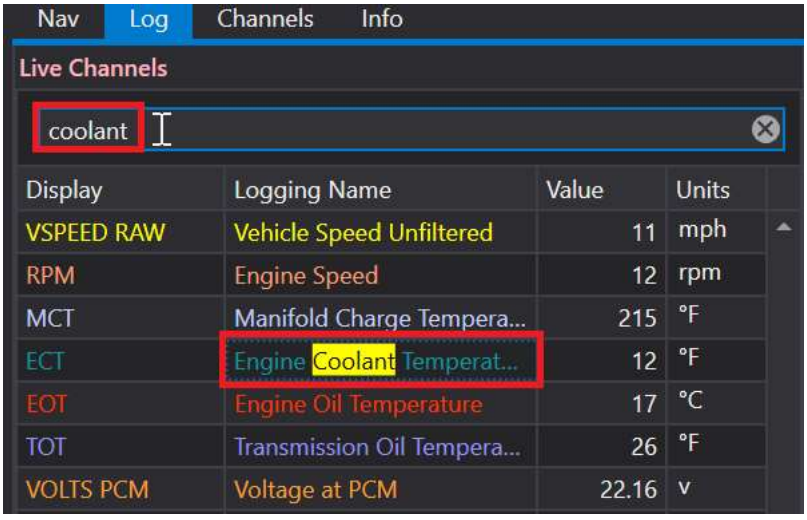
Clicking on the *Log* tab returns you to the main logging screen and displays the currently selected items. Anything greyed out is not displayed on the chart but is still logged and can be viewed live or added to the charts later using the right click menu discussed below.

Searching Channels

Use the search entry box to narrow down particular channel names you are looking for. The Show More button will allow a broader search not limited to Name1 AND Name2



Currently logged items can also be searched, to highlight entries in yellow



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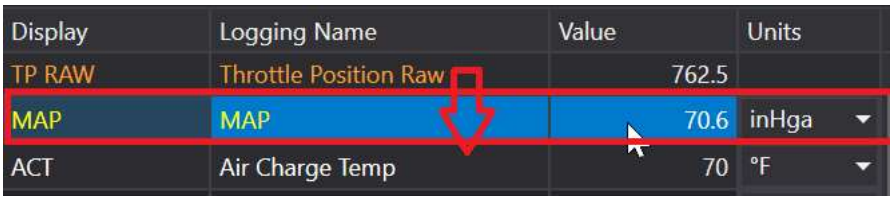
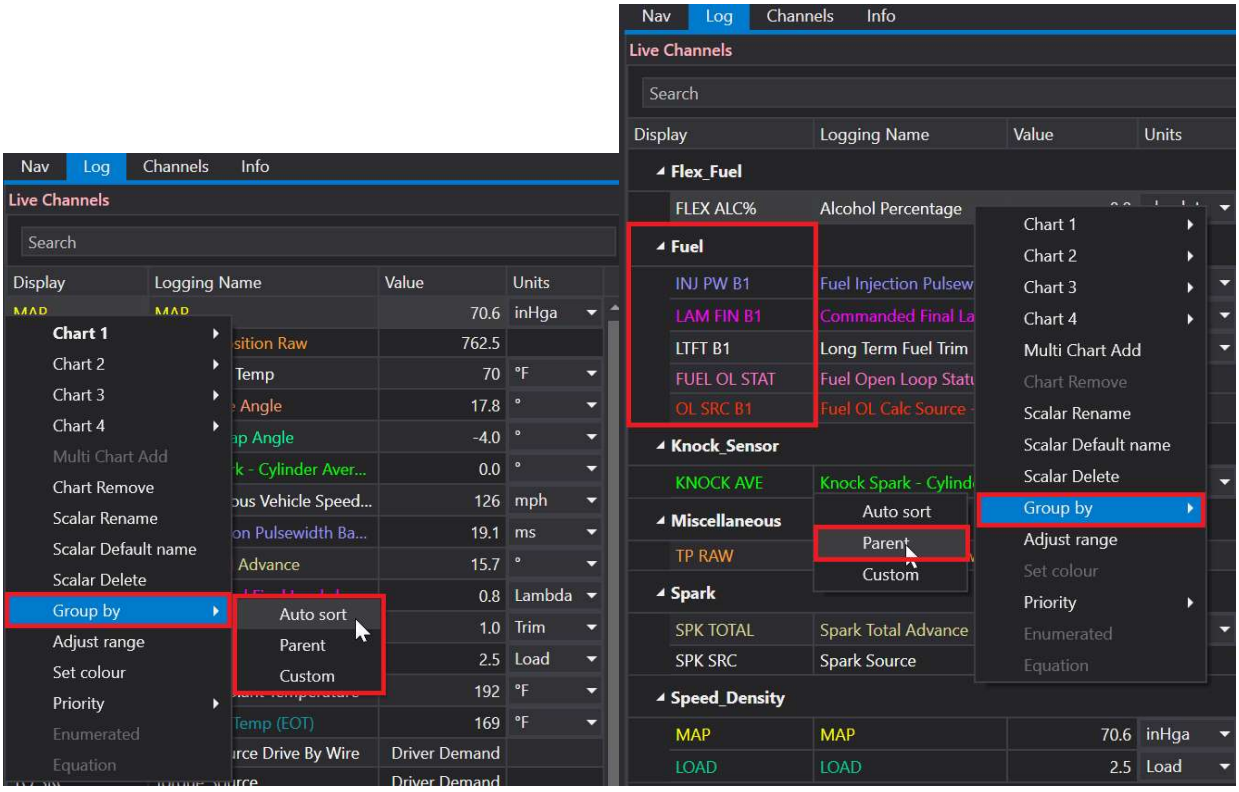
Sorting Logged Channels

By default, all items are sorted into their 'parent' groups, matching the Channel tree.

To move items, click on the scalar you would like to move, hold down the CTRL button on the keyboard and use the UP or DOWN arrows on the keyboard.



If you Right click anywhere in the scalar area and click Auto Sort it will reset the custom sorting back to default sort by parent



Another option is to group by Parent. This prevents custom sort, but groups items into clear sections by their parent. To put the list back to the previous user sorted list, select Group By then Custom

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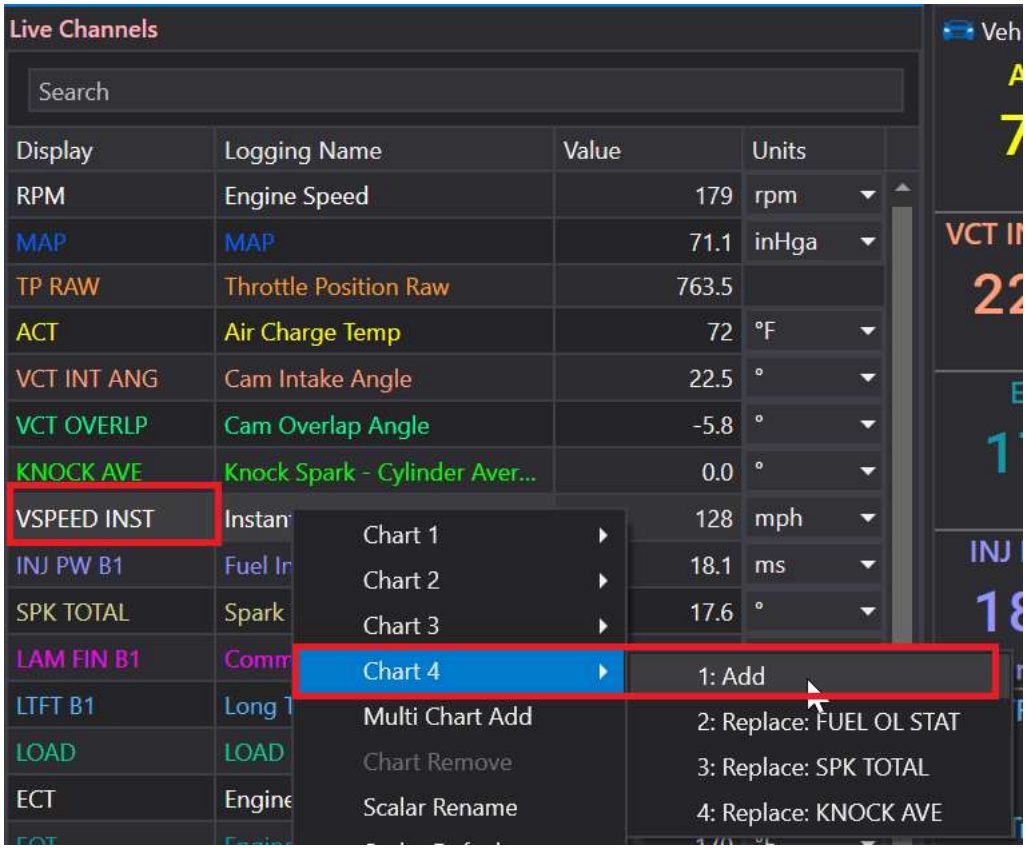
Allocating Chart Items

To add a channel to the chart logger simply right click on the item you would like to add, a menu tree will open with a range of options.

You can select which chart you would like to add the channel to by clicking on chart 1,2,3 or 4 and then selecting which item you would like to replace.

In the example below we are going to add Vehicle Speed to the chart display, currently it's a light grey colour meaning it is not selected to currently display on the charts.

Right click on the Vehicle Speed tab, the menu tree will drop down and now select chart 4, another menu tree will open, and you can select which item you would like to add or replace on the chart.



If there are spare slots available, you will have the option of 'Multi Chart Add' to use the next available slot in the chart. This will be disabled if all chart slots are allocated.

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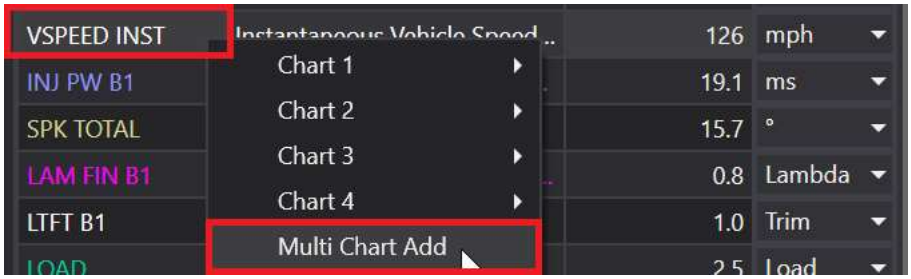
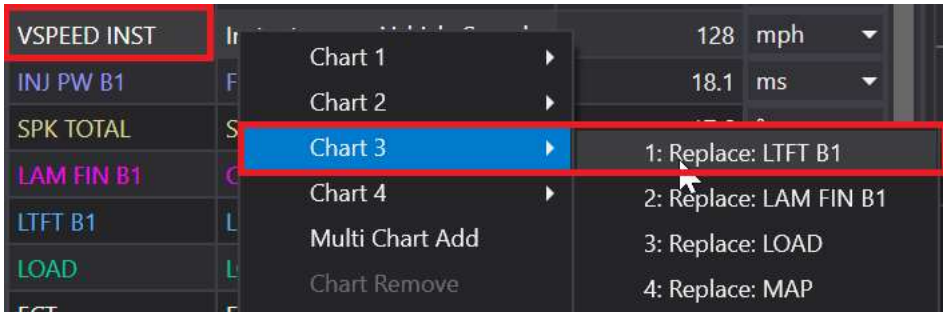
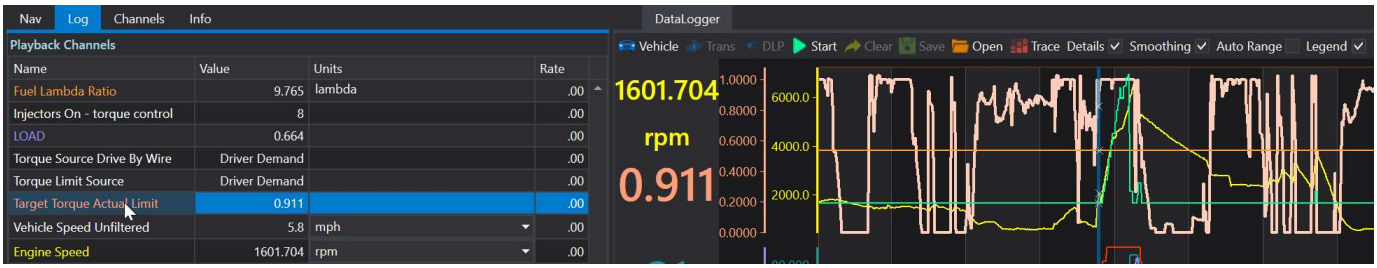


In the below case we are replacing LTFT B1, click on the Replace LTFT B1 option and VSPEED INST will now be displayed in chart 3.



VSPEED INST is now shown on chart 3, clicking on any point on the chart will display the values of data at that point. In the example below Vehicle speed is 126 MPH at the selected point.

