V550



V550 Operation



WolfEMS Pty Ltd

www.wolfmotorsport.com.au

9/22/2014

GLOSSARY OF TERMS

Wolf ECU	**Wolf Engine Control unit**
V550	**Model of Wolf ECU you have purchased**
WOT	**Wide Open Throttle**
TPS	**Throttle Position Sensor**
TPOS	**Throttle Position Sensor**
BTDC	**Before Top Dead Centre**
TDC	**Top Dead Centre**
ETS/CTS	**Engine Temperature Sensor / Coolant Temperature Sensor**
ATS	**Air Temperature Sensor**
A/C	**Air Conditioning**
PSI	**Pounds per square inch of pressure**
kPa	**Kilopascal - another form of pressure**
PWM	**Pulse Width Modulated (this is generally a device that can be pulsed e.g. a boost control valve is PWM)**
MAP	**Manifold Air Pressure sensor**
Stoich	**Stoichiometric (a precise reading of air/fuel ratio " Stoich " being lambda 1 the correct blend of oxygen and fuel)**
Hysteresis	**This is the amount that the ECU has to pass to switch again after switching once e.g. hysteresis of 3 on a fan control 88 deg turn on , it will turn on at 88 but has to cool down to 85 to turn off**
ECU	**Engine Control Unit**
Interpolation	**Takes two data points and linearize between them.**

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Before installation read the following.

Illustration 1.1 Power and grounds should be installed as per diagram.

Illustration 1.2 Shows vacuum port and serial connection. Vacuum port should be connected directly to the inlet manifold with a vacuum tube that will be adequate for the job, take into count the amount of boost you are using. Look at the path you are using to run the vacuum line and make sure it does not go over anything that will become hot.

It is recommended that you print off the wiring diagrams **Illustration 1.5** and work out what wires are required before you start the job.

After you have decided which wires are required, remove the excess wires as per **Illustration 1.3**. These can be refitted at a later date if you want to add more functions, so keeping these wires is recommended.

When deciding on the path you are taking to lay your wires in the engine bay. Keep in mind that one of the most overlooked parameters is the trigger loom. The Wolf system comes with a 4 core shielded cable for a reason. In **Illustration 1.4** you will see how having unshielded cable can pick up induced "electrical noise". This can be caused from such things as spark plugs and bad electrical connections. Always make sure that connections are of high quality and that **resistor spark plugs** are used.

> As per diagrams on various pages in this manual, the majority of the outputs "Pull to Ground". This means such things as INJECTORS, IDLE MOTORS, and BOOST CONTROL VALVES all have 12V going to one side of them and the control pin going back to the Wolf ECU.

When deciding on your wiring, WolfEMS Pty Ltd have most devices drawn up to give the correct way to be wired, these can be downloaded from our website.

When wiring up power for your accessories such as injectors and coils, keep in mind that the wiring you use here can determine if your project performs as you want.

It is recommended that a separate relay and fuse be used for such things as injector power and coils also use correct gauge wire for the job.

When acquiring the 12V power for your accessories, note on where you are getting it from. A lot of installs are done with the battery being relocated to the boot. In cases when this has been done people generally go to the Starter motor to get the main 12V. This is not acceptable as the current drop you get when the starter is engaged can cause quite a severer drop in voltage. On start is when you need maximum spark and injection voltage. If you are wired to the starter you may only be getting minimal voltage to these products causing hard to start.

Once wiring has been completed you now need to go online with the Wolf WCU and the Wolf software and download a start-up map.

At this point you can configure any other extra input/outputs you have wired in as well.

The Wolf ECU has a diagnostic light built into it. **Illustration 1.6** shows how to read this and what the colours mean.

If electrical noise is found to be a problem, some quick simple test can be performed. **Illustration 1.4** show how having incorrect wiring and/or incorrect spark plugs can cause such a problem. Always remember that when using an EFI system you must use resistor spark plugs

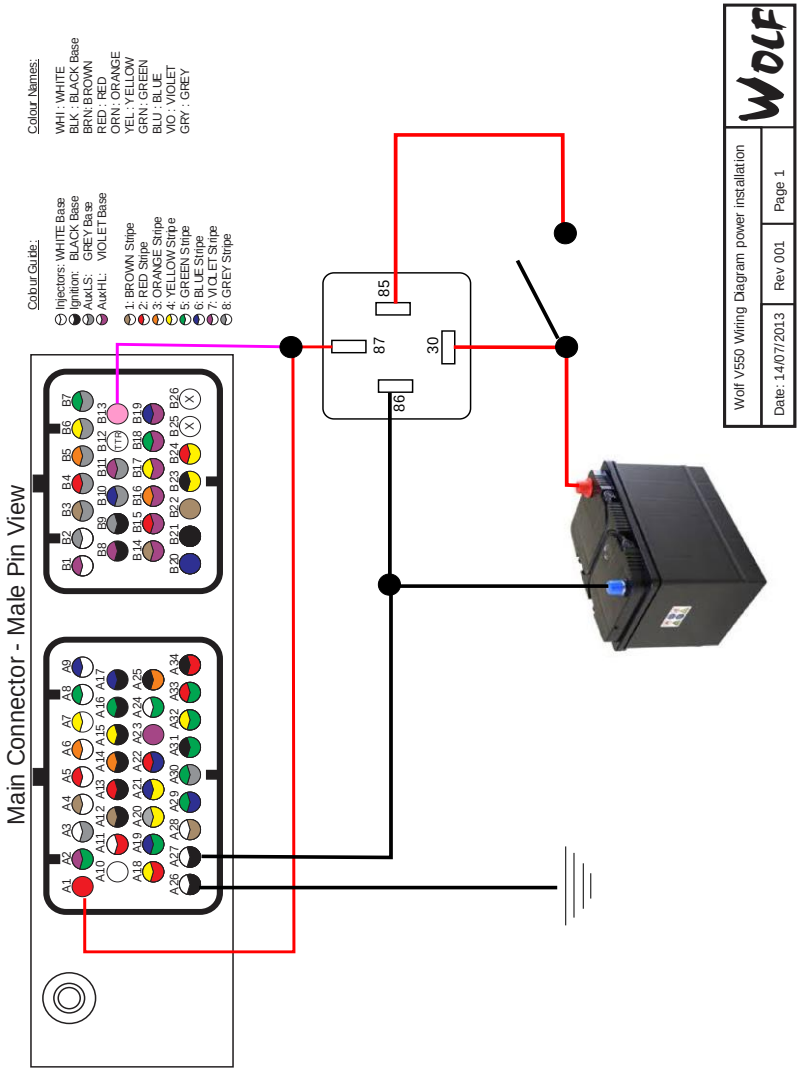


Illustration 1.1

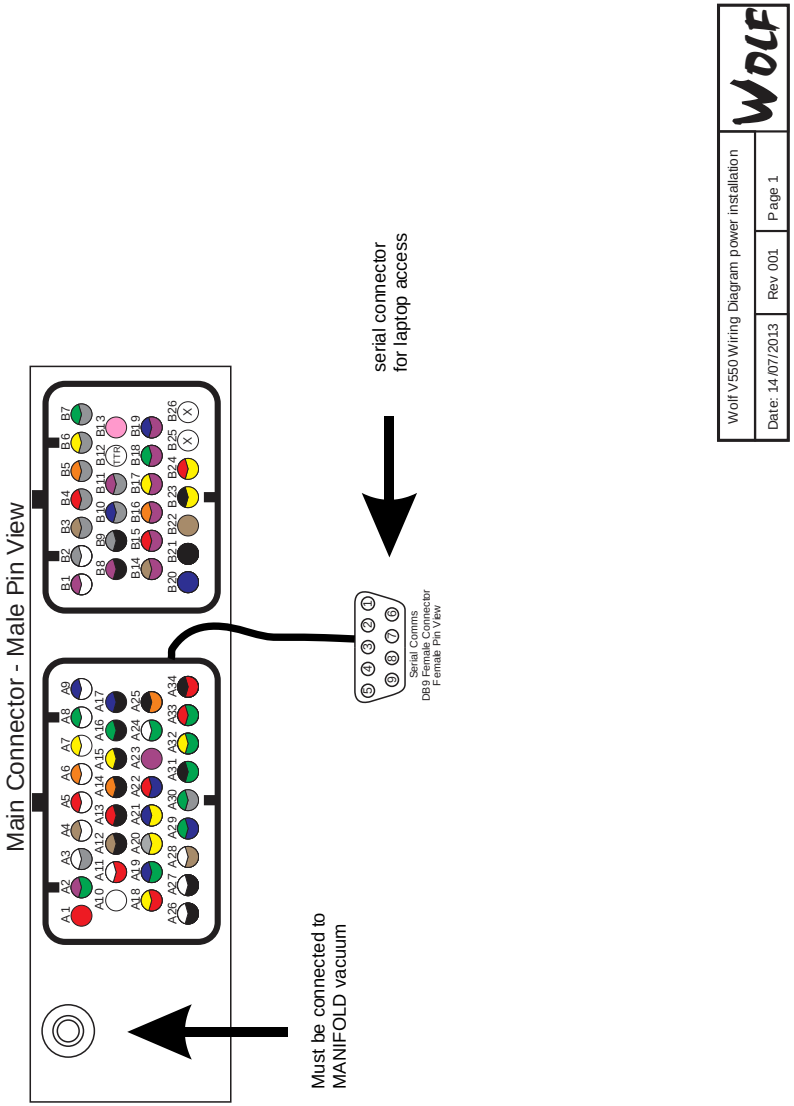


Illustration 1.2

Illustration 1.3

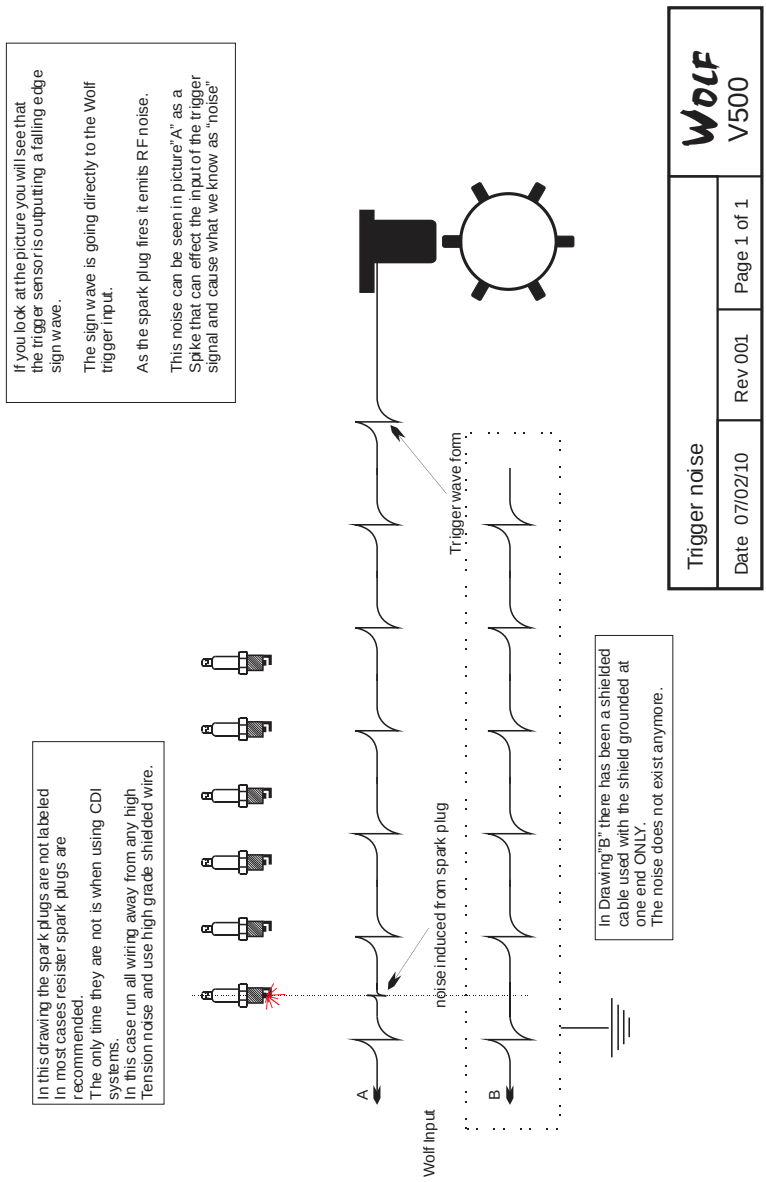
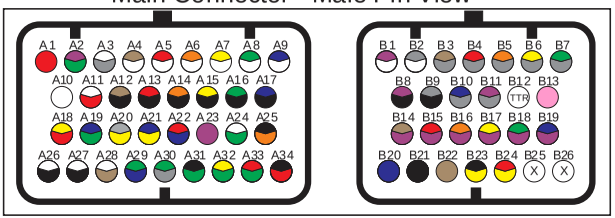


Illustration 1.4

Internal MAP Sensor
Vacuum/Boost Port Input
(Maximum Boost
Pressure 30 PSI)



Main Connector - Male Pin View



Colour Guide:

- Injectors: WHITE Base
- Ignition: BLACK Base
- Aux LS: GREY Base
- Aux HL: VIOLET Base
- 1: BROWN Stripe
- 2: RED Stripe
- 3: ORANGE Stripe
- 4: YELLOW Stripe
- 5: GREEN Stripe
- 6: BLUE Stripe
- 7: VIOLET Stripe
- 8: GREY Stripe

Colour Names:

WHI : WHITE
BLK : BLACK Base
BRN: BROWN
RED : RED
ORN : ORANGE
YEL : YELLOW
GRN : GREEN
BLU : BLUE
VIO : VIOLET
GRY : GREY

PIN NAME	DESCRIPTION
+12V Input	+12V Input
A/C Request Input	Air Conditioner Compressor Clutch Sense
Idle Air (PWM)	Output (Low Side Driver 1.1A Max)
Injector Output 1	Min Injector Impedance 0.5 Ohms
Injector Output 2	Min Injector Impedance 0.5 Ohms
Injector Output 3	Min Injector Impedance 0.5 Ohms
Injector Output 4	Min Injector Impedance 0.5 Ohms
Injector Output 5	Min Injector Impedance 0.5 Ohms
Injector Output 6	Min Injector Impedance 0.5 Ohms
Fuel Pump Output	Low Side Driver 1.1A Max
Boost Control Output (PWM)	Low Side Driver 1.1A Max
Ignition Output 1	Low Side Driver 2.2A Max
Ignition Output 2	Low Side Driver 2.2A Max
Ignition Output 3	Low Side Driver 2.2A Max
Ignition Output 4	Low Side Driver 2.2A Max
Ignition Output 5	Low Side Driver 2.2A Max
Ignition Output 6	Low Side Driver 2.2A Max
+5V Engine Sensors Output	0.2A Max
Throttle Position Sensor Input	Potentiometer or Switch Type
Engine Temperature Sensor Input	NTC Resistor Type
Air Temperature Sensor Input	NTC Resistor Type
Sensor Ground	Sensor Ground
Tacho Output	Low Side Driver 1.1A Max
Thermofan Output	Low Side Driver 1.1A Max
RS232 RXD	ECU to PC Communications
Power Ground	Connect to Chassis Ground or Battery Neg
Power Ground	Connect to Chassis Ground or Battery Neg
Trigger Reference Signal Input	Reluctor - Falling Edge, Hall - Rising or Falling
Trigger Reference Signal Ground	Signal Ground
Trigger Sync Signal Input	Reluctor - Falling Edge, Hall - Rising or Falling
Oxygen Sensor 1 Signal Input	Narrow Band or LSU-4 Wideband Sensor
Oxygen Sensor 1 Signal Ground	Narrow Band or LSU-4 Wideband Sensor
RS232 TXD	ECU to PC Communications

	PIN	PIN NAME	DESCRIPTION
WHI/VIO	B1	Injector Output 7	Min Injector Impedance 0.5 Ohms
WHI/GRY	B2	Injector Output 8	Min Injector Impedance 0.5 Ohms
GRY/BRN	B3	Aux LS1	Low Side Driver 2.2A Max
GRY/RED	B4	Aux LS2	Low Side Driver 2.2A Max
GRY/ORN	B5	Aux LS3	Low Side Driver 3A Max
GRY/YEL	B6	Aux LS4	Low Side Driver 1A Max
GRY/GRN	B7	Aux LS5	Low Side Driver 1A Max
BLK/VIO	B8	Ignition Output 7	Low Side Driver 2.2A Max
BLK/GRY	B9	Ignition Output 8	Low Side Driver 2.2A Max
GRY/BLU	B10	Aux LS6	Low Side Driver 1A Max
GRYVIO	B11	Aux LS7	Low Side Driver 1A Max
TTR	B12	Aux LS8	Low Side Driver 2.2A Max
PINK	B13	12V input power sense	senses for ignition power on this pin
VIO/BRN	B14	Aux HL1	High Side/Low Side Driver 1A Max
VIO/RED	B15	Aux HL2	High Side/Low Side Driver 1A Max
VIO/ORN	B16	Aux HL3	High Side/Low Side Driver 1A Max
VIOYEL	B17	Aux HL4	High Side/Low Side Driver 1A Max
VIO/GRN	B18	Aux HL5	High Side/Low Side Driver 1A Max
VIOBLU	B19	Aux HL6	High Side/Low Side Driver 1A Max
BLU	B20	+5V Aux Output	0.2A Max
BLK	B21	MAP/MAF Sensor Input	0 - 5V Sensor Output
BRN	B22	+8V Aux Output	0.5A Max
YEL/BLK	B23	Oxygen Sensor 2 Signal Input	Narrow Band or LSU-4 Wideband Sensor
YEL/RED	B24	Ignition Relay (for stepper motor control)	
X	B25	Dash board control comms	
X	B26	Not Used	Not Used

Wolf V550 Wiring Diagram		
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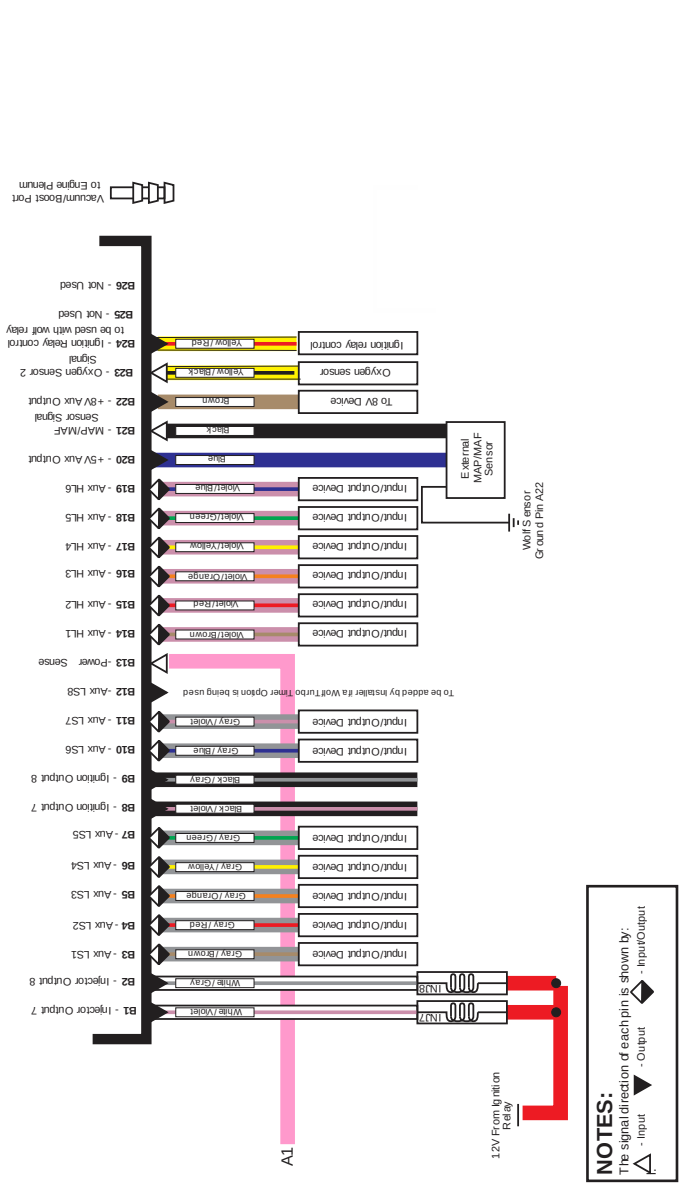


Illustration 1.5.1

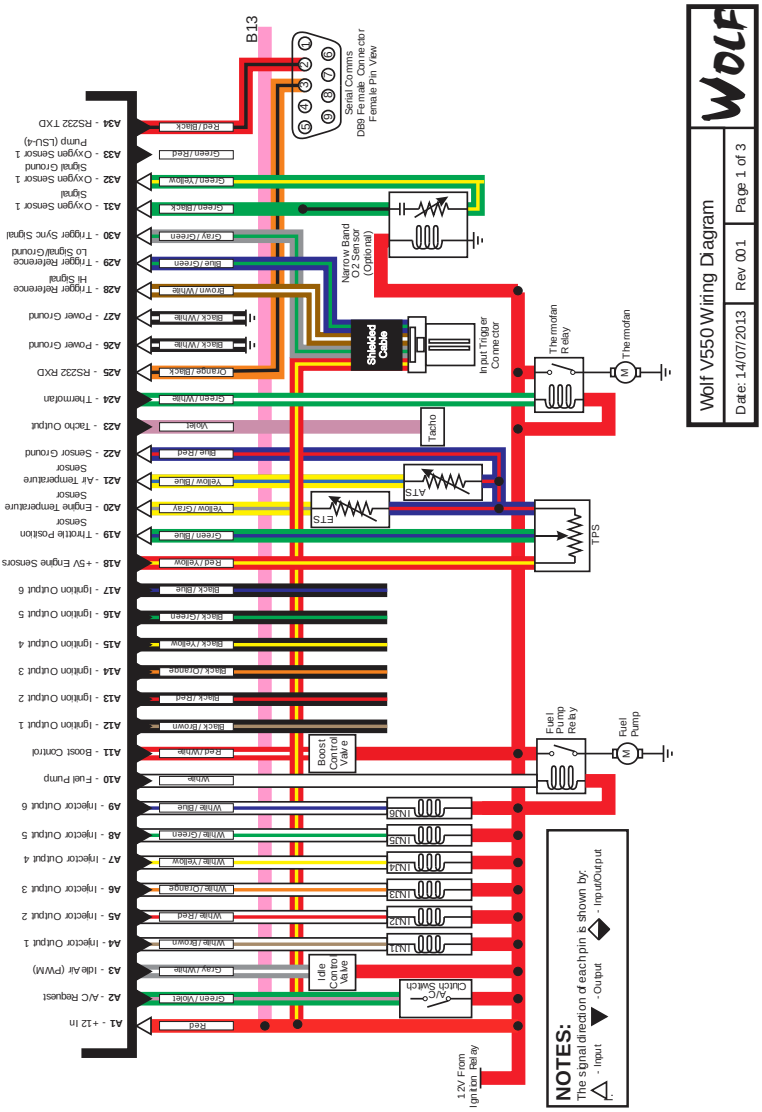


Illustration 1.5.2

Illustration 1.6

Wolf diagnostic light			WOLF V550
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The Wolf has power



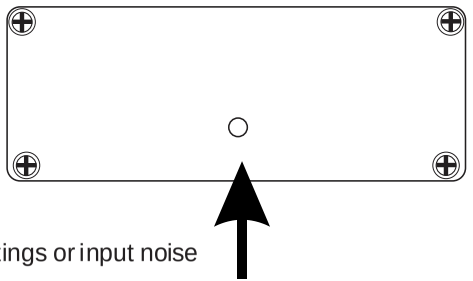
Looking for a sync



No problems and trigger inputs are good

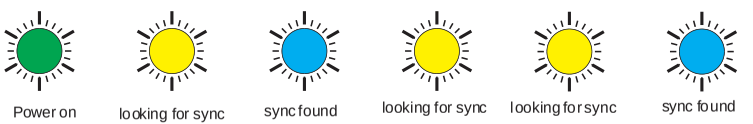


Trigger input faults, this may be incorrect settings or input noise

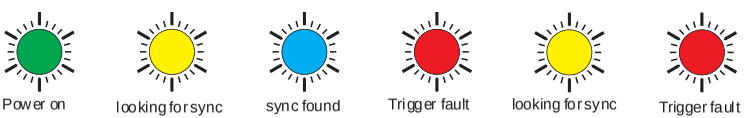




power on no trigger problems inputs all ok



Power on, looking for sync, sync seen, looking for sync again, this will happen while cranking engine



Power on, looking for sync sync seen, false trigger, looking for correct sync trigger noise on input line This can also be incorrect set up

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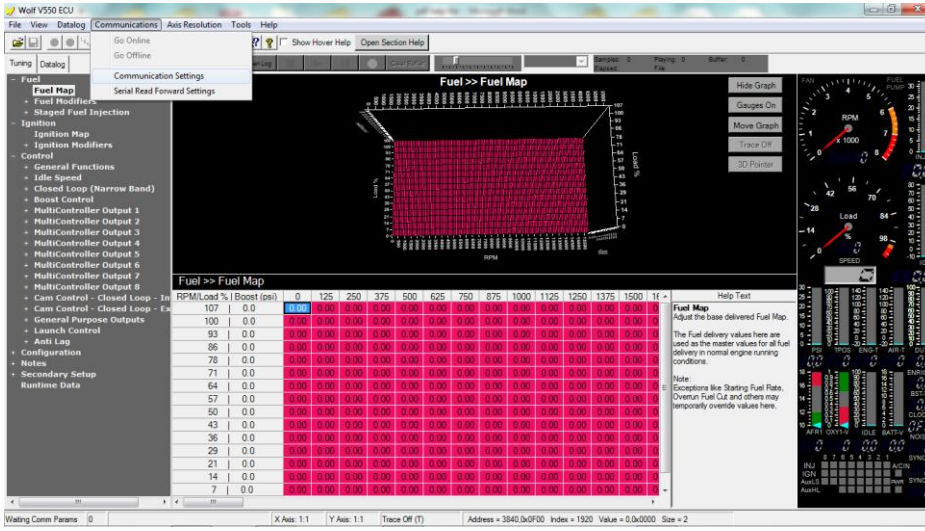
GOING ON LINE WITH WOLF SOFTWARE

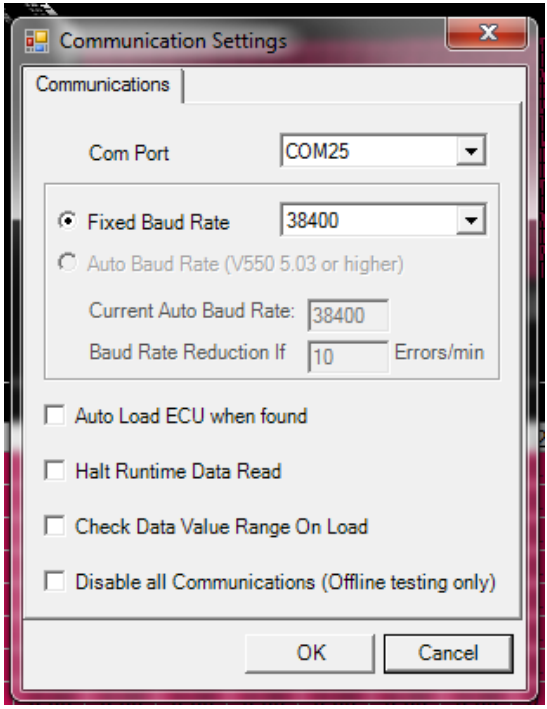
Download from your USB stick the software you require for the model Wolf ECU you have. Follow the prompts.

