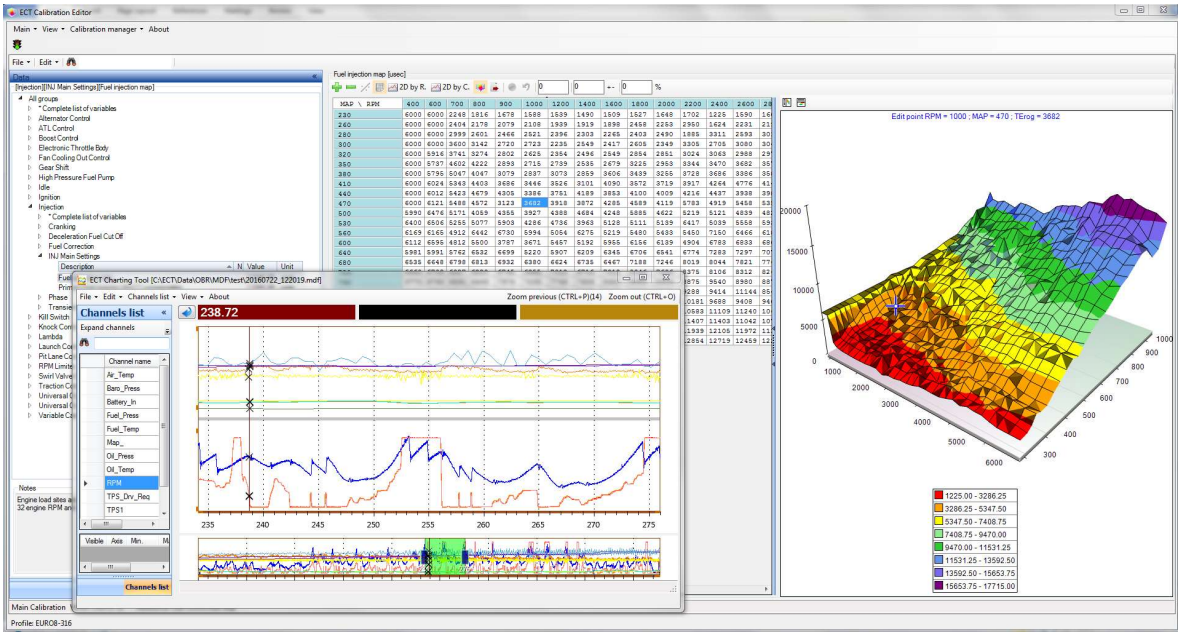
Quick guide to ECU Configuration Tool ECT

The smart tool for calibrating engine management systems and data analysis of logged data



Control Systems

Version 2.61 NDM – October 2026

For use with ECT versions from version 4.12.850

Copyright © OBR Control Systems Inc 2016-2026All rights reserved.

OBR Control Systems Inc
32233 West 8 Mile Road
Livonia, Michigan 48152
USA

Telephone : +1 (248) 672-3339

sales@obrcontrolsystems.com
www.obrcontrolsystems.com

Table of Contents

1 Introduction 5
2 Software Requirements 5
3 Software Installation 6
3.1 ECT Communication Server 6
3.2 ECT USB Drivers 7
3.3 Pseudo Programmer – Programmer for EFI ECUs 8
This program is used for programming devices. It can operate in stand-alone mode or be invoked as a tool by ECT. 8
3.4 ECT Main Tool 9
3.5 ECU Data Logger 10
4 Communication 11
5 Directory Structure 12
6 ECT Main Menu 13
7 Profiles Manager 15
7.1 Import a New Profile 15
7.2 Export a Profile 15
7.3 Modify XIP File 15
7.4 Assign Database to Display Files 16
7.5 Change ECU Display File 16
8 Displays 17
8.1 Data Display Options 18
8.2 Display Window Main Options 20
8.3 Display Management 20
8.3.1 New channel container 20
8.3.2 New link to channel container 20
8.3.3 New link to calibration elements container 20
8.3.4 New container group 21
8.3.5 Import existing channel container 21
8.3.6 Import existing calibration element container 21
8.3.7 Import existing group 21
8.4 Create New Display 21
8.4.1 Add Text 21
8.4.2 Channel 21
8.4.3 Align Windows 22
8.4.4 Add LED 23
8.4.5 Add Potentiometer 24
8.4.6 Add Gauge 25
8.4.7 Add Button 26
8.4.8 Add Maps to Displays 26
8.5 Open or Edit a Display 27
8.5.1 Smoothing Level 27
8.6 Display Options 28
8.6.1 Open display container 28
8.6.2 Arrange multiple display containers 28
8.6.3 Alarms 28
8.6.4 ECT display channel automated data logging 28
8.6.5 ECT display channel manual data logging 30
8.6.6 Print screen data PRT 31
8.6.7 Print screen data XLS 31
8.6.8 Potentiometer activation 32
8.6.9 Search parameters 32
8.6.10 Learn tool parameters 32
8.7 Multiple Display Sections 33

8.8 Strip Chart Mode 33
8.9 Display Override Functions 34
8.9.1 Creating override function 34
8.9.2 Working with override function 35
9 ASAP3 Communication 36
9.1 ASAP3 Options 36
9.1.1 Serial port communication 36
9.1.2 Ethernet communication 36
9.2 Establish ASAP3 Communication 37
9.3 Automated Test Procedures 38
9.3.1 1 – Software Installation, first time use of the ECU software. 38
9.3.2 2 – Automated Test Program 38
9.3.3 3 – Start the Automated Test 38
10 Calibrations 43
10.1 Calibration Settings 43
10.2 Load a Calibration 44
10.3 Calibration Editor 45
10.4 Calibration Display 45
10.5 Reference Map 45
10.6 Map Editing 46
10.6.1 Change a Constant 46
10.6.2 Change a 1-dimensional table 46
10.6.3 Breakpoint editor in 1-dimensional tables 47
10.6.4 Change a 2-dimensional map 47
10.6.5 Breakpoint editor in 2-dimensional maps 48
10.6.6 Interpolation 49
10.6.7 Comparing maps 49
Clone settings 50
10.6.8 Copy and paste 50
10.7 XML Files 51
10.8 Print 51
11 Sending and Receiving Maps 53
11.1 Send / Receive 53
11.2 ECU Comms 54
11.2.1 Send calibrations 54
11.2.2 Read calibrations 54
11.3 Learn 55
11.3.1 Send learn calibration 55
11.3.2 Read learn calibration 55
11.3.3 Learn functions 55
11.4 Diagnostic Tools 56
11.4.1 Reset diagnostic data 56
11.4.2 Reset counters 56
11.4.3 Output diagnose 56
11.5 MD5 Calibration Verification 56
11.5.1 Tool version 56
11.5.2 Configuration 57
11.5.3 Creating MD5 files 57
11.5.4 Verifying engine calibrations 57
11.5.5 Verifying ECU setup calibrations 58
12 Data Logger Configuration 59
12.1 Summary 59
12.2 Appearance 60
12.3 Device Database 61
12.4 Logger Configuration 62

12.5 Communicating with ECU 63
12.6 Dump Files 64
12.7 Log Files 64
13 Datalog View 65
13.1 Datalog View Options 65
13.2 File 66
13.2.1 Open main log file and load ALL channels into memory 66
13.2.2 Open main log file and choose which channels to load into memory 66
13.2.3 Open another log file for comparison and load ALL channels into memory 66
13.2.4 Open another log file for comparison and choose which channels to load 66
13.2.5 Offset value to be added to each of the compared file channels 67
13.2.6 Close file added for comparison 67
13.2.7 Print 67
13.2.8 Export 67
13.2.9 Exit 67
13.3 Edit 67
13.3.1 Channel Manager 67
13.3.2 Convert to constant sampling rate 67
13.3.3 Convert to maximum sampling rate 67
13.4 Cursor 68
13.4.1 Two Cursors 68
13.5 Channel List 69
13.6 Load a File 71
13.7 Create, Save and Load a Personalised Display Layout 71
13.8 Display Segments 73
13.9 Zoom In / Zoom Out 75
13.10 Display Orientation 75
13.11 Link analysis display with engine calibration 75
14 ECU Logger 77
14.1 Configuring 77
14.2 Update Logger – Download Data 78
15 Workspace 79

1 Introduction

The ECT communication tool is developed to give the user full access to all features in any of our engine management systems for use in motorsport and automotive development environment. The tool gives access to:

- Display of engine data
- Off-line modifications of main and setup calibrations
- On-line modifications of main and setup calibrations
- Sending and receiving calibrations to the ECU
- Sending and receiving learn calibrations to the ECU
- Resetting the ECU's automatic learn system
- Configuration and downloading of the ECU data logger
- Data recording of all parameters shown on a data display
- Graphic analysis of the logged data
- Modification of the ECU databases
- ASAP3 communication and generation of A2L files

2 Software Requirements

- A PC running Windows 10 or Windows 11.
- ECT is developed with Microsoft ®. NET Framework 4.8.1 which must be present on the PC. If the Framework is not installed during the installation, you will be asked to authorize the installation software to download and install the Framework. Alternatively, you can manually install the Framework from another source and then proceed with the installation of ECT.
- The PC must have at least 110 Mb free on the hard disk.
- The PC must have at least one available USB port.
- Our CAN communication interface is required for communication with all current devices, for example Euro-2PLUS, Euro-4, Euro-5, Euro-8, Euro-8PLUS and Euro-12.
- 4 programs are to be installed:
  - ECT Server
  - ECT USB Drivers
  - ECT Pseudo Programmer
  - ECT Main
- Databases for the system are provided by OBR Control Systems.
- The fundamental database to manage a device is the database in XML format. It contains the communication IDs and optionally the memory map, the list of channels to read, the structure of the calibration and other characteristics of the device.
- Display databases. These databases contain lists of channels or values of the calibration along with all necessary information to graphically render data. The database can be created from scratch in ECT or imported into the environment with wizards and can be modified using the tools provided by ECT.
- Firmware for the device. Developed by EFI and already present in the device. ECT gives you the ability to reprogram the ECU with a new version of firmware released by EFI (if the device includes the ability to be reprogrammed).
- Calibration of the device. Usually developed by the customer, on an initial basis provided by OBR. If the device allows it can be transmitted to the device and downloaded from the device through ECT. In most devices you can also view and edit the contents of the calibration on-line.

3 Software Installation

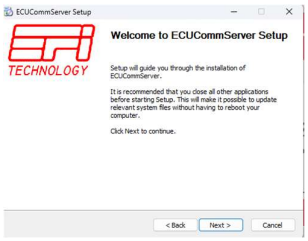
To install the ECT tool download the software from our website www.obrcontrolsystems.com, look for the 'Download' section.
Download these driver packages:

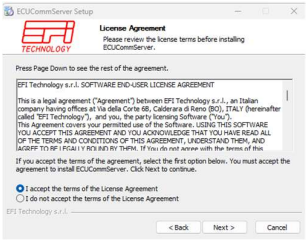
- ECT server 5.0.0.0 or newer.
- ECT USB interface drivers 2.0.0.0 or newer.
- Pseudo Programmer 0.6.4.3 or newer.
- ECT engine management tool '850' or newer.
- ECU data logger setup 5.3 or newer.

3.1 ECT Communication Server

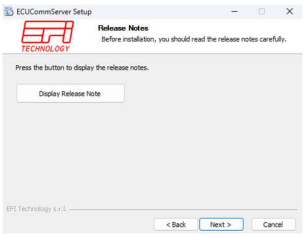
Do not connect your CAN interface to your PC during the installation..
First program to install is the server program. This software interfaces with the driver and provides the communication conditions to other programs such as ECT. Installation of this software is essential for all functions involving communication with devices.

Click **I Agree** to start the installation of the communication server.



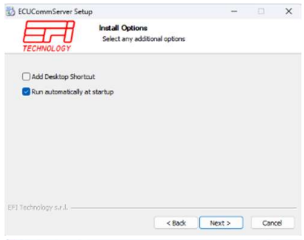


Accept the default installation path or change it now, then click **Next**.

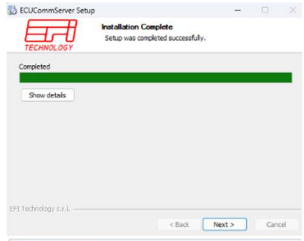


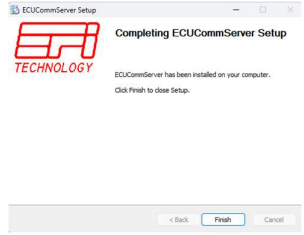
Select **Automatic Run** if you want to start the server with Windows or leave blank for the service to start when the tool is opened.

Click **Install** to proceed.



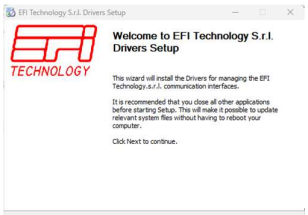
Click **Next** to continue.



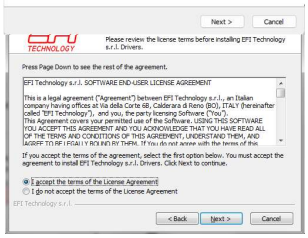


3.2 ECT USB Drivers

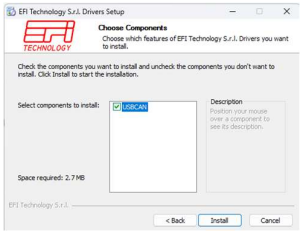
This program installs the USB drivers required to enable communication between your PC and the ECU. Installation of this software is essential for all functions involving communication with devices.



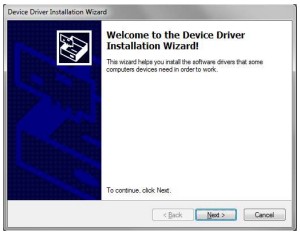
Click **I Agree** to start the installation of the communication server.



Accept the license terms and click **Next**.



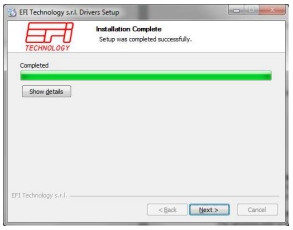
Select the USB option and then click **Install**.



Click **Next**.



Click **Finish** to complete the installation of the device drivers.



Click **Next** to finish the driver installation.

3.3 Pseudo Programmer – Programmer for EFI ECUs

This program is used for programming devices. It can operate in stand-alone mode or be invoked as a tool by ECT.

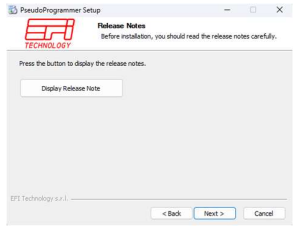


Click Next to start the installation.



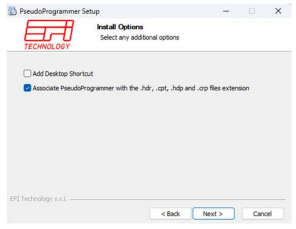
Accept the license terms and click **Next**.

Click **Next** to start the installation.

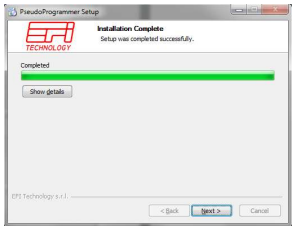


In normal installations you do not need to add neither desktop nor a quick launch shortcut. Tick the last box to associate certain file extensions with Pseudo Programmer.

Click **Next** to proceed.



Click **Next** to finish the installation.



Click **Finish** to close the setup.



3.4 ECT Main Tool

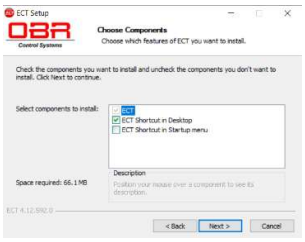
This software is ECU tool which is described in this documentation. This guide is based ECT version 850.

Click OK to proceed with the installation.

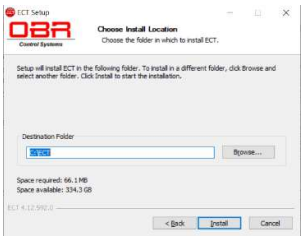


Click **I Agree** to proceed with the installation.

Select where to add shortcuts and click **Next** to start the installation.

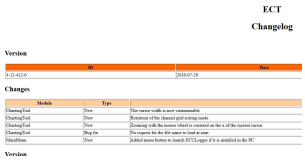


Accept the default installation path or change it now, then click **Next**.

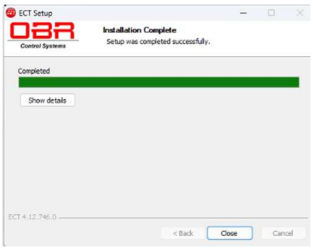


When the installation is complete a tool version history is displayed.

Close it and then click **Close**.



Installation is now complete.

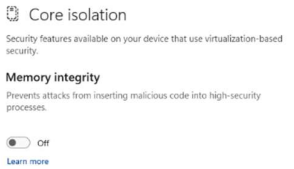


Check the setting of Window's Core Isolation setting.

Type Core Isolation in the PC's search window and press Enter.

Memory integrity must be set to OFF.

Changing this data and installing the USB drivers requires you to reboot your PC.

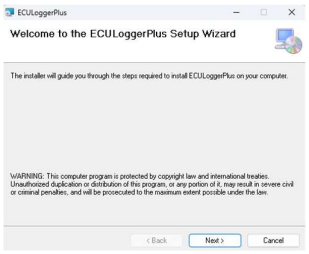


3.5 ECU Data Logger

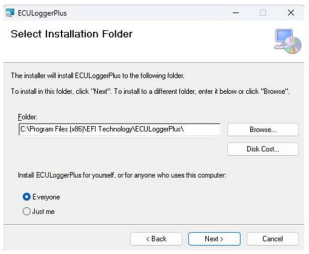
Logger software version 5.3 or newer is used for configuring the on-board data recording module available in most of our engine management modules. The software is also used for downloading logged data.

Data saved in the MDF format can be visualised and analysed graphically using the Datalog View.

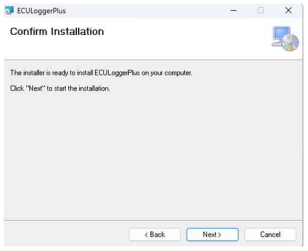
Click OK to proceed with the installation.



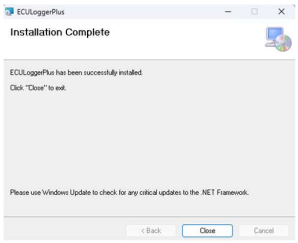
Select how to install the software, we use **Everyone**.
Click Next to continue the installation.



Click Next to finish the installation.

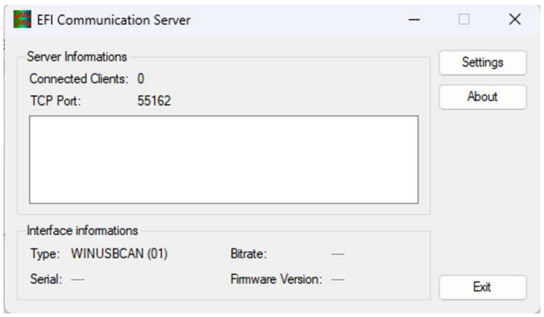


Click Finish to close the setup.

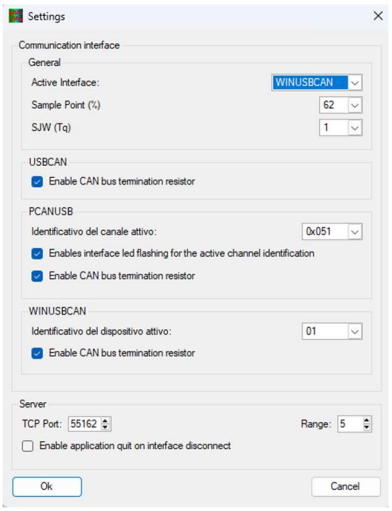


4 Communication

Communication with the ECU is via CAN. Communication via CAN requires using our dedicated USB CAN interface, part number EFP02C or the CAN interface with a data recording facility EFT20B.
Once the USB drivers have been installed and you have checked status of your computer's Core Isolation is OFF, then you must reboot your PC.
Open the ECT server by clicking on the Windows search window and type ECU, then look for the server icon in the lower right corner of your display monitor and click the icon.
The server window open:



Click on Settings and select WINUSBCAN. Make sure the CAN termination box isticked.
No other changes are required.



When you connect your interface to your PC, the server icon changes color from gray with black lines to green  with red lines.

Your ECT is now ready for communication with the ECU.

An upgrade of the CAN interface is available to enable optional ASAP3 communication.
ASAP3 communication allows data exchange between an engine dyno and the ECU.
Please see section 10.

5 Directory Structure

Several folders are created in the ECT main folder during the installation process:

BIN
Contain program folders and associated files, for example a data base editor.

CALIBRATIONS
Suggested folder for your firmware, engine and ECU setup maps.
Installing an updated version, a new folder is created, containing the related firmware.

COMMON
Contains the main program database files.

DEVICE
Individual database files for each type of ECUs and for various versions of firmware releases.

DOC
System version history files are stored in this folder.

LANG
Various system files.

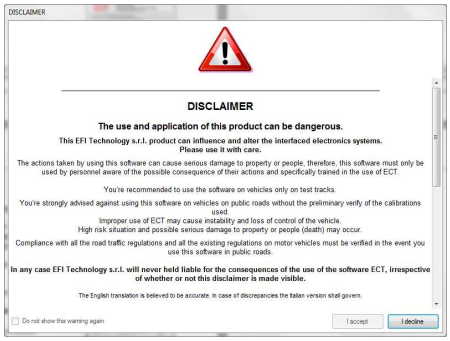
TEMPLATES
Various system files.

USER
This folder contains variations of display files for supported ECUs.

WORKSPACE
Contains databases giving quick access to displays and calibration editors.

6 ECT Main Menu

First time you start ECT after an installation or updated version has been installed this screen appears:



Scroll down, tick the box **Do not show this warning again** and click **I Accept**.
The ECT Main Menu now appears as a slim tool bar across your monitor:



- **Databases**, this section gives access to the databases for each individual ECU type and firmware version installed in the tool. To access data of a physical device, ECT must have a database file [devicename].XML corresponding to the physical device. From this database ECT reads the information required to visualize data, to program firmware, manage engine maps etc.

- **Profiles management**, a profile is a custom environment that allows you to save collections of displays together with a set of data stored in a database file [profilename].PDB. The profile manager provides commands to create, delete, copy, import and export profiles.

- **Displays**, you can create screens displaying any ECU parameter measured and calculated for each type of ECU. A screen can display any number of ECU channels in any size, font and color in a numerical window or as an analog gauge. You can add LED's in various colors to ease the data monitoring and potentiometers for easy, adjustments of numerous parameters. Furthermore, you can add access to any section of the ECU calibration, allowing you to edit for example the main fuel and spark maps directly within a display window. The display tool provides commands to create, modify, organize and load data display screens.
  It also features an option to record live data from any display screen.

- **Calibrations**, the calibration editor opens the map editor and gives access to the data in both the engine maps and the ECU setup calibrations. Both types of calibrations can be accessed working either online with the ECU or offline.

- **ASAP3**, this section gives access to the ASAP3 communication. The CAN communication interface needs to be updates with a special configuration for this feature. Please contact OBR.

- **Send / Receive**, memory interface provides access to commands to flash the device with a new firmware, to read and write the calibrations, to manage diagnostic functions (if available for the current device) and to manage the creation of HDP and CRP files.

- **Datalog View**, this is a tool used for graphical display of data recorded by the built-in data logger available in most of our ECUs and by the data recording option in the Display section. It can also open MDF files from other systems.

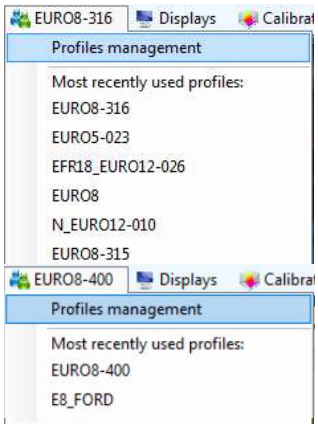
- **ECU Logger**. If you have installed the ECU logger tool you can access it from this section. Use this to configure, activate and download data the ECU logger in Euro-4, Euro-5, Euro-8 all versions and Euro-12. You can create logger configuration files, set sampling rates and trigger conditions. Data is also downloaded from the ECU to your PC in this section.

- **Arrangement**, click this option to line open windows in ECT up next to each other. If you have two groups open, this feature will split the monitor display area into two, divided vertically and showing each group in each segment.

- **Workspace**, when you have created your preferred layout of the tool, combining for example displays and the calibration editor, you can save your current layout as a workspace. This way you can load your preferred layout with a few clicks with your mouse.

- **Settings**, click this option to gain access to the main systems settings.

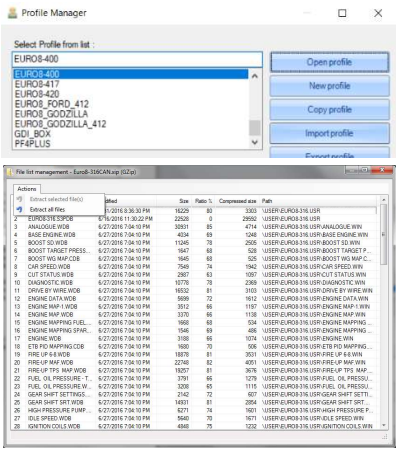
7 Profiles Manager

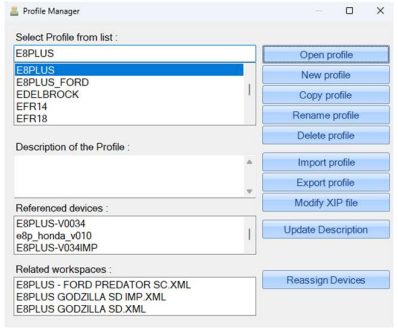


Use this section to switch between various ECU communication protocols. From the drop-down menu you click on the preferred version, and this sets the display screen protocol for the selected ECU. This section also gives access to create a new profile, to copy profiles, to import, modify and export profiles, rename and delete profiles.