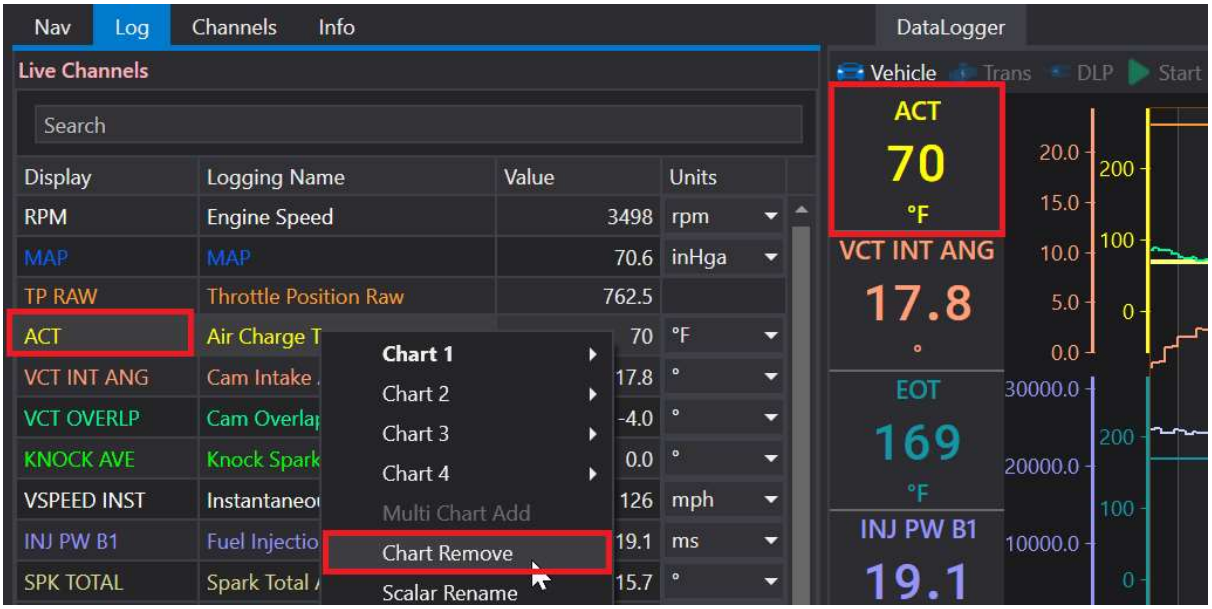
Clicking on any channel in the log list, will highlight the line in the chart, to indicate which channel have selected.



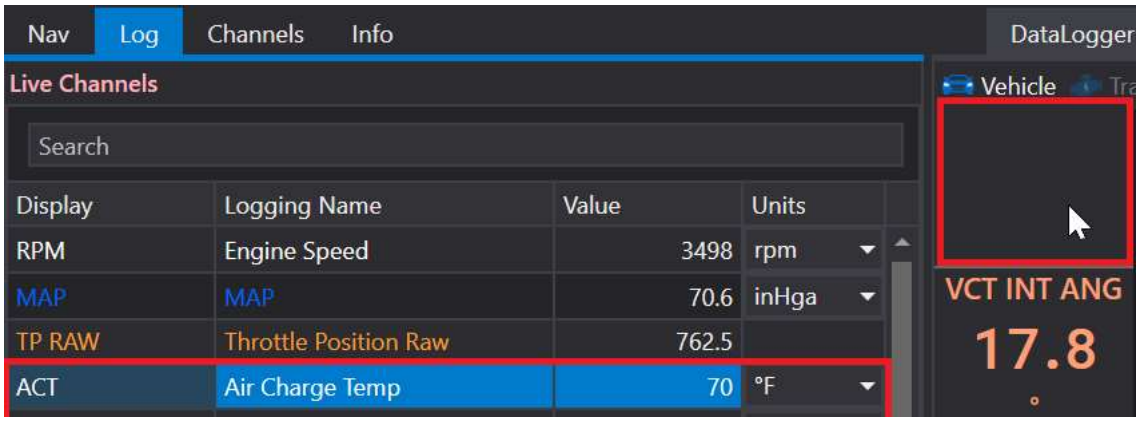
Removing Chart Items

By right clicking on the chosen logs channel, several options will appear.

Selecting Chart Remove will remove the chosen Scalar from the chart while continuing to log the data and being displayed in dull grey in the Scalar section. This creates an empty slot in the chart it was previously located.



After removing the chart item, the chart tile will be empty.



It is possible to select multiple chart items (holding down CTRL and clicking) and removing them all at the same time

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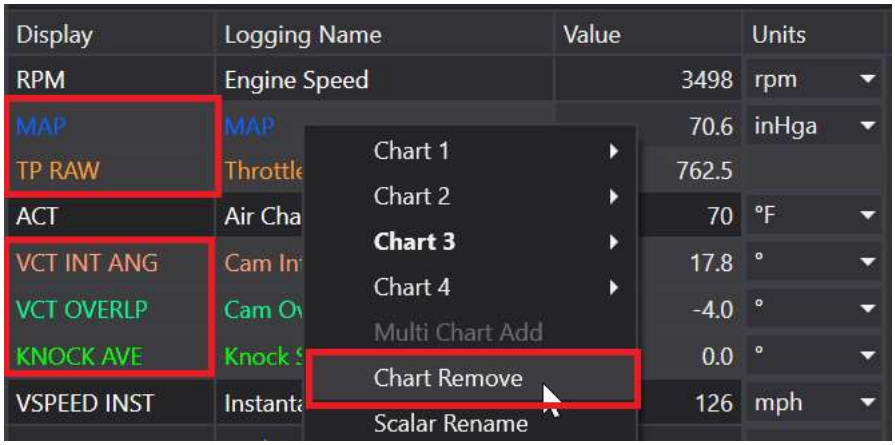
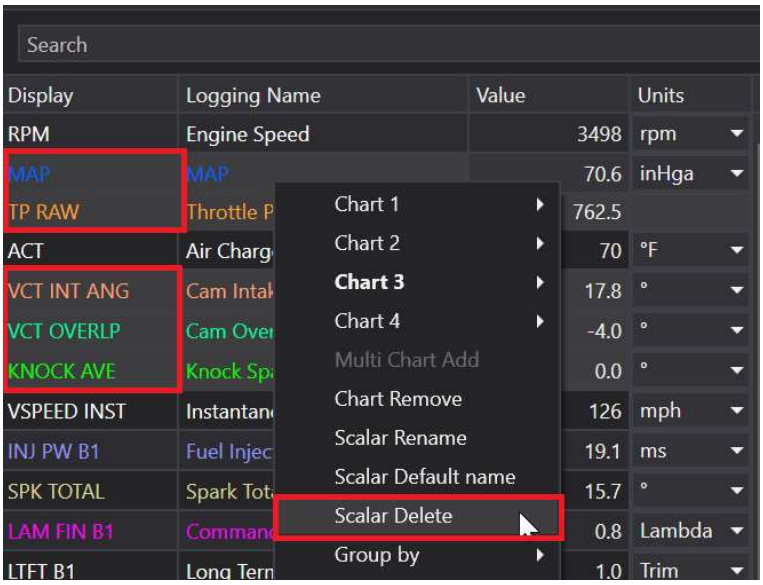


Selecting Scalar Delete will remove the chosen Scalar from the chart and delete it from the Scalar screen. This will stop logging this scalar from this point in time. Multiple channels can be deleted and deleted using CTRL key to select them, and this option. Or use the DEL key as a short cut to remove them quickly.



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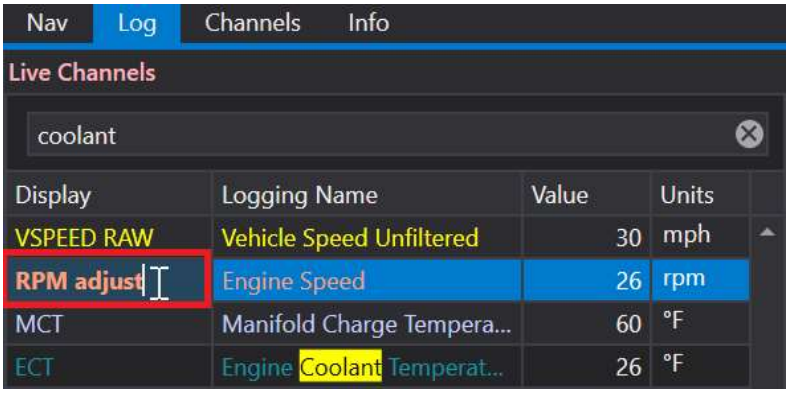
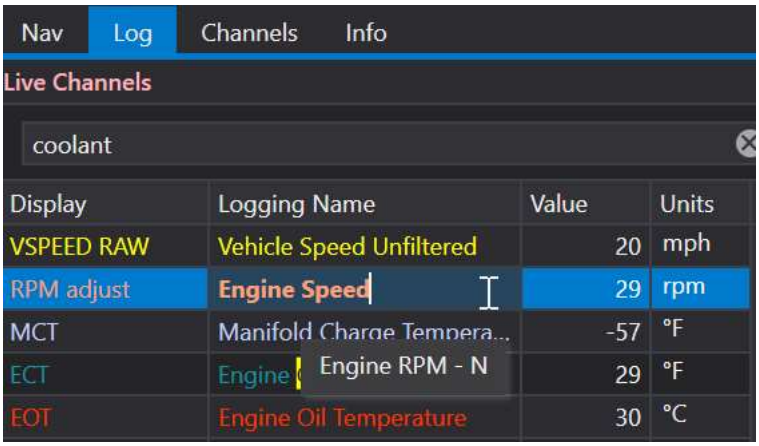
Renaming Channels

Note: Channel names and descriptions for all parameters are contained in a global database maintained by PCMTEC. Most common channels are custom named for readability, however there may be ""undiscovered" or not commonly used channels that are yet to be classified the name can often be long, or not clear as to its contents.

Renaming a channel Display or Logging Name is performed by selecting the channel, and then pressing F2 will put the channel into edit mode.



You can then rename the channel. Channels are now saved to Layout files, which are specific to each vehicle type



Renamed channels are saved to the editor and the layout files

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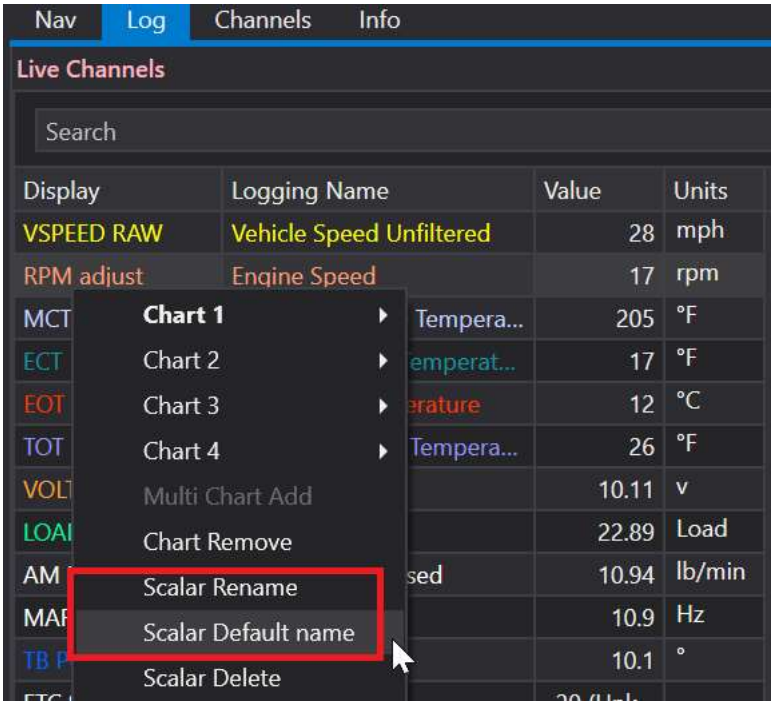

You also have the option to right click and rename or return to the default Display and Logging Name if you wish.

