USER MANUAL

DATA MASTER

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Software version: 2025.3 or later
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ECUMASTER

Contents

1. Introduction

DATA MASTER is an advanced software for data analysis intended for ECUMASTER devices. It has all the analytical features of the ADU software plus many new ones. It supports all ECUMASTER logging devices (ADU, PMU, EMU PRO, EMU BLACK, EMU CLASSIC, EDL1). In addition, it allows you to import video files and automatically synchronise them with your logged-in data.

DATA MASTER allows you not only to analyse a driver's driving style, but also the car parameters. Using corresponding project types, it is easy to analyse the different categories of motorsport, i.e. circuit racing, rallying, drag racing, and to analyse the performance of a car on a dynamometer (*Dyno*).

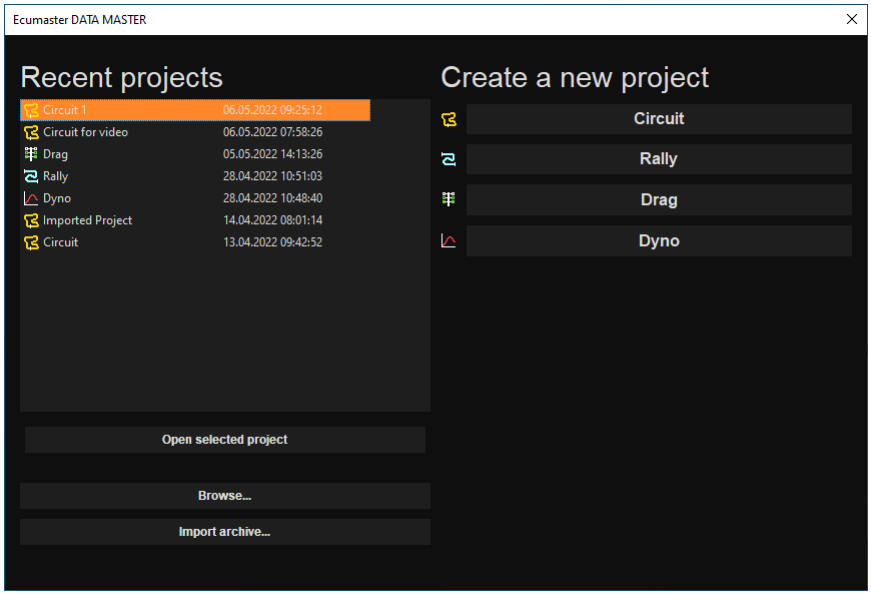
Key functionalities:

- Mathematical channels
- Video analysis with automatic synchronisation
- Lap management
- User channels support (a project file is no longer needed to load user defined channels)
- Many new / improved visualisations
- Greater integration between panels
- Global channel aliases ensuring versatility
- Support for ADU, PMU, EDL, EMU PRO, EMU BLACK and EMU CLASSIC log files
- User-defined start / finish point for a lap or special stage
- Reference track (in-depth analysis per track segment)

This manual covers the standard graphical user interface (GUI) mode of Data Master. For details on using the command-line interface (CLI) for automated log export, please refer to the Appendix B - Automatic log export *(on page 66)*.

2. Projects

Projects are the core of the application, where various data such as logs, video files, reference tracks, mathematical channels, and desktop layouts are stored. Inside a project, this data is organized and accessible. To save memory, projects keep references (paths) to logs and videos instead of storing them directly.



Types of projects

The key differences between the project types are the default desktop layouts and the method of splitting the log:

1. **Circuit:** Dedicated to circuit racing.
    - **Log split:** Lap
    - **Log Splitting Method:** Utilizes start/finish points. Laps may be obtained from the ADU, a user-defined GPS point, @SPEED channel, or by manual split.

2. **Rally:** Dedicated to rallies.
    - **Log split:** Stage
    - **Log Splitting Method:** Utilizes two points - start and finish. Splits may be obtained from the ADU (hillclimb timing mode), two GPS points, or by manual split.

3. **Drag:** Dedicated to parallel racing.
    - **Log split:** Run
    - **Log Splitting Method:** Doesn't use GPS. Approximates the start and finish based on the @TPS and @SPEED channels. Splits into sectors: 60ft, 330ft, 1/8 mile, 1000ft, 1/4 mile. Further manual improvement is possible.

4. **Dyno:** Dedicated to dynamometers.
    - **Log split:** Pull
    - **Log Splitting Method:** Doesn't use GPS. Finds split based on the @TPS channel.

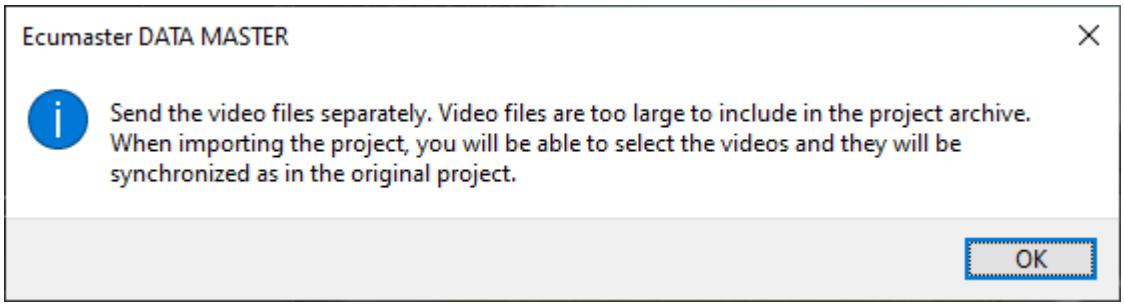
Since most of the functions work similarly for all log splits, for simplicity a log split into laps will be used further in the manual. If any functionality differs depending on the project type, this will be indicated.

Packing a project

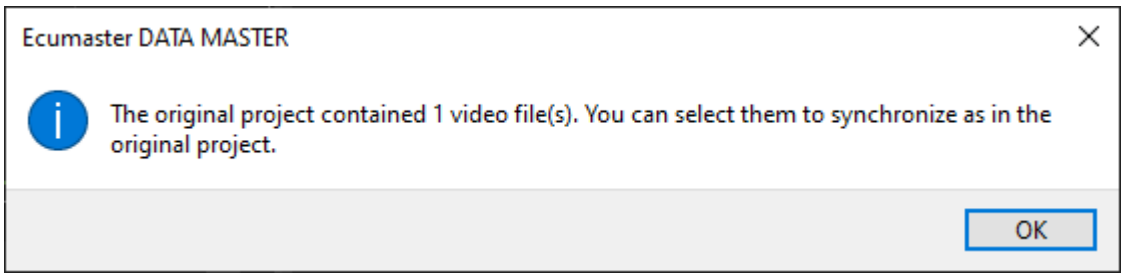
You have the option to pack a project into a .dmarchive file. This file serves as a compressed container, containing all project components except for videos.

Due to their size, video files are not included in the .dmarchive. Instead, you are prompted to send these videos separately. Upon importing the project on another machine, you will be asked to select the corresponding videos from their hard drive. Once selected, the videos are seamlessly synchronized, replicating the exact setup of the original project.

The message when packing a project that is containing the videos:

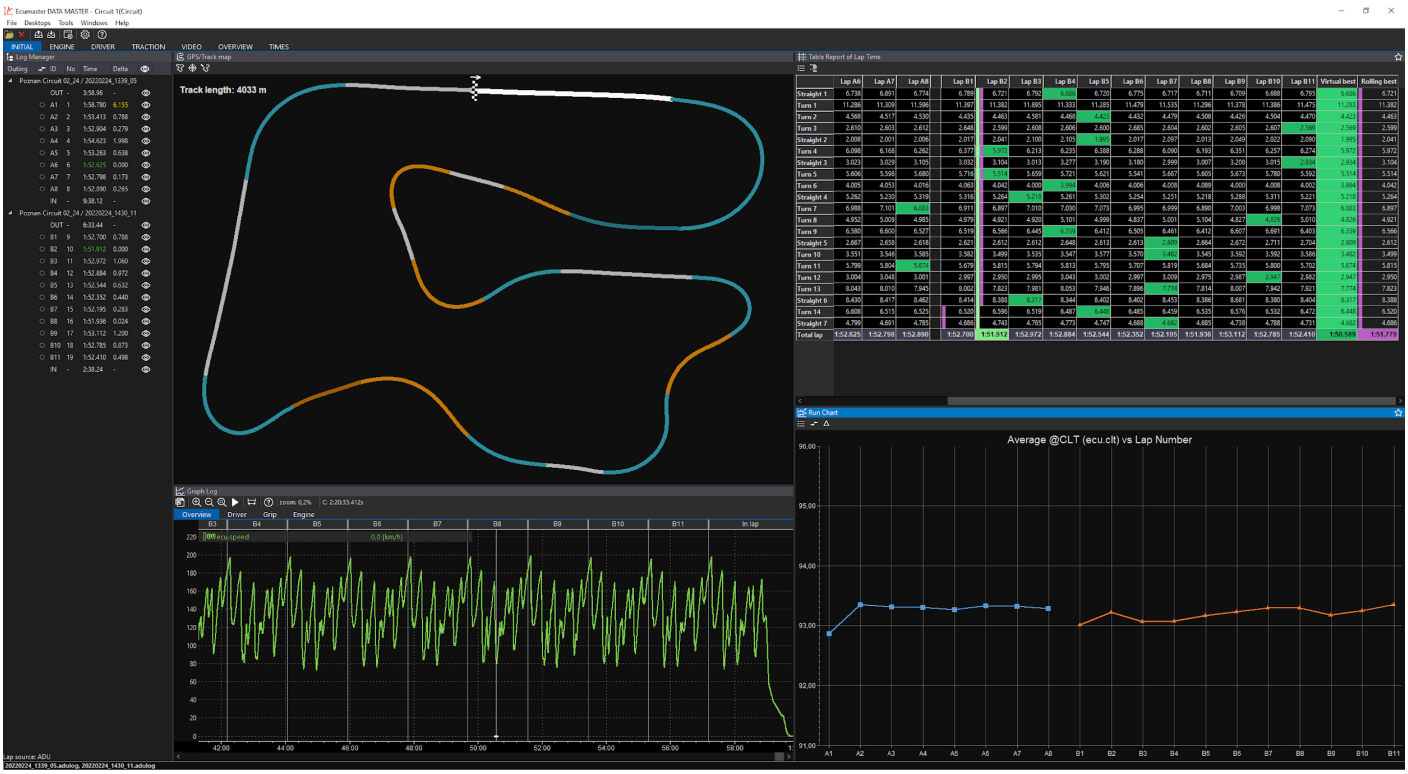


The message when importing a project that was originally containing the videos:



3. Desktops / application layout

After installing and launching the application and creating a new project, the computer screen should look like the one below:



Below is a description of all available menu functions

File	
Open log	Opening a log (***CTRL + O***)
Clear logs	Clearing all loaded logs (***CTRL + X***)
New / open project	Opening a new or a different project (***CTRL + N***)
Save project	Saving a project in the location last used (***CTRL + S***)
Save project as	Saving a project to a new file (***CTRL + SHIFT + S***)
Pack project	Packing a project into a file with the logs used in it. This option is useful for transferring and sending projects (***CTRL + SHIFT +P***)
Import project	Importing a project from an archive (***CTRL + SHIFT +I***)
Show full screen	Activating a full-screen mode. This increases the available screen space for applications (***CTRL + F***)
Exit	Exiting the application. A project is saved on exit (***ALT + X***)
Desktops	

Import desktops template...	Importing desktops
Export desktops template...	Exporting desktops
Add new panel	Adding a new panel to the desktop (***F9***)
Replace panel	Replacing a selected panel with another one (***SHIFT + F9***)
Duplicate panel	Duplicating a selected panel (***CTRL + SHIFT + F9***)
Switch desktop to...	This option allows you to switch to any selected desktop (***CTRL + 1-9***)
Next desktop	Switching to the next desktop (***CTRL + SHIFT + TAB***)
Previous desktop	Switching to the previous desktop (***CTRL + TAB***)
Toggle full size panel	Enabling / disabling full size of the active panel (***F6***)
Toggle side panel	Collapsing / Expanding the side panel (***CTRL + L***)
Show side panel	Expanding the side panel (***ALT + 1***)
Hide side panel	Collapsing the side panel (***ALT +*** `)
Add Graph Log panel	Adding a *Graph Log* panel to the desktop
Favourite panels	Adding a panel from *Favourite* to the desktop
Tools	
Lap Editor	Opening the Lap Editor window (***F5***). For more details, see Lap Editor *(on page 12)*
Maths Editor	Opening the ***Maths Editor*** window for editing mathematical channels, constants and aliases (***F7***). For more details, see Maths Editor *(on page 15)*
Coach Mode	Opening the sketching mode (***F8***) Exiting the mode using ***F8*** or ***Esc***
Options...	Opening the options window (***CTRL + SHIFT +O***)
Customize keys	Opening the Shortcuts wizard window
Windows	
Next panel	Activating the next panel (***Tab***)
Previous panel	Activating the previous panel (***SHIFT + TAB***)
Help	
View Help	Opening the User Manual

About	Opening a window with information about the software version

There are icons on the taskbar  indicating:

- ***Open log*** – opening a log
- ***Clear log*** – clearing all loaded logs
- ***Restore project*** – loading the last saved project
- ***Store project*** – saving the current project
- ***Add panel*** – adding a panel
- ***Add Graph Log*** – adding a *Graph Log* panel
- ***Add Favourite panel*** – adding a panel from *Favourite*
- ***Configuration*** – opening the *General Options* configuration window
- ***Help*** – opening the help window based on currently active panel

The *General Options* window contains the following settings:

Option	Description
Auto-synchronize video and data	Enabling automatic video synchronisation when opening a file
Automatically generate reference track	Enabling automatic reference track generation when opening a log
Evaluate reports after loading log	Enabling automatic run of all defined reports after opening the log
Use mouse wheel to zoom on Graph Log	Controlling the zoom in the *Graph Log* panel with the mouse wheel

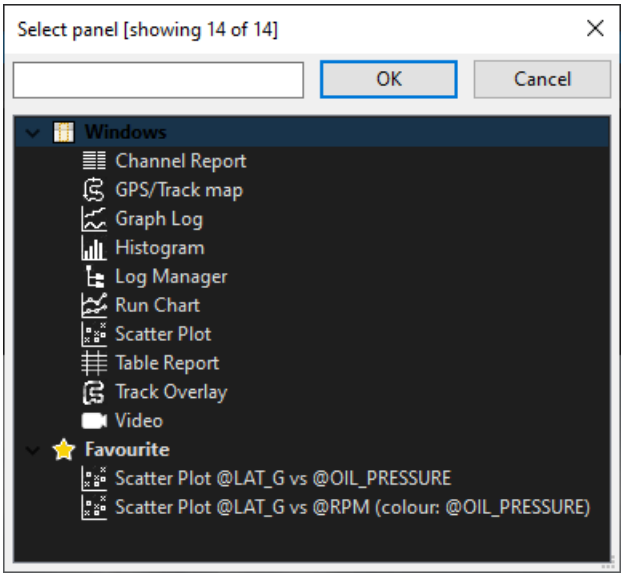
Tabs are an important part of the application. They allow you to create your own sets of windows (panels), which makes the software easier and quicker to use. After pressing the right mouse button on the tab the following menu appears:

Option	Description
New desktop	Create a new tab.
Duplicate	Duplicate a tab. This option creates a new tab and copies into it the contents of a selected one
Delete	Delete tab
Rename	This function makes it possible to change the name of a tab
Move Left	Moves a tab to the left

Option	Description
Move Right	Moves a tab to the right

Tabs form part of a project. They can also be exported to a *.dmlayout* file and loaded in another project.

Another element of the interface are panels. To add a new panel, press **F9** (or click on the ***Add*** panel icon in the toolbar). A window with all available panels will open. For a quicker search, you can enter the panel you are looking for in the filter field.



The keyboard shortcut **Tab+arrow** allows you to move between panels, **Tab+space** is used to full size panel (further described in ***Panels*** section).

Newly opened panel always show up on the right side of the desktop. You can move them by pressing the left mouse button on the*Title bar* and moving the mouse to a new position. To remove a panel from the desktop, press the right mouse button on its bar. A menu will appear from which you can delete it *(Close panel).*

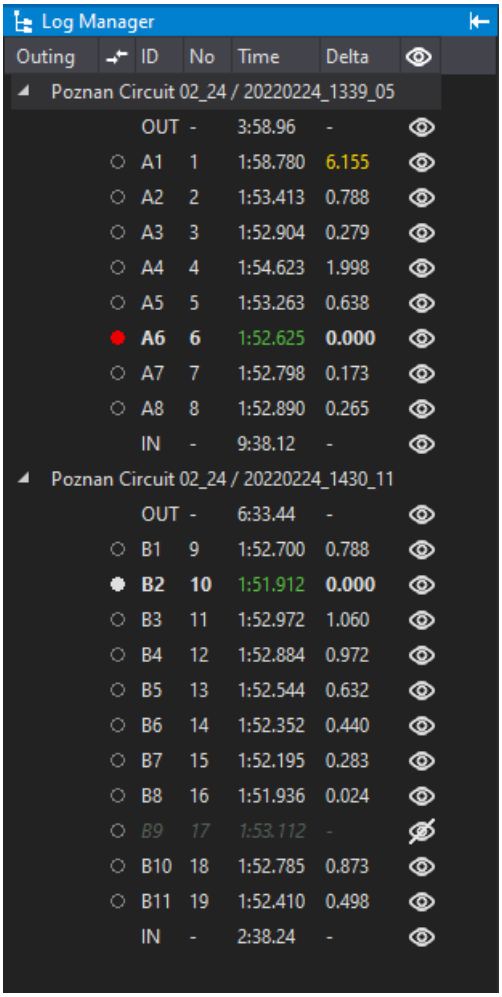
The bottom left corner shows the name and source of the currently analysed log(s).

When default-saving a project, the program remembers the path to the logs opened in the project. If you change the location in which these files are stored, the project will not find access to the logs.

4. Working with logs - *Log Manager*

Log Manager is a side panel, permanently placed on the left side of your screen. You can adjust its width or hide it by clicking the right-side icon.

Log Manager is used to manage laps and loaded logs.



- It allows you to quickly view each lap.
- It indicates the path to the saved log (*Outing*)
- It allows you to select two laps for analysis, either by selecting the circle next to the lap name (red – base lap, white – compare lap) or from the lap pop-up menu (*Set base* lap ***Ctrl*+*B*** , *Set compare* lap ***Ctrl+C***). To remove a lap from a comparison, click on the respective selection (when deleting the red base selection, the white lap being compared becomes the base selection and turns red).
- It indicates the lap name (*ID*).
- It indicates the lap number (*No*) (which is a continuation in the case of several logs).
- It Indicates the lap time (*Time*) (best time is highlighted in green).

- It indicates the difference in time relative to the best lap (*Delta*) (if the difference is greater than 3% compared to the best time, it is marked in yellow).
- It allows you to exclude selected laps from the analysis by selecting the *eye* icon or from the lap pop-up menu (*Exclude lap* ***Ctrl+E***).

Additionally, the following options are available from the log pop-up menu (right click on the bar with the name of the log):

Parameter	Description
Move file up	Change the order of the log on the list (when more files are opened) by moving it one up (***Ctrl+Up***)
Move file down	Change the order of the log on the list by moving it one down (***Ctrl+Down***)
Include log	Include the entire log for analysis (***Ctrl+Shift+I***)
Exclude log	Exclude the entire log from analysis (***Ctrl+Shift+E***)
Delete file	Delete the selected log from the list (***Ctrl+D***)

5. Lap Editor

Lap Editor is used to edit the log split. The *Lap Editor* window is opened using the **F5** key or from the main menu *Tools / Lap Editor*.