7.1 Import a New Profile

We release new versions of ECU data files as **XIP** files. This is the format used by ECT to import new ECU data files.
Download the XIP installation file you have received from OBR.
Open ECT and click on the '**Profile Manager**' icon and select '**Profiles management**'.
Click on '**Import Profile**' and locate the new XIP file, click **OK** to open it.
A new display opens, showing all the files included in the new release.
Click on '**Actions**' in the top left corner of this wind and select '**Extract All**'. Close the window when done.
If you only want to import part of the files, click on those files, and then select '**Extract selected file(s)**'.
The new database will be saved in a new folder in the main Device folder; new display files will be saved in a new folder in the main User folder.
Firmware and sample maps will be saved in a new folder in the main folder Calibrations.
Once installed you select the new version now appearing in the version list and click **Open Profile**.
By default, the XIP files we supply includes sample maps and firmware corresponding to the release number. These files will be copied into the 'Calibration' folder found in the main ECT folder when installing the data files.





7.2 Export a Profile

From within the Profile Manager you can export displays, maps, databases, workspaces etc from ECT.
Select a profile to export from the list.
Click on Export Profile and type a name for that profile in your destination folder, this will create the XIP file.
A window will open, showing all files included in the new XIP file. You can add or delete files from the list. When done, close the window.

7.3 Modify XIP File

From within the Profile Manager you can access existing XIP files and modify their contents.
Click on the button Mofify XIP File and select the file to edit. When done, close the window and save the file.

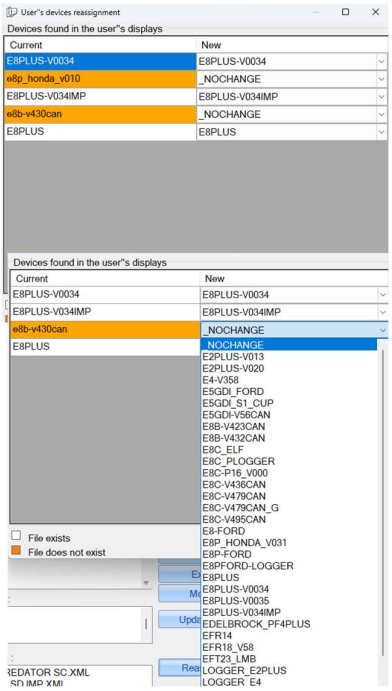
7.4 Assign Database to Display Files

You use this section to link a specific database version to data display screens.

If the databases selected do not correspond to the version of firmware used in the ECU, click first on the display version in **Select Profile from List**, then click on **Reassign Devices.**

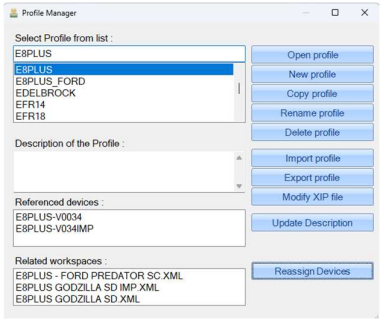
As shown on the right the data display file is linked to several databases.

Click on the right of the database you want to change, a drop-down menu opens, showing a list of available databases.



Click on the desired database to select it, then click OK to link it to the display version.

When completed click **Open Profile** to return to main program.



7.5 Change ECU Display File

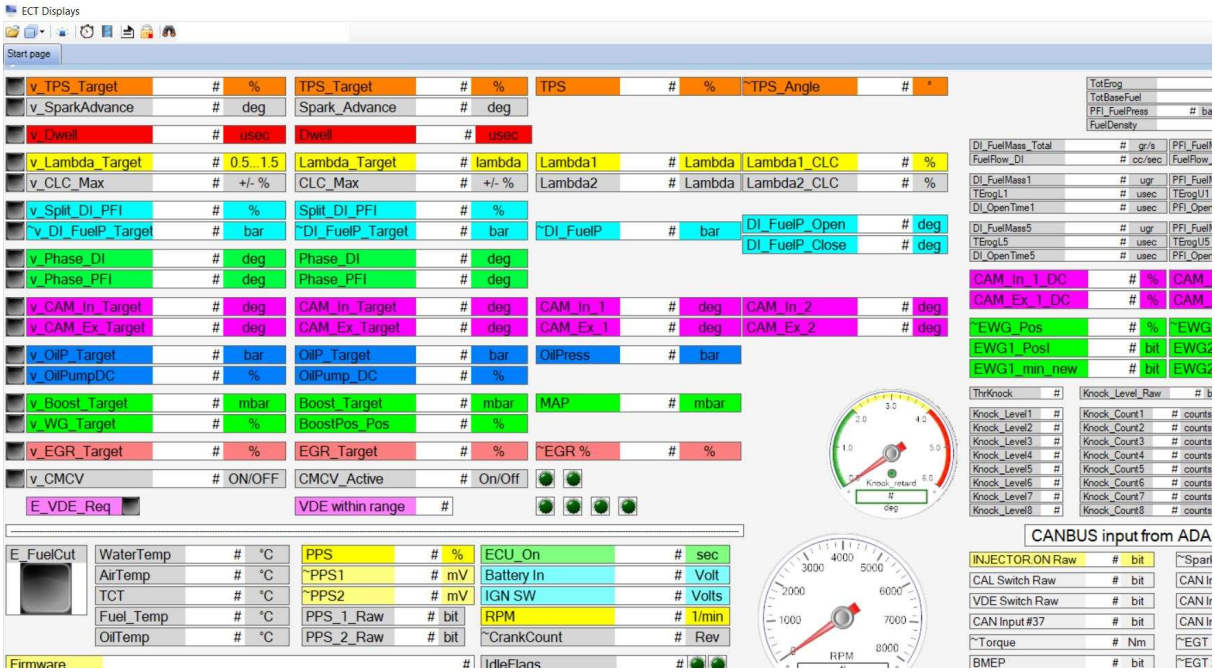
When you switch from one type of ECU to another model, you must change the database used for the communication and data display.
Click on the Profile Manager icon to open a list of available profiles.
Click on the profile you want to use and ECT is now configured to communicate with a different ECU.
When completed click **Open Profile** to return to main program.

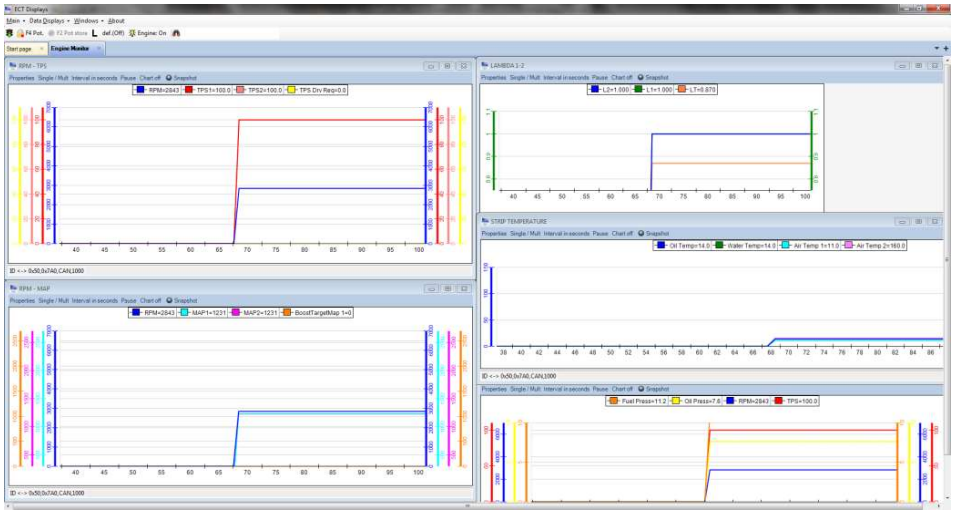
8 Displays

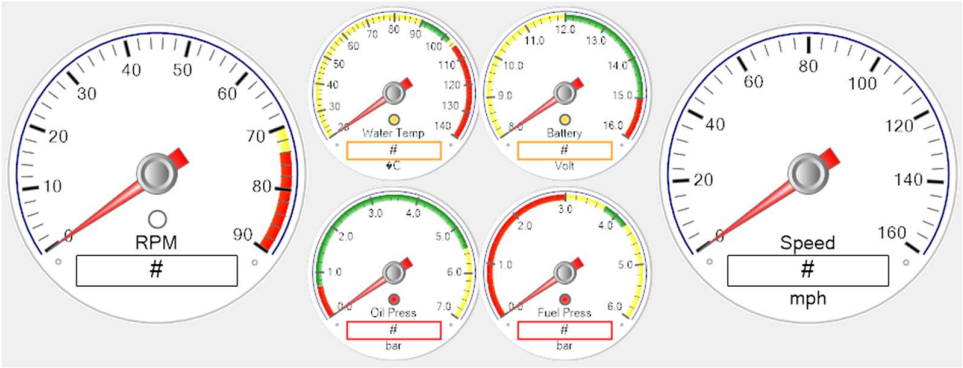
This section gives access to visualize live data from the ECU on your PC.
It is possible to create display screens with:

- Digital and analog data windows
- Text messages
- Actuation switches
- Potentiometers
- Strip charts
- ECU tables and maps
- Data recording
- Alarm configuration

Here you see examples, combining all features of the display program.



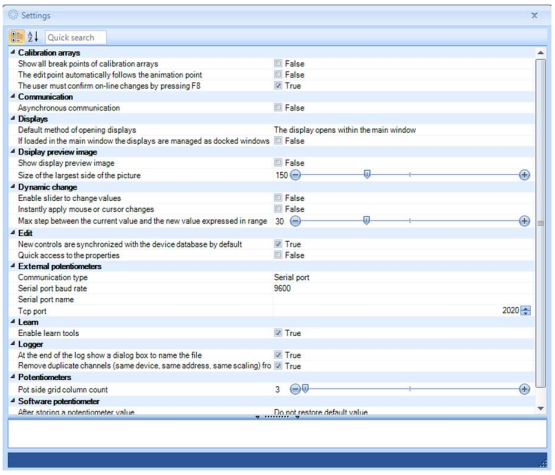






8.1 Data Display Options





First time you have installed the ECT tool you should check the settings of the display program. Open the display program, click on settings icon (gearwheel symbol) in the upper right-hand corner of the display window. Selectable options are:

Calibration:

- **Show all break points in calibrations** - if ticked all hidden map break points will be shown in maps.
  Select as personal preference.
- **The edit point automatically follows the animation point** - the edit cursor follows the animation in calibration maps when opened online. This feature can also be selected while online with a map in the ECU.
  Select as personal preference.

- **The user must confirm on-line changes by pressing F8** – when selected, you must press **F8** or click the red icon in the map header to confirm map changes to be updated in the ECU. Recommended setting.

Communication:
- **Asynchronous communication** - not recommended for our engine management systems.

Displays:
- **Default method of opening displays** - select between opening a data window within the main display window or to open as a floating window.
  When opening a display window in the main frame, then data windows are contained within the main display frame.
  When opening a display window as a floating window, the data windows can be placed anywhere on your PC screen(s), not restricted to be within the ECT program.
  Recommend setting but it is down to personal preference.
- **If loaded in the main window the displays are managed as docked windows** - list display channel data in a table format. The various controls are arranged in a scrollable vertical list. Not recommended.

Display preview window:
- **Show display preview image preview** - select to show thumb view when scrolling through display list.
- **Size of the largest side of the picture** - set to preferred size of thumb view.

Dynamic change:
- **Enable slider to change values** - this is a recommended setting for use with override data windows. See section 9.9.
- **Instantly apply mouse or cursor changes** - this is a recommended setting for use with override data windows. See section 9.9.
- **Maximum steps between the current value and the new value expressed in range** - set the maximum offset value to the current value and the new value.

Edit:
- **New controls are synchronised with the device database by default** - recommended setting, prevents incorrect database to be used with ECU firmware version.
- **Quick access to the properties** - select to show channel data properties when double clicking on a display channel window. Otherwise, you must enable display window editor first.

External potentiometers:
- **Communication type** - select type of communication with external potentiometer box by serial link or Ethernet.
- **Serial port baud rate** - select baud rate for communication, 9600 or 19200.
- **Serial port name** - select name for available port.
- **TCP port** - select Ethernet port address.

Learn:
- **Enable learn tools** - tick box to enable learn tools on display windows. See 9.6.10. Recommended setting.

Logger:
- **At the end of log file** - option to name the data logging file individually. Alternatively, the file is named by data and time stamp. Please see section 9.6.4. Recommended setting.
- **Remove duplicate channels (same device, same address, same scaling) from the logs** - select to avoid possibility of recording same data from different display windows. Recommended setting.

Look:
- **Default font:** Select your preferred font for display windows.

Potentiometers:
- **Pot side grid column size** - set the number of columns to show for map associated with the selected potentiometer.

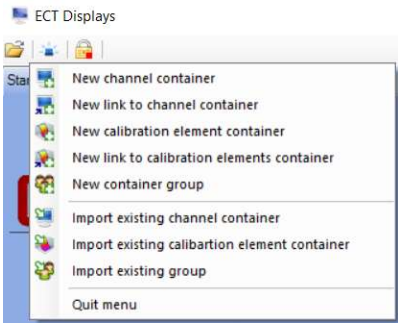
Software potentiometers:
- **After storing a potentiometer value (for software potentiometers only)** - select between options for potentiometer functionality:
  - Do not restore default value (leave potentiometers on trim applied), not recommended.
  - Restore default value and disable potentiometers (reset potentiometers to 0 correction and disable trim).
  - Restore default value and but do not disable potentiometers (reset potentiometers to 0 correction and disable trim). Recommended setting.

8.2 Display Window Main Options

When you open the display manager from the main ECT menu you have the following options:
- Open data display listing (ALT+D)
- Arrange windows
- Alarm settings and messages
- Activation of software or AMC hardware potentiometers by pressing F4.
- Search function

8.3 Display Management

Right click the folder icon for open display listing to show initial options for the display management



8.3.1 New channel container
Click to create a new display window.
Refer to section 9.4 to see how to create a new display window.

8.3.2 New link to channel container
Creates a link to a data window stored in a different folder than the default. If you import from a different type of ECU, you must link the data parameters to the current ECU database.
ew calibration element container
Use this section to ad ECU maps for online access to ECU maps.
Refer to section 9.4.7 for full details.

8.3.3 New link to calibration elements container
Creates a link to ECU data window not located in the current folder. If you import from a different type of ECU, you must link the data parameters to the current ECU database.

8.3.4 New container group
Create a new group of displays.
If you click to open a group display, all displays contained in the group will open.

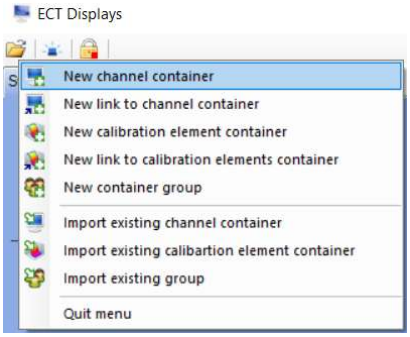
8.3.5 Import existing channel container
Import a data window stored in a different folder into the current folder. If you import from a different type of ECU, you must link the data parameters to the current ECU database.

8.3.6 Import existing calibration element container
Import a data window stored in a different folder into the current folder. If you import from a different type of ECU, you must link the data parameters to the current ECU database.

8.3.7 Import existing group
Import a data group window stored in a different folder into the current folder. If you import from a different type of ECU, you must link the data parameters to the current ECU database.

8.4 Create New Display

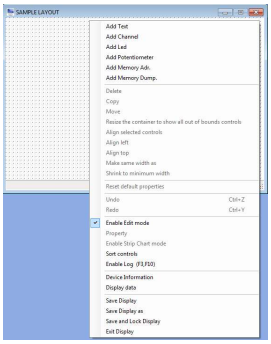
To create a new layout right click the Data Displays tab and select **New channel container**.
You will be prompted for a name, then click on **OK**.

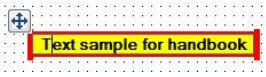


Right clicking on the display, you can now add the following:

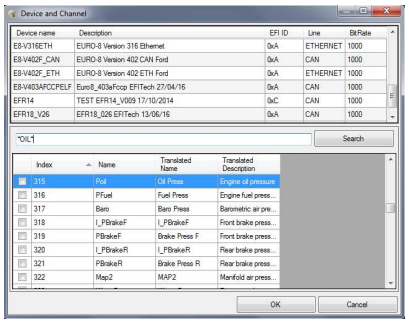
- Add text
- Add data channels
- Add LED warning lights
- Add potentiometers
- Add gauges
- Add memory addresses (special applications only)
- Add memory dump (special applications only)

8.4.1 Add Text
The command allows you to add a text to a display screen.
You can edit a display if you see a grid on the gray background. To enable the edit mode, you double click on the gray background, or you right click and select **Enable Edit Mode**.
When the grid is visible you add text by right clicking and select **Add Text**.
Write the text in the window which opens.
Click on Look to change the font and color.
When done, the text window will appear on your screen.
You can move the window to any position on your display by clicking the cross at the upper left-hand window, move your cursor to the desired position and then click again.





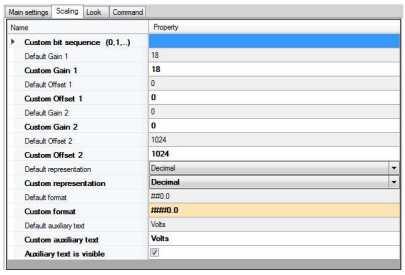
8.4.2 Channel
The command creates a window which will numerically display the value of any of the ECUs data channels.
You can edit a display window if you see a grid on the gray background. To enable the edit mode, you double click on the gray background, or you right click and select **Enable Edit Mode**.
When the grid is visible you add a window by right clicking and select **Add Channel**.
Check that you have selected the right database.



Now look for the channel. You can scroll through the channel list if you know the index number of the channel or you can search for it.

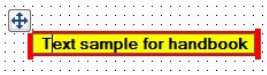
Use the * to search any combination where your wording exists. For example, if you are looking for oil temperature and oil pressure you could type ***OIL*** and then press Enter. The search will jump to the first channel which includes the words OIL. If this is one of the channels you want, you tick the box. To continue your search, click the word in the search line again and press Enter.

Once you have ticked all the channels you have searched for you clock **OK**. The search window closes, and you return to the main display window, now showing your channels.



You can change the appearance of any display window.
Double click on the window and the property window opens.
Click on **Scaling** if you want to change the channel scaling, to toggle between decimal / signed / hex / binary presentations or change the unit.

Click on **Look** if you want to change font, color and text orientation.

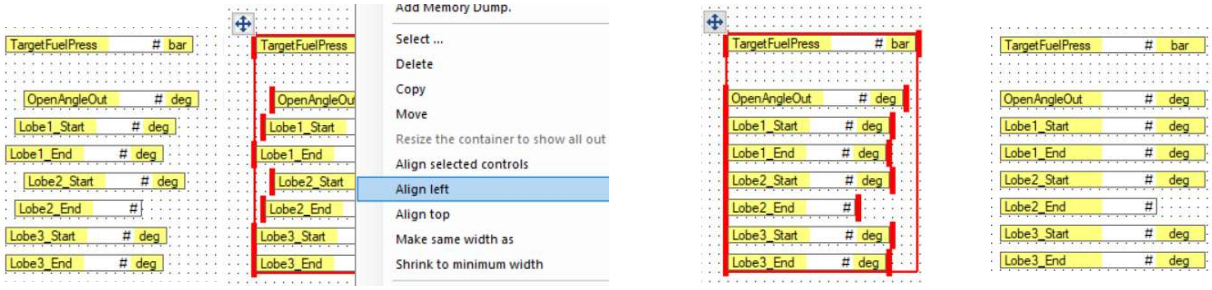


You can move the window to any position on your display by click the cross at the upper left-hand window, move your cursor to the desired position and then click again.

You can create a display for other channels as well, not just predefined ECU channels.
I you add a sensor with a 0 to 5V signal range and connect it to one of the ECUs analog inputs, then you simply look for that channel when adding the channel. Once added, you open the window and untick the box **Align the properties of the control to the DB**. Doing this will give you the option to enter your own name, scaling, format, byte handling and look.
OBR can assist with this calibration.

8.4.3 Align Windows

You can resize and realign the controls on the display screen.



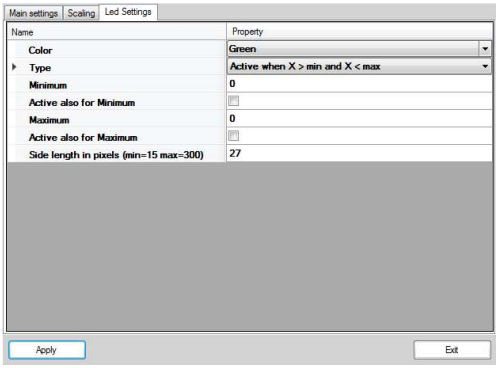
Right-click the display container and enable the **Edit Mode**.
Hold the left mouse button and draw a box around the group of windows to realign.

Now right click and select **Align Left** and click the window you want the windows to line up with.

To arrange for all windows to have the same width and font, aligning the data.
Hold the left mouse button and draw a box around the group of windows to update.
Once aligned to the left, right click the frame again and select **Make same width as**.
Click on a display window to use as the reference for size and font.

8.4.4 Add LED

The command creates a LED which can change status depending on the value of a channel.
This type of control is linked to a database device, and it can be associated with any ECU channel.
The color of the LED image is bright if the activation conditions are true and dark if the conditions are false.
When the display is in online, the value is updated continuously to a variable frequency which depends on the number of variables sampled, the bit rate, the speed of response of the control unit and the time of processing data received.



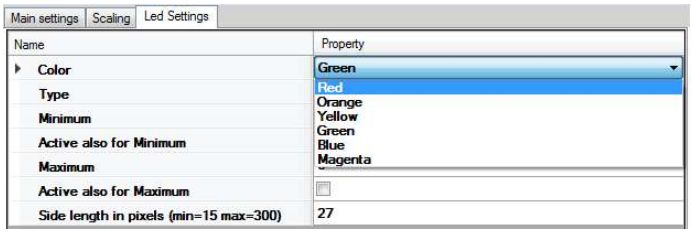
You can add a LED if you see a grid on the gray background. To enable the edit mode, you double click on the gray background, or you right click and select **Enable Edit Mode**.
When the grid is visible you add a LED by right clicking and select **Add LED**.
Check that you have selected the right database.

Now look for the channel. You can scroll through the channel list if you know the index number of the channel or you can search for it.
Use the * to search any combination where your wording exists. For example, if you are looking for oil temperature and oil pressure you could type ***OIL*** and then press Enter. The search will jump to the first channel which includes the words OIL. If this is one of the channels you want, you tick the box. To continue your search, click the word in the search line again and press Enter.
Once you have ticked all the channels you have searched for you click **OK**. The search window closes, and you return to the main display window, now showing your new LEDs.

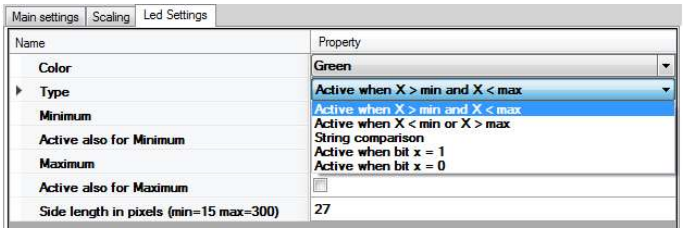
To calibrate the LED, double-click on it and the property window opens. As with other channels added you can in general change the scaling and name.
Click on **Led Settings** to configure the control.

You can select several between several colors for the LED:

- Red
- Orange
- Yellow
- Green
- Blue
- Magenta



You can select the switching conditions for the LED.



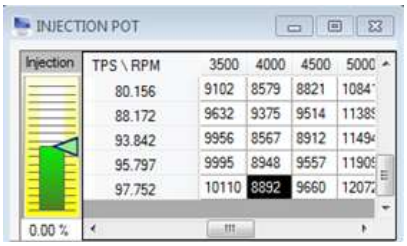
- **String comparison**. The LED is active if the string resulting from the conversion to a string of the bytes read from the control unit, is equal to the specified word in the 'string' field.

- **Active if bit x = 1** The LED is on when the value of the bit at position 'Meaningful bit' of the variable read from the control unit is equal to 1.

- **Active if bit x = 0** The LED is on when the value of the bit at position 'Meaningful bit' of the variable read from the control unit is equal to 0.

Use the command **Apply** to commit the changes.
Click **Exit**, press ESC or close the property page to cancel changes.