Note: Default naming can be done for multiple items

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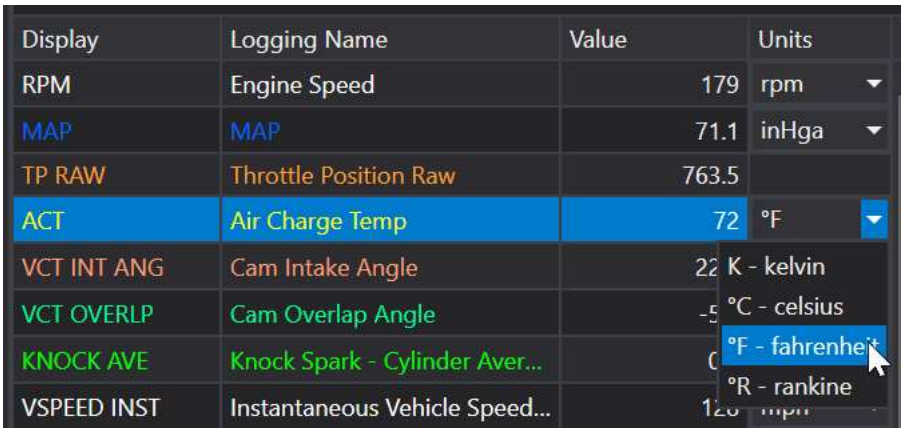
Adjusting Units

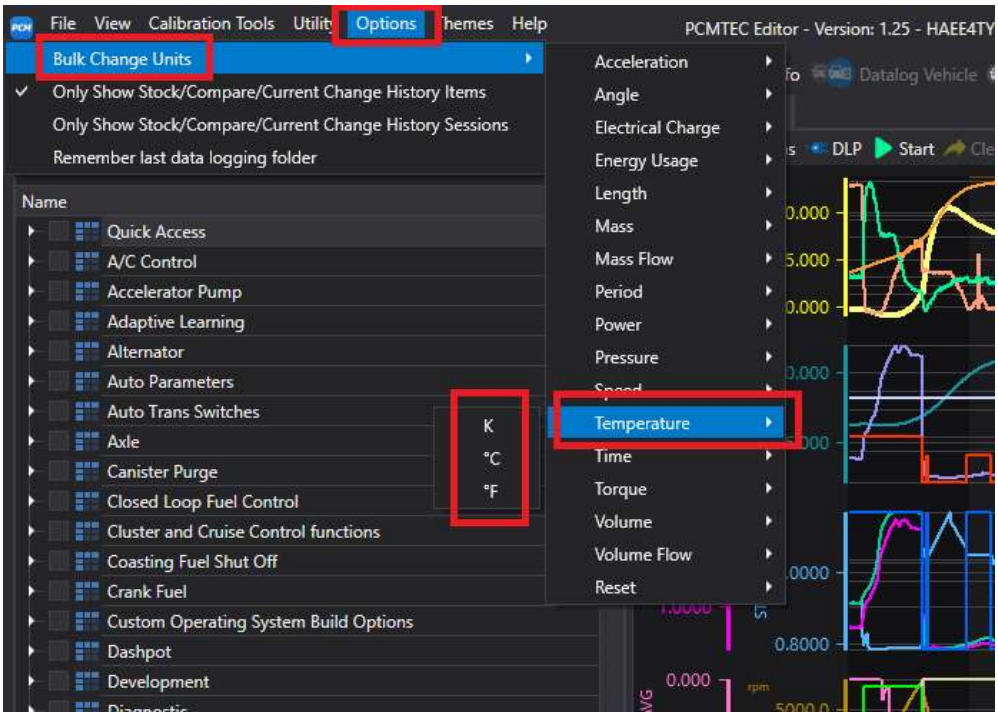
Units must be adjusted whilst the PCM is disconnected. When doing this, the charts will be auto scaled to the new unit type (for example from deg F to deg C).

Either adjust individually, from the Units dropdown:



Or adjust everything from bulk method, click on the *Options* menu at the top of the page, then click on the *Bulk Changes units* tab and select which value you would like to change.

Note: This will change units for both PCM and data logging channels



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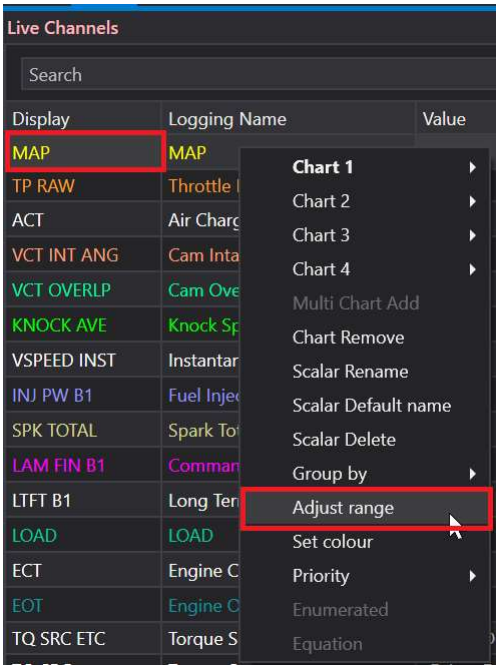
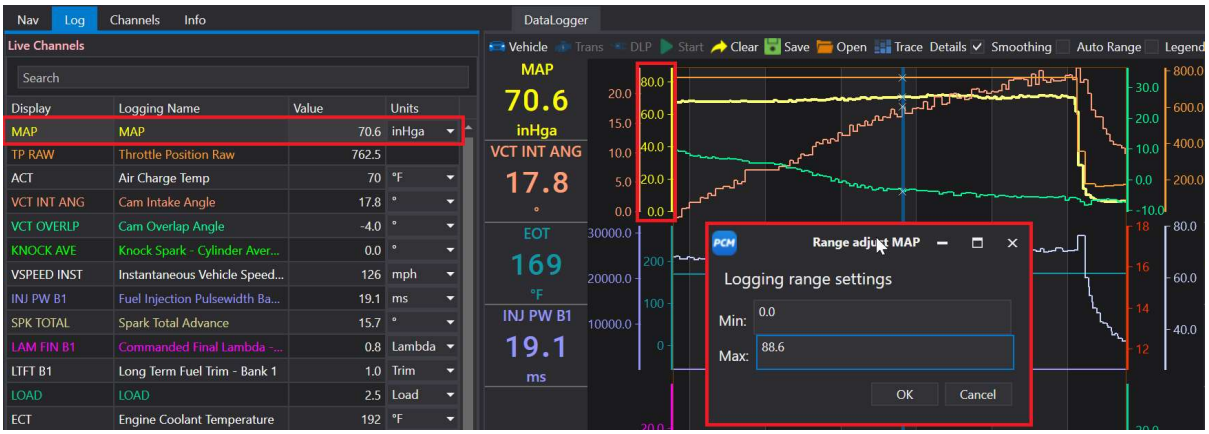
Adjusting Chart Ranges

By default, channels displayed on the chart will automatically range to the incoming data. Sometimes it might be required to rescale this data to improve data visibility on the chart or align with other channels drawn on that chart element.

There are several methods to adjust ranges of scalars from their defaults:

1. Right click on the Scalar to be adjusted and select the Adjust Range option. A new window will open that allows direct entry of the desired min/max display range on the chart.





2. Hover the mouse over the axis and use the mouse scroll button, it is also possible to adjust offset by left clicking the mouse and dragging up / down,

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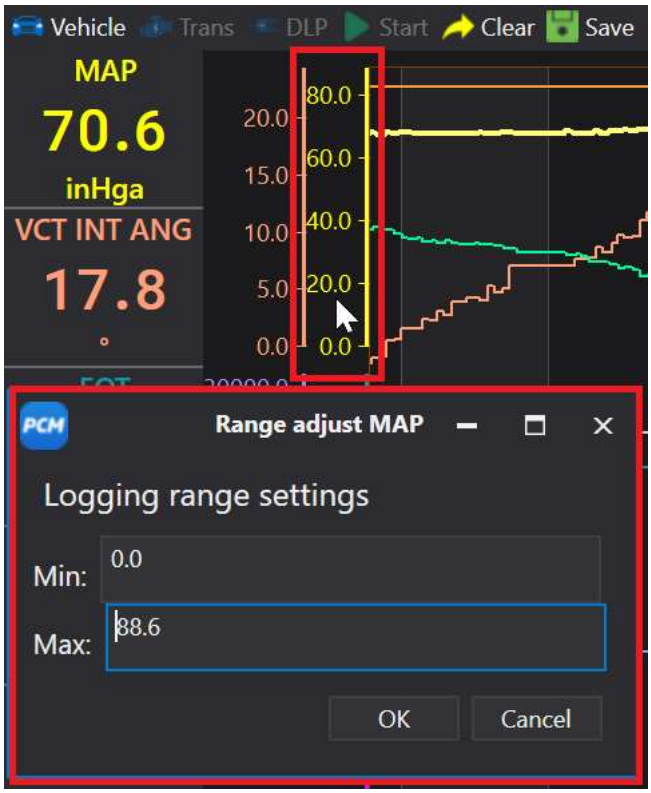
3. Right click on the axis to be adjusted and select the Adjust Range option. A new window will open that allows direct entry of the desired min/max display range on the chart.



All range adjustments are saved, and can be stored in the save Layout feature

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Display Decimals

Decimal points can be adjusted per channel, using the decimal buttons option

Select the channel that you wish to change, and then press either the **+** or **-** buttons in the panel below

Note: If you have a histogram window open for the parameter, the decimal buttons in here can be used to adjust the places for the parameter here:

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Min, Max and Average

When a section of the chart is selected, the channel minimum, maximum and average will be displayed

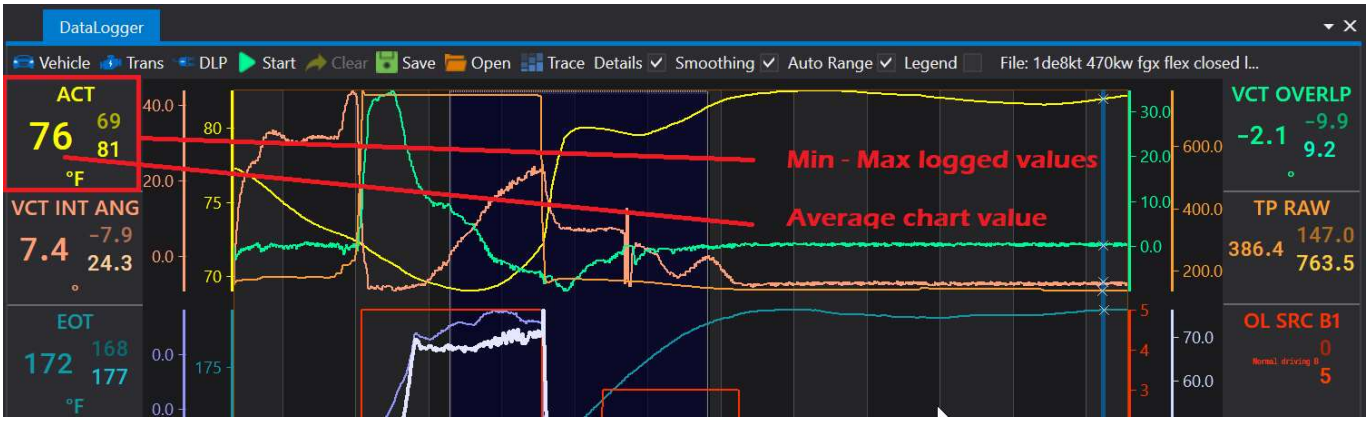
To select the blue section of the chart

1. Click on the area of the chart where you wish to start the selection and press the **CTRL** key
2. Move the mouse to the desired end of the selection area and press the **CTRL** key again

The parameters side bars will display

1. Average value
2. Minimum value
3. Maximum value

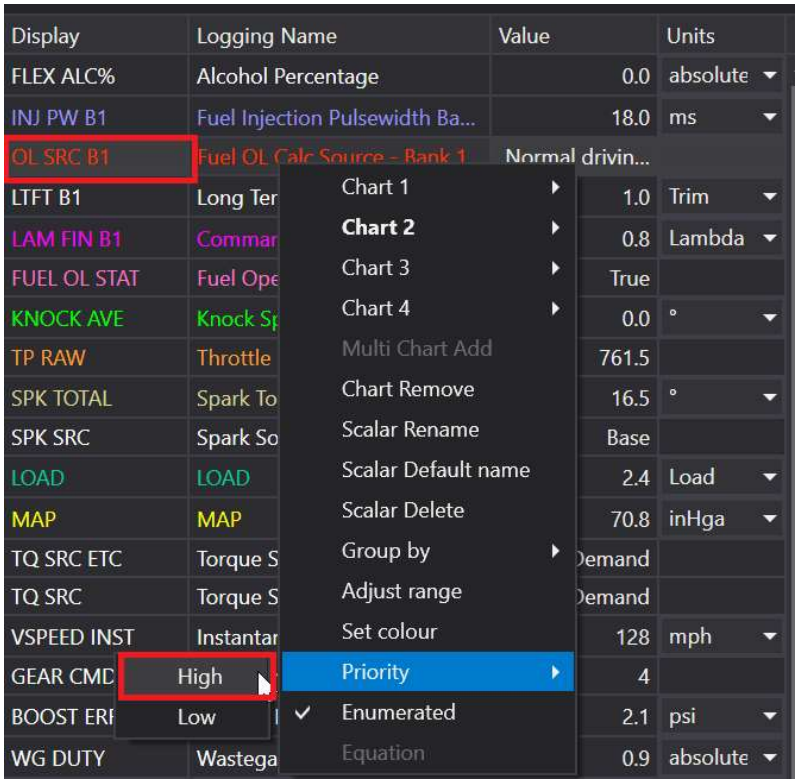
For the values inside the blue selection area:



Update Rates

Whilst there are no limitations on the number of channels you can log, on BA all channels will be 'polled'. Adding more channels will gradually reduce the update rate. On vehicles BF upwards, rapid packet reading is available for up to at least 15 DMRs and then polling available on top of this.