If you are using a “USB to 9 pin” Adaptor you will need to go into your computers “Device Manager” and note which “Com Port” your USB to Serial Port is set up with.

Once software is installed you will need to set up the “Com Port”

Go to the top of the program “Communications”. In here you will see “Communications Settings” click on this





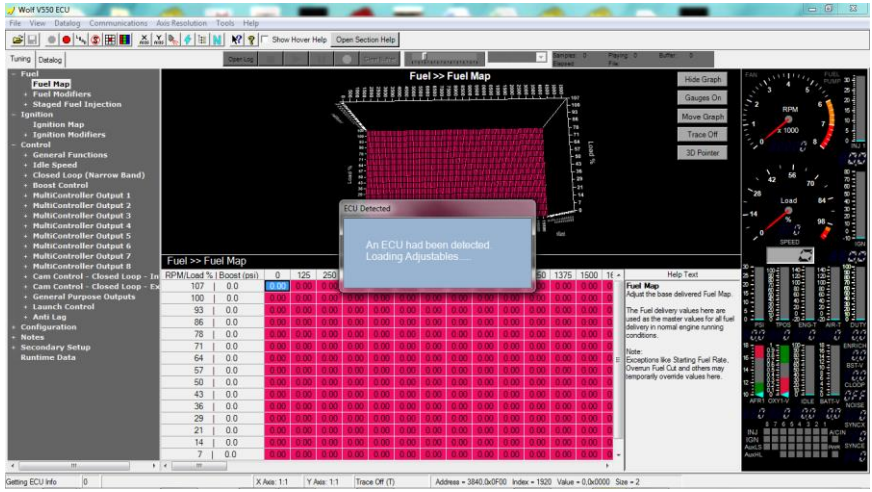
In here you can select the correct “Com Port” that the USB Adaptor is set to.

Select “OK”

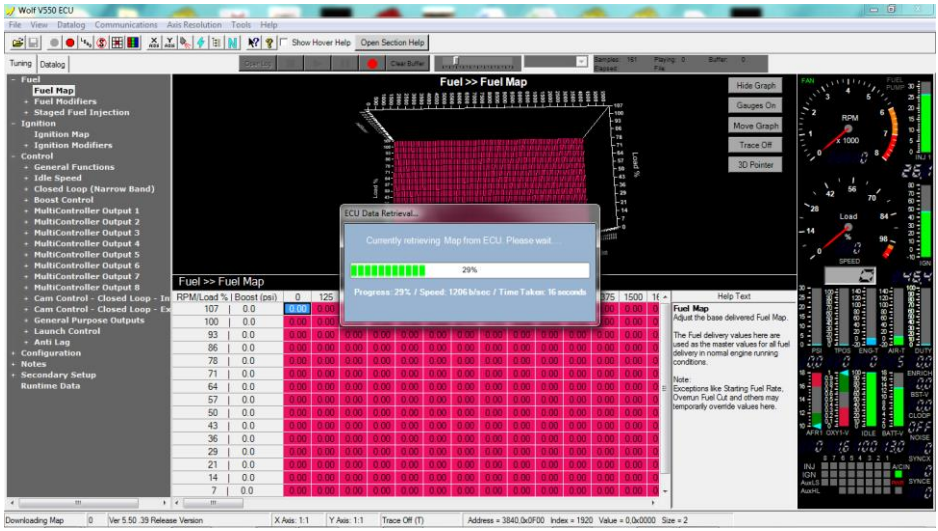
Now turn the ignition on to the Wolf ECU, make sure that you have the serial cable plugged in and that the **green light** is showing on the unit.

If all your settings are correct then a display will show like this.

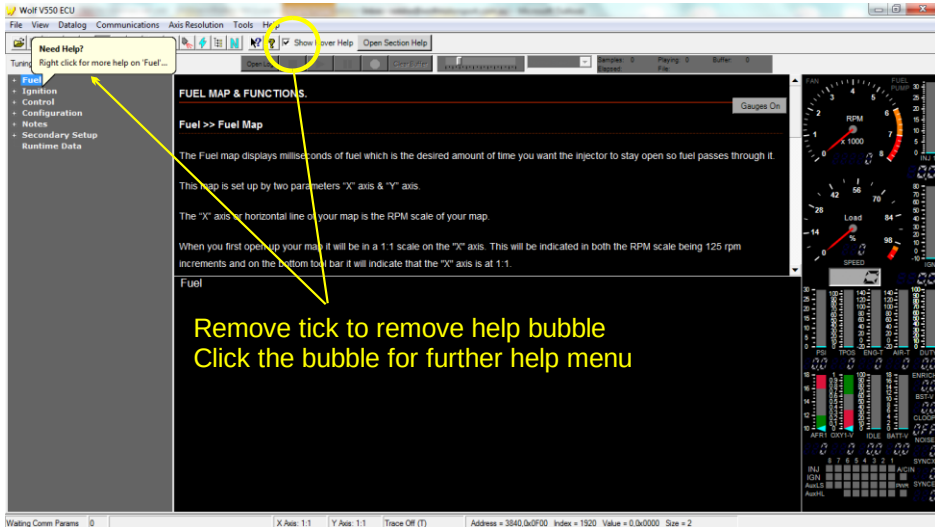
This means the Wolf is connected and data is about to start transferring.

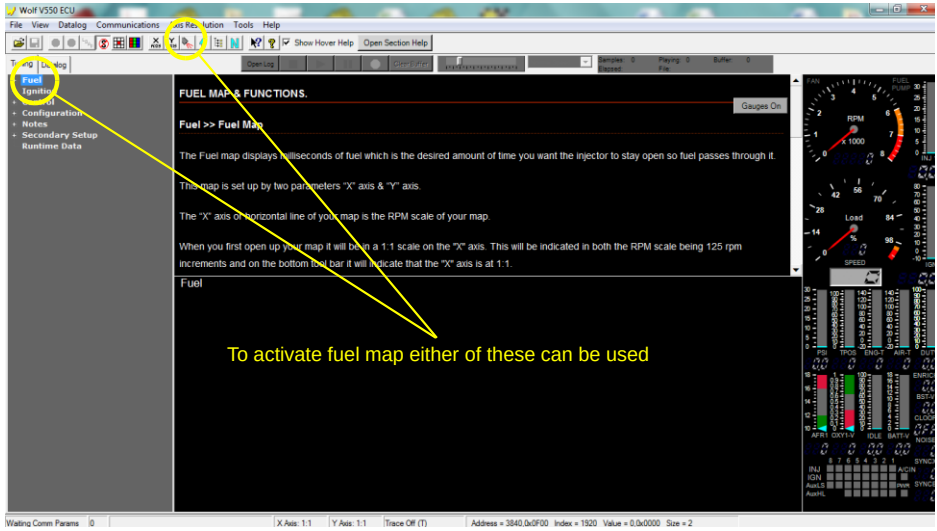


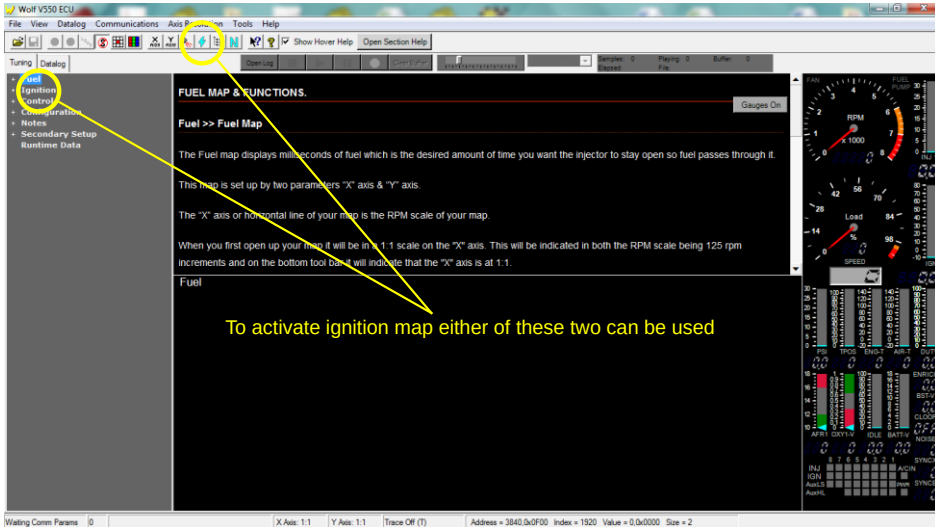
The next screen you see will be a bar graph counting up to show that the Wolf ECU is loading and the remaining time it will take for this to happen.

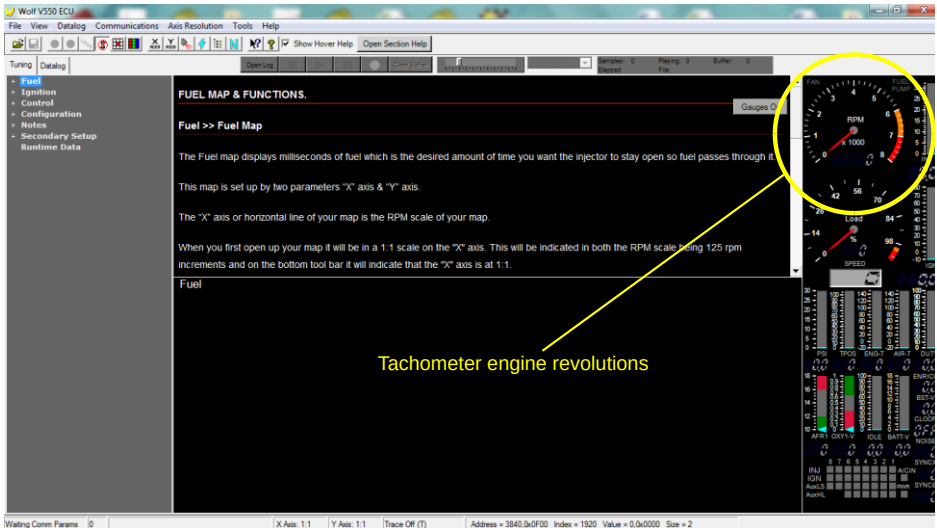


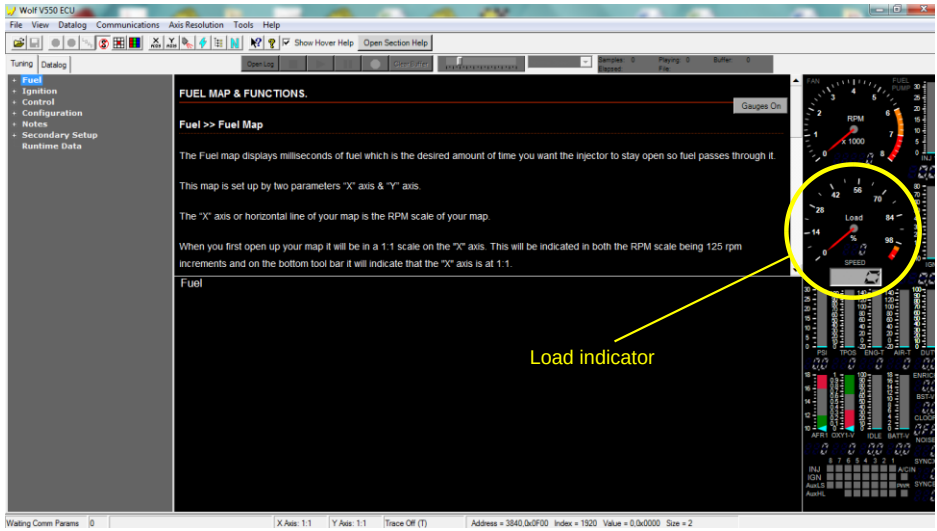
The following pictures are a quick reference to what the software can offer.

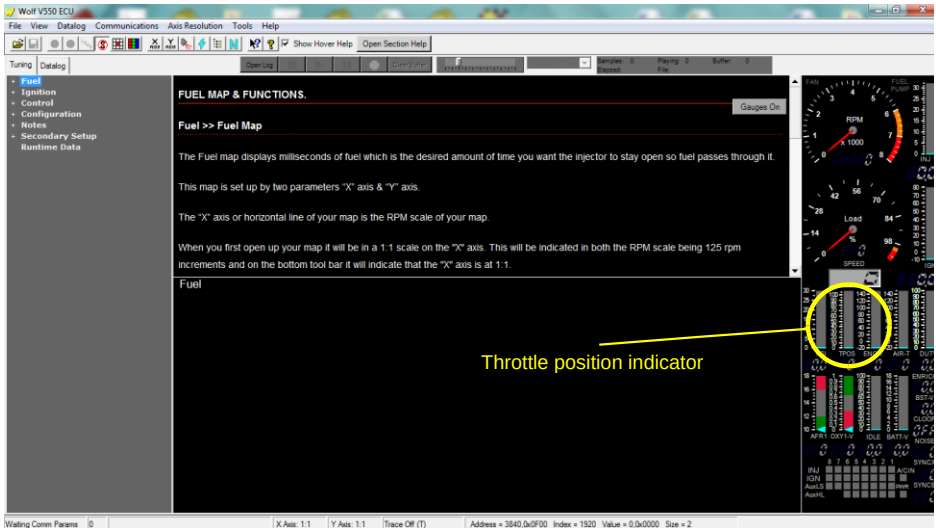


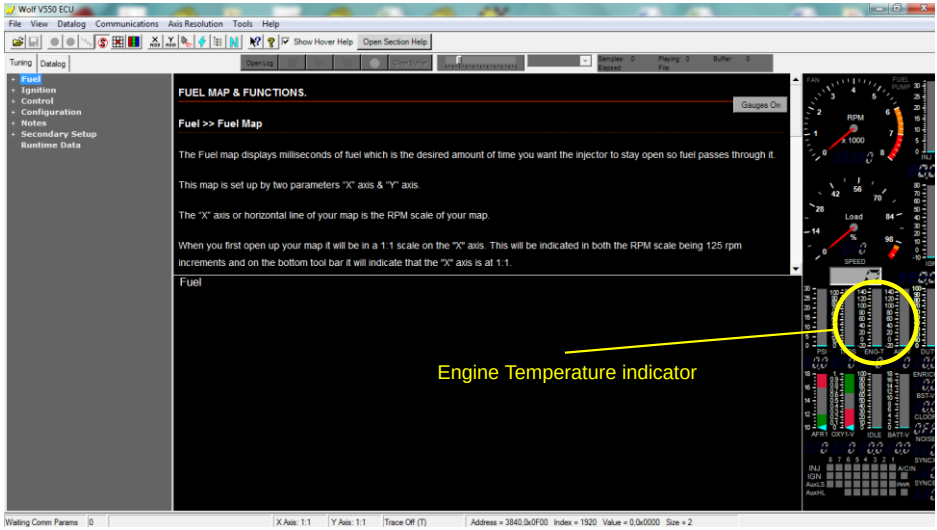


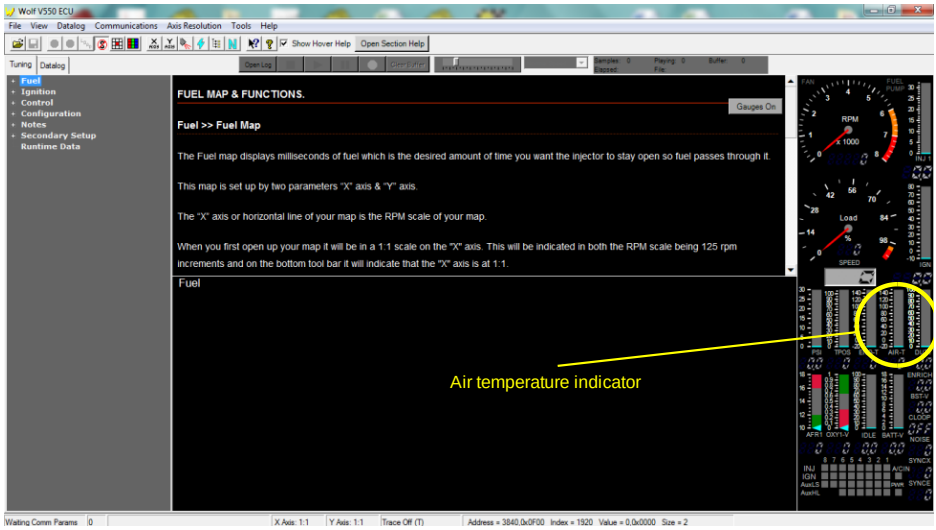

FUEL MAP & FUNCTIONS.
Fuel >> Fuel Map
The Fuel map displays milliseconds of fuel which is the desired amount of time you want the injector to stay open so fuel passes through it.
This map is set up by two parameters "X" axis & "Y" axis.
The "X" axis or horizontal line of your map is the RPM scale of your map.
When you first open up your map it will be in a 1:1 scale on the "X" axis. This will be indicated in both the RPM scale being 125 rpm increments and on the bottom tool bar it will indicate that the "X" axis is at 1:1.
Fuel
To activate ignition map either of these two can be used

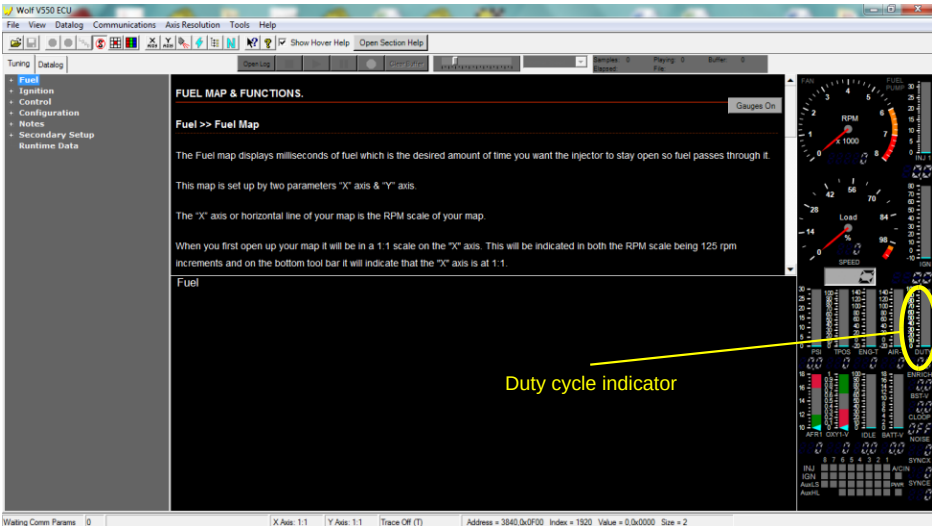

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Fuel
Tachometer engine revolutions

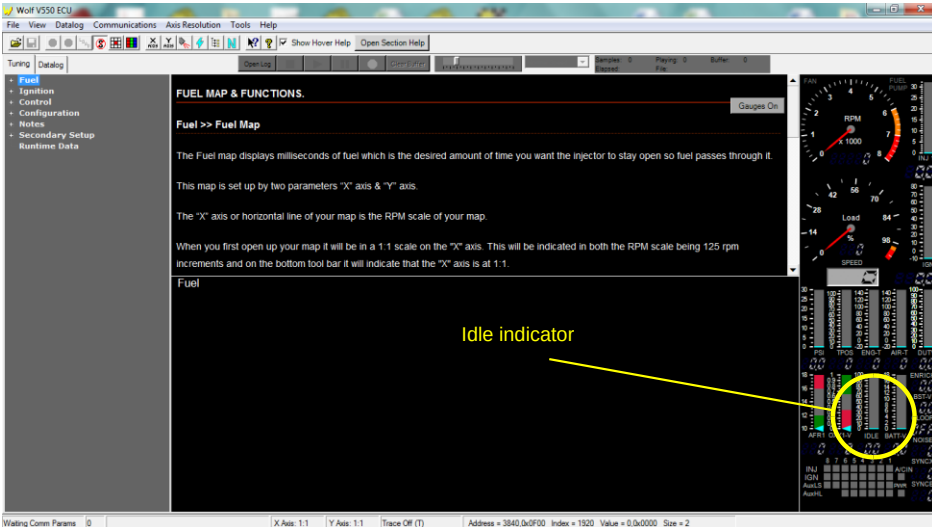

Wolf V550 ECU
File View Datalog Communications Axis Resolution Tools Help
Tuning Datalog
Fuel
Ignition
Control
Configuration
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Secondary Setup
Runtime Data
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Fuel
Load indicator
Waiting Comm Params
X Axis: 1:1
Y Axis: 1:1
Trace Off (T)

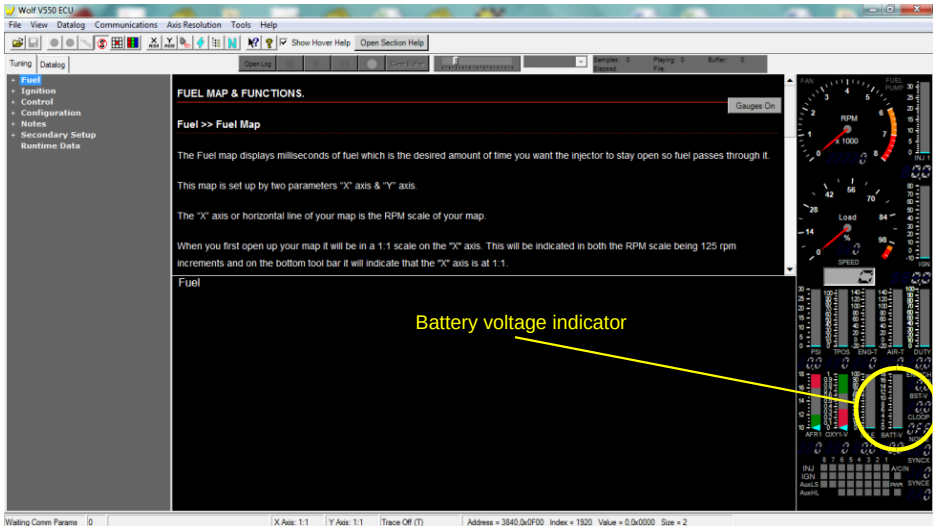

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Fuel
Throttle position indicator
Waiting Comm Params
X Axis: 1:1
Y Axis: 1:1
Trace Off (T)

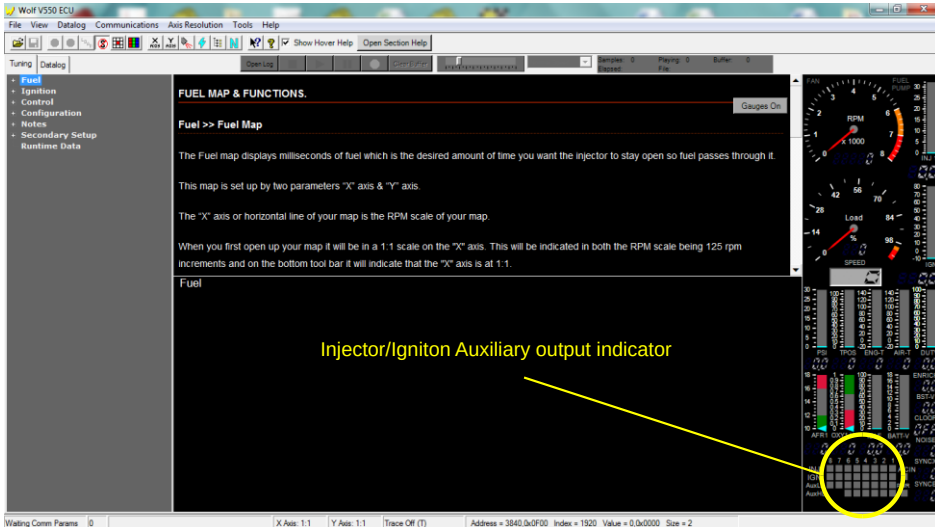

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File View Datalog Communications Axis Resolution Tools Help
Show Hover Help
Open Section Help
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Fuel
Engine Temperature indicator
Waiting Comm Params
X Axis: 1:1
Y Axis: 1:1
Trace Off (T)

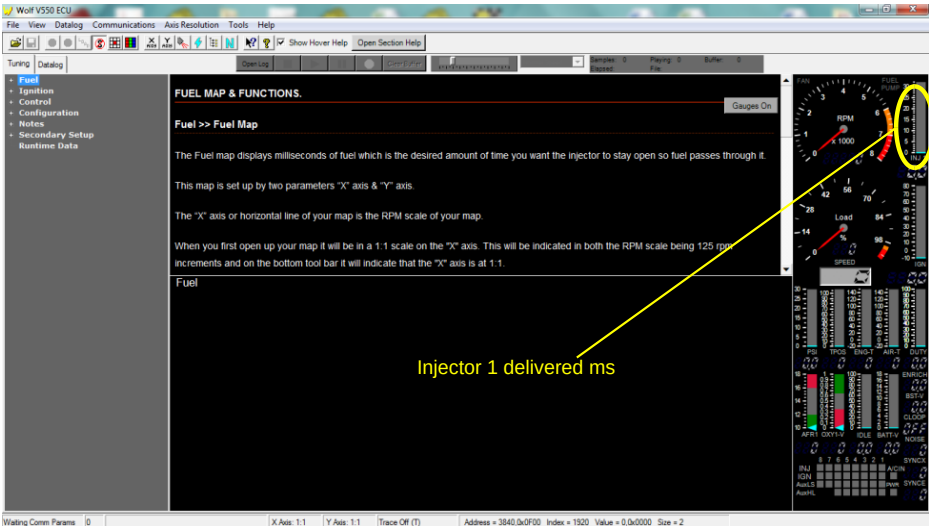

Wolf V550 ECU
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FUEL MAP & FUNCTIONS.
Gauges On
Fuel >> Fuel Map
The Fuel map displays milliseconds of fuel which is the desired amount of time you want the injector to stay open so fuel passes through it.
This map is set up by two parameters "X" axis & "Y" axis.
The "X" axis or horizontal line of your map is the RPM scale of your map.
When you first open up your map it will be in a 1:1 scale on the "X" axis. This will be indicated in both the RPM scale being 125 rpm increments and on the bottom tool bar it will indicate that the "X" axis is at 1:1.
Fuel
Air temperature indicator
Waiting Comm Params
X Axis: 1:1
Y Axis: 1:1
Trace Off (T)

