

Hyperspace ECU Android Ver 3.6

This is not a detailed manual. It is only a quick explanation to the settings in the same order as is found in the Android software. This manual has all the possibilities of the software but it may not be visible for your product. On the left of this PDF document there will be an Index file which will help you get to the part you seek as quickly as possible.

Throughout this settings manual there are Hyperlinks that will guide you to an online document with detailed explanations on that feature. All these documents are available under [Online Manuals](#) from the Spitronics Website. For wiring information use the online Wiring diagrams for each product. It can be found at [Manuals/Online Manuals/ECU/\(Product Name\)](#).

The software manuals are based on the PC Software but it is the same settings as the Android version.

Start-Up Screen



Header Name

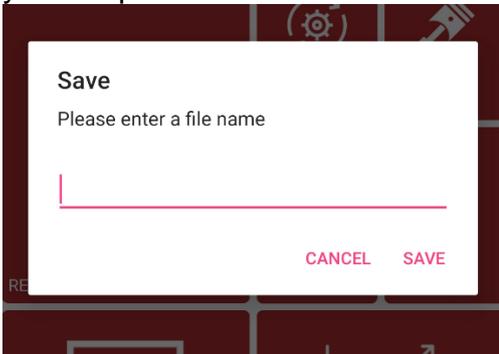
← Realtime Dashboard

Each page that you enter from the start screen will have a return button and name on top of that page. Click it to exit the page or you can use the phone's return button if it is visible.

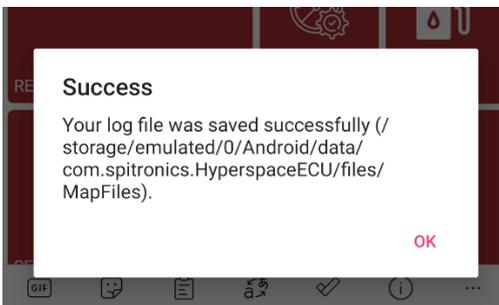
Map Save Button



Use this button to save a Map or Tune from the ECU. This will ask you to enter a file name for your Map.



Enter a file name and click save. The next block will tell you where the map will be saved.



From here you will need your phone's file manager to get the file and email it to someone or leave it there as a backup.

Map Open Button

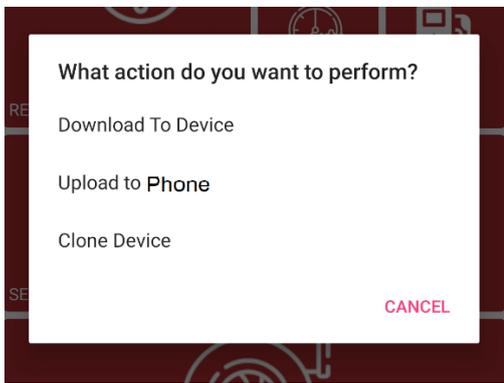


This button will open the Phone's **File Browser** and let you open a file from the phone's memory. Normally this file will be in the **Download Files** folder on your phone. If you want to open a map that you saved the follow the Save button's folder structure. Phones differ so we will not be able to log each phones procedure in this manual.

Connect Button



Once you have opened a Map then this connect button will appear. Clicking on it will bring up the next Menu.



Download to Device means the map will be loaded in the ECU but the Critical Settings will not be changed.

Upload to Phone means ignore the map and reload the map in the ECU to the phone.

Clone Device means load the map and Critical Settings into the ECU. **NB!** This feature is for setting up a new device and the outputs must not be connected to the ECU or it could damage the ECU or engine components.

Status/Save LED



This LED will flash different colours.

Green means the phone is connected with the ECU and there is no changes between them.



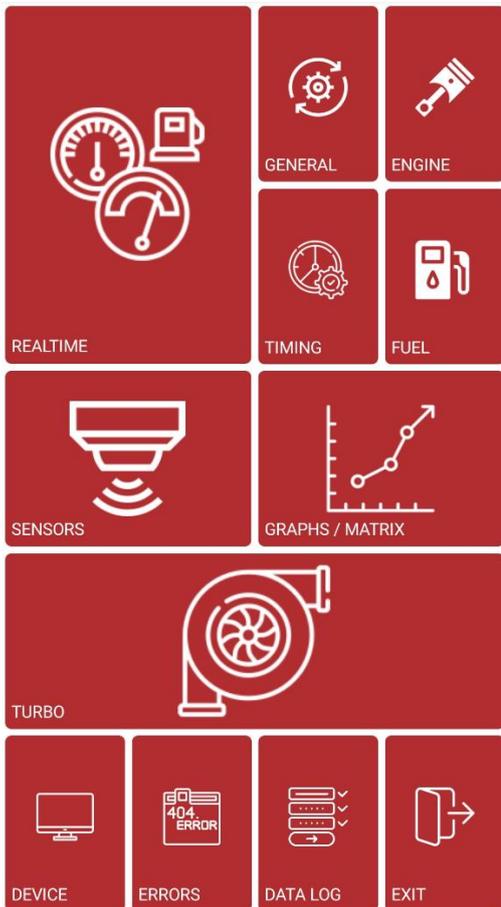
Yellow means they are connected but the maps were changed from the phone's side and the changes is not yet saved in the ECU to make them permanent.



Red means communication is lost or is not stable.

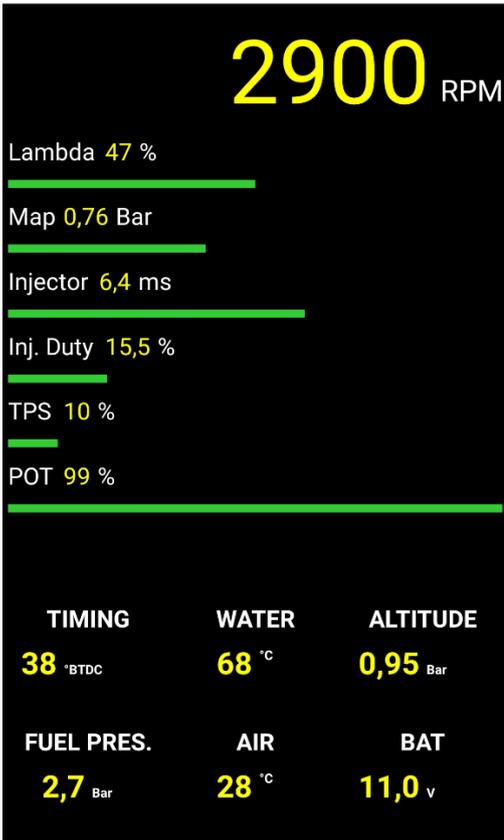
Clicking on this Yellow LED will save the data to the ECU in permanent memory. It will then flash green again.

Pages Screen



This is all the different pages that you can select from the menu. Graphs will open another selection. Note that pages may be too long and you need to scroll up with your finger sliding it to the top.

Real-Time Display



This block displays all the analogue sensor values as they change in the ECU. Below is a description of the meaning of each signal.

Lambda Sensor



This is the Lambda sensor value displayed in %.

MAP Sensor



This value displays the manifold pressure and is scaled according to the MAP range setting.

Injection Time



This value displays the total injection time that is applied after all calculations are done. It is in 0.1 milliseconds resolution.

Injection Duty



This value displays the ratio of injection time to revolution time in %.

TPS Sensor



This value displays the throttle position opening in %.

POT Sensor



This input can be connected to a potentiometer or other connections to achieve functions like launch control etc.

RPM

A black rectangular display with the text "1600 RPM" in yellow. The number "1600" is significantly larger than the text "RPM".

This value indicates engine revolutions per minute.

Ignition Timing

A black rectangular display with the text "TIMING" in white at the top and "38 °BTDC" in yellow below it.

This value displays the total ignition timing that is applied after all calculations are done. It is in 1 degree's resolution.

Water Temperature Sensor

A black rectangular display with the text "WATER" in white at the top and "83 °C" in yellow below it.

This value displays the current engine water temperature.

Altitude Sensor

A black rectangular display with the text "ALTITUDE" in white at the top and "0.94 Bar" in yellow below it.

This value displays the altitude pressure of your location.

Fuel Pressure

A black rectangular display with the text "FUEL PRES." in white at the top and "2,7 Bar" in yellow below it.

This value displays the fuel pressure in the header.

Air Temperature Sensor

A black rectangular display with the text "AIR" in white at the top and "18 °C" in yellow below it.

This value displays the current air temperature at the air intake.

Battery Voltage

A black rectangular display with the text "BAT" in white at the top and "11.1 v" in yellow below it.

This value displays battery voltage that is connected to the ECU.

General Settings

For more detailed explanation look in the [General Settings](#) Manual.

← General Settings



MAP Information

Map Information	
Name	Chevy 350 Map 1
Model	Patrol
Engine	V8 Twin Turbo M
Map No	1
Save Setup Data	<input checked="" type="checkbox"/>
Tuning Mode	Expert
Dual Map Selection	 Off

The Map information screen, **Name Model** and **Engine**, contains info for the ECU application for a specific vehicle. This helps the tuner to recognize previous work and tuning data. It is saved in the ECU and also in PC maps. It does not affect any tuning on the engine.

Map Number

Map No 1

The firmware can save up to 2 maps for different fuel setups or tuning algorithms. This is only an indication and the map cannot be forced on this page.

different products have different ways to select Dual Maps. In some conditions maps may be changed while driving. Usually the Dual Map switches is dual purposed with different functions.

Save Setup Data

Save Setup Data

This feature is handy if you want to load a map to change the tuning graphs without altering the setup data. If it is on it will load the setup settings and the graph and matrix data. If it is off it will only load the graph and matrix data. Critical settings and calibrations are not altered when loading a map. Any changes on the setup while the ECU is connected is saved as normal. This feature is permanently saved in the ECU and can only be changed when the ECU is connected.

Dual Map Selection

Dual Map Selection  Off

The map loaded in the ECU is determined by the Dual Map Selection switch. Some products like Orion2 and Venus3 has a dedicated input which is hard wired for Map selection. Mercury2 has options for different signal that is not used. This input can also be used for other tasks and this setting in software will indicate if it is used as dual map input or not. In certain conditions Maps

may be changed while driving. Do not swop Maps at full power as there may be settings that clash with graphs as the map are loading. They load in about 1 second.

NB! This is a Critical setting that alters wiring connections. Do not change it on a running vehicle. It could damage drivers or components on the engine.

Tuning Mode

Tuning Mode Expert

These Tuning features allows the tuner to select variations of tuning according to his skills. The firmware will enable more features as the level of progress is made and hide features on lower levels so that confusion for beginners is kept to a minimum.

Novice

This level is set up as the first generation of Spitronics ECU's. There are however new features which is explained further in the manual. This mode is used for graph tuning and were developed by Spitronics. It is also easier for road tune where a Dyno is not present.

Moderate

This level is more for tuners with Dyno facilities. Here the matrix tuning is present as well as the graph method for fuel and timing. There is also a selection for MAP or TPS tuning versus RPM. Included in this level is a mixture, possibly for racing engines with poor vacuum but with turbo chargers where MAP pressure needs to be compensated for. The tuner can select his preferred option. **Note:** The graph and matrix data uses its own memory space and both types could be tuned without losing the data on selection changes. This allows the tuner to tune both options and chose the best for his application.

Expert

This level is to assist the tuner to tune racing engines and different fuels where more refined parameters are required. Here parameters like Start Prime Pulse, Start enrichment, and the two Accelerator pump Enrichment values are tuned on a graph versus engine temperature. This is very useful for methanol cars also in extreme cold conditions when fuel does not ignite easy.

General Purpose Outputs

Hyperspace Ver 3.6 can handle up to 10 General Purpose (GP) outputs to configure for several different functions. These outputs can be configured to use any of the analogue signals to switch relays on or off when certain limits are reached. Due to the number of GP outputs this block was developed to be generic block. That means there is a dropdown menu to choose which output is adjusted by the tuner. Not all firmware has the ability for 10 GP outputs so the number of selections may be limited. This depends on which features are activated in the ECU. Note the operating current and requirements of each product in the electrical drawings, so that damage to the ECU will not occur. See the GP Priority register and the wiring of the specific output for that ECU. Some drivers may be positive output and some negative output. For more detailed explanation look in the Hyperspace Ver 3.6 Manual.

General Purpose Outputs	
Output Selected	Output 2
Driver Output	GP Output 2

Output Settings			
Output	RPM		
Min	2000 RPM	-	+
Max	6000 RPM	-	+
V-tech TPS	29%	-	+

Output selection

Output Selected Output 2

If an output is available, the software will show the location of the driver that is used with this GP output. Should an output not be available the driver will be blank and the Output settings will be locked on not used.

Driver Output

Driver Output GP Output 2

Selections

The tuner has a number of selections to use in the GP output. Use the drop down menu to display the others.

Not Used

RPM

Vacuum

TPS

Water Temperature

Air Temperature

POT Value

Battery Voltage

Altitude

Fuel Pressure

Lambda

Timing

Injector

CANCEL

Not used – this saves processor time

RPM – RPM/min 100rpm increments
Vacuum – pressure 0.1 Bar increments
TPS – percentage at 1% increments
Water temperature – degrees at 1°C increments
Air temperature – degrees at 1°C increments
POT value – percentage at 1% increments
Battery voltage – voltage 0.1volt increments
Altitude – pressure 0.01 Bar increments
Fuel pressure – pressure 0.1 Bar increments
Lambda – percentage at 1% increments
Timing – degrees at 1° increments
Injector – fuel at 0.1milli second increments

V-Tech

V-tech TPS 2900%

GP2 output is the only one with the V-Tech TPS limit added for the RPM setting.

Note! If you don't use these outputs, select **Not Used** so that valuable processor time can be saved.

Auxiliary RPM Output

Auxiliary

Pulses/RPM  3

Pulses/RPM

This feature is used for Rev counter calibration. You can adjust the number of pulses per revolution for the RPM output. This is handy for engine conversions. A value of 1 to 60 pulses can be achieved with this function. On some firmware you may enter 61 which will then divert the crank angle signal onto the RPM output. This is also handy if the standard ECU is still active and doing other functions in the car. Note different electrical connections in the drawings to connect the different RPM gauges onto the Spitronics ECU. When you select 0 the software will refresh and free this driver for other functions like General Purpose output on specific firmware.

If this feature is not used select zero to free up some valuable microprocessor time.

NB! This is a Critical setting that alters wiring connections. Do not change it on a running vehicle. It could damage drivers or components on the engine.

Engine Settings

For more detailed explanation look in the [Engine Settings](#) Manual.

Engine Configuration

Engine Configuration	
Engine Type	Piston Engine
Cylinders	8 Cylinders
Map Teeth	15 <input type="button" value="-"/> <input type="button" value="+"/>
Map Sensor	Custom
Map Range	2,0 Bar <input type="button" value="-"/> <input type="button" value="+"/>
RPM Range	6000 RPM <input type="button" value="-"/> <input type="button" value="+"/>
Trigger Type	36-1
Two Stroke Engine	<input type="checkbox"/>
Engine Shutdown	Fuel & Spark

Engine Type

Engine Type Piston Engine

The ECU firmware will lock this selection for a Piston or Rotary engine. For Rotary it will enable a Trailing degree graph and also a Maximum trailing degree setting. For most firmware this block will be hidden.

Cylinders

Cylinders 8 Cylinders

Most ECU firmware will lock this selection for a specific number of cylinders. Other firmware like the standard unit will open this dropdown menu for the tuner to decide for which engine it is required.

Map Teeth (Gear Type Trigger Only)

Map Teeth 17

This setting is used to synchronize the crank angle degrees where the manifold vacuum is sampled. This is very useful for engines with individual throttle bodies that has poor vacuum signal due to a common vacuum rail. This setting can be adjusted up to 180° of engine rotation after TDC. If it is a 36-1 gear as in this example, then 9 teeth will result in 90° after TDC. Start at 90° after TDC and adjust the teeth more or less at idling till the best vacuum signal is achieved. Start with the gear teeth divide by 4. For 60-2 it will be 15.

Map sensor

Map Sensor 2.5 Bar



Spitronics have a selection of 4 Map Sensors to choose from. 1.1 Bar, 2.5 Bar, 3.0 Bar, 4.0 Bar and a Custom sensor option. Select the one that is supplied with the ECU. The most popular one is 2.5 Bar.

Map Sensor Custom

Map Range **2,0 Bar**

If you use a standard MAP sensor from an engine you may choose Custom and calibrate it yourself. You need to give is a Map range where you will operate the engine in. A calibration bar will appear next to the Map sensor selection in Sensors page.

Map Range

Map Range **2,0 Bar**

Spitronics can use any MAP sensor to fuel even a normal aspirated engine. Note however, that it is best to use a sensor that is just higher than your maximum manifold pressure. It is more accurate because the sensor has better resolution over the 0 to 5-volt range. On this field you select the maximum boost pressure that you will use in the application. For example, if the engine is required to run at 0.8 Bar boost, select 1.9 Bar. This means at sea level you can run 0.8 Bar boost without running the tuning pressure off the scale. Making the scale too large will reduce valuable tuning space on the graphs or matrix. For normal aspirated engines always select 1.1 bar.

RPM Range

RPM Range 6000 RPM

This setting is used to adjust the ranges of the RPM tuning graphs or matrix. Set it to a value of 500 RPM above the engine max RPM. If you use a higher value, you will reduce valuable tuning space.

Trigger Type

Trigger Type 36-1



Selective firmware may let the user choose the crank angle sensor type. This program is written to minimise stock on the shelf for retail stores.

Two Stroke

Two Stroke Engine

This Setting will select between 2 or 4 stroke to correct the injector duty % indication bar. If it is on 4 stroke the injector time is calculated over 2 RPM's while on 2 stroke the injector time is calculated over 1 RPM. For example, on a split sequential setup, 10 milliseconds on 4 stroke means that the injector will inject 5 milliseconds each RPM to make up 10 milliseconds. While on 2 stroke 10 milliseconds will inject the full 10 milliseconds on each RPM.

Engine Shutdown

Engine Shutdown Fuel & Spark

This setting will select how the engine is shut down. **Fuel first** means that the ECU will run normally but stop injecting fuel when the key is turned off. This will let the spark burn all the unwanted fuel from the cylinder. That is handy for rotaries where the injectors are far from the intake valve. It may sound as if the engine keeps going for a moment after the key is switched off. **Fuel & Spark** cuts both immediately when the key is turned off. There may be unburned fuel on the cylinder but the engine dies immediately. **Note:** This feature is only available with certain products that have Power management capability.

Timing Settings

For more detailed explanation look in the [Timing Settings](#) Manual.