8.4.5 Add Potentiometer

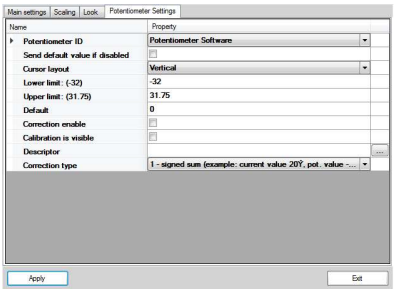


This command will add a potentiometer to a display screen. It can be associated with many ECU channels and can provide a real time global trim while running the engine.
The potentiometer can be linked directly to the engine map and can store any trims into the map.
It can be operated externally by our AMC, the Active Mapping Controller, as well as in software.

You can edit a display if you see a grid on the gray background.
To enable the edit mode, you double click on the gray background, or you right click and select **Enable Edit Mode**.
When the grid is visible you add a potentiometer by right clicking and select **Add Potentiometer**.
Check that you have selected the right database.

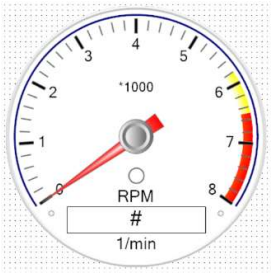
Now look for the channel. You can scroll through the channel list if you know the index number of the channel or you can search for it.
Use the ***** to search any combination where your wording exists. For example, if you are looking for a potentiometer to control the ECU spark advance you could type ***SPARK*** and then press Enter. The search will jump to the first channel which includes the words SPARK. If this is one of the channels you want, you tick the box. To continue your search, click the word in the search line again and press Enter.
Once you have ticked all the channels you have searched for you clock **OK**. The search window closes, and you return to the main display window, now showing your new potentiometers.

You can change the appearance of the potentiometer.
Double click on the window and the property window opens.
Click on **Scaling** if you want to change the channel scaling, to toggle between decimal / signed / hex / binary presentations or change the unit.
Click on **Look** if you want to change font, color and text orientation.
Click on **Potentiometer Settings** to configure the potentiometer.



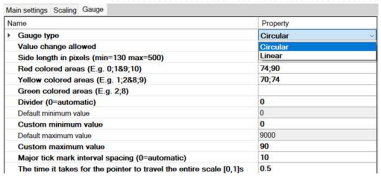
- **Potentiometer ID**, you can assign the potentiometer to any of the 6 dials on the AMC or to work as a software potentiometer.
- **Default value**, tick the box to send a default value when the potentiometer is disabled. By default, this is set to 0 trim.
- **Cursor layout**, select between vertical or horizontally.
- **Limits**, these values are defined within the ECU device.
- **Default**, key in the default value to use when disabled.
- **Correction enabled**, tick the box if you want the potentiometer to store changes into the ECU. Corrections will be made to map #1 if you press the red button on the AMC or if you press **F2**.
- **Calibration is visible**, this will show part of the ECU map for the selected function.
- **Descriptor**, select the preferred descriptor from the ECU device.
- **Correction type**, this will show you which type of correction of the base map is performed. This is defined within the ECU device.

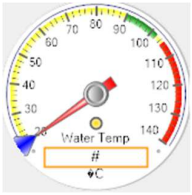
To activate and deactivate the potentiometers on open display screens, press **F4**. To change the potentiometer value, first press the **F4** key or click on the padlock icon on top of the display container. Click on the potentiometer you want to use and you can move the slider up and down by pressing the **PgUp** and **PgDn** keys, the **+** and **-** keys, use the mouse wheel or use the mouse to drag the slider up and down. Any changes by the potentiometer can be saved into the map it represents by pressing the **F2** key. In **Settings** you can activate an option which disables the potentiometers once you have pressed **F2** to store a setting.



8.4.6 Add Gauge

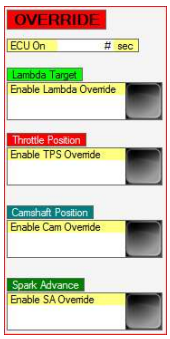
Data channels can be visualized as analog gauges as well. If you want to add a gauge to a display container, first select the **Enable Edit Mode**, then right-click and select **Add Gauge**.
Look through the data base for the channel you want to display as a gauge, for example engine RPM.
Once added, then double-click on it to open its properties, select the Gauge tab.
You have these options defining the gauge:





- **Gauge Type**
  Select between circular or linear gauge versions. Linear gauges can be displayed either as vertical or horizontal gauges.
- **Value change allowed**
  By ticking this option, you can apply a test value and check the software reaction.
- **Side length**
  Base outline of gauges are square, this defines height and width. Gauge size can also be set using the '**Make same width as**' command found when right-clicking the gauge in display edit mode.
- **Red alert ranges**
  Red warning range, start and stop are separated by semicolon, the sample gauge is set as 6500;8000
- **Yellow alert range**
  Yellow warning range, start and stop are separated by semicolon, the sample gauge is set as 5800;6500
- **OK range**
  If used it will define a green range, otherwise this will be left as base white color.
  If you want to have the same color coding at different signal values, you simply type the first range as for example in RPM 2000;3000&4000;5000.
- **Divider**
  If you want the increment on the gauge to be shown in a different format than the base value you must use a divider. For example, to show RPM on the gauge as kilo RPM you must divide by 1000.
- **Custom minimum value**
  If you want to change the set minimum value, go to the tab **Main Settings** and untick the box linking the gauge to the database. Now set the minimum value to be displayed on the gauge, in this case the value is chosen as 0.
- **Custom maximum value**
  If you want to change the set maximum value, go to the tab **Main Settings** and untick the box linking the gauge to the database. Now set the maximum value to be displayed on the gauge, in this case the value is chosen as 8000.
- **Major tick mark interval spacing**
  Set the steps between scale markings, in the sample this is set to 1000. If set to 0, a default spacing will be selected.

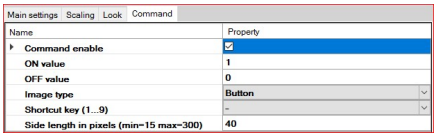
- **Time it takes for the pointer to travel scale**
  Set time for the pointer to move from the minimum to maximum position in seconds. Recommended values between 0 and 0.5.



8.4.7 Add Button

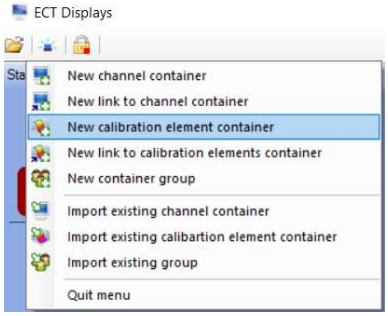
Some data channels display status flags for given functions.
When adding such windows to a display screen there is an option to add a button, allowing direct access to the function, overriding the need to jump between a display and the calibration tool.

This function requires an optional programming of the EFP02 and EFT20 CAN interfaces and special ECU firmware.



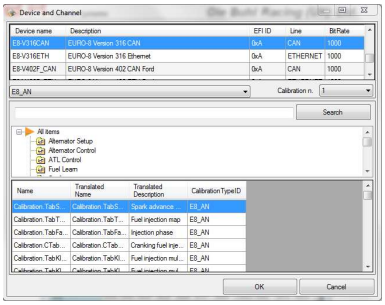
8.4.8 Add Maps to Displays

This section described how you can load an online access to any maps in the ECU.
You can add any map from the ECU to a display window.
To create a new layout right click the **Data Displays** tab and select **New calibration element container**.
You will be prompted for a name, then click on **OK**.

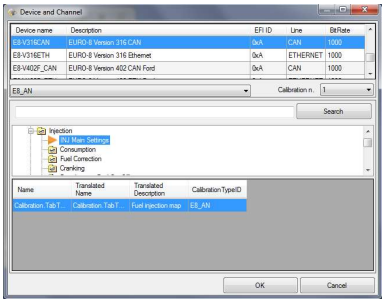


Select the type of ECU data you want to add, for example a calibration map.

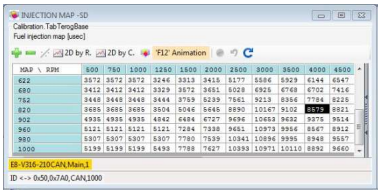
A window called **Device and Channel** now opens.
Select the ECU database.
Select the preferred expression of the ECU engine load.
You can select the engine load (the Y-axis in the map) expressed as the throttle angle (AN, alfa-N), as manifold air pressure (MAP, speed density) or as mass air flow (MAF).
Next scroll through the ECU tree to find the map you are looking for.



In the example the **INJ Main Settings** has been selected, and the base fuel map is shown as an option in the lower part of the window.
Click **OK** to select it.



The fuel map now opens, and you have full access to the injection pulse widths on a display page.
You can add any map from the ECU to a display page.
Once created, a real-time table or map are marked with a red icon next to its name while a display screen is marked with a blue icon.
Like with the Calibration Editor, maps can be edited online by an absolute value, a sum of analog changes or a percentage change for the selected cells.
The current values of the variables connected to the axes, if present, and of the output variable, if present, are displayed on the screen.

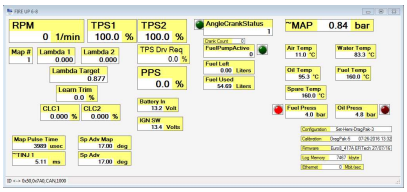


Remember to save the new display before closing it.

Any changes to a table or map will be written momentarily into the ECU, updating the engine settings in real time.
If you manually want to control the ECU update by pressing F8, check the settings for F8 in 'Main Settings'.

8.5 Open or Edit a Display

Click on the folder icon to open a display, then you click the right-hand mouse button to access:



- **Add text, channels, LED, potentiometers, gauges etc**
  Please refer to sections 9.4.1 to 9.4.7.
- **Enable Edit mode**
  Use this to open to open the display editor where displays can be created and modified.
- **Property**
- **Sampling interval list**
  Display refresh rates for all channels present in the open display.
- **Enable Strip Chart mode**
  Displays with up to 12 channels can be displayed graphically. See section 9.8.
- **Sort controls**
  Sort channels for recording mode.
- **Enable Log**
  See section 9.6.4 and 9.6.5 to learn about using the ECT data recording feature.
- **Device Information**
  Displays information about maps and firmware loaded into the ECU.
- **Display Data**
  Shows base information about current display.

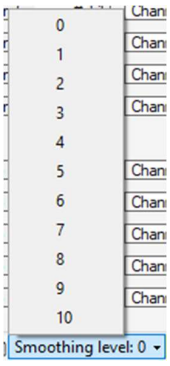


- **Save display**
  Save changes made to display.
- **Save display as**
  Save display to a new file name.
- **Save and lock display**
  Save display as a locked file, can be viewed by user without the database.
- **Exit**

You can load any of the many sample display windows we provide with the software. Simply click on **Data Displays** and scroll down to view all available displays, all marked with a blue icon on the left. Click on the one you want to load.
You can load multiple display screens if you want.
Displays marked with a red icon are online maps with ECU data.

8.5.1 Smoothing Level

ECT has a high refresh rate of data read from the ECU.
To dampen oscillations of the data display, a noise filter is added and is located at the lower left-hand corner for the container.
Click on the arrow to open the filter menu and then select the appropriate filter.
Noise reduction 0 does not filter the signal while 10 is the highest noise filter available.
Depending on application, recommended setting are in the 0 to 4 range, but this is entirely up to the user's preference.



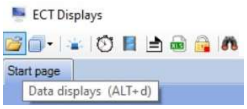
8.6 Display Options

When a display window is open and active with the ECU there are several selectable options in the upper left-hand corner of the display container:



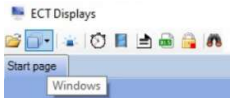
8.6.1 Open display container

Click the icon to open the list of available display containers. Click a name on the list to open it.



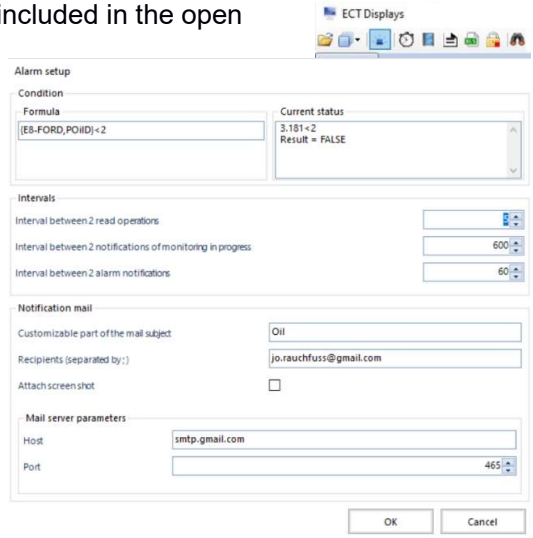
8.6.2 Arrange multiple display containers

Click the icon to select between arranging the multiple open containers as cascade, tile horizontally or tile vertically.



8.6.3 Alarms

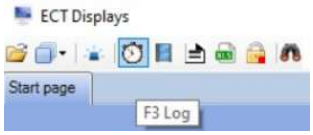
You can create a condition for an alarm related to data included in the open display containers.



In this example the alarm is set to monitor the oil pressure. If the pressure drops below 2.0 bar the alarm is active.
It is possible to create additional conditions. This can include other monitored channels but also a conditioning channel, for example engine RPM below or above a given threshold.
The system checks the oil pressure every 5 seconds, Etc etc.
When the conditions are true ECT will send an email message to the recipient listed.
You can attach a screen shot of the display showing the channel data.

8.6.4 ECT display channel automated data logging

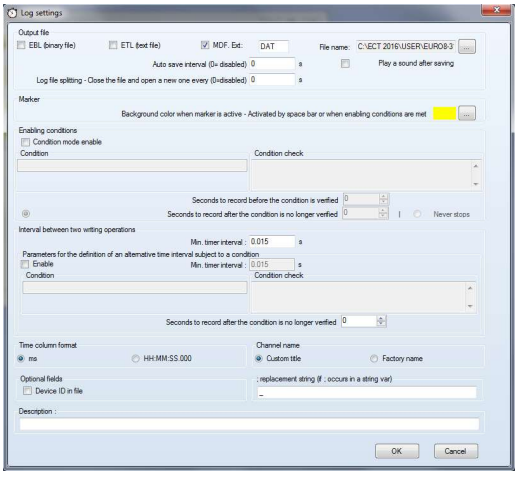
The ECT tool has a built-in data logging capability.
Data will be stored on your PC's hard disk.
The logger will record data from all open windows in a display tab.
Recorded data can be visualised using the Charting Tool, also found in the ECT main tool.
Open a display window and right click on it and select **Enable Log**.
The window heading now changes to this layout:





Press the F3 key or click on the F3 Log icon to access the logger configuration.
Data can be stored in 3 different formats:

- **EBL**, a binary format.
- **ETL**, a csv or text format.
- **MDF** data format.



In **File name** you can specify where to save the logged data file to. Refer to section 9.1 for advice on defining log file names.

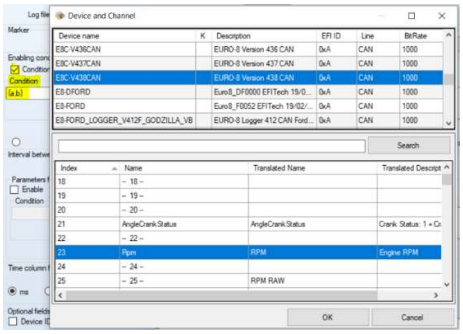
While recording data, the log file can be saved in fixed time intervals, keyed in as **Auto Save Interval**. Every time interval chosen the recorded data will be saved to file if the logger is active, overwriting the previous saved file.
If you set this time interval to 0 the data file will be created when the data logging stops.
By using the **Log file Split** option ECT can save the logged data into a new file every selected time interval.

While recording data you can mark part of the recorded data by pressing the space bar to start marking. Press the space bar again to stop marking the data. When the space bar is pressed you can define a color change of the display data as an indication of the marker being active. When you review the logged data in the Charting Tool the status of the marker is shown as a semi-transparent band.

You can start data logging manually by opening the logger configuration, selecting the file format and then just by clicking **OK**.
You can also set conditions for the logging to start automatically. In section '**Enabling conditions**' tick the box '**Condition mode enable**'.

To define a conditioning channel, you must specify the database used. In the window **Conditions** start by typing the '**{**' character. The system does by default pick the database set for the display container and you will see, for example **{ E8C-V495CAN , [Channel] }**.

Double click on **[Channel]** to open the database. You can search for the channel you are looking for, for example **RPM**. Once selected, some database versions show the channel name, some show the index number, the channel's position in the database.



If you want the data logging to start automatically when the engine RPM exceeds 3,000 RPM then change the string to **{ E8C-V495CAN , RPM } > 3000**.

Operators and symbols allowed are **+ - * / AND OR NOT > >= < ⇐ = ()**

Complex conditions are allowed, for example **({Device1,RPM}> 3000) AND ({Device2,Vbatt}> 14)**

To change the selection of a channel you can double-click between the braces.
This way you retrieve the list of available devices and corresponding channels.
The selection you make will be included in the condition you are building.
Therefore, to insert a new variable in a condition, you can write the device name and channel name directly in the box, separated by a comma, or enter a placeholder variable as **{d, c}**, and then double-click inside the braces to retrieve the list of devices and channels.

If you are online with the ECU, you can check the status of the condition shown in the box **Condition check.**

The parameter **Seconds to record before the condition is verified** gives you the ability to save data to file even before the condition of saving acquisition data was verified. This means that you can save data for example 10 seconds before your logging condition is true.

Similarly, the parameter **Seconds to record after the condition is no longer verified** gives you the ability to save to file data recorded after the condition of saving data is no longer true. Alternatively, you can select the option **Never stops** to avoid deactivating the saving of acquisition data once it begins.
In any case, logging data and data saving will end when the operator presses the **'F3'** key or exit ECT.

In section **Interval between two writing operations** you can set the minimum time for sampling data. The more channels you want to log they longer time it takes between writing to file. The minimum time between writing is 15 ms, which is 66 Hz. Typically, logging for example 32 channels the sampling rate will be around 32 Hz.

In section '**Parameters for definition of an alternative…**' you can set a different recording rate if a change in the engine data is detected. For example, if you are planning a durability engine test you want to record data at a low sampling rate. If a predefined condition appears the system will switch to a higher sampling rate recording data at a higher resolution.

Tick the **Enable** box to activate this feature and define the condition which triggers the activation. You must define database and channel(s) as described for the logging activation as well as the time to record at this sampling rate after the engine condition has returned to normal.

In **Time column format** you set the logger time stamps to be in either milliseconds or in hours, minutes and seconds format.

In section '**Channel name**' you can define how the logged channel name is shown in the log file:
- Tick the box '**Device name as prefix**' if you want the database name to be shown in front of the logged data channel name.
- Tick the box '**Custom title**' to use normal name for logged channels, recommended selection.
- Tick the box '**Factory name**' to use the internal software name instead of the normal channel name for logged channels. This setting is not recommended.

The section '**Optional field**' gives you the following options:
- **Device ID in file** gives you the option to add the ID of the database in the logged file's header. Normally this option is left unticked
- **; replacement string** gives you the option to use a different separator between data channels than semi-colon (**;**). For this reason, each occurrence of the character **;** in the string is replaced by the character specified in this box.

Click on **OK** to start logging.

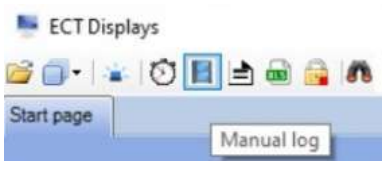


The status bar at the lower left of the display container shows the current logger status.

The data logging will stop if the activation condition changes from true to false, you close the display container, or you press the **F3** key.

8.6.5 ECT display channel manual data logging

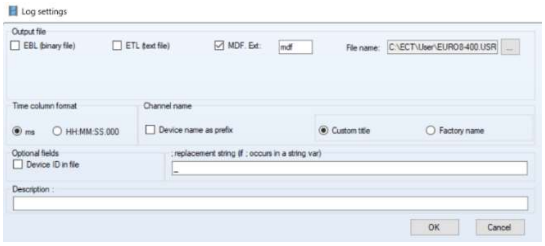
The ECT tool has a built-in and manually operated data logging capability. Data will be stored on your PC's hard disk.
The logger will record data from all open windows in a display tab. Recorded data can be visualised using the charting tool, also found in the ECT main tool.



Open a display window and right click on it and select '**Enable Log**'.
The window heading now changes to this layout:



Click on the '**Manual Log**' icon to access the logger configuration.
Data can be stored in 3 different formats:



- **EBL**, a binary format.
- **ETL**, a csv or text format.
- **MDF**, data format, recommended.

In '**Time column format**' you set the logger time stamps to be in either milliseconds or in hour, minutes and seconds format.

In section '**Channel name**' you can define how the logged channel name is shown in the log file:
- Tick the box '**Device name as prefix**' if you want the database name to be shown in front of the logged data channel name.
- Tick the box '**Custom title**' to use normal name for logged channels, recommended selection.
- Tick the box '**Factory name**' to use the internal software name instead of the normal channel name for logged channels. This setting is not recommended.

The section '**Optional field**' gives you the following options:
- **Device ID in file** gives you the option to add the ID of the database in the logged file's header. Normally this option is left unticked
- **; replacement string** gives you the option to use a different separator between data channels than semi-colon (**;**). For this reason, each occurrence of the character **;** in the string is replaced by the character specified in this box.

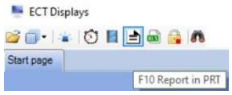
Click on **OK** to start logging.



The status bar at the lower left of the display container shows the current logger status.

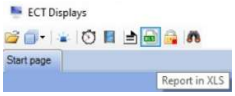
The data logging will stop if you close the display container or you click on the Manual Log icon.

8.6.6 Print screen data PRT

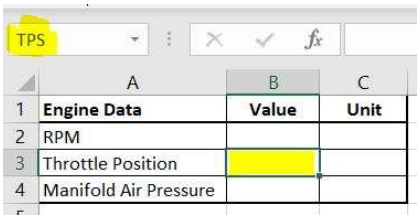


Use this option the create a data snapshot in PRT format.

8.6.7 Print screen data XLS

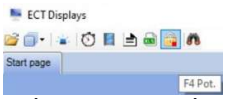


Use this option the create a data snapshot in XLS format, for example to include ECU data in a spreadsheet.
Create a spreadsheet template, an example is shown to the right. In column A you type the names of the engine parameters required for your report. You want to import data directly from the ECU into the right positions in column B.



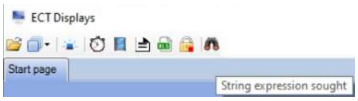
To display the throttle position in position **B3** you must type the ECU channel name in the box as shown, TPS. When done then save the spreadsheet as a template. Load the template while online it the ECU to load live data into all defined positions.

8.6.8 Potentiometer activation



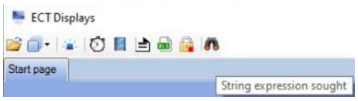
Press the F4 key or the padlock icon to active ECT's potentiometers, being either those created in software of those on the AMC.
In **Settings** you can activate an option which disables the potentiometers once you have pressed **F2** to store a setting.

8.6.9 Search parameters



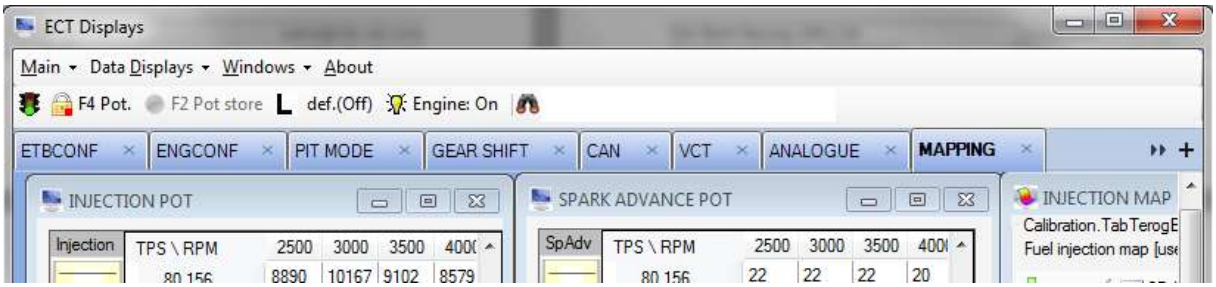
Type in the channel name you are looking for and press Enter. The data window with that channel will be marked with a red frame. You can use the * as part of the search criteria, the first of the matching display windows will be marked. Press Enter again to jump to the next matching channel name.

8.6.10 Learn tool parameters



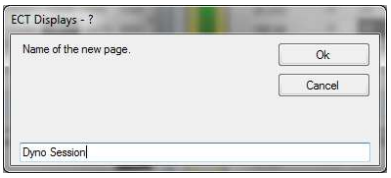
In **Settings** it is recommended to click the box to activate **Enable Learn Tools**. When online you can use the '**L**' key to toggle between the fuel self-learn settings of On ➡ Off ➡ software setting.

8.7 Multiple Display Sections



You can create displays with multiple sections. This gives you the option to switch from one set of display windows to another without having to close and then open displays.

To add another display container, click on the **+** at the right edge of the main display window. This will add a tab to the main window. Type a name for the new page and click **OK**.
A new blank display page will open, and you can start assigning display windows.



To save the new display layout it must be saved as a workspace. In the 'ECT Main Menu' click on 'Workspace', then click on 'Save Workspace' and key in a name.
To open the new layout, click on 'Workspace' and then click on 'Load Workspace'.