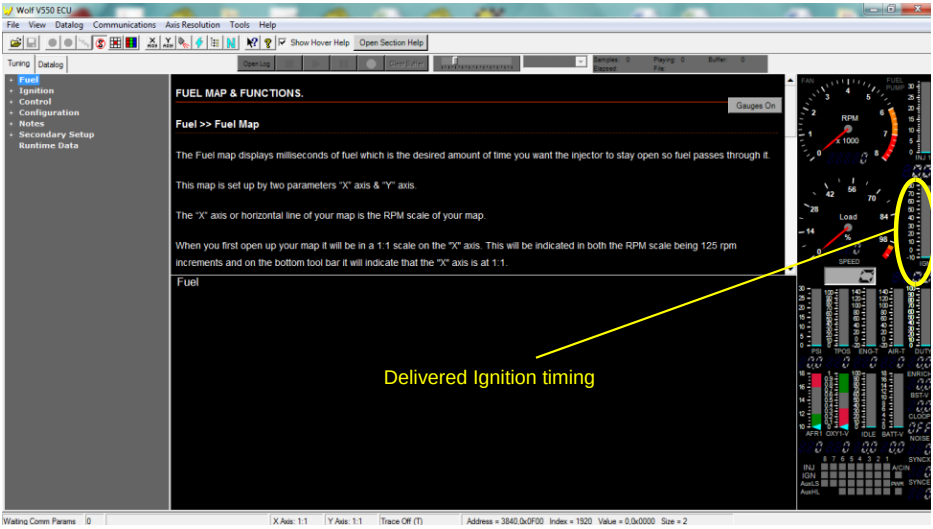

Wolf V550 ECU
File View Datalog Communications Axis Resolution Tools Help
Tuning Datalog
Fuel
Ignition
Control
Configuration
Notes
Secondary Setup
Runtime Data
FUEL MAP & FUNCTIONS.
Gauges On
Fuel >> Fuel Map
The Fuel map displays milliseconds of fuel which is the desired amount of time you want the injector to stay open so fuel passes through it.
This map is set up by two parameters "X" axis & "Y" axis.
The "X" axis or horizontal line of your map is the RPM scale of your map.
When you first open up your map it will be in a 1:1 scale on the "X" axis. This will be indicated in both the RPM scale being 125 rpm increments and on the bottom tool bar it will indicate that the "X" axis is at 1:1.
Fuel
Duty cycle indicator

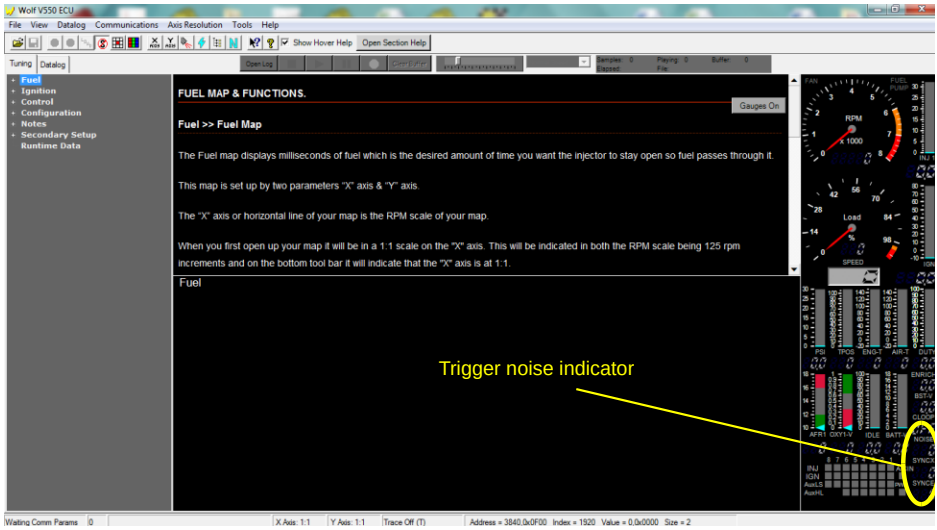

Wolf V550 ECU
File View Datalog Communications Axis Resolution Tools Help
Tuning Datalog
Fuel
Ignition
Control
Configuration
Notes
Secondary Setup
Runtime Data
FUEL MAP & FUNCTIONS.
Gauges On
Fuel >> Fuel Map
The Fuel map displays milliseconds of fuel which is the desired amount of time you want the injector to stay open so fuel passes through it.
This map is set up by two parameters "X" axis & "Y" axis.
The "X" axis or horizontal line of your map is the RPM scale of your map.
When you first open up your map it will be in a 1:1 scale on the "X" axis. This will be indicated in both the RPM scale being 125 rpm increments and on the bottom tool bar it will indicate that the "X" axis is at 1:1.
Fuel
Idle indicator

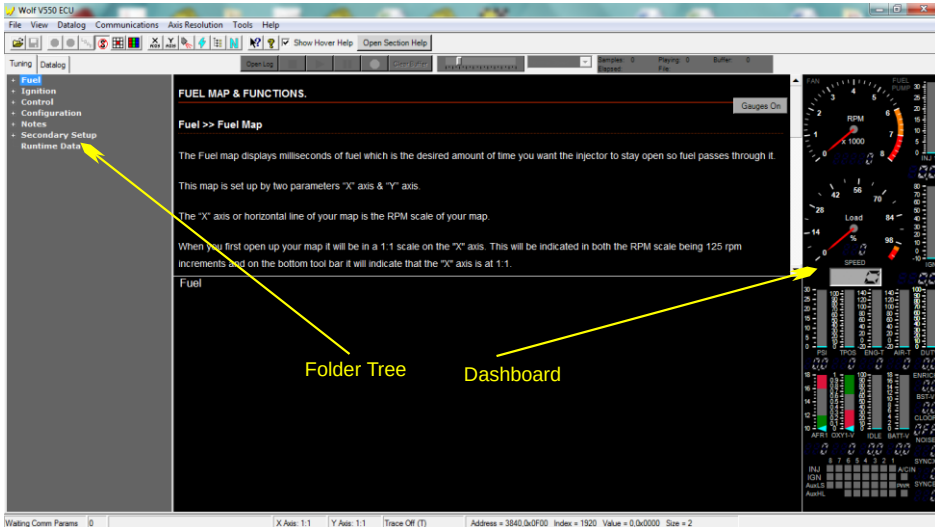

Wolf V550 ECU
File View Datalog Communications Axis Resolution Tools Help
Show Hover Help
Open Section Help
Tuning
Datalog
Fuel
Ignition
Control
Configuration
Notes
Secondary Setup
Runtime Data
FUEL MAP & FUNCTIONS.
Gauges On
Fuel >> Fuel Map
The Fuel map displays milliseconds of fuel which is the desired amount of time you want the injector to stay open so fuel passes through it.
This map is set up by two parameters "X" axis & "Y" axis.
The "X" axis or horizontal line of your map is the RPM scale of your map.
When you first open up your map it will be in a 1:1 scale on the "X" axis. This will be indicated in both the RPM scale being 125 rpm increments and on the bottom tool bar it will indicate that the "X" axis is at 1:1.
Fuel
Battery voltage indicator
Waiting Comm Params
X Axis: 1:1
Y Axis: 1:1
Trace Off (T)

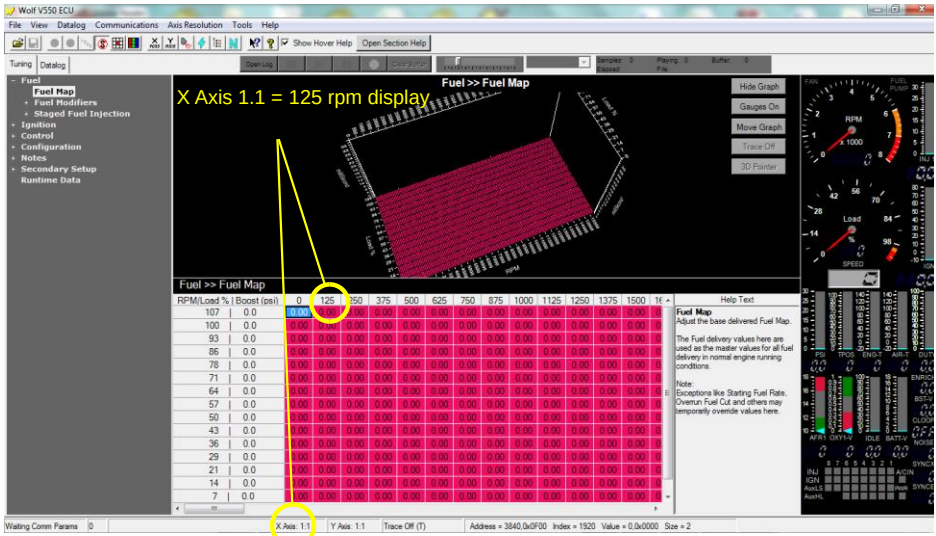

Wolf V550 ECU
File View Datalog Communications Axis Resolution Tools Help
Show Hover Help
Open Section Help
Tuning
Datalog
Fuel
Ignition
Control
Configuration
Notes
Secondary Setup
Runtime Data
FUEL MAP & FUNCTIONS.
Gauges On
Fuel >> Fuel Map
The Fuel map displays milliseconds of fuel which is the desired amount of time you want the injector to stay open so fuel passes through it.
This map is set up by two parameters "X" axis & "Y" axis.
The "X" axis or horizontal line of your map is the RPM scale of your map.
When you first open up your map it will be in a 1:1 scale on the "X" axis. This will be indicated in both the RPM scale being 125 rpm increments and on the bottom tool bar it will indicate that the "X" axis is at 1:1.
Fuel
Injector/Igniton Auxiliary output indicator
Waiting Comm Params
X Axis: 1:1
Y Axis: 1:1
Trace Off (T)

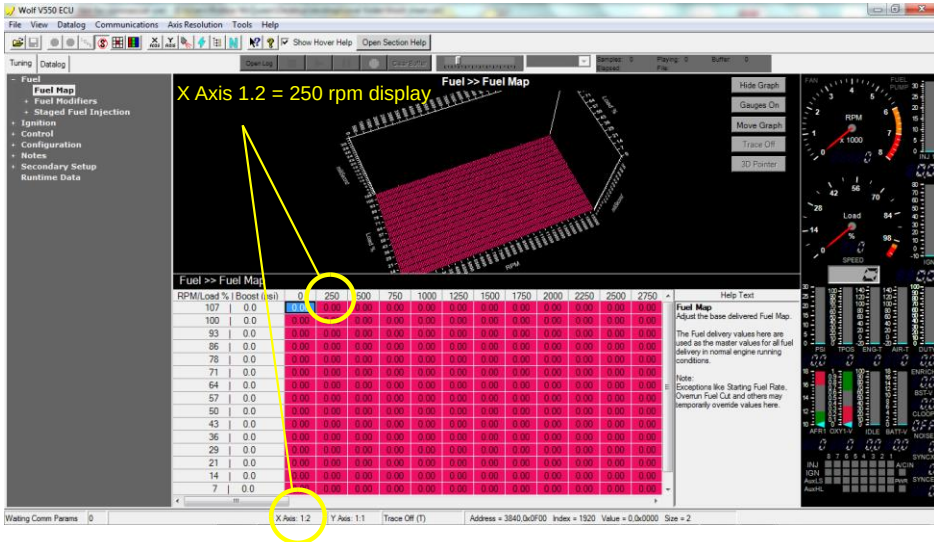

Wolf V550 ECU
File View Datalog Communications Axis Resolution Tools Help
Show Hover Help
Open Section Help
Tuning
Datalog
Fuel
Ignition
Control
Configuration
Notes
Secondary Setup
Runtime Data
FUEL MAP & FUNCTIONS.
Gauges On
Fuel >> Fuel Map
The Fuel map displays milliseconds of fuel which is the desired amount of time you want the injector to stay open so fuel passes through it.
This map is set up by two parameters "X" axis & "Y" axis.
The "X" axis or horizontal line of your map is the RPM scale of your map.
When you first open up your map it will be in a 1:1 scale on the "X" axis. This will be indicated in both the RPM scale being 125 rpm increments and on the bottom tool bar it will indicate that the "X" axis is at 1:1.
Fuel
Injector 1 delivered ms
Waiting Comm Params
X Axis: 1:1
Y Axis: 1:1
Trace Off (T)
Address = 3840.0x0F00 Index = 1920 Value = 0.0x0000 Size = 2

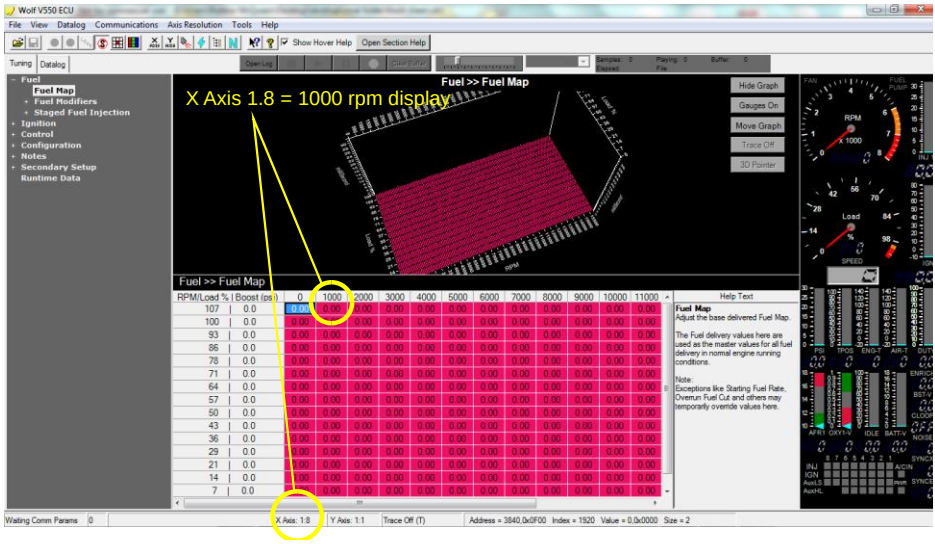

Wolf V550 ECU
File View Datalog Communications Axis Resolution Tools Help
Show Hover Help
Open Section Help
Tuning
Datalog
Fuel
Ignition
Control
Configuration
Notes
Secondary Setup
Runtime Data
FUEL MAP & FUNCTIONS.
Gauges On
Fuel >> Fuel Map
The Fuel map displays milliseconds of fuel which is the desired amount of time you want the injector to stay open so fuel passes through it.
This map is set up by two parameters "X" axis & "Y" axis.
The "X" axis or horizontal line of your map is the RPM scale of your map.
When you first open up your map it will be in a 1:1 scale on the "X" axis. This will be indicated in both the RPM scale being 125 rpm increments and on the bottom tool bar it will indicate that the "X" axis is at 1:1.
Fuel
Delivered Ignition timing
Waiting Comm Params
X Axis: 1:1
Y Axis: 1:1
Trace Off (T)
Address = 3840.0x0F00 Index = 1920 Value = 0.0x0000 Size = 2

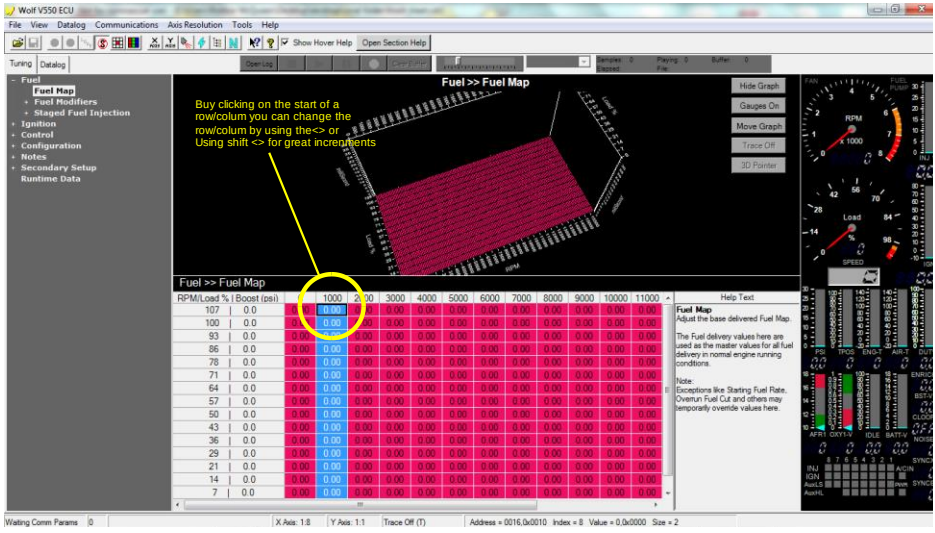

Wolf V550 ECU
File View Datalog Communications Axis Resolution Tools Help
Fuel
Ignition
Control
Configuration
Notes
Secondary Setup
Runtime Data
FUEL MAP & FUNCTIONS.
Gauges On
Fuel >> Fuel Map
The Fuel map displays milliseconds of fuel which is the desired amount of time you want the injector to stay open so fuel passes through it.
This map is set up by two parameters "X" axis & "Y" axis.
The "X" axis or horizontal line of your map is the RPM scale of your map.
When you first open up your map it will be in a 1:1 scale on the "X" axis. This will be indicated in both the RPM scale being 125 rpm increments and on the bottom tool bar it will indicate that the "X" axis is at 1:1.
Fuel
Trigger noise indicator

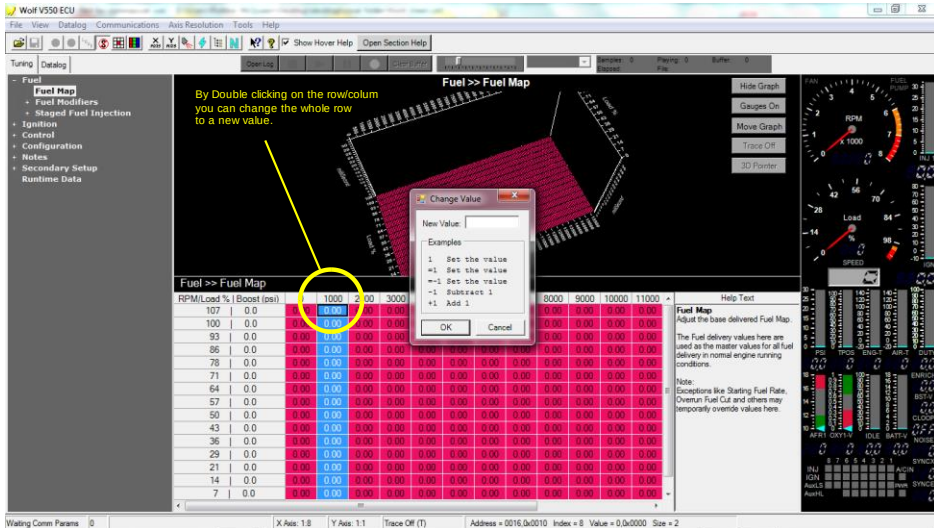

Wolf V550 ECU
File View Datalog Communications Axis Resolution Tools Help
Fuel
Ignition
Control
Configuration
Notes
Secondary Setup
Runtime Data
FUEL MAP & FUNCTIONS.
Gauges On
Fuel >> Fuel Map
The Fuel map displays milliseconds of fuel which is the desired amount of time you want the injector to stay open so fuel passes through it.
This map is set up by two parameters "X" axis & "Y" axis.
The "X" axis or horizontal line of your map is the RPM scale of your map.
When you first open up your map it will be in a 1:1 scale on the "X" axis. This will be indicated in both the RPM scale being 125 rpm increments and on the bottom tool bar it will indicate that the "X" axis is at 1:1.
Fuel
Folder Tree
Dashboard

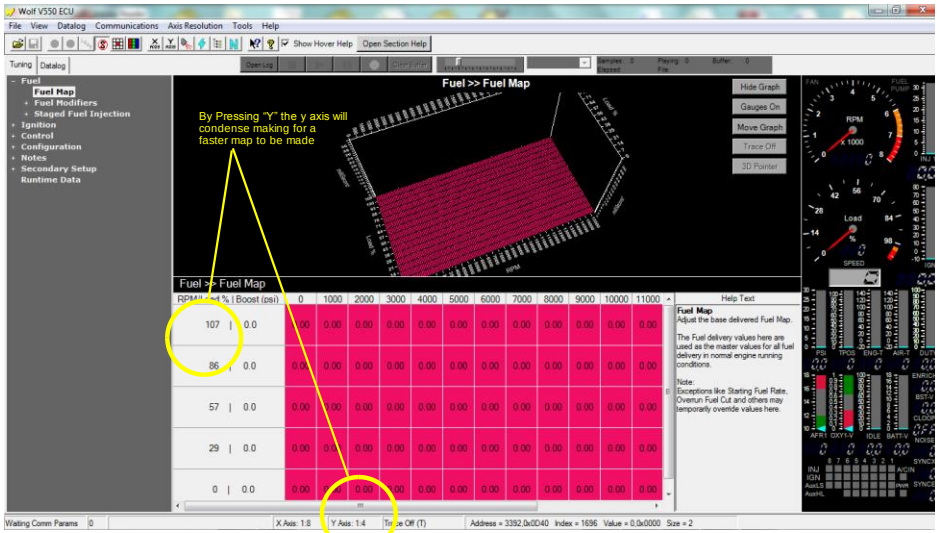

X Axis 1.1 = 125 rpm display
Fuel >> Fuel Map
Fuel >> Fuel Map
X Axis: 1.1

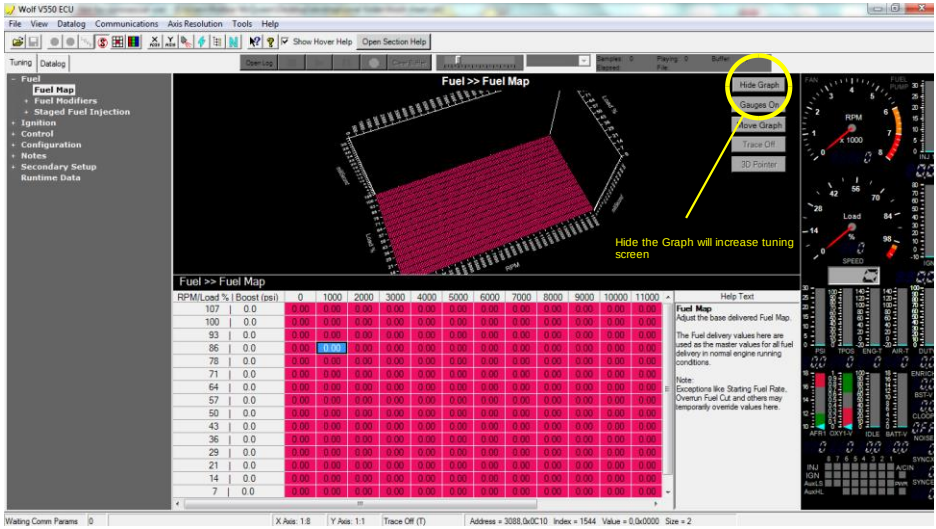

X Axis 1.2 = 250 rpm display
Fuel >> Fuel Map
Fuel >> Fuel Map
X Axis: 1.2

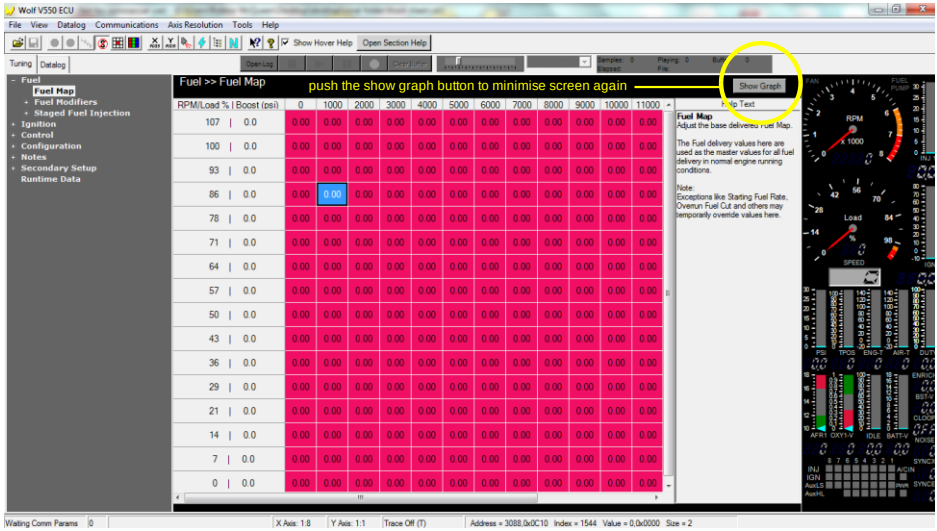

X Axis 1.8 = 1000 rpm display
Fuel >> Fuel Map
Fuel >> Fuel Map

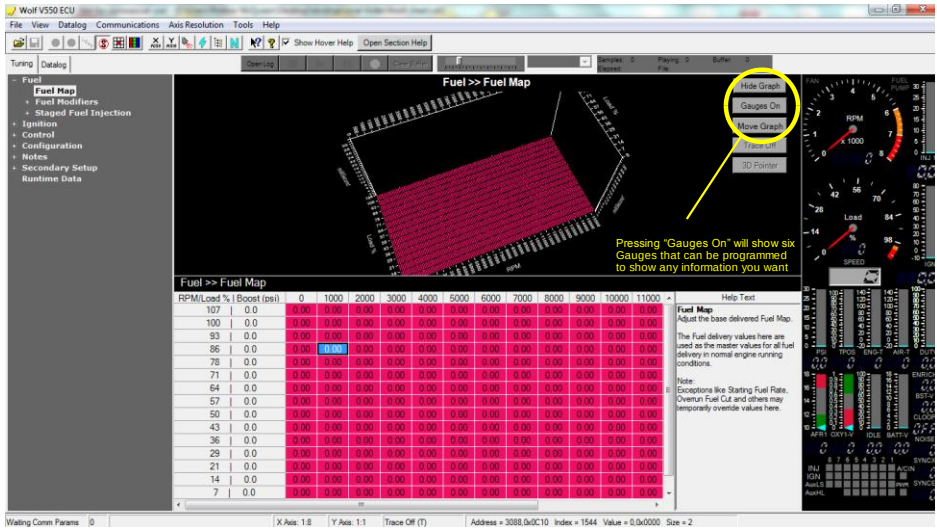

Buy clicking on the start of a row/colum you can change the row/colum by using the<> or Using shift <> for great increments
Fuel >> Fuel Map
Fuel >> Fuel Map


By Double clicking on the row/colum you can change the whole row to a new value.
Fuel >> Fuel Map
Change Value
New Value:
Examples
1 Set the value
=1 Set the value
=-1 Set the value
-1 Subtract 1
+1 Add 1
OK
Cancel
Help Text
Fuel Map
Adjust the base delivered Fuel Map.
The Fuel delivery values here are used as the master values for all fuel delivery in normal engine running conditions.
Note:
Exceptions like Starting Fuel Rate, Overrun Fuel Cut and others may temporarily override values here.