Timing Configuration

Timing Configuration		
Maximum Trailing	20 DEG	<input type="button" value="-"/> <input type="button" value="+"/>
Maximum Timing	38 °BTDC	<input type="button" value="-"/> <input type="button" value="+"/>
Minimum Coil Time	2,0 ms	<input type="button" value="-"/> <input type="button" value="+"/>
Maximum Coil Time	4,0 ms	<input type="button" value="-"/> <input type="button" value="+"/>
Vacuum Timing Split	1500 RPM	<input type="button" value="-"/> <input type="button" value="+"/>
Altitude Comp	0 DEG	<input type="button" value="-"/> <input type="button" value="+"/>

Maximum Trailing

Maximum Trailing 20 DEG

-

+

This is for rotary engines and prevents the trailing degrees from being adjusted to far from the leading plugs. In piston engines this block is hidden.

Maximum Timing

Maximum Timing 38
°BTDC

-

+

This is the maximum combined timing allowed in degrees by all the timing maps combined. If the graphs are tuned for more degrees, it will be limited by this value. On the Timing Matrix this will also prevent the tuner from selecting higher values there.

Minimum coil time

Minimum Coil Time 2,5 ms

-

+

This is the minimum coil charge time which the tuner can select. The ECU will vary the charge time automatically according to engine load from the minimum to the maximum value. It can be adjusted in 0.1 millisecond intervals from 1ms to 5ms. Standard coil setting is about 60% from the maximum value. Example if Max value is 3ms then make min 1.8ms. see the Maximum Coil Time to determine the right setting.

Maximum coil time

Maximum Coil Time 3,0 ms

-

+

This is the maximum coil charge time which the tuner can select. The ECU will vary the charge time automatically according to engine load from the minimum to the maximum value. It can be adjusted in 0.1 millisecond intervals from 1ms to 5ms. Standard coil setting is 2.5 to 3.5 milliseconds for coils of around 0.9 ohms but some new coils are lower resistance and may need shorter times. Normally the driver will heat up and may damage if it runs too hot. Always start with a min value if you are not sure. Start with 2.0 to 2.5ms. Coils with a lower resistance in the 0.4 to 0.5-ohm region, use a value of 1.5 to 2ms. Always a good idea to put a 5-Amp fuse in the power line of each coil. If you go too high the fuse will blow. If you use the Mercury Coil driver, then you can look at the overload LED. It comes on at 4-amp current. Most coils are rated at 5.5A. adjust maximum so that the OVL LED may come on at full load but not on at less than 70% load. During cold starting, this maximum value is used till the engine reaches 60°C. Thereafter spark control will commence.

Vacuum Timing Split

Vacuum Timing Split 1600 RPM

-

+

This value sets the RPM split between the Low & High Vacuum Timing maps. This value is selected about 500 to 1000 RPM's above idling.

Altitude comp.

Altitude Comp 0 DEG

-

+

This value sets the timing advance ratio for every 1000 meter above sea level. A value of 3 means that the timing will be advanced by 6 degrees at 2000 meter above sea level. If you tune the

vehicle at a higher altitude, make sure this value is set. Then when the driver descends to lower altitude the ECU will retard the timing automatically.

Crank Angle Sensor

Crank Angle Sensor

Gear Teeth 16 - +

Timing Sensor 4 °BTDC - +

This block is used to indicate to the ECU where the exact TDC point is on the crank. It works differently for the different style of crank angle sensors. These settings will allow the ECU to synchronize software timing with the actual spark timing on the engine.

On gear type trigger wheels, the **Gear Teeth** will indicate to the ECU the amount of teeth between the missing teeth slot and the Sensor position. The **Timing Sensor** will do finer adjustments to precisely set the timing in-between the teeth.

On single event triggers you will find that gear teeth adjust injection degrees in intervals as big as the pulses from the crank sensor. Mostly they are set to 1. On a 4Cyl Nissan for example the timing sensor may be adjusted to 180 degrees. If it is full sequential then it can adjust to 4 which is 720° at 180° intervals. Timing Sensor will adjust degrees between the pulses from the sensor. in a 6 cylinder is will be 120° values.

Timing Calculation

Timing Calculation

Graph MAP

Graph MAP

Graph MAP & TPS

Matrix MAP

Matrix TPS

Graph MAP & Matrix TPS

CANCEL

This block will allow the tuner to choose different options to set up timing for this engine. Each of these methods will be discussed in detail the Hyperspace Timing settings Manual.

Graph MAP

This method is for standard engines with a good vacuum signal and it allows for easy tuning in the street. It has a Dynamic timing map on top which is tuned at WOT. It has 2 vacuum tuning maps for pull-off and cruise timing adjustments.

Graph MAP+TPS

This method is used for engines with a poor vacuum signal at low RPM's and it still allows for easy tuning in the street. The ECU will use the TPS signal to calculate a MAP signal at low RPM's when there is no or little vacuum. It is used for engines where the vacuum signal is correct and above 1500RPM's.

Matrix MAP

This is for standard engines with a good vacuum signal and allows for easy dyno tuning. Here the MAP sensor versus RPM is used and the blocks are set in 1-degree resolution.

Matrix TPS

This is for normal aspirated engines with poor vacuum signal or throttle bodies and allows for easy dyno tuning. Note: It is recommended to add the altitude sensor to compensate for altitude pressure changes. TPS versus RPM does not compensate for pressure changes. Here the TPS sensor versus RPM is used and the blocks are set in 1-degree resolution.

Graph MAP + Matrix TPS

The Matrix is the same as TPS Matrix above. This is for turbo racing engines with a good or poor vacuum signal and allows for easy dyno tuning. Note: It is recommended to add the altitude sensor to compensate for altitude pressure changes in the TPS matrix. Here the normal aspirated tuning is done on the matrix and the boost timing tuning is done on the two Cruise timing graphs. They will become visible in this mode. Here the TPS sensor versus RPM is used on the matrix and the blocks are set in 1-degree resolution. Then Map sensor is used to modify timing in the cruise graphs.

Coil Combination

Coil Combination 

Wasted Spark Coil Pack

Single Distributor

Wasted Spark Coil Pack

Wasted Spark Coil Per Cylinder

Full Sequential

CANCEL

This block indicates the type of coil combinations that can be used with this firmware. Firmware will block out the ones that is not allowed. On some if you select a wrong combination the software will refresh and cancel your selection. If you have an intermediate or lower hardware class ECU, it will also hide the multi coil settings. Most COP coil per cylinder engines are fired in wasted spark configuration and each coil will have its own driver. (See the wiring diagrams for connections.)

The combo files can be loaded into intermediate, advance or ultimate ECU's. In an intermediate ECU only the single Distributer option will be available. In an advance ECU the tuner my select

between single and wasted spark. In Ultimate you may select Full Sequential on 4 Cylinder engines.

Note! On the Rotary programs the tuner may select between coil per cylinder or wasted spark. If the engine has the three coil setup where the leading spark plugs are on a wasted spark coil and the trailing are on coil per cylinder, this value is set on wasted spark. The two leading coil trigger wires must be tied together on the wasted spark coil negative. (See the connection diagrams). The charge time for the leadings will combine without overlapping and destroying the coil. Note that on high RPM's the leading spark will become weaker due to less time available to charge the coil. It has to charge twice per revolution.

NB! This is a Critical setting that alters wiring connections. Do not change it on a running vehicle. It could damage drivers or coils.

Dual distributor

Two ignition coil outputs will be activated and phased to run a dual distributor system as found on the Lexus 1uz-fe and BMW V12,

Single distributor

Only one ignition coil output will be activated and phased to run a single distributor. Old school engines use these types.

Wasted spark coil pack

Coil outputs equal to half the number of cylinders will be activated to run a wasted spark ignition coil. This is a very popular choice on smaller engines.

Wasted spark coil per cylinder

Coil outputs equal to the amount of cylinders, will be activated to COP coil per cylinder. They are fired in wasted spark sequence.

Full Sequential coil per cylinder

Orion2 have the capability to do Full Sequential Spark on 4 cylinder engines. This selection will require a Home pulse from a camshaft or distributor before the coils will be pulsed. You will need to set up the Home pulse signal.

Note that full sequential and wasted spark systems has no performance difference as both types will have a full load on the coil so spark is the same energy. It is merely required for overlap cams and NOS systems Also make sure that firmware is available for your application.

Coil Driver Trigger Combination

Coil Driver Trigger Combination



Basic Coil – Use Coil Negative Drivers

Basic Coil – Use Coil Negative Drivers

Smart Coil – Use Positive Drivers

CANCEL

This block selects the coil type connected to the ECU. There are Basic Coils that requires an HV Coil driver and then there are Smart Coils that has built in drivers.

Basic Coils require a negative pulse to charge the coil and a positive pulse to fire the coil. This requires a high voltage power MOSSFET to control the high voltage found in the coil primary during the fire cycle.

Smart Coils are coils with this high voltage driver built in. Most new cars come with Smart Coils. They require a positive pulse to charge and a negative pulse to discharge. This requires a positive driver to deliver 12V to the coil.

Note! Do check if firmware is available before you do the wiring.

NB! *The coils must get their power from the ECU power relay. At startup this relay is kept off till the ECU can read the map to see what type is selected. Having this wrong will destroy the drivers or the coils.*

NB! This is a Critical setting that alters wiring connections. Do not change it on a running vehicle. It could damage drivers or coils.

Coil Driver Outputs

Coil Driver Outputs	
Coil Driver Output 1	Coil Negative 1
Coil Driver Output 2	Coil Negative 2
Coil Driver Output 3	Coil Negative 3
Coil Driver Output 4	Coil Negative 4

On Hyperspace 3.6 Software the drivers are now also displayed. This will indicate how many drivers are allocated to coils and will change according to Coil Driver Trigger Combination. This will allow the installer to do a printout of the drivers after setting up his unit.

Note! This is the sequence of Coil Driver firing and not actual firing order. See the wiring diagrams on that.

Fuel Settings

For more detailed explanation look in the [Fuel Settings](#) Manual.

Fuel Configuration

Fuel Configuration		
Start Enrichment	0,8 ms	<input type="button" value="-"/> <input type="button" value="+"/>
Maximum Fuelling	20,0 ms	<input type="button" value="-"/> <input type="button" value="+"/>
Start Prime Pulse	12 ms	<input type="button" value="-"/> <input type="button" value="+"/>
Vacuum Fuel Cut off	0,08 Bar	<input type="button" value="-"/> <input type="button" value="+"/>
RPM Fuel Cut off	1700 RPM	<input type="button" value="-"/> <input type="button" value="+"/>
Injection Teeth	21	<input type="button" value="-"/> <input type="button" value="+"/>
TPS Gain	1	<input type="button" value="-"/> <input type="button" value="+"/>

Start enrichment

Start Enrichment 0,8 ms

This value will help an engine to stabilize after starting. This amount will be added to the injector time after the engine is started and reaches 500 RPM. It will then be phased out in a couple of revolutions. This value is also compensated with the water temperature %, and is not active in Expert mode. Then the Water Temperature graph is used. The value is set in milliseconds. In **Expert** mode this value for Start Enrichment will be blanked out and the graph value for that temperature interval will be used.

Maximum fueling

Maximum Fuelling 20,0 ms

This setting is to protect against over fueling from all the graphs with accelerator pumps etc. It will limit the final injection time to this value if it is higher.

Start prime pulse

Start Prime Pulse 12 ms

This setting is to assist in the starting of the engine. When the engine starts to crank and reaches 100 RPM a set amount of fuel is injected on all the injectors to get the first one with spark to ignite and turn the engine. A colder engine requires more initial fuel to start. This value is also compensated with the water temperature and is not active in Expert mode. Then the Water Temperature graph takes over this value. In **Expert** mode this value for Start Prime pulse will be blanked out and the graph value for that temperature interval will be used.

The Spitronics ECU's have a manual prime function where you can press the accelerator pedal before starting to inject fuel in the system. This fuel is measured at 50% of the start prime pulse setting. It is injected each time the throttle is pressed more than 25 % opening.

Should the engine be flooded, you may keep the pedal fully pressed to the floor during cranking. This will indicate the ECU to cut injectors and only provide spark. Press the throttle in all the way before putting the ignition on. It will prevent the prime pulse from injecting more fuel when the pedal is pressed. Once the engine starts release the pedal and then injection will commence as normal.

Vacuum fuel cut off & RPM fuel cut off

Vacuum Fuel Cut off **0,08 Bar**

RPM Fuel Cut off **1700 RPM**

This feature is useful in town and downhill driving and will save fuel. It will let the engine run against compression as you are decelerating. It will also prevent flaming in the exhaust during accelerator blip. Injectors will be cut when the MAP sensor value is below the vacuum setting and the engine RPM is above the RPM setting. There is a dead band feature built into these settings to prevent jerking when cruising close to the parameters. If you feel a jerk when the feature is activated or deactivated, adjust these settings till it changes over smoothly. This is normally where the change from positive to negative drive on the prop shaft is.

Injection teeth

Injection Teeth **21**

This feature adjusts the start injection degrees. It is only available on gear type triggers as low as 12 teeth per revolution. Normal injection timing starts just after the intake valve closes. The warm valve helps atomizing the fuel and makes the engine use less fuel. Put the engine on the degrees where you want to start injection. Count the number of teeth from the slot or missing teeth in the gear, in an anti-clockwise direction, to the sensor. If the pickup is in the slot imagine the tooth there and count it as well. Even if it is 60. The firmware will move injection in the slot to the closest teeth as this is not as critical as spark timing. You may change this value during tuning to see if you get better atomization and performance increase. Usually this is best seen at idle. Find the spot where it runs rich and make idling leaner. Start with low teeth and move to larger numbers to see when the valve closes. It will go rich at that point.

TPS Gain

TPS Gain **1**

This setting will adjust the rate at which the TPS sensor will move the MAP bar to the right of the graph during Graph Map + TPS calculation mode. This will simulate a MAP signal and the gain adjustment will produce the right amount of fuel during pull-off. (For further details see the tuning section).

Fuel Ratio

Fuel Ratio

Enrichment **100 %**

This setting will multiply the final fuel calculation or injector time with this % value. This is handy if you want to use a similar engine's map. Sometimes injector sizes or fuel pressure may differ between engines. adjusting the ratio will have a general effect on all tuning. Always start to tune with Ratio 100%.

Fuel Offset

Fuel Offset

Enrichment **0,0 ms**

The injector offset is used for injector dead band. This value will add injector time at the end of calculations to compensate for the time it takes to open and close the injector. It will not affect the

total real-time value displayed on the software. So make sure it is zero if you don't use it. The big advantage of this is for Altitude compensation. On older versions altitude compensation took dead band into calculations and caused a slight error by going leaner at higher altitude. The dead band value is also added on Micro Fuel graph.

Always start to tune with an offset 0. If you add an offset remember it will be added to all your fuel values.

Accelerator pump tuning

Accelerator pump selection

Accelerator Pump

MAP & TPS

None

MAP

TPS

MAP & TPS

CANCEL

The accelerator pump setting is used to richen the fuel mixture when accelerating to avoid flat spots or bog. Here you can select not to use it, use either the TPS or MAP or both signals. Below is the selections to setup each pump for TPS and MAP.

MAP

Enrichment	5,0 ms	-	+
Sensitivity	2	-	+
Max RPM	5000 RPM	-	+
Strokes	4	-	+

TPS

Enrichment	5,0 ms	-	+
Sensitivity	3	-	+
Max RPM	5000 RPM	-	+
Strokes	4	-	+

Enrichment %

Enrichment	5,0 ms	-	+
------------	--------	---	---

This is the amount of fuel that will be added momentarily when the accelerator pump is activated. This value is divided by the number of strokes and each stroke the value is reduced by the division value. It will start with 10 and reduce to zero so that fuel is gradually reduced. This value is also compensated with the water temperature graph value. In **Expert** mode this value for MAP and TPS will be blanked out and the graph value for that temperature interval will be used.

Sensitivity

Sensitivity

2

-

+

The activation sensitivity can be adjusted from 1 to 10. The lower the value, the more sensitive the accelerator pump will be. If the accelerator pump is set too sensitive it will activate randomly and cause the vehicle to over fuel. Rather keep the activation sensitivity as high as possible to avoid this from happening. For the TPS signal this value can be lower as it is more stable than MAP value and it reacts faster.

Max RPM

Max RPM

5000
RPM

-

+

This is the maximum RPM that the pump settings will be active. At high RPM you do not need an accelerator pump. A standard is 1500 to 3000 RPM for TPS and 1500 to 2200 RPM for MAP. If a value was initiated before this limit was reached it will finish the decay cycle.

Strokes

Strokes

4

-

+

This is the number of engine strokes that the fuel must be applied to and then decayed over the amount of cycles. If it is a 4 cylinder engine, a value of 8 will inject 4 full revolutions of fuel. There are two firing strokes per revolution. If it was a 6 cylinder engine, a value of 12 will inject 4 full revolutions of fuel. Always tune for the lowest value to eliminate flat spots. If a value of example 10 is selected it means that the enrichment amount will be decayed by a tenth every cycle till the tenth stroke.

Fuel Calculation

Fuel Calculation

Graph MAP

Graph MAP

Graph MAP & TPS

Matrix MAP

Matrix TPS

Graph MAP & Matrix TPS

CANCEL

This block will allow the tuner to choose different options to set up timing for this engine. Each of these methods will be discussed in detail under the tuning chapter further in the manual. You can see the **Tuning** section for detailed description on the tuning side.

Graph MAP

This is for standard engines with a good vacuum signal and allow for easy tuning in the street.

Graph MAP+TPS

This method is used for engines with a poor vacuum signal at low RPM's and it still allows for easy tuning in the street. The ECU will use the TPS signal to calculate a MAP signal at low RPM's when there is no or little vacuum. It is used for engines where the vacuum signal is correct and above 1500RPM's. The graphs are the same as above with the addition of the following settings:

Vacuum Fuel Cut off 0,08 Bar - +

RPM Fuel Cut off 1700 RPM - +

When the RPM's are below the RPM fuel cut off, then TPS idle is activated. The Vacuum Fuel Cut off setting then becomes the minimum manifold pressure value to start off from.

TPS Gain 1 - +

The TPS gain value will use the TPS signal to calculate a projected vacuum signal on the graph. When the actual vacuum is below the calculated vacuum then the ECU will use the lowest vacuum signal of the 2. Once RPM's is above the RPM fuel cut off, then TPS idle is de-activated.

Matrix MAP

This is for standard engines with a good vacuum signal and allows for easy dyno tuning. Here the MAP sensor versus RPM is used and the blocks are set in 0.1 milliseconds resolution.

