T5 Suite 2.0 User manual

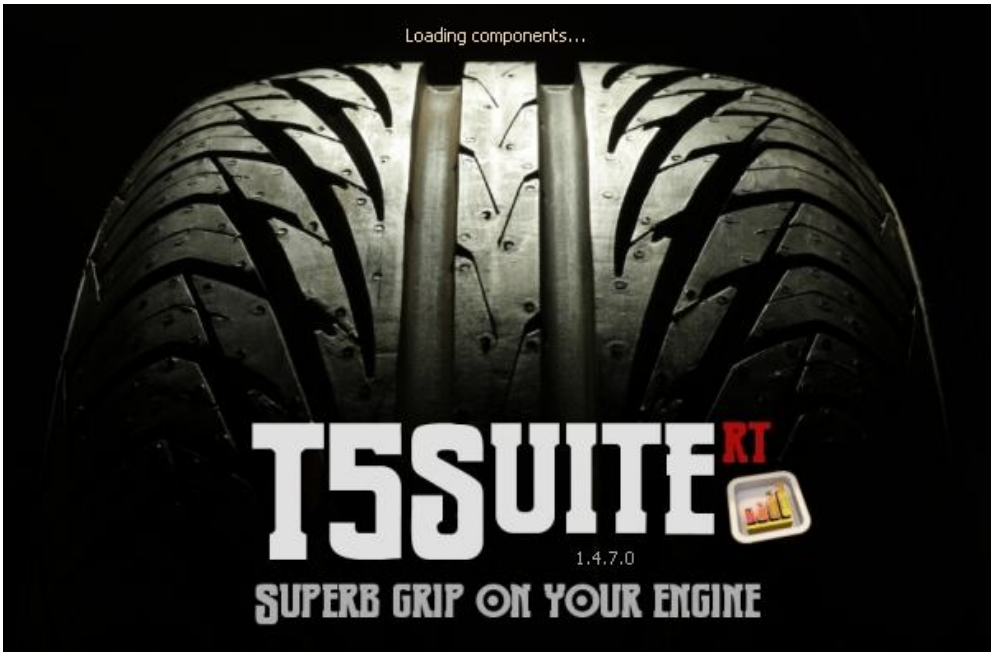


Table of contents

Table of contents 2
Purpose and scope 5
References 5
General information 5
File menu 6
File actions – Open a binary file 6
File actions – Open SRAM snapshot 8
File actions – Exit T5Suite 2.0 8
File actions – Create a backup file 8
File actions – Show vector information 8
File actions – Disassemble file 8
File actions – Options and settings 8
File actions – Settings – Auto size new mapwindows 8
File actions – Settings – Auto size columns in mapviewer 8
File actions – Settings – Show graphs in mapviewer 9
File actions – Settings – Show addresses in hex 9
File actions – Settings – Auto highlight selected map 9
File actions – Settings – Request a note on changes 9
File actions – Settings – Auto detect mapsensor type 9
File actions – Settings – Auto load last file on start-up 9
File actions – Settings – Fancy docking 9
File actions – Settings – Auto dock maps from same file 9
File actions – Settings – Auto dock maps with same name 9
File actions – Settings – New panels are floating 9
File actions – Settings – Auto update checksum 9
File actions – Settings – Synchronize mapviewers 9
File actions – Settings – Advanced mode enabled 9
File actions – Settings – Show additional symbol information 10
File actions – Settings – Use new mapviewer 10
File actions – Settings – Show easy options screen 10
File actions – Settings – Default view size for maps 10
File actions – Settings – Default view type for maps 10
File actions – Settings – Project folder 10
File actions – Settings – Auto generate LogWorks file after session 10
File actions – Settings – Directly write to ECU on changing maps (obsolete) 10
File actions – Settings – Enable canbus logging 10
File actions – Settings – Play sound when entering knocking conditions 10
File actions – Settings – Always generate AFR maps 10
File actions – Settings – Automatically open log file 10
File actions – Settings – One log per type per day 10
File actions – Settings – One log for all types 10
File actions – Settings – CAN USB device 10
File actions – Settings – Use wideband lambda through symbol 11
File actions – Settings – low voltage, high voltage, low AFR, high AFR 11
File actions – Settings – Autotune settings 11
File actions – Settings – Autotune settings – Cell stable time 12
File actions – Settings – Autotune settings – Correction percentage 12
File actions – Settings – Autotune settings – Acceptable target error 12
File actions – Settings – Autotune settings – Maximum adjustment per cycle 12
File actions – Settings – Autotune settings – Enrichment filter 12
File actions – Settings – Autotune settings – Discard measurements with fuel cut 12
File actions – Settings – Autotune settings – Fuelcut decay time 12
File actions – Settings – Autotune settings – Discard closed throttle measurements 12
File actions – Settings – Autotune settings – Auto update fuel map 12
File actions – Settings – Autotune settings – Minimum AFR measurements 12
File actions – Settings – Autotune settings – Maximum AFR deviance 12
File actions – Settings – Autotune settings – Disable closed loop on starting auto tune 12
File actions – Settings – Autotune settings – Play ping sound when cell processed 12
File actions – Settings – Autologging settings 13
File actions – Settings – Autologging settings – Enable auto logging 13

File actions – Settings – Autologging settings – Start logging trigger 13
File actions – Settings – Autologging settings – Stop logging trigger 13
File actions – Settings – Notifications 13
File general – Lookup partnumber & Browse library 14
File general – VIN decoder 14
File projects – Create a project 15
File projects – Open a project 15
File projects – Close project 15
File projects – Show transaction log 15
File projects – Roll back/undo 16
File projects – Roll forward/redo 16
File projects – Rebuild file 16
File projects – Edit project 16
File projects – Add note to project 16
File projects – Show project logbook 17
File projects – Produce latest binary 17
Actions menu 18
Actions basic – Verify checksum 18
Actions basic – Trionic options 18
Actions basic – Compare to another binary 21
Actions basic – Examine binary 22
Actions basic – Compare to original file 22
Actions basic – Show dyno graph 22
Actions basic – Show compressor map 23
Actions binary tools – Binary compare files 24
Actions binary tools – Show file in hex 24
Actions binary tools – Compare SRAM snapshots 24
Actions binary tools – Import SRAM snapshot into binary 25
Actions binary tools – Compare SRAM snapshot to binary 26
Actions binary tools – Binary compare SRAM files 26
Actions binary tools – Merge binary files 26
Actions binary tools – Split binary file 26
Actions binary tools – Move data to another binary 26
Actions binary tools – Injection timing viewer 27
Actions binary tools – Anomaly report 27
Actions binary tools – Open a save report 27
Manual tuning menu 28
Manual tuning – Injection – Injection (VE) normal 28
Manual tuning – Injection – Injection (VE) knock 28
Manual tuning – Injection – Injector constant 28
Manual tuning – Ignition – Ignition normal 29
Manual tuning – Ignition – Ignition knock 29
Manual tuning – Ignition – Ignition warm-up 30
Manual tuning – Engine warm-up – After start enrichment (1) 30
Manual tuning – Cold start – After start enrichment (2) 30
Manual tuning – Cold start – Cranking enrichment 30
Manual tuning – Turbo (manual) – Boost request 31
Manual tuning – Turbo (manual) – 1st and 2nd gear limiters 31
Manual tuning – Turbo (auto) – Boost request 31
Manual tuning – Turbo (auto) – 1st gear limiter 31
Manual tuning – Turbo advanced – PID values 31
Manual tuning – Turbo advanced – Regulation bias 31
Manual tuning – Turbo advanced – Fuel cut 31
Manual tuning – Idle control – Idle target RPM 31
Manual tuning – Idle control – Idle ignition 32
Manual tuning – Idle control – Idle ignition correction 32
Manual tuning – Idle control – Idle fuel correction 32
Tuning wizards menu 33
Tuning wizards – Easy tune to stage I 33
Tuning wizards – Easy tune to stage II 33
Tuning wizards – Easy tune to stage III 33
Advanced tuning wizards – Convert to different MAP sensor 33
Advanced tuning wizards – Convert to E85 (ethanol) fuel 33
Advanced tuning wizards – Tune for larger injectors 34

Advanced tuning wizards – Tune to stage X 34
Advanced tuning wizards – Change boost adaption ranges 35
Advanced tuning wizards – Change boost bias range 35
ECU Programming menu 37
Programmer (PE micro) – Settings 37
Programmer (PE micro) – Read ECU/Brute force erase/Program ECU 37
USBBDM programming – Download flash from ECU 37
USBBDM programming – Upload flash to ECU 37
USBBDM programming – Download SRAM from ECU 38
Canbus programming – Download flash from ECU 38
Canbus programming – Upload flash to ECU 38
Canbus programming – Download SRAM from ECU 38
Online tuning menu 39
Online tuning – basic – Connect ECU 39
Online tuning – basic – Synchronize maps 39
Online tuning – basic – Switch mode 39
Online tuning – advanced – Download SRAM from ECU 39
Online tuning – advanced – Upload SRAM from ECU 39
Online tuning – advanced – Compare ECU with binary 39
Online tuning – advanced – Write log marker (F6) 39
Online tuning – advanced – Clear knock counters 39
Online tuning – advanced – Configure real-time panel 39
Online tuning – advanced – Read DTC codes 40
Online tuning – Flash – Download flash from ECU 40
Online tuning – Flash – Upload flash to ECU 40
Online tuning – Internet – Browse tunes in internet repository 40
Online tuning – AirFuel – AFR target map 40
Online tuning – AirFuel – AFR feedback map 41
Online tuning – AirFuel – AFR error map 41
Online tuning – AirFuel – Generate new AFR target map 41
Online tuning – the real-time screen 42
Logfile analysis menu 45
Export T5Suite log file to LogWorks 45
View log in T5Suite 45
View matrix from log file 45
Help menu 45
Searching for information in the views 46
Filtering information 46
Sorting information 46
Adjusting values in map 46

Purpose and scope

By using this document users are assured to use the correct functionality of the software. The information from this document should be followed as stated and compared with expected output from the software.

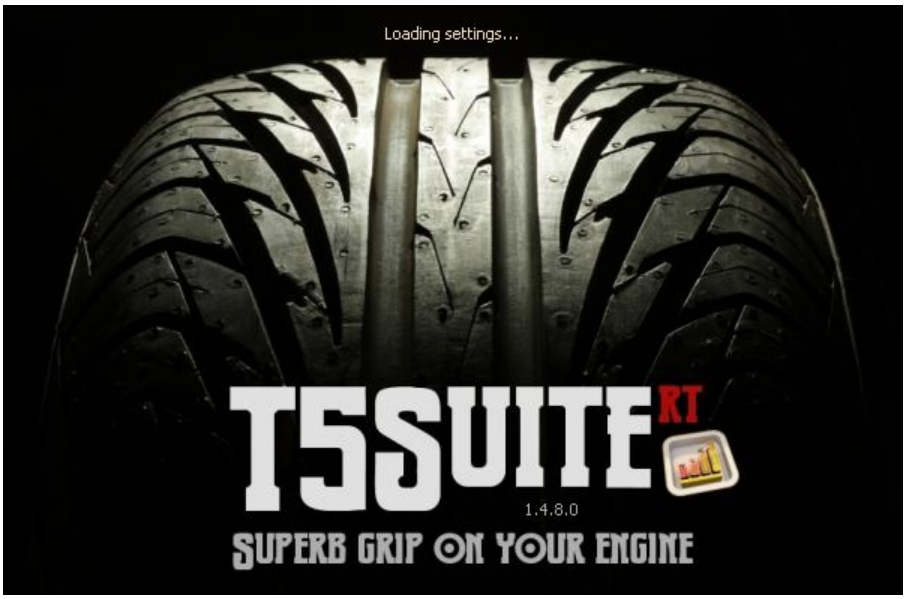
References

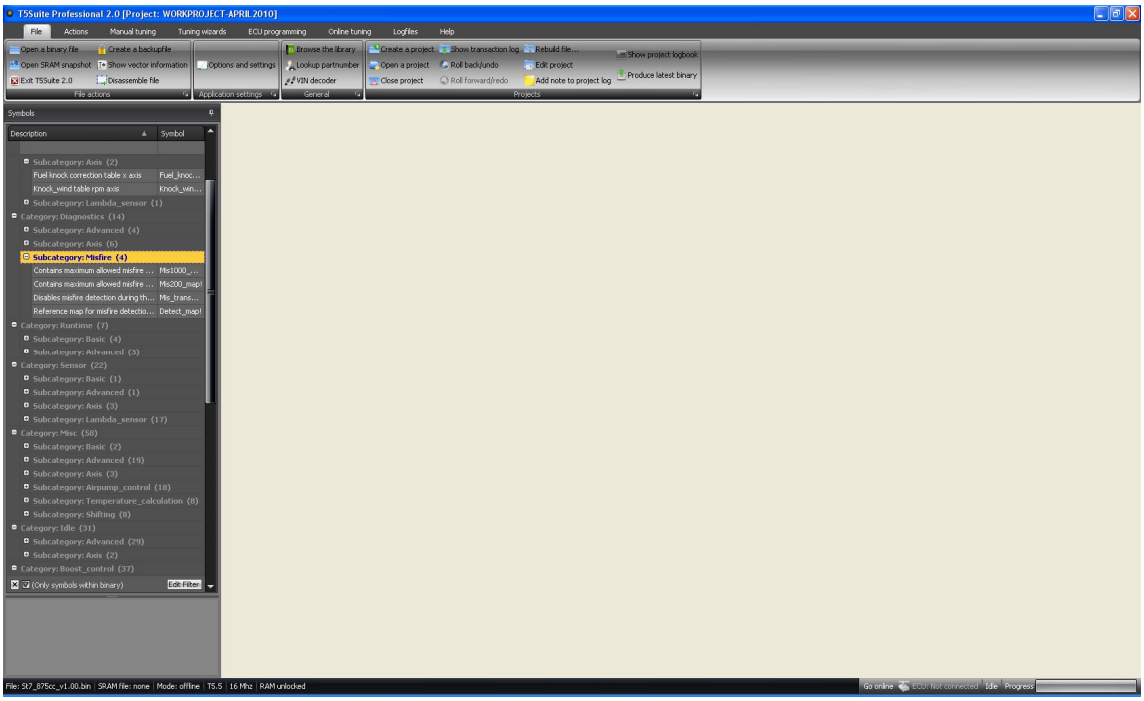
This section references, by identity and title, documents that facts in this document depend upon. Those documents are not necessarily the latest version.

Document	Title	Rev
Analyzing Trionic 5 with T5Suite	Trionic 5	1.22

General information

Thank you for downloading and installing T5Suite 2.0. In this manual you will find an overview of the most commonly used functions. After starting T5Suite 2.0 a splash screen will be displayed and after all components are loaded and the application is initialized the main screen will be displayed.