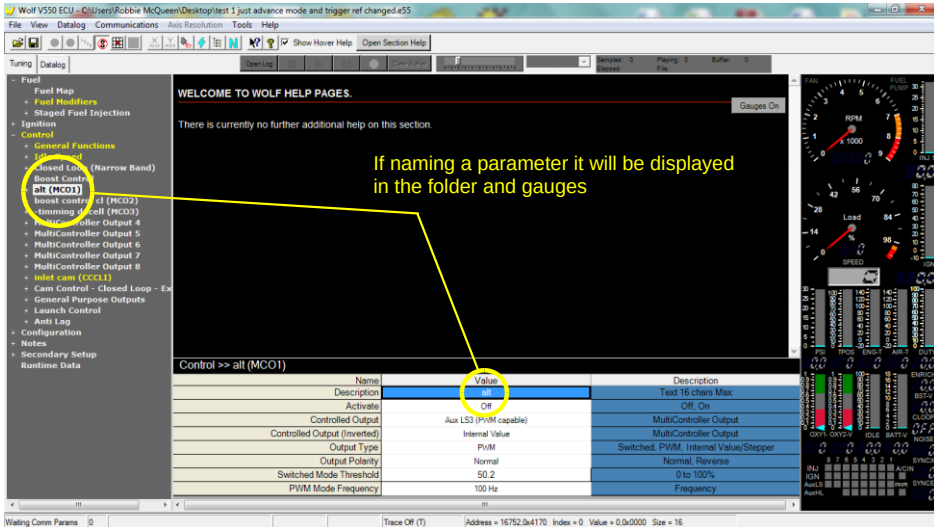

By Pressing "Y" the y axis will condense making for a faster map to be made
Fuel >> Fuel Map
Help Text
Fuel Map
Adjust the base delivered Fuel Map.
The Fuel delivery values here are used as the master values for all fuel delivery in normal engine running conditions.
Note:
Exceptions like Starting Fuel Rate, Overrun Fuel Cut and others may temporarily override values here.

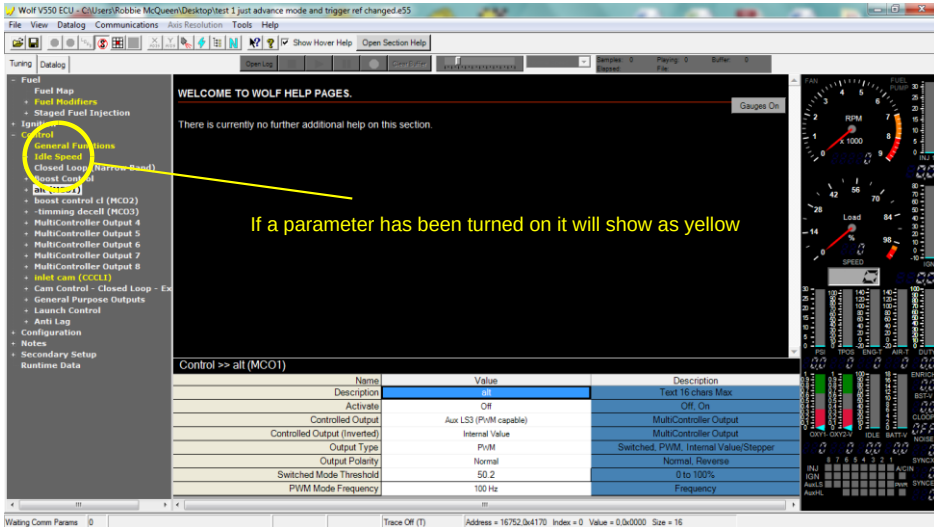

Fuel >> Fuel Map
Hide Graph
Gauges On
Move Graph
Trace Off
3D Pointer
Hide the Graph will increase tuning screen
Fuel >> Fuel Map
RPM/Load % | Boost (psi)
Help Text
Fuel Map
Adjust the base delivered Fuel Map.
The Fuel delivery values here are used as the master values for all fuel delivery in normal engine running conditions.
Note:
Exceptions like Starting Fuel Rate, Overrun Fuel Cut and others may temporarily override values here.

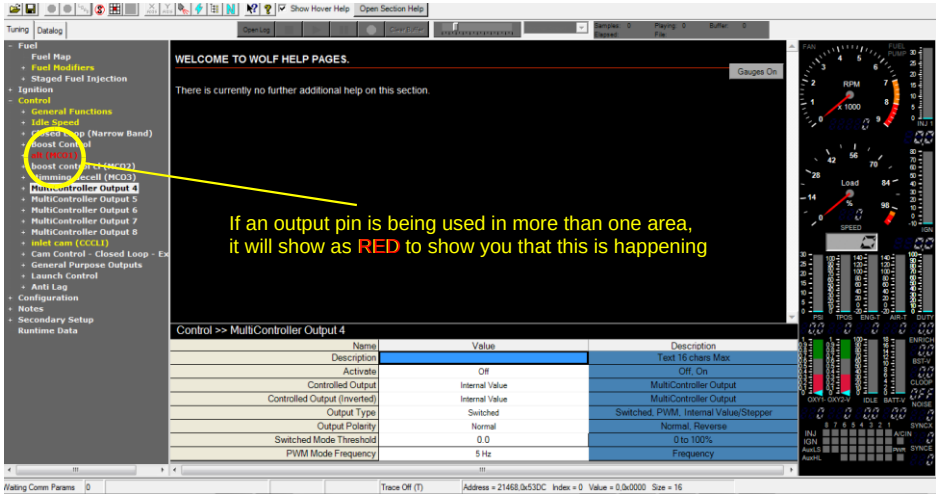

Fuel >> Fuel Map
push the show graph button to minimise screen again
Show Graph
RPM/Load % | Boost (psi)
Help Text
Fuel Map
Adjust the base delivered Fuel Map.
The Fuel delivery values here are used as the master values for all fuel delivery in normal engine running conditions.
Note:
Exceptions like Starting Fuel Rate, Overrun Fuel Cut and others may temporarily override values here.


Fuel >> Fuel Map
Hide Graph
Gauges On
Move Graph
Trace Off
3D Pointer
Pressing "Gauges On" will show six Gauges that can be programmed to show any information you want
Fuel >> Fuel Map
Help Text
Fuel Map
Adjust the base delivered Fuel Map.
The Fuel delivery values here are used as the master values for all fuel delivery in normal engine running conditions.
Note:
Exceptions like Starting Fuel Rate, Overrun Fuel Cut and others may temporarily override values here.


RPM Decimal
Lambda 1 AFR
SIDI8 Peak Reached Time 1
Gauges Off
Aux LS6 Input Value
Lambda 1 Voltage
MCO 2 Output Value
Program via drop down screen
Fuel >> Fuel Map
Help Text
Fuel Map
Adjust the base delivered Fuel Map.
The Fuel delivery values here are used as the master values for all fuel delivery in normal engine running conditions.
Note:
Exceptions like Starting Fuel Rate, Overrun Fuel Cut and others may temporarily override values here.


WELCOME TO WOLF HELP PAGES.
There is currently no further additional help on this section.
If naming a parameter it will be displayed in the folder and gauges
Control >> alt (MCO1)
Name
Value
Description
Description
alt
Text 16 chars Max
Activate
Off
Off, On
Controlled Output
Aux LS3 (PWM capable)
MultiController Output
Controlled Output (Inverted)
Internal Value
MultiController Output
Output Type
PWM
Switched, PWM, Internal Value/Stepper
Output Polarity
Normal
Normal, Reverse
Switched Mode Threshold
50.2
0 to 100%
PWM Mode Frequency
100 Hz
Frequency


WELCOME TO WOLF HELP PAGES.
There is currently no further additional help on this section.
If a parameter has been turned on it will show as yellow
Control >> alt (MCO1)
Name
Value
Description
Description
alt
Text 16 chars Max
Activate
Off
Off, On
Controlled Output
Aux LS3 (PWM capable)
MultiController Output
Controlled Output (Inverted)
Internal Value
MultiController Output
Output Type
PWM
Switched, PWM, Internal Value/Stepper
Output Polarity
Normal
Normal, Reverse
Switched Mode Threshold
50.2
0 to 100%
PWM Mode Frequency
100 Hz
Frequency



Hitting"T" again will turn the trace off, it will lock the live cell to the tunning cell, to turn this off in the top set of icons there is this icon, just push to turn this function off





By holding "shift" down
and using < > will turn fine changes int
corse changes.

These Buttons will move any function up or down
in the Wolf program, in the fuel map it will move the

Fuel >> Fuel Map

The Fuel map displays milliseconds (Ms) of fuel which is the desired amount of time you want the injector to stay open so fuel passes through it.

This map is set up by two parameters “X” axis & “Y” axis.

The “X” axis or horizontal line of your map is the RPM scale of your map.

When you first open up your map it will be in a 1:1 scale on the “X” axis. This will be indicated in both the RPM scale being 125 rpm increments and on the bottom tool bar it will indicate that the “X” axis is at 1:1.

To increase the RPM parameters, simply push the “X” button on the keyboard, this will move the scale from 1:1 (125 rpm increments), 1:2 (250 rpm increments), 1:4 (500 rpm increments), 1:8 (1000 rpm increments) & back to 1:1 again.

When in a higher scale such as 1:8 and if a change is made at one cell e.g. 2000 rpm, the ECU interpolates and changes the millisecond numbers to the next row showing left, right, up and down.

The “Y” axis is the vertical line of your map and shows the load scale of your map.

When you first open up your map it will be in a 1:1 scale on the “Y” axis, this will be indicated in both the load scale being 16 load increments and on the bottom tool bar it will indicate that the “Y” axis is at 1:1.

To increase the size of the load increments, simply push the “Y” button on the keyboard, this will move the scale from 1:1 (16 load cells), 1:2 (9 load cells), and 1:4 (5 load cells) & back to 1:1 again.

When in a higher scale such as 1:4, if a change is made at one cell e.g.57% load, the ECU interpolates and changes the fuel injection time to the next row showing left, right, up and down.

This allows for a quick fuel map to be made in very short time, extracting back out to finer tuning points allows for more control over the fuel mixture.

To adjust the fuel Map, highlight the cell that requires adjustment by left clicking it with the mouse. When a cell is highlighted, it turns blue. Using the arrow keys will cause the highlighting to move to the corresponding cell. Pressing the “<“ and “>“ (“less than” and “greater than”) buttons will change the value of a highlighted cell by .006 every time the button is pressed. For a faster change hold the SHIFT key down and the use the “<“ and “>“keys. This will then change the value by a much greater amount .06 millisecond every time.
By moving the mouse to the row indicator (this can be either load or RPM), Left click the mouse that line will highlight blue, now using the “<“ & “>“ keys you can move the whole line up or down in value. By double clicking on the row indicator, a function box will appear in the middle of the map. It will ask for a new value, by entering a value into this box it will change the entire row to that value.
Adjustments can also be made by typing the required figure into the selected cell(s).

Fuel >> Fuel Modifiers >> Trims

This page has 9 dials. These dials are directly linked to the text values at the bottom half of this screen and you can either type into the text or use the dials. These parameters will make instant changes to the fuel map. They can be left with a percentage number in them or directly applied to **the map.**

When applied to the map it will change the displayed numbers on the map and after doing so, will reset the dials back to 0. If left with a percentage number in these parameters and not applied, the trim will still be active but will not be displayed on the map; this will still make a difference to the amount of fuel delivered. This can be seen on the right hand side of the dash board in the "INJ1" gauge, as this will read differently to what is on the fuel map.

This section is generally used to see if more or less fuel is required in a short time frame, by testing if adding or removing fuel in a certain RPM and load band will cause the engine to perform differently.

0000 Load: 0%: This will make a major change at these intersecting points and interpolate to the surrounding load and RPM points.

4000 Load: 0%: This will make a major change at these intersecting points and interpolate to the surrounding load and RPM points.

8000 Load: 0%: This will make a major change at these intersecting points and interpolate to the surrounding load and RPM points.

0000 Load: 50%: This will make a major change at these intersecting points and interpolate to the surrounding load and RPM points.

4000 Load: 50%: This will make a major change at these intersecting points and interpolate to the surrounding load and RPM points.

8000 Load: 50%: This will make a major change at these intersecting points and interpolate to the surrounding load and RPM points.

0000 Load: 100%: This will make a major change at these intersecting points and interpolate to the surrounding load and RPM points.

4000 Load: 100%: This will make a major change at these intersecting points and interpolate to the surrounding load and RPM points.

8000 Load: 100%: This will make a major change at these intersecting points and interpolate to the surrounding load and RPM points.

Overall Trim: This dial allows for a percentage of fuel to be added or subtracted quickly over the entire RPM/ load range. This can be used in the event that different injectors or fuel pressure have been used and a quick fuel trim is required to allow the motor to start and run.

You can apply this to the map or you can leave the percentage number in the trim.

If you apply the trim it will change the whole fuel map by the percentage required and display the new numbers.

If you leave the percentage in the trim and do not apply it, it will not change the actual values on the fuel map but will deliver the new amount, this will also be displayed on the right hand side in the dashboard as "INJ1" will read differently to what is being displayed on the fuel map.

Fuel >> Fuel Modifiers >> Trims >> Injector Calibration Trims Activate

This allows for 8 individual injector trims to be used.

Will need to be turned on and ignition cycled to be active.

We advise that these not be used unless correct testing equipment is being used. This parameter allows for a -10% to +10% differences per injector output. This is used if there is a known fault with your project e.g. low manifold flow on one cylinder due to design.

This will not change the figures fuel map but will change the actual delivered value to the desired injector output.

Fuel >> Fuel Modifiers >> Trims >> Injector 1 Calibration Trim

Allows for a -10% to +10% differences to Injector Output 1. This is used if there is a known fault with your project.

Fuel >> Fuel Modifiers >> Trims >> Injector Trim Table Activate

Activates the Injector Trim Table, activate on/off will need ignition cycled.

Fuel >> Fuel Modifiers >> Trims >> Injector 1 Trim Table Active

"On" will operate to the parameters set in the trims table, "off" will perform as normal fuel map.

Fuel >> Fuel Modifiers >> Trims >> Trim Table

The purpose of the trim table is to allow a 3D graph for tuning of mismatched airflow/cylinder mismatching.

This is only recommended to be used with the correct tuning equipment.

This graph allows for the desired injectors to be turned on and graphed for -50% to +50% fuel at different load/RPM points.

This graph adds or subtracts the amount of fuel required in a 3D graph from the original fuel map.

If a manifold is not flowing correctly at low RPM and improves as the RPM and airspeed increase, you can then trim the injectors that need trimming to keep a perfect tune.

Fuel >> Fuel Modifiers >> Self Tuning

Important requirements:

- You must have firmware **5.50.33** or greater.
- Must have software **5.50.V** or greater.
- Must have a wideband with **0-5V** output.

Step 1: Connecting Up Wideband

Take the 0-5V from your wideband and fit it to A31 of the Wolf ECU connector. This is the signal wire from your controller. If your controller has a signal ground this is to be fitted to A32.

Configuration – Sensor Setup – Lambda 1

Configuration >> Sensor Setup >> Lambda 1 >> External Input Pin Source

Lambda

Configuration >> Sensor Setup >> Lambda 1 >> Filter Level (Jump to Target)

95%

Configuration >> Sensor Setup >> Lambda 1 >> Fuel Type

Petrol/Gasoline (14.7:1)

Configuration >> Sensor Setup >> Lambda 1 >> PC Software Dash

Lambda Gauge

Now go to:

Configuration >> Sensor Setup >> Lambda 1 >> Calibration >> From Voltage

As per the manufacturer's specs, most manufacturers will have this information in the instructions for the unit. It may be in the form of a graph or calibration table.

Configuration >> Sensor Setup >> Lambda 1 >> Calibration >> From AFR or Lambda

As per the manufacturer's specs, most manufacturers will have this information in the instructions for the unit. It may be in the form of a graph or calibration table.

Configuration >> Sensor Setup >> Lambda 1 >> Calibration >> To Voltage

As per the manufacturer's specs, most manufacturers will have this information in the instructions for the unit. It may be in the form of a graph or calibration table.

Configuration >> Sensor Setup >> Lambda 1 >> Calibration >> To AFR or Lambda

As per the manufacturers specs, most manufacturers will have this information in the instructions for the unit. It may be in the form of a graph or calibration table.

Step 2: Set Up Self Tune.

Go to "fuel modifiers – Self tuning".

Fuel >> Fuel Modifiers >> Self Tuning >> Self Tuning Activate On/Off

This will turn itself tuning "off" if engine goes below starting RPM or engine is turned off.

Self-tune will only work while in the fuel screen and is designed to turn off when laptop is removed.

Fuel >> Fuel Modifiers >> Self Tuning >> Active Above RPM:

Sets the RPM that you want the self-tuning to work above.

Fuel >> Fuel Modifiers >> Self Tuning >> Active Below Load

Sets the load that you want the self-tuning to stop working above this load.

Fuel >> Fuel Modifiers >> Self Tuning >> Active Above Engine Temp

Sets the temperature that you want the self-tuning to work (keep in mind that cold start and cold running parameters).

Fuel >> Fuel Modifiers >> Self Tuning >> Active After Time Running

Sets the time after the engine has been running before the self-tuning starts working. This takes into account the post start, hot fuel in fuel rails and heat soaked manifolds.

Fuel >> Fuel Modifiers >> Self Tuning >> Tuning Rate

This is the rate at which the self-tuning tunes.

There are a number of different parameters to keep in mind.

When your fuel map is in 1000 RPM parameters, the self-tune will be slow tuning up to 2000 RPM. After that it will increase in rate as you increase in RPM and load.

As you decrease in RPM parameters to a finer RPM e.g. 125 increments, the self-tune will now slow down its rate and give a finer tune (this will seem like it is going really slow).

The idea is to be in the coarse (1000 RPM increments) fuel map and get the map as close as you can, then bring it down in RPM rate to get a finer tune.

Note: It is not recommended to do wide open throttle settings in Self tune mode.

Suggested rate: 40. Lower is higher rate. Lower will increase the rate.

Step 3: Setting up the Fuel >> Fuel Modifiers >> Self Tuning >> Lambda Table - Self Tuning

This graph is made of RPM on the "x" axis, and load on the "y" axis. Any point on the graph that is set to "0" will mean that the self-tune will not tune at that point. If you choose to tune one parameter like "cruise", this means putting the lambda numbers you wish to aim for in those cells and as the self-tune goes into that area it will tune just that cell.

Keep in mind it is set by lambda so the numbers you type in here are required lambda figures. These numbers will stay in there even if the self-tune is turned off.

Step 4: Go to fuel map and in the tacho on the right hand side it will say self-tuning.

You are now ready to drive away.

Fuel >> Fuel Modifiers >> Starting

You will see a selection of dials. These dials are related to the text on the second half of the screen.

Fuel >> Fuel Modifiers >> Starting >> Starting Fuel Rate Trim EngTemp: 0

Quick adjustment to the **Fuel >> Fuel Modifiers >> Starting >> Starting Fuel Rate Engine Temp**.

For quick testing if more or less fuel is required at this temperature. If a number is left in there, it will be active all the time.

This will be active straight away and no cycling of the ignition is required.

This parameter is very useful if hot starts are good and you just need to see if a cold start can do with more or less fuel.

Fuel >> Fuel Modifiers >> Starting >> Starting Fuel Rate Trim EngTemp: 50

Quick adjustment to the **Fuel >> Fuel Modifiers >> Starting >> Starting Fuel Rate Engine Temp**.

For quick testing if more or less fuel is required at this temperature. If a number is left in there, it will be active all the time.

This will be active straight away and no cycling of the ignition is required.

This parameter is very useful if hot starts are good and you just need to see if a cold start can do with more or less fuel.

Fuel >> Fuel Modifiers >> Starting >> Starting Fuel Rate Trim EngTemp: 100

Quick adjustment to the **Fuel >> Fuel Modifiers >> Starting >> Starting Fuel Rate Engine Temp**.

For quick testing if more or less fuel is required at this temperature. If a number is left in there, it will be active all the time.

This will be active straight away and no cycling of the ignition is required.

This parameter is very useful if hot starts are good and you just need to see if a cold start can do with more or less fuel.

Fuel >> Fuel Modifiers >> Starting >> Initial Fuel Pulse Activate

Activate "on" allows the activation of the initial fuel pulse. This is a pulse of fuel that is added on to the starting fuel. It only happens once during cranking of the engine.

Some engines require a large amount of initial pulse and little amount of starting fuel, depending on injector size and manifold design.

Fuel >> Fuel Modifiers >> Starting >> Initial Fuel Pulse Add-On

This is the amount of fuel you wish to add on to the starting fuel rate and is written in **milliseconds**.

Fuel >> Fuel Modifiers >> Starting >> Post Start EngTempEnrichment Activate

Activates Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Rate Engine Temp Graph.

Fuel >> Fuel Modifiers >> Starting >> Post Start EngTempEnrichment Decay Mode

There are four different decay modes, each mode effecting how the **Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Rate Engine Temp** graph works. Does the engine require a "time based" decay rate or "RPM based" decay rate (read more **Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Rate Engine Temp**)?

Fuel >> Fuel Modifiers >> Starting >> Post StartEngTemp Enrichment Decay Rate

The rate at which you want to decay the post start fuel you are injecting. If a low number of 2 is used, this is going to take longer to decay all of the fuel (in effect staying richer for longer). If a larger number such as 70 is used then this will decay the fuel much quicker.

A quick addition to show how this works, 10 ms of fuel being injected into the engine on post start with a decay of 2% will take 2% of every time the decay mode is activated. The effect is that it will take a long time to use all of the post start up. Same amount of fuel, 10ms with a 70% decay means every time it is activated it will remove 70% of the post start so this will finish the post start very quickly.

Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Trim EngTemp: 0

Quick adjustment to **Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Rate Engine Temp**.

For quick testing to find if more or less fuel is required at this temperature. If a number is left in there it will be active all the time.

This will be active straight away and no cycling of the ignition is required. This parameter is very useful if hot starts are good and you just need to see if a cold start can do with more or less fuel.

Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Trim EngTemp: 50

Quick adjustment to **Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Rate Engine Temp**.

For quick testing if more or less fuel is required at this temperature, if a number is left in there it will be active all the time.

This will be active straight away and no cycling of the ignition is required. This parameter is very useful if hot starts are good and you just need to see if a cold start can do with more or less fuel.

Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Trim EngTemp: 100

Quick adjustment **to Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Rate Engine Temp**

For quick testing if more or less fuel is required at this temperature, if a number is left in there it will be active all the time.

This will be active straight away and no cycling of the ignition is required. This parameter is very useful if hot starts are good and you just need to see if a cold start can do with more or less fuel.

Fuel >> Fuel Modifiers >> Starting >> Post StartAirTemp Enrichment Activate

Activates **Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Rate Air Temp** Graph.

Fuel >> Fuel Modifiers >> Starting >> Post StartAirTemp Enrichment Decay Mode

There are four different decay modes, each mode effecting how the **Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Rate Air Temp** graph works. Does the engine require a time base decay rate or RPM based decay rate (read more **Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Rate Air Temp**)?

Fuel >> Fuel Modifiers >> Starting >> Post Start AirTempEnrichment Decay Rate

The rate at which you want to decay the post start fuel you are injecting. If a low number of 2 is used this is going to take longer to decay all of the fuel (in effect staying richer for longer) if a larger number of 70 is used then this will decay the fuel much quicker.

A quick addition to show how this works - 10 ms of fuel being injected into the engine on post start. Decay of 2% will take 2% of every time the decay mode is activated, therefore it will take a long time to use all of the post start up. Same amount of fuel, 10ms with a 70% decay means every time it is activated it will remove 70% of the post start so this will finish the post start very quick.

Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Trim AirTemp: 0

Quick adjustment to **Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Rate Air Temp**.

For quick testing if more or less fuel is required at this temperature. If a number is left in there, it will be active all the time. This will be active straight away and no cycling of the ignition is required.

Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Trim AirTemp: 50

Quick adjustment to **Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Rate Air Temp.**

For quick testing if more or less fuel is required at this temperature. If a number is left in there, it will be active all the time. This will be active straight away and no cycling of the ignition is required.

Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Trim AirTemp: 100

Quick adjustment to **Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Rate Air Temp.**

For quick testing if more or less fuel is required at this temperature. If a number is left in there, it will be active all the time. This will be active straight away and no cycling of the ignition is required.

Fuel >> Fuel Modifiers >> Starting >> Flood Clear Activate

Activates “flood clear”, this is a parameter that is set to allow no fuel to be injected into the motor at these parameters on cranking. If you set the flood clear to work above 86% TPos, then by going above 86% on the throttle while cranking the engine will stop all fuel being injected into the engine.

Fuel >> Fuel Modifiers >> Starting >> Flood Clear Active above TPos

Sets the throttle point you want the “flood clear” to work above on cranking.

Fuel >> Fuel Modifiers >> Starting >> Flood Clear Inactive Below TPos

Sets the throttle point you want the “flood clear” to not work under. This is generally set slightly below your **Fuel >> Fuel Modifiers >> Starting >> Flood Clear Active** above TPos setting. This will then allow some control if you are trying to start the motor for the first time. You can open the throttle a little and still have fuel injecting, open it up above these settings and have nil fuel injecting in.

Fuel >> Fuel Modifiers >> Starting >> Starting Fuel Rate Engine Temp

This graph adds fuel to the fuel map over engine temperature.

It only works on starting e.g. under starting RPM that is set in **Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Starting below RPM.**

This is the amount of fuel your engine requires to start but not enough to run. Keep in mind if you have big injectors that you may need to inject a small amount of fuel, if you have small injectors then this amount might be quite large. This graph is milliseconds of fuel you are adding on to the fuel map and is displayed on the right hand side in the dashboard "INJ1" which will display a larger number on cranking.

Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Rate Engine Temp

Post start enrichment is a form of enriching your engine over engine temperature immediately after the engine has been started. Most engines require some form of enrichment at this point but do not need much. This is why there are so many adjustable variables for this parameter, this is only on starting and generally 3-4 seconds after starting.