Matrix TPS

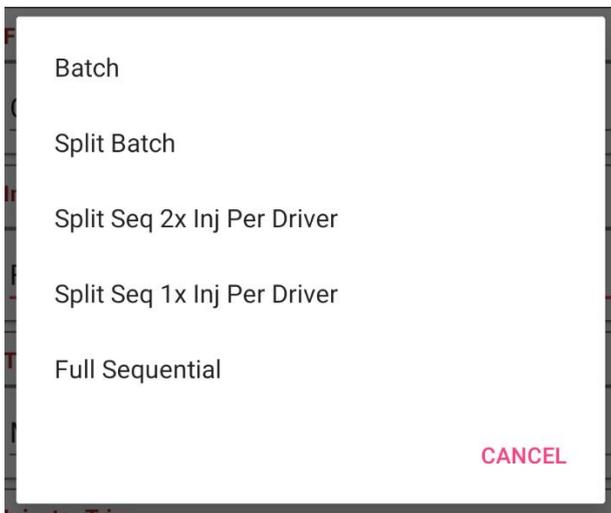
This is for normal aspirated engines with poor vacuum signal or throttle bodies and allows for easy dyno tuning. Note: It is recommended to add the altitude sensor to compensate for altitude pressure changes. TPS versus RPM does not compensate for pressure changes. Here the TPS sensor versus RPM is used and the blocks are set in 0.1 milliseconds resolution.

Graph MAP + Matrix TPS

The Matrix is the same as TPS Matrix above. This is for turbo racing engines with a good or poor vacuum signal and allows for easy dyno tuning. Note: It is recommended to add the altitude sensor to compensate for altitude pressure changes in the TPS matrix. Here the normal aspirated tuning is done on the matrix and the boost tuning is done on one Fuel Load graph. It will become visible in this mode. Here the TPS sensor versus RPM is used on the matrix and the blocks are set in 0.1 milliseconds resolution. Then Map sensor is used to modify fuel under boost. Notice how there is no fuel if there is no boost. This fuel is calculated as % boost compensation.

Injection Type

Injection Type 
Full Sequential



This setting will allow different methods of fuel injection. The firmware in the ECU will blank out the methods that are not adjustable. In some firmware a refresh will be forced to reshuffle GP outputs or cancel an illegal setting.

Batch Injection

This method all the injectors are pulse at the same time. It is not good practice as the cylinders does not get the fuel under the same conditions or injection angle, and is poor on power and economy. Spitronics programs does not use the feature unless for specific tasks.

Split Batch Injection

This method will pulse two sets of injectors 180° apart from each other. It is used where the trigger has even pulses and no cam signal is present. It is used on the standard systems where budget is of importance. For a 4 cylinder, the injectors are paired so that each cylinder gets fuel under the same condition or injection angle.

Split Seq 2x Inj Per Driver

This method will pulse two injectors connected per driver for the two cylinders that moves together. There are up to 4 drivers in the sequence. This means it can do up to 8 cylinders in split sequential mode. The injectors will pulse once per revolution and the injection time on the software will be divided by 2. With other words for each revolution only half the calculated fuel is injected. This method does not require a home pulse and is the popular choice. There is very little difference in power and economy to a full sequential system. Note that driver sequence is not cylinder sequence. You need to wire according to your engines firing order. See the drawings for this.

Split Seq 1x Inj Per Driver

This method will pulse one injector per driver. There are up to 4 drivers in the sequence. This means it can do up to 4 cylinders in split sequential mode. The injection time on the software will be divided by 2. With other words for each revolution only half the calculated fuel is injected. This method does not require a home pulse and is the popular choice. There is very little difference in power and economy to a full sequential system. Note that driver sequence is not cylinder sequence. You need to wire according to your engines firing order. See the drawings for this.

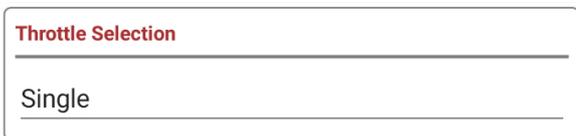
Full Sequential Injection

This method will pulse one injector per driver. The injector will pulse once every two revolutions and it will inject all the fuel calculated on the software. Here a cam pulse or home signal is required to sink the injectors with a certain stroke one the engine. If there is no home pulse it will still do full sequential injection, but stroke phasing may vary from start to start. Note that an engine is normally started in split sequential mode and then goes over to full sequential after 500 rpm is reached or when a home pulse is established. This helps for faster starting. This feature can only

be used on 4 cylinder engines. Note that driver sequence is not cylinder sequence. You need to wire according to your engines firing order. See the drawings for this. Tip: if you don't have a home pulse set injection angle to inject just after the intake valve has closed.

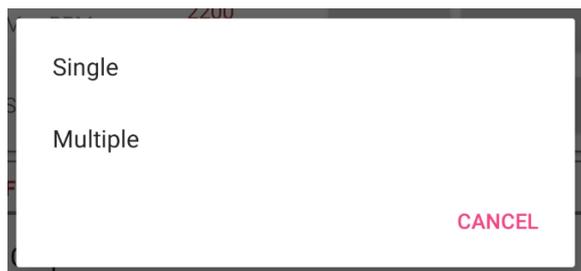
NB! This is a Critical setting that alters wiring connections. Do not change it on a running vehicle. It could damage drivers or fill cylinders with fuel which may bend con-rods.

Throttle Selection



Throttle Selection

Single

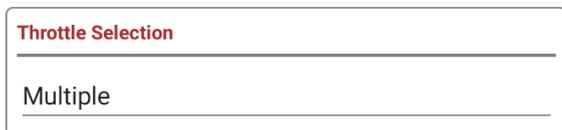


Single

Multiple

CANCEL

This setting is developed to use a MAP signal on multiple throttle body engines. The problem with them is there is no intake plenum where the vacuum could be measured. The vacuum signal only makes a spike when the valve opens. This spike is also there only once in two RPM's. This makes it important to read the signal on crank degrees when the vacuum signal is present. This setting is only available for gear type triggers as low as 12 teeth.



Throttle Selection

Multiple

On multiple throttle bodies connect only cylinder 1, or the cylinder that shares the same TDC degrees with it to the Map sensor. Do not use a common vacuum rail. You will need to set the Map teeth in the Engine Settings page.

Injector Trim

Injector Trim

No of Injectors	8	-	+
Injector 1	100,5	-	+
Injector 2	100,2	-	+
Injector 3	99,7	-	+
Injector 4	100,4	-	+
Injector 5	99,8	-	+
Injector 6	99,5	-	+
Injector 7	100,4	-	+
Injector 8	100,3	-	+

RESET Reset all to 100%

This feature allows the tuner to trim each injector individually for the ultimate performance. This is done by individual Lambda or EGT sensor on the exhaust runner to measure individual air fuel ratios. It is only selected Orion2 firmware that has this feature.

No of Injectors

No of Injectors 8 - +

This is the number of drivers selected by the tuner. The Orion2 has 4 injector drivers and can work full sequential for 4 cylinders. A setting of zero will disable this feature and free up valuable microprocessor time.

Injector Trim Setting

Injector 1 100,0 - +

These tuning blocks allow the tuner to adjust the register from 90.0 to 110.0 % for each cylinder. Adjustments can be made in 0.5 % resolutions.

Reset

RESET Reset all to 100%

This block is to clear all the registers to 100.0 % to start with. First tune the engine is as good as possible, then do minor changes here to calibrate the injectors. A tip is to use the middle average of the injectors and tune to that. Example if the injectors differ by 10 % between high and low. Then use the middle value and some will be 5% high and some 5% low.

Injector Driver Outputs

Injector Driver Outputs	
Injector Driver Output 1	Negative 1
Injector Driver Output 2	Negative 2
Injector Driver Output 3	Negative 3
Injector Driver Output 4	Negative 4
Injector Driver Output 5	Negative 5
Injector Driver Output 6	Negative 6
Injector Driver Output 7	Negative 7
Injector Driver Output 8	Negative 8

On Hyperspace 3.6 Software the Injector drivers are now also displayed. This will indicate how many drivers are allocated to Injectors and will change according to Injector Type setting. This will allow the installer to do a printout of the drivers after setting up his unit.

Note! This is the sequence of Injector Driver firing and not actual firing order. See the wiring diagrams on that.

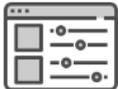
Sensor Settings

Active Sensors

	<input checked="" type="checkbox"/> TPS	<input type="checkbox"/> Show Graph
	<input checked="" type="checkbox"/> MAP	<input type="checkbox"/> Filtered
	<input checked="" type="checkbox"/> Altitude	<input type="checkbox"/> Compensate
	<input type="checkbox"/> MAP/Altitude Swop	
	<input checked="" type="checkbox"/> Water Temperature	
	<input checked="" type="checkbox"/> Air Temperature	
	<input checked="" type="checkbox"/> Fuel Pressure	<input type="checkbox"/> Show Graph
	<input checked="" type="checkbox"/> Battery	<input checked="" type="checkbox"/> Show Graph
	<input checked="" type="checkbox"/> Lambda	<input checked="" type="checkbox"/> Show Graph
	<input checked="" type="checkbox"/> Tuning POT	
	<input checked="" type="checkbox"/> Crank(TDC) - [Falling]	<input type="checkbox"/> Test
	<input type="checkbox"/> Cam (Home)	
	<input type="checkbox"/> Cam 1	
	<input type="checkbox"/> Cam 2	

This block lets the tuner select the different sensors that he requires for his application. Not all the sensors are used but each one has different features that makes the engine perform at its best. If a sensor is not used, leave the block unchecked. This will free up valuable microprocessor time. Also make sure the wiring to that sensor is properly isolated as there is power on the leads that could short circuit and damage the ECU as a result. Some of the sensors cannot be altered or will be forced on by the firmware. There may be other settings that work with this sensors on other pages. make sure you go through all the settings.

Calibration

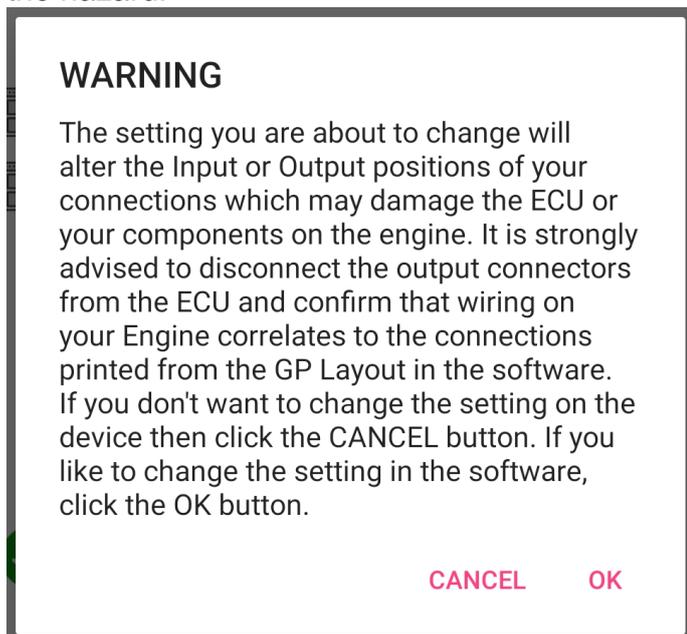


Some of the inputs can be calibrated by clicking on this calibrate button next to it. This allows for a wider range of sensors to be used and calibrated in the software.

Warning



This warning sign at certain critical settings will change wiring connections on the device. Do not change them while the engine is running. Disconnect the relevant output connectors of the ECU. You could accidentally connect a coil or injector to a GP algorithm which may damage the driver or coil or fill the cylinder with fuel. If you do change the setting a warning will pop up reminding you of the hazard.



All Critical settings will be saved separately in the ECU which means when you load a map they will not be changed. Except if you press the Clone button. Critical settings can only be altered on a live device or with the clone function.

TPS Sensor

For more detailed explanation look in the [Throttle Position Sensor](#) Manual.



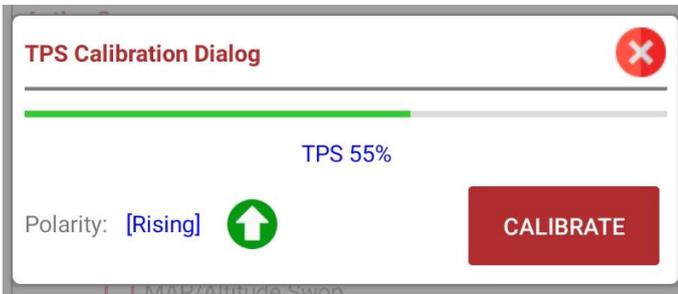
TPS

Show Graph

This sensor indicates to the ECU what the driver wants to do. It is also used for many features in the ECU, such as fueling, accelerator pump, idling control, fuel cutoff, cam control, automatic transmission control, etc. It is possible to control the engine without this sensor but with limited drivability. If there is a TPS sensor on the engine, rather connect it. If not, un-select the check box and isolate the wiring.

For the ECU to operate correctly this sensor needs to be calibrated. **Note:** When pressing the throttle while calibrating, the Fuel Prime function may squirt some petrol on the cylinders. You may disconnect the P2 and P3 connectors so that these functions will have no effect.

Click on the *Calibrate*  button left of the TPS check box and do the following procedure:



The TPS value must increase with throttle depression. If it is decreasing, click on *Polarity* to select *Negative*. This feature is normally used where the original ECU is still connected and wiring cannot be altered. In this case you connect only the ECU TPS signal wire to the OEM signal wire. Do not connect the ground or 5-volt signal wires but isolate them to prevent shorts. Now click the *Calibrate* button. The current TPS value will be written into the two blocks *Min* and *Max*.

Press the fuel pedal in completely and release the pedal completely. The *Min* and *Max* values will be indicating the range of the TPS. Click the *Save* button. You may now test the TPS signal by pressing the pedal in and releasing it. The TPS real time value should operate from 0 to 100%.

Then click on the 'Save to ECU'  button to make the changes permanent.

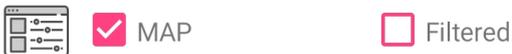
Show Graph

Show Graph

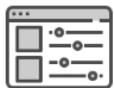
This checkbox will enable the TPS compensation graph. With this graph it is possible to add fuel % with the TPS position. It is handy to enrich the fuel mixture at full throttle conditions. There is no timing compensation for this graph.

MAP Sensor

For more detailed explanation look in the [MAP Sensor](#) Manual.



This sensor measures the MAP (Mean Absolute Pressure) in the intake plenum. This is the main sensor for the ECU to calculate the fuel amount which is injected into the engine at different conditions and load requirements.



This 'calibrate' button will only appear when the custom sensor is selected under **Engine Settings**.

Map Sensor Custom

Only custom sensors can be calibrated. Click on the calibration button.



The offset value will change the MAP reading. Adjust it to read the same as the barometric pressure of your altitude above sea level. **Note:** Remember to take temperature into account.

Filtered

The Filtered checkbox can be used to smooth an erratic map sensor signal. It will average the current sample with the previous sample. The down fall is that it may create a minor flat spot under blip conditions. This needs to be corrected with the accelerator pump feature.

If the sensor is not used, uncheck it to free up valuable processor time.

Altitude Compensation

For more detailed explanation look in the [Altitude Sensor](#) Manual.

Altitude Compensate

The ECU can compensate for altitude differences in pressure. It will adjust the fuel mixture and the timing in relation to altitude. This is optional MAP sensor and has to be ordered separately. Some products like Mercury2 has an external sensor and other products like Venus3 and Orion2 has onboard 3Bar sensors.

Select *Altitude* and click on *Compensate*. Compensate will activate Altitude compensation. Make sure the Altitude sensor read the barometric pressure at your altitude correctly.



MAP / Alt Swop

MAP/Altitude Swop

With Map/Alt Swop on Orion2 or Venus3 the Altitude and MAP Sensor can be swapped. This is handy if you have different value sensors or want to use the onboard sensor for a MAP Sensor. On Mercury2 this Map/Alt Swop will select between a 1.1Bar Altitude Sensor or a 2.5Bar Altitude Sensor. Off is 1.1Bar.

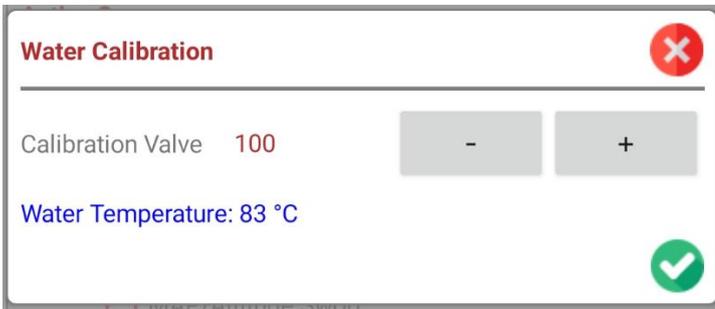
Water Temperature Sensor

For more detailed explanation look in the [Water Temperature Sensor](#) Manual.

 Water Temperature

The water temperature sensor is used mainly for cold start compensation with fuel and spark timing graphs. There is however a couple of functions that requires compensation with temperature like idle control, accelerator pump, prime pulse etc. Neglecting to wire the sensor in may result in the engine not being drivable when it is cold. All fuel injected engines have water temperature sensors mounted in the thermostat housing area. Not all are compatible with the Spitronics ECU but there are aftermarket sensors that can be fitted. Spitronics ECU's use a 2K NTC (Negative Temperature Co efficient) resistor. It is the standard for water temperature sensors for most engine manufacturers. It has a fixed calibration curve which is programmed in the firmware and it cannot be altered. It can however be slightly calibrated by giving it an offset

percentage. The normal setting is 100%. Click on the calibrate  button left of the Water sensor check box.



Reduce or increase the value to slightly shift the reading value. Do this at the critical temperature for instance where the fan must come on or off. If the error is too large you may need to replace it or get the correct sensor. These sensors are measured at 25°C with an ohm meter to see which type it is. If you have the wrong type you may need to change the sensor to a 2K sensor. Save to

ECU  button will make the changes permanent.

Air Temperature Sensor

For more detailed explanation look in the [Air Temperature Sensor](#) Manual.



Air Temperature

The Air temperature sensor is used to compensate with fuel and spark timing for density changes in warm or cold air. Neglecting to wire it in may result in the engine detonating when it is Hot. Not all engines have air temperature sensors mounted on them. Most sensors were incorporated in the MAS meter. This sensor deviates plenty between manufacturers so it is difficult to cater for all manufacturers. However, it can be installed and utilized effectively. Spitronics use a 10K NTC (Negative Temperature Co efficient) resistor. It has a fixed calibration curve which is programmed in the firmware and it cannot be altered. It can however be slightly calibrated by giving it an offset

percentage. The normal setting is 100%. Click on the calibrate  button left of the Air sensor check box.



Reduce or increase the value to slightly shift the reading value. Do this at the critical temperature for instance where the engine is at running temperature. If the error is large you may need to replace it or get the correct sensor.

These sensors are measured at 25°C with an ohm meter to see which type it is. If you have the

wrong type you may need to change the sensor to a 10K sensor. Save to ECU  button will make the changes permanent.