If one of the channels you have selected requires a faster update rate, it can be forced to use rapid packet by selecting High Priority for that channel.



The priority tick box (left of the Scalar name) will be enabled for those High priority items you have selected. If none are selected, then at least the 15 first DMRs in the list will be used for rapid packet.

To view the priority list, right click the Title bar and then *Show Column Chooser*

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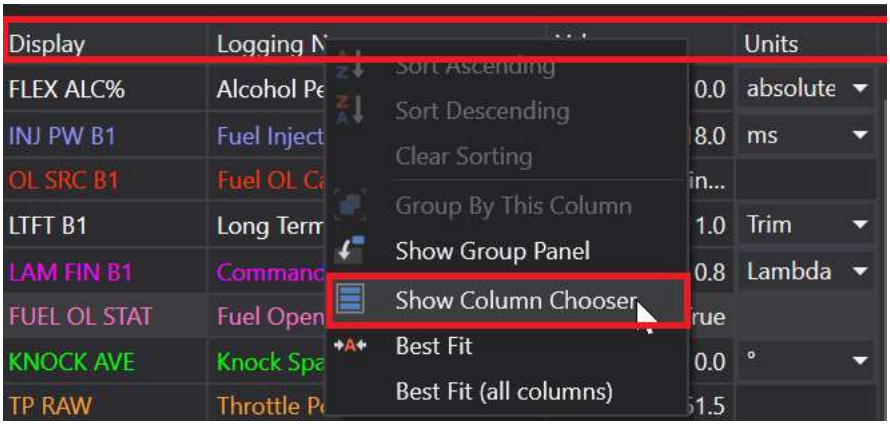
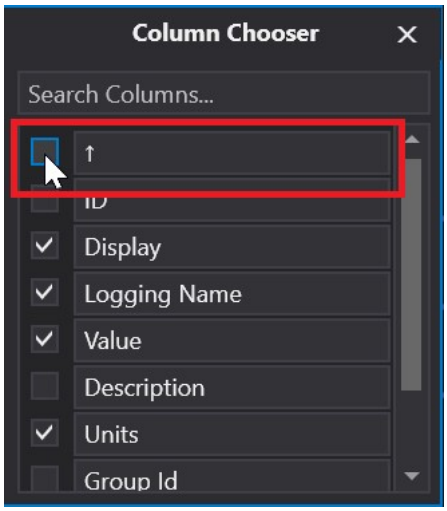
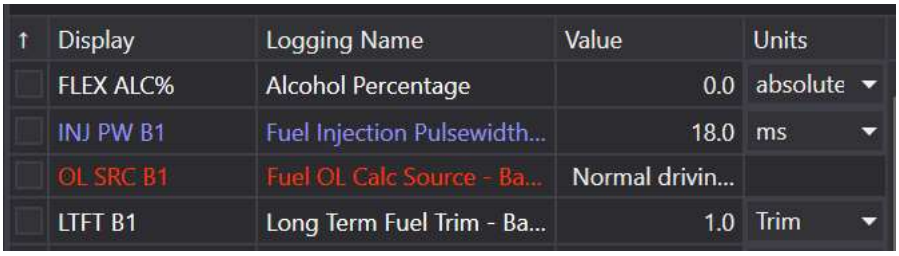


Then select the Priority column





If you select “rate” from the column chooser, it will display in the live channels feed. This shows how many times per second the channel is updating. To increase the rate, reduce the overall number of channels or make the channel a high priority channel

Note: The chart will interpolate between samples (drawing lines between the data points as they are received). When the logging rate is low, not all PCM calculated data will be drawn and the chart display may appear staggered.

When logging high frequency data, limit the number of data channels being logged and select high priority for critical channels to increase the logging efficiency.

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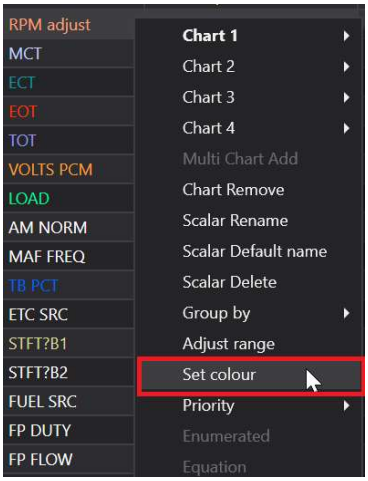
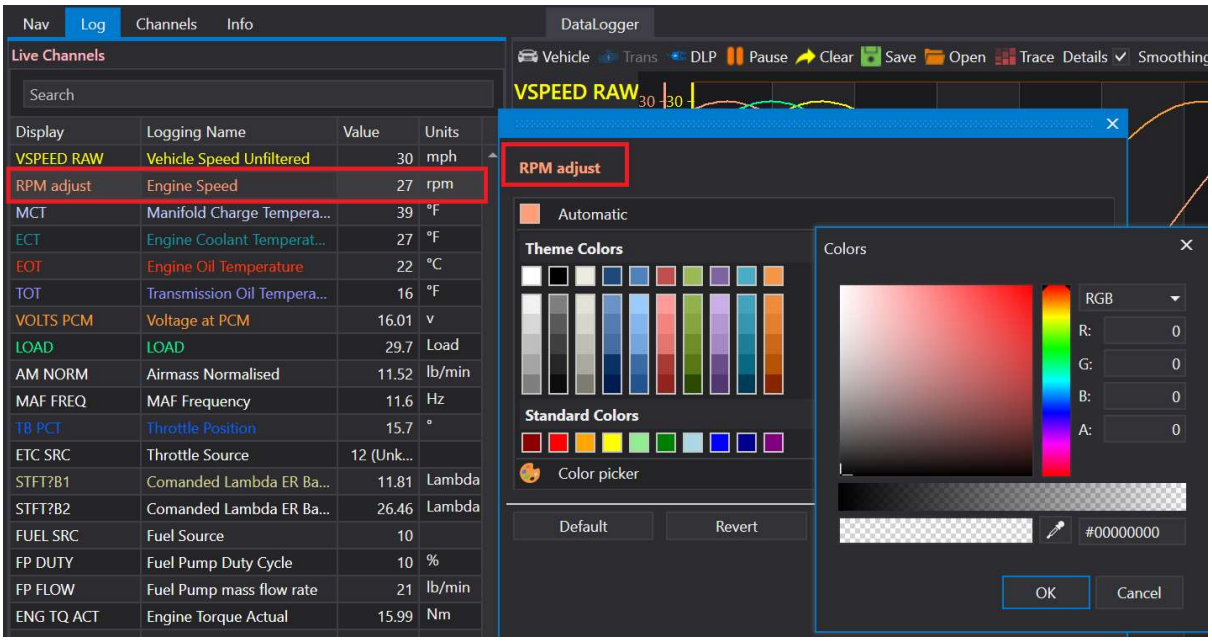
Select Colours

Right click and select Set Colour to change channel colours for any channel DMR that is displayed on the chart.



This will pop up a colour adjustment window, and offer also Default, and Revert options for resetting colour back to normal or the previous setting.



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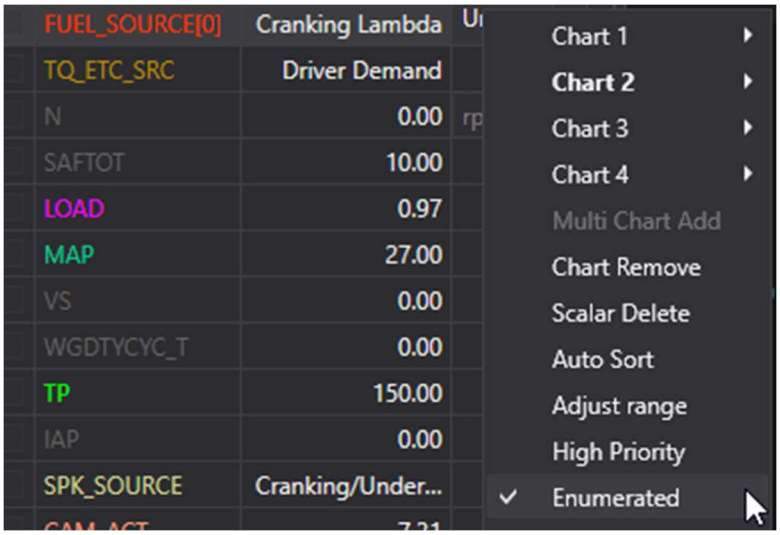
Enumerated Items

Some chart items like FUEL SOURCE and TORQUE SORUCE have meanings attached to the values, these are enumerated items. You can display the raw value by unticking the Enumerated tick box.



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6. Layouts

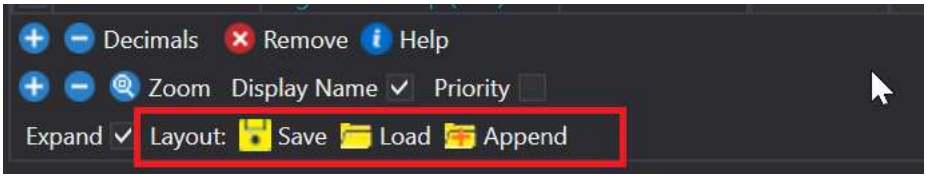
A layout is a file which describes the selected logged channels, customisations to those channels (min,max,decimals), what channels are displayed on the chart, colours, logging rates, unit selection and any custom names.

They can be useful for setting up to look at different areas (e.g. tune/fuel, transmission or CustomOS) as well as applying the same logging view to different vehicles.

When a layout is loaded which contains channels which are not available in the current file they will not be shown in the list.

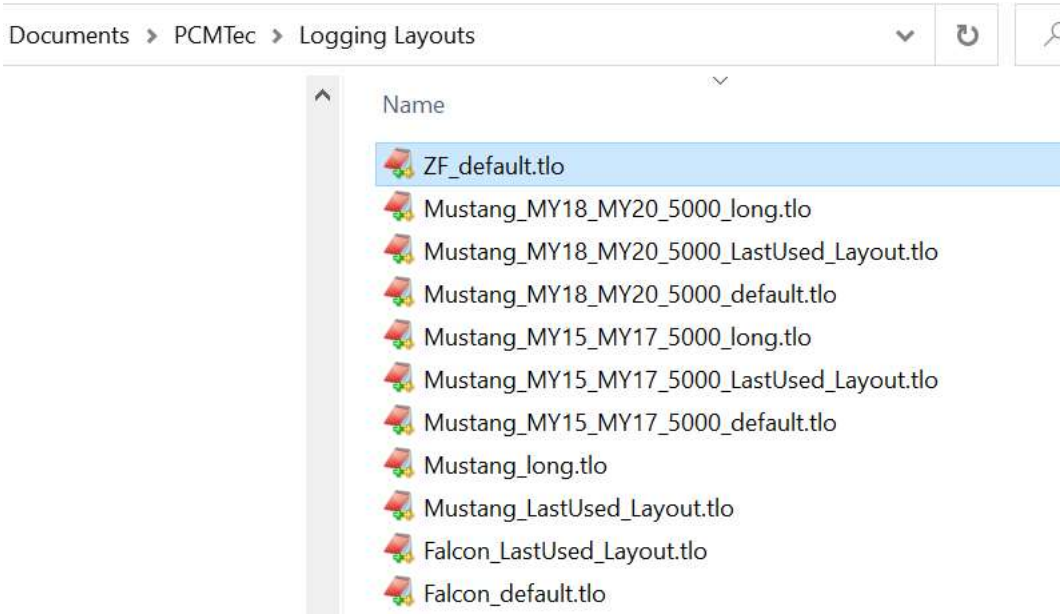
Saving, Loading and Appending

Use the Save, Load, Load Append layout buttons (also available from the File menu) to keep a copy of your current chart configuration, including the items ticked, their chart slot and their ranges



Load append will add extra chart items to your current chart (ticked and their position if available) if they were not ticked previously. Note: Where a slot is already used, these will be ignored and not displayed

Layout files are saved in the PCMTec/Logging layouts folder, and saved as TLO files



Defaults are now provided for ranges of vehicle types.

