PowerTune Digital User Manual V1.4 - May2021

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Section 0 - TIPS & TRICKS

! ! DO NOT POWER THE DASH FROM A COMPUTER USB / CAR STEREO USB PORT ! !

The dash requires at least 2.5A to power up safely. Powering the dash with insufficient amps may damage the SD card or the processor. Only use the supplied power supply or a hardwired source (example phone/tablet charger connected to a wall outlet)

Some of the most commonly requested questions or key things to understand:

1. When customising the dash screens, after double tapping to get the main menu, the menu can be dragged from the corner and relocated around the screen as needed. The onscreen keyboard can also be moved around by dragging it from the bar along the top of the keyboard. **First time setup is easiest done plugging in a mouse.**

2. When the customisation menu (double tap) is open on ANY of the four active dash screens, the gauges become unlocked/movable on ALL FOUR screens. **Keep the menu closed when not customising.**

3. Don't forget to press save in the double-tap menu after making changes to your dash screens.

4. Swipe down from any dash screen to get the brightness dimmer slider

5. To change the startup video and images, connect to the dash using a laptop (see WINSCP at end of this document) over WiFi. Locate bootvideo.mp4 (startup video) in the main directory, as well as Logo.png in the LOGO folder.

   The easiest way to modify the startup logo is to copy Logo.png onto your computer, right click and select EDIT, make your changes and then copy back to the logo folder. The resolution of the Logo image MUST be 800 X 480 pixels

   The startup video can be replaced with any mp4 file, however will only play for two seconds regardless of length.

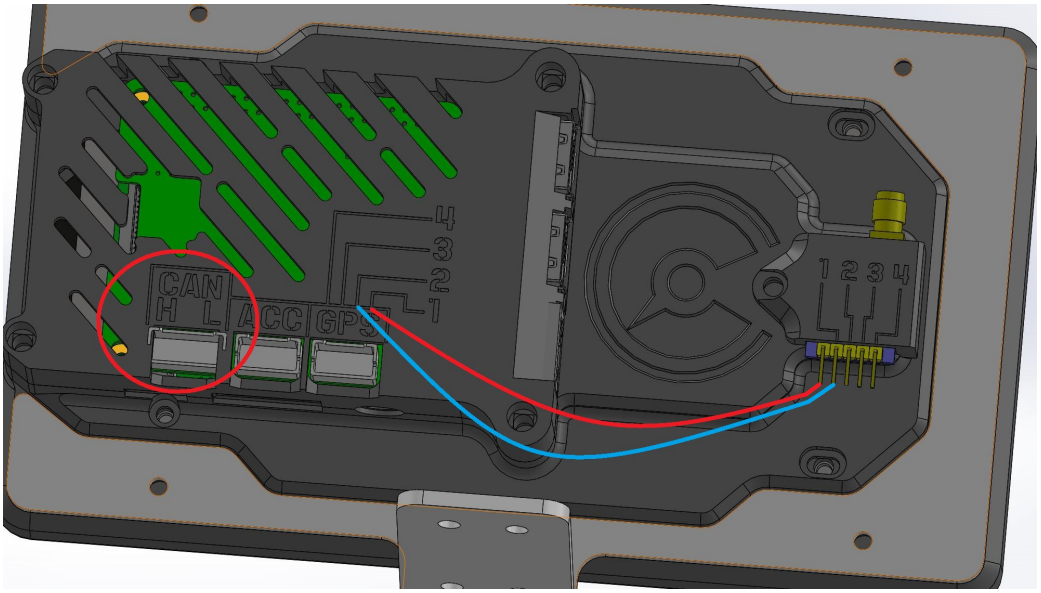
Section 1 - Installation in Vehicle

Connect the Power Supply to Ground and a Switched 12V source (ignition). If you ordered GPS, remove the GPS holder (pictured right below) and insert the GPS module (it only fits one way!). Once inserted, match the numbers of the four connected wires to the numbers labelled on the case for the GPS connection (1 goes to 1, 2 goes to 2, ect)

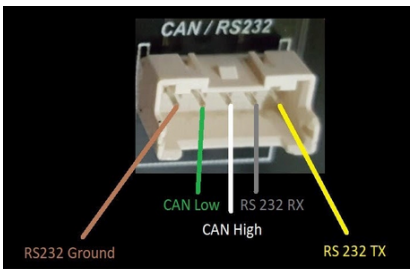
GPS + CAN Cable

For the GPS module (if ordered), simply connect the pins on the GPS module to the pins on the dash, matching the numbers in each pair. **Pin 1 to 1, 2 to 2, 3 to 3 and 4 to 4.**

Depending on ECU, connect your ECU Cable to the ECU and your PowerTune Dash CAN HI and LO connection points. The blue wire always goes to CAN LO on the dash.
.
For Apexi / Nissan Consult, insert the ECU cable into one of the USB ports on the side of the Dash, for CAN ECU's insert the CAN cable into the CANBUS port of the Dash

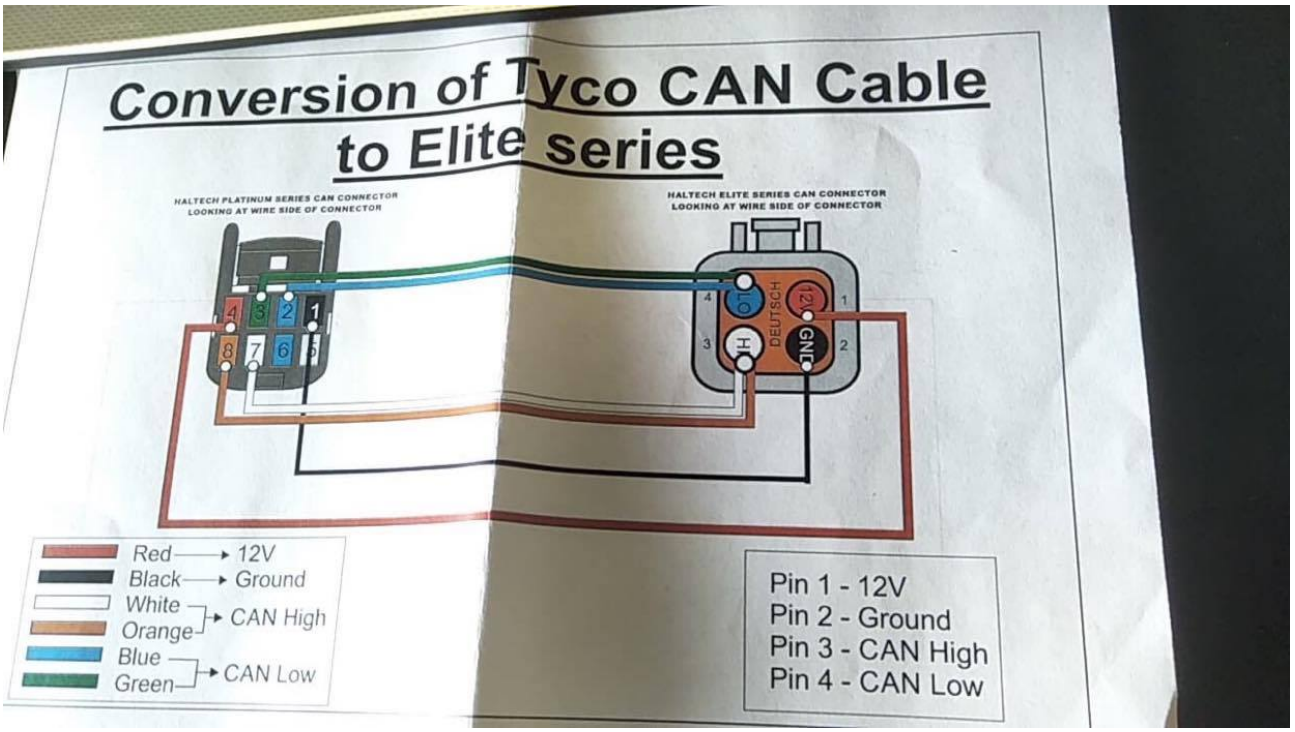


For LINK/VIPEC ECU, the MIDDLE pin on the ECU plug is can HI. The pin off to one side is can LO.

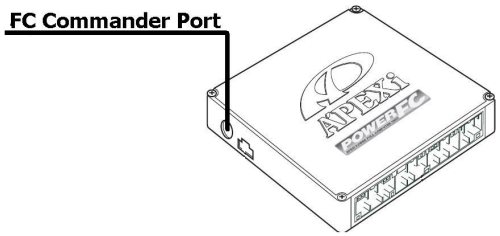


HALTECH PLATINUM AND ELITE

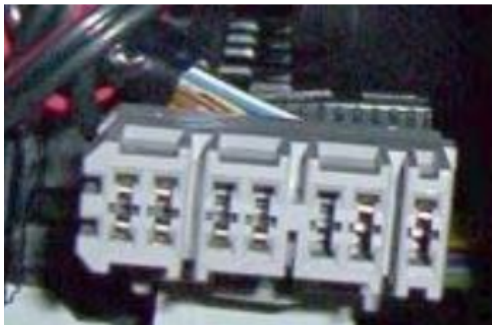
Top row pins are CAN LO, bottom row pins are can HI



For Apexi the communication port is the circle port on the Side of the ECU

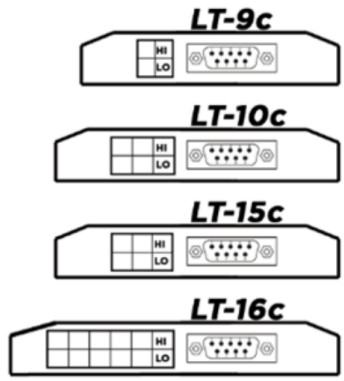


Nissan Consult Port is located in the footwell area near the drivers fuse box

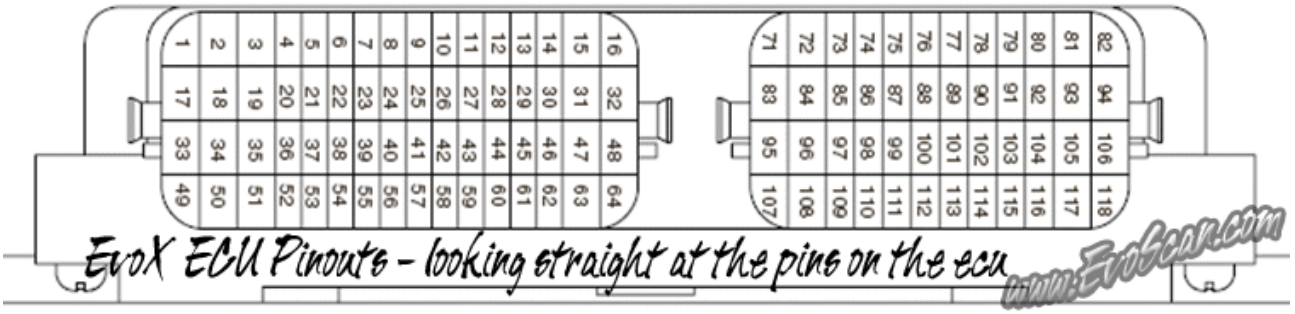


<u>Other ECUS:</u> Consult the User Manual of your ECU to locate the CANBUS port (some examples Below)