Fuel Pressure Sensor

For more detailed explanation look in the [Fuel Pressure Sensor](#) Manual.



Fuel Pressure

Show Graph

Some ECU's has the ability to control fuel pressure by speed controlling the fuel pump with Pulse Width Modulation (PWM). This is achieved by pulsing the driver at 300 Hz with a required duty

cycle and then measuring the actual fuel pressure with an electronic pressure sensor. The duty cycle is then adjusted to reach the required fuel pressure in loop control.

Calibrate



Click the calibrate button and type in 100. Click OK.



If you have an accurate fuel pressure gauge or a different fuel pressure sensor you may calibrate it with this value. It is a percentage correction which allows for range calibration only. That means calibration is accurate at the working pressure. The sensors supplied are calibrated according to the manufacturer signal specs. See the **Fuel Pressure Sensor Settings** page for other adjustments.

Battery Charge Voltage

For more detailed explanation look in the [Battery Charge Volts](#) Manual.

Battery

Show Graph

Battery and alternator voltage have a great influence on ECU systems. When an engine cranks, battery voltage can drop as far as 9 volts on cold days and when the engine is running, voltage can go up to 14.3 volts. This difference has a big influence in coil energy and injector opening speeds. So to compensate for that the Spitronics ECU's has 2 graphs. One graph is a fuel compensation graph which adds more fuel during cranking. The other is a charge time compensation graph that will act on the charge time of the coils. This will improve spark energy to help the engine start. It is not a clear cut tune as you need to put a variable power supply in place of the battery.

Lambda Sensor

For more detailed explanation look in the [Lambda Sensor](#) Manual.

Lambda

Show Graph

All Spitronics ECU's have the capability to do loop control with a lambda sensor connected. The tuner may set up parameters for lambda control and then the ECU will compensate the main air fuel ratio according to the lambda sensor in real time. This will result in the optimum mixture even if all the maps are not setup accurately or/and due to variations in environment which are difficult to tune in, such as moisture, air density etc. You need to tune the engine properly first and then activate this control afterwards.

To setup this feature, click on the *Lambda* and *Show graph* check box. If you only check Lambda, then it will display the values but not control AFR. This is handy while you do the base tuning. See the **Lambda Sensor Settings** page for other settings.

Tuning POT

For more detailed explanation look in the [Tuning POT](#) Manual.

Tuning POT

This Tuning POT is a Potentiometer or variable resistor that lets the tuner or driver change settings in real time while the ECU is operating. It cannot be calibrated but will adjust from 0 to 255 values. It is used for different functions which can be further under the **Sensor Settings Page**.

Crank and Cam angle Sensors

 Crank(TDC) -
[Falling] Test

 Cam (Home) -
[Rising]

These inputs are required by the ECU to determine exact crank and cams angles so that spark and injection timing can be calculated.



Clicking on the arrows will alternate rising or falling edge. in some cases up arrow means positive and down arrow means negative signals.

Crank (TDC)

The crank angle sensor is used by the ECU to determine exact crank degrees as it rotates. This sensor could be situated on the crank or in a distributor or encoder called a CAS. If it is situated on the cam gear like a distributor, then it will have enough pulses for 2 revolutions to represent the crank signal. For example, Toyota uses what we called a 24+TDC pattern. If the sensor is on the crank there will be 12 teeth. If it is on the cam there will be 24 teeth. If a pulse is generated on a 36-1 gear on a crank for example, then the missing tooth is used as a TDC pulse. A TDC pulse represent a signal that comes once every revolution. It is not necessary at TDC of the engine. In a distributor it may have a TDC pulse or Home pulse. If a pulse come once in two revolutions it is called a home pulse.

Test

The crank sensor has a test function. Each firmware file is programmed for a specific sensor pattern. The test function will activate a test procedure of the crank sensor pattern during cranking, to ensure that it is read correctly. If it is incorrect or has the wrong firmware, the software will show errors and not attempt to start the engine.

Cam (Home)

The cam angle sensor will always be situated on a cam shaft. It could be a lone sensor in the valve cover or in a distributor. This signal only came with later models when full sequential injection was introduced. Some distributors like Nissan and Toyota had both sensors in the distributor. The cam signal will give a unique pattern over two revolutions, allowing the ECU to detect which revolution is the firing stroke. This signal could be one pulse or a number of pulses. The ECU can compare it with the crank signal pattern and determine firing stroke.

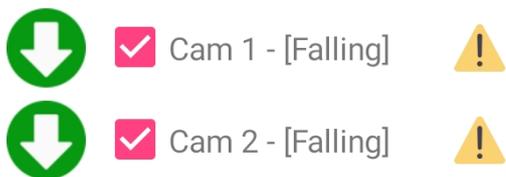
Cam Home Teeth

Cam Home Teeth

Teeth 11 - +

This feature is used to set up cam timing to establish a home pulse. Each manufacture uses a different cam pattern. One of the cam sensors must be connected to the ECU and selected. During setup, start with teeth 1 and crank the engine. It should show missing home pulses on the error codes. Increase the value and press C for clear after each adjustment. If the error stops appearing, at for example 4, then continue increasing till you see the error again. If the value is 10, for example, then set the teeth setting in the average of 7 teeth. Now the ECU knows the difference in stroke 1 and stroke 3 of the engine. One will have a pulse within 7 teeth after the slot and 3 will have no pulses. Note that Full Sequential Injection or Full Sequential Spark must be on to produce errors. Also note that Full Sequential Injection is still possible without a Cam (Home) pulse but not Spark. You need to have the Cam sensor setup correctly for spark.

Cam1 & Cam2



This feature consists of 2 cam control settings for inlet or exhaust cams. Control is still open loop so for V engines the 2 Intake Cam solenoids are connected on the same driver and the same with the Exhaust Cams. No input Cam sensors are required in open loop control. Also note that cam control will be 25% duty cycle when **Off** and 75% duty cycle when **On**. If your engine requires different control parameters, then you need to load the engine specific firmware.

First you need to select 1 or 2 cam outputs. Note that the software will refresh the setup data as these drivers are shared with GP output drivers. If you don't use cam outputs, then un select them to free up the GP drivers.

Then the cam control settings will become visible under the Turbo Settings Page. You will need to set them there.

Take note that Cam1 is used Cyl1 in V engines or Intake Cam. Cam2 is used for the opposite cam than Cam1 or the Exhaust Cam.

Idle Control

For more detailed explanation look in the [Idle Control](#) Manual.

Idle Control			
RPM	800 RPM	-	+
Start	24%	-	+
Response Time - Up	10	-	+
Response Time - Down	25	-	+
Low Limit Duty Cycle	10%	-	+
High Limit Duty Cycle	55%	-	+
TPS Idle Cut Off	3%	-	+
Driver Output	Positive 8		
Driver Output	Positive 7		

The ECU has the feature to control different types of idle motors found on an engine. Before adjusting the idle control settings, you need to select which type of valve or stepper is on the engine. **Note:** The stepper types idle motor (4 to 6 wire), require the external electronic driver. Also note that the electronic unit differs between the 4 Wire bipolar type motor and the 6 Wire common supply type motor.

RPM

This setting is the target RPM's when the engine is on running temperature. When it is cold the ECU will automatically increase engine RPM's with up to 300 RPM's. This is calculated according to fuel enrichment on the water compensation map. Every 15% will increase 100 RPM on the Idle control.

Start %

This setting is used to increase the air intake when the engine is started hot or cold. The ECU will open the idle valve with this %. Note that on stepper controls it will activate 25% every time the key is switched on. If you don't start it, it may idle high at first then come back to idle target.

Response Time Up

This setting will determine the rate at which the valve opens when the actual RPM's fall below the set point in *Idle RPM*. The further the RPM fall below the set point, the faster the ECU will open the valve to let in more air. Low values will create a faster response time and high values will create a slower response time. This setting must prevent the engine from stalling when you switch the air conditioner on, or put it in drive.

Response Time Down

This setting will determine the rate at which the valve closes when the actual RPM's go above the set point in *Idle RPM*. The further the RPM goes above the set point, the faster the ECU will close the valve to decrease airflow into the engine. This value is set higher than the *Response Up* value, to eliminate hunting. Low values will create a faster response time and high values will create a slower response time. This setting must bring fast idling down as fast as possible without hunting the engine.

Low Limit duty cycle

This setting will preload the solenoid against the spring in the idle valve so that the valve starts to open immediately when the ECU starts increasing the value. It can also be used to set minimum idling RPM for throttle valves that closes completely. To set the value start with a larger % and decrease until the desired idling RPM is reached.

High Limit duty cycle

This setting is used to limit the maximum idle RPM's. No need to open the valve more than necessary. It also allows for the use of large valves in smaller engines. Make sure that when the engine is cold, it can still lift the RPM up to approx. 1500 RPM. This can be tested by entering a large *Idle RPM* value and limit the ECU from increasing it too high.

TPS Idle Cutoff %

This value is used to disable the idle control when the driver touches the throttle. The reason is that the ECU must know when not to control idle as the driver may need just a minimal amount of revs with slight throttle.

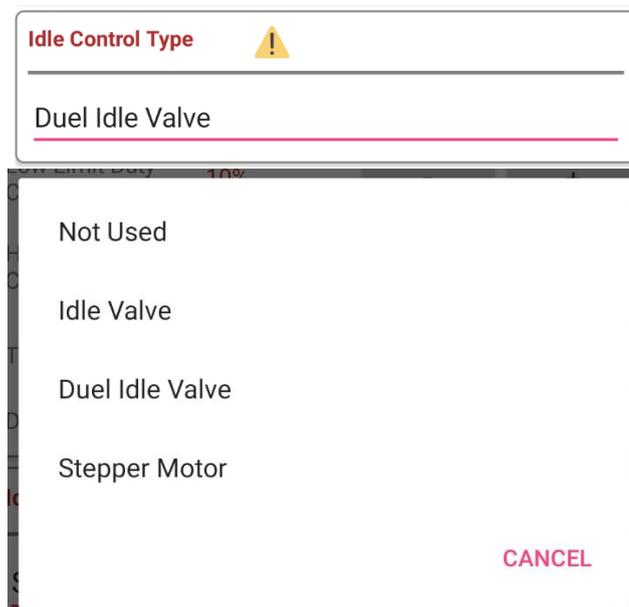
Drivers

Driver Output Positive 8

Driver Output Positive 7

This indication will show the installer which wires to connect on which outputs of the ECU. Driver 2 is only used for the dual valve to close. Note that positive and negative drivers may be used for idle control. If a valve is used, then make sure the Diode across it is wired correctly. (See the wiring diagrams and general purpose priority spreadsheet for correct installation.)

Idle Control Type



The **Type Selection** can select between the two-wire spring-loaded **Idle Valve**, the three-wire spring or non-spring loaded **Dual idle valve**, the Bipolar **Stepper motor** or common supply **Stepper motor**. Stepper motors do not use the Low Limit and High Limit settings as they keep their position when there is no signal present. If there is no idle control, select 'Not' used to free up valuable processor time and general purpose outputs.

Idle Valve

Two wire spring loaded idle valve only use one output from the ECU.

Dual Idle Valve

Three spring or non-spring loaded idle valve two outputs from the ECU.

Stepper Motor

Four or Six wire idle valves operate with a Spitronics Type 1 or Type 2 stepper motor controller, use one output from the ECU.

Lambda Configuration

For more detailed explanation look in the [Lambda Sensor](#) Manual.

Lambda Configuration			
Target Volts	45%	-	+
Startup Delay	75 sec	-	+
Control Percentage	10%	-	+
No. Samples	80	-	+
Low RPM Limit	1000 RPM	-	+
High RPM Limit	6000 RPM	-	+
High Load Limit	0,80 Bar	-	+

Target Volts

This is the desired Stoic area where the sensor determines the best mixture of 14.7 air to fuel ratio. These narrow band lambda sensors have a voltage output of 0.1 to 0.9 volt. A voltage of 0.45 volt = 14.7 A/F ratio = 45%. Spitronics work in % as this is easier to simplify between the 1 volt and 5 volt signal. This unit can receive a wide band signal of 0 to 5 volts but the electronics for driving the sensor is not built in the ECU. It will require a separate electronic board. The ECU does not convert this volt signal in A/F ratio or lambda values as it is not required for control. There is a difference in volts for different type wide band sensors. The tuner uses an accurate test instrument to tune the engine and set his AFR correctly in real time.

Startup Delay

This will give the sensors' element time to heat up so that it can measure accurately. A normal setting here is 30 to 45 seconds. If the temperature of the engine is below 30°C, then lambda control will be disabled. When you start the engine time the sensor with a stopwatch till you can see that it measures correctly.

Control Percentage

This is the value of injector compensation. It can be adjusted from 0 to 20%. This means that if on 10%, the ECU will lengthen or shorten the injector signal by 10% to achieve stoic. Always try and tune the engine accurate in open loop and give the lambda just a little control to smooth it out. If you give it a large % and the sensor fails your engine may be out of AFR.

No. Samples

This Setting is the number of samples that is used as an average to prevent the control from becoming erratic. Because the sensor has a 0.6 seconds reaction time the ECU tends to over react. Increasing the number of samples will bring more stability to the control program.

The 3 limits

This will set the control range to where the narrowband sensor is accurate. A narrow band sensor cannot always control where a slightly richer or leaner mixture is required. The control will be active between the RPM limits and below the vacuum limit. Do not use this control at high RPM and high boost. It may be too slow to react when a mixture is lean. These settings are displayed on the graphs as short bars.

Lambda Sensor input

Lambda Sensor Input

5 Volt Wide Band

1 Volt Narrow Band

5 Volt Wide Band

CANCEL

This input is used to select between a narrow band 1 volt signal and a wideband 5 volt signal. A wideband signal is linear and can cover a wider range of A/F measurements. It can be used for idling and high load readings. Notice that the rich and lean % change between the 2 sensors. Narrowband is inverted and wideband is linear.

Tuning POT Settings

For more detailed explanation look in the [Tuning POT](#) Manual.

The following functions can be selected.

Tuning POT 

Launch

Injector

Timing

Launch

Retard

CANCEL

NB! This is a Critical setting that alters wiring connections. Do not change it on a running vehicle. It could damage drivers or components on the engine.

Injector

Injector setting will change the injector time with the set % richer or leaner. The POT needs to be in the middle to have no effect on current fueling. This is handy in a race car if the driver has an

A/F Ratio gauge installed. Then he can manipulate fueling and remember under which conditions he has to lean or richen the mix. Then he can make adjustments on the graph at a later stage.

Timing

Timing will advance or retard the ignition timing by 5 degrees in this example. The POT needs to be in the middle to have no effect on current timing. It is useful in racing for tuning time while driving. Ensure that the driver has a knock sensor and light fitted to the engine.

Launch

The Launch Control feature will spin a turbo to higher RPM's while the vehicle is stationary. This is done by adjusting the RPM limiter, enrich the fuel mixture and retard the ignition timing. This will create boost pressure so that when the driver launches, there will be no turbo lag. See the Hyperspace Ver 3.6 manual for complete explanation as there are many different ways to set this up.

Transmission Retard

This feature is for automatic transmissions to retard the engine timing during gear shift. This will make the shift smoother and protect the transmission. The launch control circuit will be used and this system will disable launch control.

POT Input

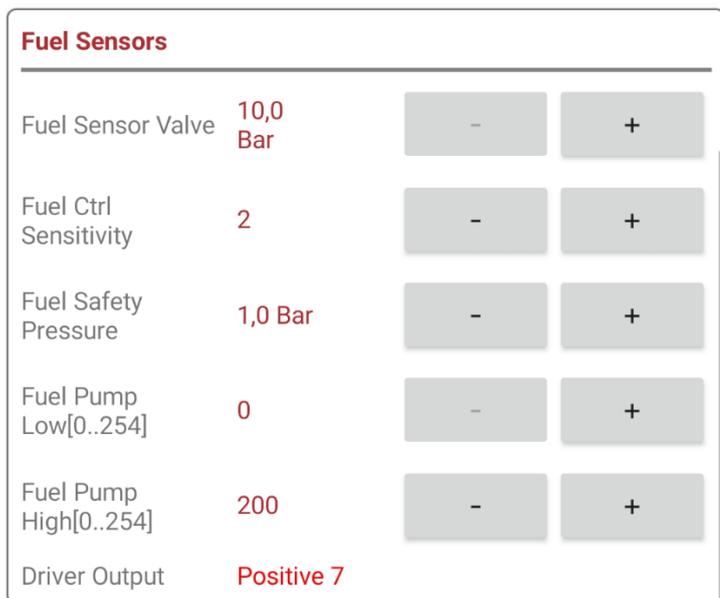
For more detailed explanation look in the [Tuning POT](#) Manual.



Some tasks requires a value input. The pot register is used for user values.

Fuel Sensors

For more detailed explanation look in the [Fuel Pressure Sensor](#) Manual.



Fuel sensor value

Type in the Fuel sensor value that you are using. They come in 4 Bar MAP, 5.5 Bar Differential pressure, and 7 Bar MAP. The most popular sensor is the 5.5Bar DP. Note: The low pressure side

of the DP sensor must be tied to the intake manifold pressure just as a normal fuel pressure regulator. This sensor will automatically compensate for the intake manifold pressure. The fuel pressure real-time gage will also be scaled to this Fuel Sensor value setting.

Fuel Control sensitivity

This setting will adjust how the ECU will react to pressure changes. Fast or slow reaction will control the pressure range. '1' is for the fastest reaction. If it is set too fast the fuel pressure will become erratic. Select the fastest value which will stabilize the pressure against hunting.

Fuel Safety Pressure

This setting is the protection feature that will cut the fuel pump in case of fuel line breakage. Especially to the sensor as this is a thin line. Use a 1 Bar setting.

Fuel Pump Low

This setting is to control the minimum duty cycle of the pump. If it is too low the pump will stop start and make the fuel erratic. Some fuel pumps need to do a minimum RPM or their veins will not deploy to pump fuel. If this is the case the pump will start to make funny noises and the fuel pressure becomes erratic. Sometimes it helps to turn the pump position so that the veins protrude downwards. Set the minimum duty cycle so that the pump runs smooth at lowest pressure. If it is too high the pump will not be able to control at the lowest pressure. A value out of 254 will make up 100% of duty cycle, it means that 127 will be 50% duty cycle.

Fuel Pump High

This setting is to control the maximum duty cycle of the pump. The high setting will limit the pump at a certain pressure. This is handy to prevent the pump from over pressure on the thinner fuel lines to the sensor. Make sure that the pump can supply the right pressure at full load high RPM. Always go for the lowest setting and keep a note on the fuel pressure at high load.