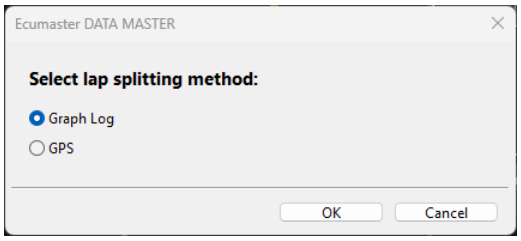
Information about log splitting other than automatic (user split) is saved in the ***.dmdata*** file (More about the *.dmdata* file in the *Graph log / Saving bookmarks* chapter).

In the *Lap Editor* panel toolbar there is:

- ***Undo / redo*** changes icon (undo – Ctrl+Z, redo – Ctrl+Y)
- ***Revert to default log split*** icon that restores the default (automatic) log split
- ***Start point editor*** editing the start / finish point (on the GPS map)
- ***Show help*** shows help for *Lap Editor*

When opening the Lap Editor window, a selection window for the lap division method appears, which includes:

- Graph log
- GPS



Graph log lap division

This option is enabled, when there is no reference track. When selecting the Graph log lap division method, the Lap Editor window looks as follows:

The window includes:

- A list of laps presented in a manner analogous to the Log Manager panel
- A graph log with all its functionalities (detailed description in the Graph Log section), used to edit lap divisions
- Buttons to edit laps

The lap being edited is highlighted in the Graph Log with gray. This active lap is selected based on the cursor position.

The following buttons are available for editing lap divisions:

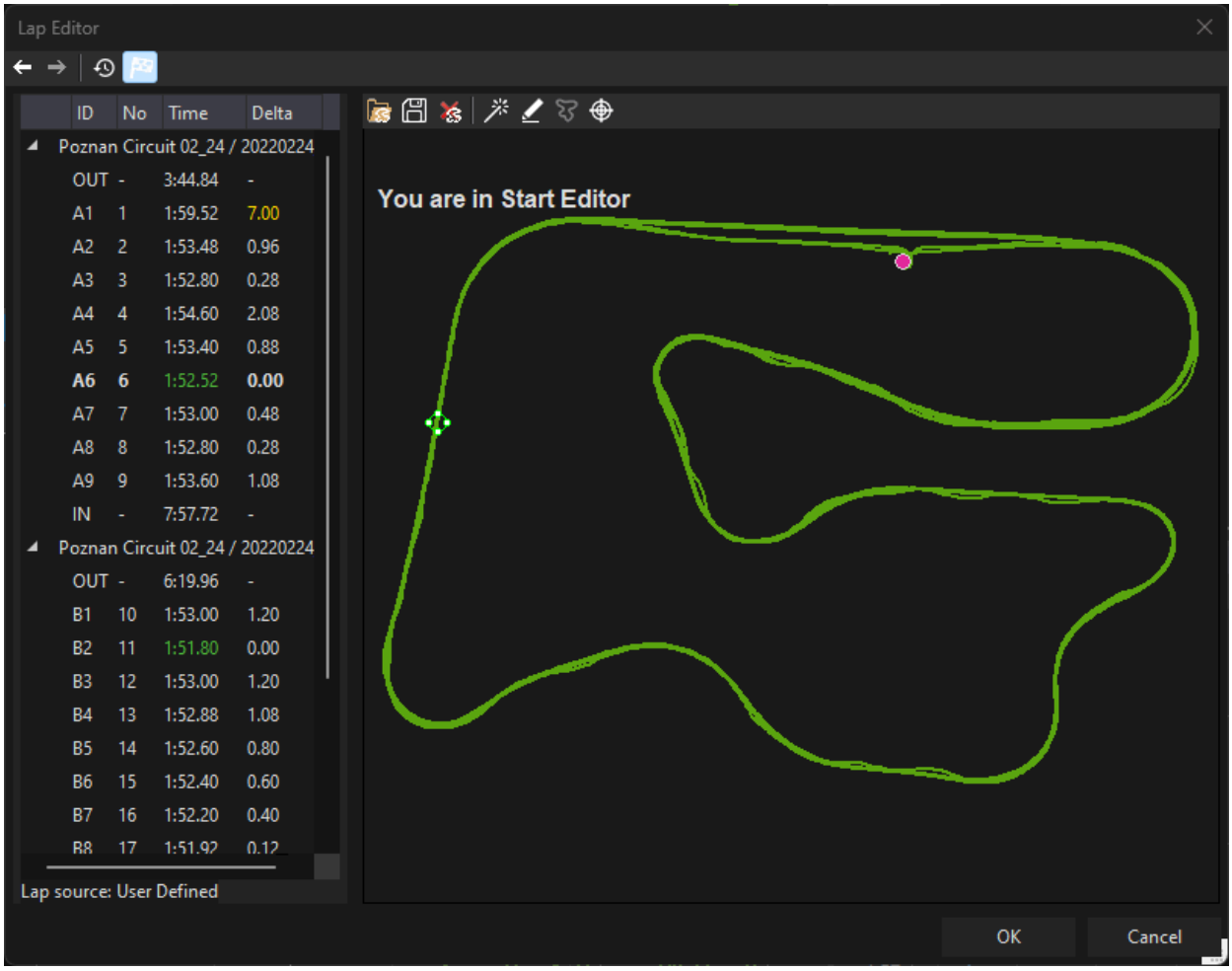
- ***Remove lap start*** (Ctrl+Shift+R): In case of an unnecessary lap division, select the respective lap from the list on the left side of the panel or place the cursor in the lap using the Graph Log. When the button is pressed, the start of the lap is removed and the lap is merged with

the preceding lap. For example, when lap A7 is selected, the marker between lap A6 and A7 will be deleted, and the resulting lap from merging laps A6 and A7 will be named A6.

- ***Insert lap start*** (Ctrl+Shift+I): If a lap division is missing, position the cursor on the Graph log where the division should be inserted and press the *Insert lap start* button. A lap will be split using the time marked by the Graph Log cursor.
- ***Move lap start*** (Ctrl+Shift+S): Use this button to move the currently active lap start to the timestamp marked by the Graph Log cursor.
- ***Move lap end*** (Ctrl+Shift+E): Use this button to move the currently active lap end to the timestamp marked by the Graph Log cursor.

GPS lap division

This option is available, when the log contains GPS data (@GPS_LATITUDE and @GPS_LONGITUDE) and speed channel (@SPEED). For more information on the standard aliases, see Channel aliases *(on page 20)*. When selecting the GPS lap division method, the Lap Editor window looks as follows:



The window includes:

- A list of laps
- A GPS / Track map with all its functionalities (detailed description in the GPS / Track map section)

You can modify the position of the start/finish line using the chequered flag icon (Start point editor). Here's how to do it:

1. Click on the chequered flag icon (Start point editor)
2. The reference track will be temporarily hidden
3. A green-white marker will appear on the track line, accompanied by a yellow point indicating the current position of the track start
4. You can adjust the position of the start / finish point by dragging the green and white marker to any desired location on the track using your mouse
5. If needed, you can undo a single change of the start / finish point position

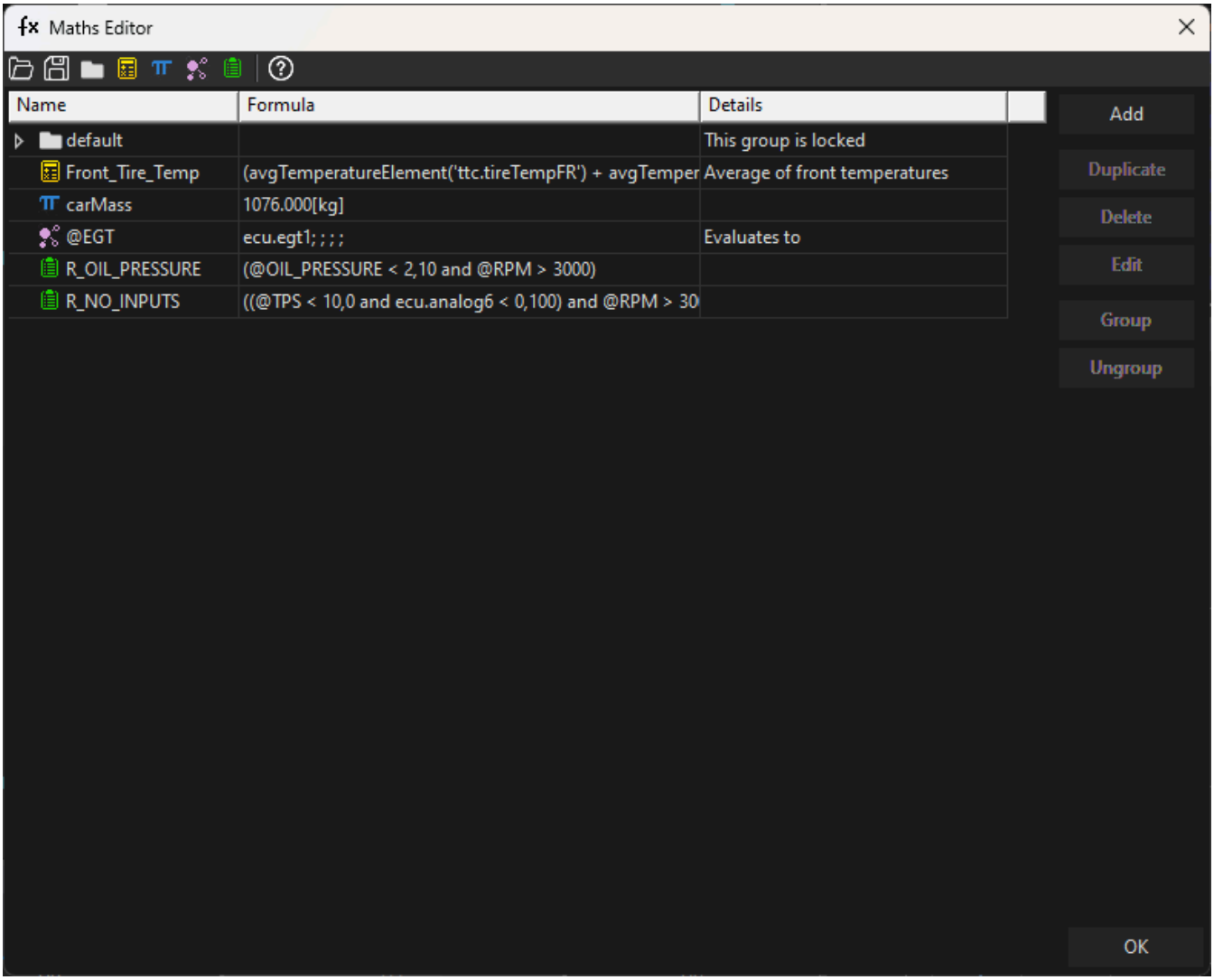
After completing the editing in the Lap Editor window, click the OK button to confirm and save the changes. Alternatively, if you wish to discard all changes made, click the Cancel button.

6. Maths Editor

Maths Editor allows you to create and organise maths channels, constants, aliases and reports.

- It allows you to perform mathematical operations on recorded data.
- It allows you to define your own constants, such as car dimensions, coefficient of friction, etc., to be used in calculations.
- It allows you to add an alias, which is a special channel placeholder that selects the first available channel from a defined list.
- It gives you the possibility to group channels, constants and aliases.
- It allows you to define logical conditions in reports for marking specific events in the log.

The ***Maths Editor*** is opened via the keyboard shortcut **F7** or *Tools / Maths Editor*. It provides an overview of mathematical channels, constants, aliases and reports. You can add, duplicate, group, edit or delete them. It is also possible to import or export a mathematical file.

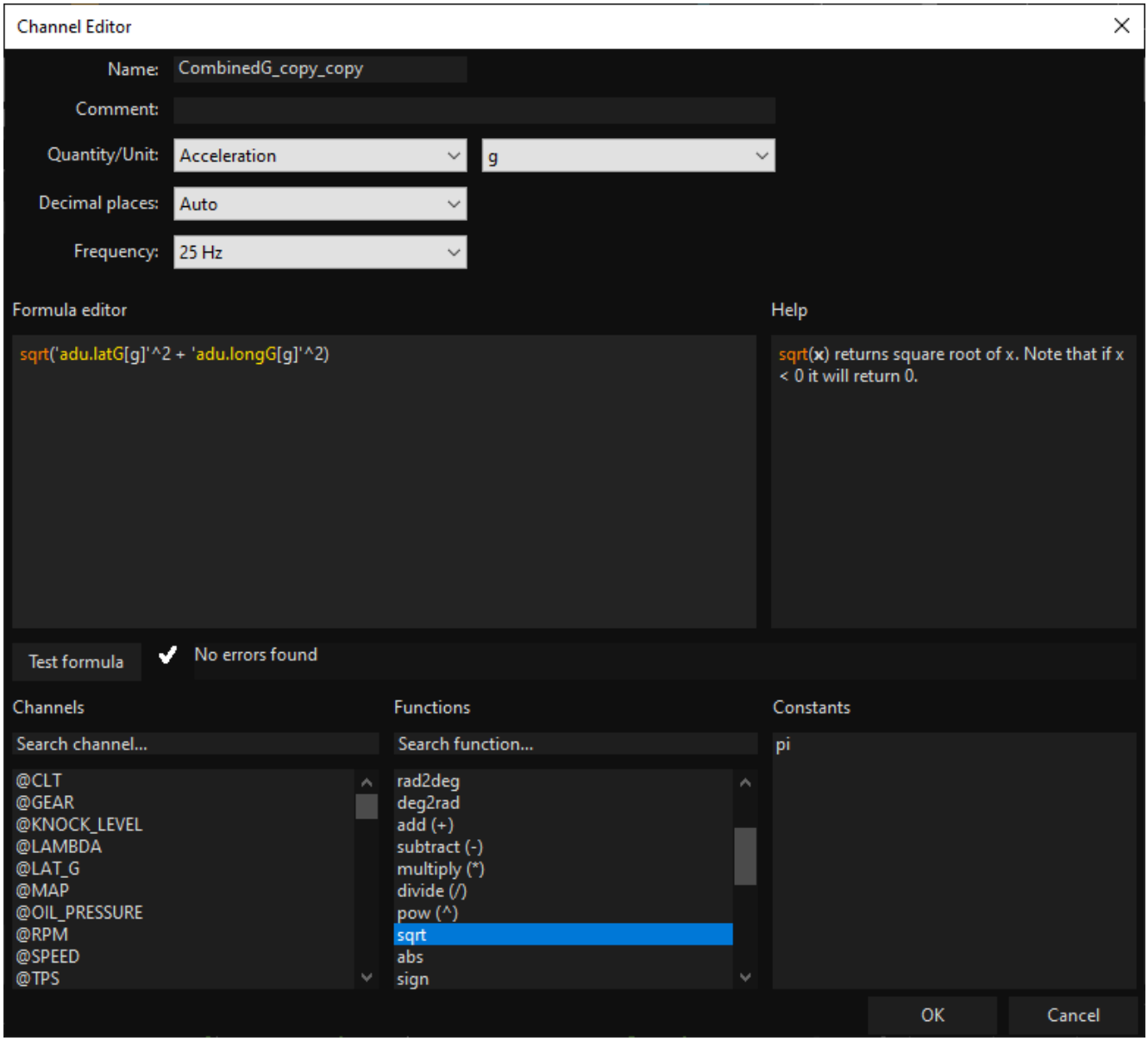


6.1. *Maths channels*

Maths channels are a powerful feature that enable you to create new channels by applying mathematical operations to the recorded data. This functionality expands the scope of analysis by allowing you to derive custom parameters and insights tailored to their specific needs.

When you create a new channel, you must give it an appropriate name (*Name*) and for easier understanding of the channel, you can write a comment (*Comment*). A physical quantity is also defined (*Quantity*), unit (*Unit*), the number of decimal places of the measured value (*Decimal places*and the frequency at which the channel will be calculated (*Frequency*).

In addition to simple numerical operators (+, -, *, /, ^) and logical operations (and, or, negation), functions such as the derivative, integration, moving average, trigonometric functions and many others are available.



All operations can be written manually or selected from the menu. The syntax is straightforward and a check tool guides the user through the process of creating a mathematical channel. The *Test formula* button is used to check the correctness of the formula and indicates errors.

Elements of syntax

Element	Description
' ' apostrophes	Any channel used in the calculation must be preceded and followed by an apostrophe '*channel*'. The channels in the syntax are highlighted in yellow.
[ ] square brackets	If you need to use a unit other than the default channel unit, type it in square brackets next to the channel used in the syntax '*channel* **[** *unit* **]**'

Element	Description
( ) round brackets	The arguments of the function must be written in round brackets. Functions in the syntax are colored orange. ***function*** (*argument*)
, comma	Function arguments in brackets must be separated by a comma ***function*** (*argument* ,argument, *argument*)

In addition to the channels and functions described above, the syntax may also include constants marked blue. The following can be used for calculations: logged channels, predefined mathematical channels, aliases and constants. Defining units other than the default units for a channel is necessary to get the correct unit in the result. The unit set in place of *Unit* is only used to display information e.g. on the log.

Functions available for calculation

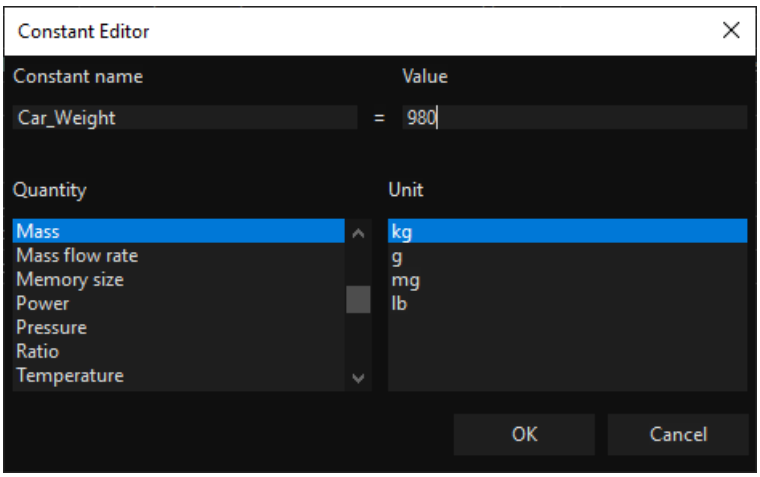
Position	Description
sin	sin(angle[°])
cos	cos(angle[°])
tan	tan(angle[°])
arcsin	arcsin(x) inverse sine function, returns the angle in degrees.
arccos	arccos(x) inverse cosine function, returns the angle in degrees.
arctan	arctan(x) inverse tangent function, returns the angle in degrees. Note: may not identify the correct quadrant.
rad2deg	rad2deg(angle[rad]) converts the angle in radians to degrees.
deg2rad	deg2rad(angle[°]) converts the angle in degrees to radians.
add (+)	add(x,y) = x+y
subtract (-)	subtract(x,y) = x-y
multiply (*)	multiply(x,y) = x*y
divide (/)	divide(x,y) = x/y Note: in case y = 0 it will return 0.
pow (^)	pow(x,y) = x^y
sqrt	sqrt(x,y) returns the square root of x. Note: if x < 0 it will return 0.
abs	abs(x) returns the absolute value of x.
sign	sign(x) returns the sign of x.
and	and(x,y) returns true if both x and y are true. Otherwise false.