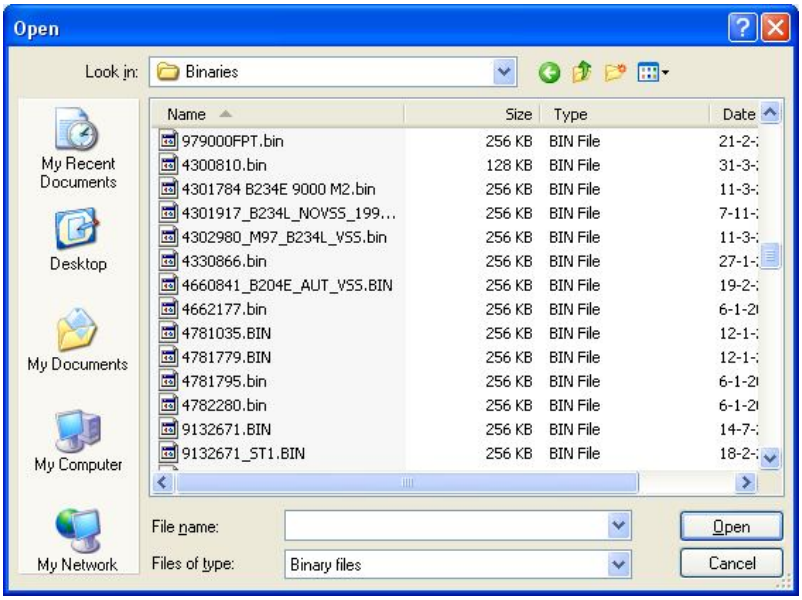


The top menu is a ribbon style menu also found in the latest Microsoft Office environments. It allows you to navigate through the available options quickly and easily. This first chapter will show you around the available options one by one.

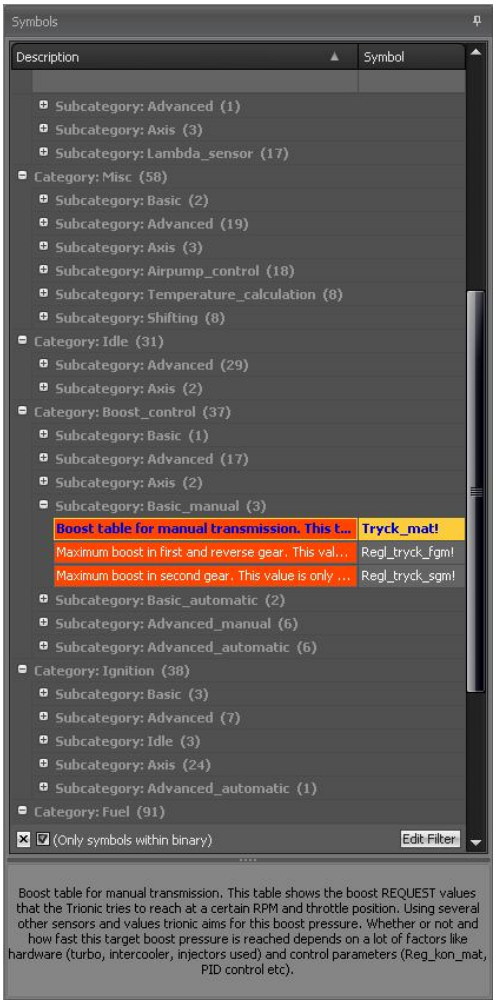
File menu

File actions – Open a binary file

This option allows you to open a binary file. T5Suite 2.0 will automatically extract all the relevant information from the file after selecting it in the open file dialog.



Once the file is opened and all information is extracted the symbol list on the left hand side of the main screen will be filled with information.



File actions – Open SRAM snapshot

Lets you open – or activate – a snapshot from the ECUs memory. This way you can view data that was in SRAM as well as data that is in the flash (bin). SRAM snapshots can be made by BDM or by CANbus.

File actions – Exit T5Suite 2.0

Exits the application in a safe manner.

File actions – Create a backup file

Lets you create a backup file for the binary at this point. It is wise to create backups before you start to make big changes to your file. If a project is opened, the backup file will be stored within the project folder otherwise it will be stored in the folder where the bin file is located.

File actions – Show vector information

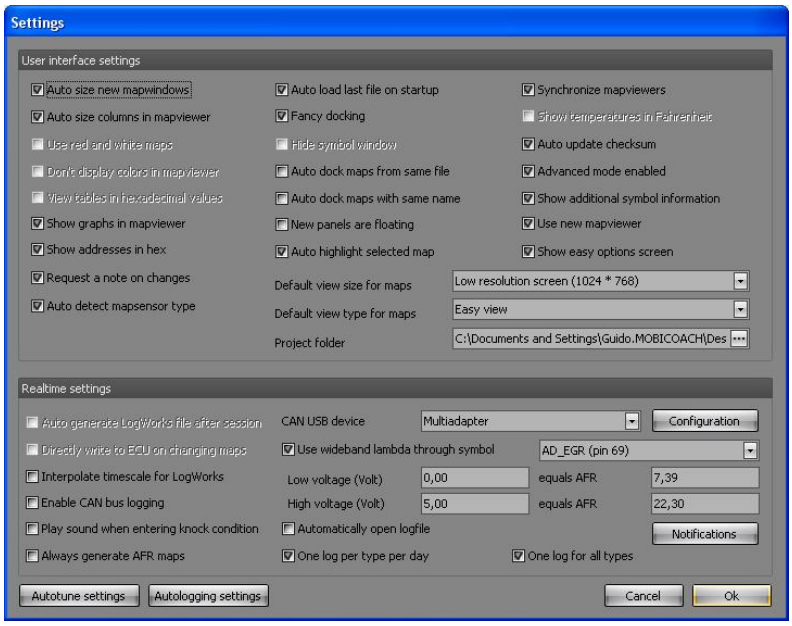
This is a little tool for techies. It shows the start-up vector information for the Motorola MC68332 microprocessor.

File actions – Disassemble file

Lets you disassemble the binary file into human readable text format also known as assembler language. If you're not sure what that means, you don't need this.

File actions – Options and settings

This will show the options screen for T5Suite 2.0.



File actions – Settings – Auto size new mapwindows

Determines whether or not new map windows will automatically be resized to fit their respective contents.

File actions – Settings – Auto size columns in mapviewer

Determines whether or not the map viewers should try to resize the columns they contain to make the content fit. As you can imagine ignition advance for example expressed in whole and fractional degrees takes more space than a simple decimal number ranging from 0-10.

File actions – Settings – Show graphs in mapviewer

To gain performance in lightweight computers you can switch off the graphical display in the mapviewer altogether with this option.

File actions – Settings – Show addresses in hex

T5Suite 2.0 can display addresses and lengths of symbols in decimal form or in hexadecimal form. This option allows you to switch between the two.

File actions – Settings – Auto highlight selected map

You can have T5Suite 2.0 select – and thus highlight the maps open from the tuning menu, so you will learn which maps are located where in the symbol list (only applicable for advanced mode).

File actions – Settings – Request a note on changes

If you are working in a project you can have T5Suite 2.0 ask you for a comment every time you make a change to one of the maps. This way, you can keep track of changes very easily.

File actions – Settings – Auto detect mapsensor type

Most pro made tunes don't have the T5Suite 2.0 marker for the correct mapsensor type in the binary file. This option lets you try T5Suite 2.0 to auto detect the correct mapsensor type for use with the current binary file.

File actions – Settings – Auto load last file on start-up

If you work on one file for a prolonged period of time you might want T5Suite 2.0 to reopen the last file automatically when you start it. This option allows you to control that behaviour. If the last opened item was a project, T5Suite 2.0 will automatically reopen that project for you at start-up.

File actions – Settings – Fancy docking

If the dragging and docking of windows (map viewers) is slow or causes issues, please turn this option off.

File actions – Settings – Auto dock maps from same file

If you open more than one map from the same file (for example fuel and ignition maps) you can choose to have those docked together using this option. If the option is turned off, windows will be tiled next to each other.

File actions – Settings – Auto dock maps with same name

If you open the same maps from different files (for example the main ignition map from 2 files) you can choose to have those docked together using this option. If the option is turned off, windows will be tiled next to each other.

File actions – Settings – New panels are floating

Upon opening a new mapviewer you can choose to have this window docked in the main screen or have it floating.

File actions – Settings – Auto update checksum

Having this checked will rid you of the constant worry whether or not the checksum of your file is valid. We advise you to keep this turned on!

File actions – Settings – Synchronize mapviewers

With this enabled, T5Suite 2.0 will try to keep multiple opened mapviewers synchronized with eachother. Cell selections, graph rotation etc will be done in all open mapviewers.

File actions – Settings – Advanced mode enabled

This will switch T5Suite 2.0 into advanced mode. This means you will have access to more options in the application and the symbol list will be visible as well.

File actions – Settings – Show additional symbol information

If checked, the little panel on the bottom of the symbol list will be visible with information about the selected map in the symbol list.

File actions – Settings – Use new mapviewer

A new, better looking surface graph has been implemented and you can choose whether you like to use the new one or the old one that was used in T5Suite 1.x.

File actions – Settings – Show easy options screen

Lets the user decide whether the "old" fashioned firmware options screen should be used or the newer "properties" like options screen.

File actions – Settings – Default view size for maps

Allows you to adjust the map viewers size for different screen resolutions.

File actions – Settings – Default view type for maps

Easy view is best if you don't know what this means ;)

File actions – Settings – Project folder

Allows you to set an alternate project root folder for creating projects. You can use this if you want all the projects to be located on a separate disk partition for example.

File actions – Settings – Auto generate LogWorks file after session

If you run a live session on your ECU with the canbus connection, T5Suite 2.0 can automatically generate a LogWorks file from that session and start LogWorks.

File actions – Settings – Directly write to ECU on changing maps (obsolete)

Meant for development purposes. Please keep this turned off.

File actions – Settings – Enable canbus logging

For debugging purposes only. Please keep this turned off on normal operation.

File actions – Settings – Play sound when entering knocking conditions

When the real-time part signals knock conditions in the ECU, a sound will be played.

File actions – Settings – Always generate AFR maps

To be able to disable AFR map generation this option was created. Users without a real-time connection will never need the AFR maps of course.

File actions – Settings – Automatically open log file

For easy access when tuning a vehicle on the road. After ending a logging session, the log will automatically be opened for reviewing.

File actions – Settings – One log per type per day

When selected the log file creation will be maximized to one log file per type of logging (depending on the selected tab page in the real-time panel). If "One log for all types" is also enabled, only one log file will be created per day for all types and sessions.

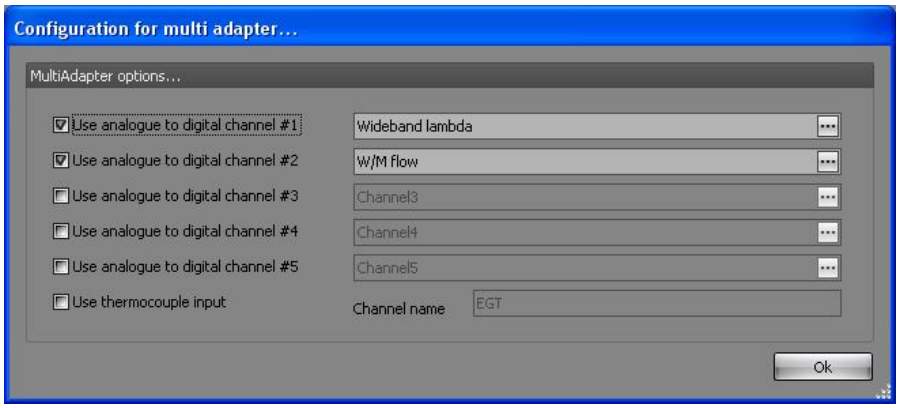
File actions – Settings – One log for all types

When selected all the various tab pages in the real-time panel will generate data into the same file instead of recreating a new log file after every tab page change.

File actions – Settings – CAN USB device

Three devices are currently supported, the Lawicel device (www.canusb.com), the DIY CANUSB and the multi-adapter that has a canbus interface a BDM interface, 5 AD inputs and a thermocouple input,

both designed by ecuproject members. The multi-adapter will require more configuration so when this is selected, the extra configuration button next to the drop down box will be enabled. By selecting it you can set the extra options.



File actions – Settings – Use wideband lambda through symbol

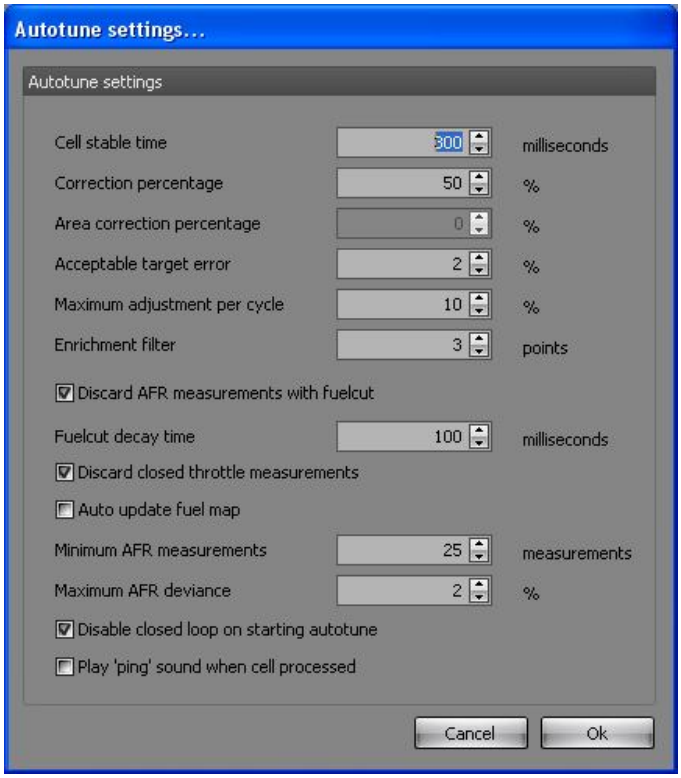
T5Suite allows you to setup you engine with a wideband lambda sensor like the LC1 from innovate motorsports. The wideband controller can deliver a linear analogue signal to the ECU. We advise you to use AD_EGR for that (pin 69).

File actions – Settings – low voltage, high voltage, low AFR, high AFR

Settings to calibrate the wideband lambda controller input within T5Suite 2.0.

File actions – Settings – Autotune settings

Lets you choose options for the Autotune fuel function in T5Suite 2.0. The options screen for Autotune will be shown. Please note that you need to be running a wideband lambda sensor to be able to use the Autotune function.