Driver Output

Driver Output **Positive 7**

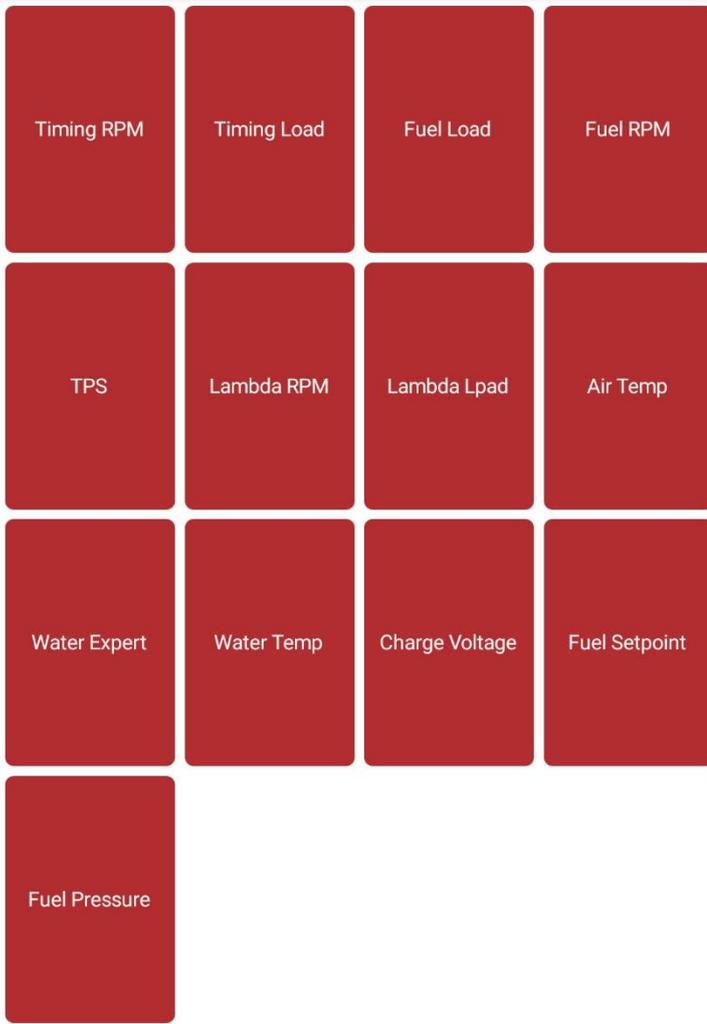
This setting will indicate to the installer which output is dedicated to the pump. This output must be positive and is used with the Spitronics Electronic relay. Make sure on the wiring connections.

Show Graph

The driver will only be visible when Show Graph is on and Fuel Pressure Control is activated.

Graphs

Graph Selection Tabs



Each graph has a tag name. Click on it to open that specific graph. On the graphs you will find the following navigation buttons.

Exit Arrow



Click on it to return to Graph selection tabs.

Graph Description

Cruise Timing Graph (High RPM) – Manifold Pressure Compensation (Bar)

This is the graph name for each graph.

Maximize Minimize button



This button will Show/Hide the tuning buttons to enlarge the graph.

Save Button / Connection LED



The LED will go Yellow once you change something. click on the LED and the data will be saved in the ECU. It will then go green again.

Zoom Button



This button will select 1 graph visible or all graphs visible. When **On**, only the relevant active graph will be displayed. It will only be on multi line graphs.

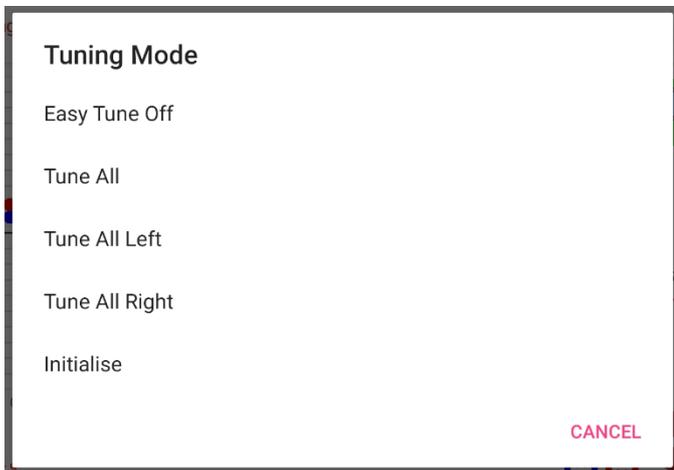
Reset Graph Values



This button will clear all the dot values to the same value that the green adjusting cursor is positioned on.

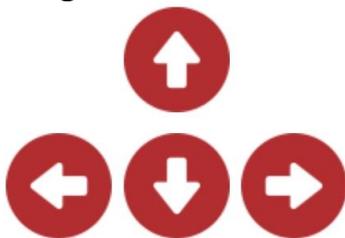
Easy Tune Selection

Easy Tune Off



This will allow the tuner to adjust a string of values simultaneously.

Navigation Buttons



These arrow buttons will navigate the green adjusting bar from left to right and then the change the value on the graph with the up or down arrows.

Specialised Buttons



These buttons will appear on certain graphs. They will be explained there.

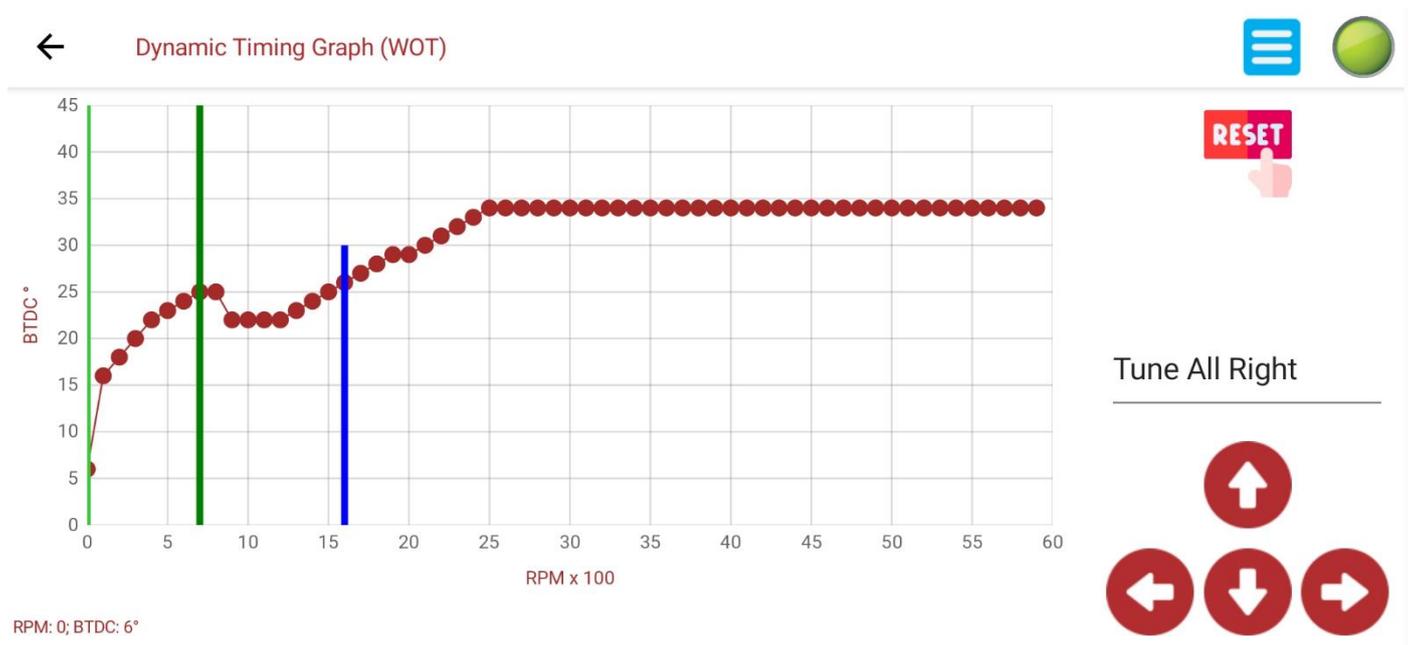
Adjustment resolution.



This button will alternate adjusting increments of 1 or 0.1 resolution.

Timing RPM Graph

For more detailed explanation look in the [Graph Map Tuning](#) Manual.

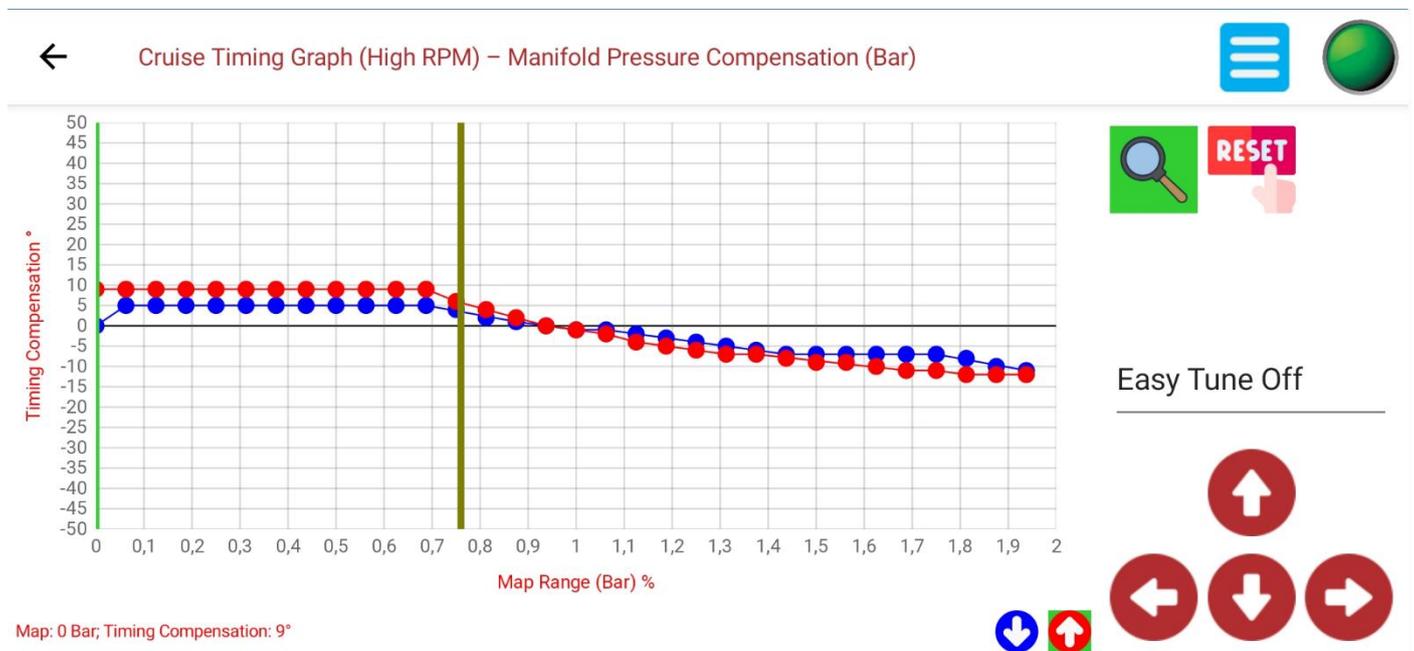


RPM: 0; BTDC: 6°

This graph will adjust Ignition Timing versus Engine RPM.
Y-Axis = Timing Degrees BTDC from 0° to 45°
X-Axis = RPM value of engine from 0 RPM to 15000 RPM

Timing Load Graph

For more detailed explanation look in the [Graph Map Tuning](#) Manual.



Map: 0 Bar; Timing Compensation: 9°

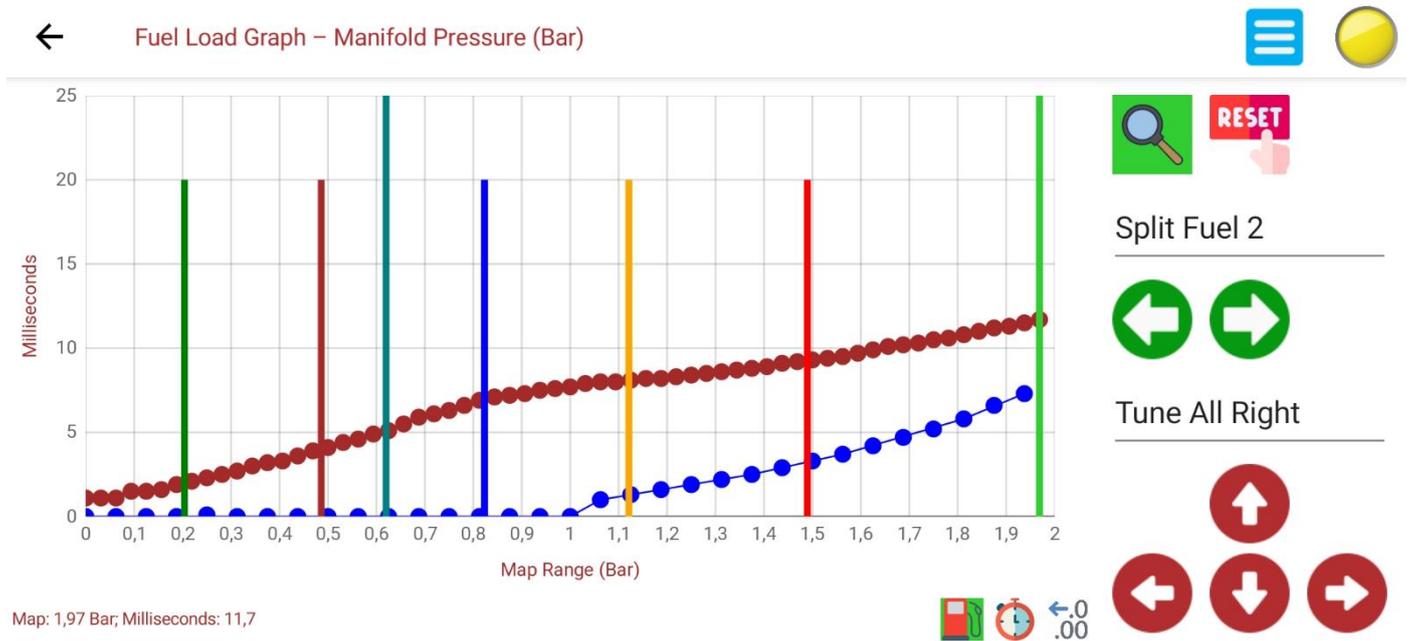
This graph will adjust Ignition Timing versus Engine Load.
Y-Axis = Timing Degrees BTDC from -50° to 50°
X-Axis = Load value of engine. Can be MAP Sensor or TPS sensor



The blue button will select Low load graph and red button will select high load graph to adjust.

Fuel Load Graph

For more detailed explanation look in the [Graph Map Tuning](#) Manual.



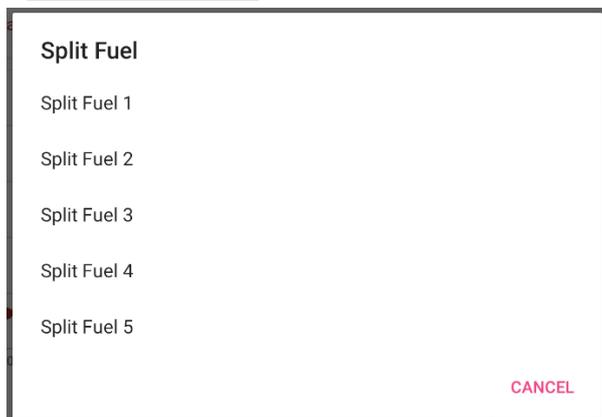
This graph will adjust Injection Time versus Engine Load.

Y-Axis Brown = Primary Injection Time in milliseconds from 0 to 25

Y-Axis Blue = Secondary Injection Time in milliseconds from 0 to 25

X-Axis = Load value of engine. Can be MAP Sensor or TPS sensor

Split Fuel 3



This selection adjusts the vertical bars which determine the operating area of each of the 5 Fuel RPM graphs. Select a Split Fuel bar and use the green arrows to adjust it on the graph. Change over point is in the middle of the lines. Green bar go all the way to the left axis and red bar go all the way to the right axis.



Selection for Main or Primary Injection Graph



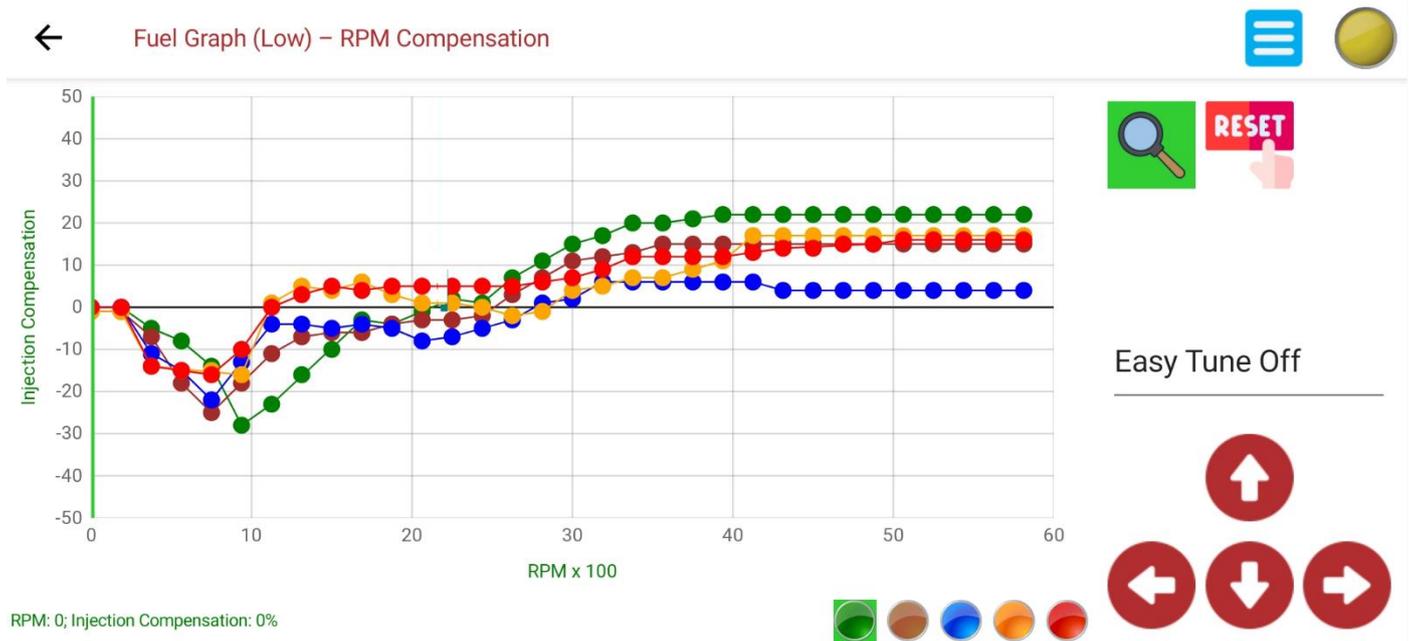
Selection for Secondary Injection Graph

←.0
.00

Adjustment resolution. Will adjust values in increments of 1 or 0.1 resolution.