Position	Description
or	**or**(x,y) returns true if at least one value of x or y is true. Otherwise false
not	**not**(x) logical negation of x
getTemperatureElement	**GetTemperatureElement**(brake disc or tyre temperature channel, index <1-16>)
derivative	**derivative**(x) returns the derivative of x in respect to time.
integratePerLap	**integratePerLap**(x) integration in the time domain. The rectangular method is used. After each lap, the value of the integral will be reset. Note that a higher frequency yields more accurate results.
integratePerFile	**integratePerFile**(x) integration in the time domain. The rectangular method is used. After each file (log) the value of the integral will be reset. Note that a higher frequency yields more accurate results.
integratePerTotal	**integratePerTotal**(x) integration in the time domain. The rectangular method is used. The value will not be reset. Note that a higher frequency yields more accurate results.
choose	**choose**(condition, value if true, value if false) if a condition obtains any positive value, the value if true is returned. Example: **choose**('ecu.speed[km/h]' > 30, 1, 0) takes the value 1 if the vehicle speed exceeds 30 km/h at a given time.
smooth	**smooth**(value, number of samples) returns the value averaged from the given number of samples.
gate	**gate**(value, minimum value, maximum value) ensures that the value does not exceed the minimum and maximum values.
timeShift	**timeShift**(channel, shift) returns the value of the channel shifted in time by shift milliseconds.

6.2. *Constants*

To enhance clarity and versatility, you have the capability to define your own constants, such as car dimensions, friction coefficients, and more. They ease the management of calculations, as you can change a variable in one place rather than updating it in multiple maths channels. This ensures consistency and simplifies the process of adjusting parameters across your analyses.

When defining a constant, you should give it a name and specify the physical quantity and unit.



6.3. *Channel aliases*

DATA MASTER has been designed to be highly versatile. When you create a visualization or maths channel, in some situations the channels used may not be available. DATA MASTER allows you to avoid this problem by using aliases.

Channel aliases serve as placeholders for specific channels, allowing you to reference them easily in visualizations and mathematical channels. Instead of directly specifying individual channels, aliases provide a flexible and dynamic way to handle data, ensuring smoother analysis workflows.

Up to five channels can be assigned to each alias. The alias uses the currently available channel with the highest priority (the first available in the list). You can assign channels to ***Custom 1*** and ***Custom 2*** from any source (i.e. channels from any ECUMASTER device, math channels, and more). The next three items: ***ADU***, ***EMU BLACK***, ***EMU PRO*** can be edited depending on the device from which the uploaded log comes from. Only channels registered from ADU can be connected to *ADU*, channels from EMU BLACK, EMU CLASSIC or EDL can be connected to *EMU BLACK*, and channels from EMU PRO to *EMU PRO*.

Standard aliases

The standard aliases in DATA MASTER are predefined aliases used across multiple areas of the application, grouped in the "default" group of the Maths Editor. These aliases provide convenient shortcuts for commonly used channels, enhancing usability and efficiency. Some of the standard aliases include @CLT, @IAT, @KNOCK_LEVEL, @GEAR, @LAMBDA, @LAT_G, @LONG_G, @MAP, @BOOST, @OIL_PRESSURE, @RPM, @SPEED, @TPS, @BRAKE, @GPS_LATITUDE, and @GPS_LONGITUDE.

It's important to note that standard aliases cannot be deleted. However, you have the flexibility to edit them to assign up to 2 channels, described as Custom 1 and Custom 2. This feature allows for further customization and tailoring of the aliases to specific needs and preferences.

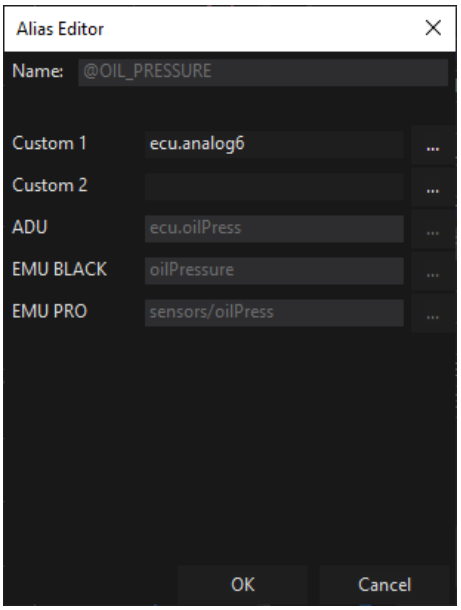
Defining the @GPS_LATITUDE, @GPS_LONGITUDE, and @SPEED aliases enables you to access all GPS features, such as the Lap Editor and Reference Track, even in logs not from the ADU. This becomes especially powerful when using EMU PRO with GPStoCAN, allowing you to analyze ECU data alongside GPS data for enhanced insights.

Examples:

You want to display the speed of the vehicle on a graph. You decide on "ecu.speed". If for some reason the channel is not available in the other log being analyzed, you would have to change the displayed channel to “gps.speed," for example. This requires a manual change of the channel or desktop depending on the log. By using the alias "@SPEED" which has the channels "ecu.speed" and "gps.speed" assigned, if it's possible, the former will be used. However, if "ecu.speed" is not available, "gps.speed" will be selected automatically. You can use aliases not only in graphs but also in mathematical channels.

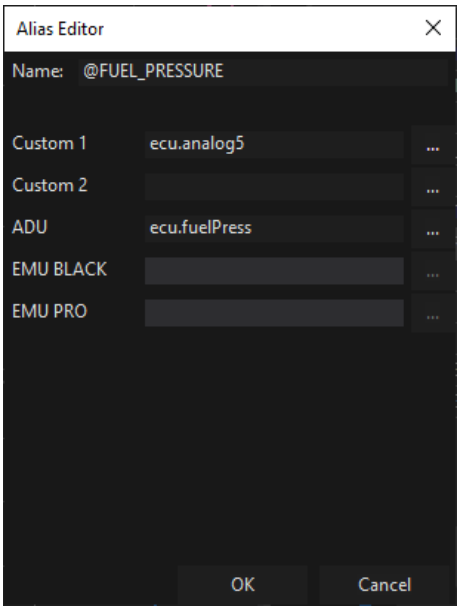
Example of editing the default alias @OIL_PRESSURE

By default, the oil pressure is logged in the ADU device to the channel named *ecu.oilPress*, in EMU BLACK *oilPressure*, and in EMU PRO *sensors / oilPress*. If the user uses an external oil sensor connected to the selected analog input on the device, then they can assign it to the default @OIL_PRESSURE alias in the Custom 1 item. This channel will have the highest priority. If another log is uploaded to this project (in which the external sensor was not used), the remaining channels will be checked. If any of the default assigned channels contain data, it will be used.



Example of creating new alias

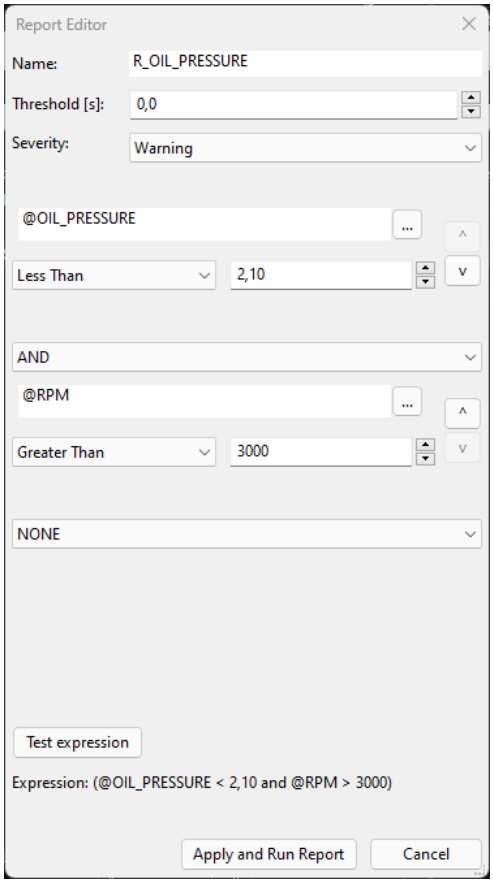
Start by naming the alias you are creating, @FUEL_PRESSURE in this example. The currently uploaded log comes from the ADU, which also used an external fuel pressure sensor connected to the input No. 5. In ADU position, connect the ADU *ecu.fuelPress* channel, and in Custom 1, the external sensor *ecu.analog5* channel. When creating this alias, if you want to add a channel in the EMU BLAK position, you must upload the logs from the EMU BLACK device (or CLASSIC, EDL).



6.4. Reports

Reports can be used to automatically identify specific situations in the log. Users can define up to three logical conditions to create a report logic. This logic is then checked against the log when the report is run, either after loading the file or by the user.

A bookmark is automatically created in the Graph Log every time the report logic is met. The length of the bookmark corresponds to the duration of the event, so if the condition is met for 0.5 seconds, the bookmark will be 0.5 seconds long.



Description of parameters when creating a new report:

- ***Name*** - must be unique and cannot contain special characters: '.', ',', '/', '\', or ' '.
- ***Threshold [s]*** - the minimum length of a bookmark that can be created by the report. Any condition met that is shorter than this threshold will be rejected.
- ***Severity*** - when a bookmark is accepted by the user (changing bookmark category to *User*) , the resulting bookmark will have this severity.
- The following sections define the logical conditions that must be met for the bookmark to be created:
  - The data channel to be analyzed
  - Comparison condition - the condition used to compare with the channel value (*Greater Than, Less Than, Greater Than or Equal To, Less Than or Equal To, Equal To, not Equal to*)
  - The specific value of the channel to be compared
  - Buttons to change the order of conditions
  - Logical condition - specifies how conditions are combined: *And, Or*, (*None* remove condition)
  - *Expression* - allows verification that the defined conditions are in the correct order.

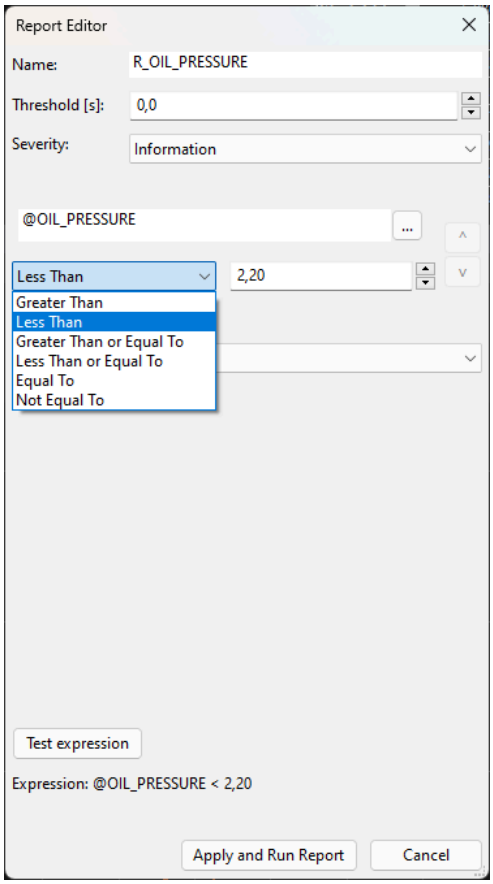
- ***Test expression*** - a button to test the formula. This allows testing the formula without creating bookmarks, providing a summary of how many bookmarks would be created, rejected due to the threshold, and already accepted by the user.
- ***Apply and Run Report*** - button to save and execute the report
- ***Cancel*** - button to cancel the report.

Bookmarks created by the report are not saved and are deleted under the following conditions: when editing the report, when deleting the report, and when exiting the application.

Example:

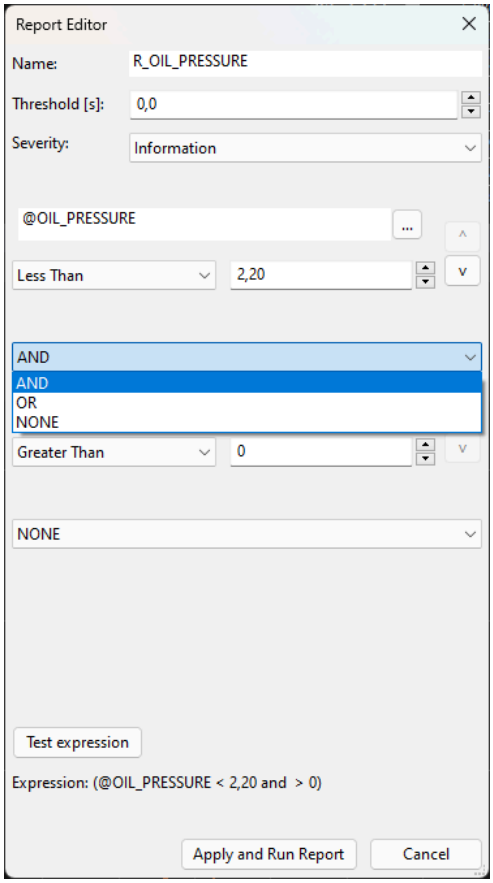
In this example, we want to quickly spot any issues with engine oiling. Instead of manually scrolling through the log, we will define a report to automate this task.

The basic condition is if the oil pressure drops below a certain minimum value. For this engine, the minimum value is 2.2 bar. Select the channel @OIL_PRESSURE. Choose the comparison condition "Less than" and set the value to 2.2.

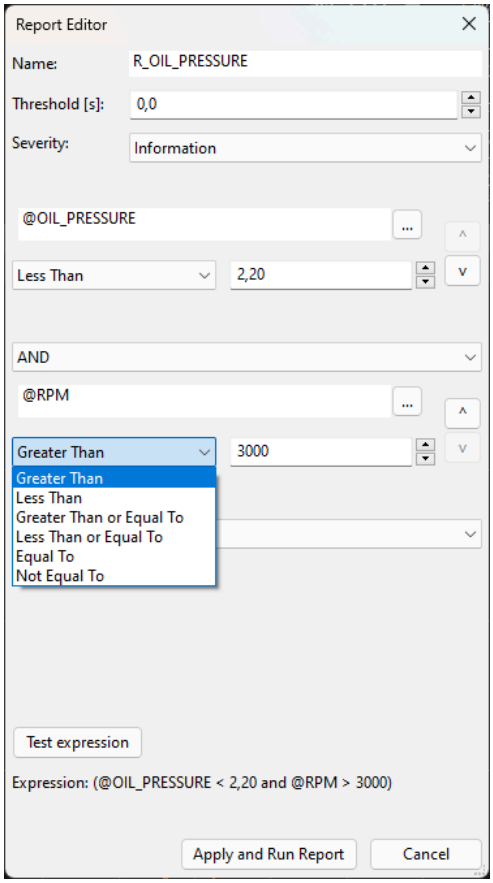


However, oil pressure depends on engine RPM. At low RPM, it's normal for the pressure to drop. If we don't account for this, we'll get many bookmarks for normal pressure drops.

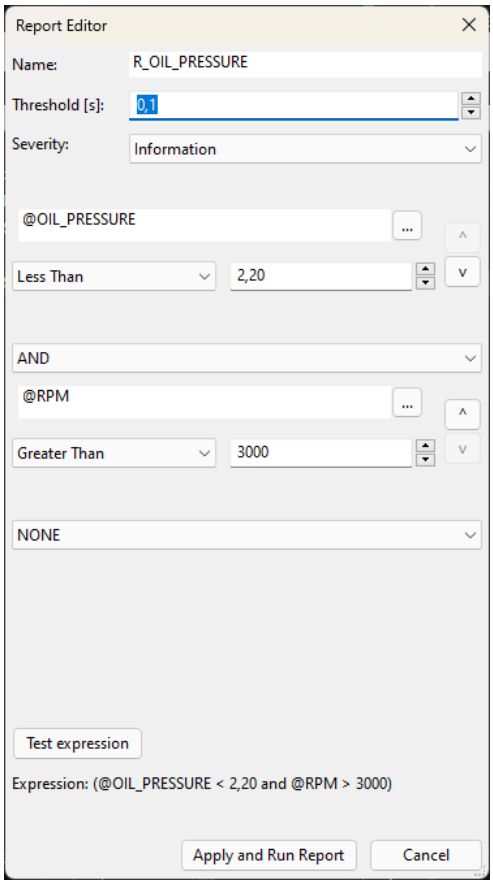
To refine this, we add another condition. Change the logical condition from "None" to "And," as we want both conditions to be met at the same time.



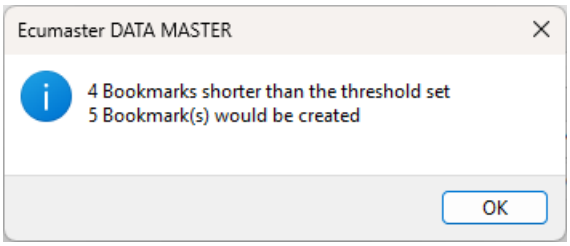
Select the channel @RPM, choose the condition "Greater than," and set the value to 3000. This will avoid bookmarks for normal pressure drops below 3000 RPM.



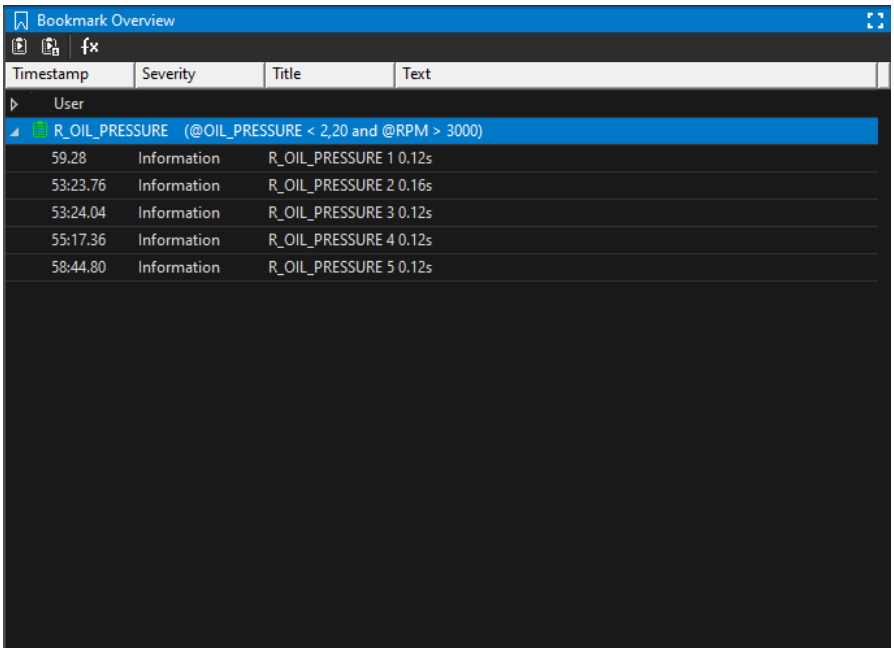
The last parameter to consider is the Threshold. This helps to ignore very short periods where the conditions are met. In this case, we want to ignore oil pressure drops shorter than 0.1s.



Now, we can test the formula to see how many bookmarks will be created.



If the number of bookmarks to be created meets our expectations, we can proceed to "Apply and Run Report". Go to *Bookmark Overview* panel to quickly navigate to all marked events.



7. Customize keys

The Customize keys option opens the Shortcuts wizard window. This window displays a table that shows all of the keyboard shortcuts available for the Main Menu and the Graph Log panel. It's possible to modify these shortcuts, but each shortcut can only be assigned to one function. If you attempt to use a shortcut that's already assigned to a different function, a warning message will appear. You will have the option to take the shortcut over or leave as is. Also, please keep in mind that the Main Menu shortcut cannot consist of a single key (with the exception of function keys F1-F12).