The LastUsed layout holds onto your current layout for the currently data logged vehicle. Backups of layout files are stored in the 'Last Used – History' subfolder

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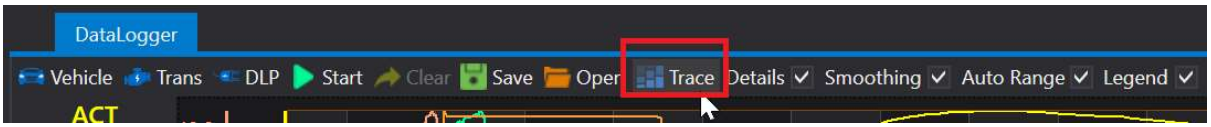
7. Histograms and Map Tracing

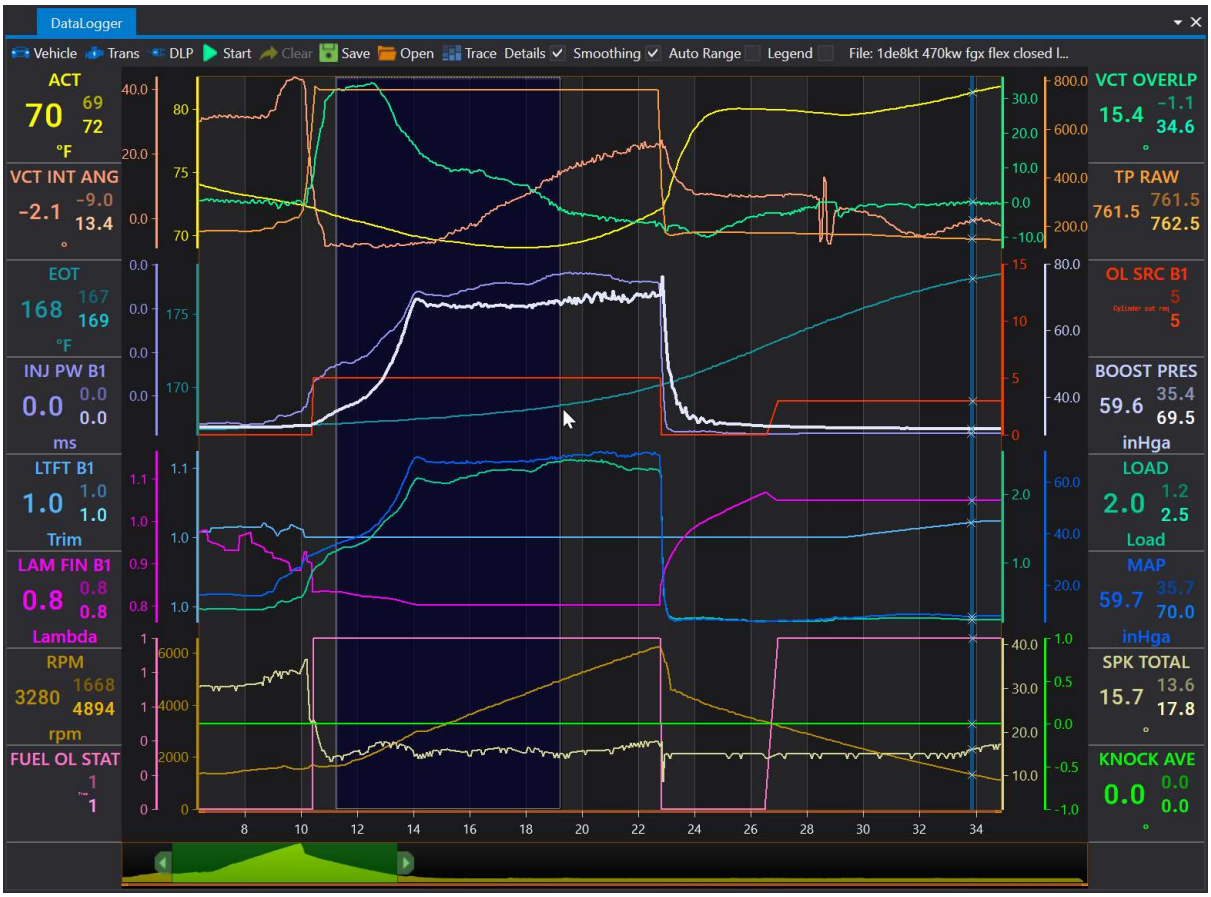


The TRACE button is used to setup histograms and map tracing. It is available during live connection, playback and when paused

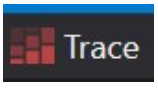
Histogram trace line overlays are available only during paused mode, when there is under 5 minutes of logging

Paused mode: Use the CTRL key once to select the start of the trace selection, and then press CTRL again to select the end of the trace selection. This will highlight with a blue box around the data

If no selection is made, then the whole log will be traced



Note: If trace line overlays are not available (over 5 minutes of selection), the Trace button will be red:



After the trace button is pressed, the following window will display

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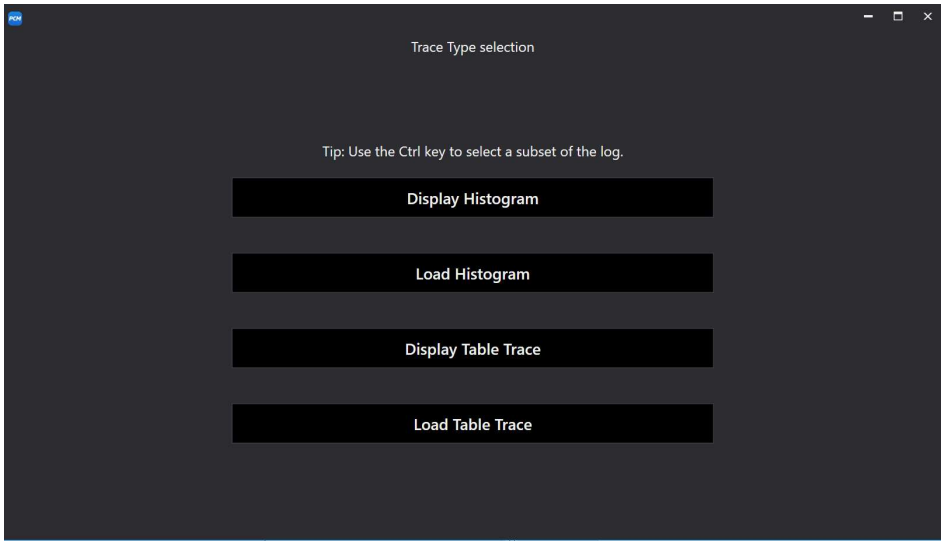

Histogram

Histograms are a user defined grid, which allow channel information to be displayed against other channel information

For example, tracing the fuel trims or spark against RPM and load as per the below example:

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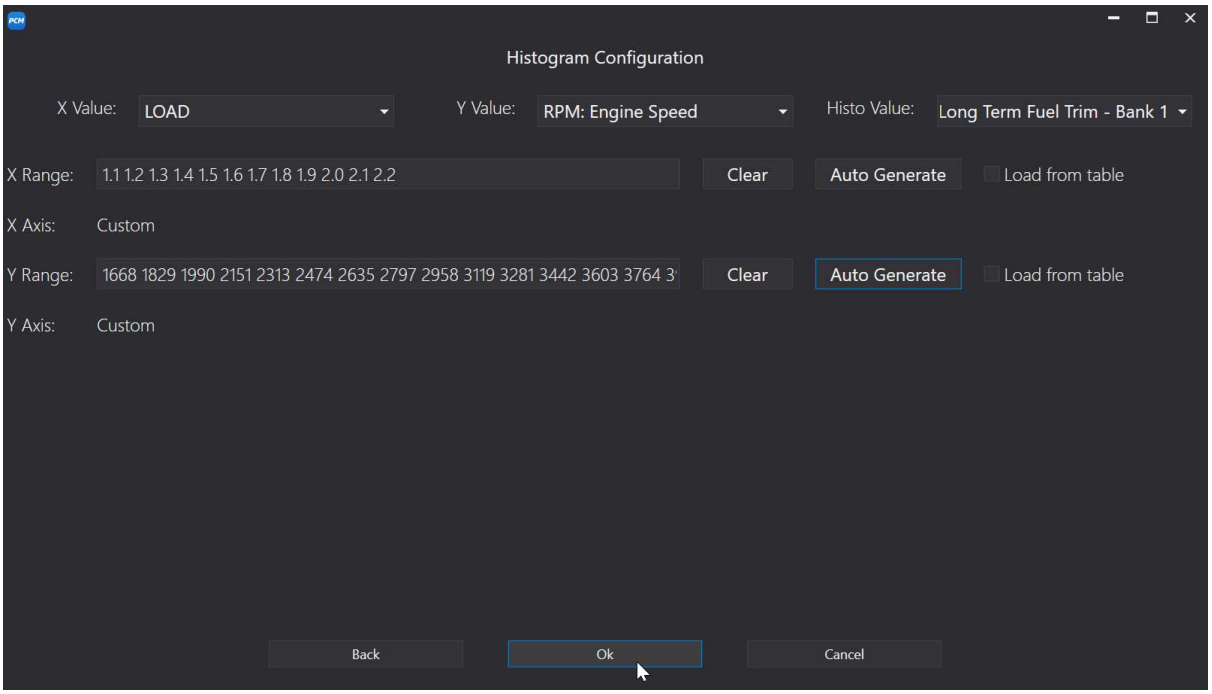
Press Display Histogram to enter the histogram configuration window

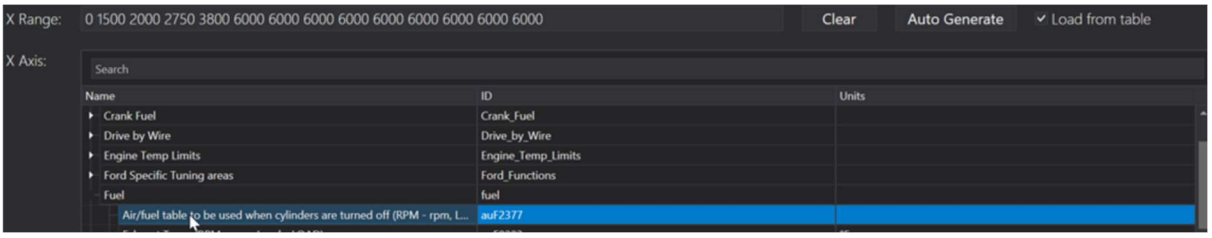
Here we define X, Y axis channels used to trace, and the histogram value which will be traced

You can either

- Enter the X Range by hand
- **Auto Generate** the range (20 values) from the current logged values selected



- Load axis from a similar table



Then press **OK** to display the histogram:

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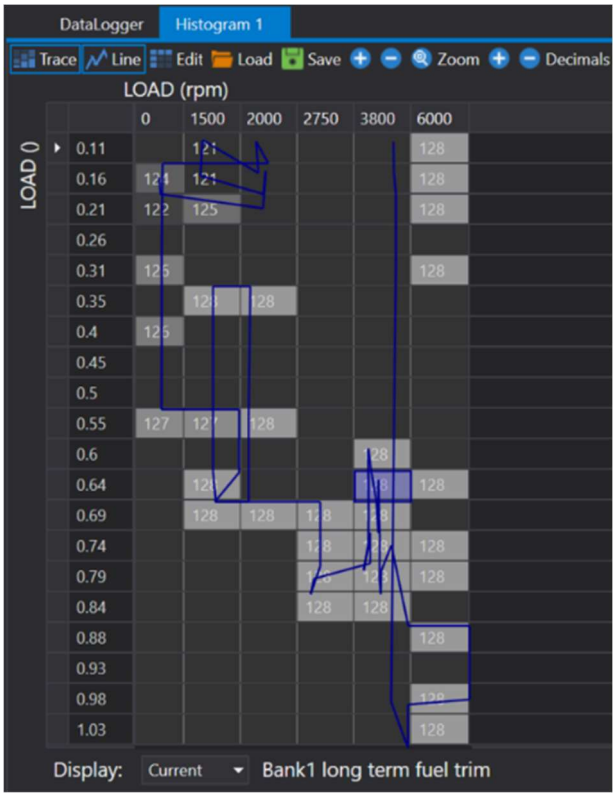
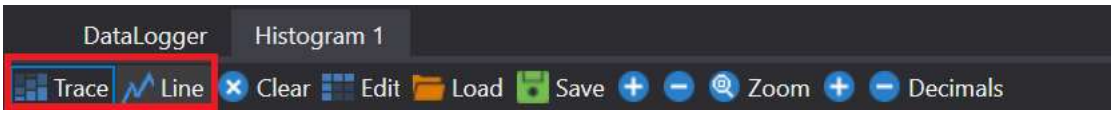
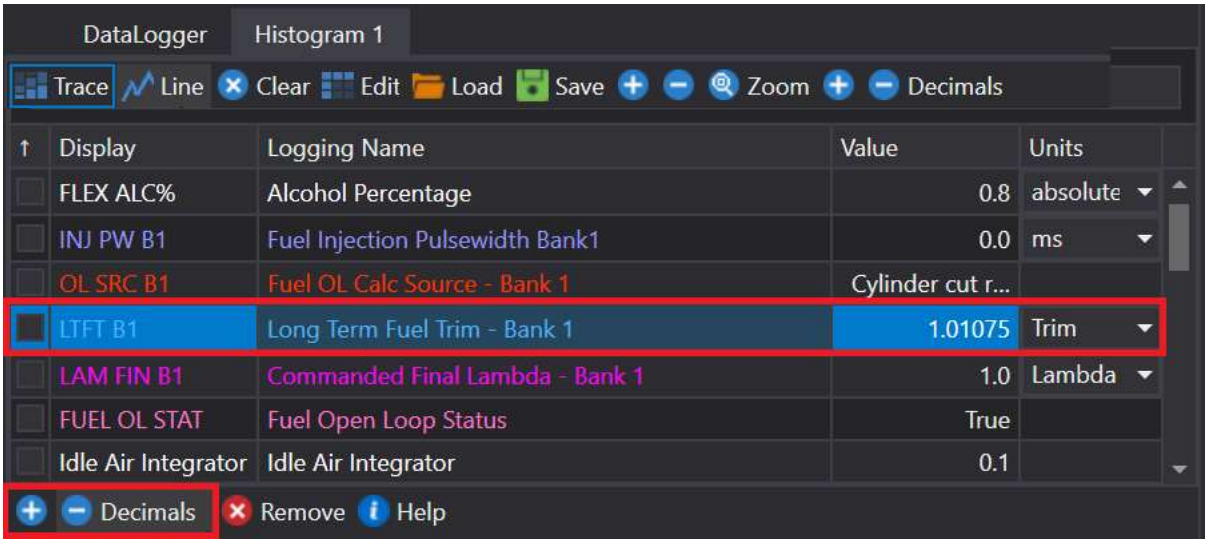


Trace cursor updates and the trace **Line** can be disabled if required.