Fuel RPM Graphs

For more detailed explanation look in the [Graph Map Tuning](#) Manual.



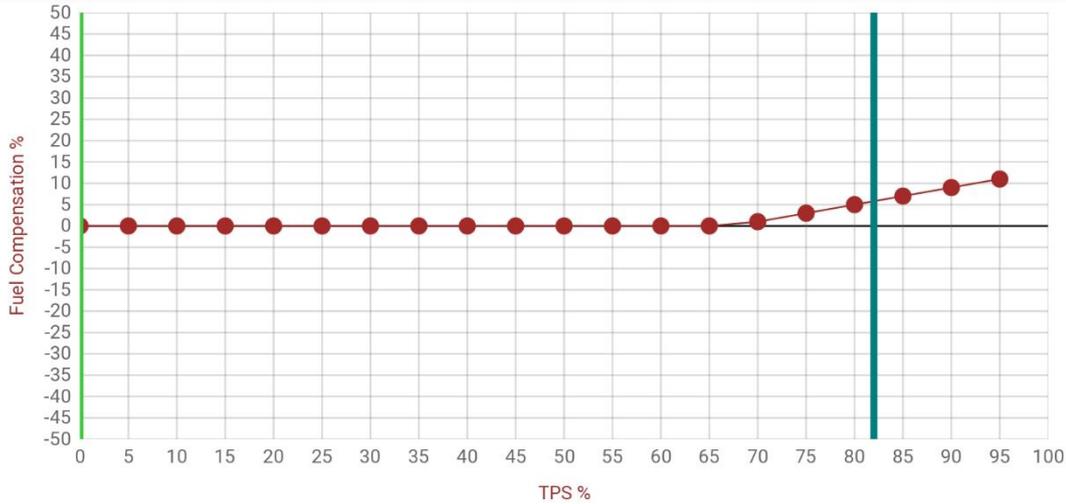
This graph will adjust Injection Time versus Engine RPM on 5 graphs. Each graph operate in a certain load section determined by the selection bars in the Fuel Load graph above.
 Y-Axis = Injection Time Compensation in percentage from -50% to 50%
 X-Axis = RPM value of engine from 0 to 15000 RPM



Click on one of these correspondent color dots to adjust the same color graph.

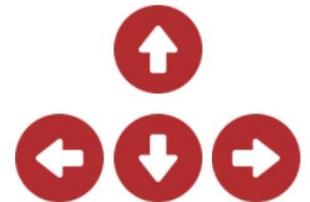
TPS Fuel Graph

For more detailed explanation look in the [Throttle Position Sensor](#) Manual.



RESET

Tune All Right

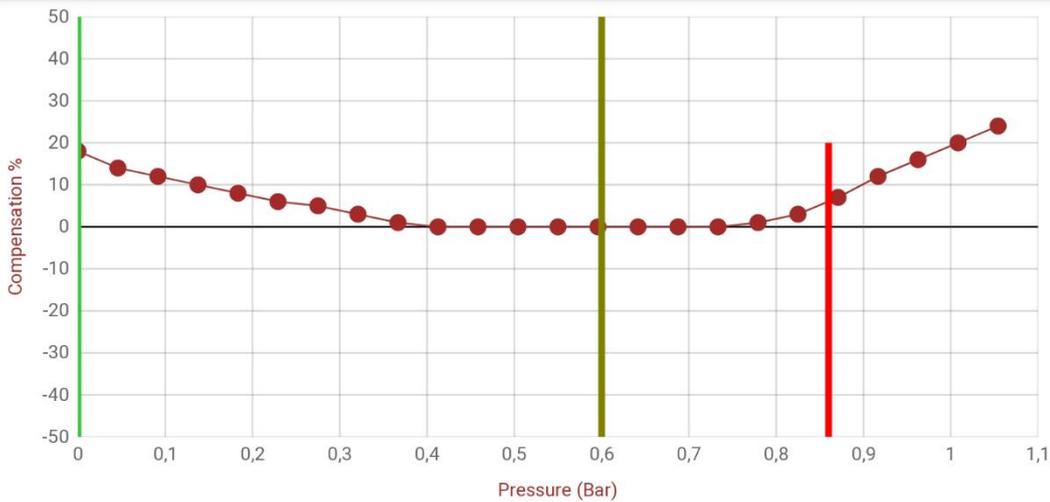


TPS: 0%; Fuel: 0%

This graph will adjust Injection Time compensation versus TPS position.
 Y-Axis = Injection Time Compensation in percentage from -50% to 50%.
 X-Axis = TPS value of engine from 0 to 100%.

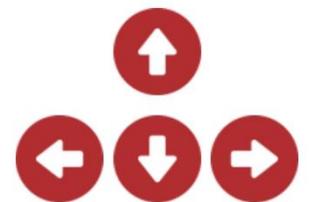
Lambda Load Graph

For more detailed explanation look in the [Lambda Sensor](#) Manual.



RESET

Tune All Right

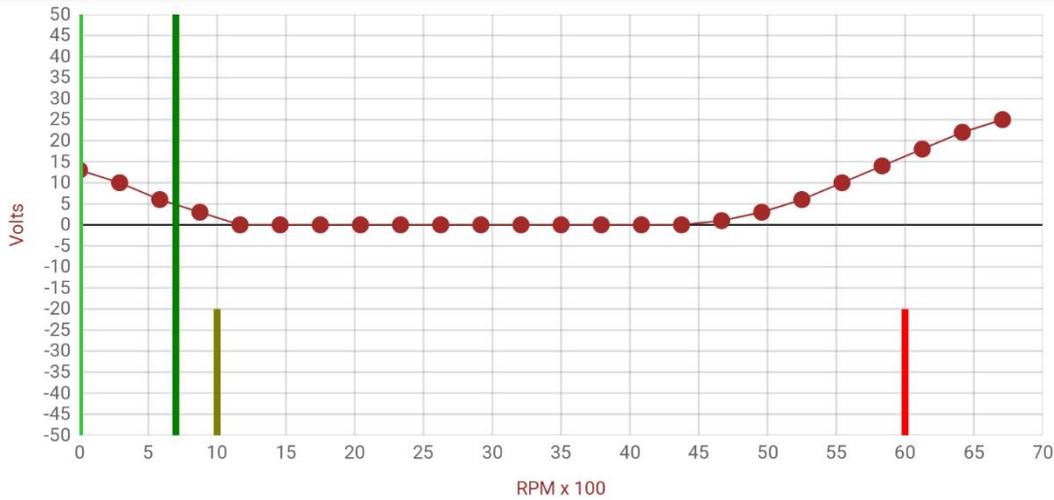


Pressure: 0 Bar; Compensation: 18%

This graph will adjust Lambda Target Volts compensation versus Engine Load.
 Y-Axis = Lambda Target Volts Compensation in percentage from -50% to 50%.
 X-Axis = Load value of engine. Can be MAP Sensor or TPS sensor

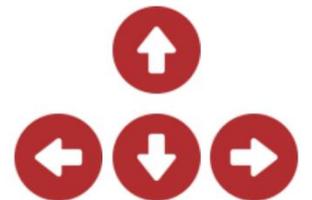
Lambda RPM Graph

For more detailed explanation look in the [Lambda Sensor](#) Manual.



RESET

Tune All Right

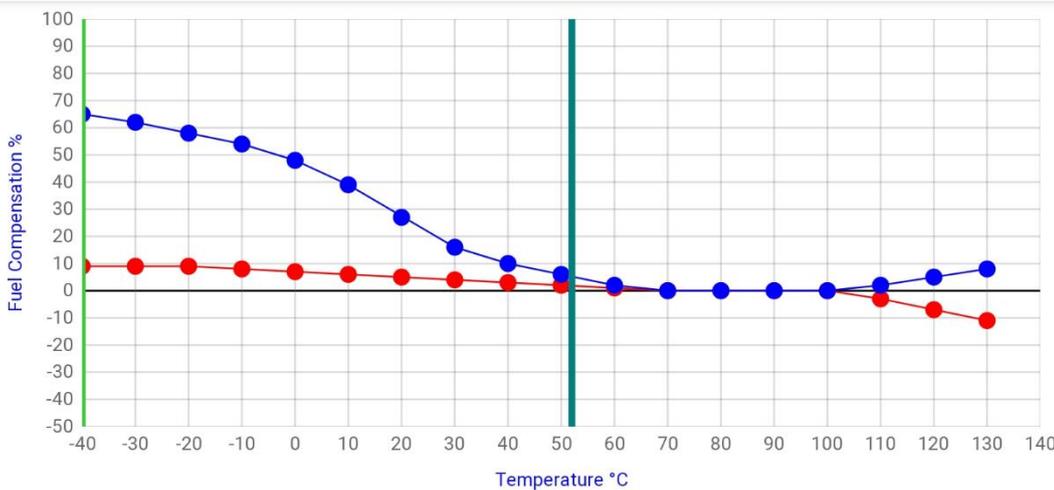


RPM: 0; Volts: 13

This graph will adjust Lambda Target Volts compensation versus Engine RPM.
 Y-Axis = Lambda Target Volts compensation in percentage from -50% to 50%.
 X-Axis = RPM value of engine from 0 RPM to 15000 RPM

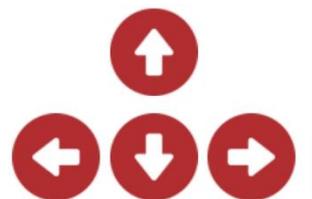
Water Temperature Graph

For more detailed explanation look in the [Water Temperature Sensor](#) Manual.



RESET

Easy Tune Off



Temperature: -40 °C; Fuel Compensation: 65%



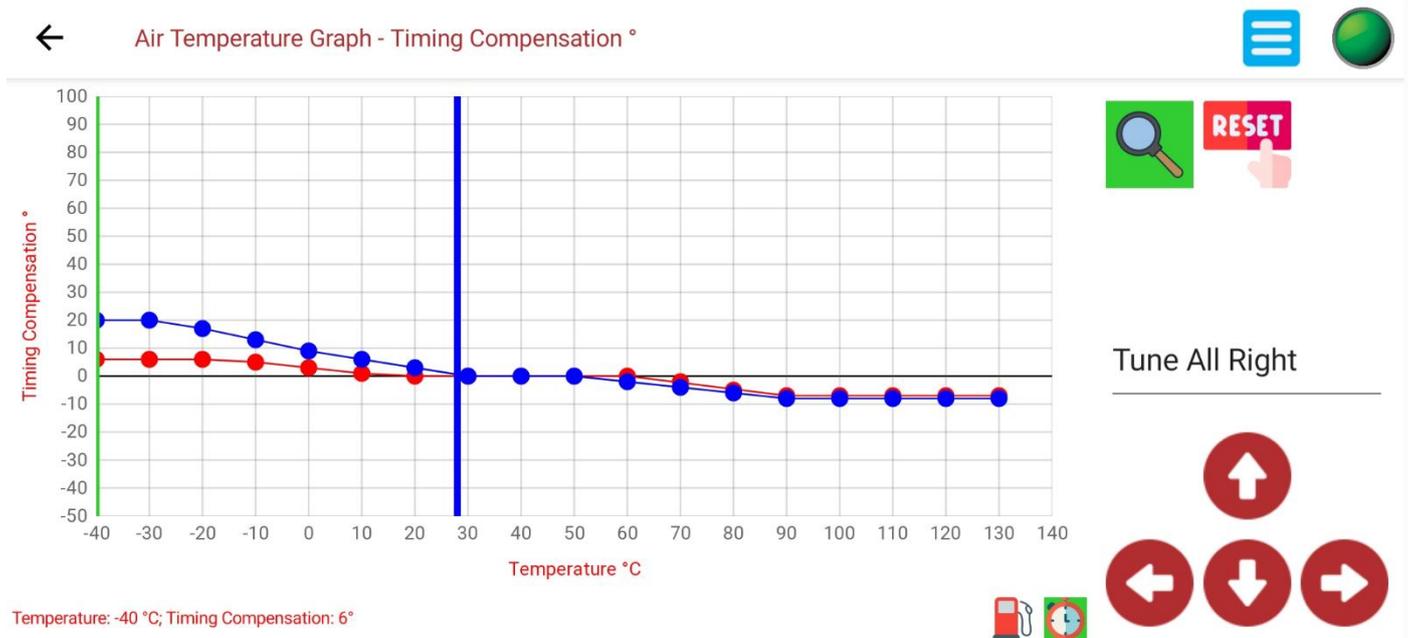
This graph will adjust Injection Time compensation versus Engine Temperature.
 Y-Axis Blue = Injection Time Compensation in percentage from -50% to 100%.
 Y-Axis Red = Ignition Timing Compensation in ° BTDC from -50° to 100°
 X-Axis = Temperature value of engine from -40°C to 140 C.



Select between Blue Fuel Graph or Red Ignition Timing Graph

Air Temperature Graph

For more detailed explanation look in the [Air Temperature Sensor Manual](#).

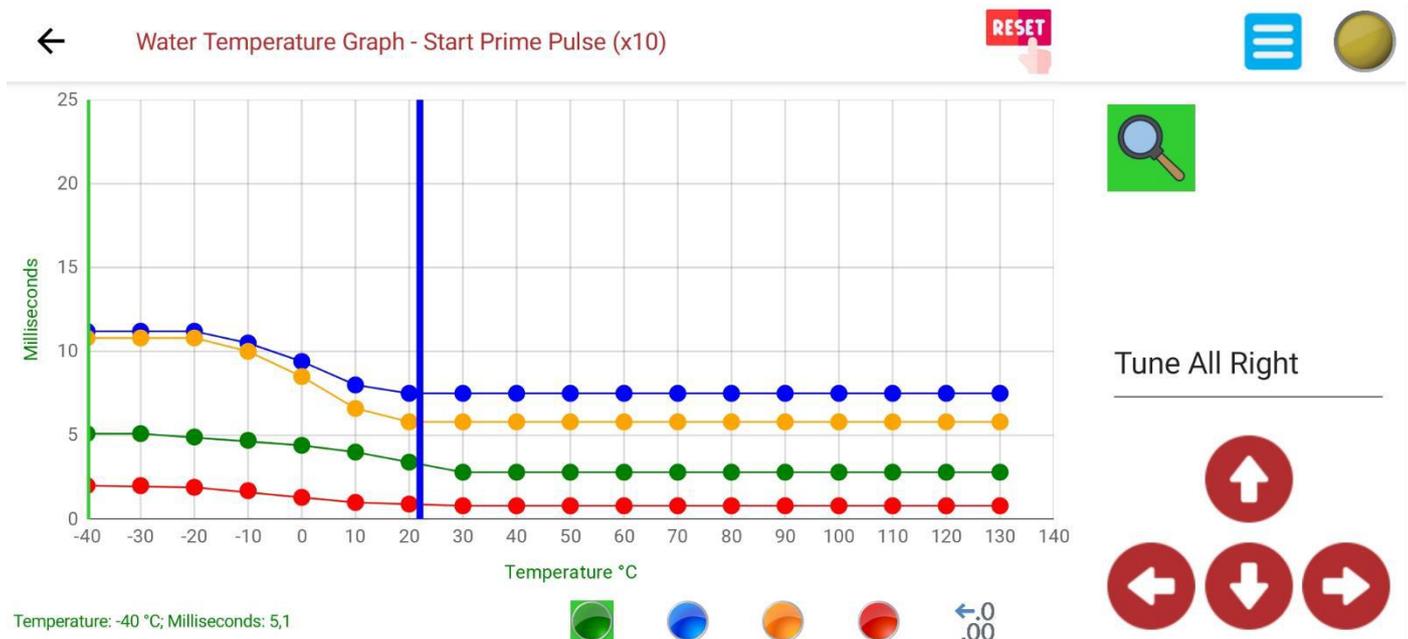


This graph will adjust Injection Time compensation versus Air Temperature.
 Y-Axis Blue = Injection Time Compensation in percentage from -50% to 100%.
 Y-Axis Red = Ignition Timing Compensation in ° BTDC from -50° to 100°
 X-Axis = Air Temperature value of intake from -40°C to 140 C.



Select between Blue Fuel Graph or Red Ignition Timing Graph

Water Temperature Expert Graph



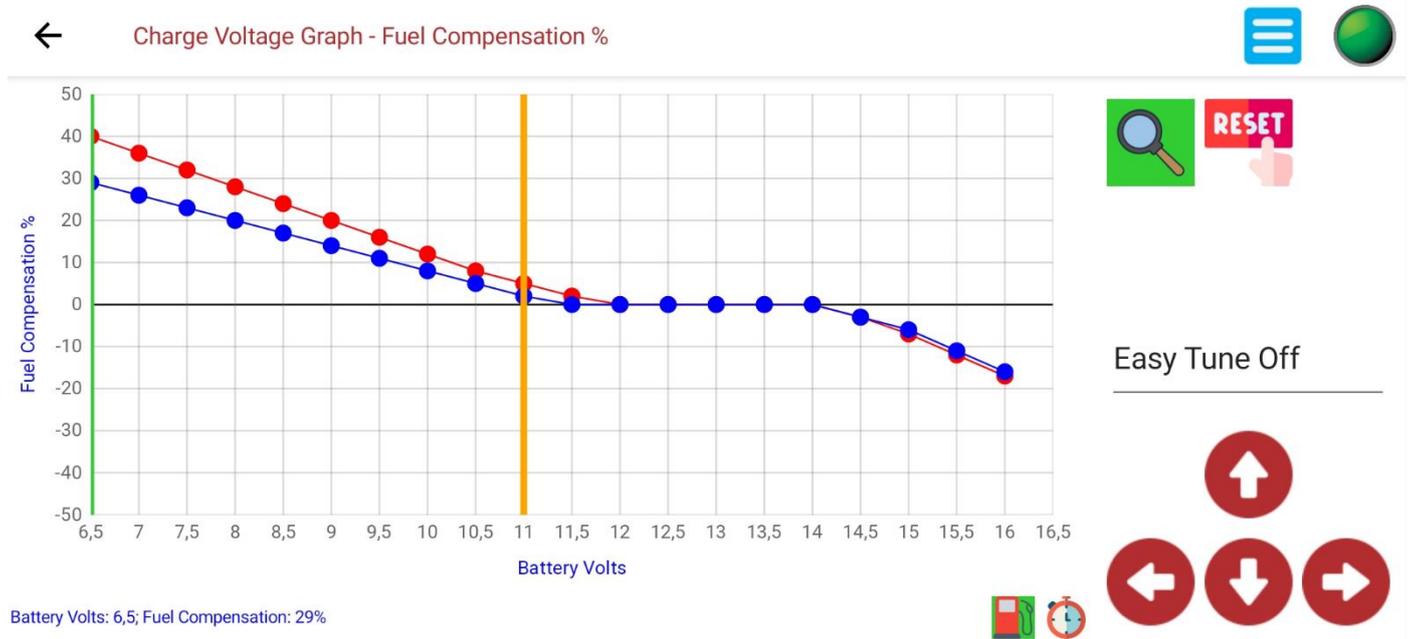
This graph will adjust Prime Pulse, Start Enrichment, Accelerator Pump Map and TPS signals versus Engine Temperature. It is only visible in Expert Tuning Mode.