File actions – Settings – Autotune settings – Cell stable time

Determines how long – in milliseconds – the system should reside in a certain load/rpm cell before T5Suite 2.0 validates the AFR measurement.

File actions – Settings – Autotune settings – Correction percentage

Determines how much a certain AFR error will be corrected. Setting this to 50% (default) means 50% of the established AFR error will be corrected for each session.

File actions – Settings – Autotune settings – Acceptable target error

Determines how big the AFR error is allowed to be without T5Suite 2.0 taking action in that certain load/rpm cell.

File actions – Settings – Autotune settings – Maximum adjustment per cycle

Determines how big the maximum adjustment will be in percentages measured from the original fuel map.

File actions – Settings – Autotune settings – Enrichment filter

Determines how big enrichment/enleanment factors are allowed to be while still doing adjustments to the fuel map.

File actions – Settings – Autotune settings – Discard measurements with fuel cut

Determines whether measurements while the system is in fuel cut will be ignored.

File actions – Settings – Autotune settings – Fuelcut decay time

Determines how long T5Suite 2.0 must wait after a fuel cut situation before handling measurements as valid.

File actions – Settings – Autotune settings – Discard closed throttle measurements

Determines whether measurements with closed throttle plate will be discarded.

File actions – Settings – Autotune settings – Auto update fuel map

This option decides the mode in which Autotune works. If this is checked the system will try to map the fuelling entirely on its own. No feedback from the user is requested. After a Autotune session the user can however revert to the previous fuel map automatically if he/she chooses to do so.
If this is not checked the Autotune function will be more like a question & answer game between T5Suite 2.0 and the user. After every session a map is prompted in which T5Suite 2.0 shows which cells are to be altered to reach the requested AFR. The user can select/deselect cells to his/her liking and update the fuel map with the selected cells.

File actions – Settings – Autotune settings – Minimum AFR measurements

(not used yet).

File actions – Settings – Autotune settings – Maximum AFR deviance

(not used yet)

File actions – Settings – Autotune settings – Disable closed loop on starting auto tune

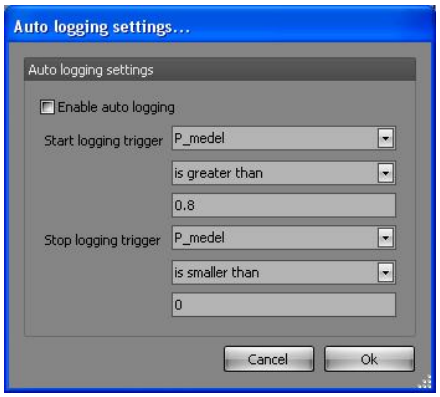
Some advanced users have closed loop operation turned off completely. In that case you might want to prevent T5Suite 2.0 to disable closed loop operation when starting an auto tune session.

File actions – Settings – Autotune settings – Play ping sound when cell processed

Allows you to have T5Suite 2.0 play a sound notification to indicate that a cell in the AFR map has been processed. This way you can proceed to the next cell without having to keep an eye on the computer.

File actions – Settings – Autologging settings

Lets you choose options for the autologging function in T5Suite 2.0.



File actions – Settings – Autologging settings – Enable auto logging

When enabled, the real-time panel will monitor the settings and start / stop sessions based on the remaining options.

File actions – Settings – Autologging settings – Start logging trigger

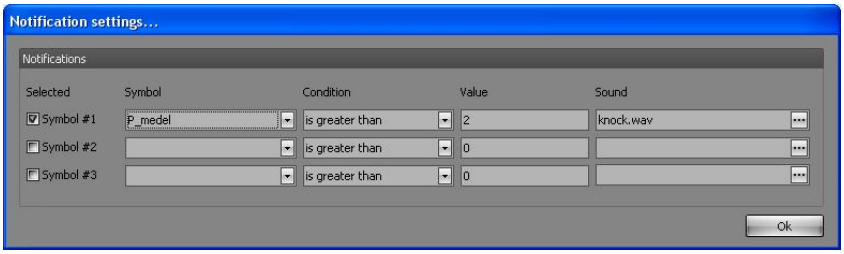
Determines what the "start logging session" trigger is. In the example P_medel (average pressure in the inlet manifold) must be greater than 0.8 bar to start a logging session automatically.

File actions – Settings – Autologging settings – Stop logging trigger

Determines what the "stop logging session" trigger is. In the example P_medel (average pressure in the inlet manifold) must be smaller (less) than 0.0 bar to end a logging session automatically.

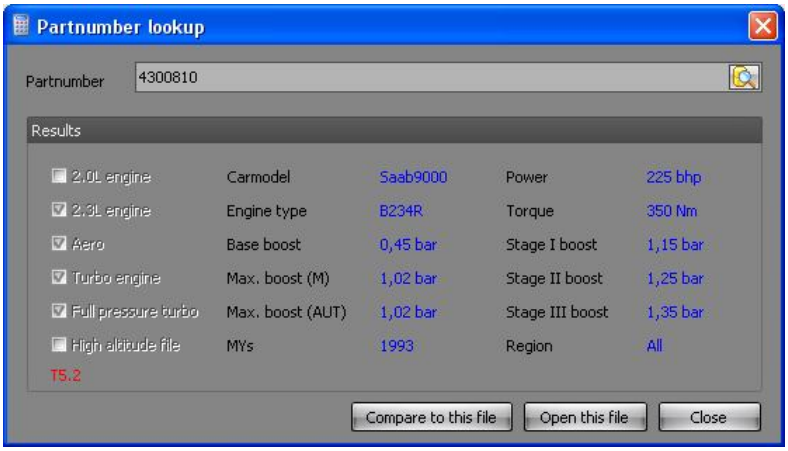
File actions – Settings – Notifications

Lets you choose notification options for T5Suite 2.0 real-time.

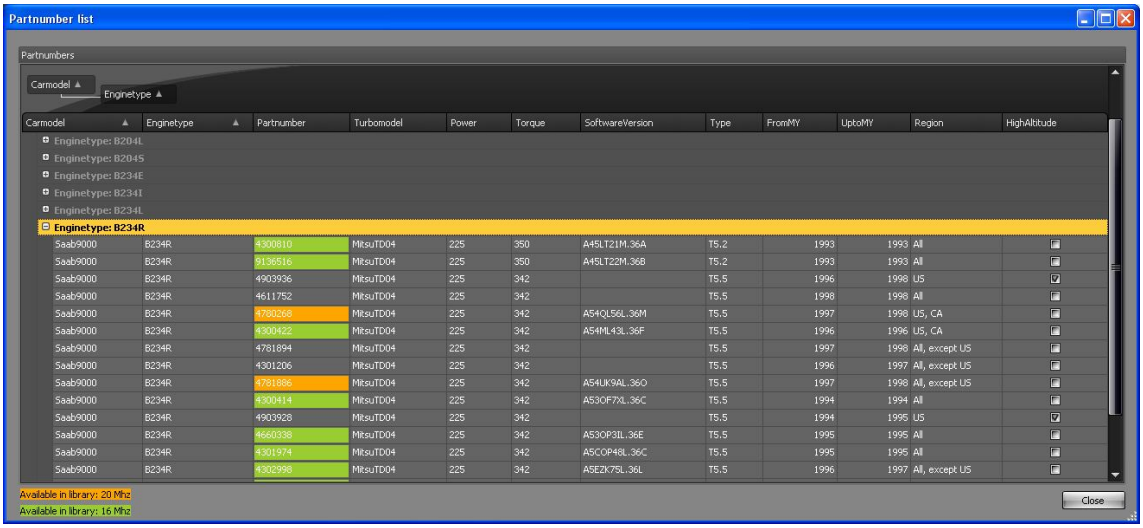


File general – Lookup partnumber & Browse library

T5Suite 2.0 incorporates a bunch of stock binary files. Within this 'library' you can search for partnumber and even open or compare files. The lookup partnumber will not open files while the Browse Library function can.



Clicking the little lookup button on the side of the text input field you can browse through the library.



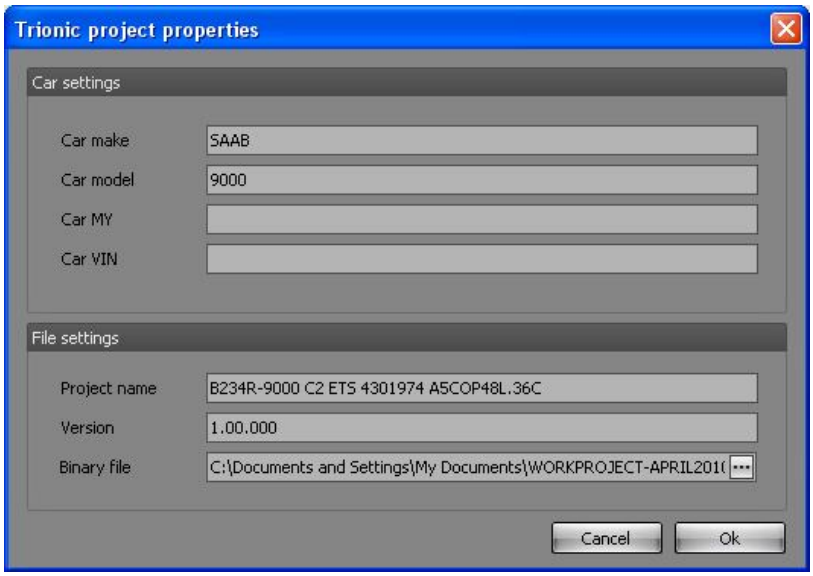
The green cells indicate that the binary file is actually present in the library and that you can use this file to open and compare. Double clicking such a row will automatically select the given file and close the browse window.

File general – VIN decoder

T5Suite 2.0 incorporates a VIN decoder which you can access though this button.

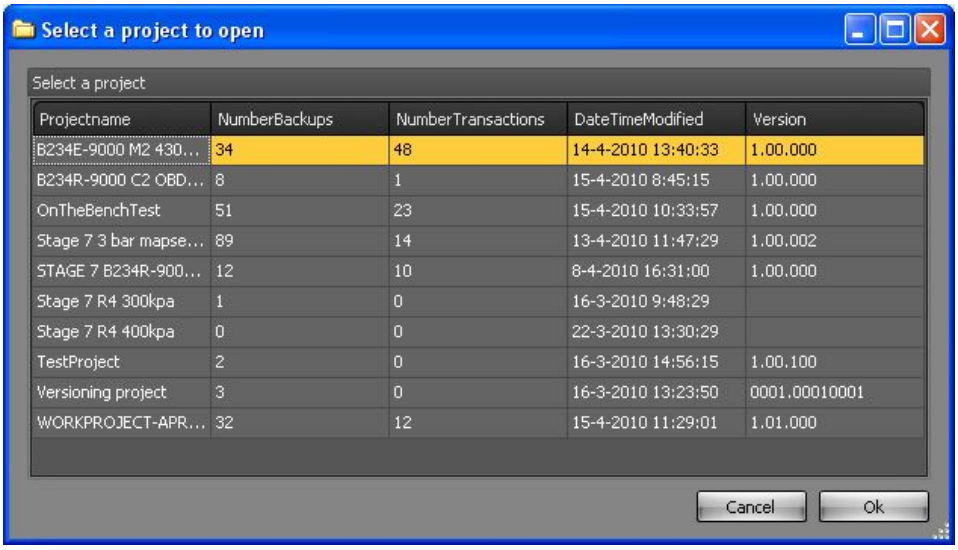
File projects – Create a project

T5Suite 2.0 allows you to work on your tune in a project based fashion. This option lets you create a new project. Projects have the advantage of having roll-back and roll-forward functions, having versioning and keeping things tidy and together. You are advised to work in a project if you do more than simple easy-tune your binary file.



File projects – Open a project

Lets you select and open a previously created project. If no projects are available (none were created before) T5Suite 2.0 will notify you with a message box.

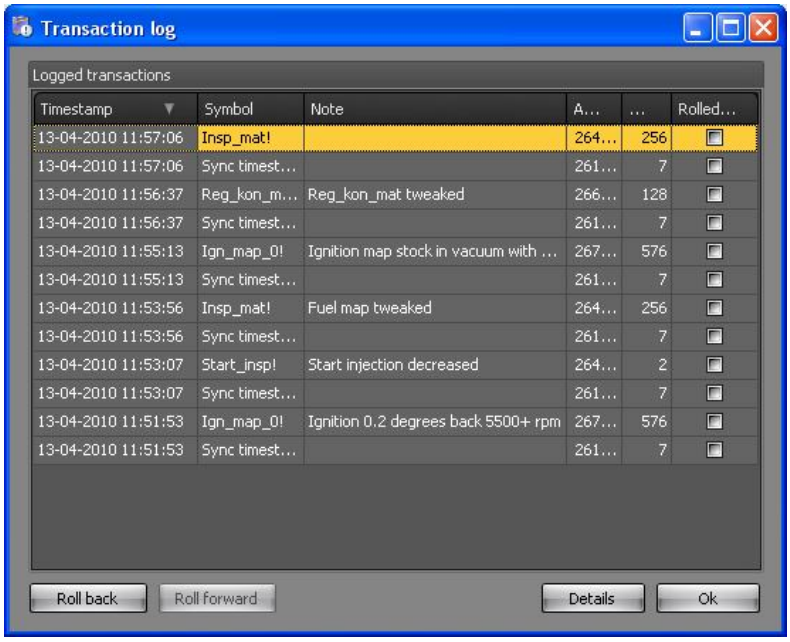


File projects – Close project

Closed the project and allows you to work on single files again.

File projects – Show transaction log

Shows the transaction log for the current project. Since a project contains only one binary file, you could see this as an undo/redo list for the project binary file.



File projects – Roll back/undo

Lets you rollback the last transaction made to the binary file. If no transactions are available to rollback, the button will be disabled.

File projects – Roll forward/redo

Lets you roll forward (redo) the last transaction that was undone/rolled back. If no transaction are available to roll forward, the button will be disabled.

File projects – Rebuild file

This enables you to rebuild a project file (binary) up to a certain point in time. T5Suite 2.0 will ask you for a date and it will restore – if possible – the file that you had at that specific date.