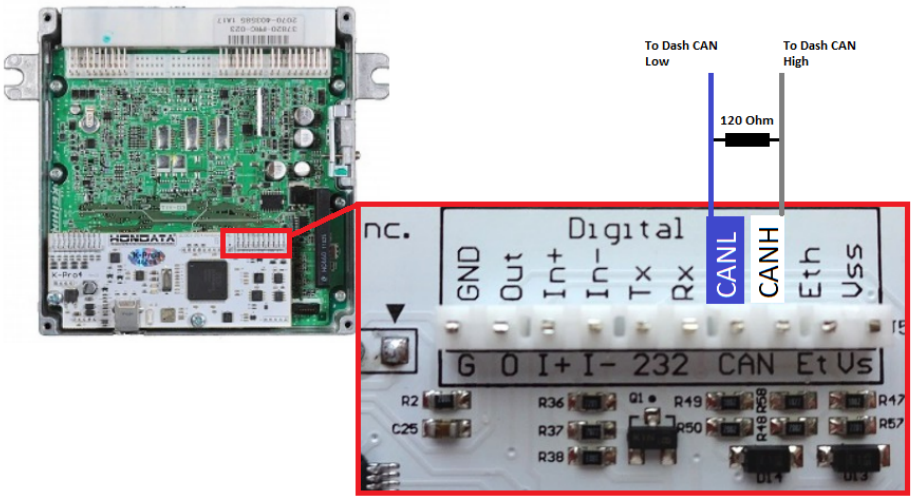
For Toyota86/BRZ - the can socket is the white plug “option connector” located behind the stereo



EVO X: (pin 90 HI and 91 LOW)



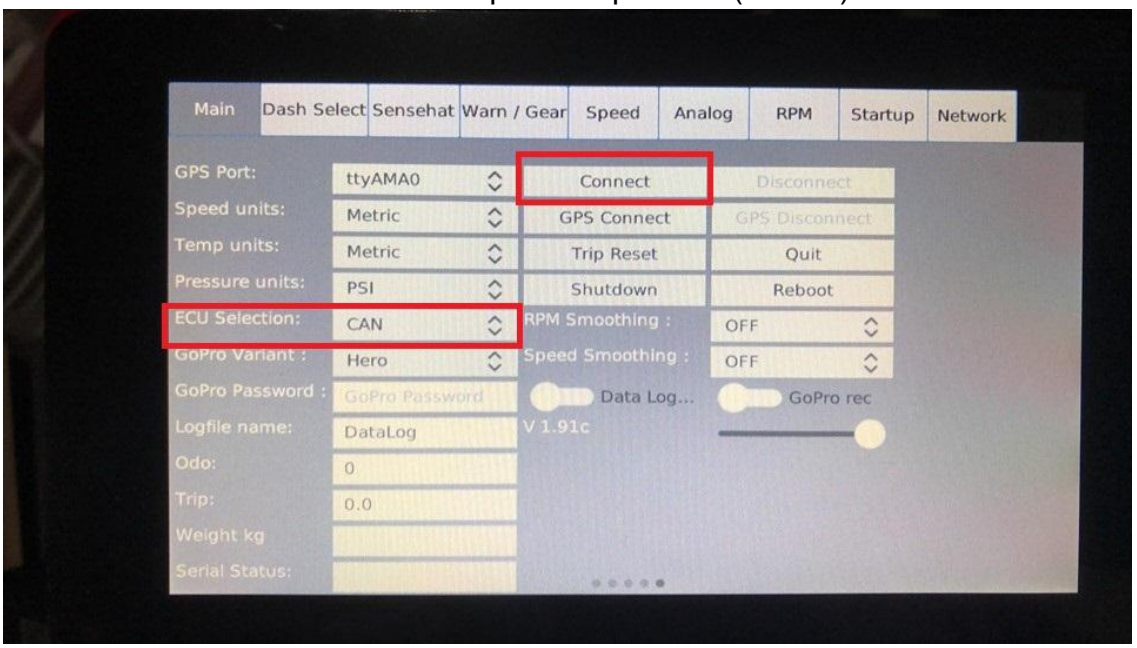
Hondata:



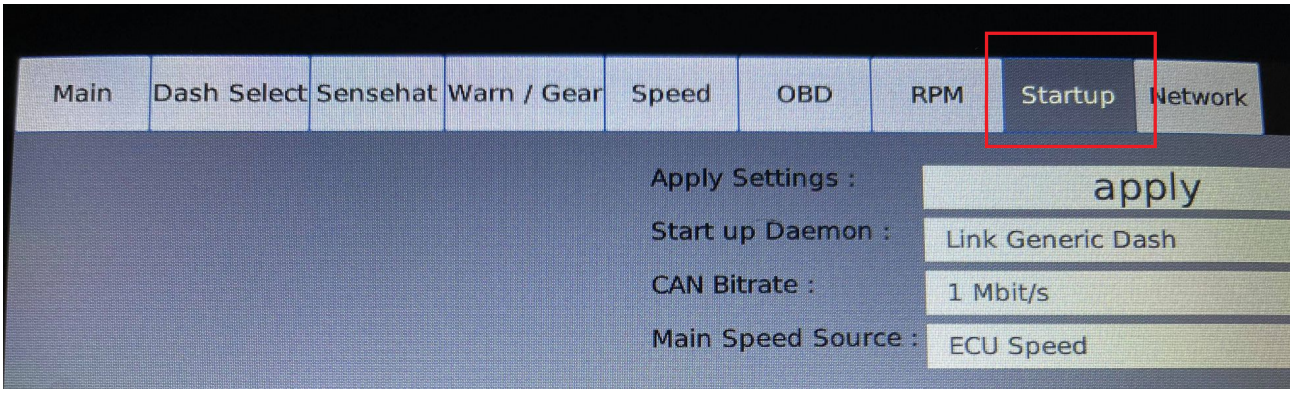
Section 2 - PowerTune Digital dash configuration

- ***CANBUS***

1. In the main Settings screen, set ECU selection to “CAN” (default)
2. Touch the connect button to the pressed position (default)



3. In the Startup settings page, scroll through the list and select your ECU (For Apexi, set to none)
4. **<u>Ensure the CAN bitrate is set correctly</u>** (see table below)
5. Ensure the speed source is set correctly (ECU or GPS)
6. Click apply and the dash will reboot

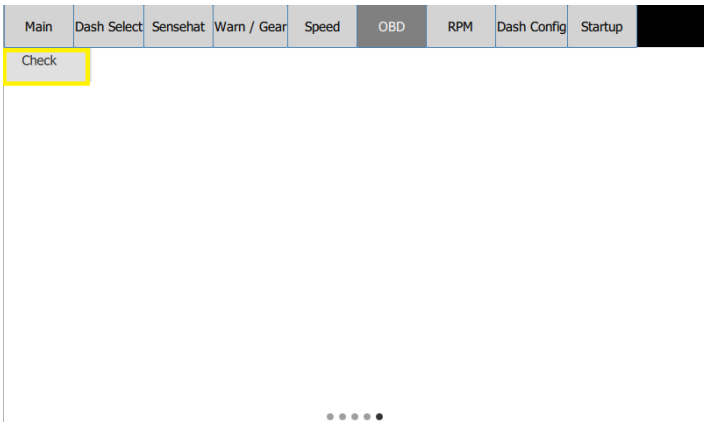


<u>SETTING THE CORRECT CAN BITRATE - VERY IMPORTANT!</u>

Required dash bitrate	Set with ECU Type
1mbit/s	Link / Haltech / Emtron / Motec / Adaptronic / ECU Master / Microtech / Emerald K3+K6
500kb	***Aftermarket ECU:*** AEM / MaxxECU / WolfEMS / Megasquirt 2-3 / Hondata ***Stock ECU:*** GM/+LS / Ford Barra / GT86+BRZ / EVO X / 350+370z / WRX / OBD2
250kb	EMS EMTECH
N/A	Nissan Consult

For Nissan consult/OBD2:

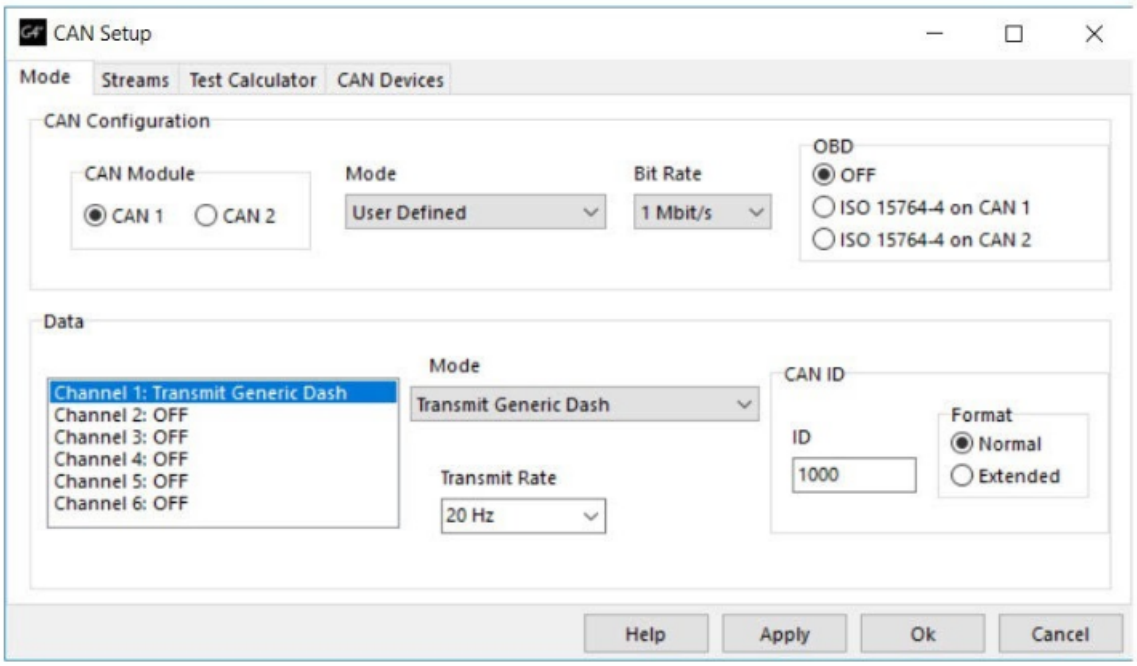
Step 1 - In the main settings tab (pictured on the previous page), Change the ECU selection dropdown box to the relevant ECU choice (if the box is greyed out, press disconnect at the top first!)
Step 2 - In the Settings menu click on the Consult/OBD settings Tab along the top



3. Click Check
4. Select the values you want to poll from the ECU
(the more you choose the slower the update rate)
5. Click Apply (The Dash will reboot and your ECU communication is finished)