Decimal points can be adjusted by adjusting in histogram bar, or in the scalar list **Decimal +/- buttons**



This will adjust the default LTFT for example from one decimal point to say three:

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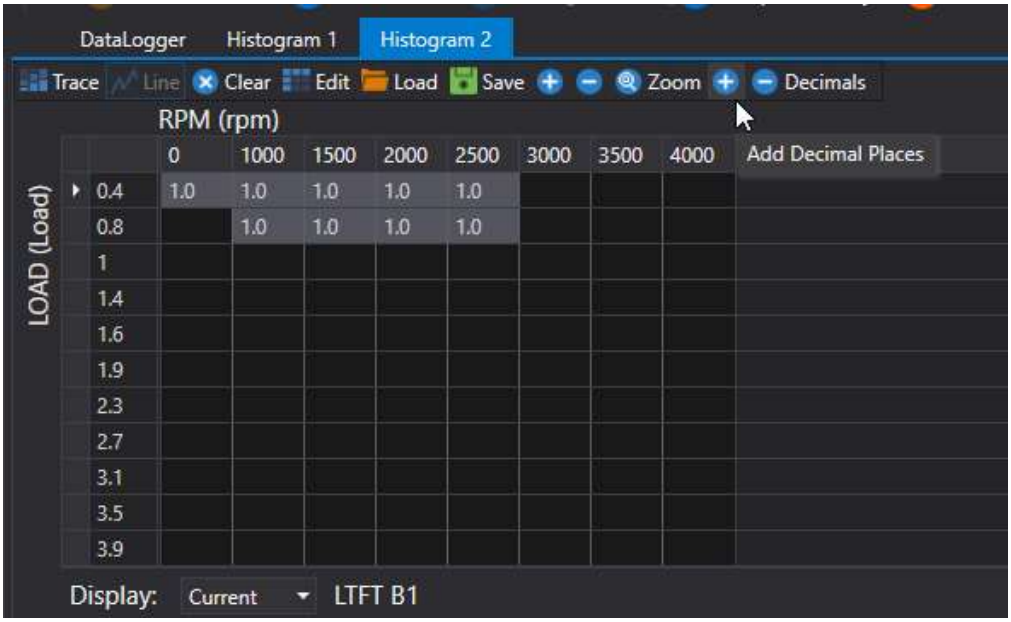
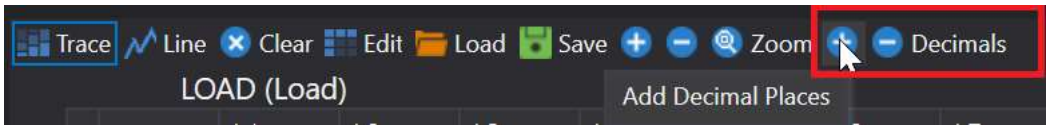
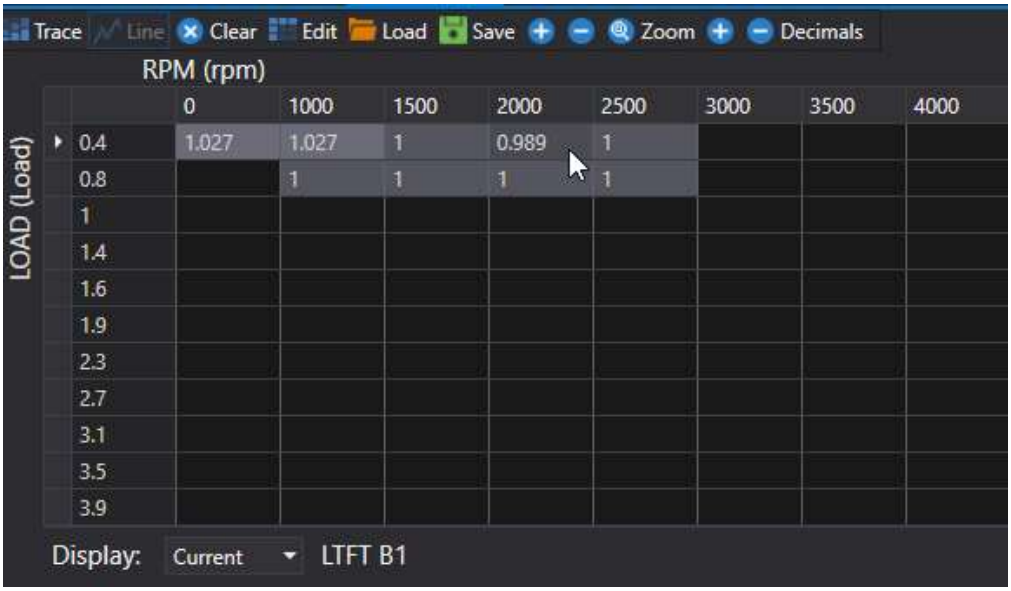
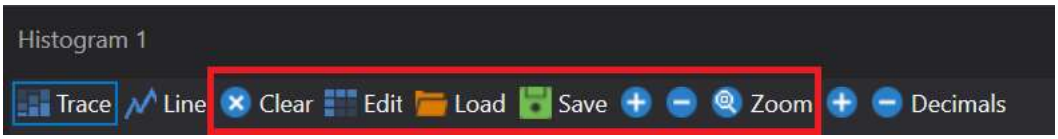






Other items in the histogram panel



Clear: – will clear the current trace window. The histogram is also cleared when the Log is cleared

Edit: – will return to the Histogram configuration window, to allow quick adjustments to the current histogram window

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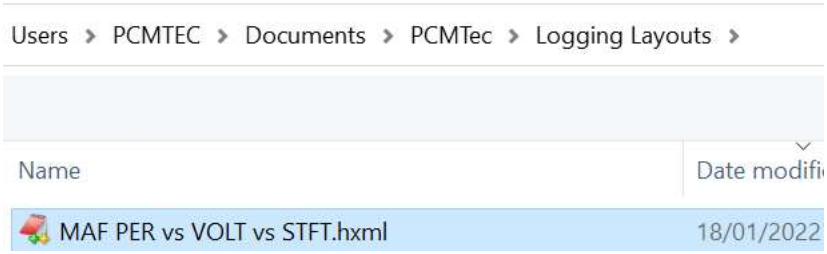
Save: – will save Histogram Layout (HXML) files to the layouts folder



Load: will allow reloading these HXML

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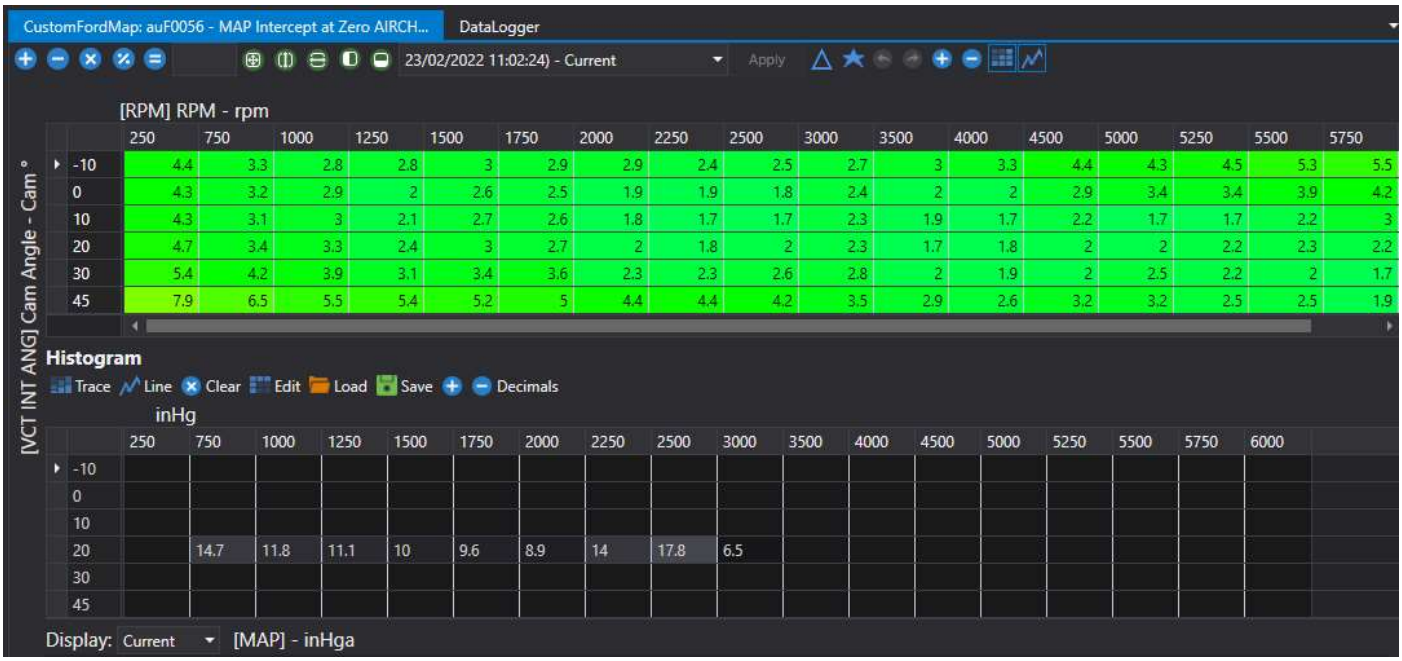
Map Table Tracing

Map table tracing allows you to quickly select an Editor table and trace data logging parameters against the existing table axis

For example, below we are tracing a trace again RPM and cam angle, using a pre existing table. There is also the option of displaying a histogram below the map table with an additional parameter, such as MAP pressure:



This is different from the histogram page, in that we are using pre-existing axis and display against Editor tables.