File projects – Edit project

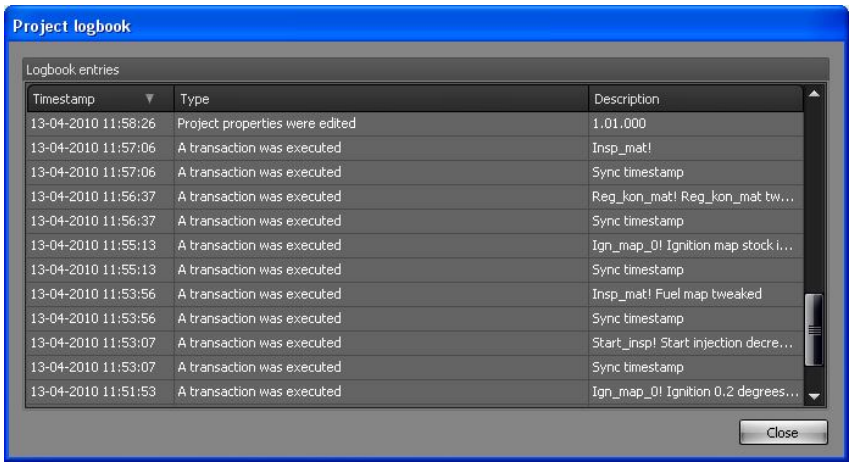
Lets you edit the project properties for any project. This enables you to manage your version numbering yourself. Version numbers are stored, together with all other project properties, in the xml file in the project folder.

File projects – Add note to project

You can add a note to you project with a timestamp attached to it, so you can keep track of changes you made in your setup. For example, if you start using different injectors or mount a bigger intercooler, you can enter a note of this into the project log for later reference.

File projects – Show project logbook

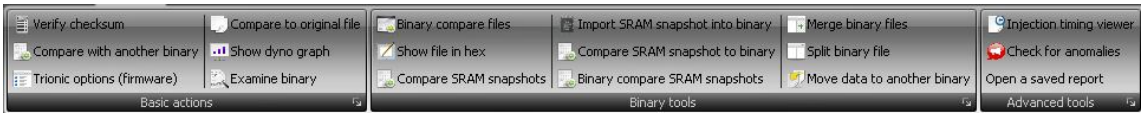
Shows you in details what has happened in your project.



File projects – Produce latest binary

Lets you export the project binary in its current state so you can save it in another location easily.

Actions menu

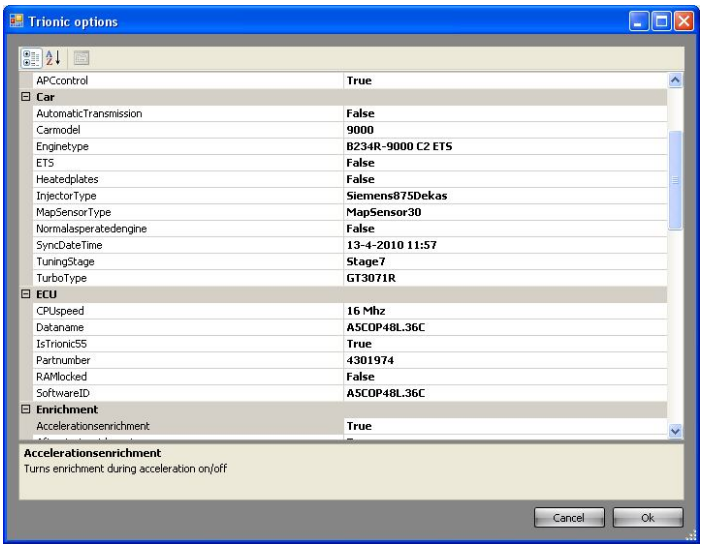


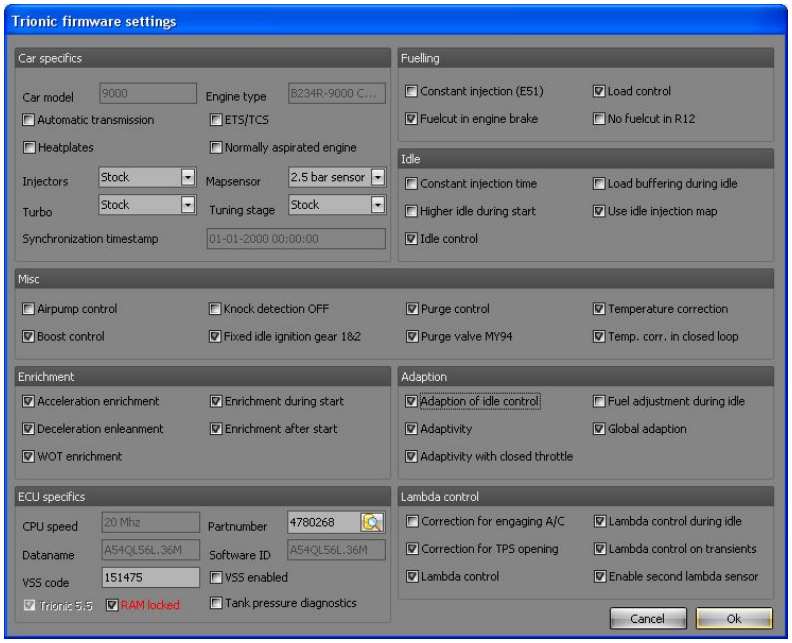
Actions basic – Verify checksum

This option allows you to manually verify the binary files checksum. This will not be needed if the auto checksum update function is turned on.

Actions basic – Trionic options

This option allows you to view and modify a lot of parameters in the ECU. There are two ways this options screen can be shown and this depends on the settings "Show easy options screen".





Adaption of idle control
Turns adaptive behavior for idle control on/off
Adaptivity
Turns fuel adaption on/off (spot adaption?)
Adaptivity with closed throttle
Turns adaption with closed throttle plate on/off
Fuel adjusting during idle
Turns fuel adaption during idle state on/off
Global adaption
Turns adaption on/off on a global level
Airpump control
Turns the air pump control (SAI models) on/off
APC Control
Turns the boost control valve control on/off
Automatic transmission
Sets the car in automatic transmission mode or in manual transmission mode. This should match the gearbox you have in your car
Carmodel
Information field, showing the car model
Engine type
Information field, showing the engine type
ETS
Turns the Electronic Throttle System on/off. This should match your car. If the car is equipped with TCS, turn it on, otherwise turn it off.
Heated plates
Some models are equipped with heat plates, located between the head and the intake manifold.
Injector type
Information field used as an indicator to T5Suite 2.0 which injectors you have mounted in the car.
Options:
Stock injectors
Green giants
Siemens DEKA 630cc/min (60lb/h)
Siemens DEKA 875cc/min (80lb/h)
Siemens 1000cc/min
Mapsensor type
Information field used as an indicator to T5Suite 2.0 which mapsensor type you are using.
Options:
Mapsensor 2.5 bar (stock, up to 1.45 bar of boost control)
Mapsensor 3.0 bar (up to 1.95 bar of boost control)
Mapsensor 3.5 bar (up to 2.45 bar of boost control)
Mapsensor 4.0 bar (up to 2.95 bar of boost control)
Normal aspirated engine
Indicates whether the car has a turbocharger mounted or not
Synchronization date/time
Indicates when T5Suite 2.0 has last altered the content of the maps in the file. This timestamp is used to determine whether to synchronize maps from the file to the ECU or the other way around.
Tuning stage
Information field, used by T5Suite 2.0 to see whether the file has been tuned before or not.
Turbo type
Information field used as an indicator to T5Suite 2.0 which type of turbo is mounted in the car. Please set to the correct type for good operation.
Options:
Stock (T25 mostly)
TD04-15T
TD04-19T
GT28BB
GT28RS
GT3071r (either .86 or .64)
Holset HX35w
Holset HX40w
CPU Speed
Information field showing the CPU speed this bin was designed to run on.
Dataname

Information field showing the software identifier called data name.

IsTrionic55
Information field showing whether this bin is a T5.5 binary or a T5.2 binary.

Partnumber
Information field showing the partnumber of the software. Normally this matches the number on the ECU housing.

RAM locked
Toggles the RAM lock flag. If RAM is locked, no data can be written to it, so no live tuning is possible. If you want to alter maps and values in real-time RAM needs to be unlocked.

Software ID
Information field showing the software identified for this specific binary file.

Acceleration enrichment
Turns mixture enrichment during acceleration on/off

After start enrichment
Turns mixture enrichment after starting the engine on/off

Deceleration enleanment
Turns mixture enleanment during deceleration on/off

Enrichment during start
Turns mixture enrichment during cranking on/off

WOT enrichment
Turns mixture enrichment during Wide Open Throttle situations on/off

Constant injection time E51
Turns a constant injection time on/off

Fuelcut
Turns fuel cut off during engine braking on/off

Load control
Turns correction factor for load changes on/off

No fuelcut in R12 (reverse, 1st and 2nd)
Turns the fuel cut off during engine braking on/off in 1st, 2nd and reverse gears.

Constant injection time during idle
Turns a constant injection duration during idle on/off

Higher idle during start
Turns a higher idle rpm during starting on/off

Idle control
Turns separate idle control on/off

Load buffer during idle
Turns load buffering during idle on/off

Use separate injection map during idle
Turns the usage of a separate injection map during idle situation on/off

Constant idle ignition angle during gear one and two
Turns the usage of a fixed, constant ignition angle in first and second gear on/off

Knock regulating disable
Turns off the knock detection algorithms in Trionic 5. Use with caution.

Factor to lambda when AC is engaged
Determines whether an extra correction factor should be applied to the closed loop operation when the airco is engaged. This allows for other AFRs then 14.7 to be targeted when engine load it higher due to the airco components being activated.

Factor to lambda when throttle opening
Determines whether an extra correction factor should be applied to the closed loop operation when the throttle plate is opening. Opening the throttle plate results in an extra air rush, while the fuelling particles cannot keep up with this sudden airflow change resulting in a lean mixture. This option allows for other than 14.7 AFRs to be targeted in these conditions.

Lambda control
Turns closed loop operation on/off. If closed loop is activated the system will be in closed loop when certain criteria are met. If closed loop is deactivated here, the system will never enter closed loop and mixture will be determines by fuelling settings only.

Lambda control during idle
Determines whether closed loop operation should be active during idle conditions.

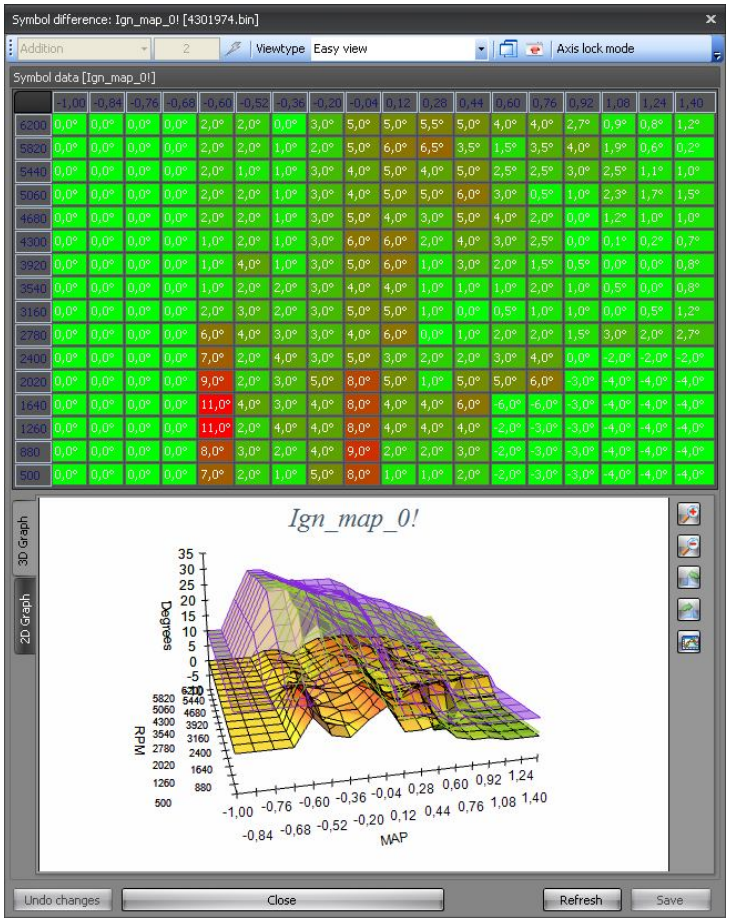
Lambda control during transients
Determines whether closed loop operation should stay active even when transients occur in the engine load or throttle plate opening.

Second O2 sensor enable
If your car is fitted with two lambda sensors (one pre-cat and one post-cat sensor) this should be enabled. Most models only have one lambda sensor and therefore should have this option turned off.

Purge
Turns the purging function on/off
Purge valve MY94
Turns the specific purge function for MY94 valves on/off
Temperature correction with active lambda control
Turns the temperature correction in closed loop operation on/off
Temperature compensation
Determines whether the system should compensate for temperature differences or not.
VSS Active
Turns VSS (Vehicle Security System) on/off
VSS Code
The VSS code to use for this car (if VSS is active)
Tank pressure diagnostics
Turns fuel tank pressure diagnostics on/off

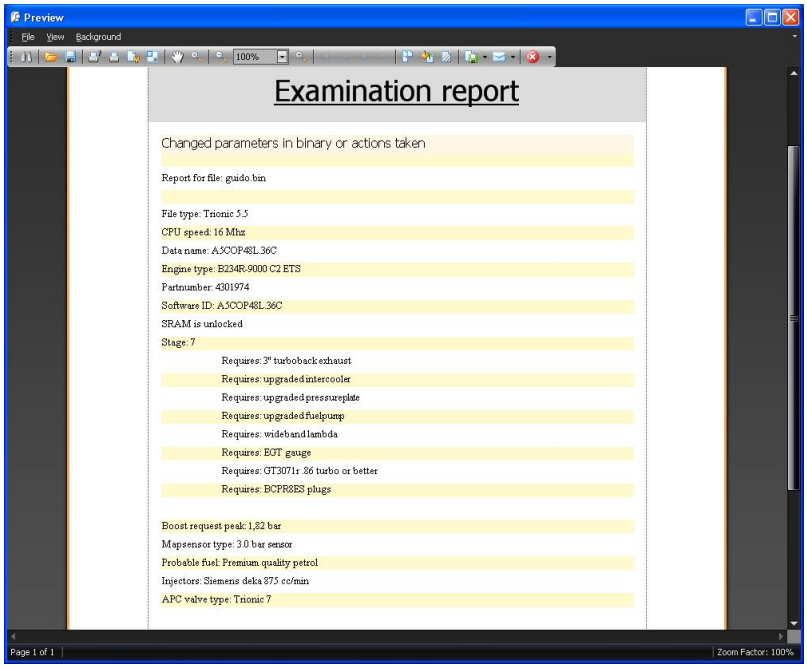
Actions basic – Compare to another binary

Comparing binary files (actually the maps inside them) is a very educational activity. Whilst comparing files you will see which maps are different in for example B234L and B234R engine types. The compare function asks you to select a binary file to compare the one to that you have already opened. If you select a binary file this will result in a list of maps/values that are different. Double clicking a symbol in this result list will open two map views, one for each binary file. If you would like to see both graphs overlaid in one viewer, you can right click on the symbol in the compare list and select "View differences map". This will look something like this:



Actions basic – Examine binary

This option will run a examination process on the opened binary file and T5Suite 2.0 will generate a report of its findings. This examination is not 100% fool-proof but it will give you a pretty accurate idea on what an unknown binary file was intended to be used for hardware wise.