Section 3 - ECU Configuration

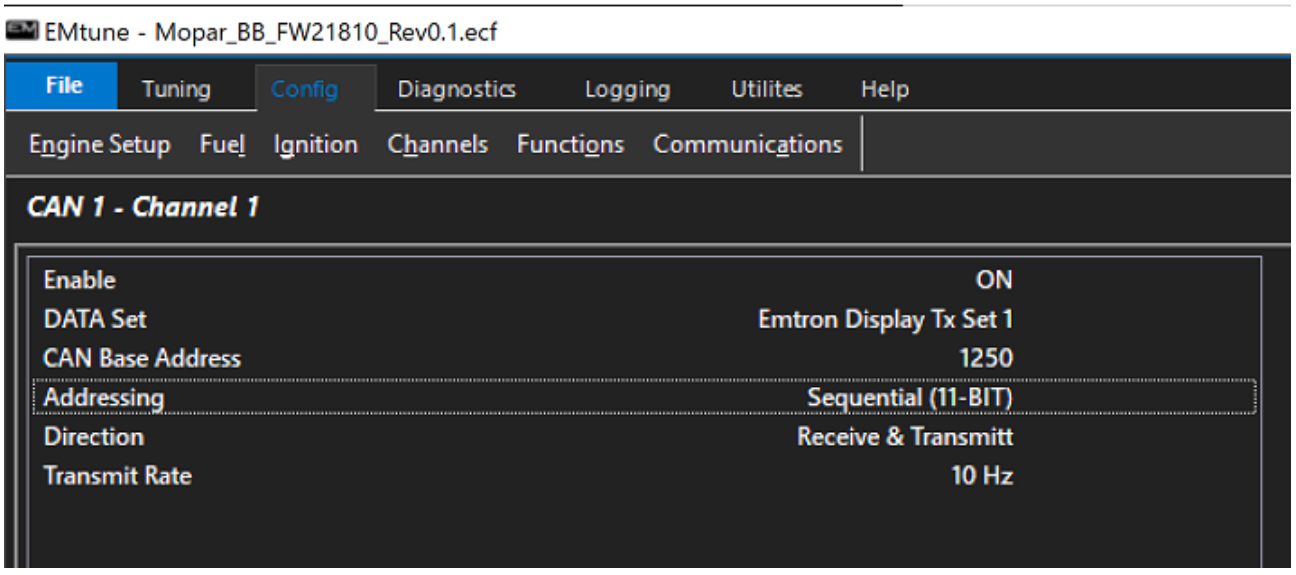
Link / Vi-PEC - Open the CAN setup within PC Link (link ecu software)



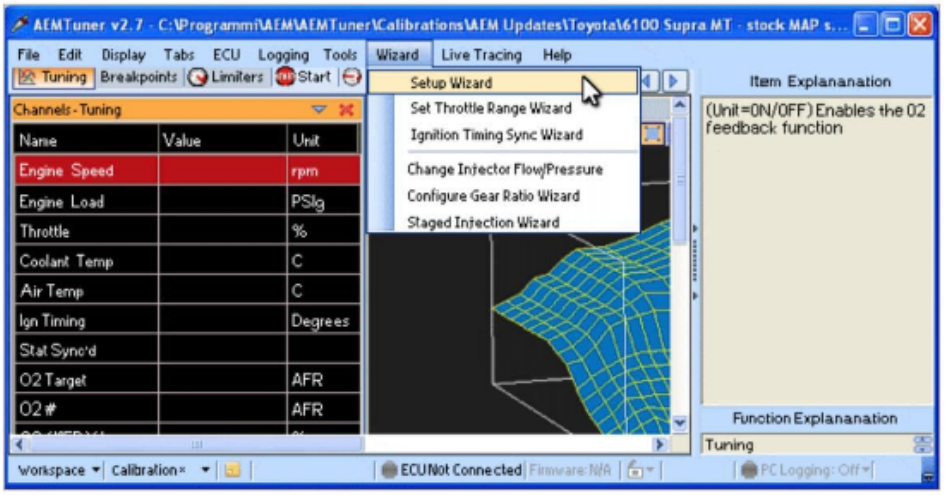
Haltech

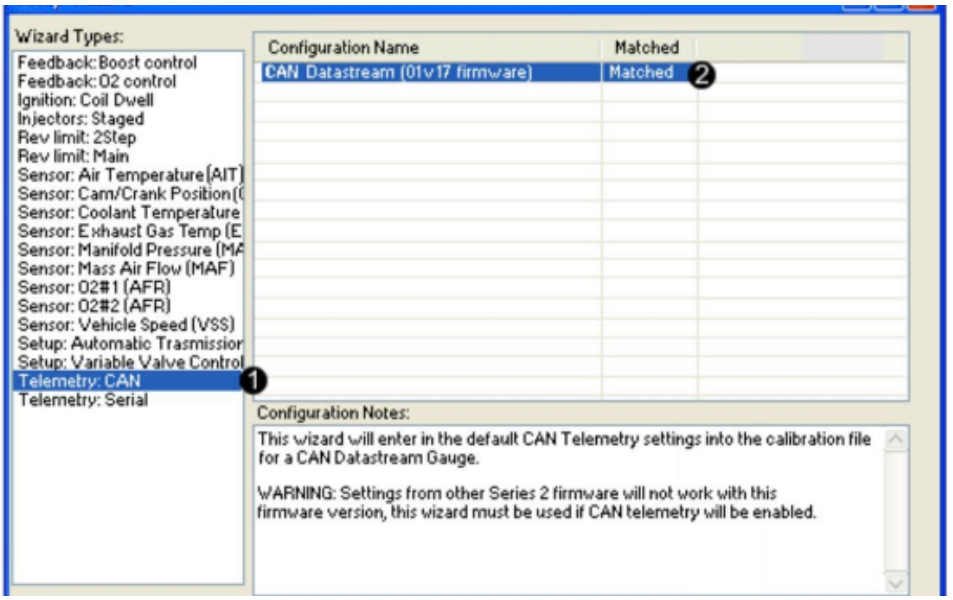
Haltech automatically outputs at 1mbit over CAN and does not require configuration in almost all cases. In some circumstances CAN output may need to be enabled at 1mbit in the Haltech windows software ECU Manager/ESP.

Emtron

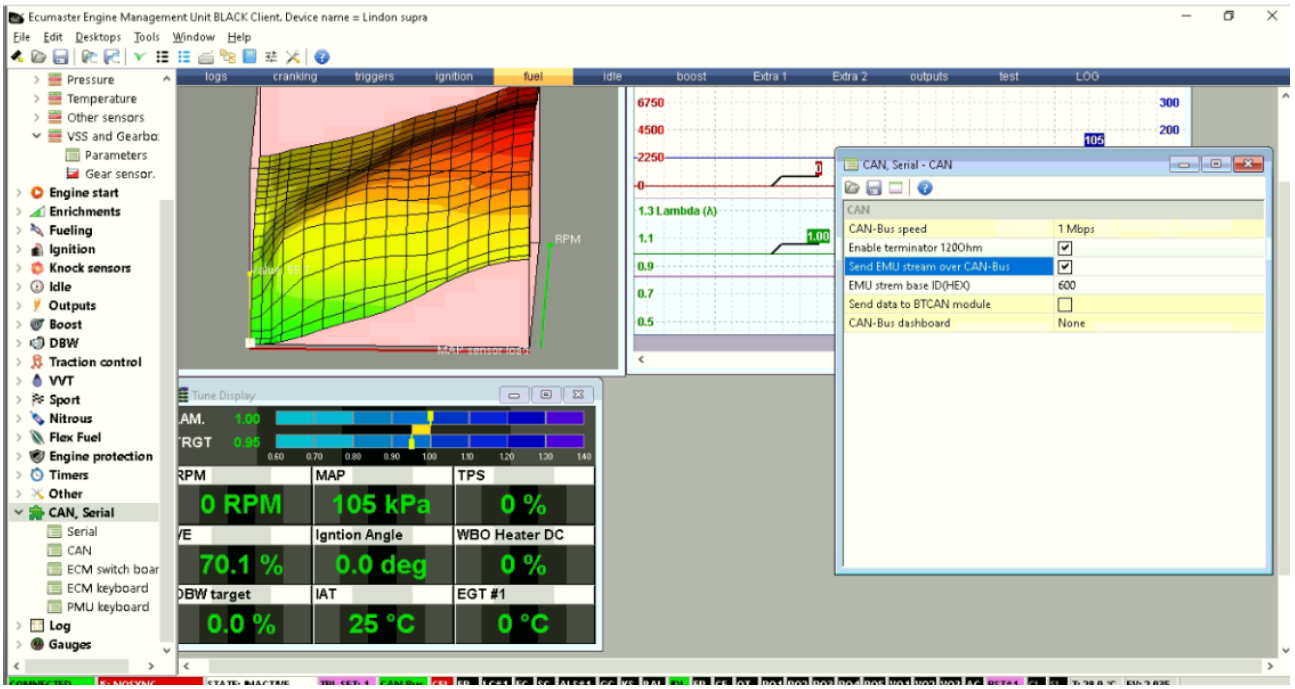


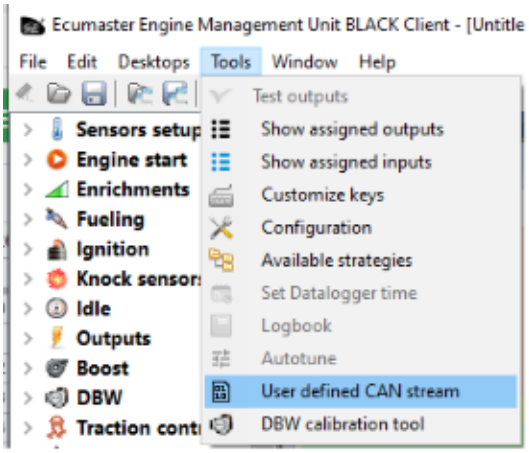
AEM

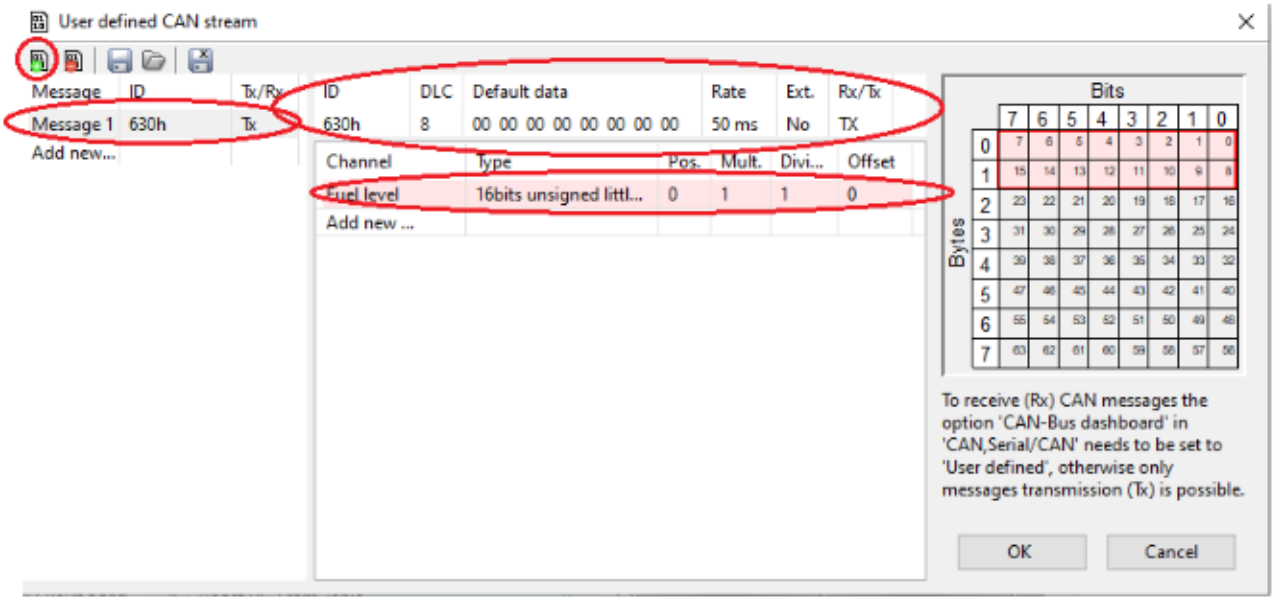

AEMTuner v2.7 - C:\Programmi\AEM\AEMTuner\Calibrations\AEM Updates\Toyota\6100 Supra MT - stock MAP s...
File Edit Display Tabs ECU Logging Tools Wizard Live Tracing Help
Tuning Breakpoints Limiters Start
Setup Wizard
Set Throttle Range Wizard
Ignition Timing Sync Wizard
Change Injector Flow/Pressure
Configure Gear Ratio Wizard
Staged Injection Wizard
Item Explanation
(Unit=ON/OFF) Enables the O2 feedback function
Channels - Tuning
Name Value Unit
Engine Speed rpm
Engine Load PSIg
Throttle %
Coolant Temp C
Air Temp C
Ign Timing Degrees
Stat Sync'd
O2 Target AFR
O2 # AFR
Function Explanation
Tuning
Workspace Calibration
ECU Not Connected Firmware: N/A
PC Logging: Off