Y-Axis Red = Prime Pulse Value in milliseconds from (0 to 25)x10.
 Y-Axis Orange = Map Accelerator Pump Pulse Value in milliseconds from 0 to 25.
 Y-Axis Blue = TPS Accelerator Pump Pulse Value in milliseconds from 0 to 2.
 Y-Axis Green = Start Enrichment Value in milliseconds from 0 to 25.

X-Axis = Temperature value of engine from -40°C to 140 C.

Charge Voltage Graph

For more detailed explanation look in the [Battery Charge Volts](#) Manual.



Battery Volts: 6,5; Fuel Compensation: 29%

This graph will adjust Injection Time compensation versus Battery Voltage.

Y-Axis Blue = Injection Time Compensation in percentage from -50% to 50%.

Y-Axis Red = Coil Charge time Compensation in percentage from -50% to 50%

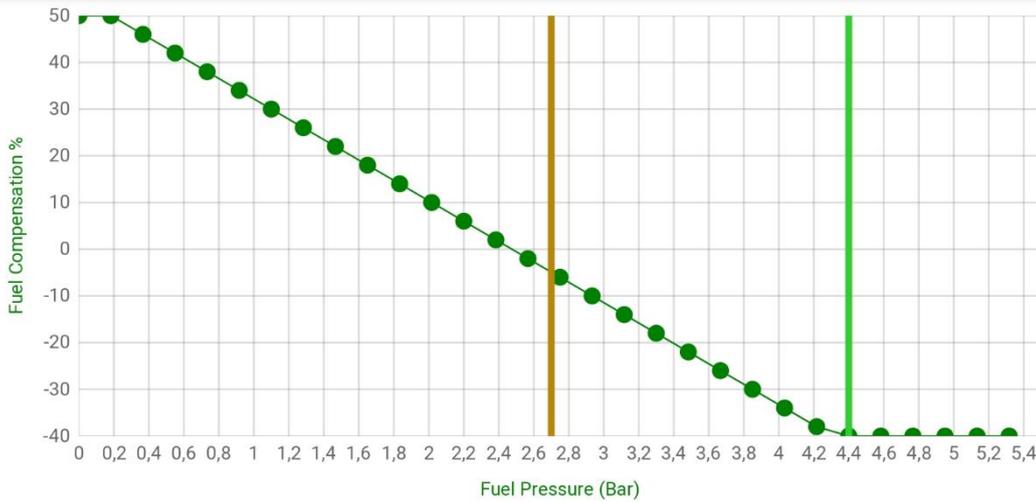
X-Axis = Battery Voltage value from 6.5V to 16.5V.



Select between Blue Fuel Graph or Red Coil Charge time Graph

Fuel Pressure Graph

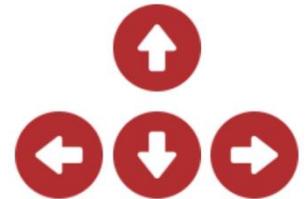
For more detailed explanation look in the [Fuel Pressure Sensor](#) Manual.



Fuel Pressure: 4,4 Bar; Fuel Compensation: -40%

RESET

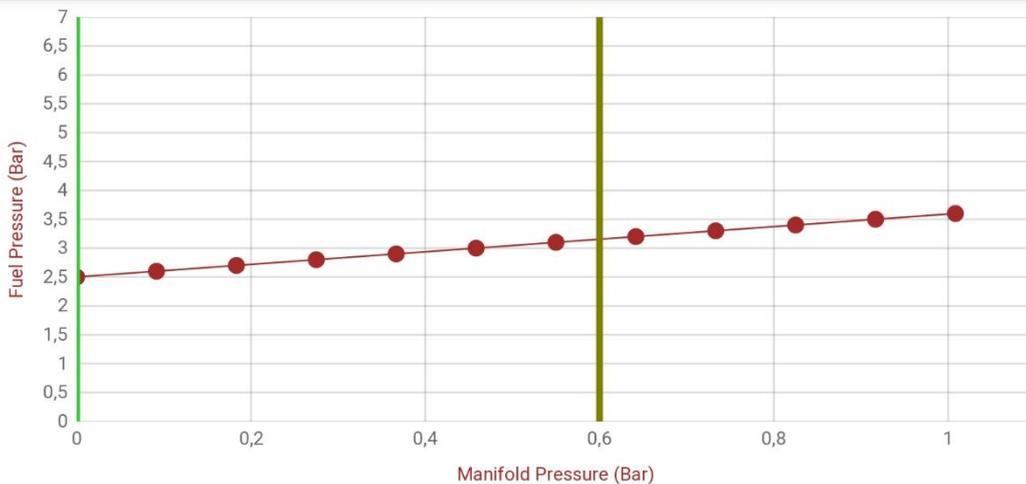
Tune All Right



This graph will adjust Injection Time compensation versus Fuel Pressure. Y-Axis = Injection Time Compensation in percentage from -40% to 50%. X-Axis = Fuel Pressure value from 0Bar to 7Bar.

Fuel Setpoint Graph

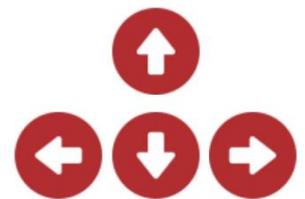
For more detailed explanation look in the [Fuel Pressure Sensor](#) Manual.



Manifold Pressure: 0 Bar; Fuel Pressure: 2,5 Bar

RESET

Tune All Right



←.0
.00

This graph will adjust the Fuel Pressure versus Load. Y-Axis = Fuel Pressure Setpoint from 0Bar to 7Bar. X-Axis = Load value of engine. Can be MAP Sensor or TPS sensor.

←.0
.00

Adjustment resolution. Will adjust values in increments of 1 or 0.1 resolution.

Turbo Settings

Launch Control

For more detailed explanation look in the [Launch Control](#) Manual.

The Tuning POT must be **On** and set to **Launch** on the **Sensors Page**.

Launch Control			
RPM Limiter	4500 RPM	-	+
Timing	-10 °BTDC	-	+
Fuel Enrichment	15%	-	+
Launch Recover Delay	20	-	+
Rapid Fire Frequency	1	-	+

Launch Control Operation

The Launch Control feature will spin a turbo to higher RPM's while the vehicle is stationary. This is done by adjusting the RPM limiter, enrich the fuel mixture and retard the ignition timing. This will create boost pressure for stationary launches and reduce turbo lag. Launch Recover Delay will bring the launch limiter slowly back to normal revs. This will improve traction during pull off. RapidFire will keep the engine on power while spinning and make exhaust noises that sounds like a machine gun. See your product's hardware manual for the different wiring options for the different activation methods like Clutch or TPS 90% options.

RPM Limiter

This is the maximum RPM that the engine will reach in launch control. The moment engine revs reaches this value minus 500RPM timing and fuel compensation will be implemented. Example: If the limiter is set as 5000RPM then the timing and fuel compensation will only start above 4500RPM. This will help the engine to rev up to launch effortlessly. Should the engine revs go above 5000RPM the fuel or spark will be cut to limit the engine from over revving. If the engine limiter is set to Soft or Hard Cut, then fuel will be cut. If it is set to Spark Only, then the RapidFire feature will come in place and only spark will be cut.

Timing

When launch is activated, timing will be retarded to this value. If you have ultimate class hardware then you can adjusted this value from -30 to 30 degrees. Advance and lower class can only be adjusted from 0 to 30 degrees.

Fuel Enrichment

To spin the Turbo requires more fuel to burn through the Turbo and spin it up. This setting will add a percentage value.

Launch Recover Delay

This feature allows for a slow increase in Launch limiter RPM when the clutch is released. It will help with traction because then engine power is slowly returned to normal. For this feature to operate Tuning POT must be set to Launch and Launch Activation must be set to Clutch so that a launch button can be used.

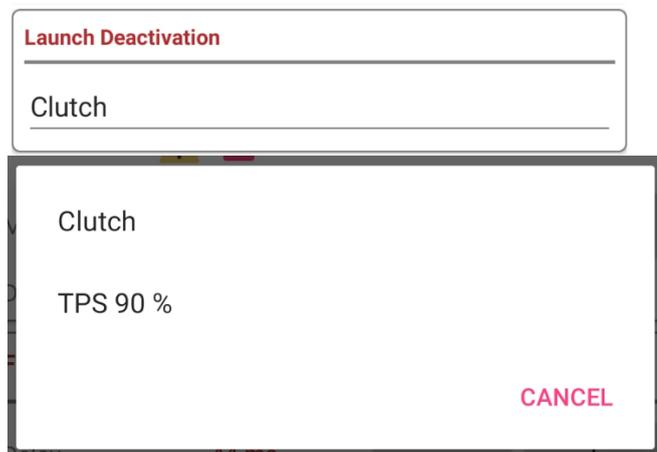
This value is adjustable in 100 milliseconds resolution. A value of 30 will result in 3 seconds delay to rise 2000 rpm. Ex. If launch rpm is 4000 and you release the clutch, then the limiter will increase over 3 seconds to 6000 rpm. Another example if the value is 23 then it will take 2.3 seconds to raise the limiter from 4000 to 6000 RPM. It can be used during shifts to higher gears by touching the launch button. The rise time will be the same for all the gears.

RapidFire

This feature will randomly spark coils when you go above the Launch Limiter for up to 500 RPM above it. Example if the launch limiter is set at 5000RPM, then it will be active from 5100 to 5500 RPM. The advantage is that the occasional adjusted spark will ignite the fuel in the exhaust making a sound like a machinegun. To get this feature to work you need to put the engine limiter on **Spark Only**. This is ideal for the spinning guys when you want to keep power at a maximum. Note that your exhaust and silencers must be modified to accommodate the explosions in them. Normal systems will be damaged.

A value of 1 in the RapidFire block will then spark once in 2 rpms. A value of 2 will spark once in 4 rpms and so on till a maximum value of 10. The spark will be alternated so that each cylinder gets a spark in turn to clear the plugs from getting wet. Always go for the lowest count that makes the desirable effect. If the engine revs go to 5500 in this example, then increase the RapidFire setting to minimize engine power.

Launch Deactivation



There are 2 methods to deactivate the Launch feature. **Clutch** is with hardwire switches and **TPS 90%** is for a semi-automatic method.

Manual Launch (Dashboard Switch and/or Clutch Switch)

Launch Control			
RPM Limiter	4500 RPM	-	+
Timing	-10 °BTDC	-	+
Fuel Enrichment	15%	-	+
Launch Recover Delay	0	-	+
Rapid Fire Frequency	1	-	+

Launch Deactivation	
Clutch	

You need to install a push to make button switch. You need to press the switch and hold it to activate launch. Press the accelerator. The launch parameters will be activated. Then when you are ready to launch release the switch with the clutch.

You need to install a push to make button switch and the clutch pedal switch with resistor combination. You need to press the clutch in to activate the clutch pedal switch. Now press the dashboard switch once and launch is activated. No need to keep the dashboard switch pressed. Press the accelerator. The launch parameters will be activated. The moment the clutch is released the launch switch will break and launch is deactivated. To activate this feature again you need to repeat the procedure. This feature lets the driver concentrate on his pull-off and free his hands for other tasks.

Automatic Launch (TPS 90%)

Launch Control			
RPM Limiter	4500 RPM	-	+
Timing	-10 °BTDC	-	+
Fuel Enrichment	15%	-	+
Launch Recover Delay	0	-	+
Rapid Fire Frequency	1	-	+

Launch Deactivation	
TPS 90 %	

You need to install the dashboard On/Off switch. To activate launch put the switch on. This method requires the driver not to press the pedal over 90% during launch activation. Pressing above 90% throttle will deactivate launch. The driver may need to practice this. He may also use a GP output to switch a light on at 80% TPS to ensure that he does not press it too deep. Both methods require the engine to rev lower than 3000RPM before activating the launch feature for the next launch. This will prevent the feature from activating during gear shift. To deactivate this feature put switch off.

Adjustable Launch RPM (TPS 90%)

This feature is useful as different race tracks give better traction and allows for higher launch RPM's. The customer can then fine tune his launch RPM's on race day. It does not have a launch button but you need to install the Tuning Potentiometer.

Launch Control			
RPM Limiter	0 RPM	-	+
Timing	-10 °BTDC	-	+
Fuel Enrichment	15%	-	+
Launch Recover Delay	0	-	+
Rapid Fire Frequency	1	-	+

Launch Deactivation	
TPS 90 %	

Set the desired *RPM limit* to 0. This will indicate to the ECU that it must use the POT value to calculate a RPM limit value. Set the desired *Timing* and *Fuel Enrichment*.

Tuning POT 	
Launch	

POT Input			
POT Register	75	-	+

Now set the *POT register* to your engines maximum RPM plus 500rpm. If engine can rev to 7000RPM then select 7500RPM. The reason is that this POT is also used to deactivate the launch control by adjusting launch RPM higher than the engine can achieve. Simply turn the POT fully clockwise.

To activate this feature, the driver simply presses the clutch and applies the accelerator till just below 90%. The driver may need to practice this. He may also use a GP output to switch a light on at 80% TPS to ensure that he does not press it too deep. Now he adjusts the tuning POT till he sees the desired RPM on his rev-counter. When he wants to launch he releases the clutch and press the accelerator 100%. Launch will then deactivate. This feature will re-activate automatically once the revs falls below 3000RPM because it does not have the Dash Board switch. You can make increments on his tuning POT to calibrate it to his engines' RPM's and his favorite settings.

Anti Lag

For more detailed explanation look in the [Anti Lag](#) Manual.

The Anti-lag function will help to keep the boost pressure up when decelerating in corners on the race track. This function will use the launch control settings which will add fuel and retard the timing. The correct installation requires an EGR valve to bypass boost pressured air from the turbo before the throttle body, into the exhaust between the engine and turbo. The extra fuel with this air will ignite and the pressure will cause the turbo to spin creating boost. If the valve is not installed, then the min throttle setting must be opened slightly as to let air pass through the engine to burn the excess fuel. You may need to retard the timing further after TDC to prevent the engine from making power.

Settings

Tuning POT 

Launch

Anti Lag

Enabled  

Min RPM **2000 RPM**  

Driver Output **GP Output 2**

Enable the feature and set the minimum RPM setting. This RPM setting is the limit which will disable the function. If the engine revs fall below this value normal fuel economy cut will resume. During racing the driver will gear down keeping the engine revs high.

Vacuum Fuel Cut off **0,10 Bar**  

TPS Idle Cut Off **7%**  

These two setting will activate the Anti-lag. When the boost pressure inside the intake manifold falls below the **Vacuum fuel cut off** value and the throttle position is below the **TPS idle cut off** value. When the boost pressure goes above the **Vacuum fuel cut off** the feature will be deactivated and normal functions will resume.

RPM Fuel Cut off **1500 RPM**  

To disable the normal **Econo Fuel Cut off** function make this value higher than max RPM.

Launch Control			
RPM Limiter	0 RPM	-	+
Timing	-5 °BTDC	-	+
Fuel Enrichment	8%	-	+

The launch settings **Timing** and **Fuel Enrichment** are also used for the Anti-lag feature. If it is activated, the timing will be retarded to the launch timing and the fuel will be enriched to improve burn pressure in the exhaust to spin the turbo.

Transmission Retard

For more detailed explanation look in the [Tuning POT](#) Manual.

This feature is for automatic transmissions to retard the engine timing during gear shift. This will make the shift smoother and protect the transmission. The launch control circuit will be used and this system will disable launch control.

Set the tuning POT on.



Set the POT on Retard and Pot Register on 0.

Tuning POT 			
Retard			
POT Input			
POT Register	0	-	+
Launch Deactivation			
Clutch			

Set the RPM limit on zero. Set the launch control timing on 5 to 15 degrees depending on the feel of the shift in the transmission. Launch deactivation must be on Clutch. Fuel enrichment is not used here.

Launch Control			
RPM Limiter	0 RPM	-	+
Timing	15 °BTDC	-	+
Fuel Enrichment	0%	-	+
Launch Recover Delay	0	-	+
Rapid Fire Frequency	0	-	+

Now connect the relevant wires from the TCU to the ECU. When the TCU makes a shift it will put a negative driver on. It will connect to the POT input of the ECU. The POT real-time bar will be high and the moment of shift it will go low, activating the retard feature.

Flat Shift

For more detailed explanation look in the [Flat Shift](#) Manual.

This feature will momentarily cut the fuel or spark or both for a pre-set time during shifting. This will slow the engine RPM momentarily to ease shifting process in the gearbox. It is initiated by a negative going transition pulse of a switch, or electronics or load cell that will give an earth contact. The switch is combined with movement of the gear lever. Note: This feature is only available on specific firmware. Ask your dealer on it before you buy.

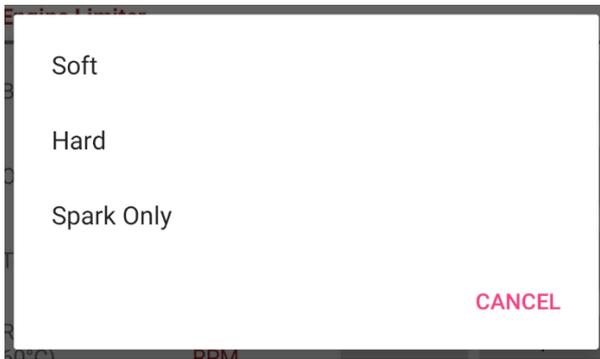
Settings

The following settings is done to activate this feature. The input is shared with the dual map input. This means dual map will not be able to operate on the fly. It will load map 1 or map 2 at start up. Then the input will be used for a flat shift input. This means dual map will not be able to operate on the fly. Normally an open switch will mean Map 1 is loaded when the ECU starts. Then if this contact is earthed the flat shift delay will be activated. If you want to start in Map 2 hold the switch in and put the ignition on. Then Map 2 is loaded, from there on the flat shift work as normal.

Flat Shift 	
Delay	44 ms
	- +

A delay can be adjusted from 0 to 350 milliseconds. Zero will deactivate the feature. Zero will disable the flat shift feature. This feature is disabled at RPM below 2000.