Selecting 'Display Table Trace' can be searched, and clicked on for one click trace display

Search or select the table you require, and where possible it will locate the DMRs you have logged (or are logging) and match them up against the table

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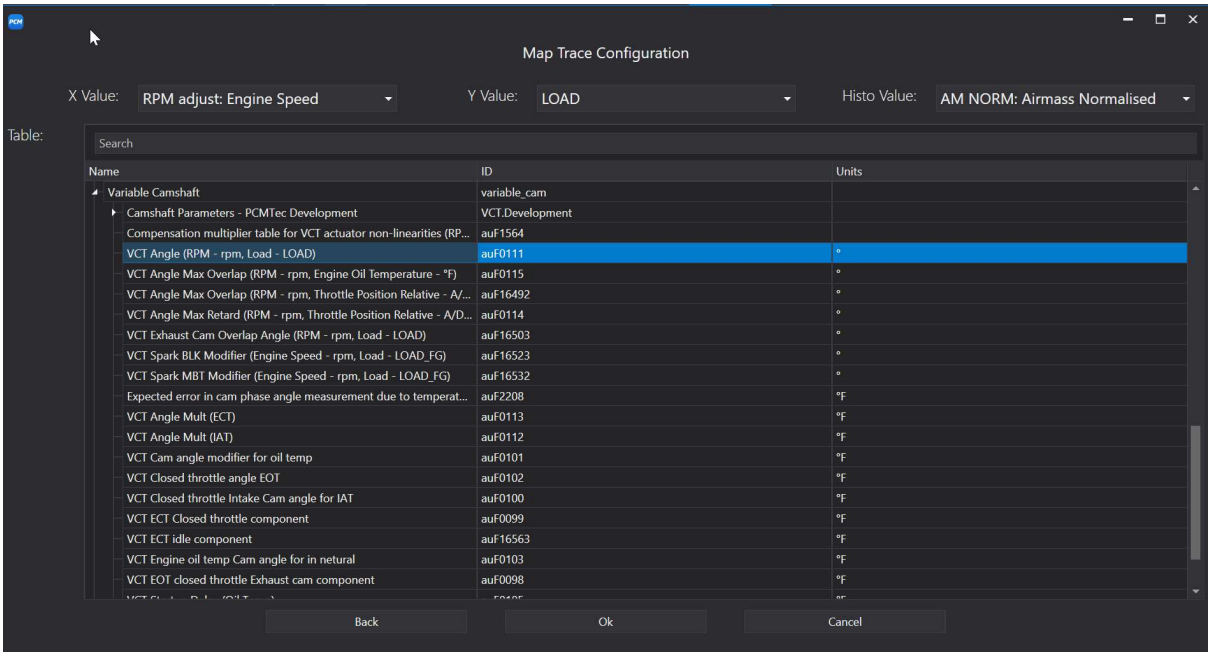
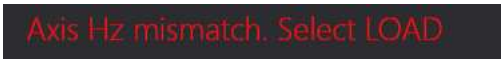
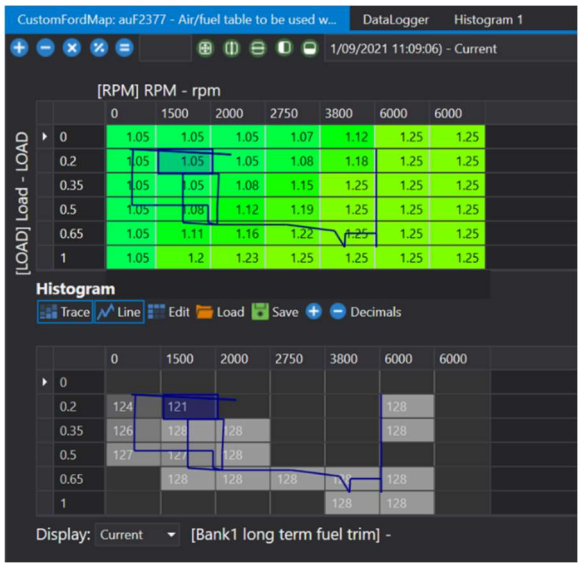


If the DMRs are not available, you may need to select them in the data logger, or find a close match. The selection window will warn you if they are not an exact match.

It may offer a recommendation based on similar channels with matching units



Like Histograms, you can select the table trace and line trace (if under 5 minutes of logging)



Note: In ‘Same Window’ channel view mode, only one table can be traced at a time.

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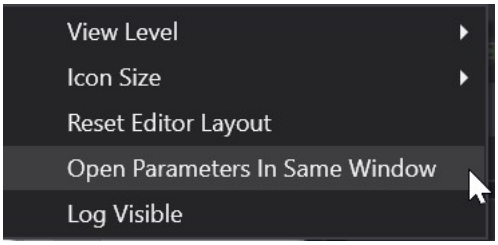
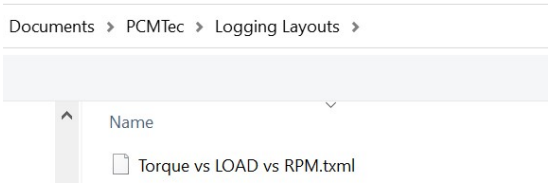


In multi window channel editing, once a table is traced, only the DMRs can be changed (the table itself locked)

Loading and Saving files works the same as Histograms but using TXML files, saved in the Layout folder



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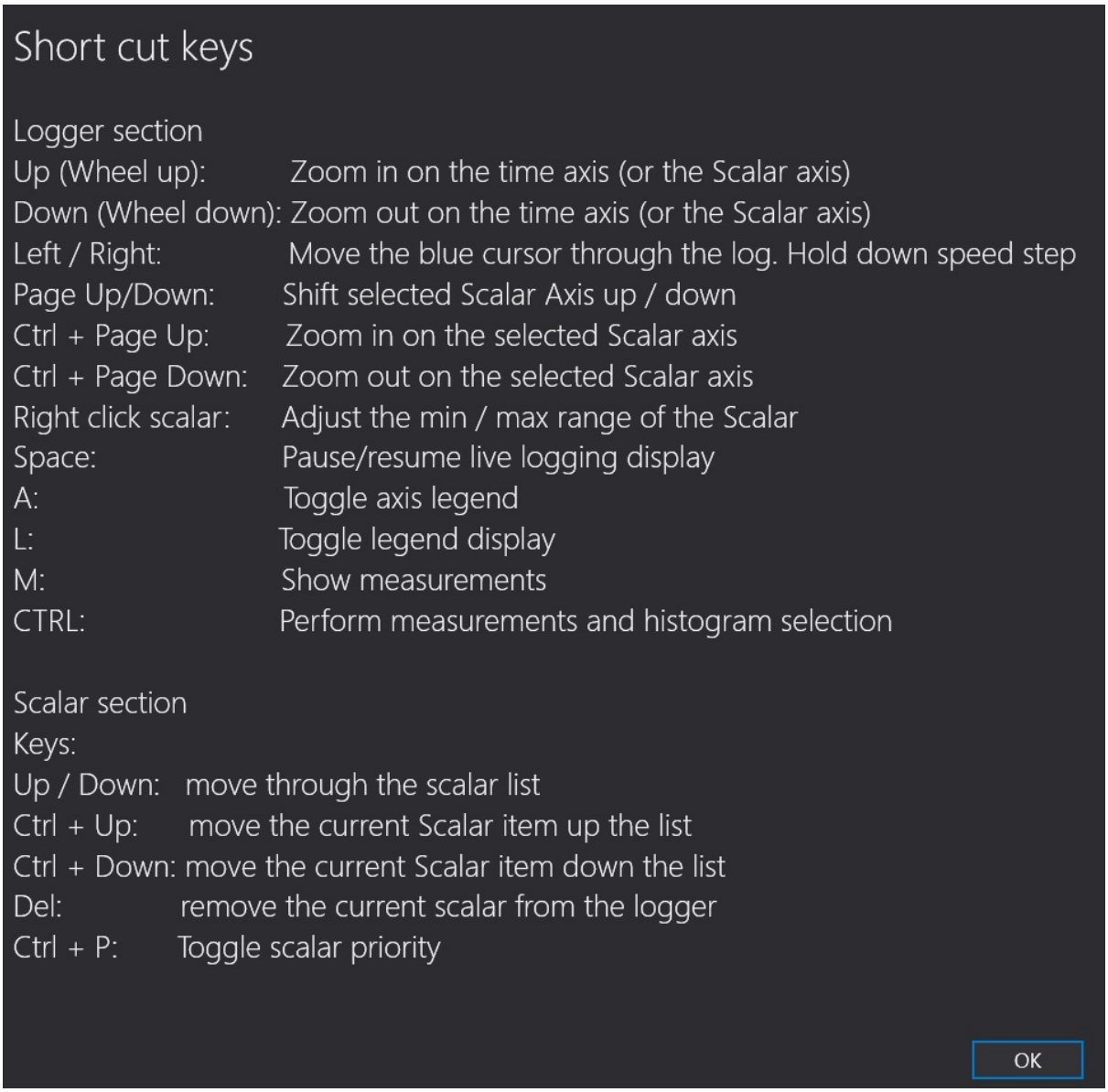
8. Short Cut Keys

Full short cut keys are available with **F1** or the Shortcuts icon



Full short cut keys descriptions are in this HOWTO on the PCMTec forum.

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9. External Voltage Inputs (DLP-8)

To log up to 8 analog inputs (or 16 with a different cable) you can use the DLP-8 analog to USB cable.

This can be used for logging the output of a fuel pressure sensor, external boost sensor, wideband AFR sensor or any other sensor which provides a scaled 0-5v output

Where to buy

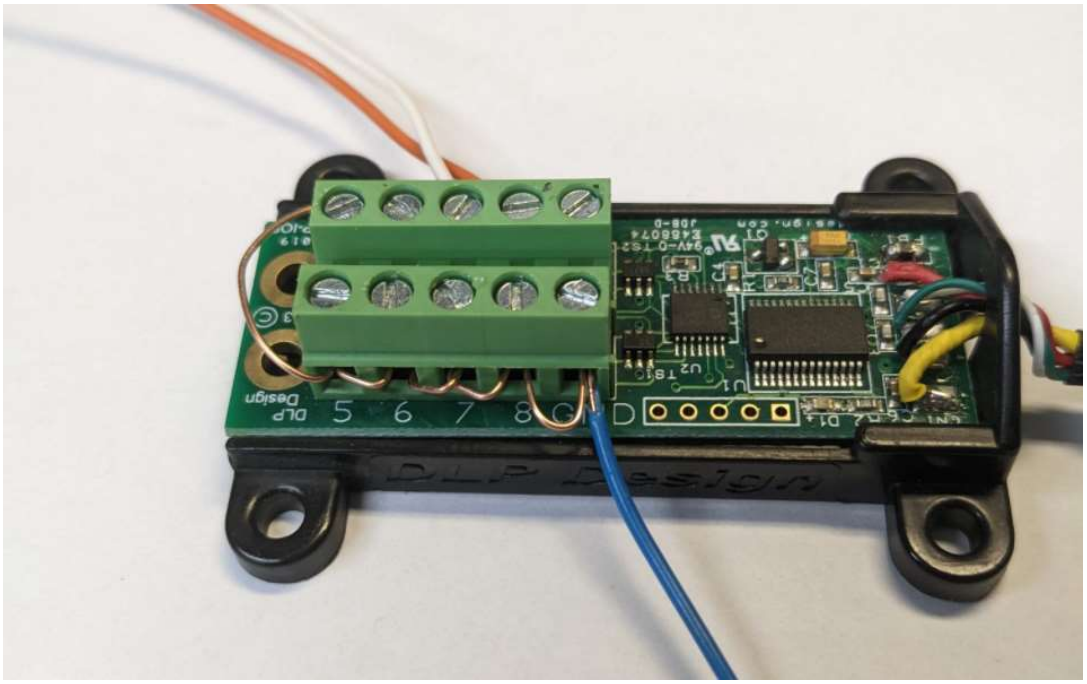
DLP-8 modules are available online from DigiKey or Mouser.

https://www.digikey.com.au/en/products/detail/dlp-design-inc/DLP-IO8-G/1894342

https://au.mouser.com/ProductDetail/DLP-Design/DLP-IO8-G

Setup

Once you have your cable, connect all unused inputs to the GND (ground) pin. This will avoid unconnected signals ‘flapping’ and affecting the inputs from your sensors