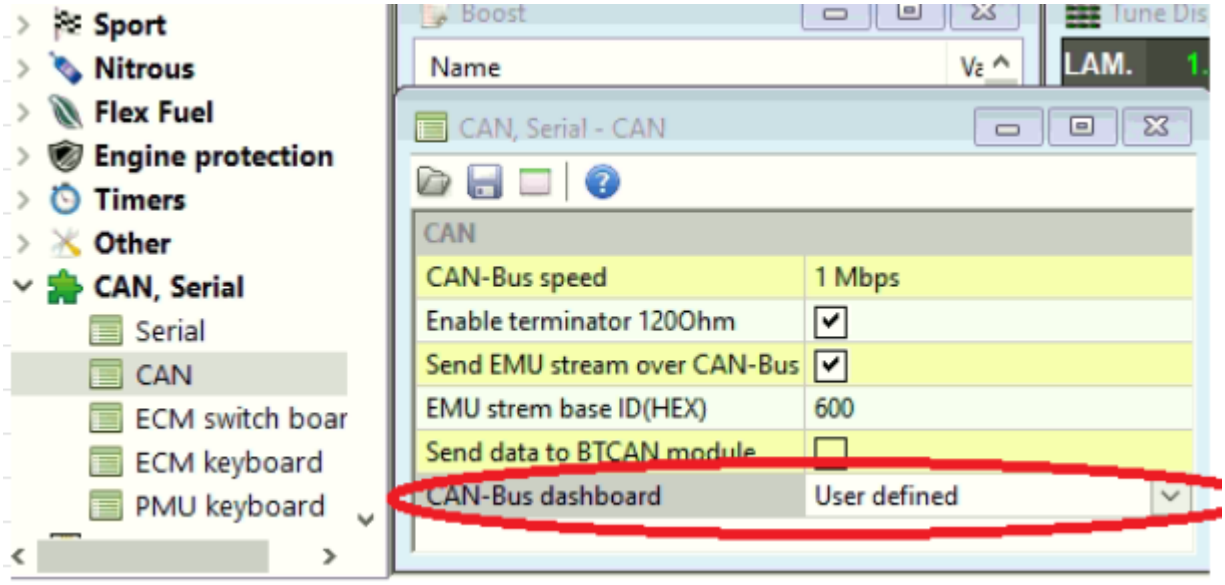

Wizard Types:
Feedback: Boost control
Feedback: O2 control
Ignition: Coil Dwell
Injectors: Staged
Rev limit: 2Step
Rev limit: Main
Sensor: Air Temperature (AIT)
Sensor: Cam/Crank Position
Sensor: Coolant Temperature
Sensor: Exhaust Gas Temp (E
Sensor: Manifold Pressure (MA
Sensor: Mass Air Flow (MAF)
Sensor: O2#1 (AFR)
Sensor: O2#2 (AFR)
Sensor: Vehicle Speed (VSS)
Setup: Automatic Trasmissior
Setup: Variable Valve Control
Telemetry: CAN
Telemetry: Serial
1
Configuration Name Matched
CAN Datastream (01v17 firmware) Matched
2
Configuration Notes:
This wizard will enter in the default CAN Telemetry settings into the calibration file for a CAN Datastream Gauge.
WARNING: Settings from other Series 2 firmware will not work with this firmware version, this wizard must be used if CAN telemetry will be enabled.

EMU BLACK + ADDITIONAL EMU SETTINGS

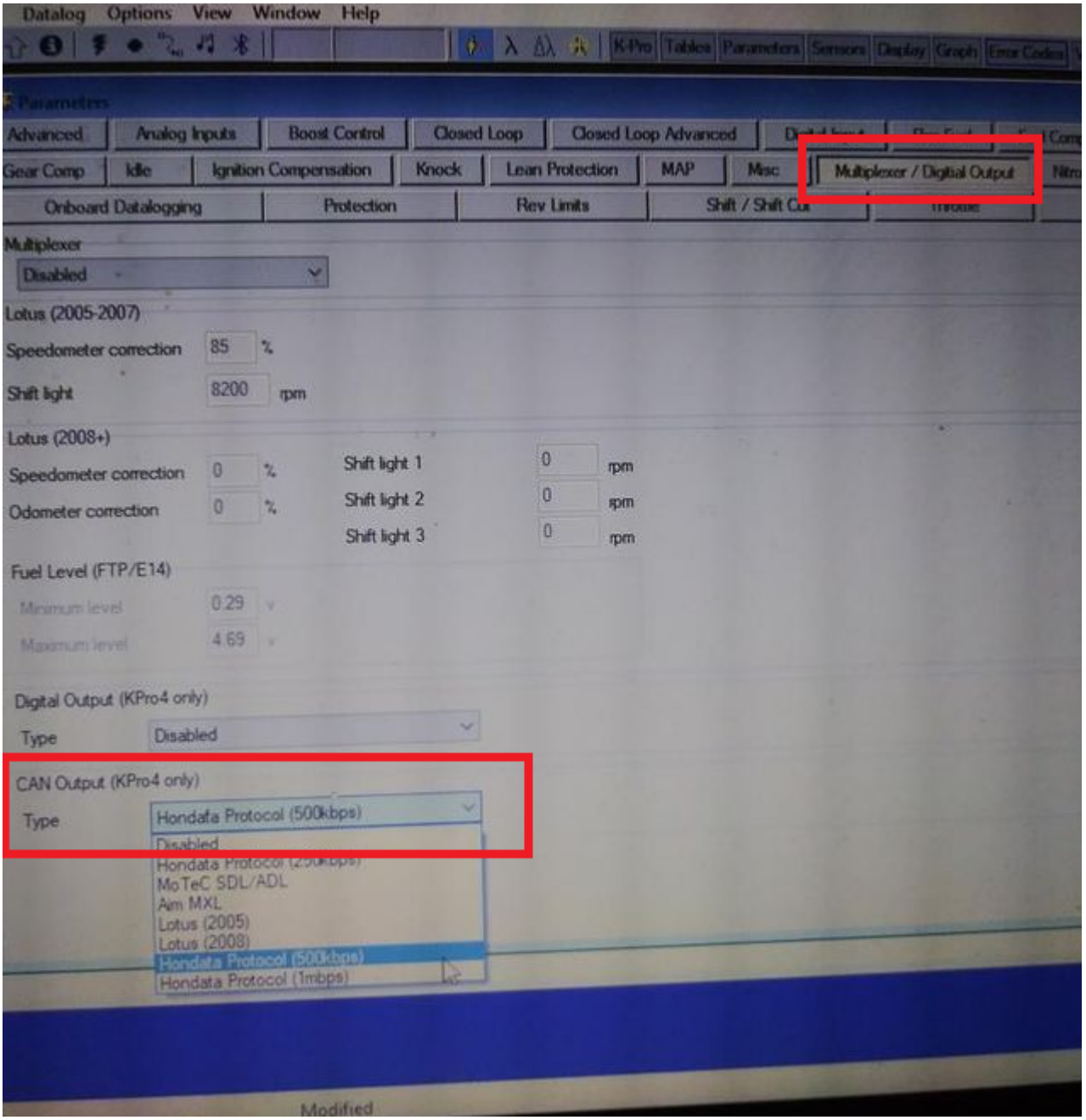




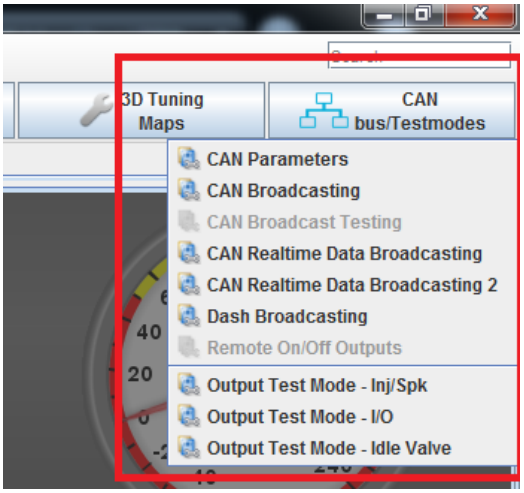


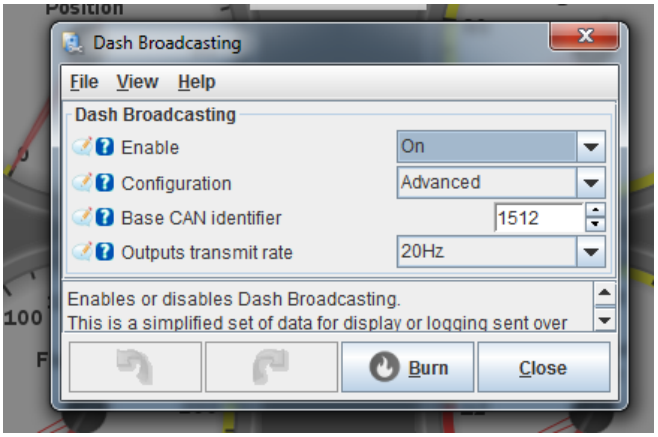

Sport
Nitrous
Flex Fuel
Engine protection
Timers
Other
CAN, Serial
Serial
CAN
ECM switch boar
ECM keyboard
PMU keyboard
Boost
Name
Tune Dis
LAM.
CAN, Serial - CAN
CAN
CAN-Bus speed
1 Mbps
Enable terminator 120Ohm
Send EMU stream over CAN-Bus
EMU strem base ID(HEX)
600
Send data to BTCAN module
CAN-Bus dashboard
User defined