Menu

Name	Shortcut
Desktops	
Add new panel	F9
Close panel	Ctrl+F4
Duplicate panel	Ctrl+Shift+F9
Next desktop	Ctrl+Tab
Next desktop #2	Ctrl+Page Down
Open desktops template	Shift+Enter
Previous desktop	Ctrl+Shift+Tab
Previous desktop #2	Ctrl+Page Up
Replace panel	Shift+F9
Save desktops template	
Select desktop 1	Ctrl+1
Select desktop 2	Ctrl+2
Select desktop 3	Ctrl+3
Select desktop 4	Ctrl+4
Select desktop 5	Ctrl+5
Select desktop 6	Ctrl+6
Select desktop 7	Ctrl+7
Select desktop 8	Ctrl+8
Select desktop 9	Ctrl+9
Toggle panel full size	F6
Toggle side panel	Ctrl+L
Hide side panel	Alt+`
Show side panel	Alt+1
File	
Clear log	Ctrl+X
Exit	Alt+X
Import project	Ctrl+Shift+I

Name	Shortcut
New / Open project	Ctrl+N
Open log	Ctrl+O
Pack project	Ctrl+Shift+P
Save project	Ctrl+S
Save project as	Ctrl+Shift+S
Show full screen	Ctrl+F
Help	
About	
View help	F1
Tools	
Coach Mode	F8
Customize keys	
Lap Editor	F5
Maths Editor	F7
Options	Ctrl+Shift+O
Windows	
Next window (panel)	Tab
Previous window (panel)	Shift+Tab

Graph log

Name	Shortcut
Add bookmark	Ctrl+T
Axis properties	Shift+Enter
Change channel	E
Change selection down	Page Down
Change selection up	Page Up
Channel properties	Enter
Create graph	C
Decrease line width	-
Delete channel	Delete

Name	Shortcut
Delete graph	Shift+Delete
Find maximum	Shift+M
Find minimum	M
Group selection	Ctrl+G
Hide plot	H
Increase line width	=
Insert channels	Insert
Move left	Left
Move left large step	Ctrl+Left
Move left large step with selection	Ctrl+Shift+Left
Move right	Right
Move right large step	Ctrl+Right
Move right large step with selection	Ctrl+Shift+Right
Move screen left	Shift+Left
Move screen right	Shift+Right
Move selected graph down	Alt+Page Down
Move selected graph up	Alt+Page Up
Set cursor at end	End
Set cursor at start	Home
Set zoom 100%	Ctrl+0
Toggle autoscale	A
Toggle distance/time	T
Toggle dots	Shift+S
Toggle grid	G
Toggle log	Space
Ungroup selection	Ctrl+U
Zoom extents	Z
Zoom in	Up
Zoom out	Down

8. Panels

Panels present data in the form of various visualisations such as tables, charts or maps.

To facilitate simultaneous data analysis across multiple visualisations, most panels feature a moving marker as a common indicator for each visualisation. This means that if a particular point (on the time / distance axis) is marked with the cursor in one window, the marker will move to the same place in other visualisations.

In the lap comparison mode there are two cursors: red for the base lap and white for the lap to be compared.

Each panel on the right side has an icon that temporarily expands it to the entire desktop. When the full size panel functionality is activated, the panel bar is highlighted in green. Clicking the icon a second time returns the panel to its original size. Switching to another desktop also resets the panel to its normal size. The keyboard shortcuts for full size panel are F6 or Tab+Space.

Each panel has a taskbar with dedicated icons. Same options are also available in the context menu displayed by right-clicking in the panel field.

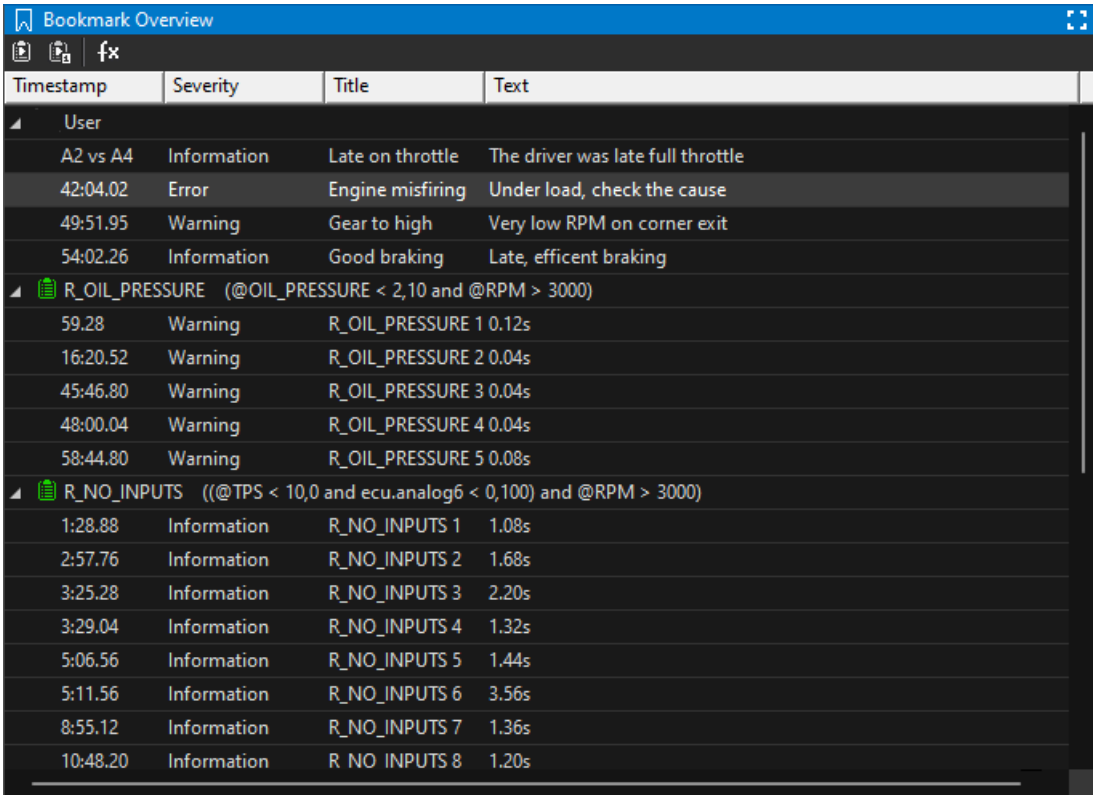
Right-clicking on the panel bar opens a menu with the following options:

Option	Key shortcut	Description
Add panel above	***Tab+Shift+Up***	Adding a panel above
Add panel below	***Tab+Shift+Down***	Adding a panel below
Add panel on left	***Tab+Shift+Left***	Adding a panel on the left
Add panel on right	***Tab+Shift+Right***	Adding a panel on the right
Duplicate panels	***Tab+Shift+D***	Duplicating a panel. This option adds a new panel on the right side with the copied settings of the selected
Replace panel	***Shift+F9***	Replacing a panel
Close panel	***Ctrl+F4***	Closing a panel

8.1. *Bookmark Overview*

The ***Bookmark Overview*** panel displays a table of all created bookmarks along with information about them (sorted by time by default). Bookmarks are organized in a tree structure: manually added bookmarks appear first under "User," followed by bookmarks generated by reports. Each report, created in the Math editor, has a unique name and is displayed as a separate category. Report-generated bookmarks are shown under their respective report names and expressions, in the order the reports were created, from oldest to newest.

The description of creating bookmarks can be found in the *Graph log / Creating bookmarks* chapter. Information about creating reports and the bookmarks they generate can be found in the *Reports* chapter.



Bookmarks can also be sorted by severity (Error, Warning, Information) and alphabetically by title within their categories. Just click on the selected heading:

Timestamp	Timestamp, displays the time at the point marked with the bookmark or the start point of the selection. If the bookmark is attached to a lap comparison, the names of the laps being compared are displayed.
Severity	Information validity: Error, Warning, Information

Title	Title of bookmark
Tekst	Description (sort alphabetically by title!)

The panel toolbar contains icons that allow you to:

- ***Run all reports***
- ***Run selected report*** – runs the currently selected report
- ***Show Math Editor*** – opens the Math Editor, where you can manage all math-related tasks and add new reports.

Double left-clicking on a selected bookmark displays it on the Graph log. Clicking on the bookmark assigned to the comparison automatically switches to the comparison mode.

Right-clicking on a selected bookmark opens a pop-up menu with the following options:

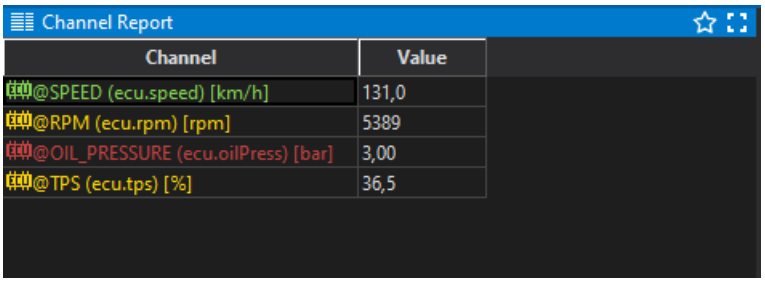
- ***Go to bookmark*** – the same as double-clicking the item
- ***Move to user*** – moves the bookmark to the user category; automatically generated bookmarks are not permanent and are displayed in a pale color regardless of their severity
- ***Edit bookmark*** – opens the bookmark editing dialog
- ***Delete bookmark*** – deletes the bookmark

Right-clicking on a report provides these options:

- ***Run report*** – executes the selected report
- ***Edit Report*** – opens the report editing dialog
- ***Delete Report*** – removes the report
- ***Clear Related Bookmarks*** – deletes all bookmarks created by the report that have not yet been moved to the user category.

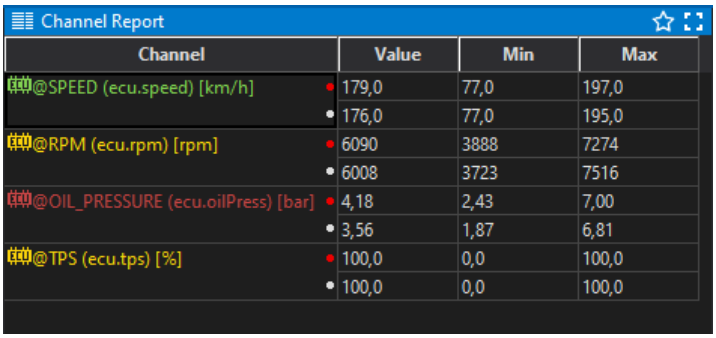
8.2. *Channel Report*

The ***Channel Report*** panel presents the values of the selected channels as a table. Those values are corresponding to a specific point (on the distance / time axis) indicated by the cursor in other panels (e.g. in the Graph Log panel).



You can also display the minimum and maximum value within:

- all uploaded logs
- the selected area on the Graph Log
- laps indicated in the comparison mode - separately for each of the compared laps (the red dot is the base lap, the white dot - the compared lap).



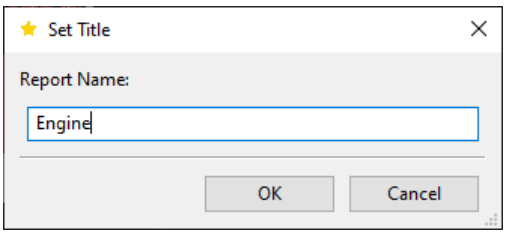
Pressing the right mouse button in the panel area displays the context menu:

Option	Key shortcut	Description
Add channel	***C***	Adding a channel / channels to the table
Change channel	***E***	Replacing the selected channel
Delete channel	***Delete***	Deleting the selected channel / channels from the table
Move up	***Alt + PageUp***	Moving the selected row up
Move down	***Alt + PageDown***	Moving the selected row down
Show values column		Display the column with a value pointed by a cursor for the selected channels. In the lap comparison mode, the cursor value is displayed separately for each compared lap.
Show max column		Display the column with the maximum value. It works as described above.
Show min column		Display the column with the minimum value for selected channels within all uploaded logs, or within the selected range on the *Graph Log.* In the lap comparison mode, the range for searching the minimal value is a selected lap or the range selected on the *Graph Log*
Channel properties	***Enter***	Shows properties window for the channel

The channel display settings are available by selecting the following option from the menu ***Channel properties***.

Option	Description
Log channel	Name of the edited channel
Graph color	Select the line display color of the channel
Autoscale	This option causes the range of values to be calculated automatically based on the logged data
Min value	Selection of the value range for a given channel
Max value	
Filter samples [0=off]	Filtering of the waveform, i.e. how many samples the value at a given point is to be determined from. A value of 0 means no filtering.
Enable alarm	Checking the box will activate the alarm (displayed on the application toolbar) if the condition defined in the ***Condition*** and ***Alarm value*** fields is met at the cursor position
Condition	Condition specifying alarm activation for values: ***Greater*** - greater than ***Alarm value*** ***Lower*** - smaller than ***Alarm value***
Alarm value	Alarm value

When adding a Channel Report panel to your favorites, by clicking the star icon in the upper right corner of the panel toolbar, the *Set Title* window will appear, where you can name your favorite panel.



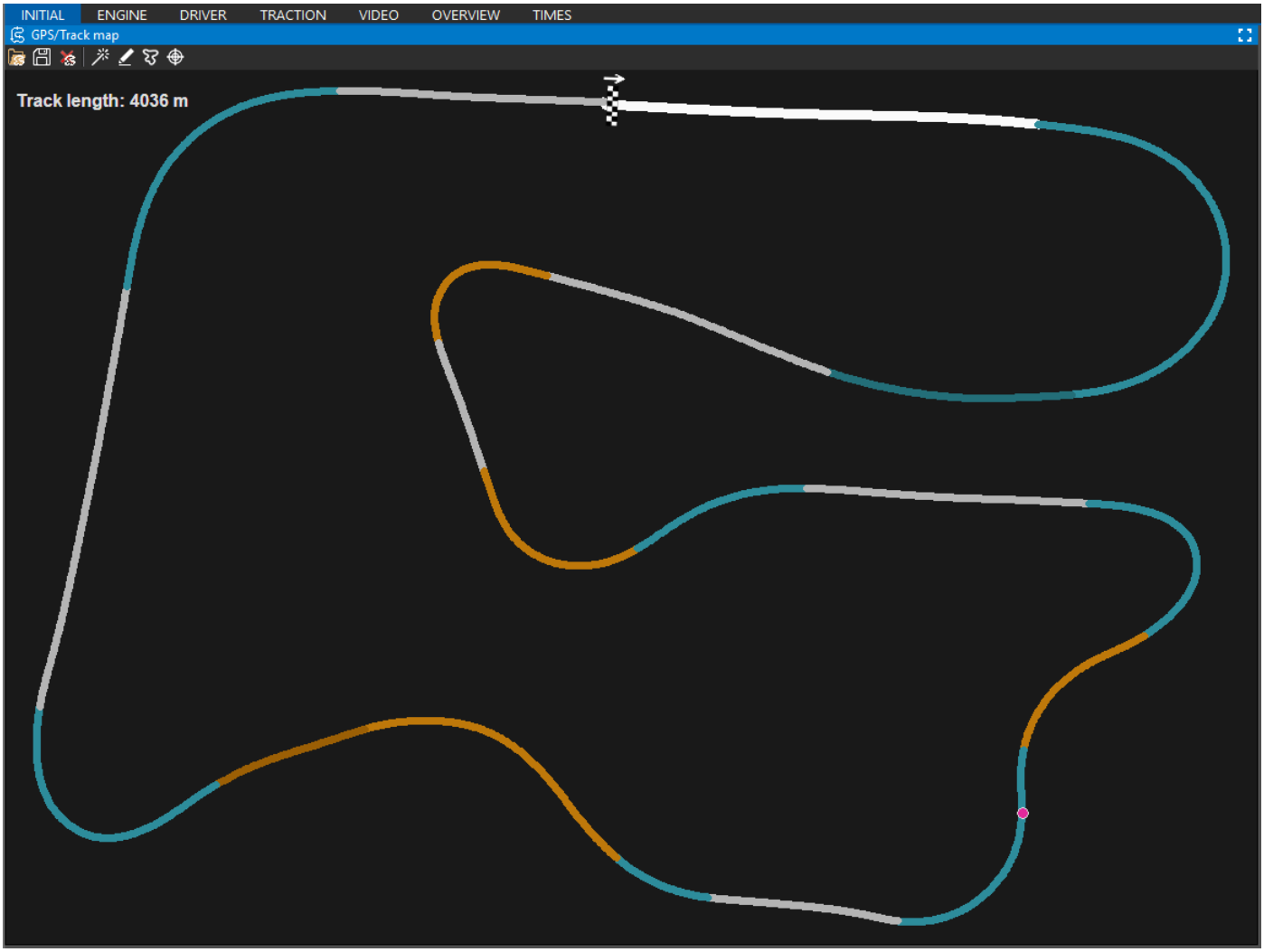
8.3. *GPS / Track map*

The ***GPS / Track map*** panel displays data from the GPS module and allows you to handle a reference track.

When reference track has not been generated or is hidden, the track map shows all the raw GPS data (drawn with green lines). If available, the background will display the satellite image of the track. A complete list of supported tracks with satellite imagery can be found in Appendix A - Tracks with satellite image support *(on page 64)*.

In the lap comparison mode, two GPS tracks are plotted: red (for the base lap) and white (for the lap being compared), allowing you to see the difference in the trajectory between the two.

Once the reference track has been generated, the division of the track into sectors and segments is obtained. The segments into which a track is divided are color-coded (white, orange and blue), depending on the type of segment (straight, left turn, right turn). The length of the track is also displayed.



The purple point on the track, determines the position of the cursor. The start / finish point is marked with a yellow marker for raw GPS data, or with chequered flag, with an arrow pointing in the direction of the track when the reference track is generated.

The taskbar icons allow you to:

- ***Open reference track*** – loading a reference track
- ***Save reference track*** – saving a reference track
- ***Clear reference track*** – removing a reference track
- ***Create reference track*** – generating a reference track divided into sectors and segments
- ***Edit reference track*** – editing reference track segments / sectors
- ***Hide reference track*** – hiding a track on the GPS map
- ***Center on track*** – displaying the track map over the entire available area

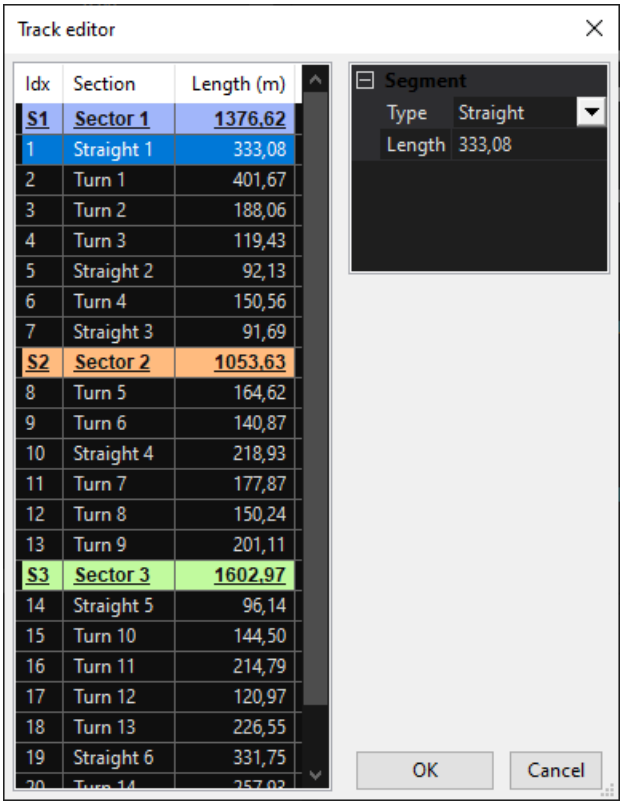
With Ctrl+ keys ↑/↓ or the mouse wheel you can zoom the image in or out (*zoom*). Use the arrows ↑/↓/→/← or the left mouse button to move the image on the screen.

When loading the log, reference track is generated automatically (if this option is enabled in the *General Options*. If you need to generate it from scratch (e.g. after clearing a reference track) press the wand icon (***Create reference track***). The following window should appear ***Reference track wizard***.

Parameter	Description
Reference lap	Selecting a lap to create a reference track. (Depending on your lap selection, the track line drawn may vary). The lap with the best lap time is selected by default.
Lateral G for corners	A parameter defining over the lateral g-force above which a track section is treated as a turn. The default setting is 0.3 G.
Min straight length	A parameter defining the minimum driving distance with an g-force less than *Lateral G for corners* to be considered a straight segment. The default setting is 80 m.