This parameter has four different decay modes that can be set to work on them:

- Injector 1 Linear: will remove the amount of fuel by the decay amount in a linear form every time injector 1 fires.
- Injector 1%: will remove the amount of fuel by the decay amount in a percentage form every time injector 1 fires.
- 0.5 sec linear: will remove the amount of fuel by the decay amount in a linear form every 0.5sec this will hold the post start fuelling in for a long time.
- 0.5 sec%: will remove the amount of fuel by the decay amount in a percentage form every 0.5sec, this is the longest setting in time that you can do for the post start.

Fuel >> Fuel Modifiers >> Starting >> Post Start Enrichment Rate Air Temp

Post start enrichment is a form of enriching your engine over air temp immediately after the engine has been started. Most engines require some form of enrichment at this point but do not need too much which is why there are so many adjustable variables for this parameter. This is only generally on for 3-4 seconds after starting. Heat soak in high performance manifolds can cause a problem for starting. Giving more fuel when the engine and air is hot can make your project start like factory.

This parameter has four different decay modes that can be set to work on them:

- Injector 1 Linear: will remove the amount of fuel by the decay amount in a linear form every time injector 1 fires.
- Injector 1%: will remove the amount of fuel by the decay amount in a percentage form every time injector 1 fires.
- 0.5 sec linear: will remove the amount of fuel by the decay amount in a linear form every 0.5sec. This will hold the post start fuelling in for a long time.
- 0.5sec%: will remove the amount of fuel by the decay amount in a percentage form every 0.5sec. This is the longest setting in time that you can do for the post start.

Fuel >> Fuel Modifiers >> Transient

In this screen you will see three dials and two buttons. These are related to the text below. Transient is the amount of fuel you want to give the engine on acceleration. Every engine is different and the result of having incorrect transient can be a horrible tune. If you are injecting too much fuel, it will flat spot, blow black smoke and not accelerate. Too little transient will also cause a flat spot, to be lean, backfire out the intake and very sluggish acceleration.

Suggestions are turn this "off" until the tune is complete. If you tune with this on, you could be tuning around it and creating bigger problems. Get the tune correct then turn transients on. This parameter is to help with the sudden opening of the throttle, which is the only time that transient works. On some vehicles you may require a lot of fuel all at once for a short time, other vehicles may require almost no fuel on acceleration.

Fuel >> Fuel Modifiers >> Transient >> Acc Enrich Activate

Turns Acceleration enrichment on.

Fuel >> Fuel Modifiers >> Transient >> Decel Enlean Activate

Turns Decel enleanment on.

Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Rate Trim Load: 0%

Quick adjustment to the **Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Rate Load** graph. This just helps to find if you need more or less in your transient graph at this load point.

Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Rate Trim Load: 50%

Quick adjustment to the **Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Rate Load** graph. This just helps to find if you need more or less in your transient graph at this load point.

Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Rate Trim Load: 100%

Quick adjustment to the **Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Rate Load** graph. This just helps to find if you need more or less in your transient graph at this load point.

Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Rate Load

This graph is load/percentage increase of the fuel map. At this point you can give the engine up to 800% more fuel than what is in the map. This allows for big throttle or supercharged engines that get a large volume of air on acceleration to have the correct amount of fuel while accelerating. This graph is only working off the load scale as its reference.

Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Rate RPM

This graph is over RPM. It looks at the amount of fuel from the Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Rate Load graph and multiplies that so it is a simple calculation at this point.

800% in our **Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Rate Load**,

50% in our **Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Rate RPM**,

At this point we only have 400% of fuel going in. If we were to change the **Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Rate RPM**, to 200% we would have 1600% going in.

Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Rate Engine Temp

Same as the last graph, this looks at both load and RPM graphs and modifies it over engine temperature. Most vehicles require more fuel when cold so get the transients right at operating temperature and then you only need to adjust the **Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Rate Engine Temp**.

Fuel >> Fuel Modifiers >> Transient >> Acc Enrichment Decay RPM

The decay rate is how fast the ECU decays the amount of fuel you are putting into the engine. When a lower number is applied e.g. 2% it decays by 2% every time injector 1 fires so the amount of fuel injected will be present over a long time. If the amount of 80% was used then it is taking 80% away from the transient amount every time injector 1 fires, resulting in this fuel not being there for long.

Fuel >> Fuel Modifiers >> Transient >> Decel Enleanment Rate Load

On this screen there is a graph in the top half, and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

This function adjusts the decel enleanment based on the load at which enleanment is started.

This table can be considered the “Decel Enleanment base map”, as it is the primary source from which the RPM and engine temp tables modify. Engine load is represented on the “x” axis. The “y” axis represents the percentage of fuel to be removed from the fuel map under decel enleanment conditions.

Fuel >> Fuel Modifiers >> Transient >> Decel Enleanment Rate RPM

On this screen there is a graph in the top half, and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

This function adjusts the decel enleanment based on the RPM at which the enleanment is started. This table modifies the “Decel enleanment rate load” table.

RPM is represented on the “x” axis. The “y” axis is a percentage of the percentage in the “Decel enleanment rate load” table.

For example: at a given RPM and load, the decel enleanment load table dictates a percentage (“y” axis) of 80% enleanment and the decel enleanment rate RPM table dictates a percentage (“y” axis) of 50% then the resulting enleanment would be 40% of fuel removed from the fuel Fuel >> Fuel Modifiers >> Transient >> Decel Enleanment Decay RPM

On this screen there is a graph in the top half, and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

This adjusts the decel enleanment decay based on the RPM at which the decay is started. Decay dictates the speed in which enleanment is turned off.

A higher percentage means that the enleanment will be turned off quickly where a lower percentage will cause the enleanment to turn off more gradually.

How Transients work, Enrichement example:

Stage 1:

From the fuel map, an injector delivers 1ms



(No fuel modifiers are applied yet)

Stage 2:

The Acceleration Enrichment Rate Load is set to 400%, so it wants to deliver 4 x the fuel map value. Note that 400% is only an example, this can be 0-800%, over 16 different load points for different engine requirements.



(Now Acc Enrichment Rate Load has been calculated)

Stage 3:

The Acceleration Enrichment Rate RPM is set to 200%, so it wants to deliver 2x the value from stage 2. Again, 200% is only an example, different engines will have different requirements.



(Now Acceleration Enrichment Rate Load and Accleration Enrichment Rate RPM have been calculated)

Stage 4:

The Acceleration Enrichement Rate Engine Temp is set to 50% so it wants to deliver 0.5 times the fuel from stage 3. 50% is an example, this can range from 0-100% for different engine types



(Now all Acceleration Enrichment Rates have been calculated, so then it will be applied)

Stage 5:

After all the Acceleration Enrichments have been applied,the injectors deliver 4ms of fuel.



(Decay has not yet started)

Stage 6:

With a Decay Rate of 12.5, 12.5% of the injector time is removed after injector 1 fires.



(Decay has started with one event)

Two examples of decay rate: Note that the fuel will not drop below the delivered amount from the base fuel map.

After injector 1 has fired:	0 times	once	twice	3 times	4 times	5 times	6 times	7 times	8 times
With a decay rate of 12.5									
Resulting milliseconds:	4ms	3.5ms	3ms	2.5ms	2ms	1.5ms	1ms	0.5ms	0ms
With a decay rate of 25									
Resulting milliseconds:	4ms	3ms	2ms	1ms	0ms	0ms	0ms	0ms	0ms

Fuel >> Fuel Modifiers >> Overrun Fuel Cut

The purpose of "overrun fuel cut" is to save fuel. This is done by cutting the fuel to your engine under certain parameters. You set these parameters so that it will only activate under deceleration driving conditions, under a low TPos, over idle RPM and below a certain load parameter.

Some vehicles cannot have this activated. Driveline and aggressive motors play a big part in setting this up. If you have a car that cruises on 1100rpm but idles on 1000rpm it is going to be very hard to set this up to work nicely. The other point is that in very heavy traffic where repeated stopping and going is required it may create hunting and/or stalling.

Set up properly it will save you fuel, but if the car is set up in a way that it cannot be used do not turn it on.

Fuel >> Fuel Modifiers >> Overrun Fuel Cut >> Activate

Turns the "Overrun Fuel Cut" on and does not make it active until parameters are met.

Fuel >> Fuel Modifiers >> Overrun Fuel Cut >> Active Below TPos

Throttle position that you want the "Overrun Fuel Cut" to work under.

Fuel >> Fuel Modifiers >> Overrun Fuel Cut >> Inactive Above TPos

Throttle position that you want the "Overrun Fuel Cut" not to work above.

Fuel >> Fuel Modifiers >> Overrun Fuel Cut >> Active Above Engine Temp

The engine temp that you want the "Overrun Fuel Cut" to work above. It is advised to not have it on when there is any form of engine temperature compensation.

Fuel >> Fuel Modifiers >> Overrun Fuel Cut >> Inactive Below Engine Temp

The engine temperature you want the "Overrun Fuel Cut" not to work under.

Fuel >> Fuel Modifiers >> Overrun Fuel Cut >> Active Above RPM

The RPM point that you want the "Overrun Fuel Cut" to turn on if all other parameters are met. It will turn on when above the set RPM.

Fuel >> Fuel Modifiers >> Overrun Fuel Cut >> Inactive Below RPM

The RPM point that you want the "Overrun Fuel Cut" to turn off when all other parameters are met. It will turn off when the RPM is below the set point.

Fuel >> Fuel Modifiers >> Overrun Fuel Cut >> Recover Fuel Pulse Activate

In some cases the engine requires a small amount of fuel when the "Overrun Fuel Cut" turns off. Recover fuel can add a small amount of fuel to create a smooth transition from "on" to "off".

Fuel >> Fuel Modifiers >> Overrun Fuel Cut >> Recover Fuel Pulse Count

The amount of pulses you want the recover fuel to stay for.

Fuel >> Fuel Modifiers >> Overrun Fuel Cut >> Recover Fuel Pulse Add on

How much extra fuel you wish to add on when the recovery fuel is active?

Fuel >> Fuel Modifiers >> Engine Temperature

To run smoothly under cold start condition, most, if not every engine will need this parameter to be set up correctly. Generally an engine requires extra fuel when it is cold and the amount of extra fuel is decreased as the engine approaches its regular operating temperature.

It is advised that this is not activated until the base fuel map is correctly tuned at normal operating temperature. This prevents trying to tune around an incorrect compensation.

Fuel >> Fuel Modifiers >> Engine Temperature >> Activate

This turns the engine temperature compensation table "on" or "off". It is advised that this is not activated until the fuel map is correctly tuned at normal operating temperature. This prevents trying to tune around an incorrect compensation.

Fuel >> Fuel Modifiers >> Engine Temperature >> Trims

This page has 3 dials. These dials are directly linked to the text values at the bottom half of this screen and you can either type into the text or use the dials. These parameters will make instant changes to the engine temperature compensation table.

They cannot be applied directly to the engine temperature compensation table. The "Restore" button turns the values of the trim dials to "0" all round.

Fuel >> Fuel Modifiers >> Engine Temperature >> Trims >> Engine Temperature Comp Trim EngTemp: 0

Trim the amount of Engine Temperature Compensation centred at 0^0 Engine Temperature.

Below 0^0 the ECU will apply the value that is set here.

Above 0^0 the ECU will interpolate between this and the 50^0 temperature point.

Fuel >> Fuel Modifiers >> Engine Temperature >> Trims >> Engine Temperature Comp Trim EngTemp: 50

Trim the amount of Engine Temperature Compensation centred at 50^0 Engine Temperature. At 50^0 the ECU will apply the value that is set here.

Above 50^0 the ECU will interpolate between this and the 100^0 degree temperature point.

Below 50^0 the ECU will interpolate between this and 0^0 temperature point.

Fuel >> Fuel Modifiers >> Engine Temperature >> Trims >> Engine Temperature Comp Trim EngTemp: 100

Trim the amount of Engine Temperature Compensation centred at 100^0 Engine Temperature.

At 100^0 the ECU will apply the value that is set here.

Below 100^0 the ECU will interpolate between this and the 50 degree temperature point.

Fuel >> Fuel Modifiers >> Engine Temperature >> Engine Temperature Compensation

Note: It is recommended that this not be used until the fuel map has been tuned at normal operating temperature.

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

This function is used to adjust fuel output under varying engine temperatures.

Engine temperature is represented in degrees Celsius on the "x" axis. The "y" axis dictates the percentage change in fuel output. A negative percentage will lower the resulting fuel output at the corresponding engine temperature. A positive percentage increases the fuel output at the corresponding engine temperature.

When in this table, pressing the "x" button will adjust the degree of adjustability. The options are visible in the bottom middle of the screen.

"X" axis: 1:1 - Adjustments can be made for every 2^0 Celsius.

"X" axis: 1:2 - Adjustments can be made for every 4^0 Celsius. Values will interpolate between adjustable points.

"X" axis: 1:4 - Adjustments can be made for every 8^0 Celsius. Values will interpolate between adjustable points.

"X" axis: 1:8 - Adjustments can be made for every 16^0 Celsius. Values will interpolate between adjustable points.

Fuel >> Fuel Modifiers >> Air Temperature

To maintain accurate air fuel ratios, most, if not all, engines will need this parameter to be set up correctly. **When air increases in temperature, it's density decreases**. This means that a change in intake air temp will require a change in fuel output.

It is advised that this is not activated until the base fuel map is correctly tuned at normal operating temperatures.

Fuel >> Fuel Modifiers >> Air Temperature >> Activate

This turns the air temperature compensation table "on" or "off".

Fuel >> Fuel Modifiers >> Air Temperature >> Air Temperature Compensation

Note: It is recommended that this not be used until the fuel map has been tuned at normal operating temperature.

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

This function is used to adjust fuel output under varying intake air temperatures. Air temperature is represented in degrees Celsius on the "x" axis. The "y" axis dictates the percentage change in fuel output.

A negative percentage will lower the resulting fuel output at the corresponding engine temperature. A positive percentage increases the fuel output at the corresponding engine temperature.

When in this table, pressing the "x" button will adjust the degree of adjustability. The options are visible in the bottom middle of the screen.

"X" axis: 1:1 - Adjustments can be made for every 2^0 Celsius.

"X" axis: 1:2 - Adjustments can be made for every 4^0 degrees Celsius. Values will interpolate between adjustable points.

"X" axis: 1:4 - Adjustments can be made for every 8^0 degrees Celsius. Values will interpolate between adjustable points.

"X" axis: 1:8 - Adjustments can be made for every 16^0 degrees Celsius. Values will interpolate between adjustable points.

Fuel >> Fuel Modifiers >> MAP Sensor

This is usually used in setups where a throttle position sensor is used to dictate load, where boost pressure is generated. TPS load indexed setups can also be useful for engines with individual throttle bodies or other engine setups that have low vacuum.

Fuel >> Fuel Modifiers >> MAP Sensor >> Activate

This turns MAP sensor compensation "on" or "off". Proper configuration of the MAP compensation table is required for this to function correctly.

Fuel >> Fuel Modifiers >> MAP Sensor >> MAP Sensor Used

This dictates whether the internal MAP sensor, which is suitable up to 30psi, is used, or an external MAP sensor is used.

Fuel >> Fuel Modifiers >> MAP Sensor >> MAP Compensation

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

This function is used to dictate the desired fuel compensation at the desired MAP sensor load.

The load is represented on the "x" axis. The "y" axis represents the percentage of fuel output adjustment, ranging from -100% (no fuel delivered) to 800% (8 times the amount of fuel delivered).

When in this table, pressing the "x" button will adjust the degree of adjustability. The options are visible in the bottom middle of the screen.

"X" axis: 1:1 - Adjustments can be made for every 0.84% load.

"X" axis: 1:2 - Adjustments can be made for every 1.69% load. Values will interpolate between adjustable points.

"X" axis: 1:4 - Adjustments can be made for every 3.37% load. Values will interpolate between adjustable points.

"X" axis: 1:8 - Adjustments can be made for every 6.74% load. Values will interpolate between adjustable points.

Fuel >> Fuel Modifiers >> Battery Voltage

Battery voltage compensation is a useful function that can alter the amount of fuel being delivered dependant on battery voltage. This can be used to increase fuel output when battery voltage drops to compensate for a slight lag in injector opening time.

It is recommended that this remains "off" until the fuel map has been tuned at normal operating temperatures.

Fuel >> Fuel Modifiers >> Battery Voltage >> Activate

Turns the battery voltage compensation table "on" or "off".

Fuel >> Fuel Modifiers >> Battery Voltage >> Battery Voltage Compensation

Note: It is recommended that this not be used until the fuel map has been tuned at normal operating temperature.

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

This function is used to adjust fuel output under varying battery voltages. Battery voltage is represented on the "x" axis. The "y" axis represents milliseconds.

A millisecond value of -1 would mean that 1 millisecond would be removed from the injector opening time. A positive millisecond value would add to the injector open time.

When in this table, pressing the "x" button will adjust the degree of adjustability. The options are visible in the bottom middle of the screen.

"X" axis: 1:1 - Adjustments can be made every 0.2 volts.

"X" axis: 1:2 - Adjustments can be made every 0.4 volts. Values will interpolate between adjustable points.

"X" axis: 1:4 - Adjustments can be made every 0.8 volts. Values will interpolate between adjustable points.

"X" axis: 1:8 - Adjustments can be made every 1.6 volts. Values will interpolate between adjustable points.

Fuel >> Fuel Modifiers >> Special Trim 1

Special trims can be used to make changes in fuel delivery using any input. This includes, but is not limited to: engine temp, RPM, any LS or HS driver and ignition degrees delivered.

Fuel >> Fuel Modifiers >> Special Trim 1 >> Activate

Turns the special trim 1 “on” or “off”.

Fuel >> Fuel Modifiers >> Special Trim 1 >> Input Used:

This dictates which input is used as the variable for the Special Trim.

Fuel >> Fuel Modifiers >> Special Trim 1 >> Special Trim 1 Table

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

This function is used to adjust fuel output in relation to an input of your choosing.

Regardless of the input chosen, the “y” axis will represent the percentage of change of fuel output. This ranges from -50% to 50%. Negative percentages will remove fuel output. Positive percentages will add fuel. The “x” axis values will vary depending on what input is selected.

When in this table, pressing the “x” button will change the degree of adjustability. The options are visible in the bottom middle of the screen.

“X” axis: 1:1 - The maximum adjustability

“X” axis: 1:2 - Adjustments are spaced twice as far apart and values will interpolate between adjustable points.

“X” axis: 1:4 - Adjustments are spaced 4 times as far apart and values will interpolate between adjustable points.

“X” axis: 1:8 - Adjustments are spaced 8 times as far apart and values will interpolate between adjustable points.

Fuel >> Staged Fuel Injection

Staged fuel injection simply means that beside from having a single set of injectors, there are additional injectors that are turned "on" under certain engine parameters. This can be useful for engines that require large amounts of fuel. Instead of running extremely large injectors (which can sometimes cause problems at idle) it uses one bank of somewhat smaller injectors for low fuel demand situations and then utilise the 2nd bank of injectors when high fuel demands are needed.

This screen has 9 buttons and a dial on the top half and 10 options in the bottom half. The buttons and dial are linked to the options below with their corresponding name. Adjusting the values of the button / dials will adjust the values in the options on the lower half.

Fuel >> Staged Fuel Injection >> activate

Turns staged fuel injection "on" or "off".

Fuel >> Staged Fuel Injection >> Overall Trim

This offers an overall trim of all the injectors that have been setup for staged injection. This ranges from -50% to 50%. -50% will remove 50% of the injector opening time. 50% will add 50% of the injector opening time.

Fuel >> Staged Fuel Injection >> Injector # Staged activate

This will cause the respective injector output to be used for staged injection. This will mean that if Injector 8 Staged Activate is set to "On", injector output 8 will be used by the Staged Fuel Injection Map. If Injector 7 Staged Activate is set to "Off", injector output 7 will be controlled by the base fuel map.

Fuel >> Staged Fuel Injection >> Staged Fuel Injection Map

This map is set up in the same way as the fuel map, however it only controls injectors that have been selected for staged fuel injection.

The values in the cells of this map represent zero to 100% on your delivered injector milliseconds.

This map is set up by two parameters "X" axis & "Y" axis.

The "X" axis is the horizontal line of your map, in this case it is the RPM scale of your map.

When you first open up your map it will be in a 1:1 scale on the "X" axis, this will be indicated in both the RPM scale being 125 RPM increments and on the bottom tool bar it will indicate that the "X" axis is at 1:1.

To increase the RPM parameters, simply push the “X” button on the keyboard, this will move the scale from 1:1 (125 rpm increments), 1:2 (250 rpm increments), 1:4 (500 rpm increments), 1:8 (1000 rpm increments) & back to 1:1 again.

When in a higher scale such as 1:8 and a change is made at one cell e.g. 2000 rpm, the ECU interpolates and changes the millisecond numbers to the next row showing left, right, up and down.

The “Y” axis is the vertical line of your map. In this case it is the load scale of your map.

When you first open up your map it will be in a 1:1 scale on the “Y” axis, this will be indicated in both the load scale being 16 load increments and on the bottom tool bar it will indicate that the “Y” axis is at 1:1.

To increase the size of the load increments, simply push the “Y” button on the keyboard, this will move the scale from 1:1 (16 load cells),1:2 (9 load cells), 1:4 (5 load cells) & back to 1:1 again.

When in a higher scale such as 1:4 and a change is made at one cell e.g.57% load, the ECU interpolates and changes the fuel injection time to the next row showing left, right, up and down.

This allows for a quick fuel map to be made in very short time, extracting back out to finer tuning points allows for more control over the fuel mixture.

To adjust the fuel Map, highlight the cell that requires adjustment by left clicking it with the mouse. When a cell is highlighted it turns blue. Using the arrow keys will cause the highlighting to move to the corresponding cell. Pressing the “<“and“>“ (“less than” and “greater than”) buttons will change the value of a highlighted cell by 0.4 every time the button is pressed. For a faster change hold

The SHIFT key down and the use the “<“and“>“ keys. This will then change the value by a much greater amount: 6.3 every time.

By moving the mouse to the row indicator (this can be either load or RPM) and left clicking the mouse, that line will highlight blue. Now using the “<“& “>“ keys you can move the whole line up or down in

Ignition >> Ignition Map

This is a map that displays ignition timing.

The ignition timing is measured in degrees before TDC (Top Dead Centre).

This map is set up by two parameters “X” axis & “Y” axis. The “X” axis is the horizontal line of your map, in this case it is the RPM scale of your map.

When you first open up your map it will be in a 1:1 scale on the “X” axis, this will be indicated in both the RPM scale being 125 rpm increments, and on the bottom tool bar it will indicate that the “X” axis is at 1:1.

To increase the RPM parameters, simply push the “X” button on the keyboard. This will move the scale from 1:1 (125 rpm increments), 1:2 (250 rpm increments), 1:4 (500 rpm increments), 1:8 (1000 rpm increments) & back to 1:1 again.

When in a higher scale such as 1:8 if a change is made at one cell e.g. 2000 rpm, the ECU interpolates and changes the ignition timing to the next row showing left, right, up and down.

The “Y” axis is the vertical line of your map; in this case it is the load scale of your map. When you first open up your map it will be in 1:1 scale on the “Y” axis, this will be indicated in both the load scale being 16 load increments, and on the bottom tool bar it will indicate that the “Y” axis is at 1:1.

To increase the size of the load increments, simply push the “Y” button on the keyboard, this will move the scale from 1:1 (16 load cells), 1:2 (9 load cells), 1:4 (5 load cells) & back to 1:1 again. When in a higher scale such as 1:4, if a change is made at one cell e.g.57% load, the ECU interpolates and changes the ignition timing to the next row showing left, right, up and down.

This allows for a quick ignition map to be made in very short time, extracting back out to finer tuning points allows for more control over the ignition. To adjust the ignition timing map, highlight the cell that requires adjustment by left clicking it with the mouse. When a cell is highlighted it turns blue. Using the arrow keys will cause the highlighting to move to the corresponding cell. Pressing the “< “or “ > “ buttons will change the value of a highlighted cell by 0.3 degrees every time the button is pressed. For a faster change hold the SHIFT key down and the use the “ < “ or “ > “, this will then change the value by a much greater amount; 5.6 degrees every time.

Adjustments can also be made by typing the required figure into the selected cell(s).

By moving the mouse to the row indicator (this can be either load or RPM), left click the mouse and the line will highlight blue. Now using the “<“& “>“keys you can move the whole line up or down in value.

By double clicking on the row indicator, a function box will appear in the middle of the map. It will ask for a new value, by entering a value in to this box it will change the entire row to that value.

Ignition >> ignition modifiers >> trims

This page has 9 dials, these dials are directly linked to the text values at the bottom half of this screen and you can either type into the text or use the dials. These parameters will make instant changes to the ignition map. They can be left with a "+" or "–" 10 degrees figure in them or applied to the map. When applied to the map it will change the displayed numbers on the map, returning the dials to 0. If left with a "+" or "–" 10 degrees figure in these parameters and not applied, the trim will still be active but will not be displayed on the map - this will still make a difference to the actual ignition timing. This can be seen on the right hand side of the dash board. The value under "IGN" will read differently to what is on the actual ignition map.

This section is generally used to see if more or less ignition advance is required in a short time frame. By testing if adding or removing ignition advance in a certain RPM and load band will cause the engine to perform differently.

The dials under **Ignition >> ignition modifiers >> trims** represent 9 different points across load and RPM. Adjusting the trim on one dial will create a major change at that particular load and RPM point and will interpolate to the surrounding points, for example:

Adjusting the dial at RPM: 4000 Load: 50% to a trim of +5.1 degrees will add 5.1 degrees of ignition advance to the ignition map at the point 4000 RPM and 50% load, and interpolate the surrounding cells.

Ignition >> ignition modifiers >> trims >> overall trim

This dial allows for the quick addition or subtraction of up to 30 degrees to the ignition timing over the entire RPM/ load range. This can be useful in the event that the engines compression ratio has been changed so a basic change in ignition timing can be achieved before tuning.

If you apply the trim it will change the whole ignition map by the figure required and display the new numbers.

If you leave the "+" or "–" figure in the trim and do not apply it, it will not display the change on the ignition map but will deliver the new amount. This will also be displayed on the right hand side in the dashboard, as "IGN" will read differently to what is being displayed on the ignition map.

Ignition >> ignition modifiers >> trims >> calibration trims

This allows for 8 individual igniter trims to be used.

This will need to be turned on and ignition to have cycled to be active.

We advise that this not be used unless there are definite known requirements or cylinder differences. This would generally be reserved for advanced tuning.

This parameter allows for a "+" or "–" 10 degree difference per ignition output.

It does not change the ignition map figures however it will change the actual delivered ignition timing to the desired ignition output.