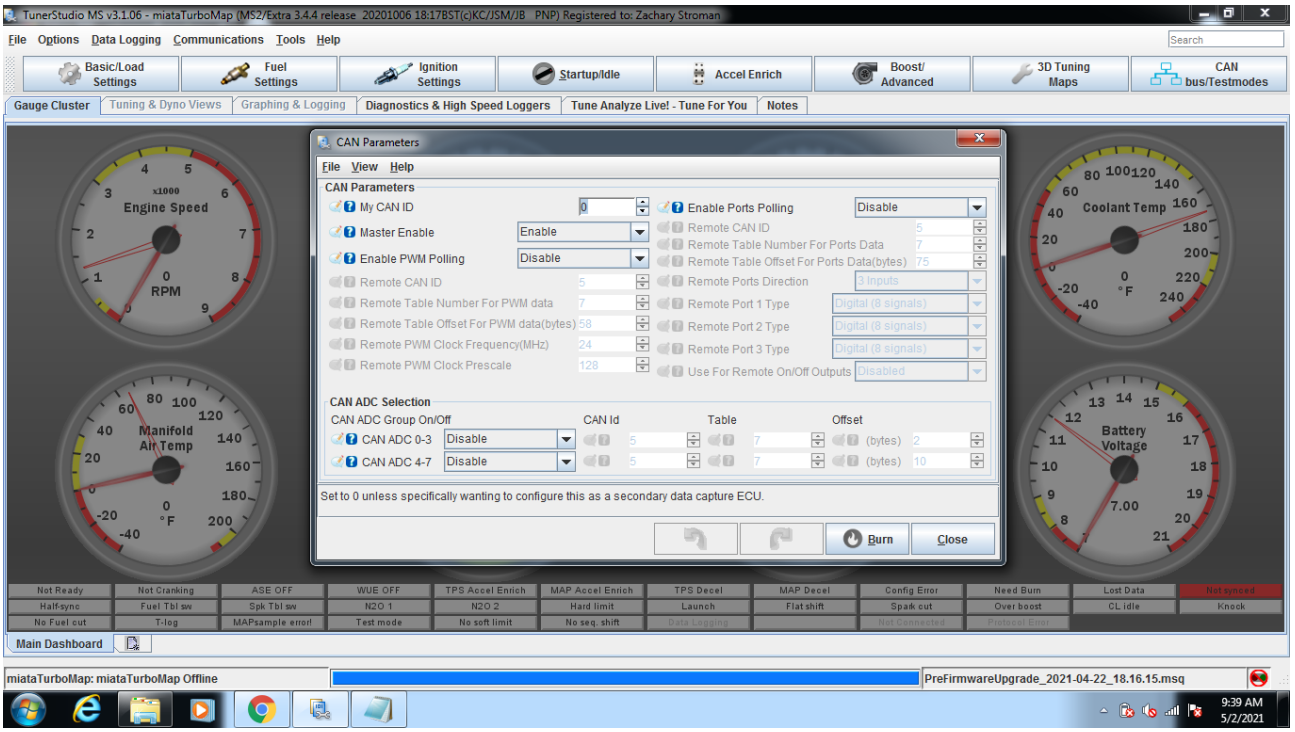
HONDATA

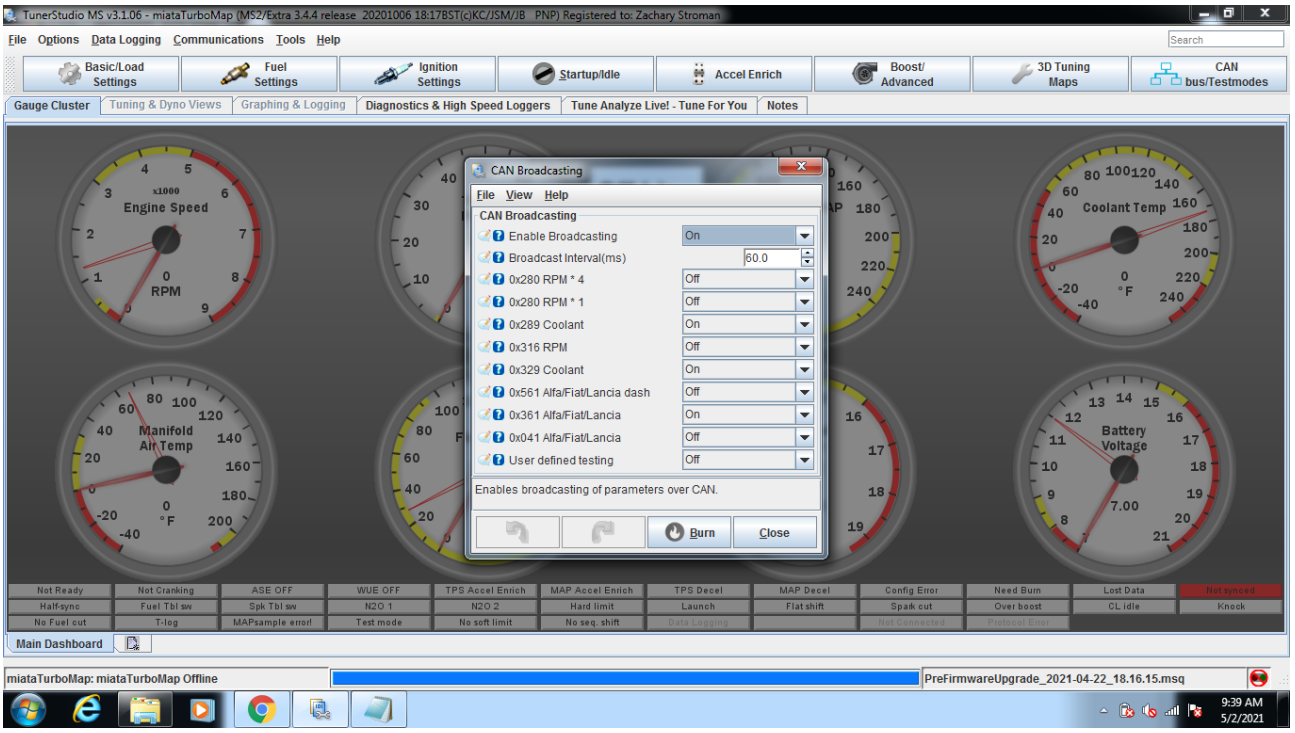

Datalog Options View Window Help
Parameters
Advanced
Analog Inputs
Boost Control
Closed Loop
Closed Loop Advanced
Gear Comp
Idle
Ignition Compensation
Knock
Lean Protection
MAP
Misc
Multiplexer / Digital Output
Onboard Datalogging
Protection
Rev Limits
Multiplexer
Disabled
Lotus (2005-2007)
Speedometer correction
85
%
Shift light
8200
rpm
Lotus (2008+)
Speedometer correction
0
%
Odometer correction
0
%
Shift light 1
0
rpm
Shift light 2
0
rpm
Shift light 3
0
rpm
Fuel Level (FTP/E14)
0.29
4.69
Digital Output (KPro4 only)
Type
Disabled
CAN Output (KPro4 only)
Type
Hondata Protocol (500kbps)
Disabled
MoTeC SDL/ADL
Aim MXL
Lotus (2005)
Lotus (2008)
Hondata Protocol (500kbps)
Hondata Protocol (1mbps)
Modified

MEGASQUIRT (requires ECU firmware 3.4.4)

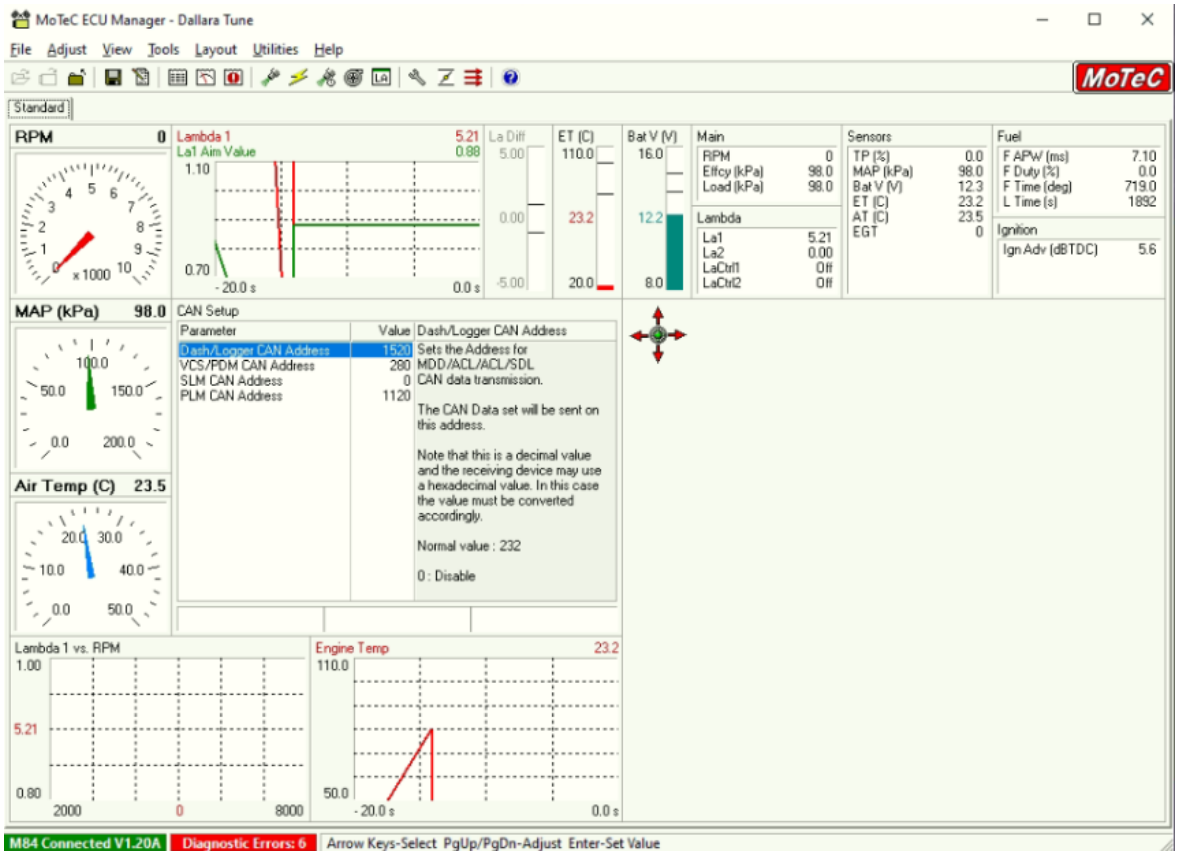




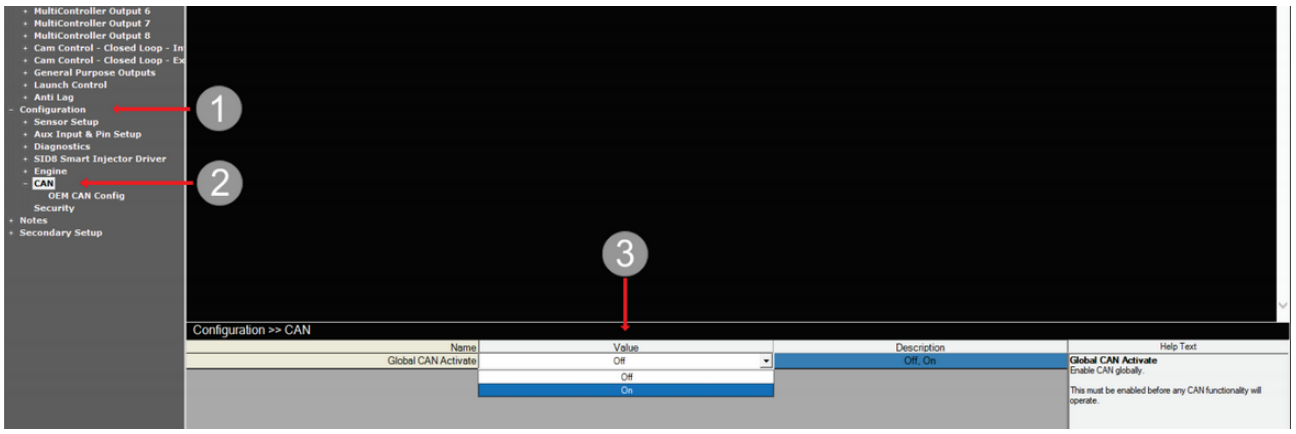




MOTEC


MoTeC ECU Manager - Dallara Tune
File Adjust View Tools Layout Utilities Help
MoTeC
Standard
RPM 0
Lambda 1 5.21
La1 Aim Value 0.88
La Diff
ET (C)
Bat V (V)
Main
RPM 0
Effcy (kPa) 98.0
Load (kPa) 98.0
Lambda
La1 5.21
La2 0.00
LaCtrl1 Off
LaCtrl2 Off
Sensors
TP (%) 0.0
MAP (kPa) 98.0
Bat V (V) 12.3
ET (C) 23.2
AT (C) 23.5
EGT 0
Fuel
F APW (ms) 7.10
F Duty (%) 0.0
F Time (deg) 719.0
L Time (s) 1892
Ignition
Ign Adv (dBTDC) 5.6
MAP (kPa) 98.0
CAN Setup
Parameter Value
Dash/Logger CAN Address 1520
VCS/PDM CAN Address 280
SLM CAN Address 0
PLM CAN Address 1120
Dash/Logger CAN Address
Sets the Address for MDD/ACL/ACL/SDL CAN data transmission.
The CAN Data set will be sent on this address.
Note that this is a decimal value and the receiving device may use a hexadecimal value. In this case the value must be converted accordingly.
Normal value : 232
0 : Disable
Air Temp (C) 23.5
Lambda 1 vs. RPM
Engine Temp 23.2
M84 Connected V1.20A
Diagnostic Errors: 6
Arrow Keys-Select PgUp/PgDn-Adjust Enter-Set Value