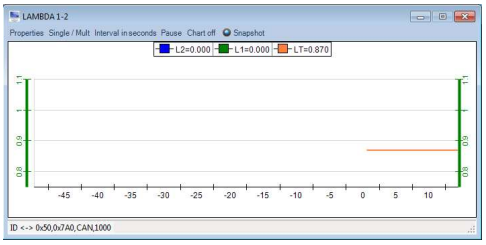
8.8 Strip Chart Mode

The command creates a window which will graphically display the value of any of the ECUs data channels. The maximum number of channels allowed in a window for a strip chart is limited to 12.

You can edit a display window if you see a grid on the gray background. To enable the edit mode, you double click on the gray background, or you right click and select **Enable Edit Mode**.
When the grid is visible you add a window by right clicking and select **Add Channel**.
Check that you have selected the right database.

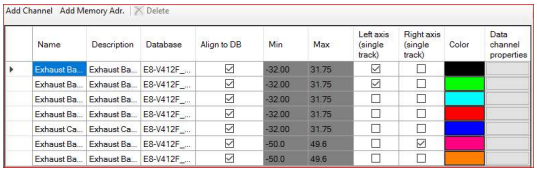
Now look for the channel. You can scroll through the channel list if you know the index number of the channel or you can search for it.
Use the ***** to search any combination where your wording exists. For example, if you are looking for oil temperature and oil pressure you could type ***OIL*** and then press Enter. The search will jump to the first channel which includes the words OIL. If this is one of the channels you want, you tick the box. To continue your search, click the word in the search line again and press Enter. Once you have ticked all the channels you have searched for you clock **OK**. The search window closes, and you return to the main display window, now showing your channels.

Once you have created a normal display window with the required channels, right click the window and select **Enable Strip Chart Mode**.
The window is now transformed into a graphic display.



You can configure the display to suit your requirements:

In **Properties** you can set the displayed minimum and maximum thresholds, link data to default database, define whether you want Y-axis displayed on left and/or right side of the window and the color of the graph.



In **Single / Mult** you can select to display all graphs in one single window or to display each channel individually.

In **Interval** you set the time interval from the right to the left Y-axis, from 2 seconds to 256 seconds.

Pause allows you to stop the strip chart moving and zoom in to analyse the chart.

Legend dock mode lets you position the window channel information window in top of the strip chart, to the right, at the bottom or at left.

Snap Shot transfers the data to the Charting Tool.

8.9 Display Override Functions

Some software versions for Euro-5, Euro-8 and Euro-8PLUS have additional mapping and testing features. In these versions you can enter temporary data for most of the control parameters directly from a data display:

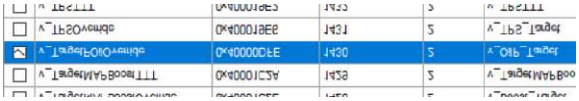




In this example you see that the programmed oil pressure target is 0.7 bar. A different pressure target has been entered in the window on the right, named '**v_OilP_Target**'. By clicking the button marked in yellow this new target for the oil pressure has been applied and the data window for oil pressure shows the new value.

8.9.1 Creating override function

The override feature is only available in some software versions for Euro-5 and Euro-8. Please contact OBR if you want to have access to these versions for your engine development work.
The override feature is based on using two new features, a value data window and an enable data window.
Start by adding a new value data window, for example overriding the oil pressure target. The value data channels are all named by '**v_***', so a **v** for value and then underscore followed by the channel name:



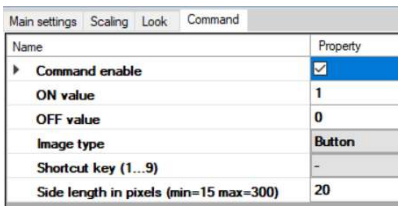


To activate the override value, you must then add another data channel, the enable data window. The enable data channels are all named by '**e_***', so an **e** for enable and then underscore followed by the channel name.



Open the property window for this enable channel and click on the '**Command**' tab.

Click on the '**Command enable**' box to add a button to the data window.
Set the '**ON value**' to '**1**'.



Set the '**OFF value**' to '**0**'.
Set the '**Image type**' to '**Button**'.
Select the size of the button you prefer.



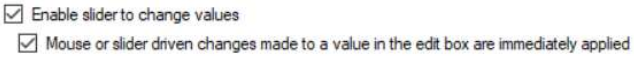
Double click on the enable window, un-tick the box '**Align the properties..**' and now delete the custom name. Click **OK** to proceed.
The window is now reduced to just the button and you can now place it where you want, for example in front of the value data window.



If you need to access the properties for the button, simply right-click it and select '**Reset default properties**'.

Close the display editor when done.
When you click on the new button it turns green when activated.

8.9.2 Working with override function



Working with override it is recommended that you have ticked both boxes as shown in the display container setup.

To enter an override value double click the white data area in the value window.



A new part of the value window opens, showing the current target value from the ECU map.
There are different ways you can change this value:

- Type in a new value in the blue window.
- Drag the slider using your mouse pointer to the new target value.
- Use the **+** and **-** buttons to move the slider to the new target value.
- Click on the blue value and use your mouse wheel to select the new target value.

Press **Enter** when done.

You can change the target value with the enable button activated or deactivated, either way works. If the enable button is activated, the new target is applied immediately if you have ticket both boxes in the display setup.



9 ASAP3 Communication

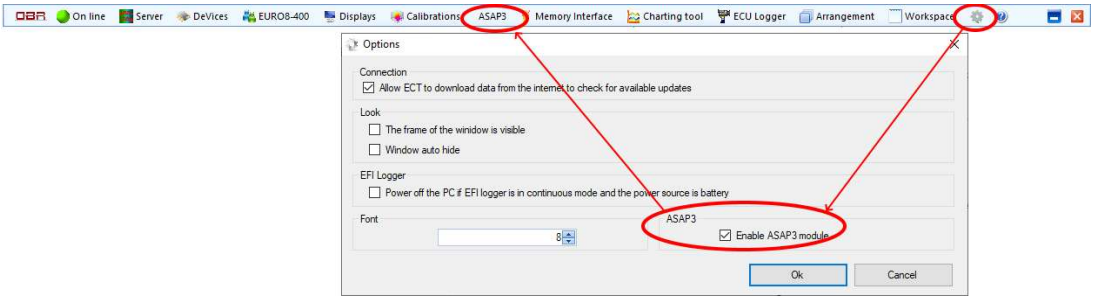
ASAP3 is a communication protocol used widely in the automotive industry to transfer data between dyno cells, engine management software, data loggers etc. ASAP3 is mostly used for automated test environments.

ECT includes the ASAP3 communication protocol for use with automated test procedures. The protocol establishes a serial RS232 or an Ethernet communication protocol between a system running an automated test procedure and the command of the engine management unit, the ECU. The communication can be between any PC on the test cell network and the test cell control system. It can also be between any PC running ECT, including other PCs connected to the main PC.
Our systems allow an easy exchange of data between the PC running ECT, communicating with the ECU, and the test cells software system.
Additionally, OBR offers an advanced, automated test procedure solution. The dyno operator can write a test specification using an Excel spreadsheet and with this procedure OBR's test program controls ECU operational data, controlling the test cell interaction.

The ASAP3 communication requires an update of our standard CAN communication interface plus an updated database for your ECU from OBR. It does NOT work with or standard CAN interface.

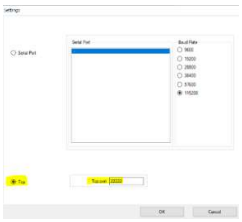
9.1 ASAP3 Options

Open the ECT main program and click on the option menu, marked in yellow on the right.
Tick the box to enable the ASAP3 option, click **OK**.



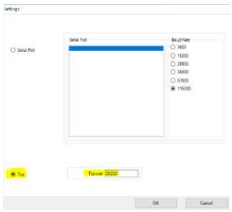
You will see a new tab added to the ECT tool's main menu, '**ASAP3**'.

9.1.1 Serial port communication



Open the ASAP3 tab and click on the '**Option**' icon in the upper right-hand corner.
ASAP3 communication with the test cell software can be enabled using a serial RS232 port, you must use an USB Serial adaptor for this setting. OBR can supply these interfaces.
If you use the serial port, you must select your preferred data baud rate. Anyway, serial links are slow, and this setting is not recommended.

9.1.2 Ethernet communication



Open the ASAP3 tab and click on the '**Option**' icon in the upper right-hand corner.
ASAP3 communication with the test cell software can be enabled using Ethernet. Ensure the port address matches the setting in the dyno application or the in the OBR automated test program.

9.2 Establish ASAP3 Communication

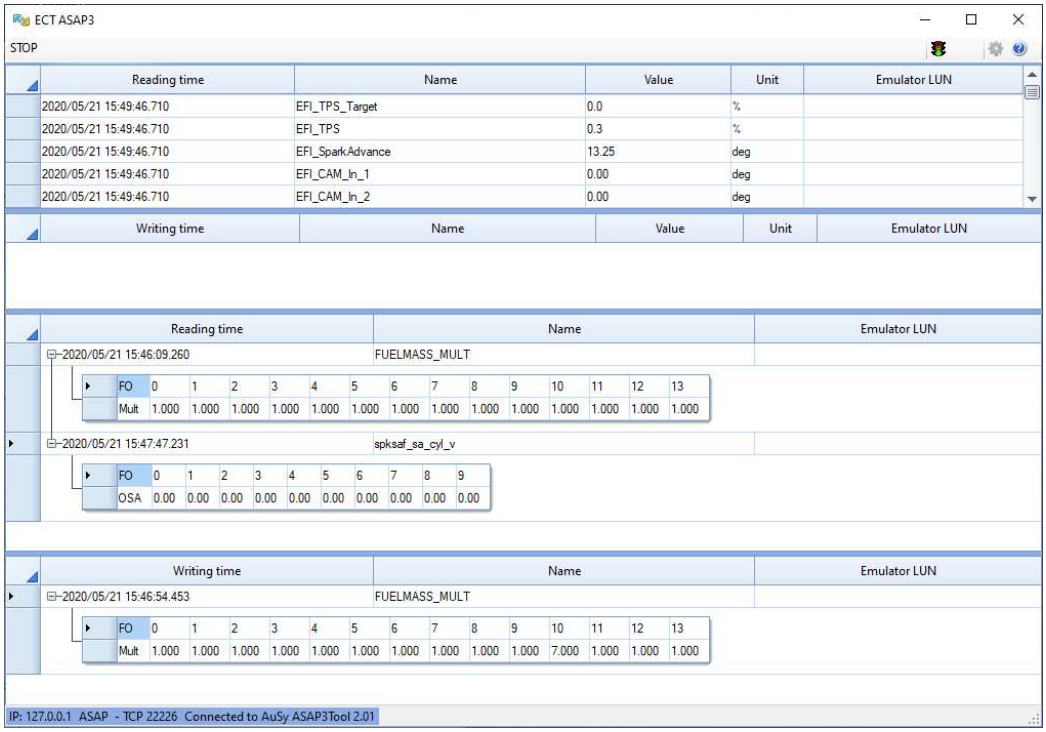


Click the ASAP3 tab in the main ECT tool.
Click on 'START' and select the database for the ECU controlling your engine and click **OK**.

If you see an error message – 'Unlicensed Command' – please contact OBR for an updated file for your EFP02 or EFT20 interface.

Enable the ASAP3 communication in your test cell's computer system and you should now have an active data exchange between your ECU and your test cell.

Communication is now established between the ECU and the test cell's computer system.



9.3 Automated Test Procedures

OBR can supply an advanced version of the ASAP3 link in which you can generate desired engine test procedures. In this program you can specify any manipulation of the ECU settings to generate a test session for any length of time. This way you can, for example, design a durability test session or you can prepare a test for optimization of variable camshaft timing versus applied spark advance and engine load.

Please contact OBR for further details about this option.

9.3.1 1 – Software Installation, first time use of the ECU software.

From our website - https://obrcontrolsystems.com/downloads - please download and install these 4 programs:

- ECU USB Interface Drivers
- ECT Pseudo Programmer
- ECT Communication Server
- ECT Engine Management Tool 746

During installation of the ECT Tool the program will ask for ECU data files in a XIP file format. These files contain the system database, display windows, workspaces and sample files. Files for every Ford engine type are available from OBR.
Installing an XIP file will install all required data files on your PC and upon completion, the system will be ready to use.

9.3.2 2 – Automated Test Program

The automated test program uses the ASAP3 system feature to communicate with and to control the ECU (or PCM).

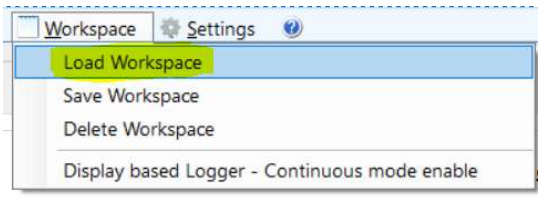
The program is contained in a Zipped folder. Unzip the folder to the root of your hard disc, C:\.

9.3.3 3 – Start the Automated Test

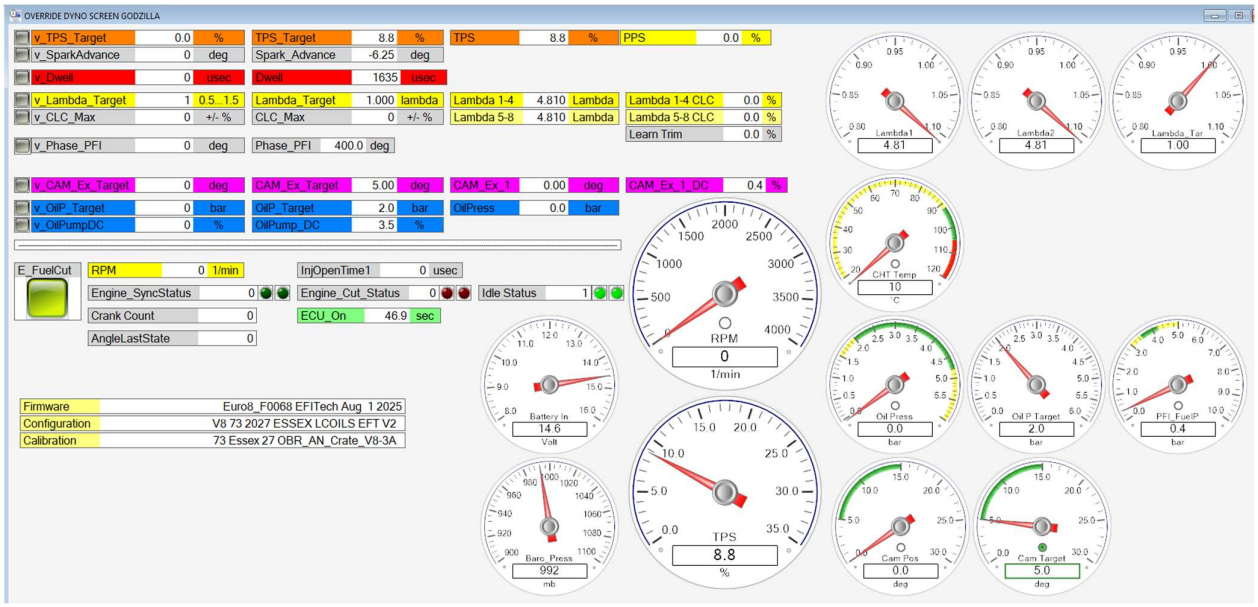
Start the tool by double clicking on the ECT icon on your PC's desktop.
Click on 'Workspace' tab:



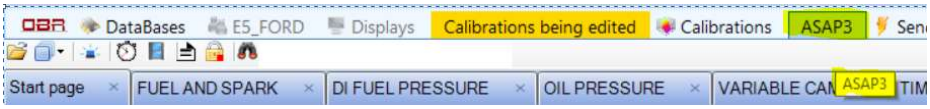
Now click on 'Load Workspace' and the select a workspace dedicated for the actual engine being tested, MPC, Nano, D35, Coyote Truck, Coyote Mustang or Godzilla.



The display files for the engine now opens:



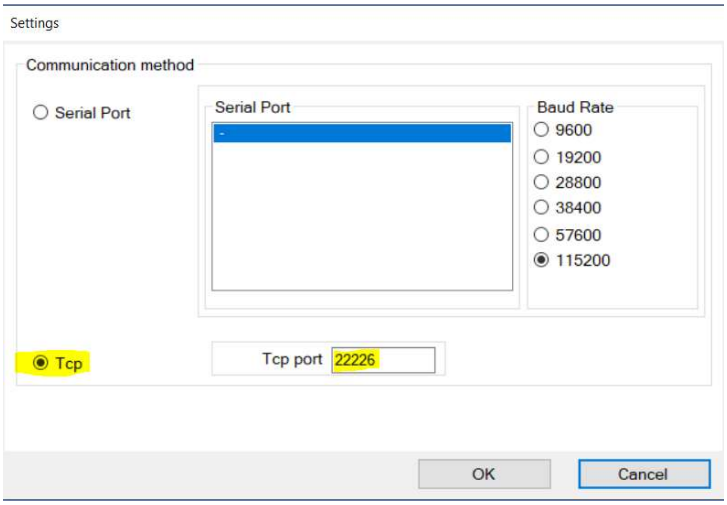
In the ECT Main click on ASAP3:



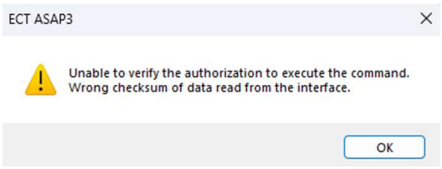
When the 'ECT ASAP3' window opens click on settings – the gear wheel icon to the right of the menu:



Now click on 'Select the device and start'. Check that the TCP and the port address '22226' is selected:

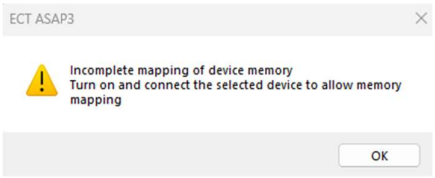


You only need to check this the first time you run the test.
Now click on ‘Select the device and start’.
Here you select the database to be used with your engine controller. Check that either the E5GDI_FORD (dedicated 3 or 4-cylinder controller for direct injection engines) or the E8-FORD (most common system for engines having up to 8 cylinders) line is highlighted in blue and click on OK.
If you see this message when opening the ASAP3 menu:



Then your CAN communication interface is NOT programmed for ASAP3 communication. In this case, please contact OBR for assistance. Updating the interface is a simple task.

If your interface has the ASAP3 upgrade and ECU is not switched ON, you will see this error message:

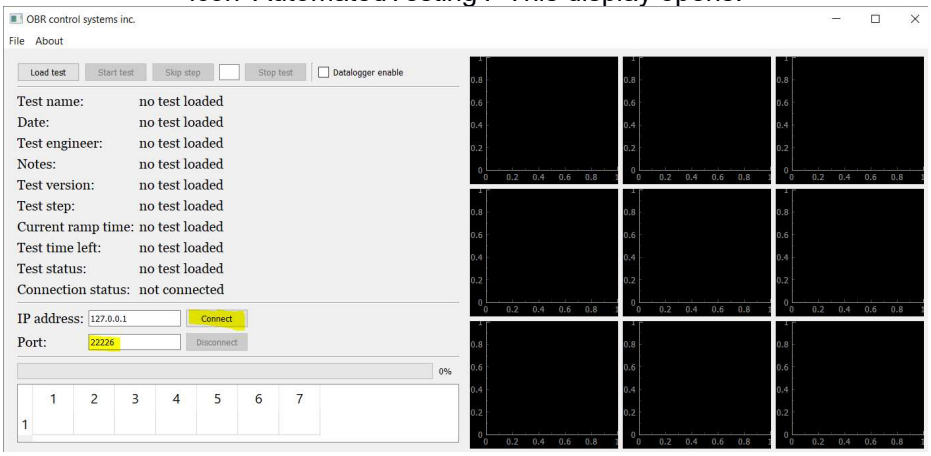


Then you just must switch the ignition ON.

A full screen table opens, displaying these headlines but no data is shown yet:



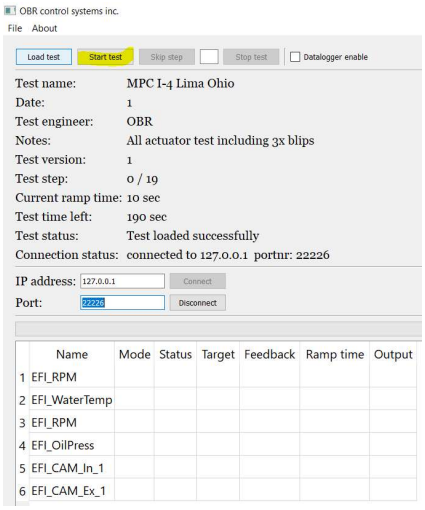
In the folder “Automated Testing’, found in the root on your C drive, double click on the application icon ‘AutomatedTesting’. This display opens:



Check that the port address is ‘22226’, then click ‘Connect’.

Now click on ‘Load Test’. The data sheet is found in the ‘Data’ folder within the ‘Automated Test’ folder. Click on the test specific for your engine and type of test you want to perform.

Click OK and then this data section opens:



Click ‘Start Test’.
Start the engine if it is not already running.
The program should now wait for the coolant temperature to reach the threshold defined in the test data sheet.
If you have a tick in the box ‘AutoStart’, the test should start automatically.
Otherwise type ‘1’ in the blank window and then click ‘Go to step’:

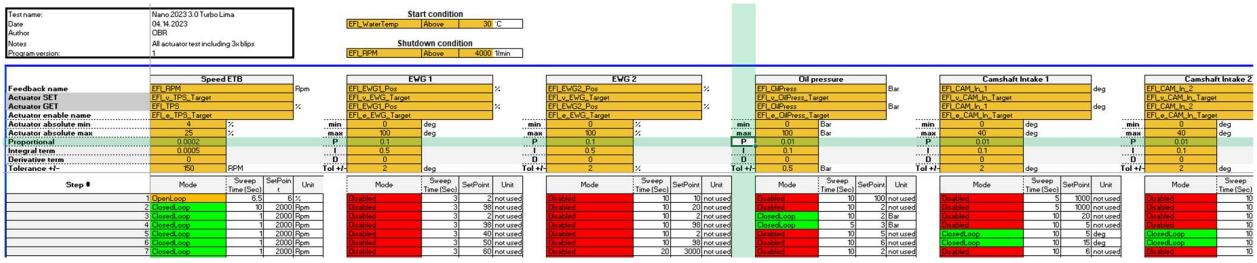


The test will now start from step 1.
If you want to stop the test at any time, click on ‘Stop Test’ and the engine will return to idle speed.
If you want to repeat a step in the test program, just key in the step number you want to repeat and press the ‘Go to step’ button.
You can follow the test on both the start page in the ECT workspace as well as on the Automated Test program’s display screen. The override buttons on the left will turn green when a test step is in progress, here for oil pressure and cam timing for the 2 variable camshafts.

The ‘EngineON/OFF’ button is green when the engine is in normal operating mode. If you need to stop the engine you can click on this button, it turns gray, and the DI and PFI fuel injections are interrupted. Click on the button again to enable fuel injection.

4 – Automated Test Programming

The test program is defined within a spread sheet as partly shown here.:

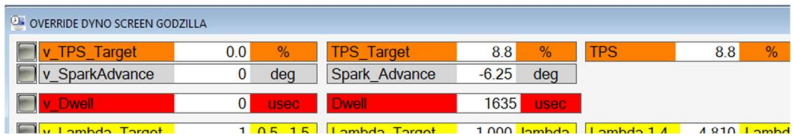


Our standard setup can handle 10 engine actuator functions in a test.
You can define engine RPM, throttle and any combination of cam timing, electronic waste gate valves, DI fuel injection pressure, oil pressure and so on.

OBR can prepare spread sheets and assist you in preparing your own test programs.

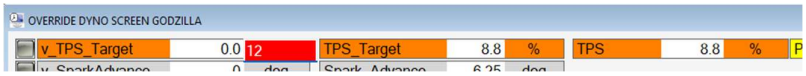
5 – Override Display Window

The Override display window gives you an easy way to change settings of many parameters.



Looking at the throttle position, there are 3 display windows on the display.
The right window ‘TPS’ shows the current throttle position.
The middle window ‘TPS_Target’ shows the requested position based on settings in the calibration map.

The left window ‘v_TPS_Target’ is used for entering a temporary throttle position **v**alue – the v in the window name.
To enter a new value for the throttle position, double click on the number in the ‘v_TPS_Target’ window and key in a new value, for example 12%.



Then press your Enter button, the new throttle position value is now set as the new target.
Now click the little button to the left of the window to activate the new position value.
This button will turn green when the new value has been activated.

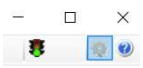


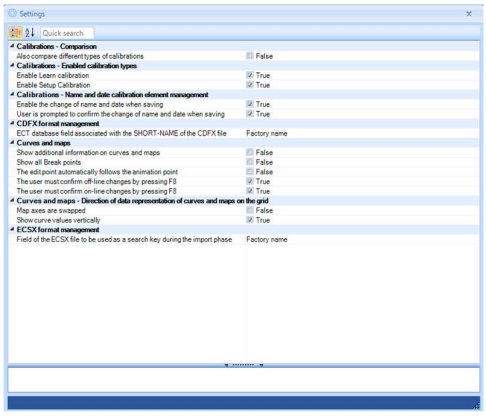
10 Calibrations

This section gives access to the engine, ECU setup, and learn maps.