Limit Type
Soft



You may select the type of engine cut which is the same as the normal rev limiter settings. Soft will cut only fuel, Hard will cut fuel and spark and Spark Only will cut spark.

Engine Limiter

For more detailed explanation look in the [Engine Limiters](#) Manual.

This block has a few protection features. Setting them may prevent the driver from damaging the engine in normal and racing conditions.



Boost limiter

This feature will cut the injectors clean if the MAP sensor detects a manifold pressure that is higher than the set value. It is not a boost controller but it is to protect against boost controller or waste-gate failure. It can be adjusted in tenths of a bar resolution. The spark will not be cut.

Over temperature limit

This feature and the next one will protect the engine against over temperature. The injectors will be cut until the revs fall below the next setting.

Temperature RPM limit

This is the maximum limp mode RPM's when the engine is over temperature. If it is due to a burst hose it is better to switch off before the engine is damaged. If it is due to low water the lower revs will help to cool it down instead of disabling the engine.

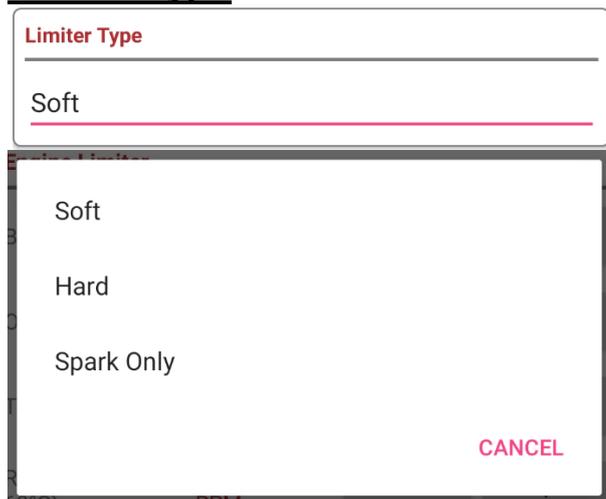
RPM limit (>=60°)

This feature will prevent the engine from over-revving under normal temperature conditions. It can be adjusted in 100 RPM intervals. RPM limit can be achieved by three methods.

RPM limit (<60°)

This feature will prevent the engine from over-revving under cold temperature conditions. It can be adjusted in 100 RPM intervals. This method will only cut the fuel and is just a protection.

Limiter Type



Limiter Type

Soft

Soft

Hard

Spark Only

CANCEL

Soft

This mode will retard the timing in three stages and then cut the fuel completely. The result will be a smooth soft loss of power. Each 100 RPM over the limit, timing will be retarded further. First retard is 15 °BTDC, then 10 and then 5 °BTDC. Then during the third stage, fuel will be cut but not the spark. This will prevent fuel from entering the exhaust and backfire there. This is the preferred method for engine over-rev limiting. **Note:** The engine may reach 300RPM above the set value.

Hard

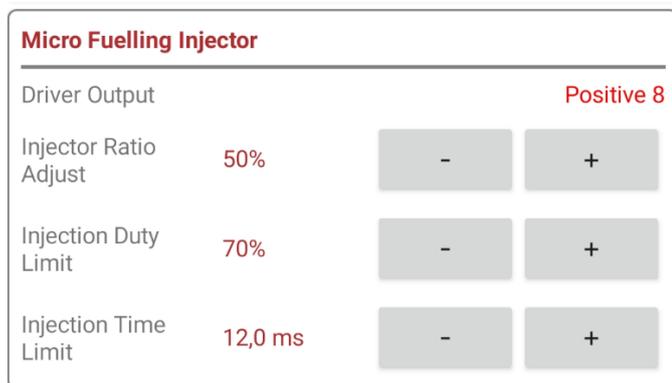
This mode will cut the fuel and spark completely. It has a jerk type feel and may result in small detonations in the exhaust.

Spark Only

This mode will cut only the spark. This will give the backfire sensation when unburned fuel is ignited in the exhaust. **Note:** Damage to the exhaust system might occur in this method.

Micro Fueling Injector

For more detailed explanation look in the [Fuel Settings](#) Manual.



Micro Fuelling Injector

Driver Output Positive 8

Injector Ratio Adjust	50%	-	+
Injection Duty Limit	70%	-	+
Injection Time Limit	12,0 ms	-	+

Some products have the ability to use two injectors per cylinder. The way these injectors are implemented vary for different applications. If you use only one type of fuel and the primary and secondary injectors does not differ too much in size, then the Ratio method is preferred. If you want to use different fuels together or the secondary injector is a lot bigger than the primary injector, then the Graph method is preferred. On the hardware side, there is also different wiring configurations for different firmware. If there are enough drivers for all the injectors, then they can

be used. If there are not enough drivers, then an extra electronic relay and isolating diodes are used to power the secondary injector's separately. So please see on the wiring diagram. This feature is only available on specific firmware.

If you are not using micro fueling, select 'OFF' to free up some microprocessor time.

Injector Ratio Adjust

This ratio will reduce the injection time when the secondary injectors start injecting with the primary. This means the fuel amount of both injectors must be the same as it was when just the primaries were injecting.

The Injector ratio adjust % field is calculated by the primary injector cc divided by the total injector cc multiply by 100.

Example: Primary = 100cc, Secondary = 200cc.

$$\text{Compensation} = \frac{\text{Primary Injector} \times 100}{\text{Primary} + \text{Secondary Injectors}} = \frac{100\text{cc} \times 100}{100\text{cc} + 200\text{cc}} = 33\%$$

Injection Duty Limit

This is a change over Duty limit from single to duel injectors. When injection duty is higher than this value, duel injectors will be activated. Below this value only primaries will inject. This will result in a lower Duty limit.

Injection Time Limit

This is a change over Injection Time limit from single to duel injectors. When injection time is higher than this value, duel injectors will be activated. Below this value only primaries will inject. This will result in a lower injection time limit.

Any of the 2 limits will activate dual injectors. There is also a dead band incorporated to prevent erratic activation of this feature.

Graph Adjust

This feature is ideal for Methanol Injectors. It will not influence the primary injector time like the ratio method. It will just bring a secondary set of injectors in at a certain boost pressure and progressively adjust the injector time for the secondary injectors on a graph in milliseconds. If you select **Graph**, a second graph on the Fuel graph will become visible. Note that the ECU must have enough drivers available for this feature. otherwise it will be forced in the OFF condition.

Micro Fueling Type

Micro Fuelling Type 

Ratio

Off

Ratio

Graph

CANCEL

Select the type of injection method to use for dual injectors.

VVTI Cam 1 & Cam 2

For more detailed explanation look in the [Crank and Cam angle Sensors](#) Manual.

This block is used to set up open loop cam control with TPS limits. It is also used to open variable intake runners found on some engines like the Lexus 1UZ VVTI. This feature is only available on specific firmware and products depending on features selected as they may share drivers with other features

VVTI - Cam 1			
RPM - High	4600 RPM	-	+
RPM - Low	2300 RPM	-	+
TPS	30%	-	+
Driver Output			Positive 5

VVTI - Cam 2			
RPM - High	3800 RPM	-	+
RPM - Low	2200 RPM	-	+
TPS	40%	-	+
Driver Output			Positive 6

RPM High

The high limit where the Cam output will be forced off if the engine RPM is higher.

RPM Low

The low limit where the Cam output will be forced off if the engine RPM is lower.

TPS

The TPS limit where the Cam output will be forced off if the throttle opening is lower.

Output Driver

This indicates which driver from the product is selected for this output.

Example: In the top block the output will be on between 2300 and 4600 RPM if the TPS value is above 30%, This is how most V-Tec cams are applied. The driver output will indicate where the solenoid must be connected on the ECU. Cam 1 is always used for the Intake cam or Cyl1 bank cam. Cam 2 is always used for the Exhaust cam or opposite Cyl1 bank cam.

VVTI Intake

For more detailed explanation look in the [Crank and Cam angle Sensors](#) Manual.

VVTI - Intake

RPM - High	4900 RPM	-	+
RPM - Low	2500 RPM	-	+
TPS	60%	-	+
Driver Output	Negative 3		

RPM High

The high limit where the Flap output will be forced off if the engine RPM is higher.

RPM Low

The low limit where the Flap output will be forced off if the engine RPM is lower.

TPS

The TPS limit where the Flap output will be forced on if the throttle opening is lower.

Output Driver

This indicates which driver from the product is selected for this output.

This block is firmware dependent on control according to requirements. For Toyota V8 the flap will be powered or activated whenever the RPM's are between 2500 and 4900 in this sample regardless of throttle position. It will also be powered if the throttle is less than 60% depressed regardless of RPM. Said in another way, the flap will not be powered at over 60% throttle and at lower than 2500 RPM or higher than 4900 RPM.

Device

For more detailed explanation look in the [ECU Home Screen](#) Manual.

Device Information

Device Serial Number	000 034 079 194
Hardware Type	Mercury2
Hardware Class	Ultimate
Firmware Type Locked	No restrictions
Firmware Number Locked	No restrictions
Brand Code	1

Firmware Information

Firmware Type	Engine Control Unit
Firmware Number	16 (36-1 8Cyl)
Firmware Class	Ultimate
Firmware Version	3.6.B

ASSIGN

The device information screen displays vital information regarding the Spitronics ECU that has been connected. Note: Firmware is the program that is loaded into the ECU to make the electronics operate in a specific way. This is normally Firmware file which is loaded into the product by a USB debug programmer or BootLoader. Software is the tuning interface that runs on the computer and it is used to tune the product's parameters.

Device Information

Device Serial Number

There is a unique number assigned to each product. It is saved on maps and recognized by the database on its status etc.

Hardware Type

Displays which type of device has been connected to the software. In this case and an Orion2 Engine Control Unit.

Hardware class

Displays the Hardware class of the product that has been connected to the software. The hardware class will determine which firmware can be uploaded onto the product. This feature allows the unit to open certain or all functions of the electronics. The amount of features determines the price of the unit. This feature can be changed over on the internet to allow for remote upgrades of the unit.

The hardware classes are as follows:

1. Micro
2. Basic
3. Standard
4. Intermediate
5. Advance
6. Ultimate
7. Commercial
8. Racing

Firmware Type Locked

This block will indicate which type of firmware are allowed on the unit. If it indicates **No Restriction**, it means that any Type of Firmware for Orion2 can be programmed into the unit like ECU, TCU TxW etc. This feature is for sponsored units or specials which was approved by the manufacturer.

Firmware Number Locked

This block will indicate which firmware number in the firmware range are allowed on the unit. If it indicates **No Restriction**, it means that any firmware number for Orion2 can be programmed into the unit. This feature is for sponsored units or specials which was approved by the manufacturer.

Brand Code

This represent a specific brand like Spitronics which is 1. Orion2 may also be rebranded to large distributors which means this code will change. Once a brand is changed the unit will only connect to the software of that brand. This will bring exclusivity to that brands customers.

Firmware Loaded Information

Firmware Type

This block will indicate which type of firmware are loaded on the unit like ECU, TCU TxW etc.

Firmware Number

This block will indicate which firmware number is loaded and a short description.

Firmware Class

Displays the class of the firmware that has been downloaded onto the device. Each firmware program supplied will have a certain class according to the features used. You may load any firmware for a specific product into the unit as long as the firmware class does not outrank the hardware class of the Orion2. The firmware classes are as follows:

1. Micro
2. Basic
3. Standard
4. Intermediate
5. Advance
6. Ultimate
7. Commercial
8. Racing

Firmware Version

This block displays the software version as well as the firmware version that is loaded into the product. In the example 3.6B is the software version which is required to communicate with the product and B is the firmware version.

The firmware version no effect on the software version. Always use the latest versions available.

Software Version

Hyperspace ECU V3.6.2 Android

Note that Software version 3.6 will be used with the Firmware version 3.6.

The first 3 is version 3 PC Software.

The second 6 is the protocol version between the PC software and the firmware. When new features are programmed into the unit, this protocol version will change in the PC software and in the Firmware.

The .2 at the end is a sub version and has no effect on the firmware. This version will indicate corrective or improved Android software. Always use the latest version available. When the Android software is started you will also find the product software version.

Assign

This red bar is a button that will activate features on new devices. Some features could be bought over the internet and then activated on the device.

Errors

CLEAR ERRORS



2022-04-09 23:53:07:601
Engine stopped. No pulses



2022-04-09 23:53:07:461
Missing crank pulses



2022-04-09 23:53:06:163
Missing crank pulses



2022-04-09 23:53:04:201
Engine stopped. No pulses



2022-04-09 23:53:03:875
Water hot/cold temperature limiter reached



2022-04-09 23:53:02:921
Engine stopped. No pulses



2022-04-09 23:53:02:590
Water hot/cold temperature limiter reached



2022-04-09 23:53:01:462
Engine stopped. No pulses



2022-04-09 23:53:01:123
Coil Overcharge Limit Reached

The ECU software has Error, Warning and Information codes displayed in the Status tool bar at the bottom. These codes will help the tuner to find problems during startup and tuning, also to see if the ECU is functioning correctly. Some of the functions on the ECU will indicate to the tuner what is happening. He can then see if these functions are operating correctly.

Press the **Clear Errors** bar to clear the list.

- 1 - **Missing crank pulses** – The crank sensor senses too little teeth per revolution
- 2 - **Too many crank pulses or spikes** – The crank sensor senses too many teeth per revolution
- 3 - **Incorrect crank TDC slot** – The crank sensor did not sense a TDC slot. (Maybe incorrect wiring)
- 4 - **Missing TDC pulse** – The TDC pulse is not present
- 5 - **Missing home pulse** – The Home pulse is not present
- 6 - **Emergency engine shutdown** – Safe shutdown of engine due to lack of or incorrect signals
- 7 - **Fuel pressure safety cut-out** – The fuel pressure sensor low limit has been reached
- 8 - **Economy fuel cut-out** – The fuel economy cut is implemented
- 9 - **RPM limiter reached** – The engine RPM limiter has been exceeded
- 10 - **Max boost limiter reached** – The boost pressure limit has been exceeded
- 11 - **Water hot/cold temperature limiter reached** – The water temperature limit has been exceeded
- 12 - **Launch limiter reached** – The launch limit RPM has been exceeded
- 13 - **Lambda control limits reached** – The lambda control limit has been reached
- 14 - **Battery low voltage limit reached** – The battery voltage falls below a critical limit
- 15 - **Selection refreshed. Confirm driver placement** – The ECU changed driver output configurations

- 16 - Timing retarded** – Ignition timing is retarded during an automatic transmission shift procedure
- 17 - Flood control injector cut-out** – Fuel is cut by injectors during cranking when the throttle is fully opened
- 18 - Flat-shift activated** – Ignition or fuel is cut for a moment to enhance gearshift for racing engines
- 19 - Ignition power switched off** – Ignition key power is switched off
- 20 - Sponsor counter depleted** – The sponsor counter is depleted for sponsored ECU's
- 21 - Anti-Lag activated** – Anti-Lag is activated on the Launch features
- 22 - Hardware Class don't support this feature** – Incorrect firmware loaded
- 23 - Speed Limit Reached** – Speed Limit was exceeded
- 24 - Bootloader Not Present** – This indicate if the BootLoader firmware was not loaded in the newer products
- 25 - Overcharge Limit Reached** – This error will come when the charge time plus graph times exceed the maximum charge times
- 26 - Test Mode is Selected** – This is used for calibrating TxW firmware
- 27 - Map was Reloaded** – This indicate that a Ma was reloaded from memory and installed in RAM to be used.
- 28 - Map Sensor Error** – This indicate MAP Sensor failure
- 29 - TPS Sensor Failure** – This indicate TPS Sensor failure
- 30 - Lambda Sensor Failure** – This indicate Lambda Sensor failure
- 31 - Water Temperature Sensor Failure** – This indicate Water Temperature Sensor failure
- 32 - Air Temperature Sensor Failure** – This indicate Air Temperature Sensor failure
- 33 - Altitude Sensor Failure** – This indicate Altitude Sensor failure
- 34 - Fuel Pressure Sensor Failure** – This indicate Fuel Pressure Sensor failure
- 35 - Potentiometer Sensor Failure** – This indicate Potentiometer Sensor failure
- 36 - Micro Fuel Activated** – This indicate that the Micro Fuel or Dual injector control were activated.

Data Logger

Log your device data here to preview and edit the map data on Hyperspace PC software.

Note that the device map with the log file needs to be send/ opened on Hyperspace PC software

Press START logging to create a logging session

START LOGGING

The data logger is very useful for taking running information and displaying it at a later stage or sending it to a remote tuner. Press the Start Logging button.

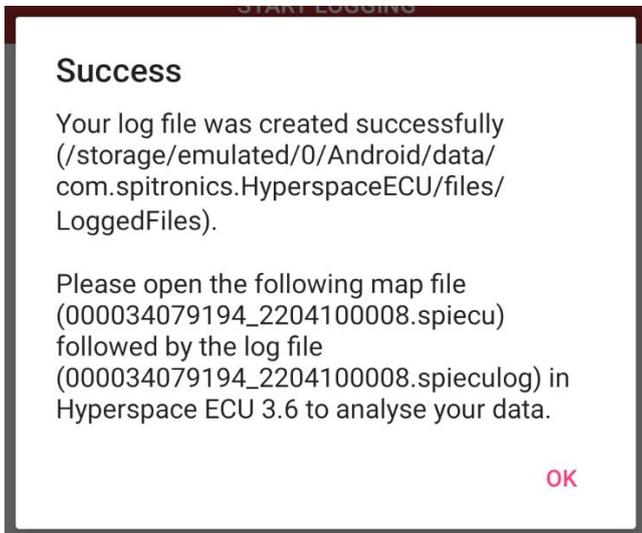
Log your device data here to preview and edit the map data on Hyperspace PC software.

Note that the device map with the log file needs to be send/ opened on Hyperspace PC software

Press STOP to save and stop the logging session

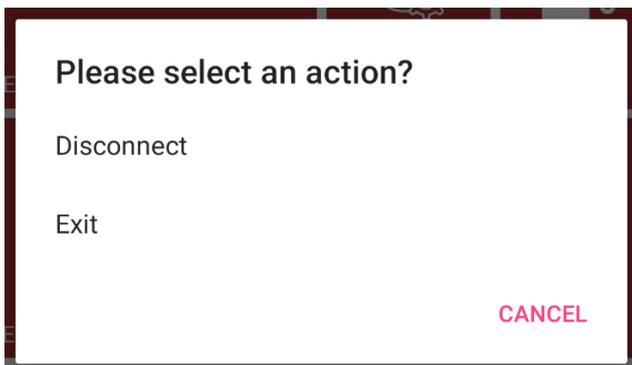


After the run press the Stop and Save button.



This block will tell you where the MAP and the Data log file is saved. You will need to open yours phones File Browser and then send the files from there.

Exit



This block is to exit the software or disconnect from the ECU while keeping the offline map active.