Wolf


MultiController Output 6
MultiController Output 7
MultiController Output 8
Cam Control - Closed Loop - In
Cam Control - Closed Loop - Ex
General Purpose Outputs
Launch Control
Anti Lag
Configuration
Sensor Setup
Aux Input & Pin Setup
Diagnostics
SID8 Smart Injector Driver
Engine
CAN
OEM CAN Config
Security
Notes
Secondary Setup
1
2
3
Configuration >> CAN
Name
Value
Description
Help Text
Global CAN Activate
Off
Off, On
Off
On
Global CAN Activate
Enable CAN globally.
This must be enabled before any CAN functionality will operate.

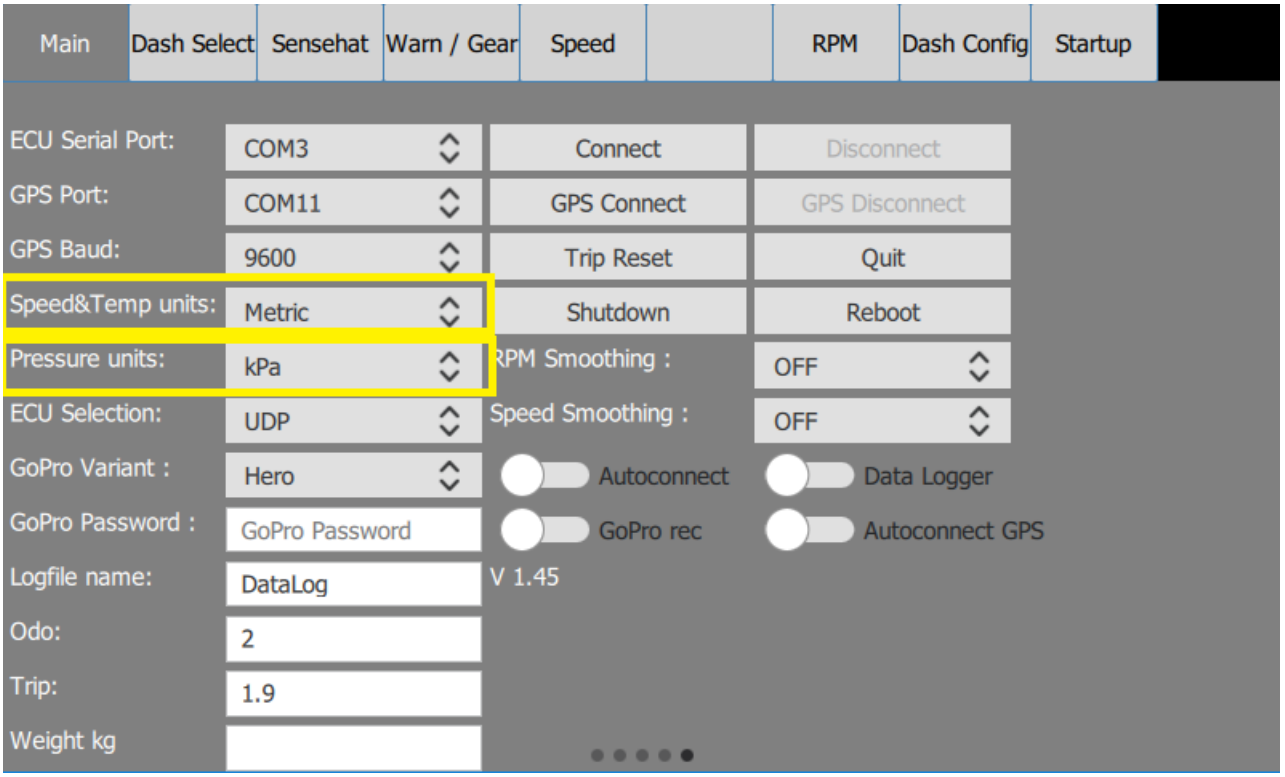
Section 4 - Dashboard Configuration

Unit selection

There are 2 unit selection drop down menus in the Settings Menu (to access settings, scroll across to the right)

Speed and Temperature
-Imperial (Speed will be shown in MPH and Temperatures in Fahrenheit)
-Metric (Speed will be shown in KMH and Temperatures in Celsius)

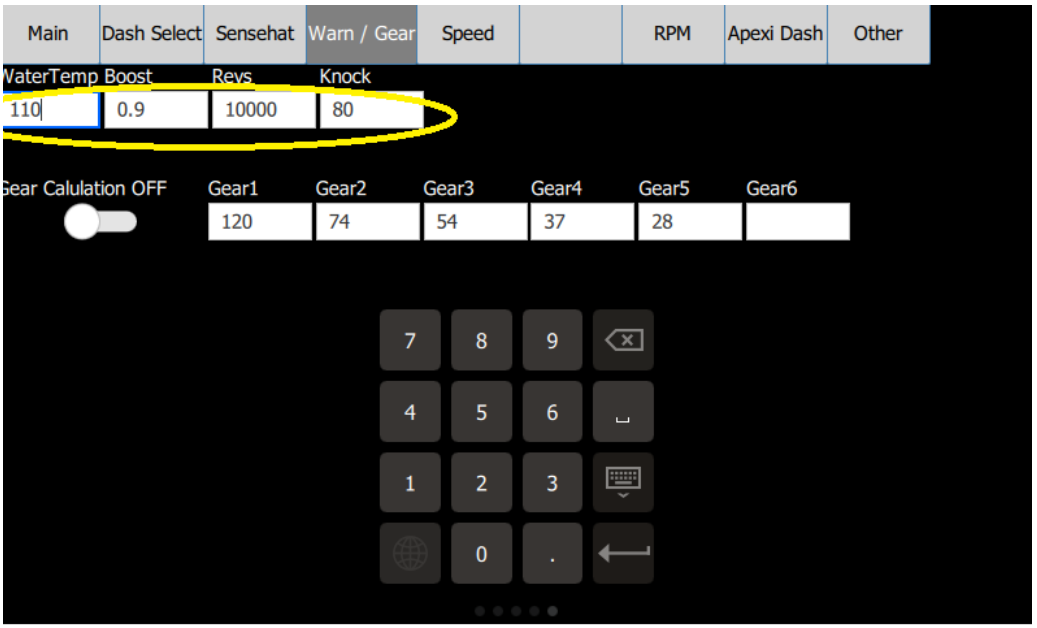
Pressure Units
-kpa (Displays all pressure units in kpa)
-PSI (Displays all pressure units in PSI)



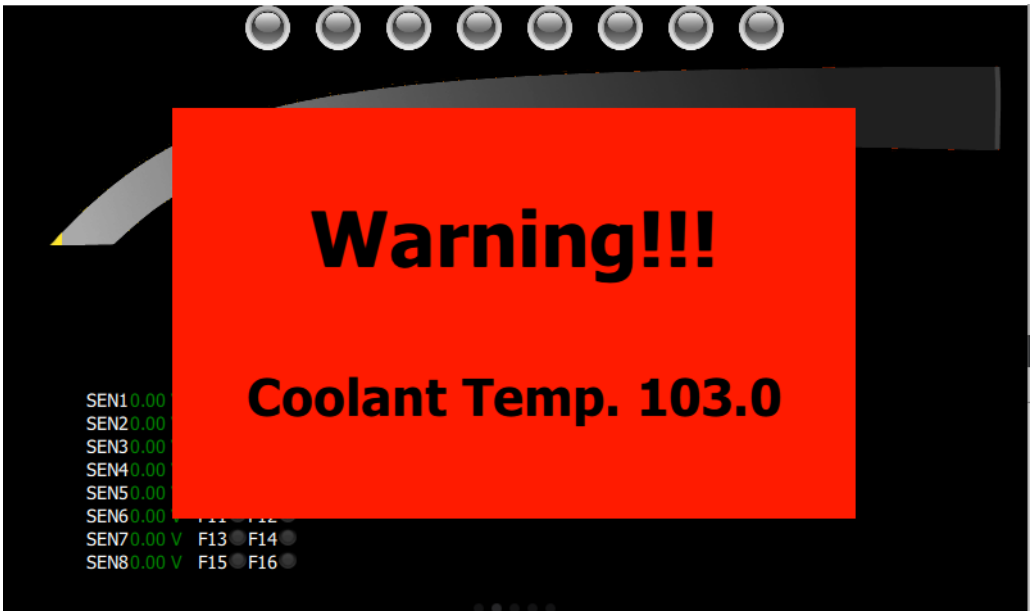
Master Warning settings

In The Settings screen click the Warn/Gear Tab

Enter the Values that you want the Warning to trigger.
If you don’t wish to have warnings, just set the values to a higher value than possible
Easter Egg :
The Revs warning Triggers a Danger To Manifold Warning like the one in a certain movie ☺



Warning Example



Speed correction

In some vehicles, both the original analogue cluster and PowerTune will show incorrect speed readings for a variety of reasons beyond just an old car, such as in situations where different size wheels and tyres have been put onto a vehicle. Firstly, have a friend measure your highway speed using a third party device (smartphone GPS app) and compare this with your speedo reading.

In the Speed Correction TAB enter your correction factor in percent, 100 is default and will display the value as sent by the ECU to the display.