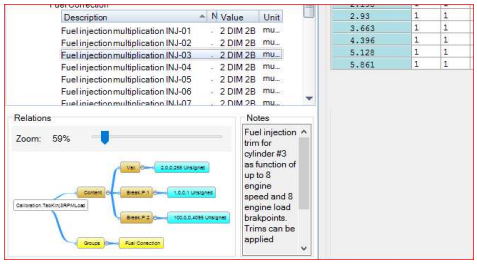
10.1 Calibration Settings

You can access the main settings for this tool by clicking on the settings icon in the right-hand upper corner of the display window and selecting your preferred options:





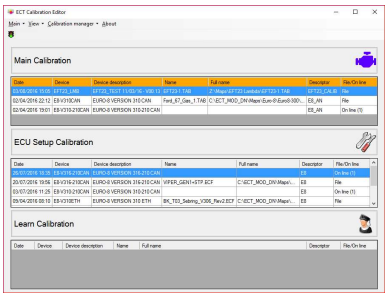
- **Also compare different types of calibrations**, select this option if you always want to compare setting in two maps, even if of different types. It is not recommended to select this option.
- **Enable learn calibration**, this option is required for the calibration tool to open learn maps.
- **Enable setup calibration**, enables the calibration tool to open the ECU setup maps.
- **Enable the change of name and date when saving**, it is recommended to check this option.
- **User is prompted to confirm the change of name and date when saving**, select this option if you want to confirm name and date each time you save a map to disc.
- **ECT database field associated with the SHORT-Name of the CDX file** - select this as the software factory name.
- **Show information about the selected variable in an area below the list of variables**, enable this option if you like the tool to show how parameters are linked.
- **Show all break points**, select this option if you want all available breakpoints in tables and maps to be displayed. If you want to hide unused breakpoints do not tick this option.



- **The edit point automatically follows the animation point**, select this option if you want the manual mapping cursor to follow the animated cursor. This can be an advantage when you map the engine in real time. Choice of setting is a matter of personal preference. Do not select this option if you prefer to move the manual cursor yourself.
- **The user must confirm off-line changes by pressing F8**, select this recommended option to manually confirm changes made to settings when working off-line by pressing **F8**. Upon pressing **F8** changes are saved in the map but not to disc. Recommended selection.
- **The user must confirm on-line changes by pressing F8**, select this recommended option to manually confirm changes to be written to the ECU when working on-line by pressing **F8**. Upon pressing **F8** changes are stored in the map in the ECU. Recommended selection. If you want changes to be written to the ECU momentarily do not select this option.
- **Map axes are swapped,** gives you the option to swap X and Y-axis in base calibration maps. Pick the setting according to your personal preference.
- **Show curve values vertically**, 1-dimensional tables are preferred shown as a vertical column. Recommended selection.
- **Field of the ECSX file to be used as a search key during the import phase** - select this as the software factory name.

It is possible to work with the maps off-line as well as on-line. While any changes in the engine map reflect the engine calibration on the fly, the setup map needs the ECU to be reset to read the new settings.

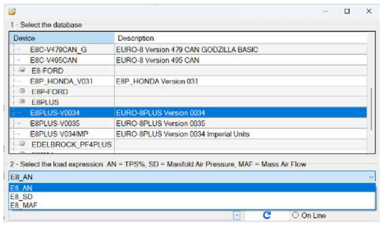
10.2 Load a Calibration



Click on the gray area where you see **Main Calibration** to load an engine map. This is the map used to optimise the engine mapping. The engine map file has a TAB or TABX file extension.

Click on the gray area where you see **ECU Setup Calibration** to load the ECU setup map. This is the map used to configure the ECU to the engine, vehicle type and the sensors used on the engine and transmission.
The ECU setup map file has an ECF or ECFX file extension.
Click on the gray area where you see the **Learn Calibration** to load the ECU learn maps. Learn maps contain the correction factors, the factors stored for adjusting the injection times to reach the lambda target values.
The learn map file has an LRN file extension.

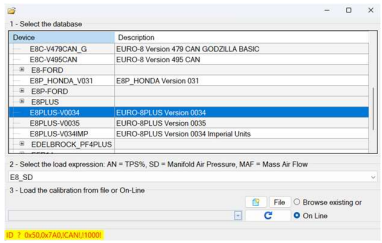
Click on the database name for the ECU in use in '**Device**', this sets the communication protocol. The database version selected should correspond to the ECU's firmware version.



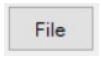
Select the engine load – you can select the engine load (the Y-axis in the calibrations) expressed as:

- **AN** - throttle angle
- **MAP** - manifold air pressure (speed density)
- **MAF** - mass air flow

To load a calibration, click on:



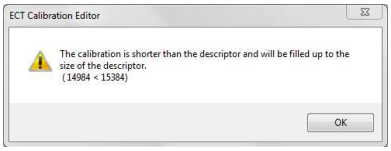

New blank calibration.



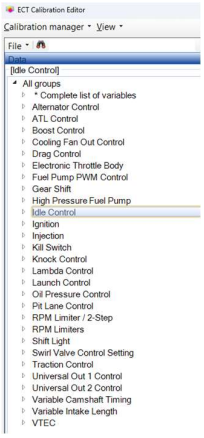
Load an existing calibration from disc.


Load a calibration on-line from the ECU.

Make sure you are connected to the ECU and the ignition is switched on.



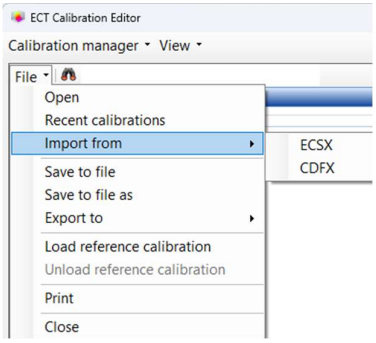
You might see a message about the length of the map:
"**The calibration is shorter than the descriptor…..**"
This is because you have loaded a map created with an older database version than the one you have selected. It is not an error message, just click **OK**.



When you save the file to disc the size will be adjusted automatically. Importing a calibration from an earlier version you must check settings of any new features. Failure to do so can prevent you from starting the engine or – in the worst case – cause damages to the engine!

Once a map is loaded into the Calibration tool – on-line or off-line – you can save it to disc by clicking in **File** and then click on either **Save to file** or **Save to file as**.

10.3 Calibration Editor



Click on the tab File to get access to:

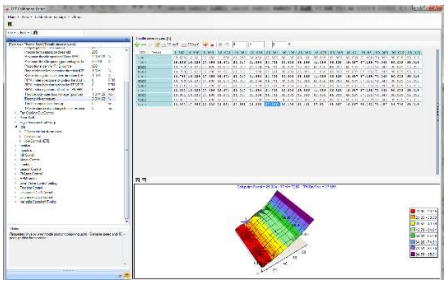
- Open a calibration.
  See section 11.3.
- Load a recent calibration.
  Quick access to previous loaded calibrations.
- Import and export calibration files in ECSX file format or CDFX (Simulink) data files, section 11.7.
- Save to file.
  Save to file as, create new file.
- Load a file for reference while generating a calibration, see section 11.5.
- Unload reference calibration, click this command at any time to unload the reference file.
- Print, access to the print manager, see section 11.8.

10.4 Calibration Display

When you open a calibration file all available features for this version of ECU and software version are listed with its main groups shown in a tree at the left side of the display.
To open a group to gain access to the calibration parameters click on the arrow to the left of the group name.
When you open a group, you can sort the content alphabetically or by numeric values.

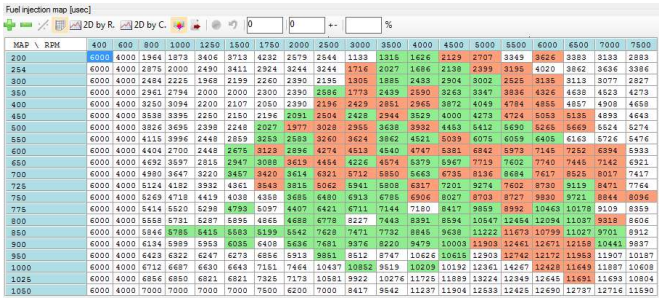
- Sort content alphabetically by clicking on the heading "**Description**".
- Sort content by numeric value by clicking on the heading "**Value**".

The screen is split between the tree on the left and selected tables and graphics are displayed on the right. You can adjust the split ratio between left and right. Using your mouse, grab the split line between the 2 screen halves and mode it to your preferred position.
In the same way you can adjust the split between top and bottom in the right-hand display, between the numeric of the map and the graphic display.
The current values of the variables connected to the axes, if present, and of the output variable, if present, are displayed on the screen.
The settings are saved when you exit the Calibration Manager.



10.5 Reference Map

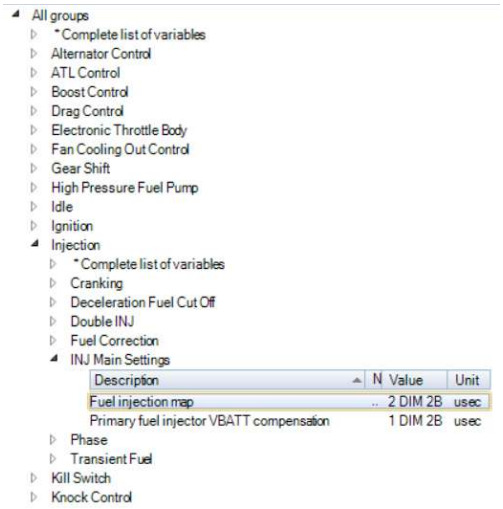
You can load a reference file in the calibration editor once you have loaded the engine map.



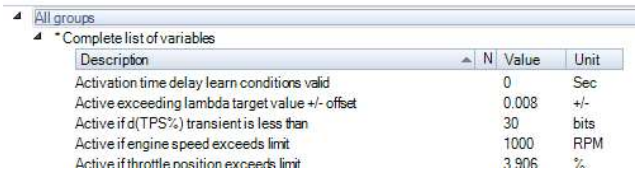
MAP \ RPM	400	600	800	1000	1250	1500	1750	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500
200	6000	4000	1964	1873	3406	3713	4232	4579	2544	1133	1915	1626	2129	2707	3349	3626	3383	3133	2883
254	6000	4000	2875	2000	2490	3411	2924	3244	3244	1716	2027	1686	2138	2399	3195	4020	3862	3636	3386
300	6000	4000	2484	2225	1968	2199	2260	2390	2195	1305	1885	2433	2904	3002	2525	3135	3113	3077	2827
350	6000	4000	2961	2794	2000	2000	2300	2390	2586	1773	2439	2590	3263	3347	3836	4326	4638	4523	4273
400	6000	4000	3250	3094	2200	2107	2050	2390	2196	2429	2851	2965	3872	4049	4784	4855	4857	4908	4658
450	6000	4000	3638	3395	2250	2150	2196	2091	2504	2428	2944	3529	4000	4273	4724	5053	5135	4893	4643
500	6000	4000	3826	3696	2398	2248	2027	1977	3028	2956	3638	3992	4453	4612	5690	5265	5669	5624	5274
550	6000	4000	4115	3996	2448	2859	3253	2583	3260	3624	3962	4521	5039	6076	6059	6405	6163	5726	5476
600	6000	4000	4404	2700	2448	2675	3123	2896	4274	4513	4540	4747	5381	6842	5973	7145	7252	6394	5933
650	6000	4000	4692	3597	2816	2947	3088	3619	4454	4226	4574	5379	6967	7719	7602	7740	7445	7142	6921
700	6000	4000	4980	3647	3220	3457	3420	3614	6321	5712	5850	5663	6735	8136	8684	7617	8525	8017	7417
725	6000	4000	5124	4182	3932	4361	3543	3815	5062	5941	5808	6317	7201	9274	7602	8730	9119	8471	7764
750	6000	4000	5269	4718	4419	4038	4368	3685	6480	6913	6785	6906	8027	8703	8727	9830	9721	8844	8096
775	6000	4000	5414	5520	5298	4739	5097	4407	6421	6711	7144	7180	8417	9859	8992	10463	10178	9109	8359
800	6000	4000	5558	5731	5287	5895	4865	4688	6778	8227	7443	8391	8594	10547	12454	12094	11037	9318	8606
850	6000	4000	5846	5785	5415	5583	5199	5542	7628	7471	7732	8845	9638	11222	11673	10799	11027	9701	8912
900	6000	4000	6134	5989	5953	6035	6408	5636	7681	9376	8220	9479	10003	11903	12461	12671	12158	10441	9837
950	6000	4000	6423	6322	6247	6273	6856	5913	9851	8512	8747	10626	10615	12903	12742	12172	11953	11907	10187
1000	6000	4000	6712	6687	6630	6643	7151	7464	10437	10852	9619	10209	10192	12361	14247	12428	11649	11897	10608
1025	6000	4000	6856	6850	6821	6821	7325	7173	10581	9922	10276	11725	11889	13224	12349	12645	11691	11693	10804
1050	6000	4000	7000	7000	7000	7000	7500	6200	7000	8417	9542	11237	11904	12533	12425	12690	12737	12716	11590

Once a map is loaded in the editor click **File**, then click **Load Reference File**.
Now locate the file you want to use as a reference and click **Open**.
Using the colors red and green it is easy to check changes in any sections of the map.
Red illustrates a decreased value while green illustrates an increased value.
By right-clicking on the main group, selecting '**Restore the values…**', the changes can easily be cancelled, returning the cell values to those in the reference map.
You can unload the reference file by clicking **File**, then click **Unload Reference File**.

10.6 Map Editing



This is an example of loading and changing the engine calibration.
A calibration is divided into various groups, these can be expanded by clicking the arrow pointing right.
You can navigate between the sections using the up, down, left and right arrow keys and the mouse.

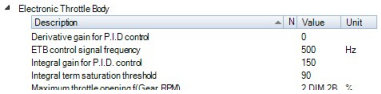


You can sort the content in each group alphabetically by clicking on the heading named **Description** and numerically by clicking on **Value**.

Calibration parameters are divided into 3 categories:

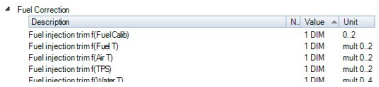
- Constants
- 1 dimensional tables
- 2 dimensional maps

10.6.1 Change a Constant



To change the value of a constant, simply double click the constant text and then key in a new value. Press Enter to confirm the change.
If you work on-line with the ECU, then the ECU will immediately change its setting once the new data is entered – unless you are working on-line with the ECU setup map.

10.6.2 Change a 1-dimensional table

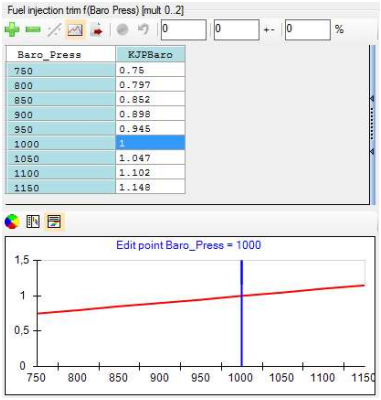


A 1-dimensional calibration table links values of a sensor or a calculated parameter with a variable output, which can be a trim offset or a multiplication factor.
Use the up and down arrows keys to move the cursor between breakpoints.

If you are working online, an animated cursor displays the current load condition. You can toggle this cursor ON and OFF by clicking the button **F12 ANIMATION**.
You can let the edit point follow the animation point. If you always want this feature active, then open the settings in the calibration editor and tick the box **The edit point automatically follows the animation point**.

Optionally, you can select this feature directly from the engine map by clicking the icon .

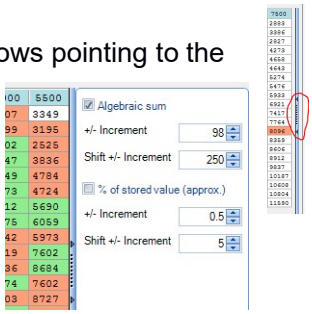
Click on  to open the graphic display of the data.



To change a value of any of the cells either double click on it using your mouse or move the blue cursor to the cell and then press Enter. Now key in the new value and press Enter.

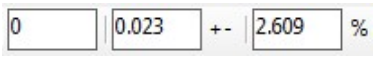
Alternatively, use the **+** and **-** keys to change the values.

You can adjust the steps applied by these keys.
Look for the button on the right edge of the table; it is marked with two arrows pointing to the left and dots, here marked in red.



Click on the dots to open the configuration window. You can modify the cells using an algebraic sum or a percentage correction.
You can define the changes of each **+** or **-** key press and the coarse change by **SHIFT +** or **SHIFT -**.

The 3 windows on top of the table or map window can be used to modify one or more cells as well as displaying the change to each cell from the base setting.
The left window can be used to fill all marked cells with a new value for all cells. This can also be done by marking the cells to be changed, press Enter, key in the new value and then press Enter again.



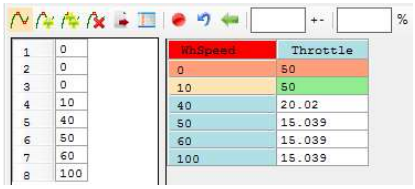
- The left window can be used to fill all marked cells with a new value for all cells. This can also be done by marking the cells to be changed, then press Enter, key in the new value and then press Enter again.
- The middle window is used if you want to increase or decrease cells with a specific value.
- The right window will increase or decrease selected cells with a percentage correction.

If you want to cancel your changes press **F11** or click the icon .

If you want to save your changes into the map, then press **F8** or click the icon .

10.6.3 Breakpoint editor in 1-dimensional tables

You can change the breakpoints in tables and maps.



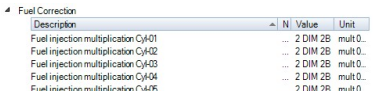
Press **F9** or click the icon to access the break point editor.
Now click on any of the break points, it will turn light brown.
Using the keys on top of the window you can now:

- Delete a break point, press DEL or click the icon .
- Insert a break point, press INS or click the icon .
- Free edit of all break points click the icon .

Press **F9** or click the icon to close the breakpoint editor.
Please also see the section with map comparison.

In section Options you can choose between displaying a table horizontally or vertically.
It is recommended to select the vertical option.

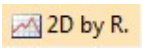
10.6.4 Change a 2-dimensional map



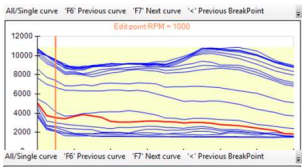
A map links values of two measured channels to a calculated parameter with a variable output, which can be i.e. injection pulse width, spark advance degrees, solenoid valve duty cycles, camshaft positions, offsets or multiplication factors.
Use the up, down, left and right arrow keys to move the cursor between breakpoints.

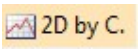
If you are working online, an animated cursor displays the current load condition. You can toggle the cursor ON and OFF by clicking the button **F12 ANIMATION**.
You can let the edit point follow the animation point. If you always want this feature active, then open the settings in the calibration editor and tick the box '**The edit point automatically follows the animation point**'.

Optionally, you can select this feature directly from the engine map by clicking the icon .

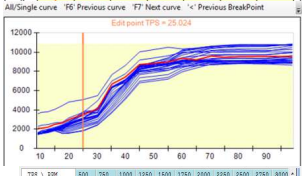
Click on 

to open 2-dimensional graphic display, showing fuel lines for each engine load site.
You can toggle between showing a single line and all lines.

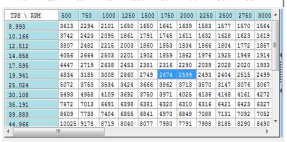


Click on 

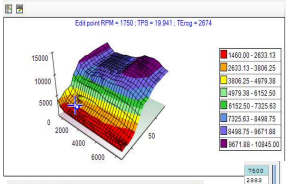
to open 2-dimensional graphic display, showing fuel lines for each engine speed site.
You can toggle between showing a single line and all lines.



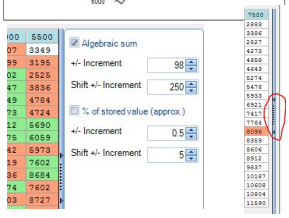
Click on  to open 3-dimensional graphic display.
You can rotate the display, click and hold your left mouse button and rotate the graphics.
To change a value of any of the cells either double click on it using your mouse or move the blue cursor to the cell and then press Enter. Now key in the new value and press Enter.



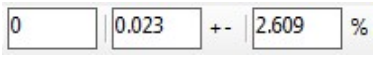
Alternatively, use the **+** and **-** keys to change the values.
You can adjust the steps applied by these keys.
Look for the button on the right edge of the frame; it is marked with two arrows pointing to the left and dots, here marked in red.



Click on the dots to open the configuration window. You can modify the cells using an algebraic sum or a percentage correction.
You can define the changes of each **+** or **-** key press and the coarse change by **SHIFT +** or **SHIFT -**.



The 3 windows on top of the table or map window can be used to modify one or more cells as well as displaying the change to each cell from the base setting.
The left window can be used to fill all marked cells with a new value for all cells. This can also be done by marking the cells to be changed, then press Enter, key in the new value and then press Enter again.



- The left window can be used to fill all marked cells with a new value for all cells. This can also be done by marking the cells to be changed, then press Enter, key in the new value and then press Enter again.
- The middle window is used if you want to increase or decrease cells with a specific value.
- The right window will increase or decrease selected cells with a percentage correction.

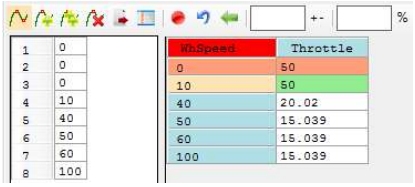
If you want to cancel your changes press **F11** or click the icon .

If you want to save your changes into the map then press **F8** or click the icon .

10.6.5 Breakpoint editor in 2-dimensional maps

You can change the breakpoints in any 2-dimensional maps.

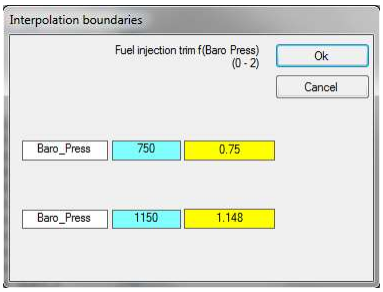
Press F9 or click the icon  to access the break point editor.
Now click on any of the break points on either the X or Y-axis, it will turn light brown.
Using the keys on top of the window you can now:



- Delete a break point, press DEL or click the icon .
- Insert a break point, press INS or click the icon .
- Free edit of all break points click the icon .

Press F9 or click the icon  to close the break point editor.
Please also see the section with map comparison.

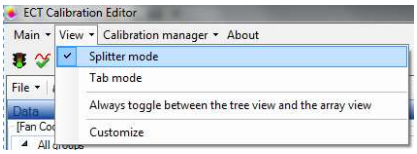
10.6.6 Interpolation



You can interpolate values between two selected cells in a table or map. Click on the first cell, hold your left mouse button pressed and drag the cursor down, marking the cells. Then release the button.

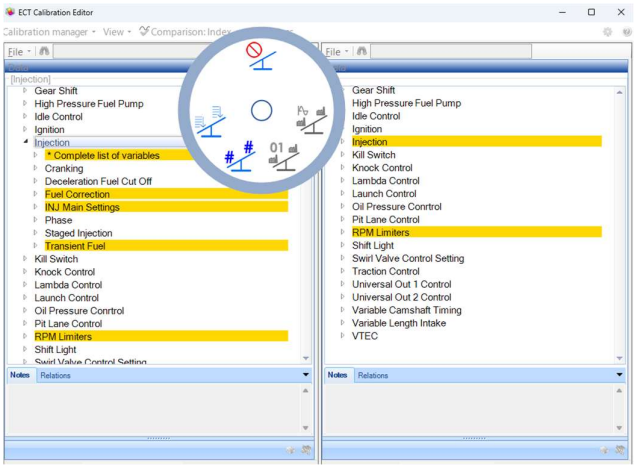
Using the interpolation function the tool can automatically calculate calibration values. Mark the cells in the column or row you want to linearize, click the icon and now key in the interpolation boundaries. Click **OK** to perform the calculation and return to the map.

10.6.7 Comparing maps

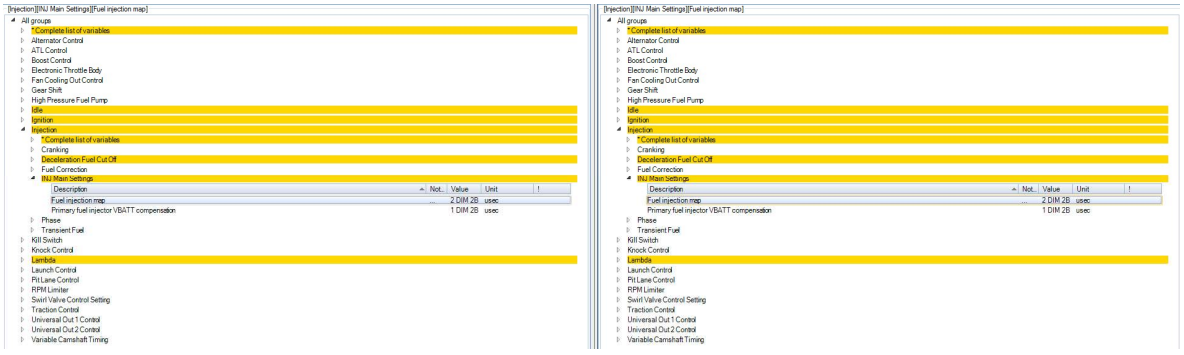


You can compare the contents of two calibrations from your PC.
You can choose to display the two calibrations side by side (Splitter mode) or on two individual tabs (Tab mode).