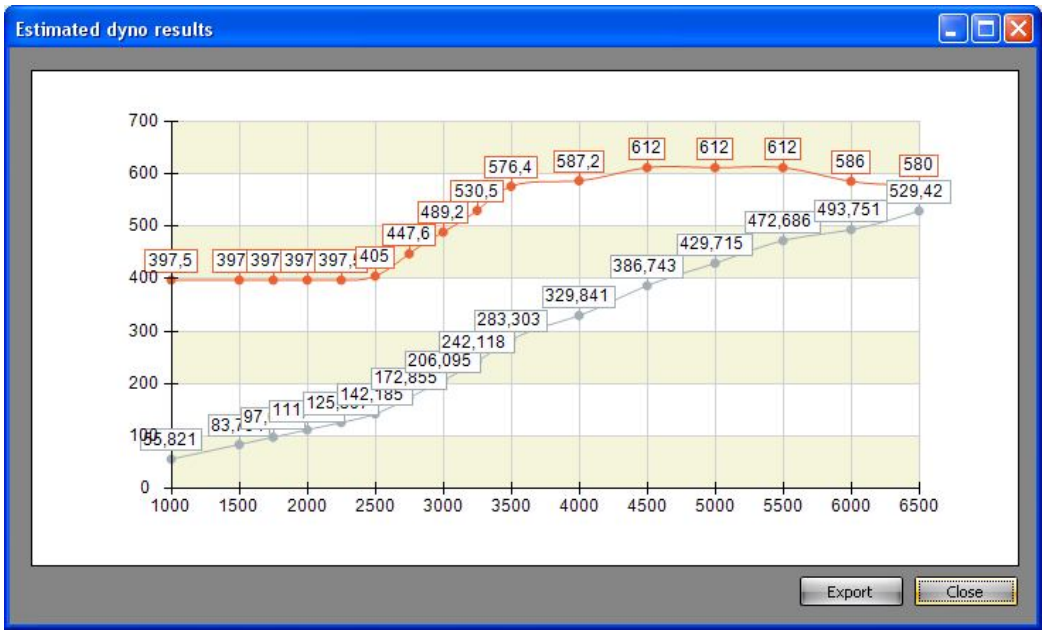


Actions basic – Compare to original file

If T5Suite 2.0 has the original file matching your specific binary it will allow you to quickly compare your file with the original.

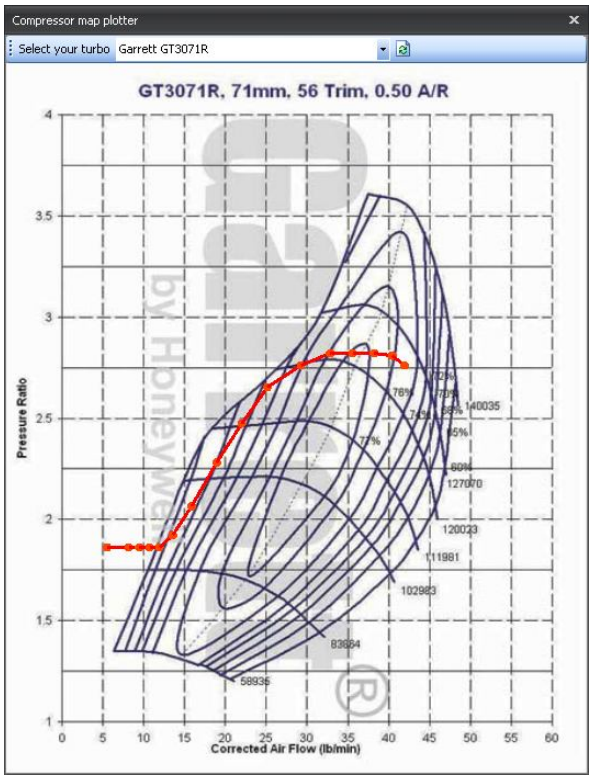
Actions basic – Show dyno graph

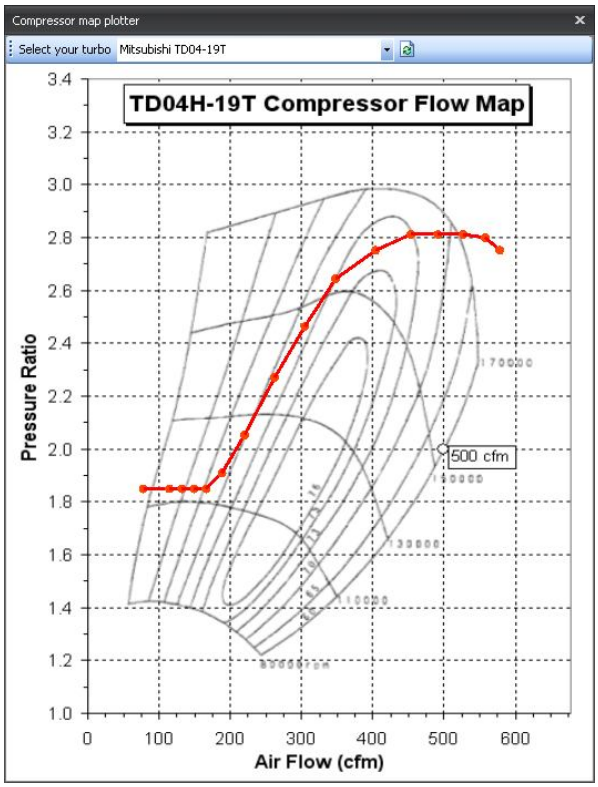
This will show you a rough indication of what your dyno graph should look like based on the current binary. The result of this graph largely depends on whether the boost request can be met.



Actions basic – Show compressor map

This will show you a rough indication of where you will land in the compressor map with your current boost request. This of course assumes that you can actually reach your requested boost.





Actions binary tools – Binary compare files

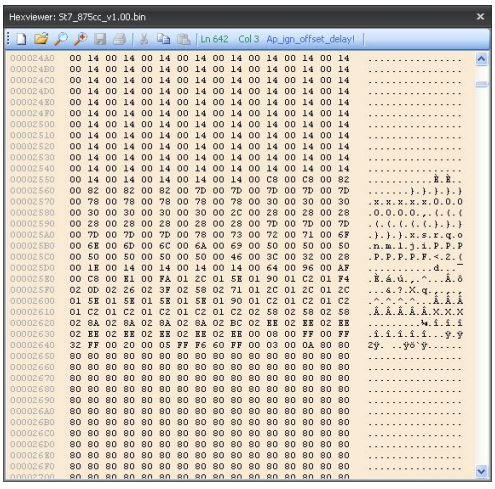
Lets you do a binary (byte-by-byte) compare of two files. This is a good tool to verify whether a programming session was successful or not. Sequences of steps would be:

1. Program ECU
2. Read file from ECU
3. Compare original and downloaded file with Binary compare.

If the result screen is empty the files are identical (successful programming).

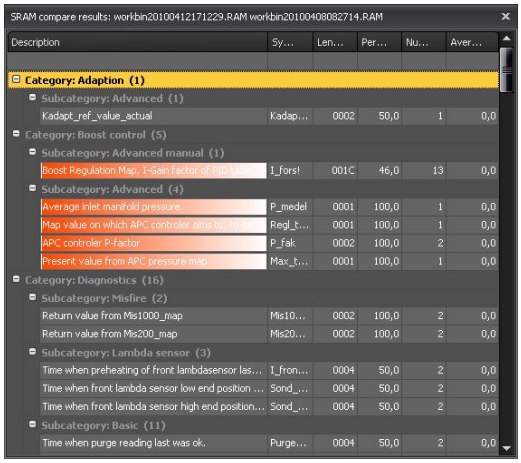
Actions binary tools – Show file in hex

Lets you explore the binary file in hexadecimal form (advanced users!)



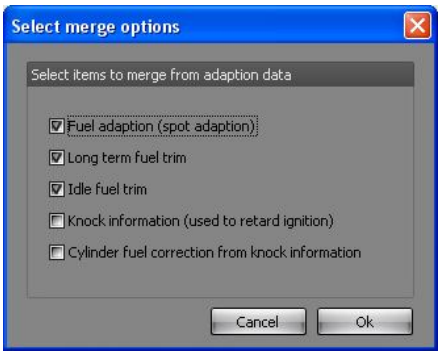
Actions binary tools – Compare SRAM snapshots

Lets you compare two different SRAM dumps from the ECU to see which settings where altered, either by you or the ECU itself (adaption). The result is a difference list from which you can choose to view the separate maps/parameters.



Actions binary tools – Import SRAM snapshot into binary

This allows you to import the most important adaption data into the binary file from a SRAM dump that you made from the ECU after is has been allowed to adapt. You can choose which items to import (use with caution, advanced users only!)



Actions binary tools – Compare SRAM snapshot to binary

Mostly the same as comparing SRAM files but now you can compare the current binary file to a SRAM dump and see what the ECU has learned (adapted) so far OR which changes you've made in real-time to the ECU which are still stored in SRAM (or at least the SRAM snapshot that you took at that time).

Actions binary tools – Binary compare SRAM files

Mostly for exploration of SRAM dump files. You can use this function to find the differences in two SRAM files.

Actions binary tools – Merge binary files

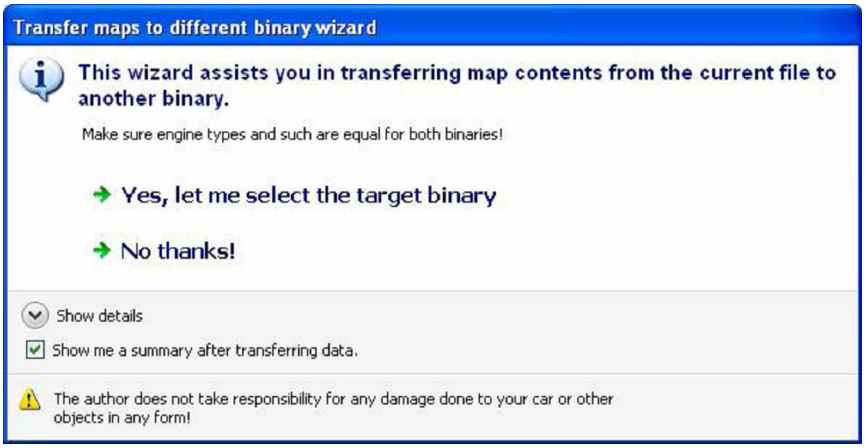
Only useful when you have two binary files (one for each flash chip in the ECU) and you want to stitch them together (advanced users).

Actions binary tools – Split binary file

Only useful when you want to have two binary files (one for each flash chip in the ECU) created from the current binary file (advanced users).

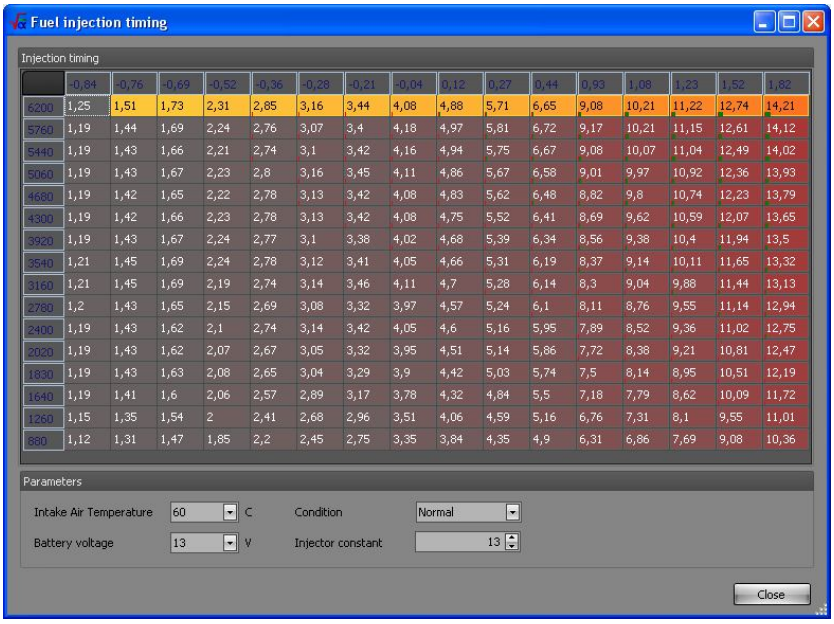
Actions binary tools – Move data to another binary

If you have a set of tuned maps in one binary file and you want to have them transferred to a different base file, you can use this function. Please note that different base files might have different map sizes and T5Suite 2.0 might be unable to transfer them. Exchanging data between T5.5 and T5.2 and v.v. is very dangerous!



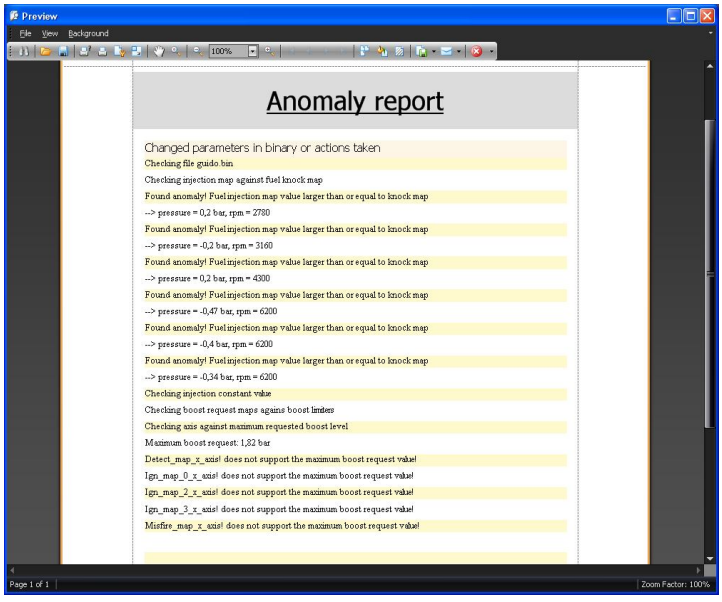
Actions binary tools – Injection timing viewer

This starts a new screen showing the approximate injection duration figures for each engine speed and load point. You can use this data to make sure your injectors are big enough and small enough ;)



Actions binary tools – Anomaly report

Builds a report of anomalies (things that should normally not occur) that T5Suite 2.0 finds in the currently opened binary file.