After pressing OK, a reference track divided into segments (left turn, right turn, straight line) and their constituent sectors will be generated. By default the track is divided into three sectors. The start / finish line is displayed as a chequered flag, with an arrow indicating the direction of travel on the track. This line is also a fixed boundary of the first sector, i.e. it cannot be removed. Other sector boundaries can be created at any given point.

To edit segments and their constituent track sectors, select the pencil icon in the toolbar (***Edit reference track***). The ***Track editor*** window will appear.



You can use it to delete or split segments and sectors, as well as change the type and length of segments (in the window on the right where the type and length of the selected segment is displayed). When a segment or sector is selected, it is automatically highlighted on the preview screen. To edit the division of the reference track, click on the corresponding segment with the right mouse button. A context menu will appear with the following options:

Option	Description
Remove segment	Deletes the selected segment by attaching it to the segment immediately following it
Split segment	Divides the marked segment in the middle of its length
Split sector	Adds a sector border at the end of the selected segment
Remove sector	Deletes the sector in which the selected segment is located by attaching it to the following sector. The exception is the last sector (whose end is the start / finish line), deleting the last sector makes it join the preceding sector.
Move current sector end	Moves the end border of the sector in which the selected segment is located to the end of the selected segment. If the end of the selected sector is the start / finish line, an additional sector border will be added at the end of the selected segment (additional sector will be created)
Move current sector start	Moves the initial boundary of the sector in which the selected segment is located to the beginning of the selected segment. If the beginning of the selected sector is the start / finish line, an additional sector border will be added at the beginning of the selected segment (additional sector will be created)

The segments into which a track is divided are color-coded (white, orange and blue), depending on the type of segment (straight, left turn, right turn). To facilitate the reading of the data, the same colors for the corresponding segments have been used in the table in the *Table Report* panel. The purple point on the track determines the position of the vehicle.

The resulting track can be saved on the drive using the floppy disc icon (***Save reference track***).

After closing a project the currently used reference track is saved automatically. It will load reference track next time you open this project.

8.4. *Graph Log*

Graph log is the basic panel showing channel graphs as a function of time / distance.

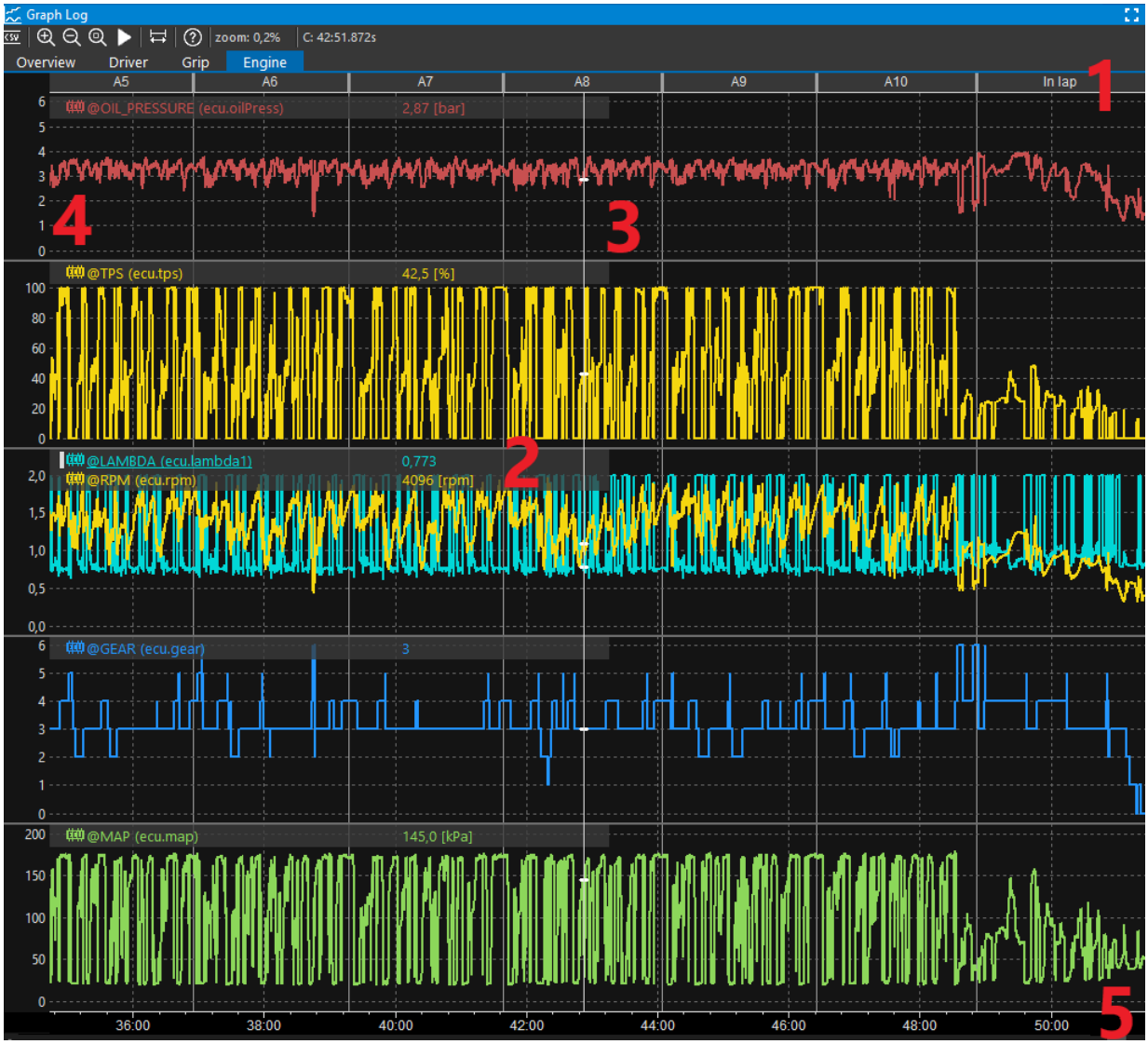
The panel toolbar contains icons allowing:

- ***Export to CSV -*** exporting to CSV file with the possibility of changing the settings:

Export frequency	***Same as channel***	Export frequency including actual logging frequency for individual channels
	1Hz, 5Hz, 10Hz, 25Hz, 50Hz, 100Hz, 125Hz, 250Hz, 500Hz	Selection of export frequency, the same for all exported channels
Interpolate		If the export frequency is higher than the logging frequency of the individual channels, the missing data will be completed by the previous value or by interpolation
Separator Decimal / Column	***system / ";"***	The decimal separator is either a comma or a dot (depending on system settings), the column separator is a semicolon
	"." / ","	The decimal separator is a dot, the column separator is a comma
Preview		A window for previewing the resulting file
Tables		Presentation of data in table form
Raw output		Presentation of the contents of the resulting .csv file

- ***Zoom in***, ***Zoom out***, ***Zoom extents*** – change of scale.
- ***Playback*** – start / stop playback - after enabling playback, the cursor moves in real time.
- ***Axis properties*** – change of the X axis setting in lap comparison mode. It is possible to select the distance / time axis and the speed channel used to determine the lap distance. If you select a speed source with @SPEED, ensure that the channel linked to this alias is expressed in kilometers per hour (km/h).
- ***zoom:*** – the current zoom rate is displayed on the taskbar.
- ***c:*** – information about the current position of the cursor is displayed on the taskbar.

The **Graph Log** panel, just like the main application dashboard, has tabs that can be used to organise the displayed channels (e.g. engine, track, etc.). The handling of the tabs is no different to that of the main application desktop.



Elements of the *Graph Log* panel

1. Lap axis – Clicking on the selected lap on the axis makes it fit the screen. In the Lap Comparison mode, the track segment axis is displayed instead of the lap axis when a reference track is generated. Clicking on the segment makes it fit the screen. You can zoom in on the part of the track by clicking on two segments when holding shift.
2. Channel panel – displays the channels presented on a given chart along with the values of these channels indicated by the cursor. In case of a selection, it displays the channel value for the start cursor and the delta (difference) between the values in the start and end cursors. (Note that full information is displayed when the panel window is wide enough). The following is displayed in the lap comparison mode values for both laps. The active channel

is indicated by a vertical white line next to the name. The active channel can be changed with the Page Up / Down keys or by left clicking on the channel name. It is also possible to select a channel by right-clicking on the chart.

3. Cursor
4. Value axis – if two or more channels are displayed on one chart, the channels with the same unit have a common axis, the next added channel with a different unit has a separate axis (displayed on the right hand side), and each next added channel with a different unit has the displayed axis on the left when this channel is selected (the axis for the underlined channel is visible on the left hand side). In the autoscale mode, the maximum and minimum values of all channels within the graph are searched. Green dashes next to the channel name mean that autoscaling is enabled. When autoscaling is off, the lines are white. Autoscaling is enabled / disabled by using the 'A' hotkey or calling the Axis properties window.
5. Time / distance axis – if Graph Log is used in a *Dyno*-type project, two time axes are displayed when comparing *pulls*. The upper axis can be moved, causing the *pull* being compared to move.

Navigation in the *Graph Log* panel

Clicking the left mouse button on the chart causes the cursor to move. Double-clicking with the left mouse button starts edition of the selection. The selection can be confirmed by clicking the left mouse button again, in which case the selected fragment will be zoomed in. If you hold down the Shift key when confirming a selection, the selected area remains selected without zooming in.

By pressing the right mouse button in the log area, the context menu is called up:

Option	Key shortcut	Description
Change channel	***E***	Replacing the selected channel
Create new graph	***C***	Adding a channel on a new graph
Insert channels	***Insert***	Adding a channel on the currently active graph
Remove graph	***Shift+Delete***	Deleting a graph
Remove channel	***Delete***	Removing a selected channel from the graph
Move up	***Alt + PageUp***	Moving a graph up
Move down	***Alt + PageDown***	Moving a graph down
Toggle line style	***Shift + S***	Changing the display mode: line / dots / connected dots

Option	Key shortcut	Description
Increase line width	***+***	Increase the thickness of lines / dots on the graph
Decrease line width	***-***	Reduce the thickness of the lines / dots on the graph
Toggle grid	***G***	Turns the grid on / off
Toggle autoscale	***A***	Enables / disables auto-scaling of the selected channel
Toggle hide	***H***	Hides the active channel without deleting it
Find minimal value	***M***	Moves the cursor to the minimum value of the selected channel
Find maximal value	***Shift+M***	Moves the cursor to the maximum value of the selected channel
Add bookmark	***Ctrl+T***	Adding a new bookmark
Edit bookmark		Edit selected bookmark
Delete bookmark		Delete the selected bookmark
Channel properties	***Enter***	Displays the channel properties window (described in the *Channel Report* chapter - *Channel properties*)
Axis properties	***Shift+Enter***	Displays properties window for the value axis

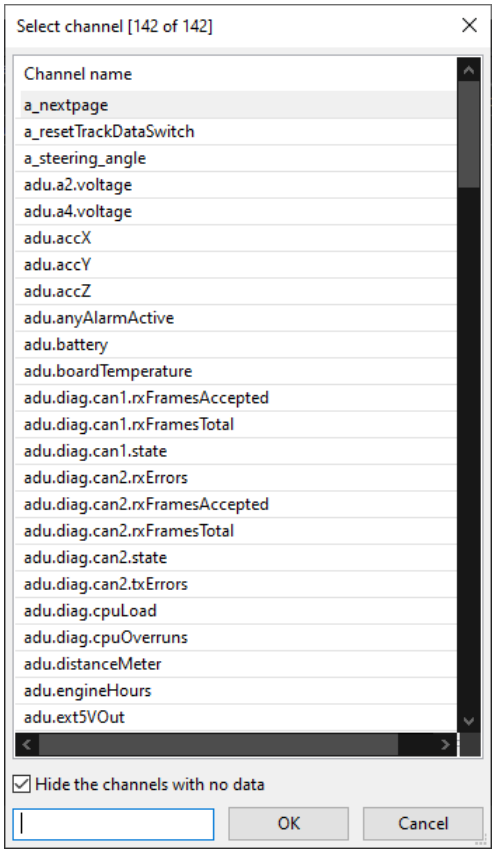
Axis properties window:

Option	Description
Unit	Unit of the currently edited axis
Range mode	***Autoscale*** - automatic adjustment of the axis range to the plot ***Manual*** - manual setting of the axis range by defining a minimum and maximum value
Min value	Minimum value for the axis
Max value	Maximum value for the axis

Additional operations on the *Graph Log* panel are possible using the following default keyboard shortcuts. You can also make your own shortcuts in the *Tools / Customize keys* (more information you can find in *Customize keys* section).

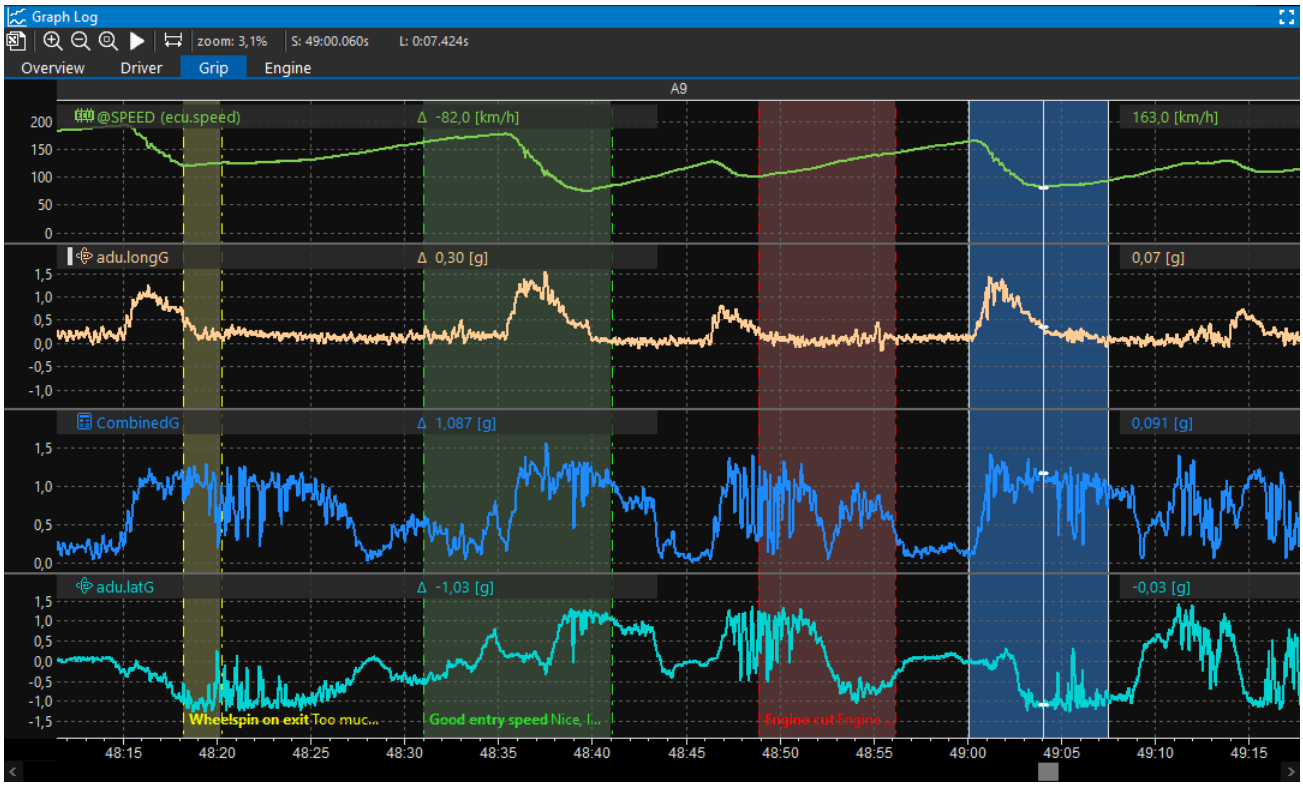
Option	Key shortcut	Description
Cursor movement	←/→	Moves the cursor forward / backward by one unit
Move the cursor by a bigger distance	***Ctrl +*** ←/→	Moves the cursor forward / backward by ten units
Screen offset	***Shift +*** ←/→	Moves the screen without changing the cursor position
Marking the area	***Ctrl + Shift +*** ←/→	Marks the area between the start and end positions of the cursor
Zoom in/out	↑/↓	Zoom in / out view
Positioning the cursor at the beginning	***Home***	Moves to the start of the log / lap in lap comparison mode
Positioning the cursor at the end	***End***	Moves to the end of the log / lap in lap comparison mode
Changing the active channel	***PageUp*** / ***PageDown***	Changes the active channel to the channel above / below
X axis domain change	***T***	Changes the X axis, in lap comparison mode, between the time and the distance axis

If you change or add a new channel to the chart, the channel selection window appears. For easier searching, the channel name can be entered in the lower field of the window, which will filter the available channels. For example, if you enter the word **gps** , only channels containing the word **gps** will be displayed. Using the Shift or Ctrl keys, it is possible to select multiple channels to be added to one chart. If the **Hide the channels with no data** box is selected, the list will display only channels with logged data.

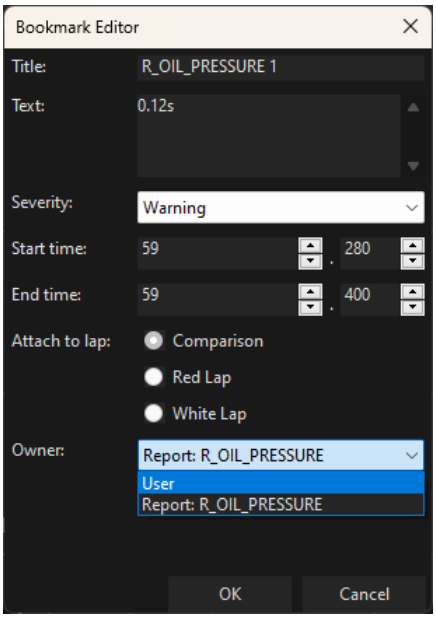


Creating bookmarks

Bookmarks are marked places on the graph log, to which you can make a note and write down the conclusions of the analysis.



When adding a new bookmark, the Bookmark Editor window appears.



Parameter	Description
Title	Bookmark title (limited to 30 characters). On the Graph log, the entire title and the beginning of the description are displayed in bold print.
Text	A longer description of the bookmark. The entire description, including the title, is displayed after hovering the mouse over the bookmark area (on the Graph log) in the tooltip.
Severity	Bookmark validation: Information – information bookmark, highlighted in green Warning – a warning bookmark highlighted in yellow Error – a bookmark indicating an error, highlighted in red The colors for each validation apply only to bookmarks in the user category. All bookmarks generated by reports are highlighted in white, independently from their severity.
Start time	The bookmark is created at the point or selection marked on the Graph log. The boundaries of this area can be edited by entering the exact start and end times.
End time	
Attach to lap	When creating a bookmark in lap comparison mode, you can assign it to:

Parameter	Description
	Comparison – this bookmark is active (highlighted) in the comparison mode, while grayed bookmark is attached to each of the compared laps when the comparison mode is off ***Red lap*** – the bookmark is active (highlighted) regardless of the mode. It is marked with a red dot next to the bookmark description on the Graph log. ***White lap*** – the bookmark is active (highlighted) regardless of the mode. It is markedwith a white dot next to the bookmark description on the Graph log. After accepting the created bookmark, it is not possible to change its assignment!
Owner	This parameter is available for bookmarks automatically created by the report. Moving an automatically generated bookmark to the User category allows for saving it for further analysis. (Bookmarks generated by the report are temporary and are not saved.)

Saving bookmarks

Bookmarks (created by the User) are saved in DMDATA files, under the name of each log (used in the analysis) with the .dmdata extension. (Bookmarks generated by the report are temporary and are not saved.)