Open the calibration manager and load the first of the two calibrations to compare.
Now click on **Calibration Manager** and select **Load empty frame for Main Calibration**.
Load the second calibration. Click on Comparison and select one of the active comparison (blue).
Other types of comparisons are show, inactive ones are greyed out.

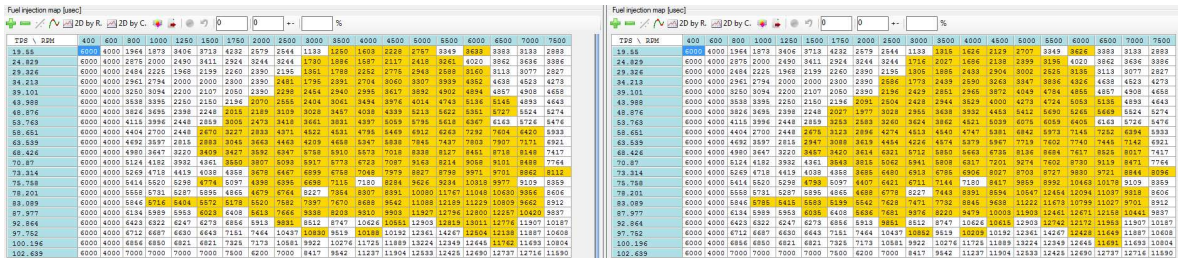


Displaying the two calibrations side by side any differences between the two are marked in yellow:

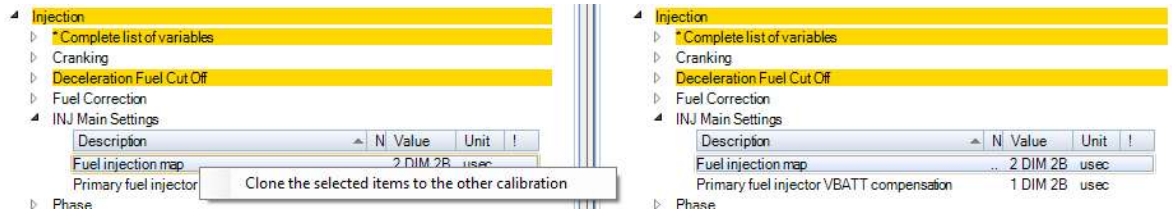


You can compare calibrations working either off-line or on-line with the ECU.

To see the differences between i.e. the two fuel maps, open the fuel map in both maps. The colored cells indicate that values differ between the two maps:



Clone settings
You can clone settings from one calibration directly into a second calibration.
Go to the section in the calibration you want to copy.

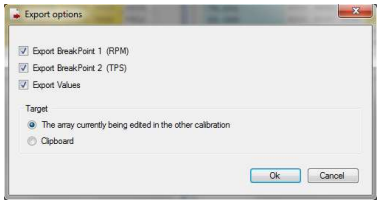


Right click the section you want to copy, either a complete group or individual sections, to the other calibration and select **Clone the selected items to the other calibration**.
This way you can easily copy constants, tables and maps between calibrations.

10.6.8 Copy and paste

While comparing calibrations there are several ways you can blend values from one map to another map. If you want to copy all cells and break points from one map to the other, you can do so with two clicks of the mouse.
Open the two calibrations. Open the maps to copy data from and to.

Having the two maps next to each other, click on this icon on the calibration you want to export data from.
In '**Export Option**' you have 3 choices:



- Export breakpoint 1 (RPM)
  Only export breakpoints on the X-axis
- Export breakpoint 2 (Load)
  Only export breakpoints on the Y-axis
- Export values
  Export data from all the cells in the map, including the hidden cells.

Select the target for your data export:

- The array currently being edited in the other calibration
  Copy all data cells from one map to the other map.
- Clipboard
  Copy all data cells from one map to the PC's clipboard.

Select your preferences and click **OK**.
The complete map, including breakpoints, is now being copied to the other map.
You can copy part of a table or a map or all data cells from one calibration to another.

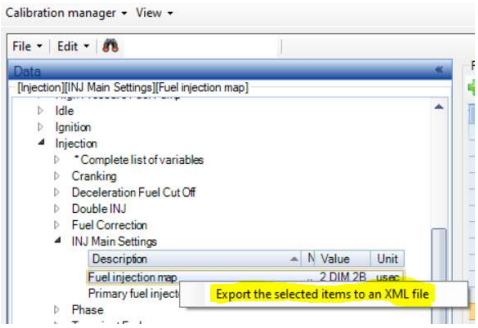
Mark the data cells to copy or click on the upper left cell in a table or map to mark all cells. Press '**CTRL+C**' to copy cells or click on '**Edit**' in the main menu and select '**Copy**'. You can copy data cells, or you can copy data cells together with the X and Y-axis breakpoints.
Data on the clipboard can now be pasted into another calibration or into other documents, for example Word or Excel.
In Excel click on the cell you want to use as the top left cell and click **CTRL+V**.

You can also insert the data into another map or calibration. Mark the section in a map where you want to paste the data, click on '**Edit**' and select '**Paste – from clipboard to selected cells**'.
You can also use the '**CTRL+V**' to paste the data.

Click or press **F8** to save the changes or **F11** to discard changes.

10.7 XML Files

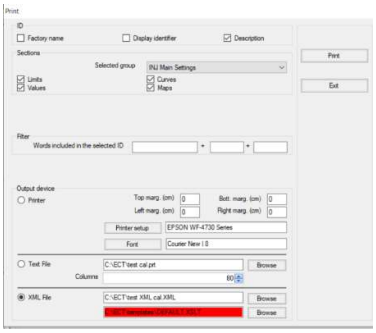
XML is a file format used for sharing both format and data. In ECT we use it to save part of or all the data from a calibration to a file on your PC, shared via a network or update from an older to a newer version.



If you are modifying a calibration, you can right-click the groups in which you have made alterations and select '**Export the selected items to an XML file**'. You can include one single group or several groups.
ECT will save an XML file on your PC in the display folder linked to your ECU version.
The file can then be imported by another user on the network by clicking on '**File'** and then '**Import from XML**'. This way users can easily share file updates as this feature is available for both engine calibrations and for ECU setup calibrations. Once imported, the changes from the original map have now been applied to the updated calibration file.

The XML export and import found under '**File**' is for use with a new blank calibration, intended to update a calibration from an older to a newer software version. If data is found outside boundaries set in the new version, data will be corrected to respect the updated settings.

10.8 Print



The print manager allows you print the full dataset of a calibration or parts of it.
In section **ID** you can select the channel name to include with the data:

- Factory name
  Prints channel names using the internal software names.
  Not recommended.
- Display identifier
  Prints channel names using the display identifier names.
  Not recommended.
- Description
  Prints channel names using the normal channel names, recommended selection.

In **Sections** you select which data type to include with your printed data:

- Limits
  Prints system limits. This parameter is for use with Euro-4 only.

- Values
  Prints the value of all constants in the calibration.
- Curves
  Prints the value of all tables in the calibration.
- Maps
  Prints the value of all maps in the calibration.

In **Order** you select the printing order of the data channels. It is recommended to tick only the box '**Sorted by group**'; this lists channels sorted in groups and each group sorted alphabetically.

In '**Filter**' you can include up to 3 words included in the names for the channels you want to include in your print.

In "**Output device**' you select how to print your data.

- Printer
  Select your printer or choose to print to file as for example a '**PDF**' document.
- Text File
  Print data as a text listing.
- XML file
  Print data to an XML data file.

Click on '**Print**' or '**Print preview**' to start printing.

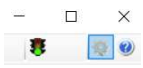
11 Sending and Receiving Maps

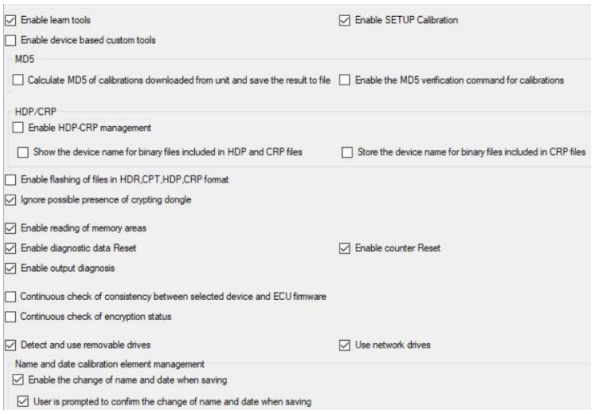
This section gives access to communication with the ECU, updating firmware and sending and receiving calibrations. You can also access the diagnostic features from this tool.

11.1 Send / Receive

The Memory Interface is used to program an ECU with firmware and calibrations. It is also used to read calibrations from the ECU.
Furthermore, it can be used to create files for protected and encrypted ECU versions.

You can access the main settings for this tool by clicking on the settings icon in the right-hand upper corner of the display window and selecting your preferred options:





- **Enable learn tools**
  Required setting.
- **Enable setup maps**
  Required setting except for Euro-2.
- **Enable device-based customs tools**
  Not recommended.
- **Calculate MD5 of calibrations**
  Special verification tool, not required for standard installations.
- **Enable MD5 verification**
  Special verification tool, not required for standard installations.
- **Enable HDP-CRP management**
  Setting for encrypted option, leave unticked.
- **Show the device name in HDP and CRP files**
  Setting for encrypted option, leave unticked.
- **Store the device name for CRP files**
  Setting for encrypted option, leave unticked.
- **Enable flashing of HDR and CRP files**
  Setting for encrypted option, leave unticked.
- **Ignore encrypting dongle, tick the box**
  Recommended setting.
- **Enable reading of memory areas**
  Not required.
- **Enable diagnostic data reset, tick the box**
  Optional setting for use with on-board diagnostic, only for use with Euro-4.
- **Enable counter reset, tick the box**
  Optional setting for use with on-board diagnostic, only for use with Euro-4.
- **Enable output diagnosis**
  Optional setting for use with on-board diagnostic.
- **Continuous check of consistency**
  Not required.
- **Continuous check encryption**
  Setting for encrypted option.
- **Detect and use removable drives**
  Recommended setting.

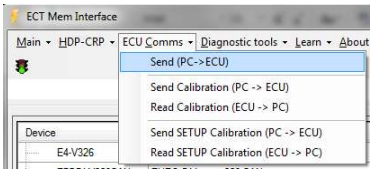
- **Use network drives**
  Recommended setting if you are connected to a network.
- **Enable name and date change**
  Recommended setting.
- **User prompt at saving**
  Recommended setting.

11.2 ECU Comms

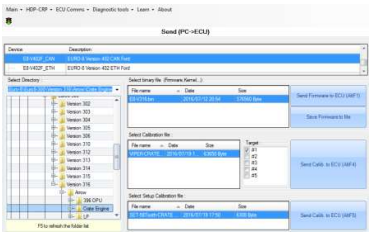
This section gives you access to send and receive ECU calibrations and ECU firmware.

11.2.1 Send calibrations

Click on **ECU Comms** and select **Send** to get access to commands for sending main calibrations, ECU setup calibrations to the ECU.



Make sure you have selected the right ECU database.
Next locate the calibration folder in the tree on the left.
This section will allow you to send firmware, main calibration file and ECU setup calibration.



To send firmware to an ECU you will need to use CAN communication, using either our EFP02C or EFT20 USB CAN interfaces.
Start by switching the ECU ignition off.
Click the firmware version you want to send.
Click **Send Firmware to ECU** and follow the instructions on screen.

Warning:
If you switch the ECU off during the transmission of firmware, the ECU will appear not to communicate with the PC when you switch it on again. But this is quickly sorted out. Simply repeat the firmware transmission, the ECU will be back communicating.

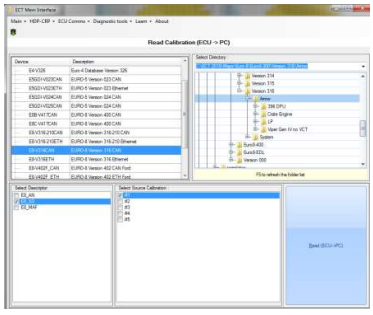
To send a calibration to the ECU, make sure you have selected the right ECU database.
Next locate the calibration folder in the tree on the left.
Select the calibration to send and the destination location.
Click on '**Send Calib to ECU**'.

To send the ECU setup calibrations to the ECU click on the calibration to send.
Now click **Send Calib to ECU**.

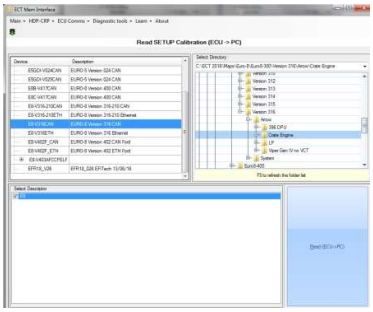
11.2.2 Read calibrations

Click on **ECU Comms** and select **Read** to get access to commands for sending main calibrations, ECU setup calibrations and learn files to the ECU.

Make sure you have selected the right ECU database.
Next locate your calibration map folder in the tree on the right.
This section will allow you to read main calibration files and ECU setup calibrations.
To read the main calibrations from the ECU click to select the descriptor settings and select which of the multiple locations you intend to read from.
Click **Read**.



You will be prompted for a calibration name, but the tool will propose the current name.



Next you will be asked if you want to mix the calibration with the learn calibration map.

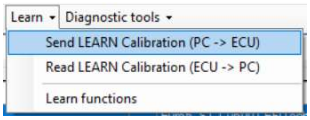
- If you are mapping the engine and are using the ECU self-learn feature, you select YES to this option. Have patience while the tool creates the new fuel map, you will see when it has finished.
  The ECU software has an option to perform this process automatically. If you use that option then click NO to this option.
- If you are not mapping the engine and only want the calibration from the ECU, select NO to this option.

To read the ECU setup calibration make sure you have selected the right ECU database.
Next locate your calibration map folder in the tree on the right.
Click **Read**.

11.3 Learn

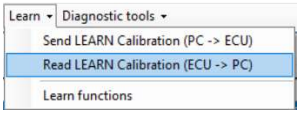
This section gives access to send and receive learn calibrations from the ECU.

11.3.1 Send learn calibration



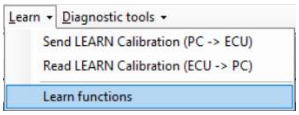
Use this option to send a learn calibration back to the ECU.
Make sure you have selected the right ECU database.
Next locate the calibration folder in the tree on the left.
Select the learn calibration to send and the destination location.
Click on '**Send Calib to ECU**'.

11.3.2 Read learn calibration



Use this option to read a learn calibration from the ECU.
Make sure you have selected the right ECU database.
Next locate the destination calibration folder in the tree on the left.
Select the ECU location from which you want to read the learn calibration.
Click on '**Read (ECU->PC)**'.

11.3.3 Learn functions



This section gives access to learn reset functions in the ECU.

Section '**Reset functions**' gives you access to reset the fuel learn calibrations withing the ECU. Select which of the available calibrations to reset and click **OK**.

Section '**Min max adjusting**' is for used with Euro-4 **only** and is used to set the minimum and maximum throttle positions for a cable operated throttle body. To set the minimum position, wind the idle speed screw on the throttle body so far back that the throttle blade closes fully in the housing. When done, click **OK** to set the minimum position and then confirm by clicking **OK**.

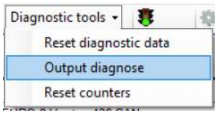
To set the maximum position, open the throttle fully and click **OK** and confirm by clicking **OK**.
To save this setting in the ECU, switch the IGN KEY off, the main relay will click and then turn the IGN KEY back on. During this process, the ECU saves all learned data.

11.4 Diagnostic Tools

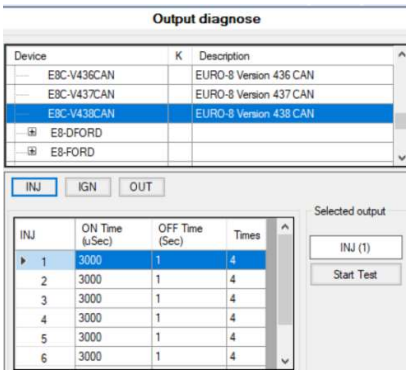
This section includes tools to reset timers in Euro-4 and a tool to check all outputs in all our ECUs.

11.4.1 Reset diagnostic data
Section used to reset all diagnostic flags in Euro-4.

11.4.2 Reset counters
Section used to reset all diagnostic counters in Euro-4.



11.4.3 Output diagnose
This section is used to check injector drivers, coil drivers and digital outputs in all ECUs.

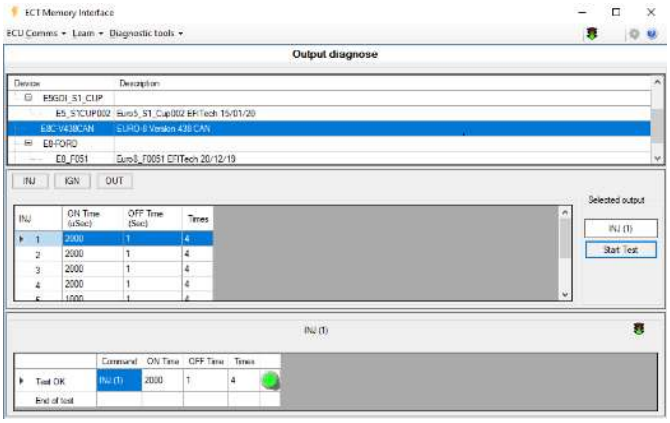


To start a test, click on the database for the ECU in use.
Next select which driver group to test:

- Injector drivers (**INJ**)
- Ignition drivers (**IGN**)
- PWM and relay drivers (**OUT**)

In the table for each of the drivers, key in the driver on-time in microseconds (µs), key in the time between consecutive tests in seconds (s) and the number of repetitive tests.

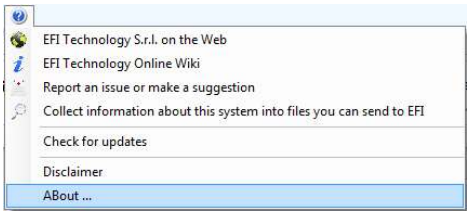
Select which driver group to test, click on either **INJ**, **IGN** or **OUT**.
In the example the injector driver test will switch the driver ON for 2,000 µs (2 ms) with 1 second between each of the 4 tests.
Please note that the injector and ignition driver numbers might refer to the cylinder numbers, this is dependent on how the engine firing order is defined in the ECU setup calibration.
Click on the driver number to test, here #1.
Click on the button marked '**INJ(1)**' to start the test. Once completed the system will confirm the driver status – '**OK**' or '**Fail**'.



11.5 MD5 Calibration Verification

A new way to compare and verify maps programmed into any of the ECU's has been developed. Using this process, it is possible to let for example a scrutineer check if the ECU maps conform to provided sample maps. It is not necessary for the engine builder to hand over the real maps.
The engine builder will use the ECT to generate a signature file for each of the maps programmed into the ECU, being either engine or setup maps.

11.5.1 Tool version
The compare function is available in ECT from version 314.
Please check your ECT version is compatible, otherwise you can always download the latest tool version from our website - www.obrcontrolsystems.com – from the Support section.



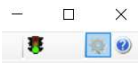
To check which tool version you have installed, please click on the "?" in the main menu, then select "About":

11.5.2 Configuration

Once the right tool is installed on your PC, start the ECT program.
Click on the icon for "Memory Interface" in the main menu:



When the window opens click on the icon in the upper right-hand corner.
In Settings tick the 2 boxes:

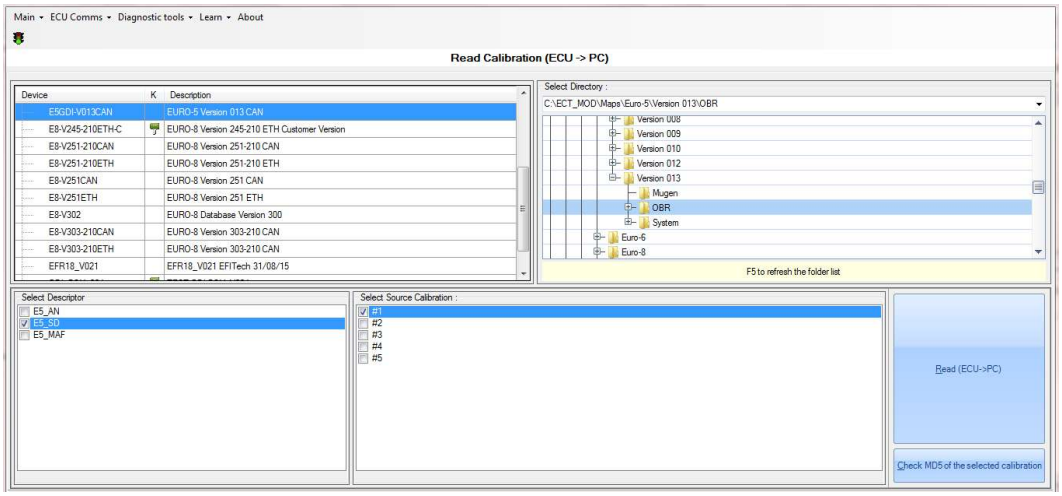




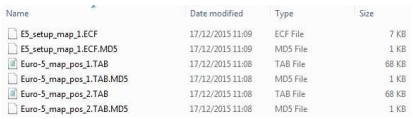
- 'Calculate MD5 of calibrations downloaded from unit and save the result to file'.
- 'Enable the MD5 verification command for calibrations'.

11.5.3 Creating MD5 files

Creating the MD5 files used for map verification is very easy.
Simply copy the finalised maps from the ECU to your PC.
Select "ECU Comms" and then "Read Calibration" to copy an engine map to your PC.
Do not mix with the learn table.
Select "ECU Comms" and then "Read Setup Calibration" to copy an ECU setup map to your PC.



Here is shown the result of downloading two engine calibrations and one ECU setup calibration:



The files with extension MD5 are the files used for use with the verification process.

11.5.4 Verifying engine calibrations

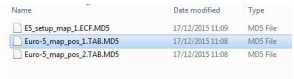
To verify maps in the ECU proceed this way:
Connect your PC to the ECU and open the "Memory Interface" section in ECT.
Click '**ECU Comms**' and then '**Read Calibration**'.
Select which engine map to verify:



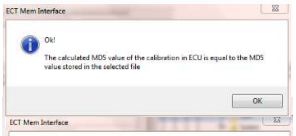
Click the verification button to start the process:



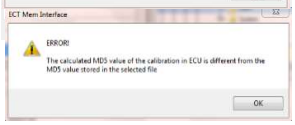
Select the signature file linked to the selected engine map:



If the signature file is generated from the map found in the checked location you will see a confirmation:

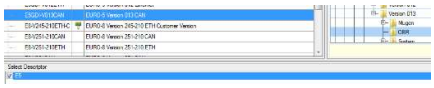


If the map and the signature files do not correspond you will see an error message:



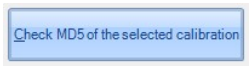
11.5.5 Verifying ECU setup calibrations

To verify the setup map in the ECU proceed this way:

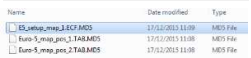


Connect your PC to the ECU and open the “Memory Interface“ section in ECT.
Click “ECU Comms” and then “Read Setup Calibration”.

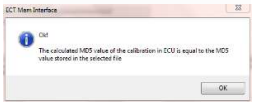
Click the verification button to start the process:



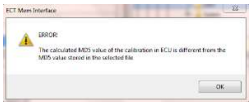
Select the signature file linked to the selected ECU setup map:



If the signature file is generated from the map found in the checked location you will see a confirmation:



If the map and the signature files do not correspond you will see an error message:



12 Data Logger Configuration

12.1 Summary

The ECU logger is a PC tool to extract logged data from EFI Technology ECUs. This includes the EURO4, EURO5, EURO8, EURO8PLUS and EURO12 but also the older legacy EURO6 and EURO12 with their appropriate XML database file.

The extracted data will be stored in a dump file (*.bin) together with the logger configuration and the lap time info. The user can also choose to convert it to MDF (v3.30). dump files can always be converted later by loading them with the ECU Logger and converting them to MDF, 2D or CSV file format.

The ECU logger allows a user to create a logger configuration for the target ECU using the device database. This includes channels to log, logging speed of the channels, stop delay, trigger mode (disabled, continuous, external or channel triggered). When channel triggering is chosen, the tool enables the user to select the thresholds between which the logger will be active. The configuration can be stored on the PC in a *.spt file. The tool can also read an existing configuration from an ECU.