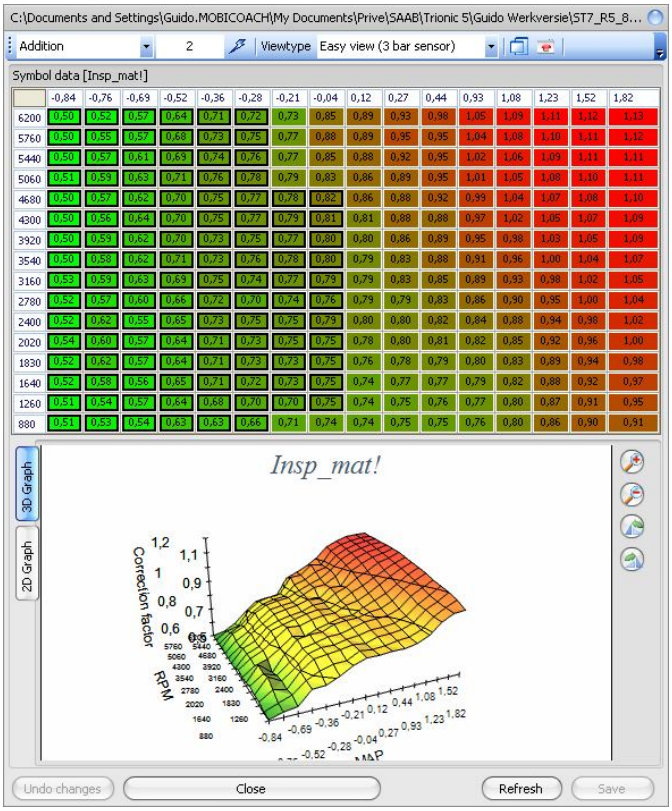
Actions binary tools – Open a save report

Since reports in T5Suite 2.0 can be saved to hard disk and the report format is not a very common one, this option allows you to review previously saved reports.

Manual tuning menu

Manual tuning – Injection – Injection (VE) normal

Lets you edit the main injection correction map directly (Insp_mat!)
Please note the black rectangular indicators in the viewer. These indicate the cells that operate in closed loop. Blue indicators indicate the knock adaption range and white indicators show the boost adaption range.



Manual tuning – Injection – Injection (VE) knock

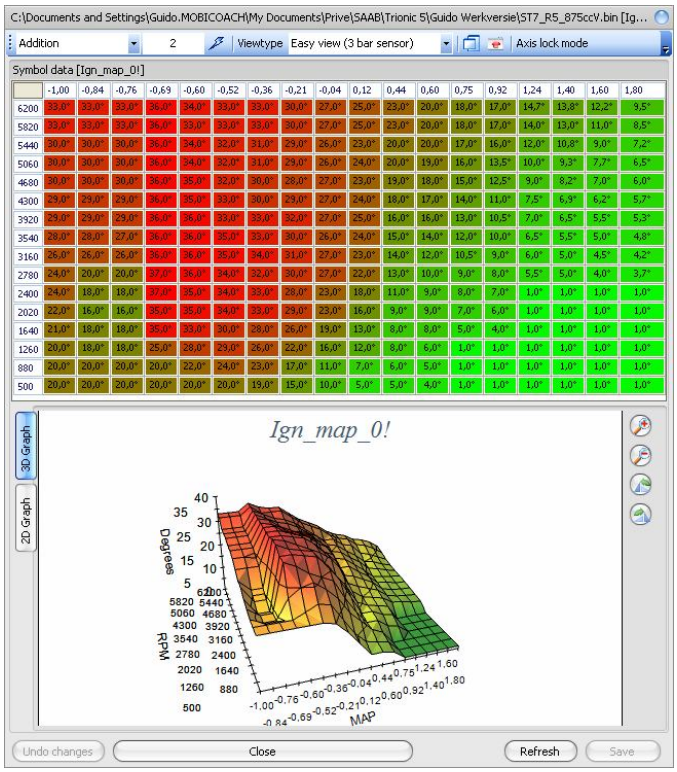
Lets you edit the knock injection correction map directly (Fuel_knock_mat!)

Manual tuning – Injection – Injector constant

Lets you edit the main injection constant directly (Inj_konst!)

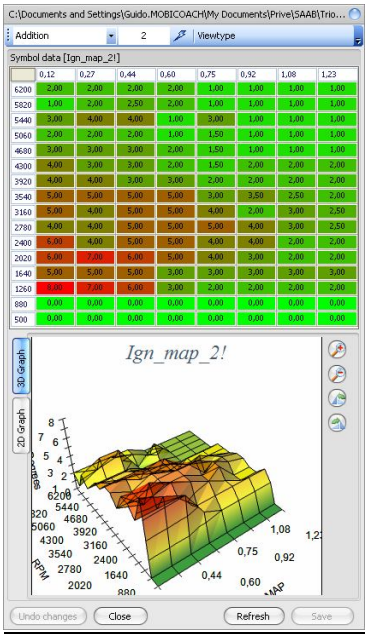
Manual tuning – Ignition – Ignition normal

Lets you edit the main ignition map directly (Ign_map_0!)



Manual tuning – Ignition – Ignition knock

Lets you edit the ignition knock map (ignition pull values) directly (Ign_map_2!)

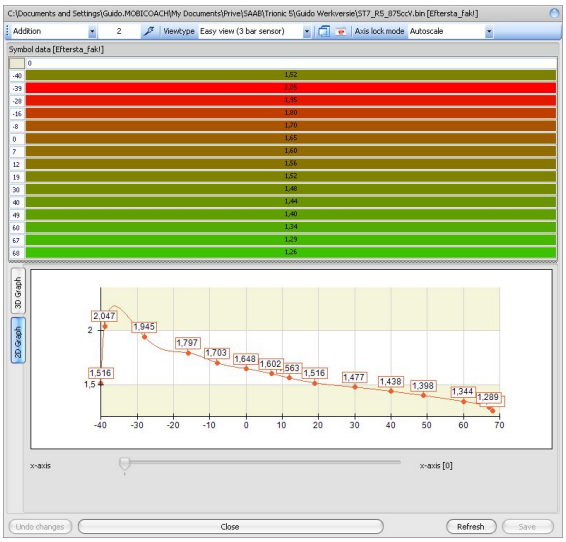


Manual tuning – Ignition – Ignition warm-up

Lets you edit the warm-up ignition map directly (Ign_map_4!)

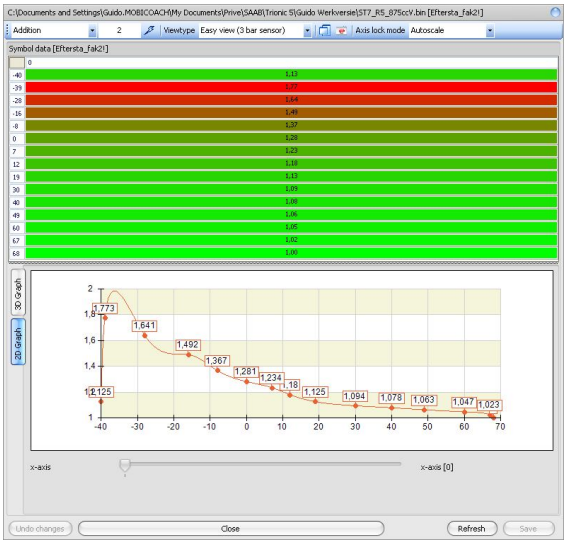
Manual tuning – Engine warm-up – After start enrichment (1)

Lets you view and edit the first after start enrichment factors. They depend on coolant temperature (y axis). These are multiplication factors on the final injection time.



Manual tuning – Cold start – After start enrichment (2)

Lets you view and edit the first after start enrichment factors. They depend on coolant temperature (y axis). These are multiplication factors on the final injection time.

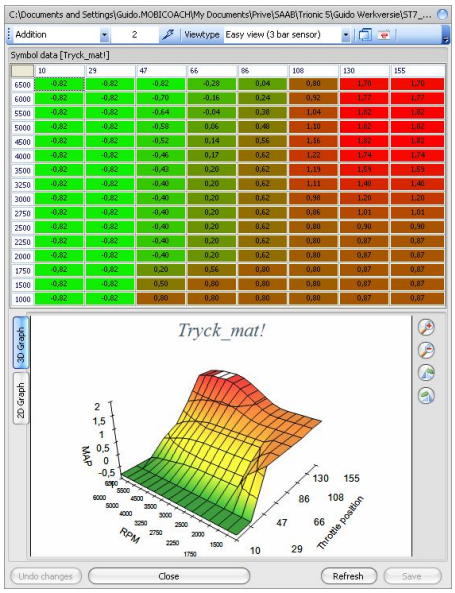


Manual tuning – Cold start – Cranking enrichment

Lets you view and edit the cranking enrichment factors. They depend on coolant temperature (y axis). These are multiplication factors on the final injection time.

Manual tuning – Turbo (manual) – Boost request

Lets you view and edit the boost request values for cars with a manual gearbox



Manual tuning – Turbo (manual) – 1st and 2nd gear limiters

Lets you view and edit the boost limiter values for 1st and 2nd gear for cars with a manual gearbox. These limiters can be disabled.

Manual tuning – Turbo (auto) – Boost request

Lets you view and edit the boost request values for cars with an automatic gearbox.

Manual tuning – Turbo (auto) – 1st gear limiter

Lets you view and edit the boost limiter values for 1st gear for cars with an automatic gearbox. These limiters can be disabled.

Manual tuning – Turbo advanced – PID values

Lets you view and edit the PID values for the boost controller in Trionic 5 for manual as well as automatic gear boxed cars (mind that these are different maps for manual and automatic). For more information on PID controller functioning please refer to the Trionic 5 documentation also shipped with T5Suite.

Manual tuning – Turbo advanced – Regulation bias

Lets you view and edit the bias (pretension) values for the boost controller in Trionic 5 for manual as well as automatic gear boxed cars (Please note that these are different maps for manual and automatic). For more information on PID controller functioning please refer to the Trionic 5 documentation also shipped with T5Suite.

Manual tuning – Turbo advanced – Fuel cut

Lets you view and edit the fuel cut level. This map is shared between manual and automatic cars. Note: 255 (or 1.55 bar in easy view) means the fuel cut function has been turned off.

Manual tuning – Idle control – Idle target RPM

Lets you set the target idle engine speed values (depending on coolant temperature).

Manual tuning – Idle control – Idle ignition

Lets you set the default idle ignition advance value.

Manual tuning – Idle control – Idle ignition correction

Lets you set the ignition control for idle state. The target rpm value error (actual rpm-target rpm) is the y axis for this map.

Manual tuning – Idle control – Idle fuel correction

Lets you set the fuelling control values for idle state.

Tuning wizards menu

Tuning wizards – Easy tune to stage I

Lets you convert your stock binary file to stage I equivalent. The wizard will guide you through a couple of steps and it will also create a report for you afterwards. A backup of your original file is created in the process before changes are made to it.

Tuning wizards – Easy tune to stage II

Lets you convert your stock binary file to stage II equivalent. The wizard will guide you through a couple of steps and it will also create a report for you afterwards. A backup of your original file is created in the process before changes are made to it.

Tuning wizards – Easy tune to stage III

Lets you convert your stock binary file to stage III equivalent. The wizard will guide you through a couple of steps and it will also create a report for you afterwards. A backup of your original file is created in the process before changes are made to it.

Advanced tuning wizards – Convert to different MAP sensor

Lets you convert your stock binary file for usage with a 3/3.5/4 bar mapsensor. Since this is an advanced topic you will understand that manual checks need to be done and changes need to be made for the file to be optimal for usage in your setup.

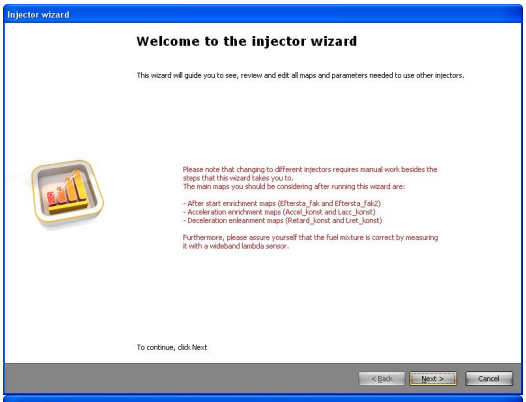
Advanced tuning wizards – Convert to E85 (ethanol) fuel

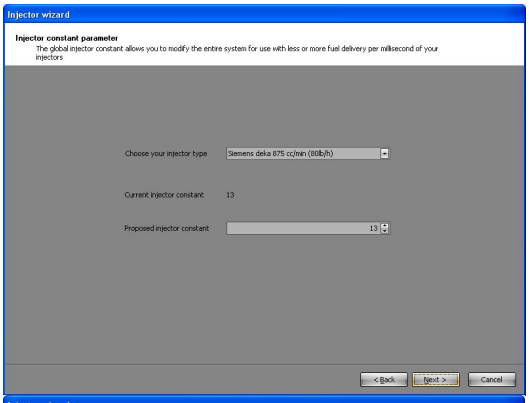
Lets you convert your binary file for usage with E85 fuel. Since this is an advanced topic you will understand that manual checks need to be done and changes need to be made for the file to be

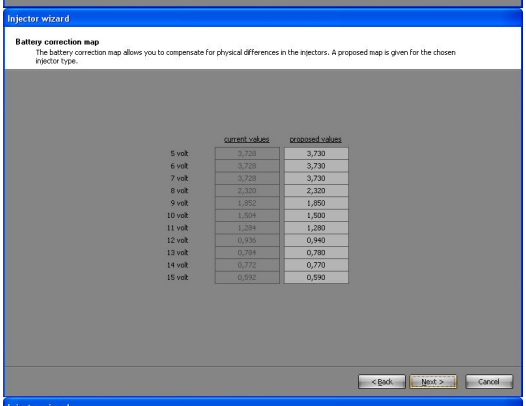
optimal for usage in your setup. Maps that are changed by the wizard are: main and warm-up ignition maps, global fuelling (injector constant), cranking- and after-start- enrichment.