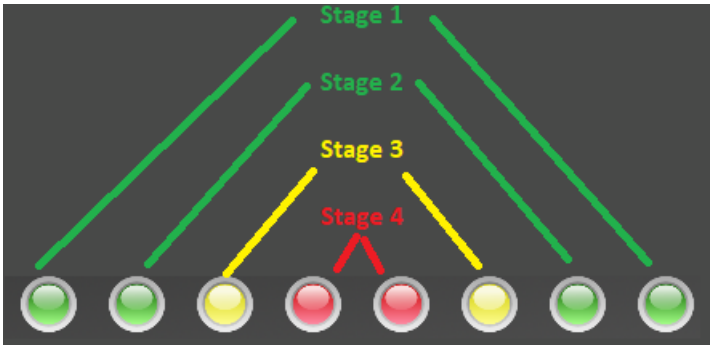
Example:

Your friend tells you the smartphone says you are driving at 100 KM/H per hour but your speedo shows 90 KM/h, which is 10% too little. You then enter 110 in the speed correction and this will show 10% more speed than what is read from the ECU

RPM and Shiftlight Settings

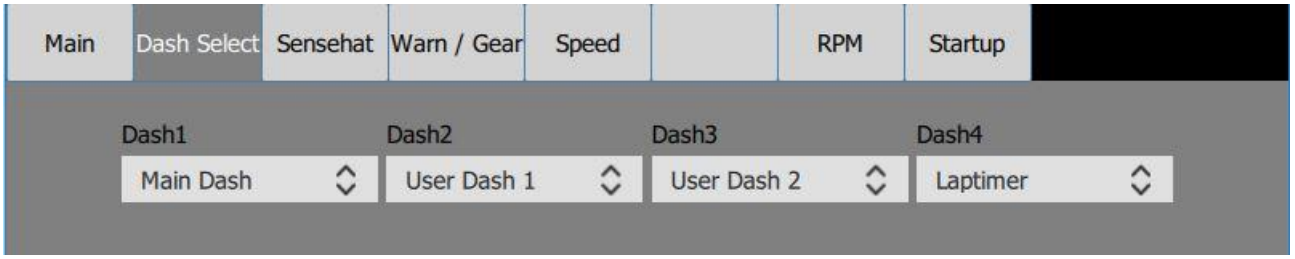
Click on the RPM Settings TAB

1. Enter the max Value Your RPM Gauges should display (this does not affect ECU settings, nor does any other PowerTune feature)
2. The shift Lights on the Dashboards have 4 Stages
   Enter the RPM value that triggers each Stage



Dashboard display configuration

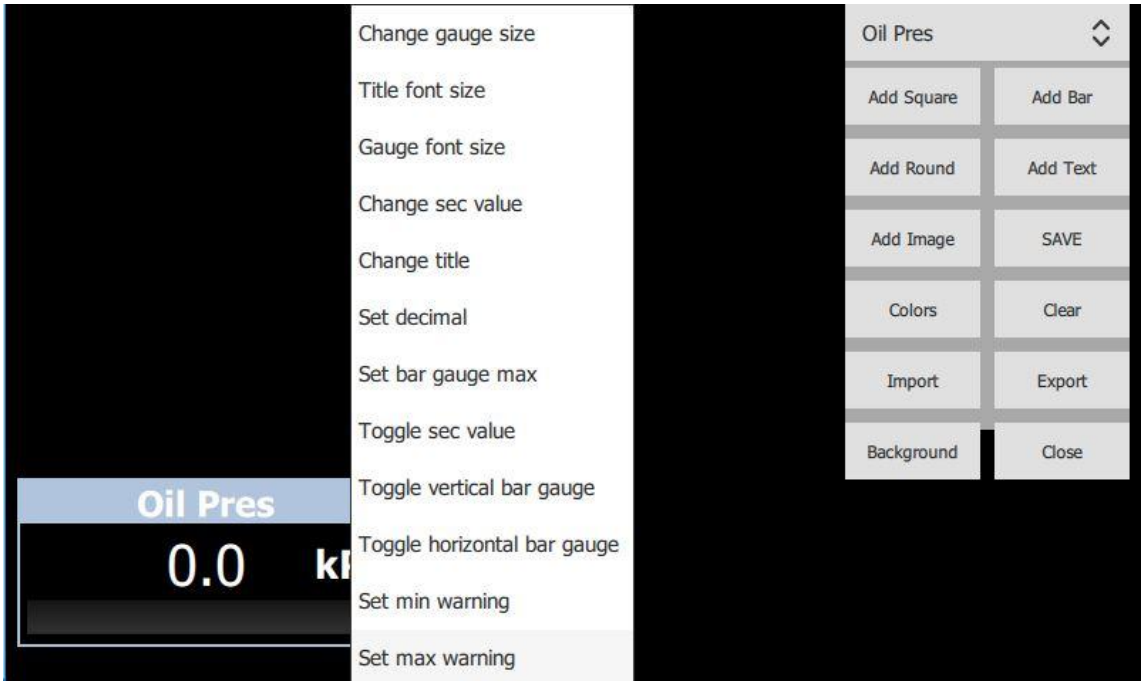
You can select 4 Different active dashboard screens from the dropdown boxes in the “dash select” tab of settings.



Some dashboards in PowerTune are configurable, such as UserDash. In order to begin building a dash, in the dash select screen, add UserDash1 one of the four active displays. Scroll across to this display, which will be an empty black page. **Start building your dash by double tapping the black page. When the main menu is open, all the gauges across all four dashe screens become unlocked and can be moved around. Keep the menu closed when not needed!**

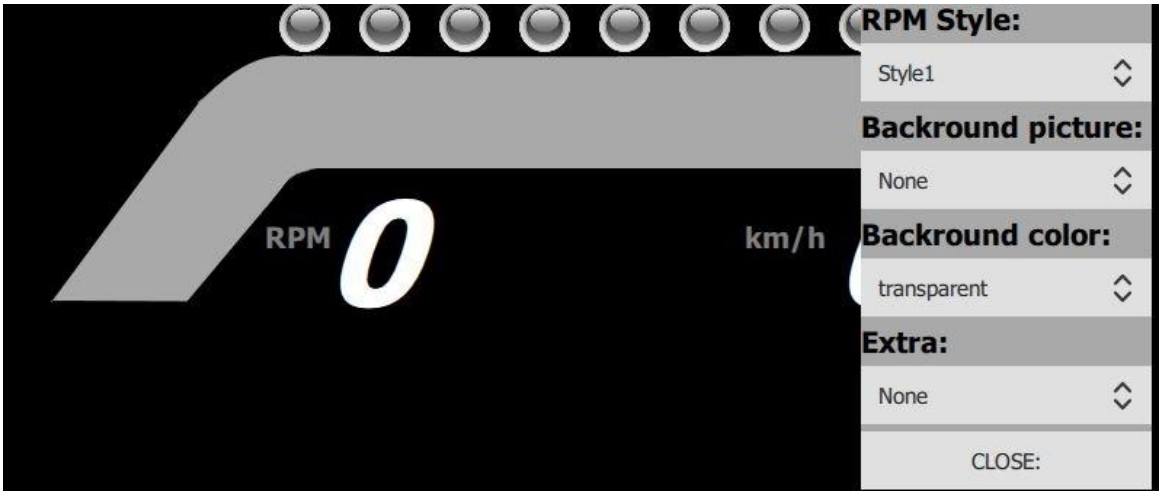
From the dropdown box in the top right corner, select the desired sensor and then start by clicking ‘add square’ to add a square style gauge. Once the gauge has been added, you can double-tap on the gauge to modify the look, style, warnings and limits as well as the labels.

Double-tap on the gauge, this will allow you to move the gauge by dragging it across the screen and will also bring up the settings menu for the gauge, allowing you to change a variety of values. For example, if we wanted the gauge to flash red if the Oil Pressure drops below a certain level, we would select “set min warning” and enter the lowest acceptable number before the gauge starts flashing red to warn you. To remove the gauge, scroll down in the options list and select “remove gauge”

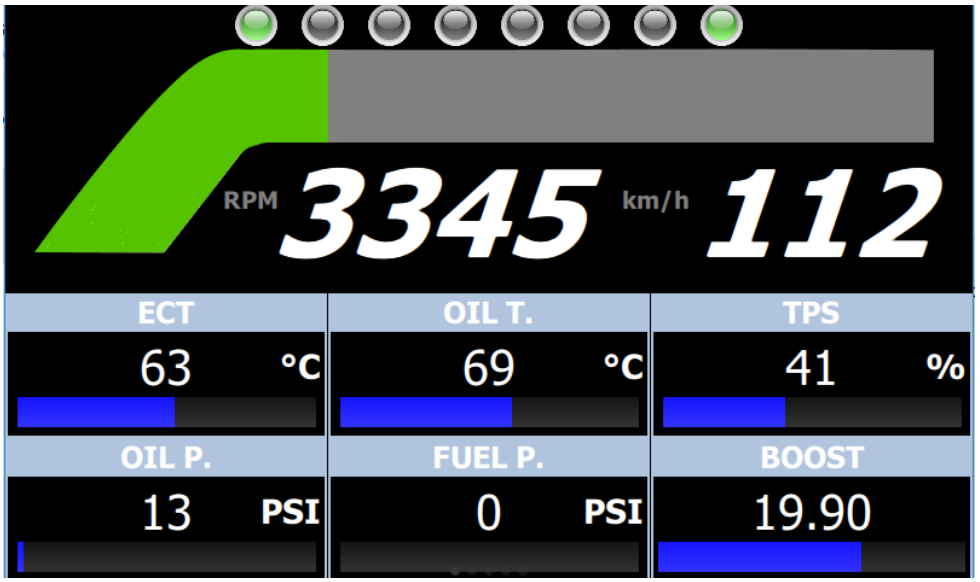


From the same menu where you added the square gauge, note the other buttons available. The “save” button will save your changes for the next reboot. The “background” button will allow you to add your RPM/speed bar style, background pictures and colours. To add background images, put the files (PNG FILES ONLY) in the folder /home/pi/Logo If you want the background image to perfectly cover the entire display, the resolution for the image must be 800x480 pixels

Set the RPM style in the top right corner to your preferred taste. Power-FC users have the option to add sensor states using the “extra” menu.



Example dash:

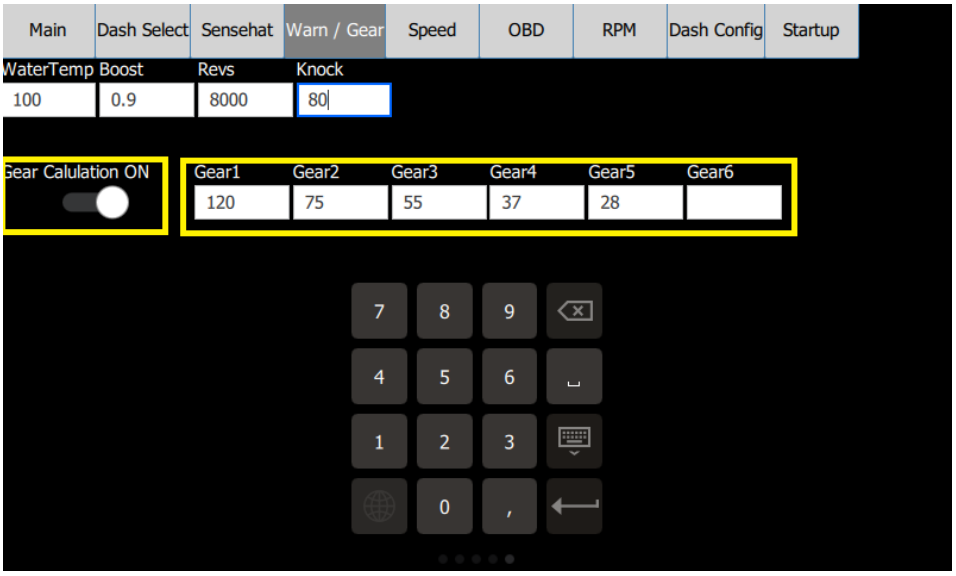


Setting up the Gear Calculation Feature :

If your ECU does not send the current gear you can switch on the gear calculation feature. (Leave the switch off if your ECU sends this information)
In the Settings screen click on the “Warn/Gear” Tab
To make the Gear calculator work you need to set up the values per gear .
RPM divided by Speed gives a fixed number for each gear .
Drive your car and record the speed at a specific rpm for each gear (you can choose different rpms per gear, just record the speed you are driving, the current rpm and note which gear you are in) . You can round the result to the next full number