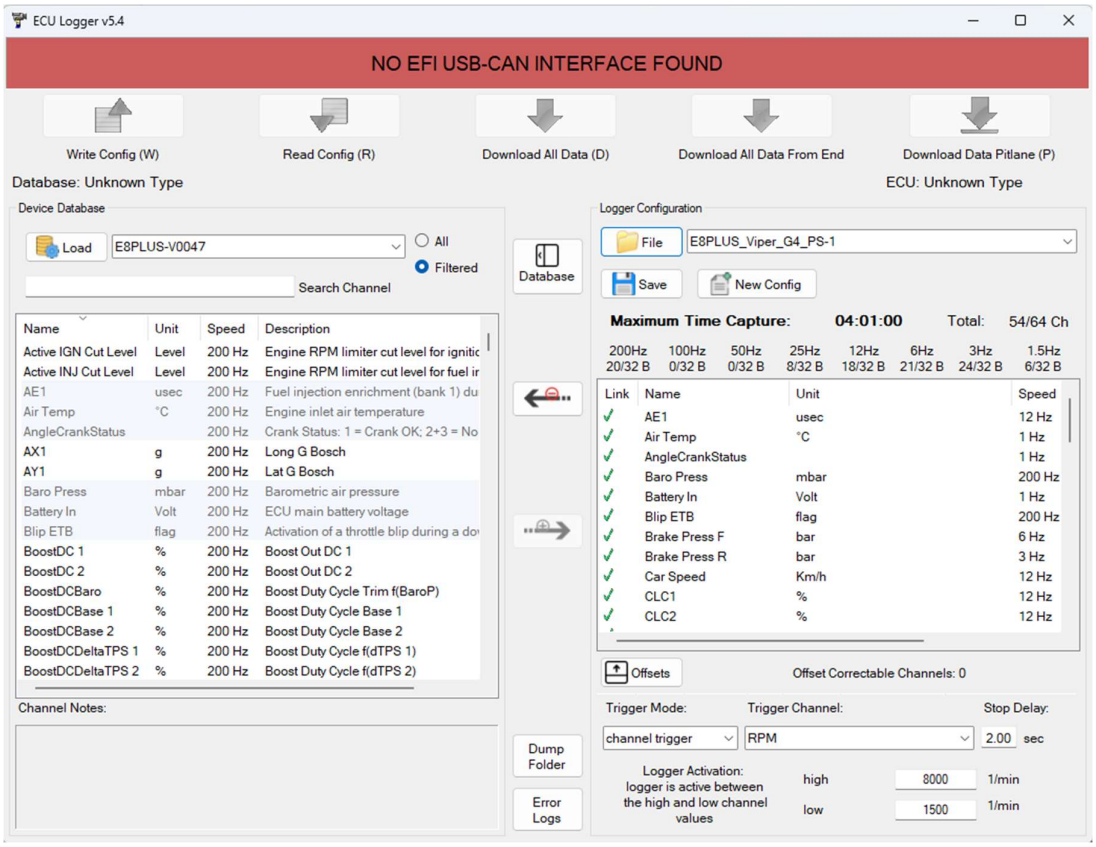
This document will clarify how to use the tool and explain the functionality.

Short key list:

Arrow Key Left	Increases frequency of the selected channels in the configuration (circles around when max frequency is reached)
Arrow Key Right	Decreases frequency of the selected channels in the configuration (circles around when min frequency is reached)
Delete Key	Deletes the selected channels in the configuration
Ctrl + A	Selects All channels in the configuration box which has the focus (top or bottom one)
Space bar	Adds selected database channels to the configuration
Ctrl + R	Read configuration from ECU
Ctrl + W	Write configuration from ECU
Ctrl + D	Download Data from ECU
Ctrl + P	Download Data Pitlane Mode

12.2 Appearance

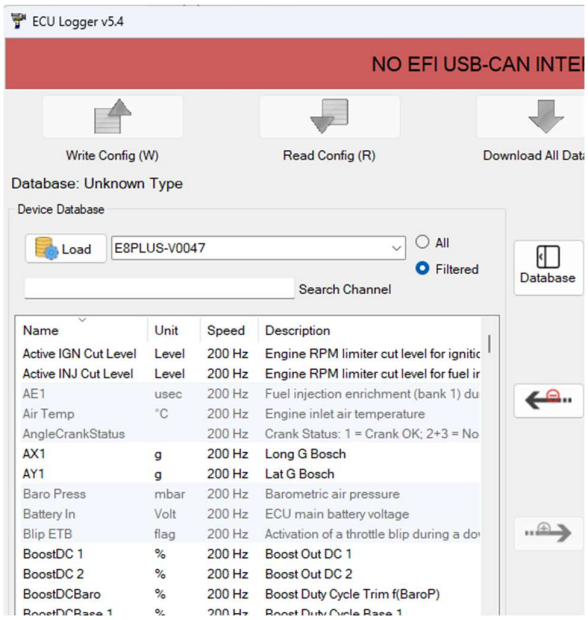
Below is a screenshot of the ECU Logger Tool, depending on the connection status and the current
activity, the top bar will change color and display the status. In the case below it indicates that there is no EFI USB-CAN interface connected.



Other states can be:

EFI COMMUNICATION SERVER OFFLINE	No ECU Communication Server Found, this means the communication server is not installed on the pc
NO DATABASE LOADED	There is no device database loaded (the tool needs the XML database to know how to talk to the ECU). The EFI USB-CAN interface is connected though.
CONNECTING TO ECU...	The tool is attempting to get a connection to the target ECU.
NO ECU CONNECTED	The tool is not connected to an ECU
LOGGER STANDBY (remaining time to capture: 15:05:43)	The tool is connected to the ECU and the logger is not running, it is in an halted state. Showing the remaining time that can be captured.
LOGGER RUNNING (remaining time to capture: 15:05:55)	The tool is connected to the ECU and the logger is running / recording. Showing the remaining time that can be captured.
ERASING LOGGER DATA... (could take a few minutes)	The tool is connected to the ECU and the ECU is busy with erasing the datalogging memory.
PITLANE MODE, Waiting for ECU...	The tool is in pit lane mode, ready to download all logger data from the ECU the moment it connects.

12.3 Device Database



A device database can be loaded by pressing the load button in the device database section (left). This will open the database folder of ECT (if installed) and allow the user to select an XML database.
The 6 most recent databases selected are put in the dropdown box next to the load button for quick access.

On the right of the combo box there are 2 radio buttons (All and Filtered), per default Filtered is selected and this only shows the channels in the database marked for the logger.
When All is selected it will display all channels of the database.

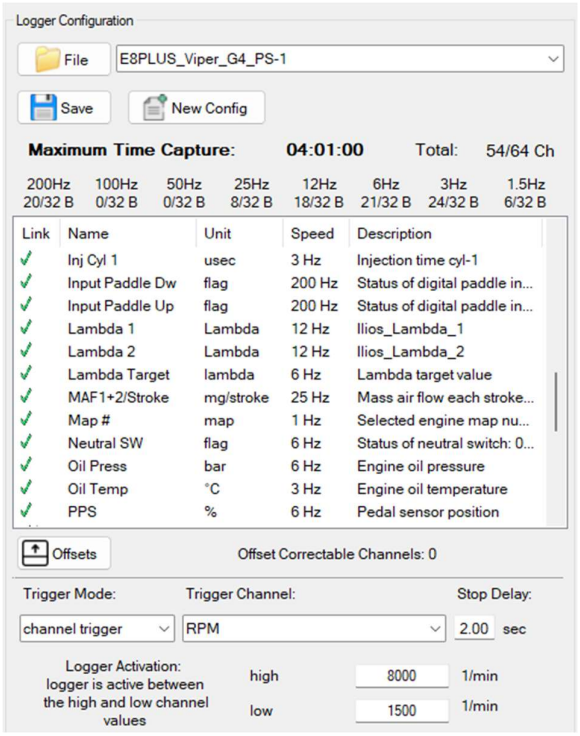
Channels can be added to the configuration by pressing the arrow button that points to the right. Multiple channels can be selected. Pressing the space bar after having selected some channels, will also add them to the configuration. After they are
added, the cursor will move to the next channel in the database that was not added yet.

The search bar below the load button will filter the channels using the search string entered the bar. Multiple search strings can be entered by using the asterisk (*).

Below the channels is a Channel Notes Box which contains the Notes for the channel that was last selected.

The top button in the middle column called “Database” will hide or expand the database section to give more screen space to the logger configuration screen. When the database section is needed again, click the Database button to show the section again.

12.4 Logger Configuration



Just like in the device database section, the load button will open the last used folder in which configurations were stored and allow the user to select a configuration (.spt) or a dump file (.bin) to read the configuration from.

When a configuration is loaded correctly, it will display all signals with a link column, this will indicate if the channel was found in the opened database file (if found and was equal, if found but was not equal, if was not found). The lightning bolt is added if that channel is configured to be a trigger channel.

The maximum capture time (with the format days hours:minutes:seconds) is displayed above the channels together with the total number of channels configured.
Depending on the ECU the total channels supported can be different, the amount is displayed after connecting to the right of maximum time capture.
The maximum number of bytes per frequency group is also limited, depending on the channel sizes, and this can result in more or less channels per frequency. The amount supported is displayed after connecting to the ECU below each frequency group.

The logging speed of these channels can be changed by either double clicking a channel and selecting a new frequency or by selecting multiple channels and pressing the arrow keys (left for higher frequency, right for lower frequency).

Pressing the arrow button that points to the left will remove the channels from the configuration. Pressing New config will remove all channels and start a default empty config.

Pressing the offset button will open the offset correction channel box, channels can be put here or removed by pressing arrow up button or arrow down button respectively.

When a channel is configured as an offset correctable channel, the current value will be read continuously and displayed in the offset column. This value will be used to correct the channel to value zero when generating an MDF after the data is extracted from the ECU. This offset value will be automatically fixed when writing the configuration to the ECU.

Below the channel boxes are the trigger options and the stop delay (number of seconds to keep logging after the logger is stopped and how long to wait to start logging).

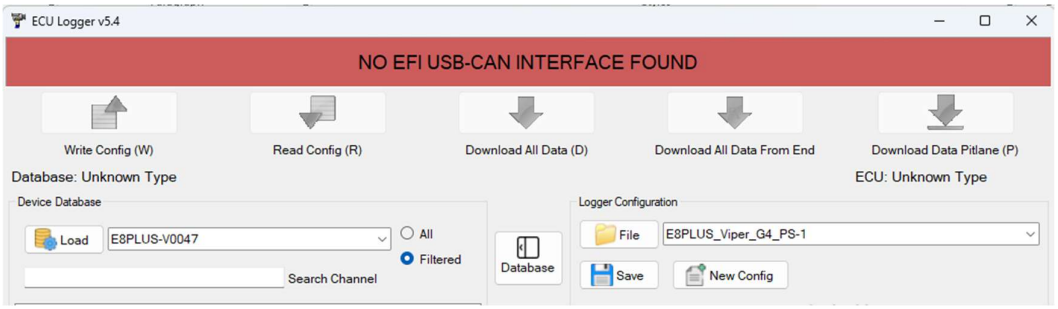
12.5 Communicating with ECU

After configuring all channels to log, the user can connect to an ECU and click Write Config to upload the configuration into the ECU. Uploading the config will zero all offset correctable channels automatically and will command the ECU to erase the datalogger memory after uploading the configuration. After the datalogger memory is erased, the logger will automatically start (or wait for a trigger depending on the configuration).
The Read Config button will read only the configuration from the ECU, but not the lap info or the logged data.

The “Read All Data” button will initiate the process of extracting the logged data from the ECU. First, it will read the configuration, then the lap time info and afterwards it will start reading the data logged data.
While it is reading the data, the operation can be cancelled at any time creating an MDF from the data
read up until it got cancelled. The logger will continue running after it gets cancelled.

Normally the data is extracted by reading the datalogger memory from start to finish, but alternatively the data can also be extracted from finish to start by clicking the Download All Data From End button. This will allow users to extract the last 10min quickly for example. After the data is extracted, the user can decide to clear the memory and restart the logger or to continue from the current point.

To Download All data immediately when the ECU connects, press the Download Data Pitlane button.
This will prepare the logger to start downloading as soon as the ECU connects to the interface. Typically used in the pitlane at the racetrack for fast data extraction.



The Read Config button will read only the configuration from the ECU, but not the lap info or the logged data.
The “Read All Data” button will initiate the process of extracting the logged data from the ECU. First, it
will read the configuration, then the lap time info and afterwards it will start reading the data logged data.
While it is reading the data, the operation can be cancelled at any time creating an MDF from the data
read up until it got cancelled. The logger will continue running after it gets cancelled.

Normally the data is extracted by reading the datalogger memory from start to finish, but alternatively the data can also be extracted from finish to start by clicking the Download All Data From End button. This will allow users to extract the last 10min quickly for example. After the data is extracted, the user can decide to clear the memory and restart the logger or to continue from the current point.

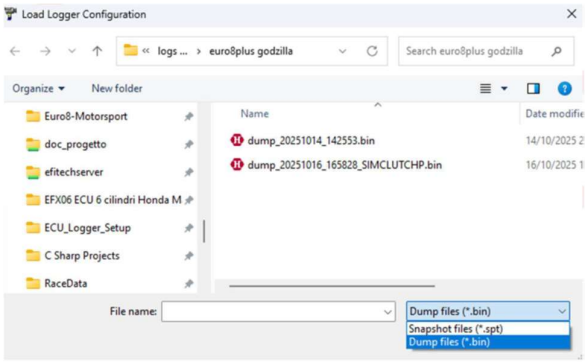
To Download All data immediately when the ECU connects, press the Download Data Pitlane button.
This will prepare the logger to start downloading as soon as the ECU connects to the interface. Typically used in the pitlane at the racetrack for fast data extraction.

To access the location where the logger puts the dump files (bin), the user can click on the Dump Folder button. This will open Windows Explorer on the location where the dump files are stored.

The ECU Logger will write all activity to an error log, which can be investigated in case of maloperation
or to trace back which steps were executed. Also, more information about device database warnings
(channels with problems which are not shown in the channel box) and about connection difficulties can
all be traced back to the error log. An error log is always created and stored in temp folder and thus
automatically deleted by windows. To go to the folder where error logs are stored, the user can press
the Error Log button.

12.6 Dump Files

The generated dump files contain the raw data extracted from the ECU + the read logger configuration.
Dump files are a space effective way as data backup and very useful as a debug tool in case something went wrong during data extraction or Logs button.
Logger configuration can be loaded from the dump file simply by filtering dump files in the file open
window:
Normally configurations are loaded from .spt files but also dump files can be used.



After selecting a dump file, also a pop-up will ask to save the logged data, so the user can generate a readable log file from the raw data, such as MDF (select for use with ECT Datalog Viewer) , 2D or CSV.
After clicking one of the options, the user will be prompted for a save location for the log file.



12.7 Log Files

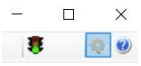
Working with MDF files, events are added to the log file where lap times are visualized:
An event can be a key off/key on event or a channel trigger event (logger halted/resumed).

13 Datalog View



The Datalog View Tool is a graphic data analysis tool, displaying recorded data in a strip chart mode.
It can display data from both the ECU's internal data recording module as well as from the ECT logger tool.
It can read the dedicated file formats used in ECT as well as the standard MDF file format.
Data can be displayed in up to 5 separate windows plus an overview window at the bottom of the display.

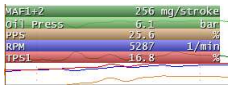
13.1 Datalog View Options



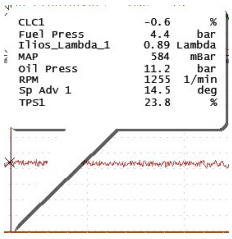
You can access the main settings for this tool by clicking on the settings icon in the right-hand upper corner of the display window and selecting your preferred options:



- **Tool tip on mouseover**
  Select option if you want a help text to pop up when you move the mouse tip into a new section of a display.
- **Show the values related to the current cursor on the chart background**
  Select to display channel data windows on the chart for the current cursor position.



- **Show the values related to the current cursor in a balloon**
  Select option to display channel data in a balloon linked to the cursor position.



- **Font size in percentage**
  Use this option to prsonalize the data font size.
- **Automatic resizing of the channel list width**
  Select this option to adjust channel width automatically when expanding details list, maximum when expanded, minimum when compact.

- **Apply channel properties used in previous sessions**
  Select this recommended option to use previous defined channel properties.
- **Clear channel property history**
  Select this option to discard earlier used channel properties.
- **Layout list management**
  Recommended to select the option to link the channel list to all logged files.
- **Background color**
  Choose between a dark or a light chart background.
- **Axes grid lines management**
  You can show grid lines on the X-axis and on the Y-axis only if you have chosen to show the data channel's Y-axis. You can also set the color of the grid lines in this section.
- **Events**
  Set the width of a display graph, its visual appearance and its color.
- **Visibility of the color bands generated by the display markers**
  While recording data it is possible to add display user activated highlights. Select this option to display these sections.
- **User interaction while opening files**
  When opening data logging files created in ECT it is possible to exclude duplicated channels. This can happen if data was recorded having more than one display open sharing identical parameters. It is recommended to select the setting to automatically delete duplicate channels.
- **The X-axis shows the date**
  If selected the x-axis will show the run time of the day instead of showing the default session run time.

13.2 File

File in the main menu gives access to:

13.2.1 Open main log file and load ALL channels into memory

When opening a log file in the preview window, all data channels in the file are selected, click on **OK** to load the data in the charting tool.

13.2.2 Open main log file and choose which channels to load into memory

Selecting this option to load a file, you can select individual data channels to load.
Click on a channel to load. To load additional channels, hold CTRL down and click all additional channels, then click **OK**.
Optionally, you may click '**Select all**' to load all data channels and then click on **OK**.

13.2.3 Open another log file for comparison and load ALL channels into memory

Select this option to load a second file as reference or comparison.

13.2.4 Open another log file for comparison and choose which channels to load

Select this option to load a second file as reference or comparison, optionally selecting individual files.
Click on a channel to load. To load additional channels, hold CTRL down and click all additional channels, then click **OK**.
Optionally, you may click '**Select all**' to load all data channels and then click on **OK**.
This file will be loaded into a different display segment than the first file. If data from the first file was loaded into display segment #1, then select segment 2 to 5.

13.2.5 Offset value to be added to each of the compared file channels

Select this option to align channel data between to logs. You can adjust this by keying in a positive or negative time interval in seconds, with a resolution of the time base at which the data is recorded. You can also use the interval by two cursors lined up at reference points for both data files.

13.2.6 Close file added for comparison

Click this option to unload the second data file loaded for comparison.

13.2.7 Print

Use this option to print the current screen layout, either using your printer or print to file.
You can add text for both header and footer and select to print as portrait or landscape.
Click PRINT to print the screen layout.

13.2.8 Export

The current charting tool display can be export in various formats:

- As a picture file
- As a CSV file
- As an EBL data file
- As an MDF data file

ECU logged data files, the MDF format, can be exported to a CSV file as well.
If you have logged data channels with different sampling rates, then the option to create the file will initially be greyed out. To export to a CSV format, all data channels must have the same sampling rate.
You can easily perform this update. With the MDF file loaded, click on 'Edit' and now select 'Convert to maximum sampling rate'. Confirm your choice by clicking 'Yes'. When you then return to 'File' and "Export', you can now select the option to export to a CSV file format.

13.2.9 Exit

Click to close the charting tool.

13.3 Edit

Edit in the main menu gives access to:

13.3.1 Channel Manager

This section is under revision.

13.3.2 Convert to constant sampling rate

Converts a dataset, where data channels are recorded at varying and not constant sampling rates, to data displayed with a constant sampling rate.

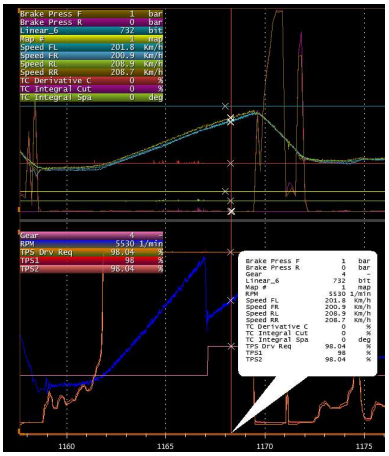
13.3.3 Convert to maximum sampling rate

Converts a dataset, where data channels are recorded at different sampling rates, to the highest sampling rate used by one or more channels. Data channels recorded at a lower sampling rates will have values added, calculated by interpolation.

13.4 Cursor

You can place a cursor anywhere in the display window.
Simply double click on the desired position to place the cursor.
You can adjust the width of the cursor by clicking on **Cursors** and **Cursor line width**.

Column V(t1) in the channel list now shows the data the value of individual channels at the cursor position is shown.
The measuring points are marked with an **x** where the lines are crossing.



You can open a window displaying channel values for all channels shown in the display window.
Click on the settings icon in the main menu and select **Show the values related to the current cursor on the chart background**.
Data will be shown in the upper left hand corner of the data window.
Displaying channel data can also be linked directly to the cursor position, shown in a separate window.

Click on the settings icon in the main menu and select **Show the values related to the current cursor in a balloon**.

Using your mouse, you can grab the cursor and move it to any position. Place your mouse pointer over the cursor, it will change to show arrows, click and hold the left mouse button while dragging the cursor.
Using the left arrow key (**<-**) and the right-hand arrow key (**->**) you can move the cursor in steps of the actual rate data was recorded at, maximum 5 ms.

Using the scroll wheel on your mouse you can zoom in and zoom out centred around the cursor position. While dragging the cursor you can monitor the channel values change in window V(t1).

The overview window at the bottom of your monitor will show the full log while the sections above shows any level, zoomed in or zoomed out. The part of the logged data analysed is shown as a green area in the overview window.

- **CTRL+O** is a hot key to zoom out to show the complete run.
- **CTRL+P** is a hot key for zoom out in steps to finally show the complete run.
- **CTRL+R** bring up a 2nd cursor, placing it close to the primary cursor.

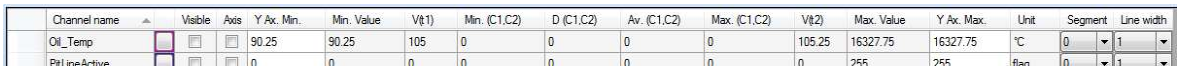
13.4.1 Two Cursors

It is possible to load a 2nd cursor by clicking **CTRL+R**. With this feature you can measure time between 2 events and display average values of the data channels between the two cursors.



With 2 cursors in a display you can measure time between events, and you can quickly evaluate data channel values between the two cursors.

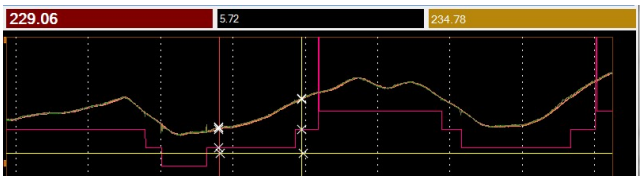
Click on '**Expand details**' to show:



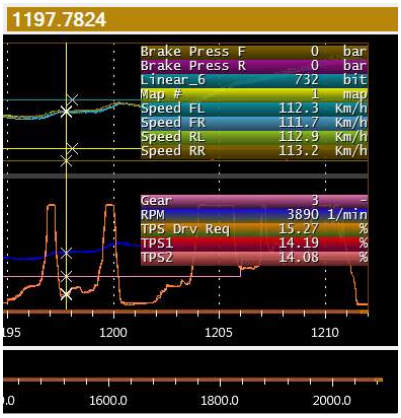
Additional columns are now displayed in the channel list:

- **D (C1,C2)** shows the difference between channel values at cursor 1 and cursor 2 positions.
- **Av (C1,C2)** shows the average channel value between cursor 1 and cursor 2 positions.
- **Max (C1,C2)** shows the maximum data value found between cursor 1 and cursor 2 positions.
- **V(t2)** shows the channel data at cursor 2 position.

The time measured since start recording data and to the position of cursor 1 is shown in the left window above the graphic display.



The time measured since start recording data and to the position of cursor 2 is shown in the right window above the graphic display.
The time difference between the positions of cursor 1 and cursor 2 are shown in the middle window above the graphic display.
By clicking on either of these windows you can change which cursor is the active one.
If you have activated the display of channel data values the data for cursor 1 position will be shown on the left side of the display when you move the cursor.
The data for cursor 2 position will be shown on the right side of the display when you move the cursor.



13.5 Channel List

The channel list in the main display gives access to:



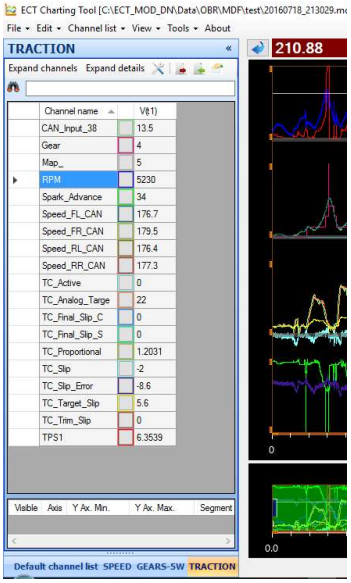


- **Hide all data channels**, click on '**«**' to hide all logged channels.
- **Show all data channels**, click on '**»**' to show all logged channels.
- **Expand channels**, click on the text to show all data channels recorded.
- **Compact channels**, click on the text to show only data channels visible in current display.
- **Expand details**, click on the text to show data details for all channels recorded.
- **Compact details**, click on the text to show only name, color and value at cursor position.
- Manual or automatic channel scaling.

To the left of the strip chart graphic data window you have the channel list. This list displays either all channels loaded with the data file if you click "Expand channels" or, if you click "Compact channels" only the channels open in the data window.

- Click **Channel Name** to sort channels alphabetically.

- Tick or untick the box marked **Visible** to add or remove channels. Click on a channel, press CTRL+V to add or remove a channel.
- Tick or untick the box marked **Axis** to add or remove the channel scaling on the Y-axis. If selected, you can also add grid lines.
- **Y Ax. Min.** shows the display's minimum value of the channel.
- **Min Value** shows the data channels global minimum value.
- **V(t)** shows the channel data at the cursor position.
- **Max Value** shows the data channels global maximum value.
- **Y Ax. Max.** shows the display's maximum value of the channel.
- **Unit** shows the unit of the data channel, for example bar, degrees, RPM.
- Using **Segments** you can assign the data channel to 1 of 5 available display segments. See section 13.8.
- In **Line width** you select the thickness of the data graph, recommended value is "1".
- **Format** allows you to define number of channel data decimal points.