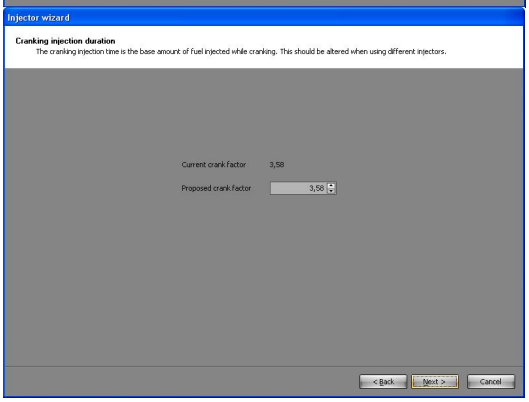
Advanced tuning wizards – Tune for larger injectors

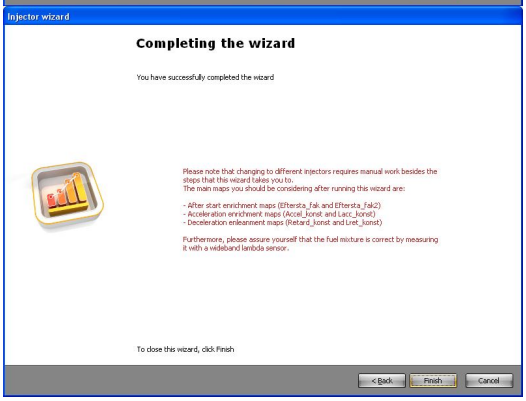
This will start a wizard which will lead you through all the relevant maps and it will make proposals on what to change and where to change it.





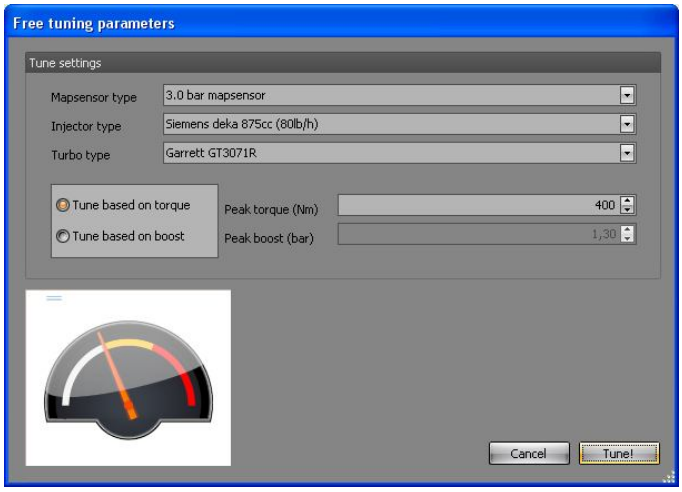






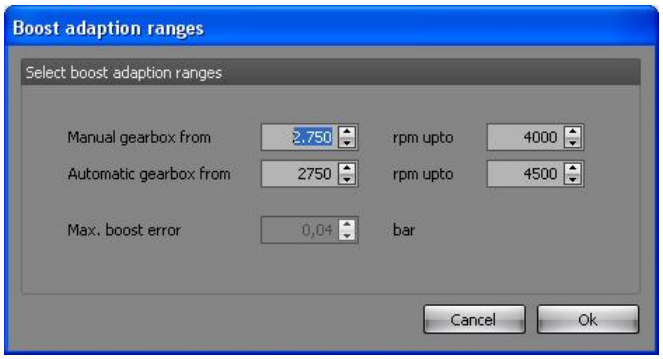
Advanced tuning wizards – Tune to stage X

This wizard is a little bit more complicated than the easy tune wizards (stage I-III). Depending on your input T5Suite 2.0 will try to generate a close as possible match to your hardware. Please do note that tuning beyond stage III will require you to verify AFR settings and knock sensitivity in real-time to make sure everything is working properly. Mapping for cold- and warm-start are also known issues to address after tuning for larger injectors and/or different mapsensor types.



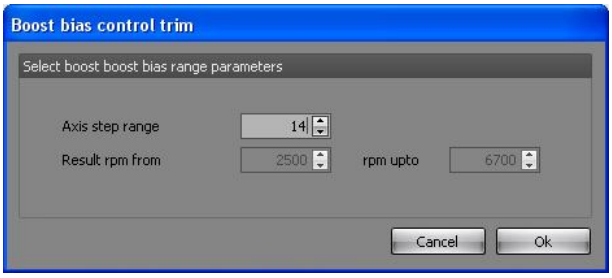
Advanced tuning wizards – Change boost adaption ranges

For bigger turbos, the boost adaption ranges do not match up with what is hardcoded into the binary file (the stock ranges are optimized for T25/TD04 turbo types). You can adjust these ranges with this feature. The hardcoded ranges will be altered in your binary file.



Advanced tuning wizards – Change boost bias range

In late binaries (probably all OBDII files) the boost bias map (Reg_kon_mat) has hardcoded rpm support point (y-axis points). Since these support points run only up to 5500 rpm, this is not enough to support good control when using a large turbo which requires more control in higher rpm ranges as well. You can alter the code in the binary using this option and stretch the support points range.

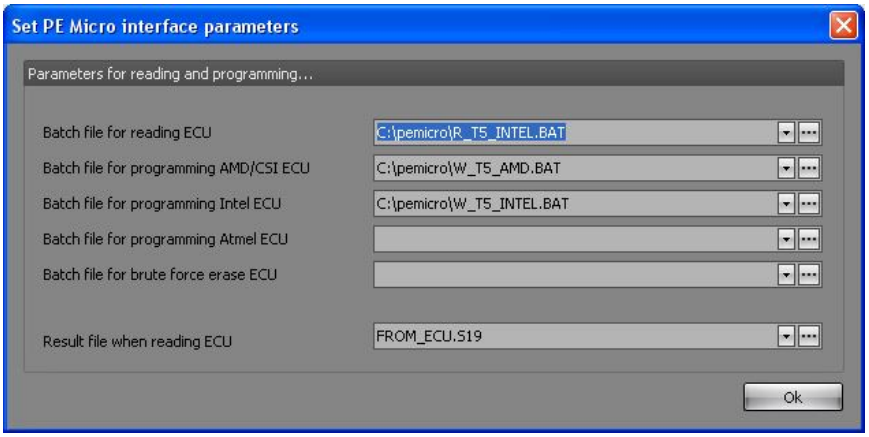


The original map with stock support points:

Once the changes are applied, the reg_kon_mat will look something like this:

ECU Programming menu

Programmer (PE micro) – Settings



Lets you customize the settings needed for interfacing with the PE micro software. Please refer to the PE micro manuals for setting up the batch files needed to program the ECU.

Programmer (PE micro) – Read ECU/Brute force erase/Program ECU

Allows you to spawn one of the batch files assigned to T5Suite 2.0 in the settings options screen.
Writing:
The application only runs a batch file which must program the ECU by itself. The binary file will be converted to Motorola S19 format (PE micro does not accept bin files) and this S19 file will be placed in the same directory as the batch file which is set in the parameters in T5Suite. The write batch file will be started every time you hit the "program ECU" button in T5Suite. T5Suite will not wait for the cycle to finish and continue directly after launching the batch file. The batch file must program the file name TO_ECU.S19.
Reading:
The application only runs the batch file which must read the firmware from the ECU by itself. The S19 file will be converted afterwards to binary format and imported into T5Suite. For this to happen, T5Suite must wait for the batch file to finish. In the meantime in stands in "hold" and you cannot use the application. The resulting S19 file from the read-batch file must be placed in the same directory as the batch file itself and must be name FROM_ECU.S19.

USBBDM programming – Download flash from ECU

If you have connected the ECU via the USB BDM adapter you can download the firmware from the ECU by running this function. It will ask you where to store the binary file.

USBBDM programming – Upload flash to ECU

If you have connected the ECU via the USB BDM adapter you can upload new firmware to the ECU by running this function. It will ask you which binary file to program in the ECU.

USBBDM programming – Download SRAM from ECU

Lets you create a SRAM snapshot from the ECU.

Canbus programming – Download flash from ECU

If you have connected the ECU via the canbus (Lawicel) adapter you can download the firmware from the ECU by running this function. It will ask you where to store the binary file.

Canbus programming – Upload flash to ECU

If you have connected the ECU via the canbus (Lawicel) adapter you can upload new firmware to the ECU by running this function. It will ask you which binary file to program in the ECU.

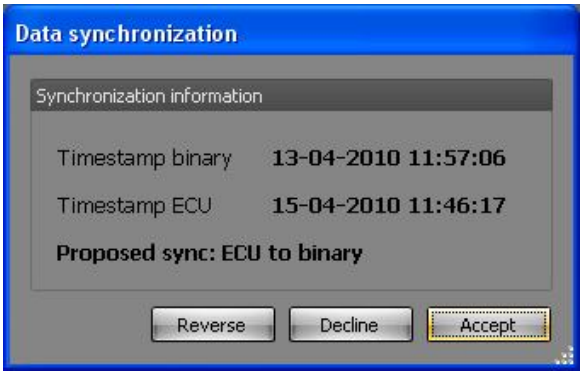
Canbus programming – Download SRAM from ECU

Lets you create a SRAM snapshot from the ECU.

Online tuning menu

Online tuning – basic – Connect ECU

This options starts a real-time session with the ECU. Once connected you can monitor, edit, download and upload data from and to the ECU. Choosing this option automatically opens the real-time panel which shows a default set of data to monitor. You can alter the layout of this panel as well as the data shown in it. NOTE: Real-time sessions can only run through canbus, not through BDM!!!
If the ECU and the binary file are not in sync, T5Suite 2.0 will ask you if you want to resynchronize.



Online tuning – basic – Synchronize maps

Lets you synchronize maps between the binary file and the connected ECU.

Online tuning – basic – Switch mode

Lets you switch between online and offline mode.

Online tuning – advanced – Download SRAM from ECU

This option allows you to download a snapshot of the ECUs SRAM (working memory) for later analysis or reference.

Online tuning – advanced – Upload SRAM from ECU

This option allows you to upload a snapshot of the ECUs SRAM (working memory) back into the ECU. This works like a sort of system restore point you can make.

Online tuning – advanced – Compare ECU with binary

This option check all differences between the ECU and the binary you've loaded.

Online tuning – advanced – Write log marker (F6)

Allows you to write a marker in the log. This way, you can easily find the timestamp when something happened later on when analyzing the logs.

Online tuning – advanced – Clear knock counters

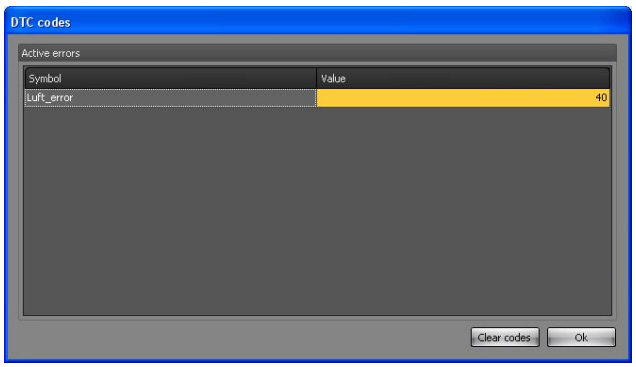
Allows you to reset all the knock counters in the ECU to zero.

Online tuning – advanced – Configure real-time panel

Allows you to configure the real-time panel in offline mode. This way you can pre-configure the panel before even starting your car.

Online tuning – advanced – Read DTC codes

Reads all the error code counters in the ECU and displays which error counter holds values greater than zero. It also lets you clear the error counters (reset to zero).



Online tuning – Flash – Download flash from ECU

If you have connected the ECU via the canbus (Lawicel) adapter you can download the firmware from the ECU by running this function. It will ask you where to store the binary file.

Online tuning – Flash – Upload flash to ECU

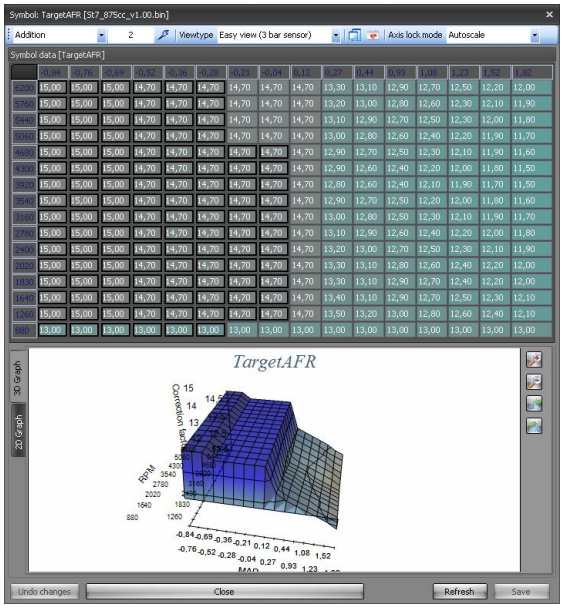
If you have connected the ECU via the canbus (Lawicel) adapter you can upload new firmware to the ECU by running this function. It will ask you which binary file to program in the ECU.

Online tuning – Internet – Browse tunes in internet repository

If you are connected to the internet, you can browse generic tunes that are available on a web server. These tunes are made by ecuproject members.

Online tuning – AirFuel – AFR target map

Lets you set your desired AFR values for each load and rpm point for this binary file. After logging with a wideband lambda sensor you can compare the target values to the feedback values.



Online tuning – AirFuel – AFR feedback map

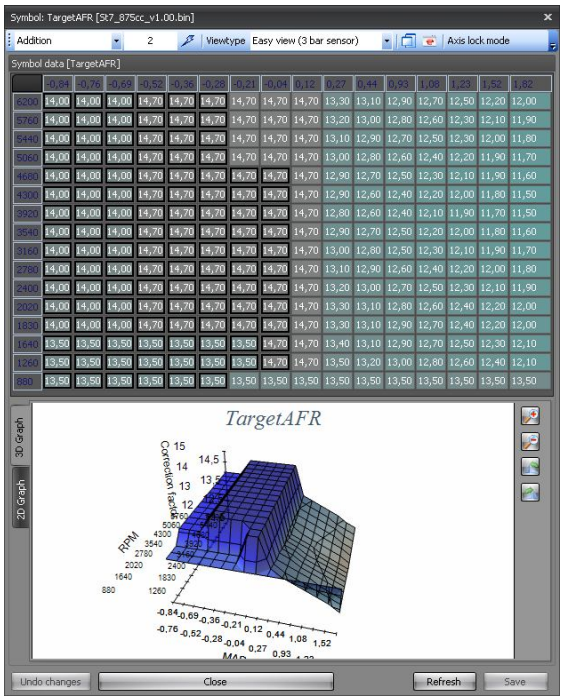
Shows you the measured average values from the real-time sessions you have done for this binary file.

Online tuning – AirFuel – AFR error map

Shows you the difference between the target AFR values you have entered – or the default ones – and the measured feedback values.