Each ignition output is affected by the respective ignition calibration trim, for example:

If an engine was at idle and had an ignition map value of 10 degrees. A value of -5.1 in the "ignition 1 calibration trim" will retard the ignition output by 5.1 degrees on ignition output 1. The other ignition outputs would be unaffected and remain at 10 degrees before TDC, where ignition output 1 would have a resulting timing of 4.9 degrees before TDC

Ignition >> ignition modifiers >> trims >> trim table

The purpose of the trim table is to allow a 3D graph for tuning of mismatched airflow in different cylinders.

This is only recommended to be used with the correct tuning equipment.

This graph allows for the desired ignition outputs to be turned on and graphed for "+" or "–" 10 degrees at different load/RPM points.

This graph adds or subtracts the amount of ignition timing required in a 3D graph from the original ignition map.

If a manifold is not flowing correctly at low RPM and improves as the RPM and airspeed increase, you can then trim the ignition outputs that need trimming to keep a perfect tune.

Ignition >> ignition modifiers >> trims >> ignition trim table activate

Turns on the ignition trim table to allow selected injectors to be adjusted using the ignition trim table.

Ignition >> ignition modifiers >> trims >> Ignition # trim table activate

("#" representing the desired ignition output number)

"On" will cause the specified ignition output to operate under the conditions set in the trims table.

"Off" will cause the desired output to perform as per the ignition map.

Ignition >> Ignition Modifiers >> Starting

On the top half of this screen there are 3 dials. These correspond to the text on the bottom half of the screen. Changing the value of a dial will change the value of the corresponding text and vice versa.

Ignition >> Ignition Modifiers >> Starting >> Start Ignition Timing EngTemp: 0

This function will adjust the ignition timing under starting conditions by the indicated value. This ranges from -11.3^0 (retards ignition by 11.3^0) to 78.4^0 (advances ignition 78.4^0). This will change the ignition timing at 0 ^{0} Celsius to the selected value and will interpolate above to the value at 50^0 Celsius.

Ignition >> Ignition Modifiers >> Starting >> Start Ignition Timing EngTemp: 50

This function will adjust the ignition timing under starting conditions by the indicated value. This ranges from -11.3^0 (retards ignition by 11.3^0) to 78.4^0 (advances ignition 78.4). This will change the ignition timing at 50^0 Celsius to the selected value and will interpolate to the selected values at 0 and 100^0 Celsius.

Ignition >> Ignition Modifiers >> Starting >> Start Ignition Timing EngTemp: 100

This function will adjust the ignition timing under starting conditions by the indicated value. This ranges from -11.3^0 (retards ignition by 11.3^0) to 78.4^0 (advances ignition 78.4 ^{0}). This will change the ignition timing at 100^0 Celsius to the selected value and will interpolate below to 50^0 Celsius.

Ignition >> Ignition Modifiers >> Engine Temperature

This function allows the user to set changes to ignition timing in relation to engine temperature.

Ignition >> Ignition Modifiers >> Engine Temperature >> Activate

This turns the engine temperature ignition compensation table “on” or “off”.

Ignition >> Ignition Modifiers >> Engine Temperature >> Active Above RPM

This sets the minimum RPM value that the engine temperature ignition compensation table will be active above. This can be used to prevent the table from making changes to ignition timing at idle or under starting conditions.

Ignition >> Ignition Modifiers >> Engine Temperature >> Engine Temperature Compensation

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other. This function is used to adjust ignition timing output under varying engine temperatures. Engine temperature is represented in degrees Celsius on the “x” axis. The “y” axis dictates the change in degrees BTDC (Before top Dead Centre) and ranges from -45^0 (retards ignition timing) to 44.6^0 (advances ignition timing).

When in this table, pressing the “x” button will adjust the degree of adjustability. The options are visible in the bottom middle of the screen.

“X” axis: 1:1 - Adjustments can be made every 2^0.

“X” axis: 1:2 - Adjustments can be made every 4^0. Values will interpolate between adjustable points.

“X” axis: 1:4 - Adjustments can be made every 8^0. Values will interpolate between adjustable points.

“X” axis: 1:8 - Adjustments can be made every 16^0. Values will interpolate between adjustable points.

Ignition >> Ignition Modifiers >> Air Temperature

This function allows the user to set changes to ignition timing in relation to intake air temperature.

Ignition >> Ignition Modifiers >> Air Temperature >> Activate

This turns the air temperature ignition compensation table "on" or "off".

Ignition >> Ignition Modifiers >> Air Temperature >> Active Above RPM

This sets the minimum RPM value that the air temperature ignition compensation table will be active above. This can be used to prevent the table from making changes to ignition timing at idle or under starting conditions.

Ignition >> Ignition Modifiers >> Air Temperature >> Air Temperature Compensation

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

This function is used to adjust ignition timing output under varying air temperatures.

Air temperature is represented in degrees Celsius on the "x" axis. The "y" axis dictates the change in degrees BTDC and ranges from -45^0 (retards ignition timing) to 44.6^0 (advances ignition timing).

When in this table, pressing the "x" button will adjust the degree of adjustability. The options are visible in the bottom middle of the screen.

"X" axis: 1:1 - Adjustments can be made every 2^0.

"X" axis: 1:2 - Adjustments can be made every 4^0. Values will interpolate between adjustable points.

"X" axis: 1:4 - Adjustments can be made every 8^0. Values will interpolate between adjustable points.

"X" axis: 1:8 - Adjustments can be made every 16^0. Values will interpolate between adjustable points.

Ignition >> Ignition Modifiers >> Special Trim 1

Special trims can be used to make changes to ignition timing using any input. This includes, but is not limited to: engine temp, RPM, any LS or HS driver and ignition degrees delivered.

Ignition >> Ignition Modifiers >> Special Trim 1 >> Activate

Turns the special trim 1 "on" or "off".

Ignition >> Ignition Modifiers >> Special Trim 1 >> Input Used

This dictates which input is used as the variable for the Special Trim 1.

Ignition >> Ignition Modifiers >> Special Trim 1 >> Special Trim 1 Table

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

This function is used to adjust ignition timing output in relation to an input of your choosing.

Regardless of the input chosen, the "y" axis will represent the change in ignition timing in degrees BTDC (Before Top Dead Centre). This ranges from -45^0 (retards ignition timing) to 44.6^0 (advances ignition timing). The "x" axis values will vary depending on what input is selected.

When in this table, pressing the "x" button will change the degree of adjustability. The options are visible in the bottom middle of the screen.

"X" axis: 1:1 - The maximum adjustability.

"X" axis: 1:2 - Adjustments are spaced twice as far apart and values will interpolate between adjustable points.

"X" axis: 1:4 - Adjustments are spaced 4 times as far apart and values will interpolate between adjustable points.

"X" axis: 1:8 - Adjustments are spaced 8 times as far apart and values will interpolate between adjustable points.

Ignition >> Ignition Modifiers >> Rotary Trailing Ignition Split

When selecting the ignition outputs to be "rotary mode", this option allows for a timing split between leading and trailing. In this folder you can set the desired amount of timing split you want.

Ignition >> Ignition Modifiers >> Rotary Trailing Ignition Split >> RPM Table

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other. This function allows you to set the desired ignition split over RPM. The "x" axis represents RPM, while the "y" axis represents degrees BTDC.

When in this table, pressing the "x" button will adjust the degree of adjustability. The options are visible in the bottom middle of the screen.

"X" axis: 1:1 - Adjustments can be made every 125 RPM.

"X" axis: 1:2 - Adjustments can be made every 250 RPM. Values will interpolate between adjustable points.

"X" axis: 1:4 - Adjustments can be made every 500 RPM. Values will interpolate between adjustable points.

"X" axis: 1:8 - Adjustments can be made every 1000 RPM. Values will interpolate between adjustable points.

Set the desired amount of timing split you want.

Ignition >> Ignition Modifiers >> Ignition Lock

Ignition lock is a particularly useful function in the event that the user needs to check or adjust the engines ignition timing. Ignition lock will simply keep the engines ignition locked to the selected timing in degrees BTDC (Before Top Dead Centre). The reason this is handy is it prevents the Wolf ECU from changing the ignition timing through ignition modifiers or from imperfections in the map, giving the user confidence when setting ignition timing.

Ignition >> Ignition Modifiers >> Ignition Lock >> Activate

This turns the ignition lock "on" or "off".

Ignition >> Ignition Modifiers >> Ignition Lock >> Ignition Lock Fixed Timing

This sets the ignition timing the user wants to have the ECU locked to.

Control >> General Functions >> Thermo Fan

The ECU can control an electric thermo fan.

Vehicles can be set up with a primary thermo fan with the option for one or more secondary fans and or A/C condenser fans.

Control >> General Functions >> Thermo Fan >> Activate Primary Thermo Fan on A/C

Having this set to “on” will cause the primary thermo fan output to be activated when there is an input to the A/C request.

Control >> General Functions >> Thermo Fan >> Active Above Engine Temp

This sets the engine temperature that will cause the primary thermo fan to turn on. This value or above will keep the fan on.

Control >> General Functions >> Thermo Fan >> Hysteresis

The hysteresis allows a value to be made that will act as a gap between switching on and switching off at the nominated “active above engine temp”.

This prevents the thermo fan from rapidly switching on and off.

Control >> General Functions >> Thermo Fan >> Activate A/C Thermo Fan

When on, this activates the selected pin (see next description) to control a secondary thermo fan.

Control >> General Functions >> Thermo Fan >> A/C Thermo Fan Controlled Pin

This dictates which pin will be used as the output for the secondary thermo fan.

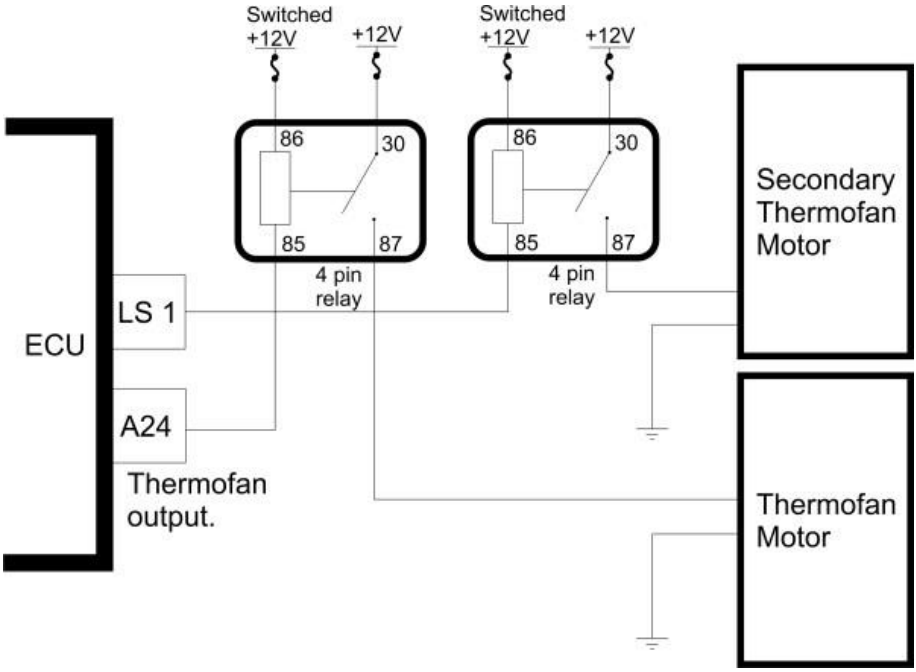
Control >> General Functions >> Thermo Fan >> Activate Secondary Thermo Fan Above EngTemp

This sets the engine temperature that the secondary thermo fan will be turned on. It is turned on when the temperature is above the set value.

Control >> General Functions >> Thermo Fan >> Hysteresis

This has the same function as the above hysteresis, but is for the secondary fan.

Basic wiring diagram of a twin thermo fan setup



Control >> General Functions >> Fuel Pump

The Wolf V550 has a dedicated fuel pump control output.

Control >> General Functions >> Fuel Pump >> Activate

When on, activates the dedicated fuel pump control output. This will activate the fuel pump control output when the key is on for a brief moment (see next description) and while the engine is running.

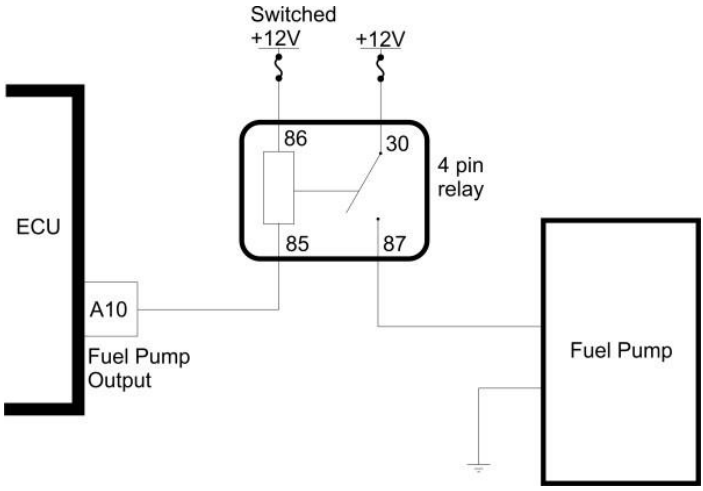
Control >> General Functions >> Fuel Pump >> Initial Activation Seconds

This dictates the number of seconds that the fuel pump will prime when the ignition is turned on. This prevents the fuel pump being active when the engine is not running, particularly for safety in the event of a fire.

Control >> General Functions >> Fuel Pump >> Force HL6 High When Fuel Pump Driven On

In some cases a high side fuel pump driver is required. Turning this on will activate HL6 and drive it high when fuel activation is activated.

Basic wiring schematic for fuel pump:



Control >> General Functions >> Idle Lock

This function is designed for engines that are having difficulties idling. This can be due to large camshafts, low manifold vacuum, poor fuelling etc. This parameter allows you to lock the idle setting and give a desired amount of fuel and ignition without alterations no matter what happens to load or RPM within the desired specifications. This can calm an aggressive idle to be manageable.

Example: To work under 1200RPM, Below 1.2 TPOs, don't work above 1300RPM or TPOS of 2.

Control >> General Functions >> Idle Lock >> Activate

On will turn the idle lock on and work when in the desired parameters, this will also be shown in the right hand side of the dashboard, it will light up "idle lock".

Control >> General Functions >> Idle Lock >> Active Below RPM

The desired RPM you wish for idle lock to be used under, if you have an aggressive idling motor you may want this to be slightly higher than your targeted RPM.

Control >> General Functions >> Idle Lock >> Inactive Above RPM

The RPM you want the idle lock not to work above, if at any point the RPM goes above this point while in idle lock it will turn the idle lock off, this should be set within a 200 RPM of your active below settings.

Control >> General Functions >> Idle Lock >> Active Below TPos

This setting should be as low as possible so that the idle lock will only work when closed throttle is achieved.

Control >> General Functions >> Idle Lock >> Inactive Above TPos

This setting is to disable the idle lock above the desired TPOs setting.

Control >> General Functions >> Idle Lock >> Delivered Fuel

The amount of fuel you wish to give the engine while idle lock is active.

Control >> General Functions >> Idle Lock >> Delivered Ignition

The amount of ignition timing you wish to give the engine while idle lock is active.

Control >> General Functions >> Rev Limit

This function is to allow the over revving of your engine.

There are many different times you may want to limit the RPM of your engine, e.g. different fuels being used, different amount of boost, launch control, 2 stage, also Valet mode (this is when you want to leave your car with someone you do not trust so you can limit the RPM on them.)

We have four RPM modes. These can be selected to be used at different times e.g.: when activated by switches or by other parameters in our program.

You can setup one rev limit as an overall rev limit. Then set one up to be a valet mode activated by a switch and another to be the rev limit for launch control when activated.

Control >> General Functions >> Rev Limit >> Rev Limit – Main

Allows another form of rev limiting that can be activated via a switch or the program.

Control >> General Functions >> Rev Limit >> Rev Limit - Main >> Activate

"On" allows the primary rev limit to be active when desired parameters are met.

Control >> General Functions >> Rev Limit >> Rev Limit - Main >> Rev Limit RPM

Maximum RPM you want the engine to rev to, your engine will not rev past this point.

Control >> General Functions >> Rev Limit >> Rev Limit - Main >> Rev Limit Mode

There are four different modes to be selected:

Hard Cut Fuel: this will cut the fuel only on all injectors at the desired RPM

- Hard Cut Ignition: this will cut the ignition on all ignition outputs at the desired RPM.
- Hard Cut Both: this will cut both fuel and ignition on all injector and ignition outputs at desired RPM.
- Soft Cut Ignition: this will cut individual ignition events (as per described below). This will cut the desired ignition events in a random pattern, to limit the engines RPM in a soft function. Random rolling is to ensure each firing is cut safely.

Control >> General Functions >> Rev Limit >> Rev Limit - Main >> Soft Rev Limit

On/off. This also has four other options to be selected:

- Cut 1 in 8: this will cut one ignition event in every eight, this is a very soft rev limit and can be driven through if tried.
- Cut 2 in 8: this will cut two ignition events in every eight, this will do the opposing firing events and will limit most vehicles at this point.
- Cut 4 in 8: this will cut four ignition events in every eight, this being still soft it will limit most high powered vehicles at this point without the harsh hard rev limit effects.
- Cut 6 in 8: this is for very high powered vehicles that are trying to limit RPM. When producing high power at these points it will cut six in every eight ignition events. It has a random starting roll and will mathematically select the next event to be cut.

Control >> General Functions >> Rev Limit >> Rev Limit - Main >> Soft Rev Limit Hard Cut RPM

The RPM limit that you want to hit if the engine drives past your desired soft cut e.g.: soft cut at 3000RPM then hard cut at 3400RPM

Control >> General Functions >> Rev Limit >> Rev Limit - Main >> Tacho Red Line (indicative)

This sets the “Red line” on the dashboard on the right hand side. It has no other function apart from visual to indicate to the tuner that you are near the desired red line.

Control >> General Functions >> Rev Limit >> Rev Limit - Main >> Tacho Yellow Line (indicative)

This sets the yellow line on the dashboard on the right hand side. It has no other function apart from visual to indicate to the tuner that you are near the desired yellow line.

Control >> General Functions >> AirCon Control

This parameter allows for trims to be added when the A/C is activated, some engines require more fuel or timing to help stabilize the idle and give correct emissions.

This parameter generally only takes effect at idle and is turned off as acceleration is applied.

There is a secondary parameter to this WOT control this allows control of the A/C relay so that it can be turned off at high loads, stopping the risk of a/c system damage.

Control >> General Functions >> AirCon Control >> Activate

Allows activation of the trims to be used when the activation of the A/C request is engaged.

Control >> General Functions >> AirCon Control >> Fuel Trim when Active

The desired enrichment required when the A/C is on, this is a trim and is in percentage on the delivered fuel amount.

Control >> General Functions >> AirCon Control >> Ignition Trim when Active

The desired amount of increase in ignition timing when the A/C is on.

Generally this can be a couple of degrees to help with the extra load on the engine.

Control >> General Functions >> AirCon Control >> Disabled Above Load

The load you want to turn the extra trims off at.

Normally set this about 10 load points higher than were the engine idles at. This will stop the trims turning on and off if a slight hunt occurs.

Control >> General Functions >> AirCon Control >> Disabled Above Throttle Position

The Throttle Position that you want the trims to turn off at.

Normally set to about 5 higher than you have your throttle set to at idle.

This allows for some movement in the throttle before the trims turn off.

Control >> General Functions >> AirCon Control >> Disabled Above RPM

Turns the trims off above this RPM.

Suggested about 500 RPM above idle RPM.

Control >> General Functions >> AirCon Control >> AirCon Request Sense on 0V Input

The input to the Wolf ECU can accept either 12v or 0V to indicate that the A/C has been activated.

This allows you to select 0V switching. The input from the A/C switch is switching to ground. With this parameter left off it is looking for a 12V switch input.

Control >> General Functions >> AirCon Control >> Wide Open Throttle Control (WOT)

WOT control is to allow activation of a relay to control the A/C compressor. This relay may need to be turned off for a number of reasons - the most obvious is engine speed and load.

With this parameter we allow you to set the load and RPM that you want the A/C to work between and also have other inputs such as pressure switches to take into account.

When the A/C input is activated it then looks at what needs to be turned on e.g.: fans, idle speed, WOT control pin. This is all done in such a way that it does not create load on the engine.

The A/C request is turned on, the idle will step up if active. The WOT pin grounds after the desired time and then the fans switch on, all of this can be seen on the dashboard on the right hand side.

Control >> General Functions >> AirCon Control >> Wide Open Throttle Control (WOT) >> WOT Activate

Allows the operation of the WOT control pin. Not all vehicles require this parameter.

Control >> General Functions >> AirCon Control >> Wide Open Throttle Control (WOT) >> WOT A/C Controlled Pin

The pin you wish to ground to control the A/C when all parameters are met.

Control >> General Functions >> AirCon Control >> Wide Open Throttle Control (WOT) >> WOT A/C Clutch Engage Delay

This is the delay that you request between A/C request being activated and the grounding of the WOT control pin. This time allowing for the idle speed to build up, this section is as follows:

- 10 = 1 sec.
- 20 = 2 sec.

Control >> General Functions >> AirCon Control >> Wide Open Throttle Control (WOT) >> WOT Controlled Pin Output Polarity

Do you want it to work over selected parameters or up to selected parameters?

- Normal: work over selected parameters.
- Reverse: work up to selected parameters.

Control >> General Functions >> AirCon Control >> Wide Open Throttle Control (WOT) >> WOT Disable A/C above Load

Allows to be turned off above a certain load point.

You want this set to a high load point so that the A/C is not turning on/off on acceleration, e.g.: if a force fed car that is running 20PSI boost may get 3 PSI on an acceleration to pass a car, so you don't want the A/C to turn off at this point - so set the A/C load higher than this let's say load 65%.

Control >> General Functions >> AirCon Control >> Wide Open Throttle Control (WOT) >> WOT Disable A/C above Throttle Position

The throttle position that you want the A/C to stop working at.

As per the previous section you do not want the ac to turn off too early. On most soft to med accelerations, the throttle does not pass 85% throttle. If set to 85% then the throttle has to pass this before it turns the A/C off.

Control >> General Functions >> AirCon Control >> Wide Open Throttle Control (WOT) >> WOT Disable A/C above RPM

The RPM that you want the A/C to stop working.

This will vary depending on the type of engine but a general rule is about 1000 RPM less than desired rev limit.

Control >> General Functions >> AirCon Control >> Wide Open Throttle Control (WOT) >> WOT Disable A/C below RPM

This allows for the A/C not to be working below a desired RPM.

This helps with starting of the engine while the A/C is switched on. It is also useful if under shoot happens on decel, normally set 200 rpm under desired idle speed.

Control >> General Functions >> AirCon Control >> Wide Open Throttle Control (WOT) >> WOT External Activation By

Allows an external source to be used as well as the A/C request.

User defined on what pin they use, but as an example we will use LS1 (this could be wired up to a pressure switch or even a cabin temperature switch).

Control >> General Functions >> AirCon Control >> Wide Open Throttle Control (WOT) >> WOT External Activation Switch Point

As the pin we have selected is LS1 for the example, this can be calibrated to read any figure we want (see LS inputs). Let's say we have calibrated it to pressure, so turn off at 550kpa pressure. This is the activation point.

Control >> General Functions >> AirCon Control >> Wide Open Throttle Control (WOT) >> WOT External Activation Hysteresis

As per our example we are using pressure so we want it to turn off at 550kpa but back on as the pressure drops, 30kpa less therefore our hysteresis will be 30.

Control >> General Functions >> AirCon Control >> Wide Open Throttle Control (WOT) >> WOT External Input Polarity

As per our example we are using pressure to turn the A/C off (don't want to over pressure the A/C) so our polarity will be reversed, works up to pressure point then turns off.

Normal would mean it turns on over this point.

Control >> General Functions >> Shift Light

This function allows for one or more lights to set off at different RPM.

You can have six solid functions at different RPM. You can use one as a pre warning and then the final stage to flash. These can also be used to drive different things that you may want driven only over a certain RPM.

As an example, the operation of three lights may be as such - one comes on at 3000 RPM to let you know to get ready to change. The next comes on at 4000 RPM as a reminder and that RPM is much closer now and finally at 5000 RPM time to change gear.

Control >> General Functions >> Shift Light >> Light Stage 1

Control >> General Functions >> Shift Light >> Light Stage 1 >> Activate On/Off

Activates this mode if required.

Control >> General Functions >> Shift Light >> Light Stage 1 >> Trip RPM

Sets the RPM that you wish to ground the desired pin at.

Control >> General Functions >> Shift Light >> Light Stage 1 >> Controlled Pin

Shift light 1 will control the desired pin that has been selected.

Control >> General Functions >> Shift Light >> Light Flash Point

This will flash any light that is being activated at this point by the shift light mode.

Control >> General Functions >> Shift Light >> Light Flash Point >> Activate

“On”/”Off” activates the flashing of the lights.

Control >> General Functions >> Shift Light >> Light Flash Point >> Flash Above RPM

The RPM that you want the lights to be flashing above.

Control >> General Functions >> Stepper Motor (Aux HL1-4)

This is where you set up the drivers for the HL1-4.

The HL1-4 is our dedicated stepper motor drivers. If you are using them as a stepper motor driver then this parameter needs to be filled in.

There are lots of different applications that stepper motors are used for - not just as idle. For example, one can be used to drive the oil pump on a rotary.

If you are using HL1-4 as normal outputs, then leave this turned off.

Control >> General Functions >> Stepper Motor (Aux HL1-4) >> Activate

"On"/"Off" turns the HL1-4 to a stepper motor driver.

Control >> General Functions >> Stepper Motor (Aux HL1-4) >> Stepper Control Value Source

As previously described, you can use the HL1-4 for many controllers. Most common is as idle speed, but can also be driven from a multi-controller also.

If controlling from a multi-controller the Multicontroller section must be filled out.

Control >> General Functions >> Stepper Motor (Aux HL1-4) >> MultiController Source Setup

As per idle speed, when using the HL1-4 as the idle device, you have to set up the parameters you want the stepper motor to work in.

Control >> General Functions >> Stepper Motor (Aux HL1-4) >> MultiController Source Setup >> Step Speed

This is the speed that you want the idle speed to work at. If you try to make the stepper motor work quicker than it can it will "skip" steps.

Hence, a good starting point is 1.2 for most stepper motors.

Control >> General Functions >> Stepper Motor (Aux HL1-4) >> MultiController Source Setup >> Step Size Multiplier

The step size multiplier can be used for a stepper motor that has more than 256 steps. This is not often used, as most stepper motors have a step range of less than 255 steps.

A suggested value is “0”.