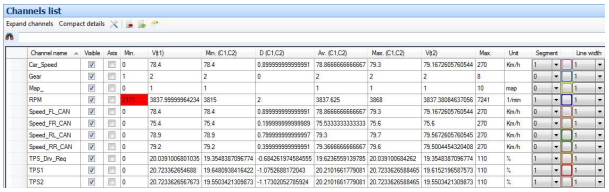
You can also change channel scaling by marking one channel or multiple channels and then right-click the marked channels. Selecting '**Automatic recalculation of minimum and maximum values**' re-scales the channels to display data between the minimum and maximum recorded data for each channel.

Hoover the mouse over any channel in the list to highlight the channel in the graphic window. You can also hoover the mouse over the graph in the display to highlight it in the channel list.

- If you double click on the minimum channel value in the channel list a cursor will be placed in that position within the full run. Using the zoom function, you can view the data in detail.
- If you double click on the maximum channel value in the channel list a cursor will be placed in that position within the full run. Using the zoom function, you can view the data in detail.

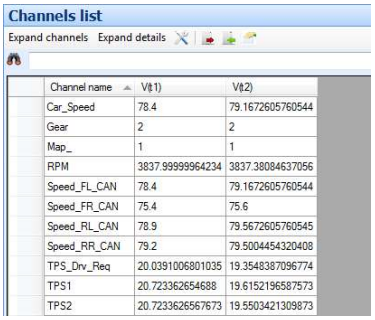


Click on the icon  to define which channels shall be visible in the channel list.

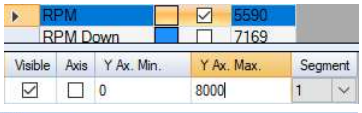


Typical full channel list for a user configured display having 2 cursors.

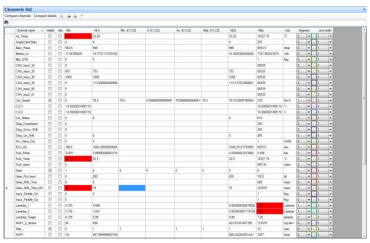
Click on **Compact Details** to reduce the channel list to display the data channel values at cursor positions only.



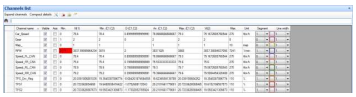
To change the scaling of a data channel, click on the channel in the channel list.
Key in the minimum value to display on the Y-axis in '**Y Ax. Min**'
Key in the maximum value to display on the Y-axis in '**Y Ax. Max**'



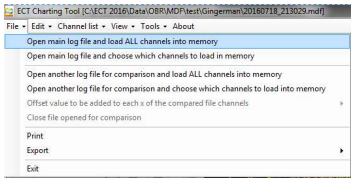
A full channel list could look like this:



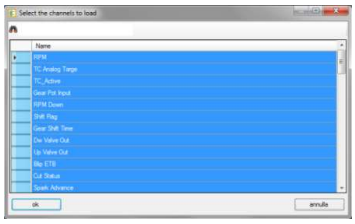
Click on **Compact Channels** to show only channels active in the open graphic window.



13.6 Load a File

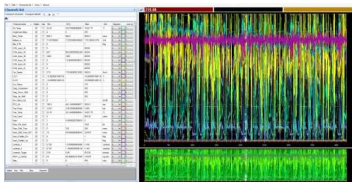


When you open Charting Tool it opens its file manager. Locate the folder where you store your downloads. If you have used the ECT logger tool for displays, the default location is the display folder for the ECU in use, found in the main ECT\USER location.
Select the file format you have selected for your ECT logging feature.
Select the **MDF** file format if you load a file from an ECU logger.
Click '**Open**' to select the data file to analyse.



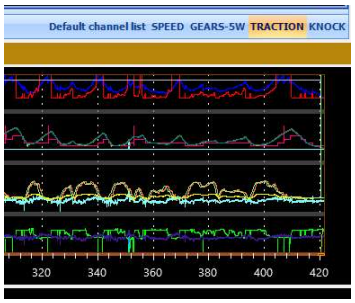
The tool opens a channel window giving you the option to load all recorded data channels or to select individual channels - by default all channels are selected.
Click **OK** to open selected files.

The channel manager and a main graphic display now opens.
First time the Charting Tool opens it will display all files as default.
If you change any channel data, for example scaling or colors, these settings are saved when you exit Charting Tool.
All files are displayed in a main single segment large strip chart and an overview window at the bottom of the screen.



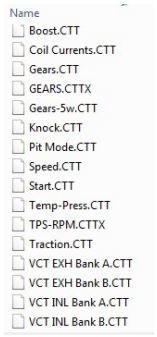
On the left is shown the default channel list with access to recorded data. In this window you can change the color of each channel, it shows the minimum and maximum channel values and gives access to change the minimum and maximum displayed channels.

13.7 Create, Save and Load a Personalised Display Layout



You can create personalised data layouts, making it easy to switch between for example analysis of combustion, gear shift and traction control.
Opening the tool select the channels you want to open for a specific layout.
If you loaded all channels when you opened the tool, you can generate a personalised layout by de-selecting channels.

- Select channels to be included in the new group by un-ticking the box **Visible** to remove data channels you do not want to display in your personalised group.
- Select your preferred color for the data channel.
- Tick the box **Axis** to add the channel scale on the left Y-axis in the display segment.
- Select in which segment of 5 to display the data channel.
- Select the line width; recommended setting is **1**.

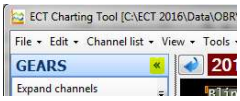


When the display is created, click the icon to save the layout.

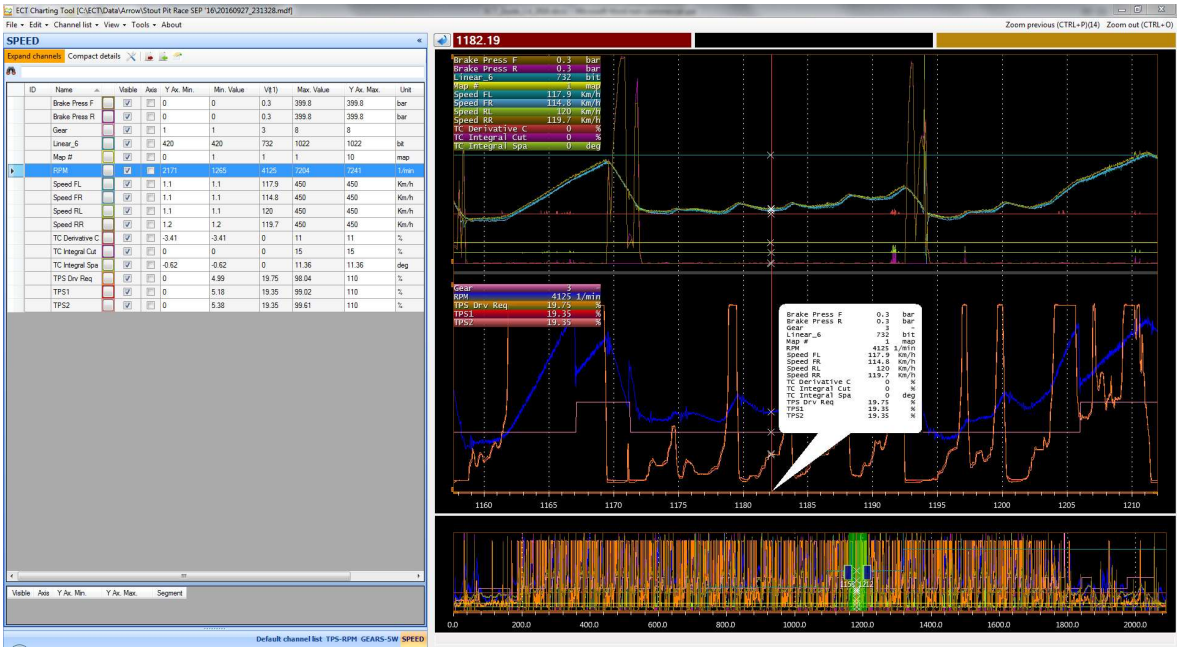
Click the icon to load a layout. Select your layout from the list of your saved layouts. Once a new layout has been created, any changes made to it will be saved automatically when you close the layout.
You can load several layouts in a display screen. Depending of the display orientation, you will see a tab either to the left or at the bottom of the display screen, listing the layouts loaded.
Switch between layouts with a single mouse click.
The tool will automatically set minimum and maximum channel values, but you can change these to suit your preferences.
In the channel window click the column to the left of the data channel you want to manually set minimum and maximum display values for.



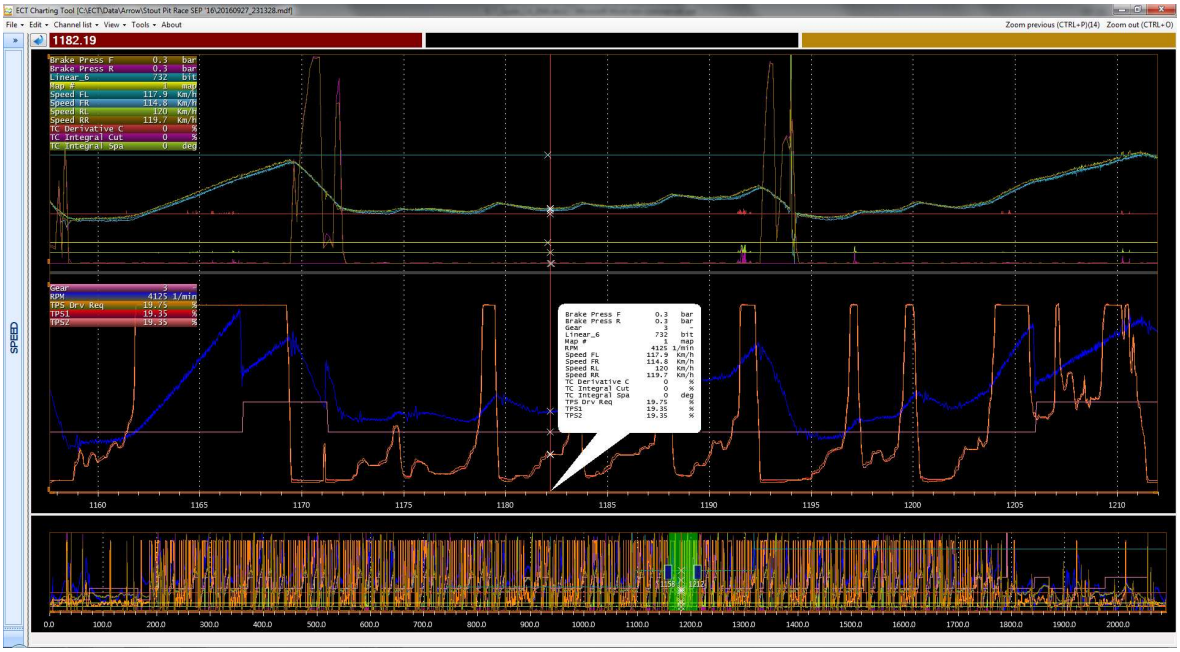
The channel selected turns blue and settings for the Y-axis can now be modified in the window below the channel data.
You can maximise the graphic display window by closing the channel list.
Click on the double arrow, **<<** marked in yellow, to expand the graphic window.



Change from this layout:



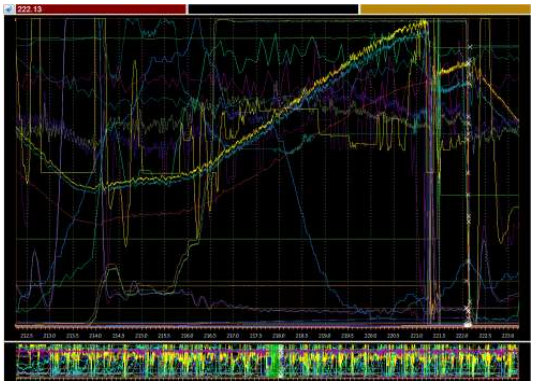
To this layout:

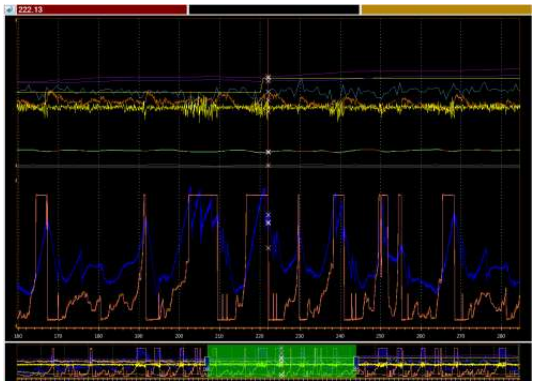


Click on the double arrow **>>** to return to the channel list.

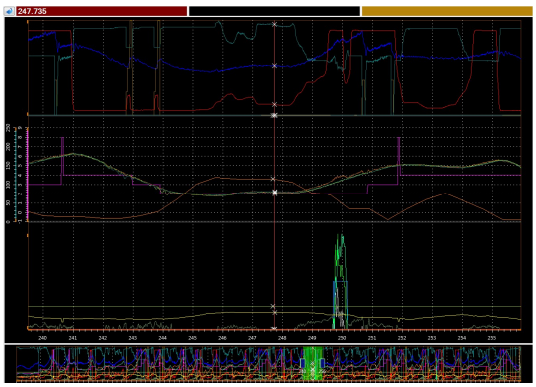
13.8 Display Segments

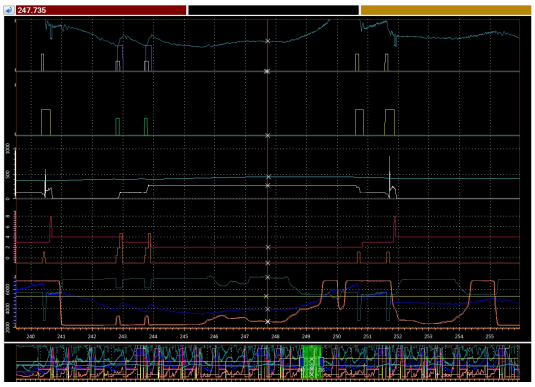
Data can be visualized in individual segments. You can select up to 5 individual segments. Additionally, an overview window is shown at the bottom of the window. To move a channel to another segment, click on it in the channel list, press **CTRL+1** (you can select 1-to-5). You can also select the segment directly from the expanded channel list detail, select the segment number from the drop-down menu.
Here are examples of 1 and 2 segments layout:



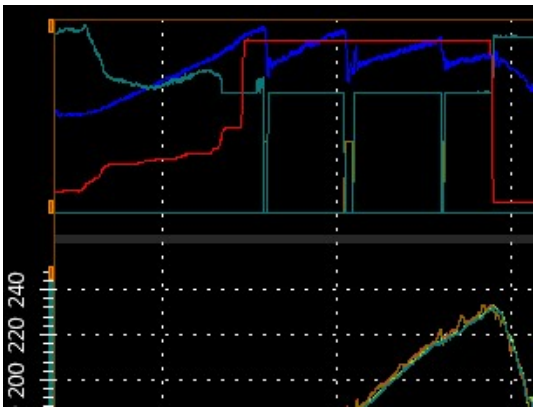


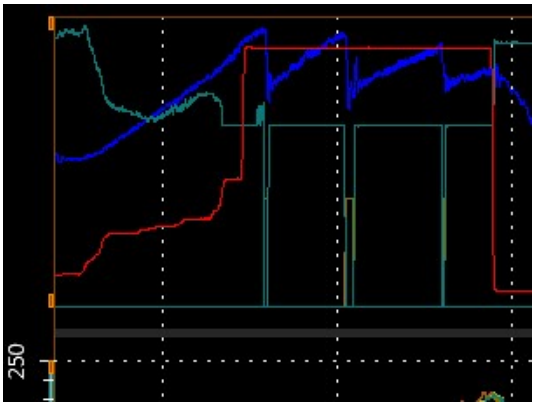
Here are layouts having 3 and 5 segments:



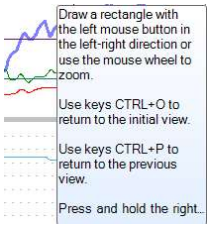


The height of each display segment can be adjusted to suit personal preferences.
Place the cursor on the segment's bottom line, it will turn to fat gray.
Click your left mouse button and mode the line up or down.





13.9 Zoom In / Zoom Out

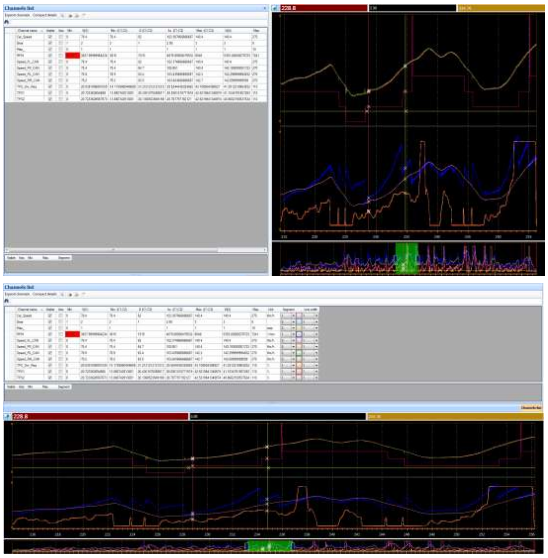


There are two ways you can zoom in on data for a closer analysis of events.

You can draw a rectangle by click and hold the left mouse button and move the mouse from left to right. Let go of the mouse button when the desired area is marked and the display zooms into the desired area.
Click **CTRL+P** to return to the previous level in steps or press **CTRL+O** to the initial view.

Another way is by using the cursor position and the scroll wheel on your mouse.
Double click on the display to place your cursor in a desired position.
Now use the scroll wheel on your mouse to zoom in, centred on the cursor.

13.10 Display Orientation

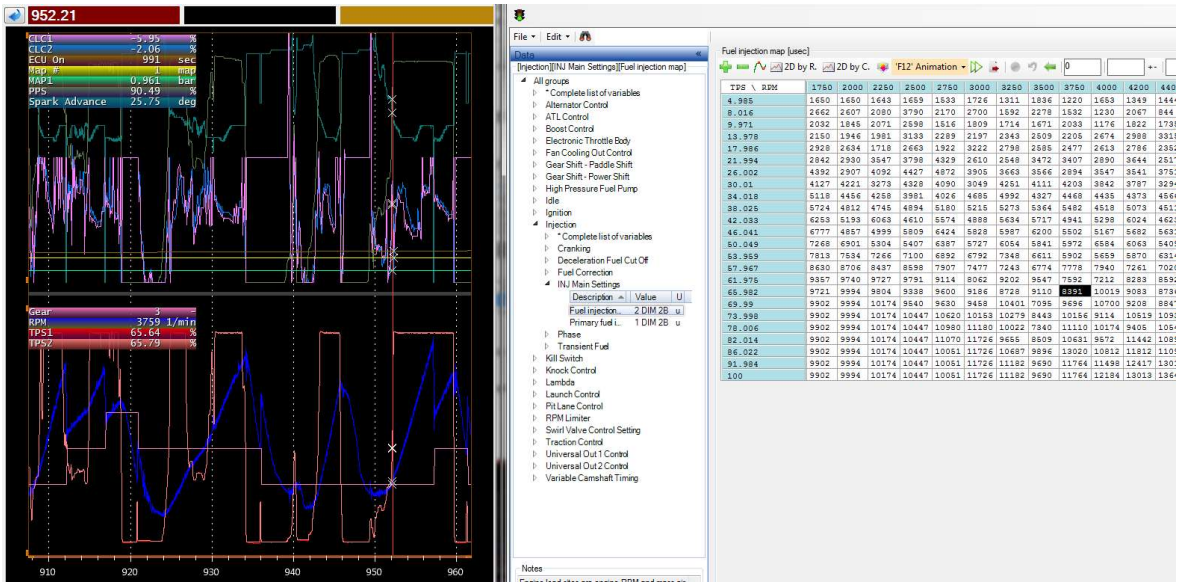


You can change your display layout orientation:

Click on the icon  in the upper left-hand corner of the graphic display to change the layout to:

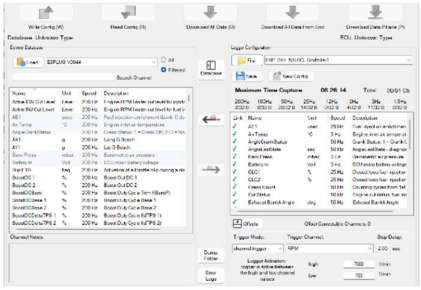
Click on the icon  to return to the first orientation.

13.11 Link analysis display with engine calibration



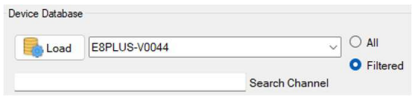
You can link the logged data with the actual speed and load position within the engine calibration. The logged data must contain a data channel with the same name as the X-axis in the engine calibration, for example RPM.
This way you can follow the settings within, for example, the fuel map, the boost map or the spark advance map.
To link the data simply open the logged data file, then open the calibration tool.
Open the engine calibration from which the data log file was generated.
Select the map to analyse, shown here as the fuel map, and note the black cursor follows the location of the data cursor in the data display.

14 ECU Logger



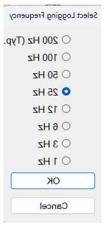
Except for Euro-2PLUS all current ECUs have a built-in data recording module.
If you have installed the data logger tool from version 5.3, you can access it from within ECT.

14.1 Configuring



The logger configuration can be defined working either on-line or off-line with the ECU.
On the left side of the screen click on '**Load**' in the '**Device Database**' section.
Database channels will be listed as those tagged in the database for logging will be shown when the option '**Filtered**' is ticked. Recommended setting.
If the option '**All**' is ticked, then all data channels will be displayed.

Double click or click the right pointing arrow to add channels from the database to record. They will appear in the window to the right.
To remove a data channel from the list, click on it and press 'Del' on your keyboard or click the left pointing arrow.



Data channels can be recorded at sampling rates between 1.5 Hz and up to 200 Hz.
To change a selected sampling rate for a channel, click on the channel and use the right or left arrow key to select the preferred rate or double click on the channel to open the logged frequency window. Select a sampling rate and click 'OK'.
The maximum recording time for the selected data channels is shown.

Activation of the logger can be controlled by several options:



- **Continuous**, ECU logging data when the ECU is switched on.
- **External switch**, the logger is activated by an external switch.
- **Internal switch**, the logger is controlled by one of the logged channels.

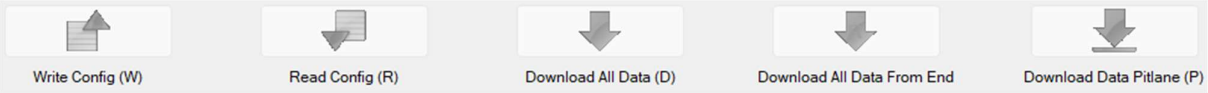
Typical data channels used for activating the logger are car speed and engine RPM.
Select the threshold for activating the logger.
If you have chosen to use the engine RPM as a trigger it is recommended to have the activation threshold above the engine idle speed.
You can set a high threshold for stopping the data recording. If you want to record data with no upper limit, then set engine RPM or car speed well above what will be achieved.

In '**Start Delay**' you can key in a delay for activating or deactivating the recording when the lower threshold is reached. Suggested time is 2 to 10 seconds.

Click on '**Save**' to save the logger configuration file to disk.

Saved logger configurations can be loaded by clicking the '**File**' button.

14.2 Update Logger – Download Data



Click '**Write Config (W)**' to upload the logger configuration to the ECU, this takes a few seconds.

Click on '**Read Config (R)**' to read a logger configuration from the ECU.

Click on '**Download All Data (D)**' to download recorded data.

To prepare a download awaiting the car to arrive in the pit lane, click on '**Download Data Pitlane (P)**'. With this option downloading data starts as soon as ECT detects connection to the ECU.

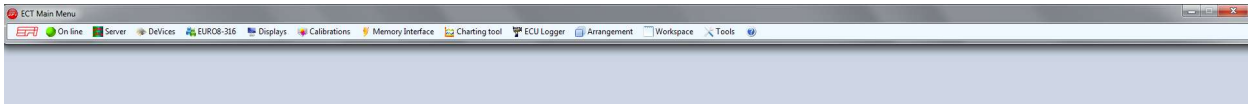
When the downloaded, ECT suggests a file name with date and time fo the download, you can add comments or key in a dedicated file name.
Click **OK** when done editing.

If you have chosen to delete data automatically, the ECU will clear the memory. In this process the ECU clears the memory and will start recording new data when done if the start conditions are met.

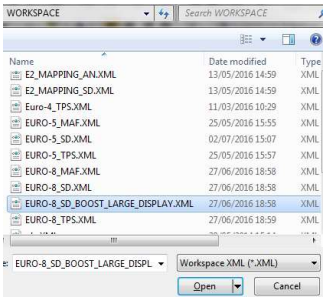
15 Workspace

Once you have created your preferred layout of the tool, combining for example displays and the calibration editor, you can save your current layout as a workspace.
This way you can load your preferred layout with a few clicks with your mouse.

As an example, you start with this layout:



Click on '**Workspace**' in the main menu, click on '**Load Workspace**' and select one of your layouts.



Now click on Open and your display could for example look like this:



or