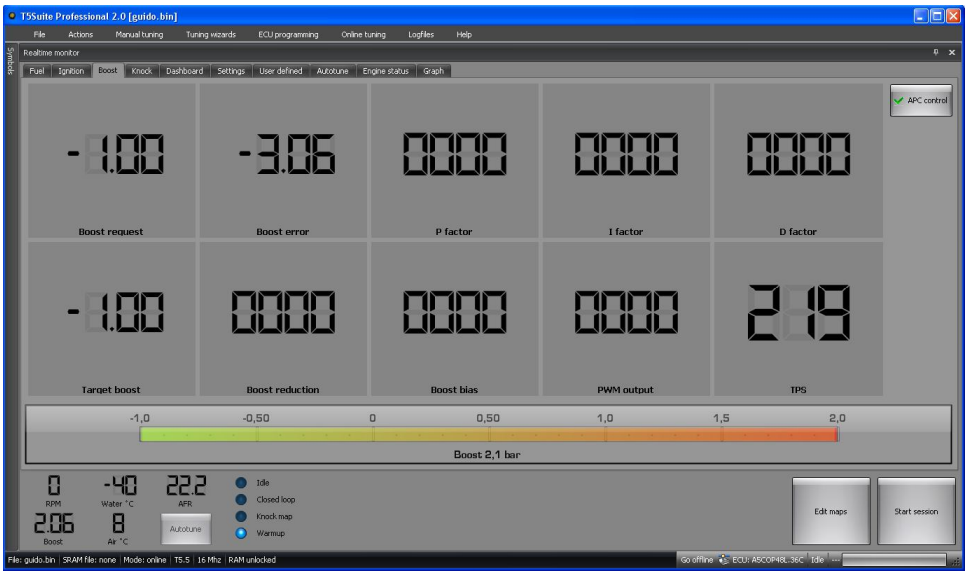
Online tuning – AirFuel – Generate new AFR target map

Lets you generate a new default AFR target map based on certain properties in the binary. If you use big injectors, the target for low rpm and low load will be richer for example.

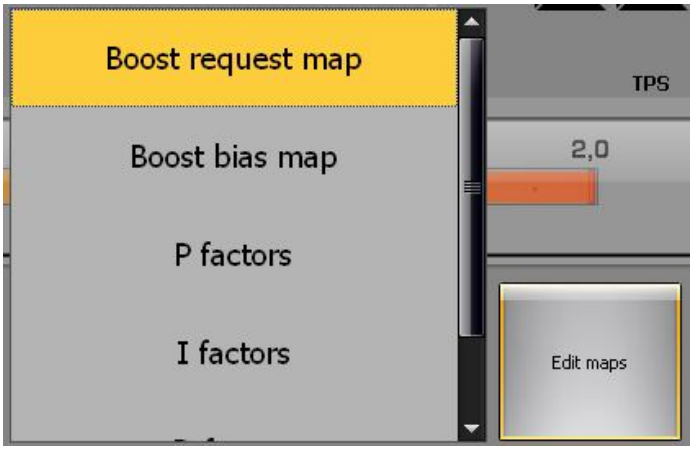


Online tuning – the real-time screen

Once you've switch to online mode and the canbus connection is running, T5Suite 2.0 will behave a little bit differently. You can switch to the real-time panel for monitoring, logging and tuning and maps viewers will show SRAM content by default. The real-time panel should look something like this:



You can edit maps which hold a relation to tuning boost in the boost tab. The ignition tab will get you access to ignition related maps etc. You can directly start a mapviewer by clicking the "Edit maps" button. This will popup a selection of maps.



Selecting one of these entries will start a mapviewer over the real-time panel.

	10	29	47	66	86	108	130	155
6500	-0,82	-0,82	-0,82	-0,28	-0,04	0,50	1,58	1,76
6000	-0,82	-0,82	-0,70	-0,16	0,26	0,56	1,70	1,88
5500	-0,82	-0,82	-0,64	-0,10	0,38	0,68	1,82	1,94
5000	-0,82	-0,82	-0,58	0,02	0,44	0,74	1,82	1,94
4500	-0,82	-0,82	-0,52	0,14	0,56	0,86	1,82	1,94
4000	-0,82	-0,82	-0,40	0,20	0,62	0,92	1,64	1,71
3500	-0,82	-0,82	-0,40	0,20	0,62	0,86	1,42	1,52
3250	-0,82	-0,82	-0,40	0,20	0,62	0,92	1,24	1,34
3000	-0,82	-0,82	-0,40	0,20	0,62	0,80	1,04	1,13
2750	-0,82	-0,82	-0,40	0,20	0,62	0,80	0,98	0,98
2500	-0,82	-0,82	-0,40	0,20	0,62	0,80	0,88	0,88
2250	-0,82	-0,82	-0,40	0,20	0,62	0,80	0,88	0,88
2000	-0,82	-0,82	-0,40	0,20	0,62	0,80	0,88	0,88
1750	-0,82	-0,82	0,20	0,56	0,80	0,80	0,88	0,88
1500	-0,82	-0,82	0,50	0,80	0,80	0,80	0,88	0,88
1000	-0,82	-0,82	0,80	0,80	0,80	0,80	0,88	0,88

Note that because of performance, the graph is off by default and data is displayed in blue to denote that the data is volatile (present in SRAM).

Autotune criteria

For Autotune to become available you will have to meet certain criteria.

- You will have to be in advanced mode
- SRAM should be unlocked in the ECU
- Engine temperature should be over 70 degrees Celcius

If you get to the point where all Autotune criteria are met, the Autotune button will be enabled. If you click it, an Autotune session will commence and the tab will be switched to "Autotune". Here you can see which cell in the fuel map is active and which cells are measured by Autotune with what AFR value. The moment Autotune is activated the software switches off closed loop control in the ECU by altering the pgm_mod symbol accordingly. This also switches off purge control because purging will occur only when the system is running in closed loop. While running the Autotune algorithm constantly checks whether all runtime criteria for making adjustments are met. These criteria are:

- No enrichment after fuelcut is allowed
- System is not allowed to run in the idle map (this might be changed in future releases)
- Purge is not active
- Cooling water temperature enrichment is finished
- Afterstart enrichment is finished
- Closed loop control is inactive
- Engine should be warmed up
- Fuelcut is not active
- Knock map is not active

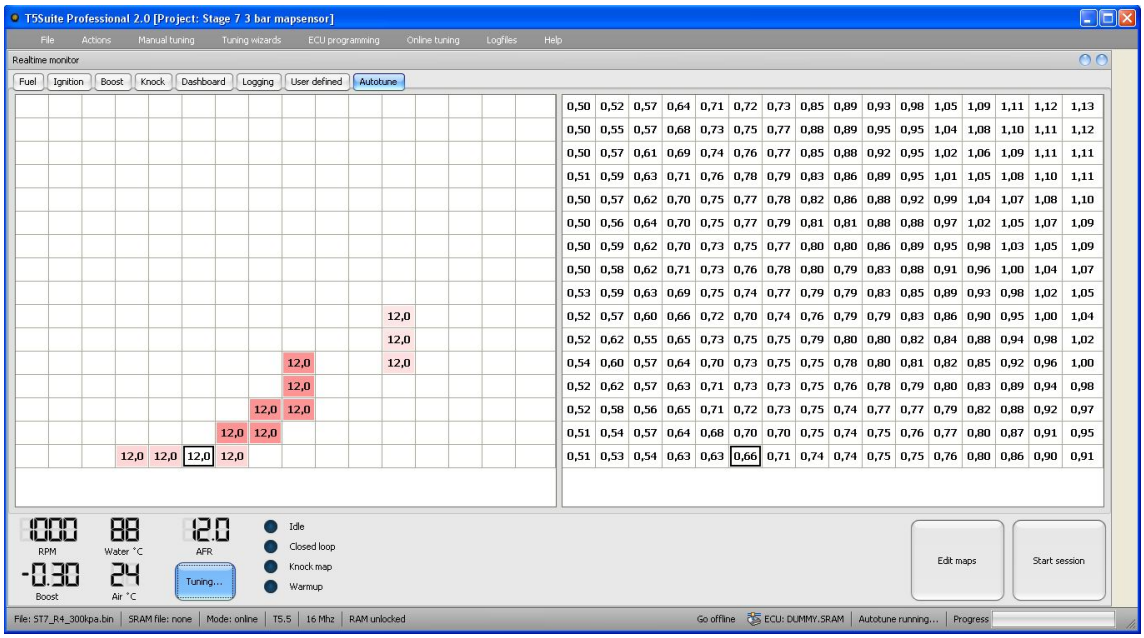
Optionally when Discard fuelcut measurements is active in the Autotune settings:

- Cylinder 1-4 should not be in fuelcut mode

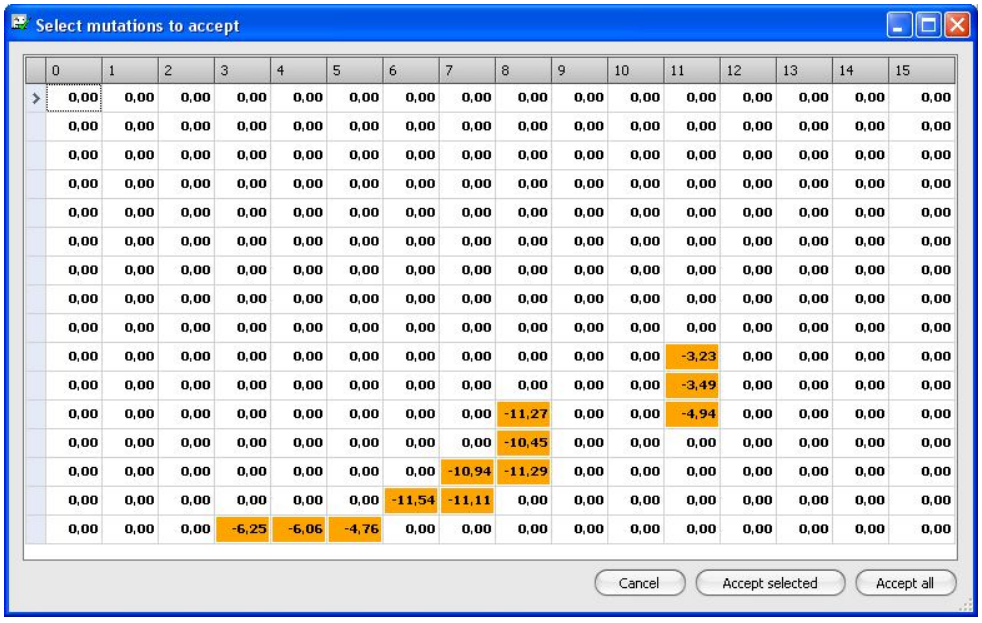
Optionally when Discard closed throttle measurements is active in the Autotune settings:

- Throttle plate is not allowed to be fully closed

If all runtime criteria are met the algorithm measures AFR values through the wideband lambda input and determines the cell in which it should average this value by means of current engine speed and manifold pressure. Depending on the mode in which Autotune is running (direct update or user approve) it updates the fuel map in the ECU or it stores the averaged value in memory. In the latter case it shows the user a proposal for adjustments to be made after the Autotune session is ended.



After the Autotune session, the software will show you a map in which the cells to be corrected are highlighted and showing the percentages to correct the fuel map.



You can cancel this session, accept all selected cells (after selecting the cells you want to correct) or you can accept all suggested correction. T5Suite 2.0 will save all mutated data into the ECU.

Logfile analysis menu

Export T5Suite log file to LogWorks

Will convert and export a T5Suite log file to LogWorks format and automatically start LogWorks to view the file.

View log in T5Suite

Load and shows the log file in the viewer inside T5Suite 2.0.

View matrix from log file

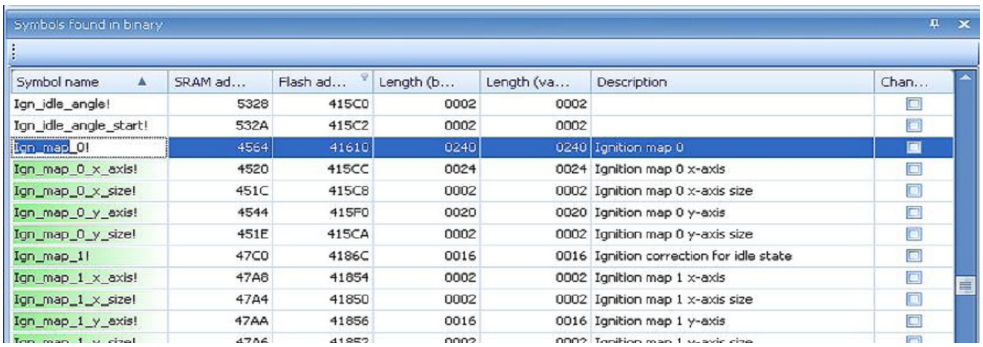
Lets you view three channels in a log file displayed as a surface graph (matrix).

Help menu

Gives you access to the T5 documentation, this file and allows you to check for updates online.

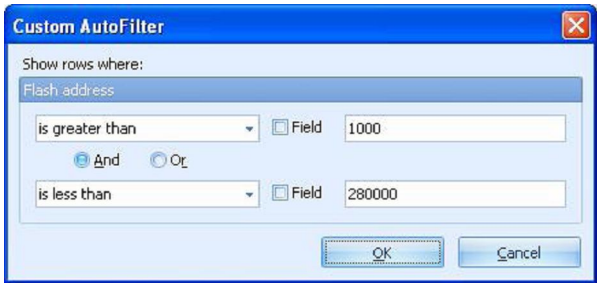
Searching for information in the views

The used data viewers all support something called "incremental searching". If you select a value in one of the views and start typing the name or address you are looking for the view will automatically scroll to the given entry (best match). You normally should have the column you are searching in as the primary sort column. To do this just click on the column header of the column in question.



Filtering information

You can easily filter information in the views by selecting the little filter image in the column header and choosing one of the options. The most elaborate filters can be defined in "custom" of course. Here's a sample.



Sorting information

Information can be sorted ascending or descending by clicking the column header you want to sort on.

Adjusting values in map

To avoid that you have to adjust all values of a "large" map manually some features have been added to the mapeditor.
Plus key: adds 1 to all selected cells
Minus key: substracts 1 from all selected cells
PageUp key: adds 10 to all selected cells
PageDown key: substracts 10 from all selected cells
Home key: sets all selected cells to the maximal value
End key: sets all selected cells to the minimal values
To be able to get your work done faster you can selected one or more cells in a table and copy them to the clipboard by rightclicking and selecting "Copy selected cells".
To paste the cells select the location where you want to cells to appear – this could be in another map and even in another binary – rightclick and select "paste selected cells" and then "At original position" or "At currently selected location".