This file is created when:

- cleaning logs
- deletion of logs
- saving the project
- closing the application

When the log file is opened, information from the file (with the same name as the log file) with the .dmdata extension is automatically downloaded. If you rename the log file, please note that you must also rename the .dmdata file. Both of these files must have the same name for information from the .dmdata file to be retrieved.

The .dmdata file is saved on the disk from which the log was opened. If it was downloaded from a USB flash drive, remember not to remove it before the application is finished.

The .dmdata file also saves information about log splitting (other than automatic).

8.5. *Histogram*

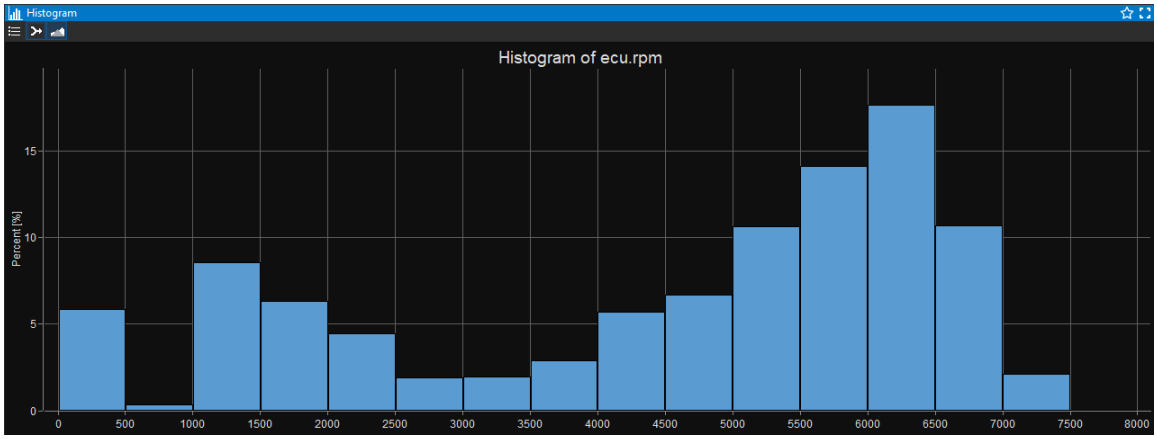
The ***Histogram*** visualisation is used to analyse the frequency of occurrence of the channel values.

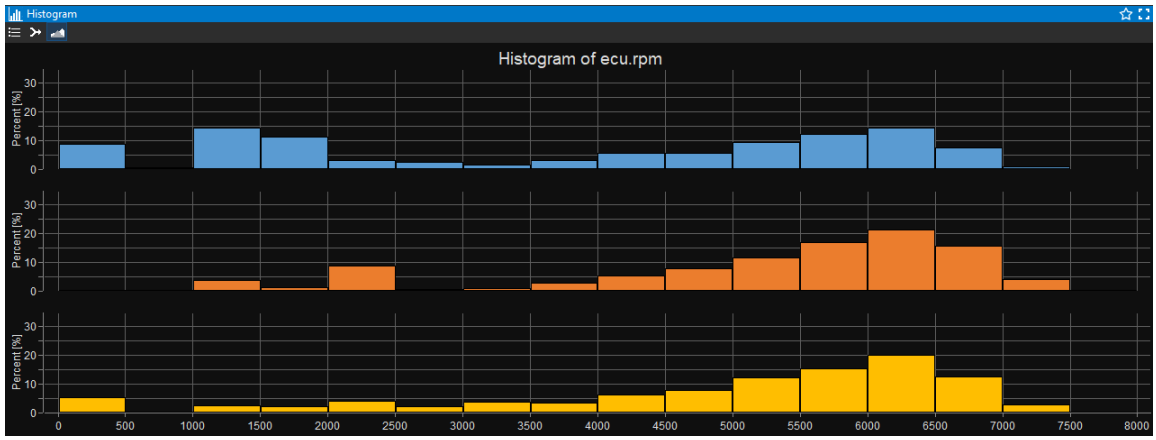
To configure the panel, click on the ***Panel properties*** icon on the *Histogram* panel's taskbar or press the right mouse button.

Option	Description
Channel X	The channel defining the X axis
Filter channel	The filter channel introduces an additional condition on a separate channel, the fulfilment of which determines whether (at a particular point in time) data from channel X will be collected for analysis or rejected
Discard samples above	Rejecting samples above the set value for the filter channel
above value	Upper limit value for the filter channel
Discard samples below	Rejecting samples below the set value for the filter channel
below value	Lower limit value for the filter channel
Autoscale X axis and Y bins	Automatic scaling of the X axis range and the number of bins
Autoscale X axis	Automatic scaling of the X axis range
Min	Initial value of the X axis
Max	Final value of the X axis
Set bin width	Setting the bin width
Bin width	Width of a bin
Bin count	Number of bins
Exclude outliers	Rejection of outliers (deviating from normal distribution)
Y axis channel	Y axis unit defining the frequency of occurrence of the defined phenomenon ***Percent*** – percentage ***Time*** – time frame
Centered bins	Sets the description of the X axis values at the centre of the bins

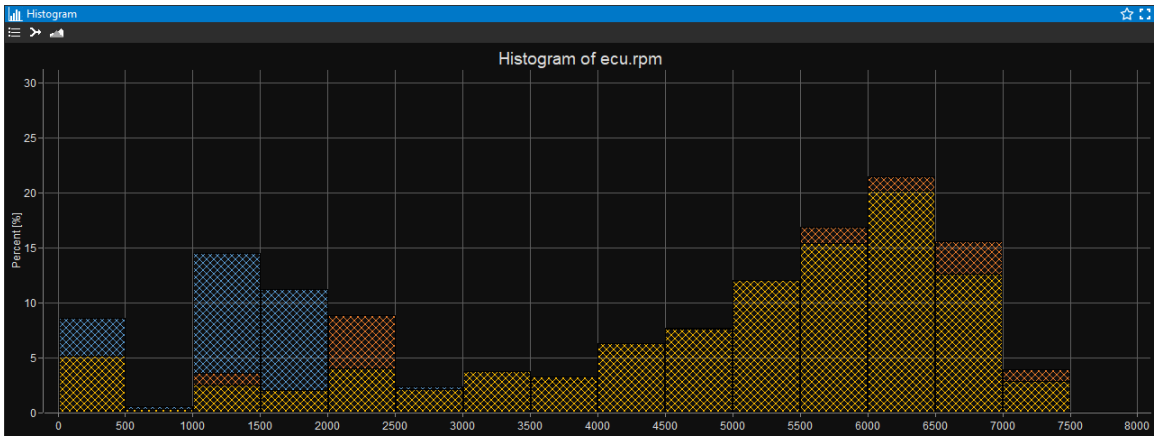
In the panel ***Histogram*** panel you can analyse data from several logs at the same time. They can be analysed merged into one long log on one histogram (default setting), or separately on separate

axes (one below the other). Use the arrow icon to switch between these views ***Compare / Append Mode***.





In the split log mode we can plot the logs onto a single histogram, where each log will be marked with a different color. The ***Tiled / Overlay*** icon is used for this purpose.



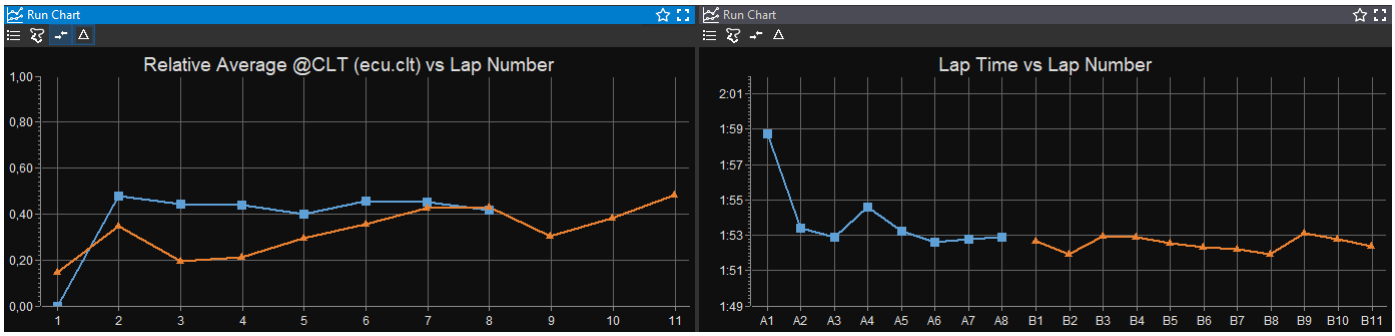
8.6. *Log Manager*

The ***Log Manager*** panel is described in the chapter *Working with logs – Log Manager.*

8.7. *Run Chart*

The ***Run Chart*** panel shows each lap as one point on the graph. The point value can be a lap time or a selected metric. Metrics allow the user to select the maximum / minimum / average value of a given channel.

The *Run Chart* panel can also operate in sector mode. Each point on the graph shows the value for the selected sector (instead of the entire lap). The *Run Chart* panel operation mode can be changed to a sector by clicking ***Focus on...*** icon or by selecting the sector mode in the Table Report panel and choosing the selected sector.



On the graph: the X axis represents the lap numbers, the Y axis is defined by selecting the ***Panel properties*** icon.

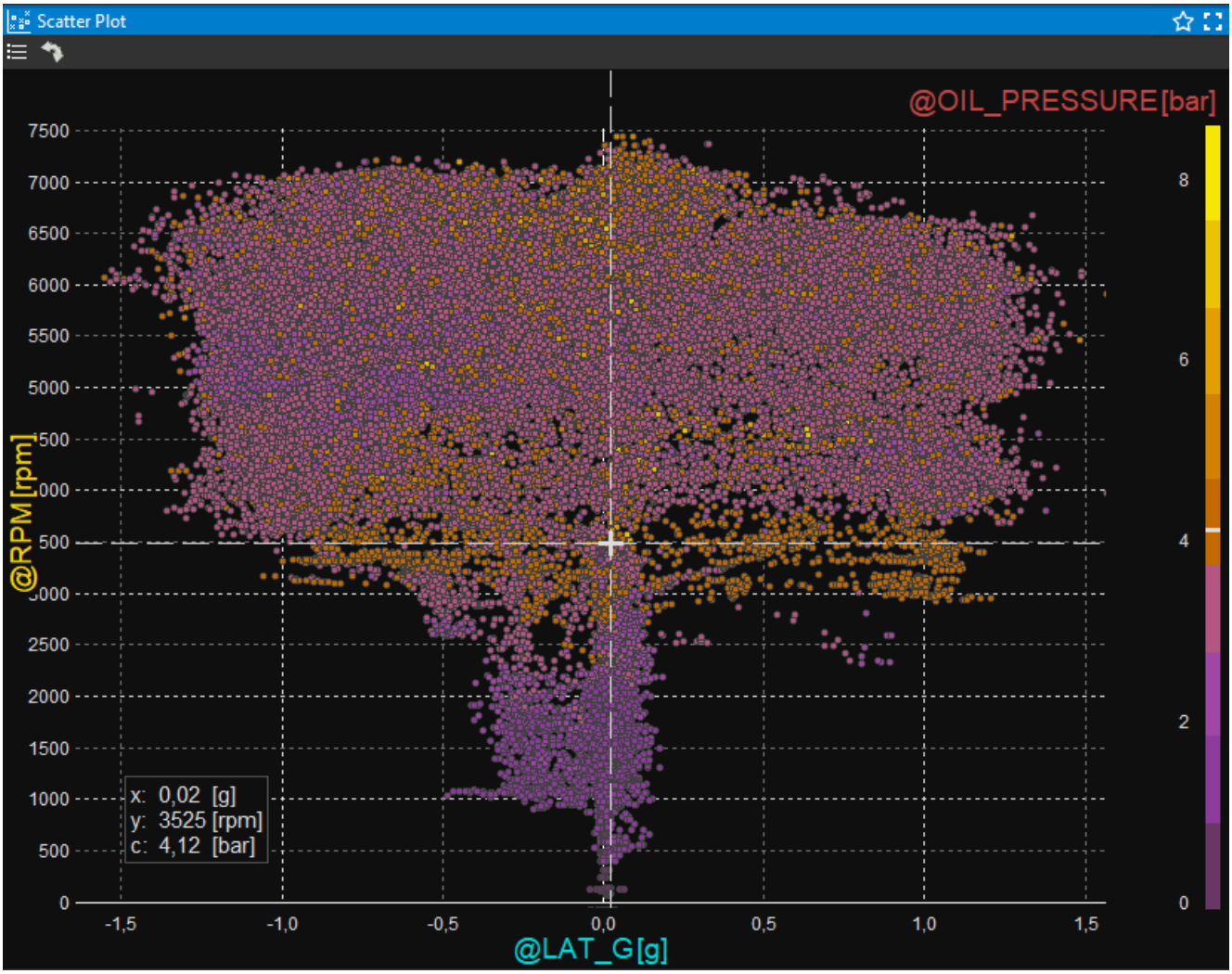
Option	Description
Use lap time as Y axis	When this field is activated, the Y axis is defined by the lap times
Channel	Channel defining the *Y axis* (in case the field *Use lap time as Y axis* is inactive)
Summary parameter	A type of metric that specifies values for a given lap: ***Min*** - minimum value ***Max*** - maximum value ***Average***

When analysing several logs simultaneously, by default the graphs from both logs are plotted side by side, so that one is a continuation of the other. In this case, laps are described on the X axis by lap name (i.e. the letter denoting the log in question and the number of the lap in that log e.g. A1, A2, B1, B2, etc.). Using the arrow icon *Compare / Append Mode* you can overlay the logs on top of each other. Then the lap numbers are marked on the X axis. By clicking again on the *Compare / Append Mode* icon, you return to the previous view.

In addition, for clarity of the graph, the Y axis can be scaled using the icon with the delta symbol *Absolute / Relative Mode*. In the mode *Relative Mode,* the values on the Y axis are shown with reference to the lowest value.

8.8. *Scatter Plot*

Another way of visualising data is ***Scatter Plot*** (with three axes: X, Y and color axis).



To define axes, click the icon ***Panel properties*** icon.

Option	Description
X channel	Channel defining the X axis
X range mode	***Autoscale*** - automatic adjustment of the X axis range to the plot ***Manual*** - manual setting of the X axis range by defining a minimum and maximum value

Option	Description
X min value	Minimum value for the X axis
X max value	Maximum value for the X axis
Y channel	Channel defining the Y axis
Y range mode	***Autoscale*** - automatic adjustment of the Y axis range to the plot ***Manual*** - manual setting of the Y axis range by defining a minimum and maximum value
Y min value	Minimum value for the Y axis
Y min value	Maximum value for the Y axis
Color channel	Channel defining the color axis
Color range mode	***Autoscale*** - automatic adjustment of the color axis range to the plot ***Manual*** - manual setting of the color axis range by defining a minimum and maximum value
Color min value	Minimum value for the Color axis
Color max value	Maximum value for the Color axis
Dot size	Changing the size of the points on the graph
Trace width	Cursor trace line width
Trace length	The length of the cursor tracking line (the number of samples in the trace).
Legend placement	Changing the position of the legend on the plot

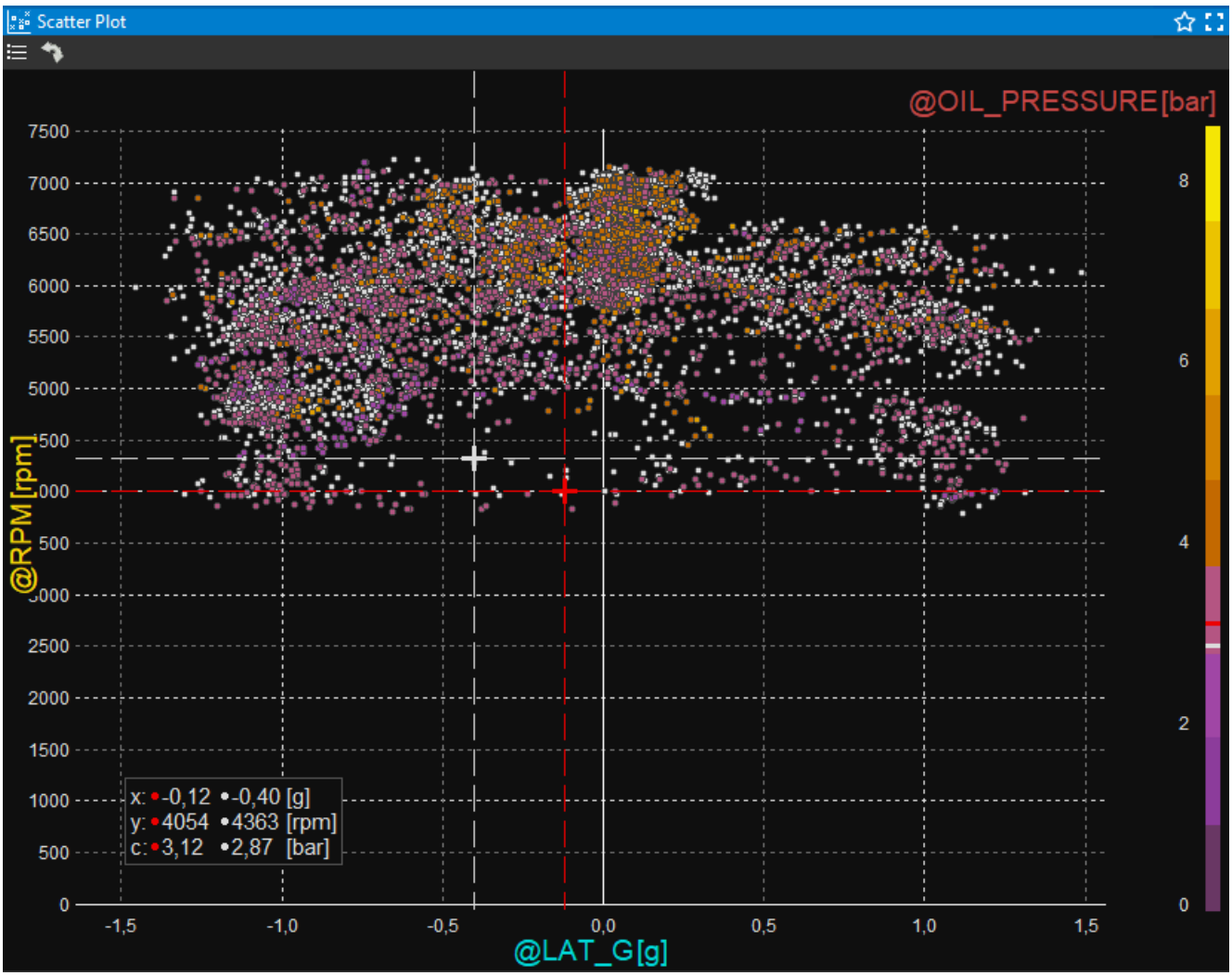
The ***Swap X/Y*** icon allows you to swap the X axis with the Y axis, causing the graph to rotate. If laps are selected for comparison in the *Log Manager* panel, the *Scatter Plot* chart will include only the points belonging to the laps being compared. The points from the base lap are colored according to the legend, while points from the comparison lap are white. The size of points on the graph can be changed with the "**+**" and "**-**" keys or in the pop-up menu with the *Increase / Decrease marker size* or in the *Panel properties / Dot size*.

The ***Table Builder*** icon generates a *Table Builder* corresponding to the *Scatter Plot* panel. It will share the same axes (channels and ranges).

The next element of the graph is the cursor (or two cursors in lap comparison mode) which indicates the coordinates of the point currently marked on the time / road axis. The position of the cursor can be changed by double-clicking a point on the graph.