Control >> General Functions >> Stepper Motor (Aux HL1-4) >> MultiController Source Setup >> Direction to Open

The stepper motor control signals can be conveniently reversed if the motor is stepping backwards to the intended direction.

Suggested setting is normal (forward).

Control >> General Functions >> Stepper Motor (Aux HL1-4) >> MultiController Source Setup >> Reset Speed

This is how fast the stepper motor resets itself back to the desired position.

The lower the number the faster it resets. The larger the number the slower it returns.

Suggested value is 1.2.

Control >> General Functions >> Stepper Motor (Aux HL1-4) >> MultiController Source Setup >> Reverse Step Init Activate

A stepper motor should be initially stepped in reverse to its physical start point when the ECU is powered up. This is to ensure the position of the stepper motor is the same every time the ECU is powered up.

It is suggested this is turned on.

Control >> General Functions >> Stepper Motor (Aux HL1-4) >> MultiController Source Setup >> Reverse Steps on Initialisation

This should be greater than the number of steps required by the stepper motor to do a full travel. Most stepper motors are between 150-250 steps.

Set this to 250 steps.

Control >> General Functions >> On-Vehicle Communications

Some vehicles require a data stream to run their dash board.

If you wish to use this feature, you will require the extra hardware to go in-line with this parameter.

This can be purchased from your local Wolf Dealer.

Control >> General Functions >> On-Vehicle Communications >> Activate

When on, will activate a data stream to be forwarded out on pin B25 automatically.

Control >> General Functions >> On-Vehicle Communications >> On-Vehicle Communications Type

Select the vehicle type you are installing the Wolf ECU onto.

Control >> General Functions >> Test Output Pins

After you have installed the Wolf ECU into your project, you may want to check that you have everything working as it should.

This handy function allows you to test individual pins to see if they are connected.

Control >> General Functions >> Test Output Pins >> Activate

“On”/”Off”, remember after testing to turn this parameter OFF.

Control >> General Functions >> Test Output Pins >> Select Output Pin to Test

Choose which output pin you wish to test.

The ECU will pulse the output pin 3 times per second.

Injector outputs will pulse for the number of milliseconds that the starting fuel is set to.

Ignition outputs will pulse for the current coil charge time.

Auxiliary outputs will pulse at 50% duty cycle.

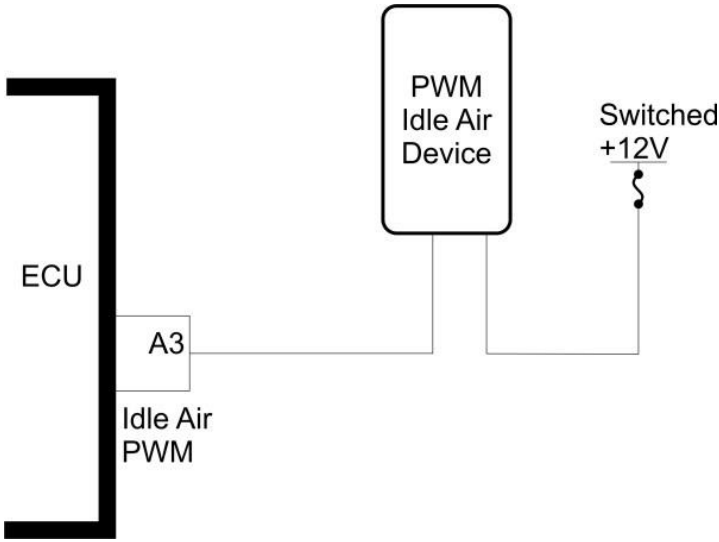
Control >> Idle Speed

Idle speed allows you to set almost any idle speed device and set it as per factory settings.

If you take the time and read through this section it is very complex but can make the difference between a nice tune and a perfect tune.

Some of the biggest problems that we see are to do with idle speed, not having the parameters set correctly is one of the most common.

Basic wiring schematic for PWM Idle Air Speed device:



Control >> Idle Speed >> Trims

This area is for a quick adjustment after the idle speed has been set up and proven to be working, it is for testing if more or less idle speed is required.

Control >> Idle Speed >> Trims >> Target RPM Trim EngTemp: 0

Adjusts the idle speed at set temperature, this will interpolate to higher and lower temperatures.

Control >> Idle Speed >> Trims >> Target RPM Trim EngTemp: 50

Adjusts the idle speed at set temperature, this will interpolate to higher and lower temperatures.

Control >> Idle Speed >> Trims >> Target RPM Trim EngTemp: 100

Adjusts the idle speed at set temperature, this will interpolate to higher and lower temperatures.

Control >> Idle Speed >> Target RPM Engine Temp

This is a 2D graph RPM/Engine temp. You set the targeted RPM at what engine temperature you require. Keep in mind that most engines require more idle speed when cold.

Another point to look at is as you open the idle valve when cold, it will not rev up if you are not giving it enough fuel. Keep this in mind when setting up the idle device as when you increase fuel, your idle opening may be too much.

You can make changes to this graph by increasing and decreasing the set RPM in the bottom text screen. You can minimise and maximise the graph by using the "x" button and adjustments can be made by typing in the RPM or using "<" or ">".

If you wish to get a starting point, double click on the word "RPM" in the grey box. This will bring up a dialog box that asks you for a new value. Type in the new value and hit "enter". This will put the desired RPM across the whole graph, now you can work the graph from there.

Control >> Idle Speed >> Initial Centre Engine Temp

This is how far open the idle speed device is when not being used while driving or accelerating. The idle speed device must be given a value even when not in the idle parameter's, this is its initial centre. This helps with a number of problems. When getting off the throttle, the idle speed is already open so it catches the idle and brings the idle down to stop under shooting.

It allows you to set the initial centre so that when it is cold you have the range on the idle speed device to create a high idle for clean idling when cold.

It allows for A/C add on to compensate for A/C being turned on.

Once the motor is running, set the initial centre to be slightly higher than what it is taking to idle the engine. What this means is you have the engine running, you have checked ignition timing and mixtures. On the right side in the dashboard there is an idle indicator, when the engine is warm you want this to read around 20-30%, this means it is taking 30% of the idle speed to run at idle.

If this is an aftermarket throttle body or the engine has been modified then you may have to adjust the throttle or air bleed. Don't forget that if you adjust throttle, you need to adjust the TPos settings back to zero.

Now let's say you have the engine running at 20% idle, you will want to set you initial centre to about 28% (different idle speed devices will be different settings). This means when you accelerate, the idle speed device will open up to 28% and as you close the throttle, it will hold the RPM up and then slowly bring the RPM down to desired amount.

If the RPM is holding up too high, lower the amount in the initial centre. If not high enough, increase the initial centre. Be aware that if the RPM is holding up then it may be that you have not gone too high in RPM but is holding up due to increase ignition timing in the ignition map.

Control >> Idle Speed >> Activation

Control >> Idle Speed >> Activation >> Activate

"ON"/"OFF" - if "off" is selected then the idle speed device will go to the initial centre and stay there.

Control >> Idle Speed >> Activation >> Lower Inactive Below RPM

Below what RPM do you not want the idle speed to work? At this point it will go back to the initial centre.

Normally, this is set to around 30 RPM but keep in mind this can help in certain cases, for example if engines were undershooting which happens due to big cams, low manifold vacuum. If you set this to be 100RPM below the targeted RPM, this undershoots it, turns "off" and the idle speed device goes to the initial centre. This causes the idle to pick up and not stall.

Control >> Idle Speed >> Activation >> Lower Active above RPM

To be set above your **lower inactive** below point. Point that you require the idle speed to work above this RPM.

Control >> Idle Speed >> Activation >> Higher Active below RPM

This is the RPM that you want the idle speed to stop working at. If this is set to 2000 RPM, as you accelerate past 2000RPM the idle speed, device will go to the initial centre.

Be aware that if this is set too low or too high you can have problems. It is too low if you start the car up when cold and you have extra opening turned on. It revs up and goes past this point then it is going to go to its initial centre which may at this point hold it above the higher activation point so it will not come down from this point.

If you have it set too high, let's say 4000RPM, and you are slowing down through the gears pulling up at a set of lights, TPos is closed but the engine is being held up in RPM by the gearbox. The ECU is going to think that it needs to slow the motor down so it will close the idle speed device as you come to a stop. The engine almost stalls due to a closed idle speed so this needs to be set just above the highest RPM you will be seeing when starting the vehicle (this is normally cold).

Control >> Idle Speed >> Activation >> Higher Inactive Above RPM

Should be set 200RPM above higher active point.

Control >> Idle Speed >> Activation >> Active Below TPos

The TPos point that you want the idle speed to work under. Set this as low as possible e.g.: 1.2 but if you have a TPos or throttle body that moves as it heats up you may have to increase this out to 5.

Control >> Idle Speed >> Activation >> Inactive Above TPos

Make this slightly greater than Active below TPos setting.

Control >> Idle Speed >> Activation >> Activate with Vehicle Speed

Let's you have an input from wheel speed. If you have a speed input it is a good idea to use this, as previously explained one big issue you may come up against is in a manual car changing down and slowing to a stop using the gears. By having a speed input in we can say "don't work until under desired speed" let's say 10km/h, that way the idle speed will stay at its initial centre and not move until you are almost stopped.

Control >> Idle Speed >> Activation >> Active Below Vehicle Speed

The speed you want the idle speed device to start working.

Control >> Idle Speed >> Activation >> Inactive Above Vehicle Speed

The Speed you want the idle speed to stop working.

Control >> Idle Speed >> Tracking

This folder contains the various settings for the speed at which the idle control device tracks.

Control >> Idle Speed >> Tracking >> Tracking Dead RPM Band

The dead band is a section of RPM in which the idle speed device will not change. If you have 40 in here it will allow the RPM to wander 20 RPM either side of the targeted RPM before it starts to track. If you have this band set too narrow, hunting can occur as the idle speed tracks into and out of the dead band. Have this band too wide and erratic idle control will happen e.g.: idle one time at 900rpm the next time at 700rpm.

Suggested value is 40-60 - but keep in mind this can be opened up if required.

Control >> Idle Speed >> Tracking >> Tracking Normal RPM Band

This is the band that outside the dead band, the idle speed device is going to move at its normal speed, normally around 180RPM. This means 90RPM either side of your targeted RPM, the idle speed will move at its normal speed and track back to the desired RPM slowly. Outside these parameters the idle speed is working at fast speed (explained below).

Control >> Idle Speed >> Tracking >> Tracking Normal Speed

This will depend on what idle speed device you have.

A starting point would be 20.

Note: The greater the number the slower the speed.

Control >> Idle Speed >> Tracking >> Tracking Fast Speed

Tracking fast speed is used when RPM is out of the Normal RPM Band. This will make more rapid changes towards the desired idle RPM. The required value will depend on what idle speed device you have.

A starting point would be 9.

Note: The greater the number the slower the speed.

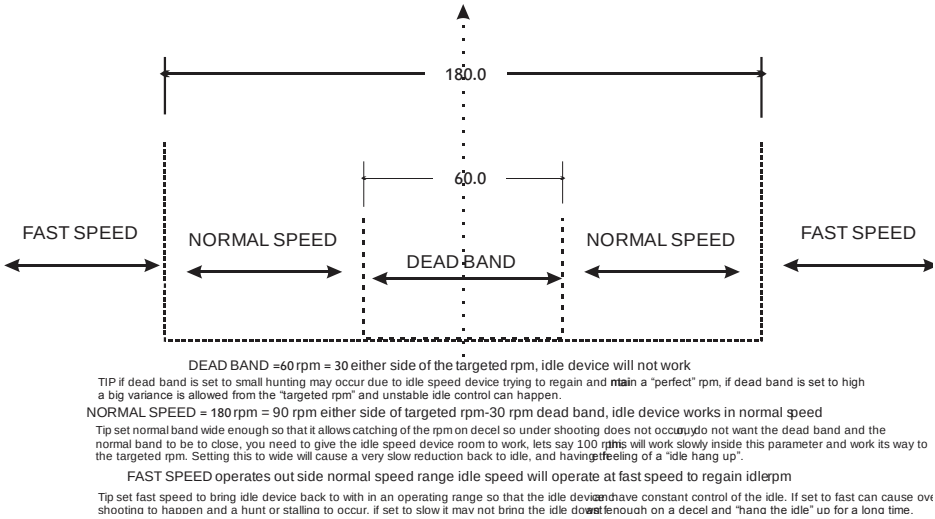
Control >> Idle Speed >> Tracking >> Tracking Reset Speed

This is the speed that the idle device resets itself to the initial centre. On a PWM device this can be as low as 0.4, on a stepper motor as low as 1.2.

Control >> Idle Speed >> Tracking >> Tracking Step Size

This allows you to set the amount of steps your idle device takes every time it makes a move. As an example, if I had a device that took 255 steps from open to close and my step size was .4, it would take a long time to travel the whole range. If I had the step size set to 1.2 we have now tripled the range from the previous setting and still have good control over the device. If I set it to 5, this would be faster because every movement the device makes is 5 steps but fine idle control can be a problem and it may require that for a steady idle.

Suggested value: 0.4-1.2.



Control >> Idle Speed >> Limits

Limits are created for two reasons.

You may have a device that needs to be limited for correct use. For example, Mazda MX5 idle speed device has a built in "limp home" mode. If this device loses power to it, it shuts all the way. What this really does is open the valve by 30%. This is really interesting if you are trying to control this valve. Your engine will slow down like expected and then as the valve keeps closing the engine will speed up confusing both you and the ECU. What we do is put a "minimum" clip on this which does not allow it to close more than 30%. The same can be said for over opening some idle valves, they only need to be opened 50% of the way. If they open too far they lose their way and do not know how far they are open, so in this case we put a "maximum" clip of 50%

If you are wanting to test your idle device, you can use the min/max clips and move the device to the desired area and have it stable, not hunting around. This is ideal if you are trying to bring the idle amount down by means of opening up an air bleed or moving a throttle plate. Keep reducing the clip values until you have it idling at 20% value and then set the clips back to the desired parameters again.

This is also a good way to see if your device is working correctly. If you increase the values and it decreases in speed, reduce the clip and it picks up in speed your device could be wired backwards.

Control >> Idle Speed >> Limits >> Idle Clip Activate

Turns the idle clip function "On/Off".

Control >> Idle Speed >> Limits >> Clip Minimum Value

Sets the desired minimum idle value required.

Control >> Idle Speed >> Limits >> Clip Maximum Value

Sets the maximum idle value required.

Control >> Idle Speed >> Extra Opening

There are two major parameters in extra opening.

The first one is extra opening over engine temp. The extra opening function will open the idle device for a desired time while starting the vehicle. Not all vehicles require this. It comes down to injectors and manifold design as to whether you require extra opening.

The other parameter is for the A/C. When the A/C request is activated you can request that your engine increase in RPM while this function is working.

Control >> Idle Speed >> Extra Opening >> Fast Idle Activate

When on, activates the temperature based extra opening. This is only on start-up.

Control >> Idle Speed >> Extra Opening >> Fast Idle Engine Temp Below

What temperature do you want this function to work up to? Some vehicles only need it to 40deg, others all the time.

Control >> Idle Speed >> Extra Opening >> Fast Idle Opening Extra

The value input here will be added to the initial centre for start-up.

Control >> Idle Speed >> Extra Opening >> Fast Idle Time

How long do you want the extra opening to last? 3-4 seconds once the engine has fired. You may need to keep the extra opening there to clear out the extra fuel you have injected. This setting will change per vehicle. It is suggested to use 2 as a starting point.

Control >> Idle Speed >> Extra Opening >> Fast Idle Decay Speed

This is the speed that the idle speed device will start to close after the extra opening has been activated for its desired time. 30 is suggested but will vary depending on the idle device, the greater the number the slower the speed.

Control >> Idle Speed >> Extra Opening >> AirCon Opening Extra Activate

Allows the idle speed device to increase when A/C request is activated.

Control >> Idle Speed >> Extra Opening >> AirCon Opening Extra

If you wish to add any steps to the initial centre you can by adding some steps in here. As you accelerate, the idle will hold up slightly higher.

Some vehicles require many steps, some require none.

Control >> Idle Speed >> Extra Opening >> AirCon RPM Increase Activate

Switching to “On” allows you to add to the targeted speed when the A/C Request is activated.

Control >> Idle Speed >> Extra Opening >> AirCon RPM Increase

Allows the number you have in here to be added to the targeted RPM so the idle speed will now chase a higher idle speed.

Control >> Idle Speed >> Special Trim

This parameter is designed so that you can use any input for any purpose.

The special trim allows you to increase or decrease the RPM as required by a remote source or internal from the program. For example, a four wheel drive has a big winch on it. They want the idle to step up when the winch is activated to allow for extra load on engine. You put the switch input into the Wolf ECU and set up the special trim.

Another example - four wheel drives that are going down a steep decline. Even in low range, the idle might be too fast in road speed. You close the idle valve completely to allow for minimum idle. The engine will not stall with the motion of the wheels rotating the engine, but too low an idle to be comfortable for every day driving.

Control >> Idle Speed >> Special Trim >> Activate

Allows the activation of the special trim to take effect.

Control >> Idle Speed >> Special Trim >> Input Used

Choose what input you wish to use, can use an external input or internal from program.

Control >> Idle Speed >> Special Trim >> Special Trim Table

2D table allowing 50% +/- of the idle speed device.

Control >> Idle Speed >> Stepper Motor Setup

If using a stepper motor idle device you will need to set up a couple of parameters. What direction does it move forward/reverse? How many steps?

Control >> Idle Speed >> Stepper Motor Setup >> Direction to Open

This is not the direction it moves to open the idle port.

What direction does the stepper motor move? Most stepper motors are forward.

If the stepper motor drives out of its housing to close the idle bypass, this is known as forward.

Control >> Idle Speed >> Stepper Motor Setup >> Reverse Steps on Engine Stop

How many steps does it take for your stepper motor to travel a full cycle?

Suggested value: 200.

Control >> Idle Speed >> Stepper Motor Setup >> Stepper Motor Reset On Every ECU Power Up

If you have installed the idle relay from WolfEMS Pty Ltd, by leaving this “off” will allow for the power to be held on when the key is turned off and the idle will reset itself at this point. On restart, it will have correct idle position and a clean start achieved.

If you are using a PWM or have not purchased the idle relay, then you will need this to be switched “on”. This will rest the idle device when the key is turned on. With a stepper motor without the relay installed, it may take about 3-4 sec after turning the key on before starting should happen.

Control >> Idle Speed >> Configuration

This is where you tell the ECU what type of idle speed device you have, and how you want it to be controlled.

Control >> Idle Speed >> Configuration >> Output Type

There are two different types of idle speed devices, PWM (Pulse Width Modulation) and stepper motor:

- PWM: these are generally two or three wire and rely on a pulse to drive them open. They have 12V on one pin and a ground pulse to the other pin. The size of the pulse determines how far open they are. The three wire PWM idle speed devices generally require an inverted signal, this will be given from the Wolf and to the third pin on the device.
- Stepper motor: normally these have four or six wires.

Control >> Idle Speed >> Configuration >> PWM Inverted Output Pin

To be used in the case of a three wire PWM idle speed device. You can select any of the LS outputs (select the one that has been wired to the device).

Control >> Idle Speed >> Configuration >> PWM Valve Frequency

PWM idle devices use a specific frequency. Each device is different. If you start at 30 Hz you should hear your device humming. Now increase the frequency up slowly until the humming stops, this will be close to the correct frequency. Please note this is just a guide if you do not have the correct information available.

Control >> Idle Speed >> Configuration >> PWM Mode Fast Reset and Centre

Set if you want to your idle speed device to reset to the initial centre when not being used.

Control >> Closed Loop (Narrow Band)

Closed loop is used for trimming your fuel map to keep Stoich while cruising, it requires an O2 sensor NARROW band.

You can then set the Stoich values you wish to achieve.

After some time running it will start to chase the desired mixture. Keep in mind that this is only for solid state driving. It will not work while accelerating or decelerating.

You should have the tune complete and the fuel mixtures close to where you want the closed loop to be. The less the ECU has to modify the less chance of hunting and irregular running happening.

You should try to keep the percentage of change down to a minimum, with bigger injectors this change is going to be even smaller (a big injector means less fuel required for change).

Control >> Closed Loop (Narrow Band) >> Configuration >> Activate

Turns the closed loop "On/Off".

Control >> Closed Loop (Narrow Band) >> Configuration >> Track Freq. (Reactivate Delay)

When all the parameters have been met for closed loop to be activated, this is the time the Wolf ECU waits before taking control.

Suggested value: 100

This helps with stability when using closed loop.

Control >> Closed Loop (Narrow Band) >> Configuration >> Lambda Input Used

This is the input pin that is being used by the sensor.

There is Lambda 1, Lambda 2, and Lambda 1 & 2.

This allows for individual banks to be controlled in closed loop.

Control >> Closed Loop (Narrow Band) >> Configuration >> Stoich High A/D Voltage

This is the voltage of the sensor that you wish to work under. If it goes higher than this it will start to control the mixtures and bring it back below this voltage.

Suggested voltage: .53

You do not want to make this too close to your Stoich Low Voltage. As the lambda sensor oscillates and if it is too close, hunting will occur.

You are better to start further apart and bring it in slowly.

Control >> Closed Loop (Narrow Band) >> Configuration >> Stoich Low A/D Voltage

This is the voltage of the sensor that you wish it to work above. If the voltage goes below this it will start to control the mixtures and bring it back above this voltage

Suggested voltage: .47

You do not want to make this too close to your Stoich High Voltage, as a lambda sensor oscillates and if you have it too close hunting will occur.

You are better to start further apart and bring it in slowly.

Control >> Closed Loop (Narrow Band) >> Configuration >> Active Below Load

This is the load that you want the closed loop to work below.

As this can be set to suit all engines, take note of what load your vehicle cruises at and set this parameter to be slightly higher. You don't want closed loop working under harder throttle positions.

Control >> Closed Loop (Narrow Band) >> Configuration >> Inactive Above Load

The Load you want to turn the closed loop off at.

When it goes past this load point, it will turn off and only reactivate when it goes into the "Active Below Load" point. Suggest making this slightly higher than the "Active Below Load".

Control >> Closed Loop (Narrow Band) >> Configuration >> Inactive Below RPM

This is the RPM that you don't want the closed loop to work below.

Some vehicles don't want to run in closed loop at idle so set this parameter above your idle RPM. This will stop it trying to go into closed loop at idle.

Control >> Closed Loop (Narrow Band) >> Configuration >> Inactive Above RPM

Set this point you wish for the closed loop to turn off at higher RPM.

Generally find a safe average maximum speed that the vehicle is going to cruise at and go about 1000 rpm above this.

Control >> Closed Loop (Narrow Band) >> Configuration >> Inactive Below Ms

This turns the closed loop off if it goes below a desired injector millisecond.

This can also be a safety function stopping the Wolf ECU from leaning out too far due to faulty sensor or wiring.

Control >> Closed Loop (Narrow Band) >> Configuration >> Inactive Below Engine Temp

The temperature you wish to turn the closed loop off/on at due to engine temp.

The closed loop will not work below this temperature.

Control >> Closed Loop (Narrow Band) >> Configuration >> Active Above Engine Temp

The temperature you want the closed loop to work above.

Control >> Closed Loop (Narrow Band) >> Configuration >> Active After Time

Once the power has been activated this is the time before the closed loop will start to work.

This time allows for O2 sensors to heat up and post start parameters to be meet.

Suggested time: 120.00

Control >> Closed Loop (Narrow Band) >> Configuration >> Injector 1 (Lambda Input Selection)

As this can be controlled by either Lambda inputs and for individual banks left/right, you must select what sensor controls this injector.

This section is the same setup for injector 1-8

Control >> Closed Loop (Narrow Band) >> Tracking

Control >> Closed Loop (Narrow Band) >> Tracking >> Track Rate

This is the Rate that the closed loop will track when getting close to the desired fuelling.

Suggested value: .04%

Control >> Closed Loop (Narrow Band) >> Tracking >> Jump Rate (x Track Rate)

As the fuelling gets further away from the desired amount it will require a greater change

Suggested value: 1.00

Control >> Closed Loop (Narrow Band) >> Limits

Control >> Closed Loop (Narrow Band) >> Limits >> Change % Allowed

This is the maximum limit allowed to be changed from the original ms.

Take note if you are using very small injectors then this limit may need to be increased. If you are using very large injectors then this limit will be quite small.

Keep in mind that this is a safety function in case of a faulty sensor or wiring, this will only allow the change to the limit. Generally set this to run either side of your Stoich value.

Control >> Boost Control

Allows the control of boost to force fed engines via a solenoid that can be pulsed to reduce the boost via a wastegate. Keep in mind that if you have a 14psi wastegate, getting below this is almost impossible. This applies the other way, if you have a 14 psi actuator and want 30 psi, it may also be hard.

These are mechanical problems not Wolf ECU faults.

Control >> Boost Control >> Activate

Turns the boost control "ON/OFF". Turned on, allows for control of the boost via either closed loop or normal mode.

Control >> Boost Control >> Mode

There are two modes the boost controller can be run in.

(1) 0 - mode, this is closed loop boost control. This will read from the 3D table and all trims will have an effect. This does not look at the boost control valve position.

(2) 1 - mode, this mode will allow for manual control over boost. This drives the solenoid from the boost control valve position. It will not look at the 3D map when in this mode but will be affected by all the trims.

Control >> Boost Control >> P - PID Control (Boost)

This is how fast you want the boost control to react going to the desired boost e.g. : aiming for 10psi, you have this number set high so that it will allow big steps before it starts to control the boost. This can allow for low to high boost very quickly.

As boost is climbing it will reduce what it looks for, so at 5psi it will look for 7.5psi to see how close it is to the desired amount. At 7.5 the "X" & "Y" axis allow for a 3D table to be built for controlling the boost psi it will look for 8.75 psi and start to react faster as it gets closer. Too big a number will cause over shoot or uncontrollable boost. Suggested value 0.0745.
If boost is slow to increase from the start, adjust this number up, only small increments at a time.

Control >> Boost Control >> I - PID Control (Boost)

As boost is maintained at desired amount, “I” stops any fluctuation of the boost.

In cases where incorrect wastegates are fitted or incorrect boost control valve is being used, they may be very sensitive to the control of both “P” and “D” so this is a filter to smooth the reaction time once boost is achieved.

Suggested value 0.0117

This may need to be slower or faster depending on boost control device.

Control >> Boost Control >> D - PID Control (Boost)

As “P” is starting to control the boost near its desired amount “D” takes over and allows for a nice transition to the desired amount, you could say this puts the curve on the line. As the boost shoots up it slows down at the top and curves to the desired line, this will increase or decrease that curve. Not using “D” may cause over shooting of the boost and haunting of the boost as the controller tries to bring it back down in a hurry.