Example :

gear	rpm	speed @ rpm	formula	gear value to be entered in
1st	3000	25	3000rpm / 25 *Km*h	120
2nd	3000	40	3000rpm / 40 *Km*h	75
3rd	3000	55	3000rpm / 55 *Km*h	55
4th	3000	82	3000rpm / 82 *Km*h	37
5th	3000	108	3000rpm / 108 *Km*h	28



Useful non PowerTune related fact :

Now that you know the value for each gear you can now also calculate each gears top speed, or speed in a specific gear at a specific RPM

Lets say your car is a Mazda RX7 and your redline is 8100 RPM
Just take the rpm and divide it by the calculated gear value

1st Gear = 8100rpm / *120* = *67 Km*h
2nd Gear = 8100rpm / 75 = 108 *Km*h
3rd Gear = 8100rpm / 55 = 147 *Km*h
4th Gear = 8100rpm / 37 = 219 *Km*h
5th Gear = 8100rpm / 28 = 289 *Km*h

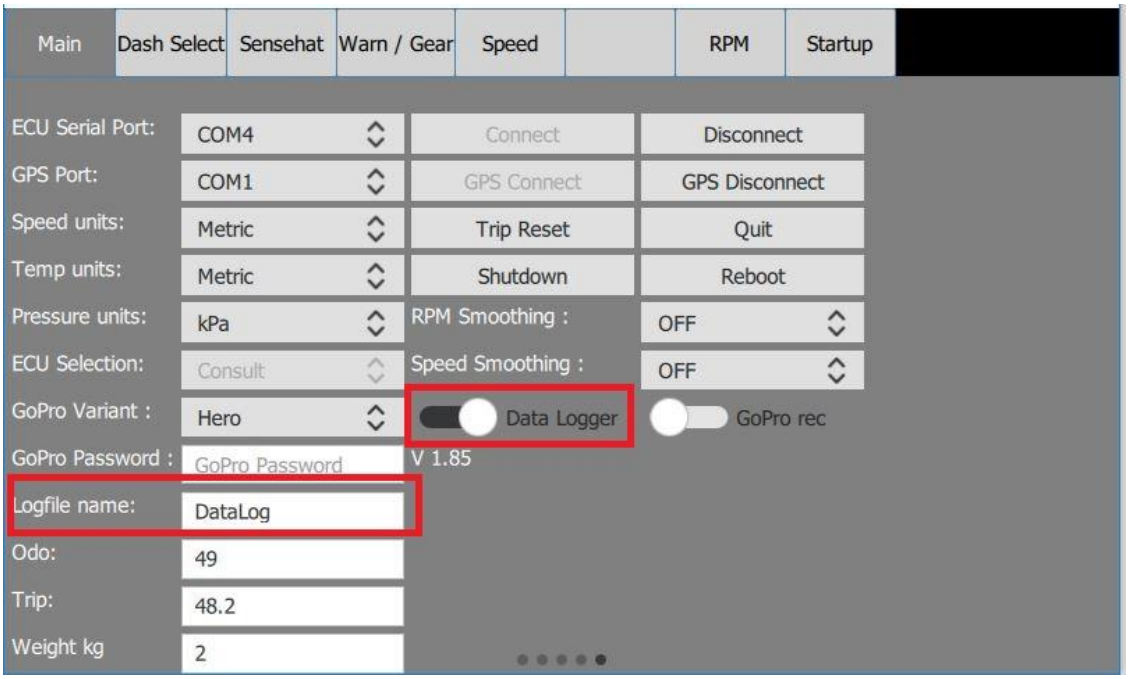
GPS/Lap timer setup

The GPS and Laptimer dashes can be enabled from the dash select tab in the settings menu. PowerTune automatically calculates lap times based on the start/finish line of the particular track you are using via the GPS module coordinates. It does not require any manual input from the user, other than resetting the fastest lap time when required and selecting the current track from the dropdown boxes along the top right corner of the laptimer dash. Our testing has shown lap times are accurate to within 1/10th of a second. The GPS dash screen will only display map data if the display is connected to a WiFi network - typically this dash screen is not required to be active.

Datalogging

To start datalogging, enable the datalog switch in the settings menu. PowerTune will export the data to a CSV spreadsheet stored on the SD card of the unit. **Each time you toggle the datalog switch, the current datalog will be overwritten.** If you want to datalog multiple runs, ensure you change the logfile name each time, example run1, run2 ect

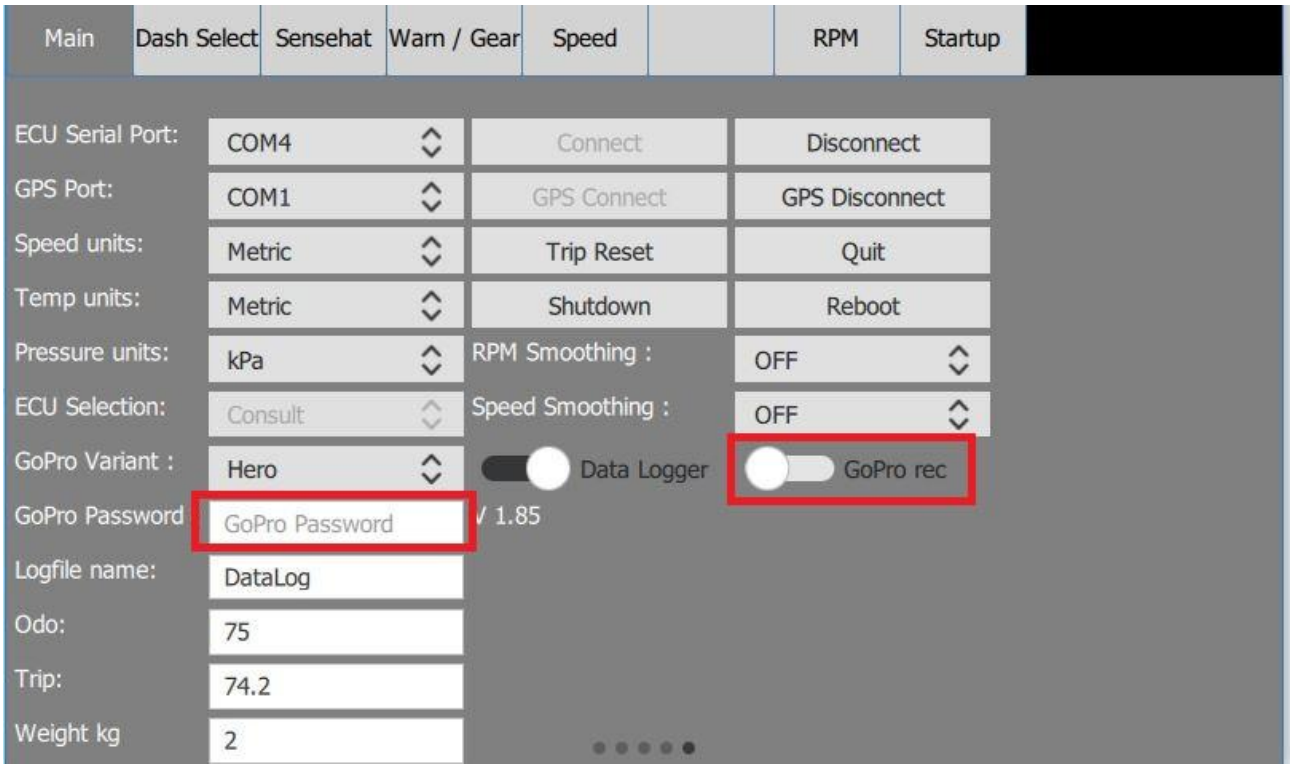
The datalog files can be found in the directory /opt/PowerTune when connecting to your display from a computer (more details below, refer to WINSCP).
(opt is a root folder, is it not within the home folder)
Note: Datalogs will be deleted when PowerTune is updated.



GOPRO setup

PowerTune can integrate with GoPro cameras so you can trigger the GoPro recording from your PowerTune dash; and with datalogging enabled it will also log the moment the recording is started so you can overlay your ECU data onto video footage, just like a real racing car driver! First, quit PowerTune from the settings menu, and connect the display to your GoPro's WiFi network (see WiFi setup in this manual for detailed steps). Once you have connected the WiFi, restart the display back into PowerTune by typing sudo reboot now (and then press enter)

Re-enter the GoPro password into the password box and when you are ready toggle the “GoPro rec” button. This will tell your GoPro to start recording, and if datalogging is enabled, this exact moment in time will be captured in the datalogs.



WIFI Setup + software update

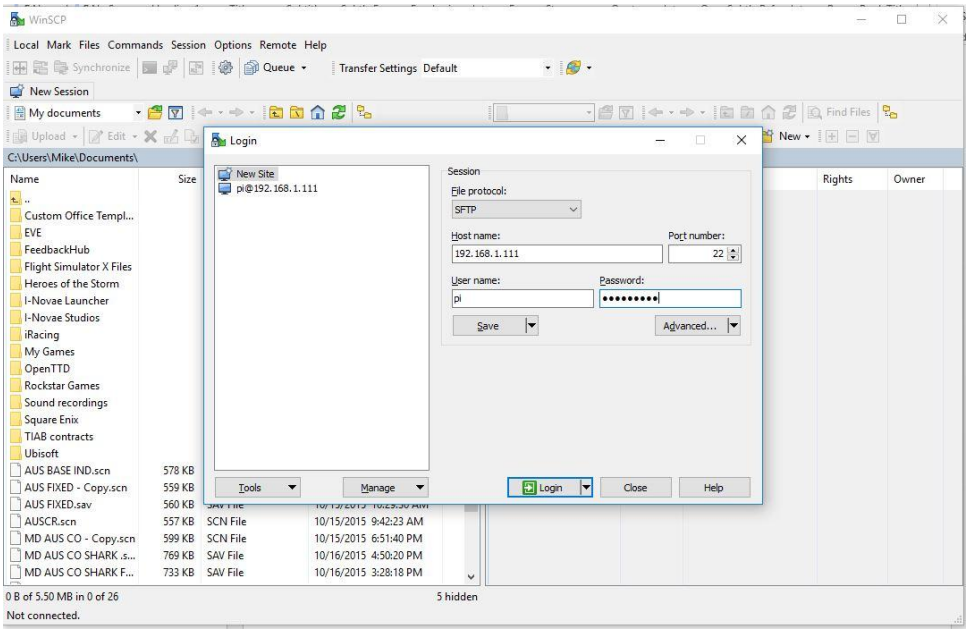
Scroll across to the main settings menu and select “network”. Select your country in the top right corner and select “scan” - Locate your wifi network and select it. Tap into the passphrase box and enter your WiFi password. Once the password has been typed, press the button to close the keyboard (bottom right corner of keyboard) then press apply, the dash will reboot to connect. Return to the network tab of settings and press the update button to start the software update, which will take several minutes.

Accessing PowerTune from Laptop via WIFI

Install ‘WINSCP’ for Windows from: https://winscp.net/eng/download.php

Connect your display to your WiFi network (or via LAN cable) and obtain the IP address for the display. You can obtain the IP address by scrolling across to the network tab in settings and located the WLAN address, eg 192.168.0.10

In WINSCP, Enter your IP address into the host name field, username as ‘pi’ and password as ‘raspberry’ without the ‘ ’and select Login. Leave the port as whatever is selected by default.



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