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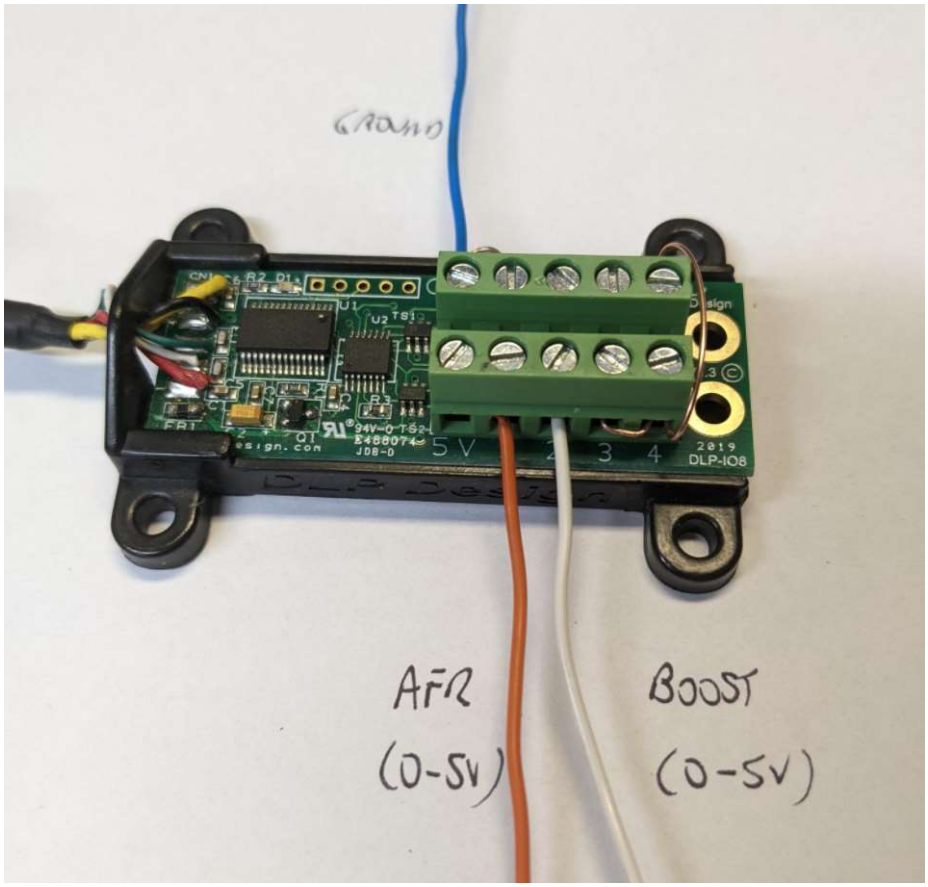
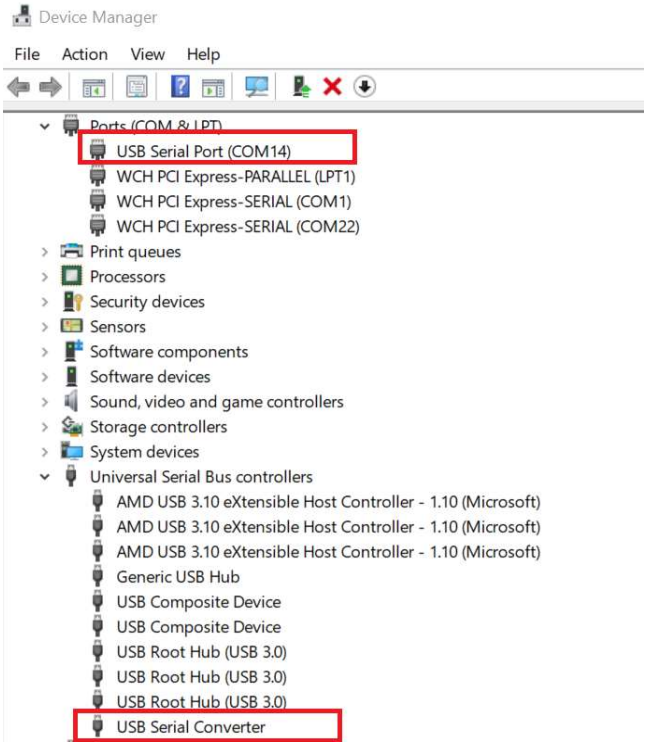
Connect the GND from the DLP to your sensor(s) and inputs 1,2 etc to your input devices. For most setups, the wideband (0-5 volt) AFR signal and Boost (0-5 volt) signal will be useful.



Next plug in your DLP device into your PC. It should install FTDI drivers automatically, and add a COM port to Device Manager when plugged in.



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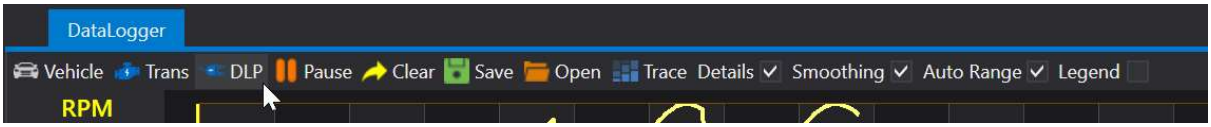
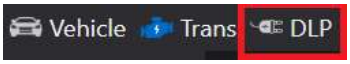
Connecting

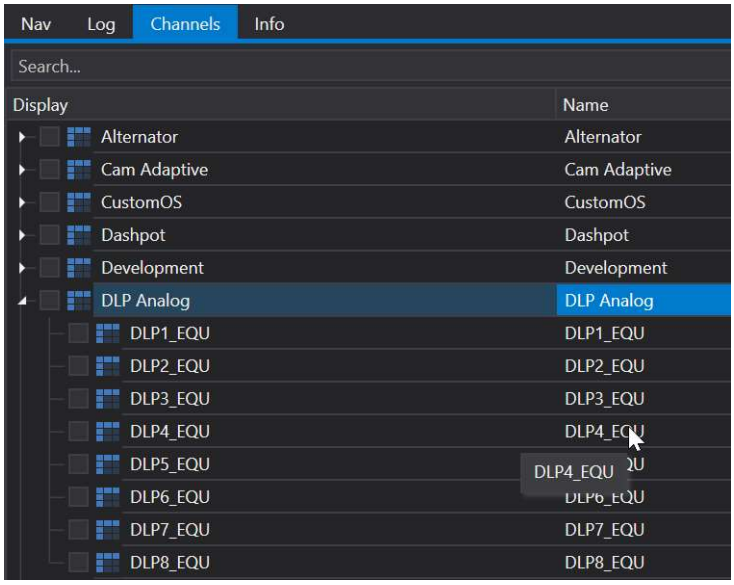
Inside the data logger, first connect to the vehicle, and then press the DLP button to connect to the device:



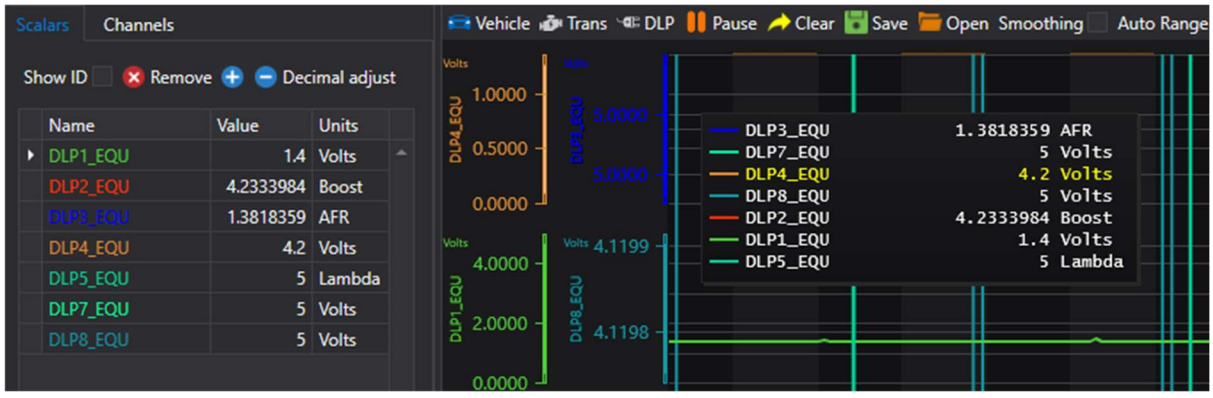
It will change to grey once connected



Next select under Channels, which of the inputs you would like to log



They will display on the chart



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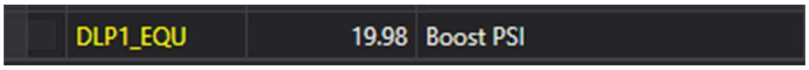
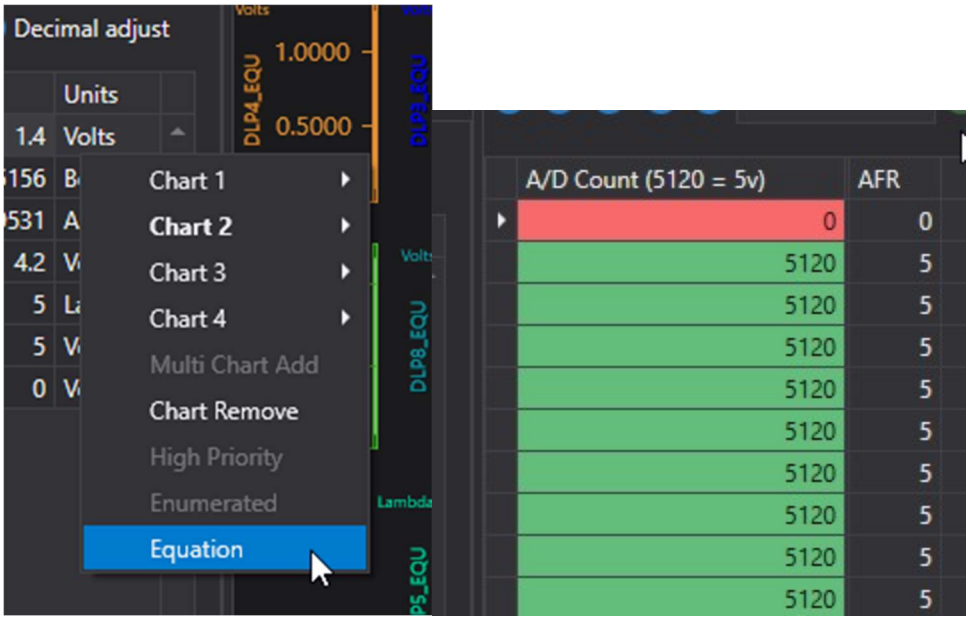
Units and Scaling

To change the description/units press F2 to enter Edit mode, then click in the Units field and type the new Units



To modify the voltage lookup table right click and pick “Equation”



You can enter in a new voltage lookup table here to suit your wideband etc. 5v = 5120 and 1v = 1024. Eg 1024 * voltage = A/D count.

If you have data from your wideband documentation that for example specified 1.2 lambda at 4.5v and 0.55 lambda at 1v you would enter the data as follows:

1v *1024 = 1024 A/D
4.5v * 1024 = 4608 A/D

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The table will be:

DLP AD Millivolts	Lambda value
0	0.55
1024	0.55
4608	1.2
5120	1.2
…	…
5120	1.2

This will clamp your lambda reading between 0.55 and 1.2 lambda.

Display Range

To adjust the display range, right click on the scalar and Adjust Range (or right click on the chart scales) the same as with other channels

Datasheet reference

http://www.dlpdesign.com/usb/dlp-io8-ds-v17.pdf

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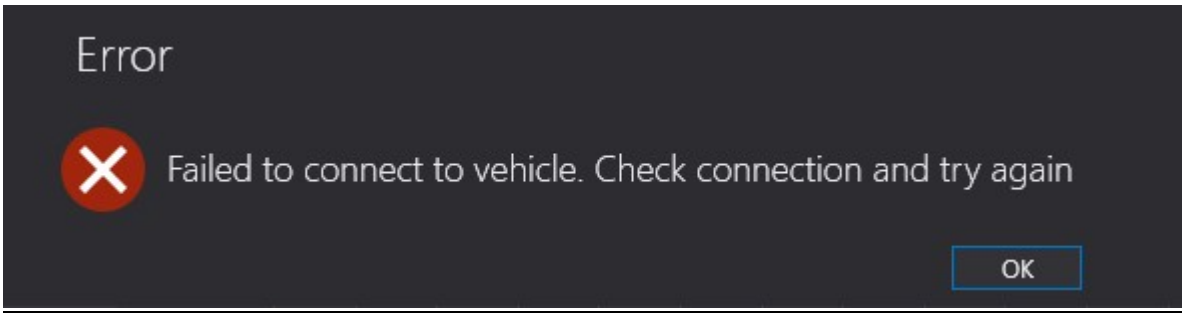
10. Troubleshooting

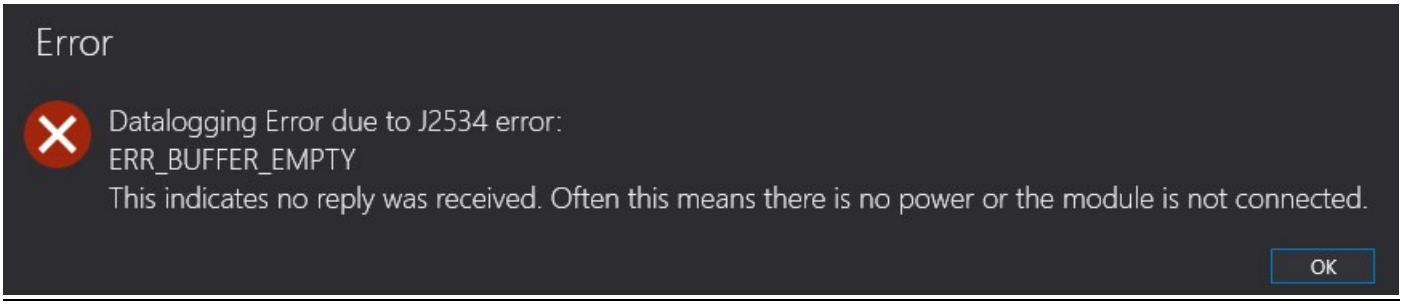
Common Problems

Connection issues

If you get a Failed to connect to vehicle error message, check the vehicle is switched on, and cable is correctly plugged into the OBD2 port of the vehicle and the laptop.



When there is no data from the PCM being received by the cable, you may receive an ERR_BUFFER_EMPTY or ERR_INVALID_DEVICE_ID error message. In this case, unplug the J2534 cable from the PCM and laptop and then replug in the cables.



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11. Where to Get More Help

PCMTec Forum

The PCMTec forum is where users can discuss problems online in an open forum setting. PCMTec staff and developers also post guides and assist with user queries.

Access the PCMTec Forum via https://forum.pcmtec.com

PCMTEC Service Desk

For Workshop Customers or for support with software bugs or other issues.

Contact the service desk via www.pcmtec.com/contactus

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