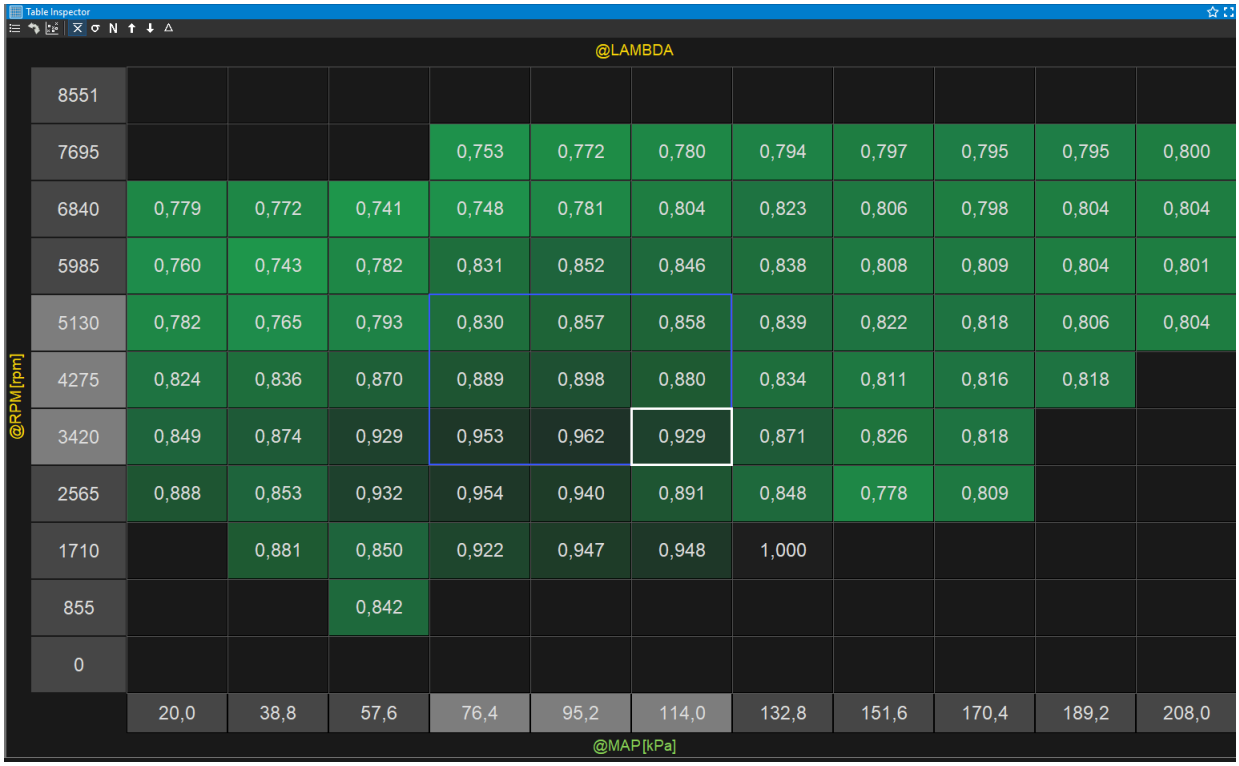
There is also a legend in the corner of the graph describing the values of the x, y and color axes of the point indicated by the cursor. The position of the legend on the chart can be changed (or turned off) by right-clicking on the legend window.

When playback is turned on (from the *Graph Log* or *Video* panel), a trace is drawn on the *Scatter Plot* following the moving cursor. You can define the width and length of the trace in the *Panel properties*. If you want to turn off the trace you should set the *Trace width* or *Trace length* to 0.



8.9. *Table Builder*

The ***Table Builder*** offers a data visualization using a map-like table. Each cell within this table represents a specific location defined by its X and Y coordinates. *Table Builder* calculates and presents a summary statistic of the defined channel for each cell.



@RPM[rpm] \ @MAP[kPa]	20,0	38,8	57,6	76,4	95,2	114,0	132,8	151,6	170,4	189,2	208,0
8551											
7695				0,753	0,772	0,780	0,794	0,797	0,795	0,795	0,800
6840	0,779	0,772	0,741	0,748	0,781	0,804	0,823	0,806	0,798	0,804	0,804
5985	0,760	0,743	0,782	0,831	0,852	0,846	0,838	0,808	0,809	0,804	0,801
5130	0,782	0,765	0,793	0,830	0,857	0,858	0,839	0,822	0,818	0,806	0,804
4275	0,824	0,836	0,870	0,889	0,898	0,880	0,834	0,811	0,816	0,818	
3420	0,849	0,874	0,929	0,953	0,962	0,929	0,871	0,826	0,818		
2565	0,888	0,853	0,932	0,954	0,940	0,891	0,848	0,778	0,809		
1710		0,881	0,850	0,922	0,947	0,948	1,000				
855			0,842								
0											

The following icons are on the toolbar:

- **Panel properties** (described below)
- **Swap X/Y** – allows you to swap the X axis with the Y axis
- **Scatter plot** – generates a *Scatter Plot* corresponding to the *Table Builder* panel. It will share the same axes (channels and ranges)
- **Show mean value** – displays the average value of the *Channel* within each cell
- **Show variance** – displays the variance of the *Channel* within each cell
- **Show number of samples** – displays the number of samples within each cell
- **Show maximal value** – displays the maximal value of the *Channel* within each cell
- **Show minimal value** – displays the minimal value of the *Channel* within each cell
- **Show value range** – displays the range of *Channel* values (max value minus min value) within each cell

To define axes, click the icon **Panel properties** icon

Option	Description
Channel	Channel defining the values in the table
Discard samples above	Rejecting samples above the set value for the *Channel*
above value	Upper limit value for the *Channel*
Discard samples below	Rejecting samples below the set value for the *Channel*
below value	Lower limit value for the *Channel*
Conditional formatting	Conditional formatting, applies a cell fill color (on a scale from strong color to no color at all) depending on the numerical value
Format base on	Selection of the parameter that determines the cell fill color: • Value • Variance • Count
Minimal number of samples	The minimal number of samples at which the cell value will be displayed
X(Y) channel	Channel defining the X(Y) axis
X(Y) min value	Minimum value for the X(Y) axis
X(Y) max value	Maximum value for the X(Y) axis
X(Y) creation type	Step - adjusting the desired step length within the X(Y) axis range Linear interpolation - adjusting the desired number of points within the X(Y) axis range
X(Y) step	Width of a bin on the X(Y) axis
X(Y) points	Number of points on the X(Y) axis

The next element of the table is the cursor which indicates the coordinates of the point currently marked on the time / road axis. The position of the cursor can't be changed by double-clicking because in the cell there is an averaged value from multiple samples.

When playback is turned on (from the *Graph Log* or *Video* panel), a trace is drawn on the *Table Builder* following the moving cursor.

You can select a range of cells using the mouse or arrow keys while holding down the shift key. Then, you can copy the selection by right-clicking and choosing 'copy cells' or by pressing Ctrl + C. You can paste the copied data into a spreadsheet or EMU Black / EMU PRO software.

8.10. *Table Report*

The ***Table Report*** panel shows times or aggregated values from the selected channel by lap in the form of a table. With the reference track generated these values are shown separately for each segment or sector of the track.


Table Report of average @SPEED (ecu.speed)

	Lap A1	Lap A2	Lap A3	Lap A4	Lap A5	Lap A6	Lap A7	Lap A8	Lap B1	Lap B2	Lap B3	Lap B4	Lap B5	Lap B6	Lap B7	Lap B8	Lap B9	Lap B10	Lap B11
Straight 1	186,5	187,5	187,8	187,3	184,2	188,4	186,2	188,6	187,7	189,3	186,8	189,0	189,3	188,1	189,4	189,7	190,2	188,7	186,4
Turn 1	131,7	131,7	132,9	132,7	131,3	132,5	132,5	131,0	132,1	133,2	126,9	133,0	133,0	131,5	130,9	132,6	132,3	132,6	131,7
Turn 2	160,2	161,1	160,8	161,0	160,7	161,5	161,9	160,6	162,4	163,4	160,4	162,6	163,3	162,4	161,8	162,7	162,8	162,3	162,3
Turn 3	173,7	174,8	174,4	174,8	175,4	175,5	176,4	174,6	176,1	177,3	175,7	176,7	177,6	175,8	177,0	177,0	176,6	176,3	175,4
Straight 2	159,2	160,3	158,4	157,0	161,1	160,6	165,4	165,7	158,7	162,9	159,5	155,0	164,8	159,0	157,1	159,1	157,8	157,5	160,8
Turn 4	88,3	90,4	89,0	90,1	91,7	92,2	90,6	88,5	88,9	92,7	89,9	88,9	86,8	87,2	92,6	90,4	87,6	89,9	91,6
Straight 3	117,8	119,0	117,9	120,5	119,9	119,7	118,9	119,5	119,2	119,9	120,4	113,0	116,3	117,5	122,1	121,4	115,2	120,2	122,8
Turn 5	110,0	108,4	106,6	110,6	108,6	110,6	109,1	106,9	108,9	110,8	109,5	111,0	110,5	111,4	108,6	109,5	109,4	106,9	112,1
Turn 6	138,2	131,7	138,4	138,0	138,8	138,8	138,1	137,3	136,8	138,4	138,2	138,3	138,2	138,4	138,2	138,3	139,1	138,0	137,7
Straight 4	156,7	153,1	155,8	157,0	158,2	157,3	156,3	155,8	156,8	157,0	157,7	157,3	157,0	157,9	158,2	157,3	158,1	156,3	157,2
Turn 7	92,2	92,0	92,6	93,3	90,9	92,2	91,6	93,7	92,3	94,3	92,4	91,5	91,4	92,5	92,4	94,6	93,0	94,2	91,8
Turn 8	121,4	119,3	121,1	117,5	118,1	120,5	119,8	120,7	121,5	122,4	123,0	118,9	120,7	122,4	118,6	118,1	123,0	123,4	118,7
Turn 9	110,2	119,6	119,1	118,7	118,4	118,5	118,2	119,1	119,1	119,7	119,3	120,8	120,7	120,2	121,0	119,9	117,4	114,6	120,6
Straight 5	99,2	143,0	141,5	141,3	141,8	141,7	142,8	142,7	142,7	143,2	143,6	143,8	143,8	143,9	144,2	142,2	141,5	141,1	141,9
Turn 10	93,5	157,7	156,1	156,3	156,6	157,0	157,9	157,7	158,2	158,6	158,9	158,1	159,3	159,5	160,3	157,6	156,8	156,6	157,8
Turn 11	123,2	141,5	141,4	139,1	139,3	140,0	139,4	143,0	143,4	142,2	140,8	139,8	140,8	141,2	141,5	143,6	142,3	141,2	141,9
Turn 12	148,5	153,4	155,4	134,8	152,5	153,9	153,8	154,9	155,4	156,4	156,0	155,4	155,8	155,4	153,9	157,8	156,6	156,0	157,2
Turn 13	103,9	106,3	107,4	96,3	107,2	106,5	107,1	107,5	107,1	109,6	108,2	108,0	107,9	109,1	109,0	108,3	106,8	107,9	108,6
Straight 6	152,0	152,8	153,9	149,2	152,7	153,2	153,5	153,3	154,4	154,9	154,6	154,6	154,6	154,9	154,5	155,7	150,5	155,6	154,7
Turn 14	149,9	152,5	150,7	150,0	151,0	148,8	151,8	150,8	151,4	148,5	151,0	150,9	153,1	150,8	152,3	150,4	150,3	150,4	152,1
Straight 7	168,6	169,3	167,8	166,8	169,8	167,8	170,3	169,1	170,8	169,2	170,8	170,0	169,0	170,8	171,4	170,9	169,8	168,6	170,4
Total lap	129,6	135,7	136,0	134,0	135,6	136,3	136,1	136,1	136,5	137,6	136,0	136,4	136,7	136,8	137,1	137,1	136,0	136,3	137,0

To change the view between segments or sectors use the *Sectors / Segments* icon on the taskbar of the panel. If the Table Report panel is set to sector mode and a sector is marked in the table, it will be highlighted in the GPS / Track map panel and will change the Run Chart panel operating mode to the sector summary.

In the two lap comparison mode, a red (for the base lap) and a white (for the lap being compared) dot appears next to the lap number in the table. If any laps have been excluded from analysis in the *Log Manager panel*, it will be greyed out in the table. To configure the panel press the ***Panel properties*** icon on the taskbar.

Option	Description
Use time as cell value	Activation of this field has priority over the other settings *(Channel* and *Summary parameter*). Provides a table with lap times ***Table Report of Lap Time***.
Channel	Channel defining the values in the table
Summary parameter	A parameter specifying which value within a segment is to be displayed: ***Min*** - minimum ***Max*** - maximum ***Average***
Conditional formatting	Conditional formatting within a segment, applies a cell fill color (on a scale from strong color to no color at all) depending on the numerical value.

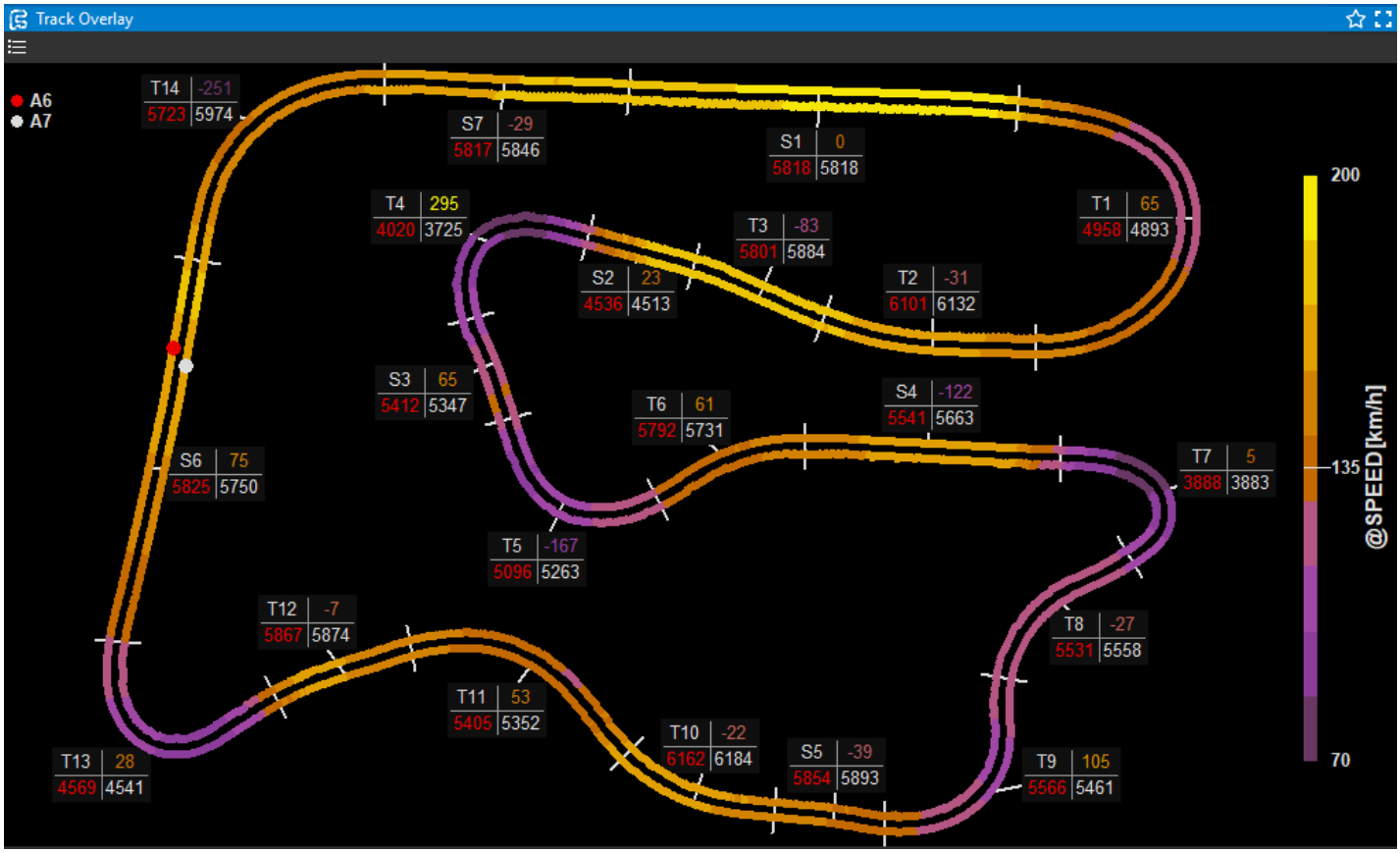
Table Report of Lap Time shows the times in each segment for all laps. The best times achieved in each segment / sector are highlighted in green. They form the ***Virtual best*** column showing the theoretical best lap time. The purple line indicates the ***Rolling best*** time. It indicates the best time achieved during a run, but which did not necessarily start at the physical start of the lap. The green line indicates the best time achieved in one lap.

Table Report of Lap Time

	Lap A1	Lap A2	Lap A3	Lap A4	Lap A5	Lap A6	Lap A7	Lap A8	Lap B1	Lap B2	Lap B3	Lap B4	Lap B5	Lap B6	Lap B7	Lap B8	Lap B9	Lap B10	Lap B11	Virtual best	Rolling best
Straight 1	6.784	6.911	6.785	6.793	6.877	6.738	6.891	6.774	6.789	6.721	6.792	6.686	6.720	6.775	6.717	6.711	6.709	6.688	6.795	6.686	6.795
Turn 1	11.418	11.357	11.333	11.283	11.509	11.286	11.309	11.596	11.397	11.382	11.895	11.333	11.285	11.479	11.535	11.296	11.378	11.386	11.475	11.283	11.475
Turn 2	4.581	4.528	4.491	4.529	4.493	4.568	4.517	4.530	4.435	4.463	4.581	4.468	4.423	4.432	4.479	4.508	4.426	4.504	4.470	4.423	4.470
Turn 3	2.661	2.613	2.695	2.614	2.610	2.610	2.603	2.612	2.648	2.599	2.608	2.606	2.600	2.685	2.604	2.602	2.605	2.607	2.569	2.569	2.569
Straight 2	2.058	2.058	2.064	2.065	2.096	2.008	2.001	2.006	2.017	2.041	2.100	2.105	1.995	2.017	2.097	2.013	2.049	2.022	2.090	1.995	2.090
Turn 4	6.341	6.251	6.226	6.259	6.126	6.098	6.168	6.262	6.377	5.972	6.213	6.235	6.388	6.288	6.090	6.193	6.351	6.257	6.274	5.972	6.274
Straight 3	3.127	3.028	3.124	3.072	2.978	3.023	3.029	3.105	3.032	3.104	3.013	3.277	3.190	3.180	2.999	3.007	3.208	3.015	2.934	2.934	2.934
Turn 5	5.638	5.658	5.677	5.614	5.706	5.606	5.598	5.680	5.716	5.514	5.659	5.721	5.621	5.541	5.667	5.605	5.673	5.780	5.592	5.514	5.592
Turn 6	3.999	4.219	4.008	4.001	4.002	4.005	4.053	4.016	4.063	4.042	4.000	3.994	4.006	4.006	4.008	4.089	4.000	4.008	4.002	3.994	4.002
Straight 4	5.317	5.404	5.315	5.274	5.258	5.262	5.230	5.319	5.316	5.264	5.218	5.261	5.302	5.254	5.251	5.218	5.288	5.311	5.221	5.218	5.221
Turn 7	7.068	7.085	7.000	6.928	7.129	6.988	7.101	6.883	6.911	6.897	7.010	7.030	7.073	6.995	6.999	6.890	7.003	6.998	7.073	6.883	7.073
Turn 8	4.920	5.018	4.981	4.989	5.006	4.952	5.009	4.985	4.979	4.921	4.920	5.101	4.999	4.837	5.001	5.104	4.827	4.826	5.010	4.826	5.010
Turn 9	6.808	6.512	6.437	6.593	6.599	6.580	6.600	6.527	6.519	6.566	6.445	6.359	6.412	6.505	6.461	6.412	6.607	6.691	6.403	6.359	6.403
Straight 5	3.778	2.618	2.708	2.707	2.667	2.667	2.658	2.618	2.621	2.612	2.612	2.648	2.613	2.613	2.609	2.664	2.672	2.711	2.704	2.609	2.704
Turn 10	5.884	3.547	3.599	3.603	3.596	3.551	3.546	3.585	3.582	3.499	3.535	3.547	3.577	3.570	3.482	3.545	3.592	3.592	3.586	3.482	3.586
Turn 11	7.111	5.742	5.745	5.774	5.809	5.799	5.804	5.674	5.679	5.815	5.794	5.813	5.795	5.707	5.819	5.684	5.735	5.800	5.702	5.674	5.702
Turn 12	3.097	3.059	2.998	3.299	3.020	3.004	3.048	3.001	2.997	2.950	2.995	3.043	3.002	2.997	3.009	2.975	2.987	2.947	2.982	2.947	2.982
Turn 13	8.335	8.126	7.940	9.110	7.996	8.043	8.010	7.945	8.002	7.823	7.981	8.053	7.946	7.896	7.774	7.814	8.007	7.942	7.921	7.774	7.921
Straight 6	8.521	8.514	8.407	8.767	8.524	8.430	8.417	8.462	8.414	8.388	8.317	8.344	8.402	8.402	8.453	8.386	8.681	8.380	8.404	8.317	8.404
Turn 14	6.545	6.462	6.568	6.536	6.482	6.608	6.515	6.525	6.520	6.596	6.519	6.487	6.448	6.485	6.459	6.535	6.576	6.532	6.472	6.448	6.472
Straight 7	4.789	4.703	4.803	4.813	4.780	4.799	4.691	4.785	4.686	4.743	4.765	4.773	4.747	4.688	4.682	4.685	4.736	4.788	4.731	4.682	4.731
Total lap	1:58.780	1:53.413	1:52.904	1:54.623	1:53.263	1:52.625	1:52.798	1:52.890	1:52.700	1:51.912	1:52.972	1:52.884	1:52.544	1:52.352	1:52.195	1:51.936	1:53.112	1:52.785	1:52.410	1:50.589	1:52.410

8.11. *Track Overlay*

If the reference track is generated ***Track Overlay*** shows a map of the track with the selected channel highlighted in color.



The visualisation shows data from one lap (marked as baseline). The cursor only moves when operating within the selected lap in other panels, or when the cursor is moved in the *Track Overlay* panel (using the Ctrl + → / ← keys or the left mouse button).

It is also possible to compare two laps (the outer lap with the red cursor is the base lap and the inner lap with the white cursor is the lap being compared).

With Ctrl+↑/↓ keys or the mouse wheel you can zoom the in and out. Use the arrows ↑/↓/→/← or the left mouse button to move the view on the screen.

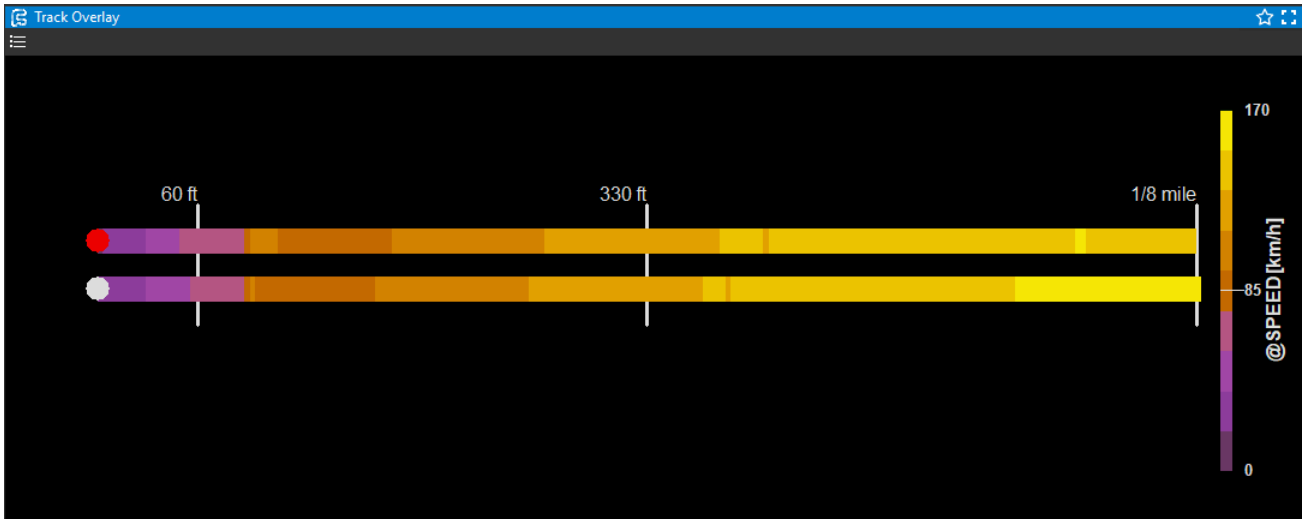
The following settings are available in the *Track Overlay* panel of the ***Panel properties*** window

Option	Description
Show labels	Displaying *labels* for each track segment in the visualisation. The labels contain the name of the segment and may additionally represent values from the selected *turn / straight* channels for the

<table>
<tr><th>Option</th><th>Description</th></tr>
<tr><td></td><td>given lap. The lap comparison mode shows the values for each lap and the difference between them (delta)

<table><tr><td>Segment no.</td><td>Delta</td></tr><tr><td>Value for the base lap</td><td>Value for the lap to be compared</td></tr></table>
(These labels can be moved with the left mouse button to improve the clarity of the visualisation).</td></tr>
<tr><td>Color channel</td><td>Channel plotted on a track map.</td></tr>
<tr><td>Turn summary channel</td><td>A channel that defines the value shown in the labels within each turn of the selected lap.</td></tr>
<tr><td>Turn parameter</td><td>A parameter specifying which value within a turn is to be displayed:
Min – minimum
Max – maximum
Average</td></tr>
<tr><td>Turn and straight summary channels equal</td><td>When this field is activated, the configuration for displaying values for straight sections of the track will be the same as for curves. (Otherwise, the display parameters for straight and curve may be different)</td></tr>
<tr><td>Straight summary channel</td><td>A channel that defines the value that is set in labels within each straight of the selected lap.</td></tr>
<tr><td>Straight parameter</td><td>Parameter specifying which value within the straight section of the track is to be displayed:
Min – minimum
Max – maximum
Average</td></tr>
</table>

For a **Drag** type project, the ***Track Overlay*** panel works without the need to generate a reference track. Then, the color specified in the *Color channel* is applied to the drag strip generated by the distance from the start.



8.12. *Video*

Video can be a great supplement to data analysis, providing valuable visual context for logged parameters. Data Master supports multiple video formats, including *.mp4, *.mov, *.wmv, and *.avi, and offers both automatic and manual synchronization options. When using a GoPro video that includes suitable metadata, channels such as *gopro speed*, *longitude*, and *latitude* are automatically populated and can be used for analysis or to verify synchronization accuracy.

It is possible to load multiple video files for a single log. One of the files can be synchronized, and the rest will be played in sequence as a continuation. By default, videos are ordered based on the order in which they were opened. However, you can change the order and select which file to synchronize using the right-click pop-up menu.

Note:

Video should be treated as a supplementary tool for analysis. Due to limitations in metadata precision and frame timing, it's not possible to achieve perfect, frame-accurate synchronization in all cases.

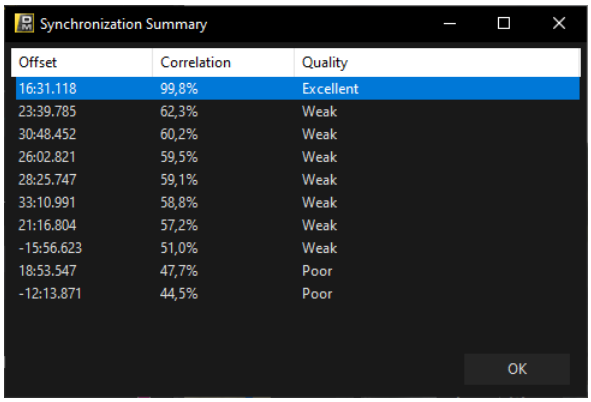
To use video with Data Master, it must first be synchronized with the log file. This can be done in two ways:

1. Automatic Synchronization (recommended) Automatic video synchronization can be enabled in the General Options window or by right-clicking the video file. This feature works when the following conditions are met:

- The log file includes valid GPS data
- The video was recorded using a GoPro camera (Hero5 Black or newer)
- The GoPro camera had GPS enabled during recording

When these conditions are fulfilled, the software will automatically align the log data with the video based on GPS data. This process is generally accurate and fast, eliminating the need for manual input.

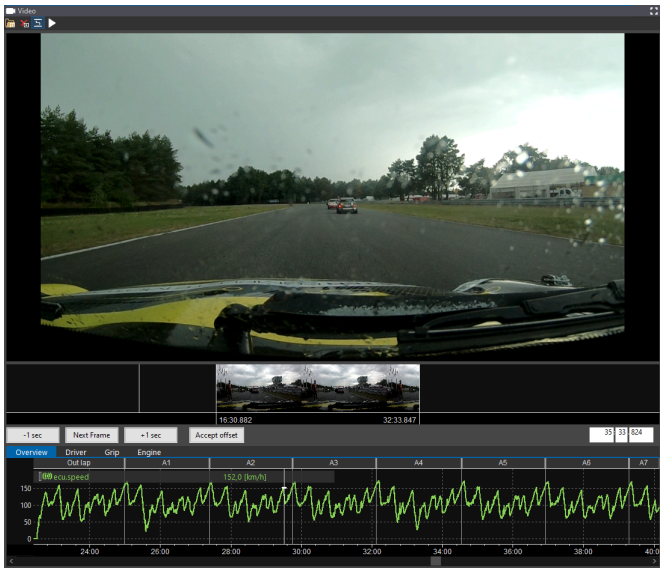
After synchronization, a **summary window** is displayed showing a list of the **top ten offset values** with the best correlation between the log and video. The offset with the highest match is selected automatically, but the user can also review and choose a different one if needed.



2. Manual Synchronization To manually synchronize a video file with a log:

1. Click the **Synchronize Video** icon on the taskbar.
2. The log window will appear below the video window, and the cursors for both will be **temporarily separated**.
3. Find a characteristic point in the log and video—such as exiting the pit lane, a sharp turn, or throttle application.
4. Place the log cursor at the correct time.
5. Match the video to the same event using:
    - **-1 sec / +1 sec** buttons to step the video by one second
    - **Next Frame** button for frame-by-frame adjustment

6. Click **Accept Offset** to confirm synchronization. The offset value will be displayed to the right.
7. Once accepted, both cursors will merge and playback will be synchronized.



When comparing two laps, two windows will appear: the top window displays the base lap, and the bottom window shows the comparison lap.

In the *Video* panel, you can also enable the overlay controls that display data over the video. To do this, select the **Overlay** icon from the taskbar. You can choose between two layouts: **Track** or **Simple**. These layouts are not editable, meaning the positions and appearance of the controls

cannot be changed. However, you can customize the displayed data by editing the default **aliases** linked to each control (see the *Aliases* section for more details).

8.13. *Favourite*

Once you have configured a panel, you can add it to your favourites by pressing the star icon in the top right corner. This will enable you to quickly select pre-configured panels from the window selector or from the application toolbar.

To remove a panel from favourites, deselect the filled star icon or in the *Select panel* window, right-click the favorite panel, and then select *Delete favorite panel*.

When you make any changes to your favourite panel, it is treated as a different panel. To remember these changes in your favourite window, uncheck and recheck the star icon.

9. Appendix A - Tracks with satellite image support

Belgium

Circuit de Spa-Francorchamps, Circuit Zolder

Croatia

Rijeka Grobnik

Czech Republic

Automotodrom Brno

France

Circuit de Nevers Magny-Cours

Germany

Eurospeedway Lausitzring, Hockenheim, Motorsport Arena Oschersleben, Nurburgring, Schleiz

Hungary

Pannonia Ring

Italy

ACI Vallelunga Circuit, Autodromo Nazionale Monza, Fanciacorta International, Imola, Misano World Circuit, Mugello Circuit, Racalmuto

Latvia

Bikernieki

Netherlands

Circuit Zandvoort, TT Circuit Assen

Poland

Tor Poznań, Tor Słomczyn

Portugal

Autódromo Internacional do Algarve

Scotland

Knockhill Racing Circuit

Slovakia

Slovakia ring

Spain

Circuit de Barcelona-Catalunya, Circuit de la Comunitat Valenciana Ricardo Tormo, Circuito de Albacete, Circuito de Navarra, Circuito Permanente de Jerez, Ciudad del Motor de Aragón

Sweden

Anderstorp Raceway, Falkenbergs Motorbana, Gelleråsen Arena, Gotland Ring, Kinnekulle Ring, Linköpings Motorstadion, Mantorp Park, Mittsverigebanan, Ring Knutstorp, Sturup Raceway

UK

Anglesey International, Brands Hatch GP, Cadwell Park, Donington Park, Oulton Park, Silverstone Natl., Snetterton Circuit, Thruxton Motorsport Centre.

USA

APEX Motor Club, Arizona Park, Barber Motorsport Park, Buttonwillow, Chuckwalla, Circuit of the Americas, High Plains, Laguna Seca Raceway, Michelin Raceway Road Atlanta, Miller Motorsports Park, New Jersey Motorsport Park, Pittsburgh International Race Complex, Pueblo Park, Road America, Sears Point Raceway, Thermal Blue, Thunderhill, Virginia International Raceway, Willow Springs

Qatar

Lusail Circuit

10. Appendix B - Automatic log export

10.1. Description

Data Master can operate in automatic export mode, allowing logs to be loaded and exported without opening the Graphical User Interface. This is done by specifying all necessary parameters via the Command Line, using an export configuration file.

Creating an Export Configuration File

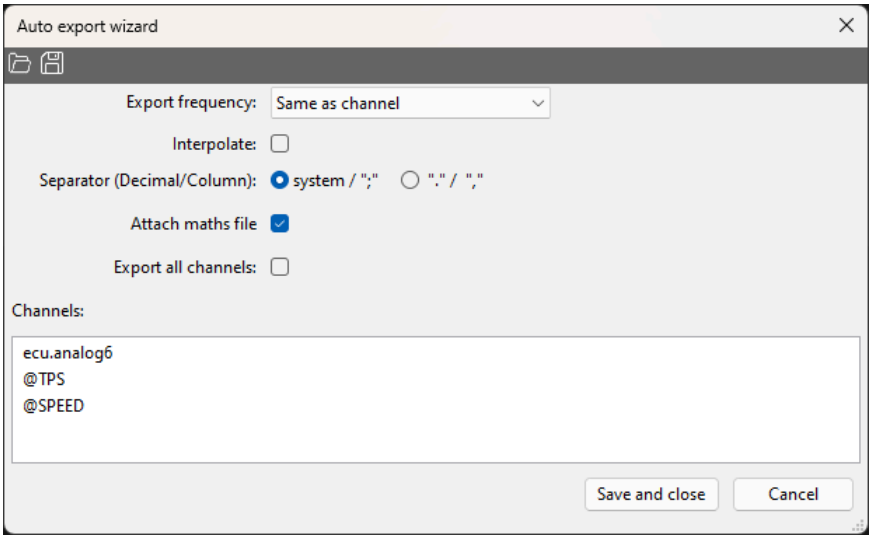
Before running an automated export, an export configuration file must be prepared. This file defines the export parameters and can be created within the Data Master software. Follow these steps:

1. Open Data Master.

2. In the *Graph Log* panel, click the "..." (*More Commands*) icon on the toolbar and select **Auto Export Wizard**.

3. In the wizard, configure the export settings:

- **Open** an existing export configuration file or create a new one.
- Select the **Export Frequency**.
- Choose whether to apply **data interpolation** or disable it.
- Set the **decimal separator**.
- Enable **Attached maths file** if you want to include mathematical channels and aliases that were loaded in the project at the time of creating the export file. If this option is not selected, these elements will not be included in the export.
- Decide whether to export **all channels** or only the channels currently present in the *Graph Log* (if "Export all channels" is not selected).



4. Save the configuration file in a chosen folder.

Running Automatic Export via Command Line

Once the export configuration file is ready, logs can be converted automatically without opening the software. To do this, use the Command Line and follow these steps:

1. Open the **Command Line**.

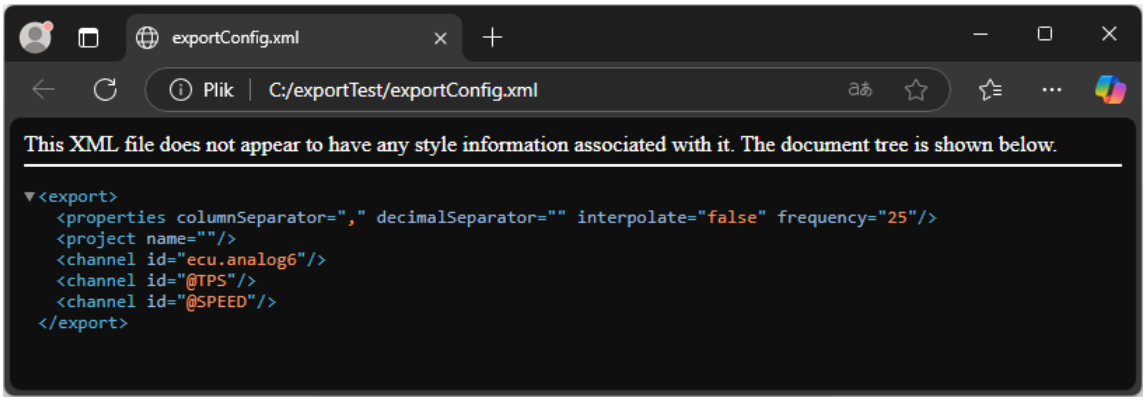
2. Enter the following command: DATA_MASTER.exe -csv-export <config_file_path> <log_files>

- Replace <config_file_path> with the absolute or relative path to the previously saved export configuration file.
- Replace <log_files> with:
  - A specific log file path (absolute or relative).
  - A wildcard pattern * to export all log files in the folder.
  - *.extension (e.g., *.adulog) to export all log files of a specific type in the directory.
  - A list of multiple log files with their paths.
- File names (for both the config file and logs) must be enclosed in double quotes (" ").

After executing this command, Data Master will process the logs according to the specified parameters and export them automatically. The resulting files will have the same names as the original log files but with a .csv extension.

> **Note:**
> If a file with the same name already exists, it will be overwritten.

Example configuration



10.2. Document history

Version	Date	Changes
1.0	2025.04.25	Initial release

11. Document history

Version	Date	Amendments
0.1	2022.05.20	First version of the document
2023.2	2023.04.28	Added Customize Keys chapter Changed the description of value axis in Graph Log Changed the Scatter Plot panel properties description
2023.5	2023.08.24	Added the description of a full size panel feature
2023.6	2023.09.29	Document layout changed to the Ecumaster standard format Reference Track description moved to *Panels / GPS / Track Map* *Lap Editor* description updated
2024.4	2024.04.19	Adjusted to changes from version 2024.4: Added *Table Builder* chapter *Maths Tree* chapter split for easier navigation *Channel aliases* description improved New menu items described
2024.5	2024.07.26	Renamed *Math Tree* to *Math Editor* Added the *Reports* chapter Updated the description of bookmarks
2024.7	2024.10.23	Added information about satellite imagery support to "GPS / Track Map" description Added "Appendix A- Tracks with satellite image support"
2025.3	2025.04.25	Updated and improved *Video* description Added "Appendix B- How-to Automate Log Export in Data Master"