Suggested value 0.0745, smaller number, smaller curve, larger number, bigger curve.

Control >> Boost Control >> Active Above Load

Below this load setting, the boost control valve will not work. This is the same for both modes, normally set to just above atmospheric. This way, the valve is not running when the key is on but engine is not running.

Control >> Boost Control >> Valve Polarity

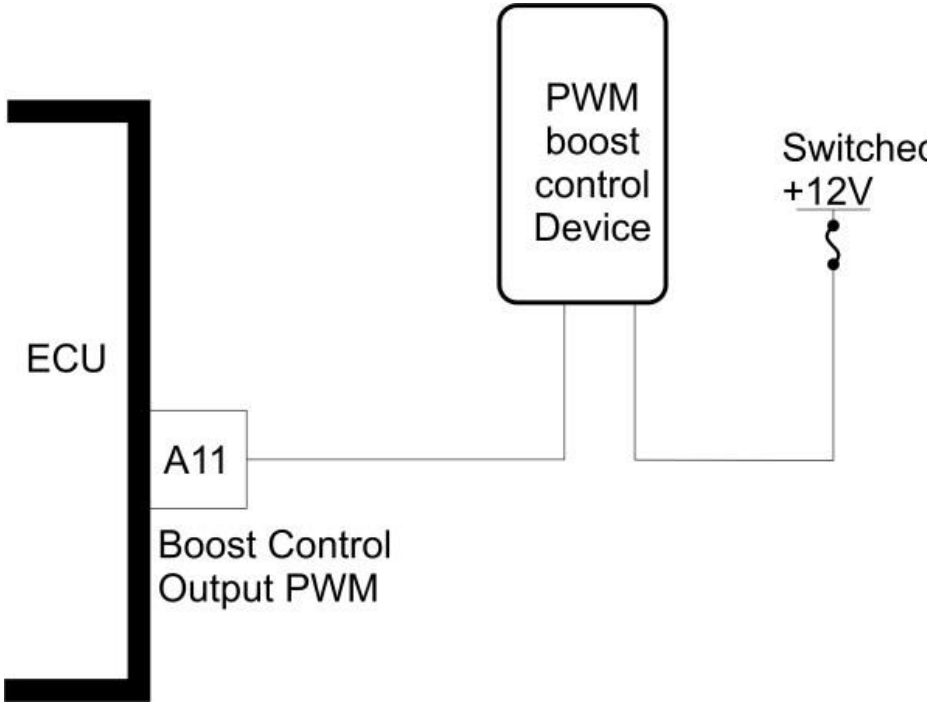
Do you want the duty cycle to be low most of the time or high most of the time? If you have a valve that has been wired up incorrectly it will try to increase the boost as you are asking it for less boost. A good test for this is to put your boost controller into mode “1”, now use the boost control valve position. Start with your setting set to “10” everywhere, now run the motor up slowly and see if it increases in boost and goes past the desired amount. Put “100” in the graph, now try the same thing, if this reduces the boost and limits it, you have the valve wired incorrectly. Change the polarity from normal to reverse and retest to make sure it is working properly.

Control >> Boost Control >> Valve Frequency

This should be set to the manufacturers specs for the valve.

Suggested 15 Hz-30 Hz.

Basic wiring schematic for boost control valve:



Note that this is the typical way that this type of component is wired and that some products may differ from the above schematic.

Control >> Boost Control >> Trims

Allows for quick adjustment of the Boost Control valve position to test if more or less is required to maintain the desired boost.

Control >> Boost Control >> Trims >> Boost Control Trim RPM

There are three boost trim calibration options:

- 0000: This trim will be more effective at 0 rpm and interpolate up to 4000 rpm.
- 4000: This trim will be more effective at 4000 rpm and interpolate up to 8000 rpm and down to 0 rpm.
- 8000: This trim will be more effective at 8000 rpm and interpolate down to 4000 rpm.

Control >> Boost Control >> Boost Pressure 3D Table (Mode 0)

There are two modes the boost controller can be run in. This table only works in mode "0". The modes are:

- 0: mode, this is closed loop boost control, it will read from the 3D table and all trims will have an effect. This will not look at the boost control valve position.
- 1: mode, this mode will allow for manual control over boost and drives the solenoid from the boost control valve position. This will not look at the 3D map when in this mode but will be affected by all the trims.

Control >> Boost Control >> Boost Pressure 3D Table (Mode 0) >> 3D Table X Axis

The "X" & "Y" axis allow for a 3D table to be built for controlling the boost.

This can be set to any parameter you desire and allows for the boost to be set via a range of parameters such as speed, RPM, throttle, engine temp, air temp.

Control >> Boost Control >> Boost Pressure 3D Table (Mode 0) >> 3D Table Y Axis

The "X" & "Y" axis allow for a 3D table to be built for controlling the boost.

This can be set to any parameter you desire and allows for the boost to be set via a range of parameters such as speed, RPM, throttle, engine temp, air temp.

Control >> Boost Control >> Boost Pressure 3D Table (Mode 0) >> Boost Pressure (Mode 0) 3D Table

This Graph is the desired 3D table of boost required at what point.

Control >> Boost Control >> Boost Pressure 3D Table (Mode 0)

There are two modes the boost controller can be run in. This table only works in mode "0". The modes are:

- 0: mode, this is closed loop boost control, it will read from the 3D table and all trims will have an effect. This will not look at the boost control valve position.
- 1: mode, this mode will allow for manual control over boost and drives the solenoid from the boost control valve position. This will not look at the 3D map when in this mode but will be affected by all the trims.

Control >> Boost Control >> Boost Pressure 3D Table (Mode 0) >> 3D Table X Axis

The "X" & "Y" axes allow for a 3D table to be built for controlling the boost.

This can be set to any parameter you desire and allows for the boost to be set via a range of parameters such as speed, RPM, throttle, engine temp, air temp.

Control >> Boost Control >> Boost Pressure 3D Table (Mode 0) >> 3D Table Y Axis

The "X" & "Y" axis allow for a 3D table to be built for controlling the boost.

This can be set to any parameter you desire and allows for the boost to be set via a range of parameters such as speed, RPM, throttle, engine temp, air temp.

Control >> Boost Control >> Boost Control Valve Position Table - Mode 1

This 2D graph allows for the duty cycle of the valve to be manually altered for desired boost to be obtained.

100 is more, 0 is less (depending on how the valve is wired up).

Control >> Boost Control >> Engine Temperature Trim Table

You may want to alter the boost depending on engine temp. This 2D graph allows for this.

For example, you can give it less as the engine is cold and more at operating temp and then as the engine gets to temperatures higher than operating temp, back the boost off again.

Control >> Boost Control >> Air Temperature Trim Table

This 2D graph allows for adjustment to boost over air temp. As the air temp increases, so does the risk of detonation.

Reducing boost over air temp is one way to prevent this happening.

Control >> Boost Control >> Throttle Position Trim Table

This 2D table allows for adjustment of boost over throttle position. This can be very handy for such things as reducing boost to 10psi below 80% throttle, allowing for a four wheel drive to get out of a sticky situation without bogging itself, but when on the open road WOT and you have 22psi.

This allows for the high/low boost settings without a switch.

Control >> Boost Control >> Over Boost Cut

Over Boost Cut is a form of protecting your engine from over boosting. In this section you can select at what boost you want to cut, for how long the engine remains over boosted before Over Boost Cut takes effect and what method you wish to cut the boost by.

Control >> Boost Control >> Over Boost Cut >> Activate

“On” or “Off” will make the Over Boost Cut active or inactive.

Control >> Boost Control >> Over Boost Cut >> Activation Pressure

This is the pressure that the Over Boost Cut will operate at. Normally set 3 PSI above desired setting of boost.

Control >> Boost Control >> Over Boost Cut >> Activation Time Delay

This is a time delay before the Over Boost Cut starts. This time delay is set so that small turbo spikes do not set off the Over Boost Cut. A suggested time is 3 seconds but will depend on set up of turbo.

Control >> Boost Control >> Over Boost Cut >> Boost Cut Method

This is the method in which Over Boost Cut is going to operate. There are 3 methods to choose from: Rev Limit, Rev Limit Valve Position and Valve Position.

Rev Limit

This will activate the rev limit when Over Boost Cut is activated

Rev limit-valve position

This will activate the rev limit as well as reposition the wastegate valve when Over Boost Cut is activated.

Valve Position

This will activate the valve position to go back to predetermined position when Over Boost Cut is activated.

Control >> Boost Control >> Over Boost Cut >> Boost Cut Valve Position

This is the position that you want the wastegate solenoid to go back to when Over Boost Cut is activated. This should be set to a position that will reduce boost in a timely fashion.

Control >> Boost Control >> Special Trim

This section allows the user to modify the boost control valve position from any of the allowable inputs.

Control >> Boost Control >> Special Trim >> Activate

This turns the special trim either "On" or "Off".

Control >> Boost Control >> Special Trim >> Input Used

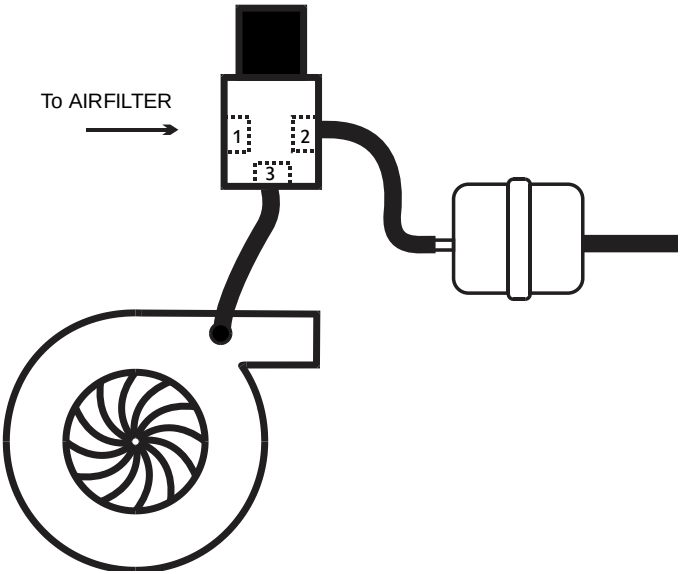
This lets the user select which input will be used for the special trim. It becomes the "X" axis of the **Control >> Boost Control >> Special Trim >> Special Trim Table**. See the next section for more information on the Special Trim Table.

Control >> Boost Control >> Special Trim >> Special Trim Table

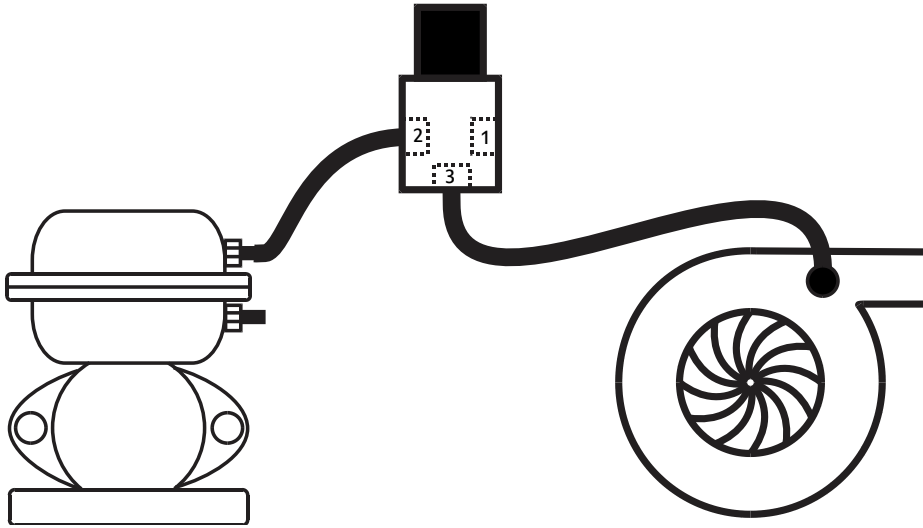
This is a 2D graph allowing the user to adjust the position of the boost control valve + / - 50%. The "X" axis will contain the selected input used (previous folder) while the "Y" axis represents the + / - 50% adjustment

of the boost control valve position. Pressing x on the keyboard will change the resolution of the “X” axis on the table in the lower half of the screen.

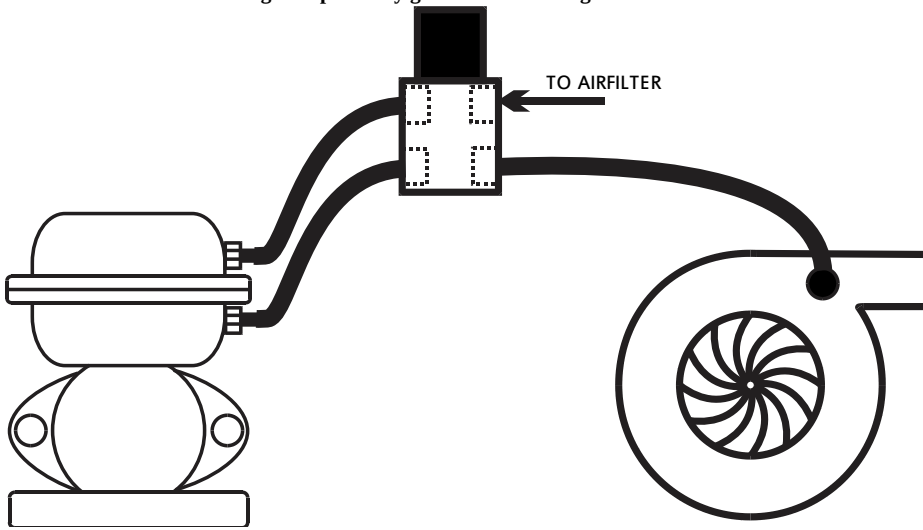
Boost control for internal wastegate



Boost control external wastegate, good control for minimum boost to slightly higher than spring pressure



Boost control external wastegate 4 port very good control for high boost control



Control >> Multicontroller Outputs

These are functions that allow the control of almost any parameter in any way.

If you wish to use a solenoid and PWM (pulse width modulate) and have it controlled by a number of different parameters, this can be done.

If you would like to just switch the solenoid “on”/”off”, this can also be done.

Then you may like to use the MCO to control part of the program, this too can be done.

The following is some examples on how to use the MCO to make your project better.

Example 1: Intake Manifold

This is a vacuum solenoid that switches to activate a vane inside the manifold. This creates long and short runner lengths.

Set up: knowing what you want to control this and how.

Control >> MultiController Output 1

What MCO is being used for this part of the project?

Control >> MultiController Output 1 >> Description

This should be filled in with a friendly “Title” on what you are controlling. When you are tuning, you will be reminded of this parameter so in this example, we will call this “Manifold”.

Control >> MultiController Output 1 >> Activate

Do we want this MCO to work or not? Enter “ON” or “Off”

Control >> MultiController Output 1 >> Controlled Output

This is the pin you pick to control your device with. If using an injector or ignition, make sure they are set as auxiliaries. In this example we are going to use injector 8.

Control >> MultiController Output 1 >> Controlled Output (Inverted)

On some devices not only do they require a drive pulse but also require an inverted signal at the same time. If you are not too sure of your device, please contact Wolf EMS Pty Ltd for further instructions.

This area can be left blank in all other cases.

Control >> MultiController Output 1 >> Output Type

You have three choices here:

- Switched
- PWM
- Internal value/stepper motor

This is the output type you wish to drive. In this example we are using "switched" as we just want to switch the solenoid "On"/"Off."

Control >> MultiController Output 1 >> Output Polarity

As explained throughout the Wolf program, output polarity requires you to decide.

Do you want it to:

- switch over your threshold point or
- work up to it and switch "off"

Normal means it will switch "on" after the threshold point.

Reverse means it will work up to this point.

We wish to switch the manifold "on" after our threshold point so we are selecting "Normal".

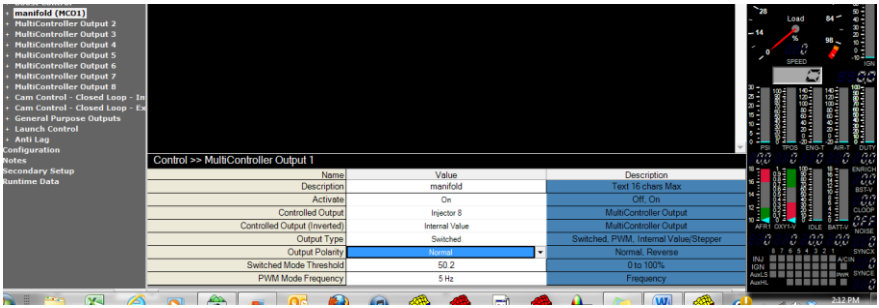
Control >> MultiController Output 1 >> Switched Mode Threshold

This is the point that you want the switching to take place. On our 3D graph we will be using the numbers of 0-100.

The switch point we will make “50”. This will become clearer as you read on but what this means is that at any point that our MCO value goes over “50” it will switch Injector 8 on.

Control >> MultiController Output 1 >> PWM Mode Frequency

If our control pin is to be PWM, this is where we would select the frequency that we want the valve to run at.



Now with that sorted you need to select the next folder down.

Control >> MultiController Output 1 >> MultiController 1 - 3D Table (Master)

In here you will see there are two parameters that can be selected, these are “X” & “Y” axes for your 3D table,

“X” axis is the lines running across the screen.

“Y” axis is the lines running up and down the screen.

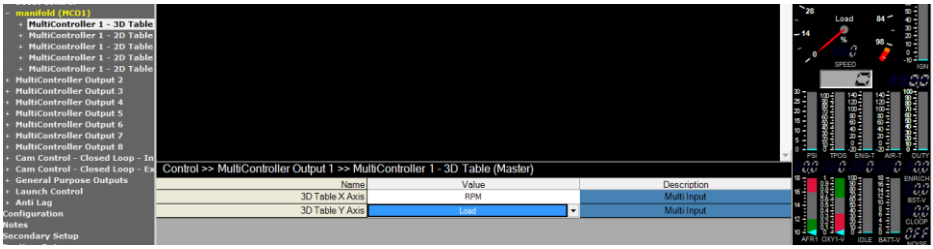
Control >> MultiController Output 1 >> MultiController 1 - 3D Table (Master) >> 3D Table X Axis

As this is a manifold that we are switching, let’s go with RPM across the page.

Control >> MultiController Output 1 >> MultiController 1 - 3D Table (Master) >> 3D Table Y Axis

I have found that with manifold control the best option for the "Y" axis is LOAD.

Now that these are set we will have control of the manifold RPM/LOAD.



Go to the 3D table:

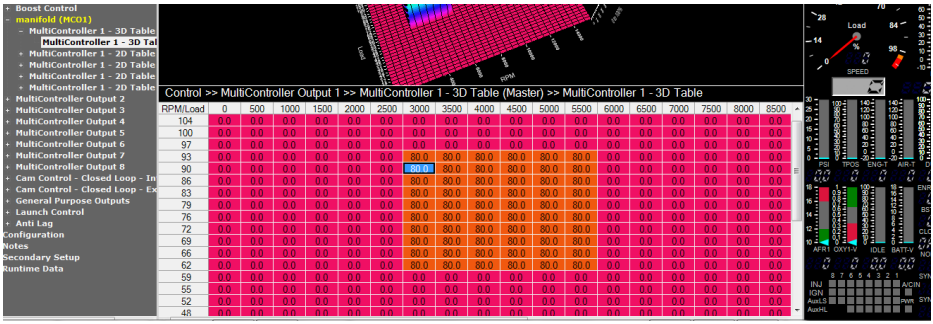
Control >> MultiController Output 1 >> MultiController 1 - 3D Table (Master) >> MultiController 1 - 3D Table

You will notice in here that we have a 3D table that has "RPM" across the top and "LOAD" up the left hand side. Now this should be all zeros in this map at this time.

Let's find our desired RPM for turning the manifold On/Off, also our desired Load point.

In this example I have set the MCO 3D graph from 80 to 3000-5500 RPM and 62-93% load. What this means is that as the parameters are met, e.g., go into the 80 squares of my MCO, it will turn on because my switch point threshold was set to 50, so we are exceeding this point.

You will notice I have gone back to 0 after 5500 RPM. This will now switch my manifold off due to the fact that it has gone below my threshold number.



This can now be adjusted by moving the “0” to “80” to find the best area for your manifold to work.

The reason I did not put 100 in the numbers is it gives us room to play if we want to make further adjustments.

Control >> MultiController Output 1 >> MultiController 1 - 2D Table 1

This table is a 2D table that allows another parameter to modify the value of the 3D table you have just made.

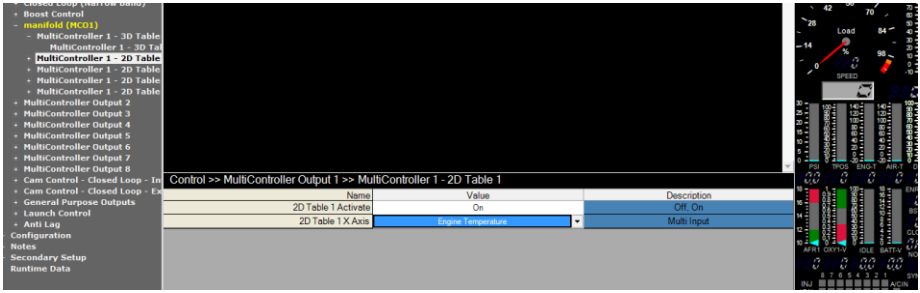
Control >> MultiController Output 1 >> MultiController 1 - 2D Table 1 >> 2D Table 1 Activate

“ON”/”OFF”, do you want it to affect the map or not?

Control >> MultiController Output 1 >> MultiController 1 - 2D Table 1 >> 2D Table 1 X Axis

What parameter do you want the 2D table to be controlled by?

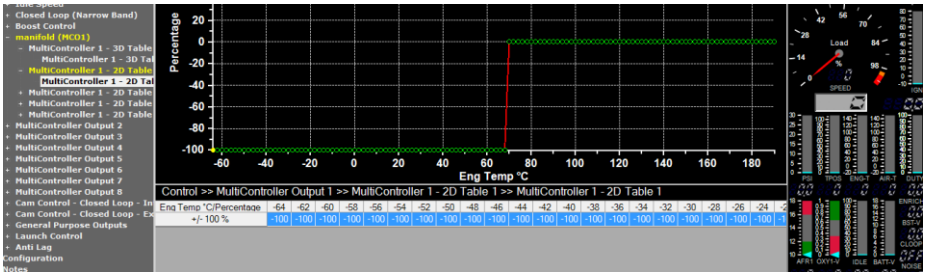
In this example we will use engine temperature. I am doing this so that when my engine is cold it will not allow the manifold to work properly allowing a sluggish drive when it is cold. This can assist in heating the engine up quicker and also stop allowing full power to the engine until operating temp is achieved.



Control >> MultiController Output 1 >> MultiController 1 - 2D Table 1 >> MultiController 1 - 2D Table 1

You will now see a table that has engine temperature going across the screen and -100% to +100% on the left hand side. This means I can now add or subtract at different temperatures to the number on my 3D table. So let's set this up so that up until 68º engine temp we will have no manifold control.

Do this by highlighting the numbers in the text bar below and dragging to desired temp then using your "<"or ">" keys move the line to where you want it.



Going by the picture, you can see I have subtracted 100% from the 3D table until 68º. This will bring the 80 number down to 0. So you are now not passing the switch point, and then back to normal.

This example was set up to show the use of a MCO using the 3D table and one of the 2D tables. There is another three 2D tables for further control.

Example 2: PWM line Pressure

Set up: knowing what you want to control with this and how.

Control >> MultiController Output 1

What MCO is being used for this part of the project?

Control >> MultiController Output 1 >> Description

This should be filled in with a friendly Title on what you are controlling. This way when you are tuning you will not forget about this parameter. In this example we will call this "Line Pressure".

Control >> MultiController Output 1 >> Activate

Do we want this MCO to work or not - "ON" or "Off".

Control >> MultiController Output 1 >> Controlled Output

This is the pin you pick to control your device with. If using an injector or ignition, make sure they are set as auxiliaries.

In this example we are going to use LS1. You need to use LS if you want to PWM your pin.

Control >> MultiController Output 1 >> Controlled Output (Inverted)

On some devices, not only do they require a drive pulse but also require an inverted signal at the same time.

If you are not too sure of your device, please contact Wolf EMS Pty Ltd for further instructions.

This area can be left blank in all other cases.

Control >> MultiController Output 1 >> Output Type

You have three choices here:

- Switched
- PWM (Pulse Width Modulated)
- Internal value/stepper motor

This is the output type you wish to drive. In this example we are using PWM as we just want to pulse the solenoid. By pulsing the solenoid with different amounts of duty cycle you can increase or decrease line pressure.

Control >> MultiController Output 1 >> Output Polarity

As explained throughout the Wolf program, "Output Polarity" means do you want it to switch over your threshold point or work up to it and switch off.

Normal means it will switch "on" after the threshold point.

"Reverse" means it will work up to this point.

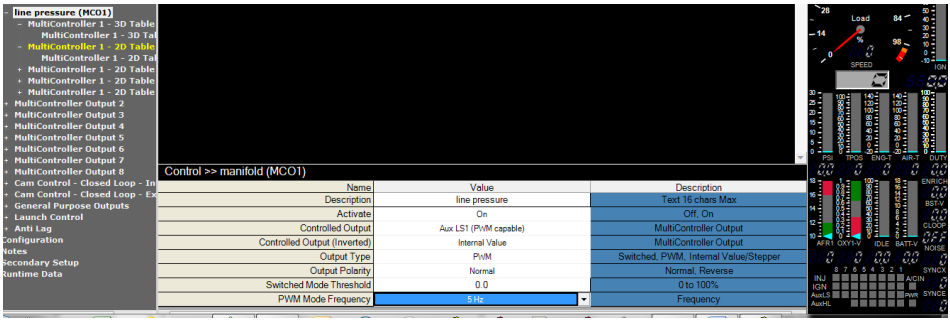
When using this in PWM mode think of it as "do I want to ground the solenoid for the amount of duty cycle asked for or let it go high for the amount of duty cycle asked for?" Normal will ground for the amount of duty cycle asked for.

Control >> MultiController Output 1 >> Switched Mode Threshold

When using PWM mode this parameter does not matter.

Control >> MultiController Output 1 >> PWM Mode Frequency

If we were to PWM our controlled output then this is where we would select the frequency that we want the valve to run at.



Now with that sorted you need to select the next folder down.

Control >> MultiController Output 1 >> MultiController 1 - 3D Table (Master)

In here you will see there are two parameters that can be selected. These are “X” & “Y” axis for your 3D table, “X” axis is the lines running across the screen, “Y” axis is the lines running up and down the screen.

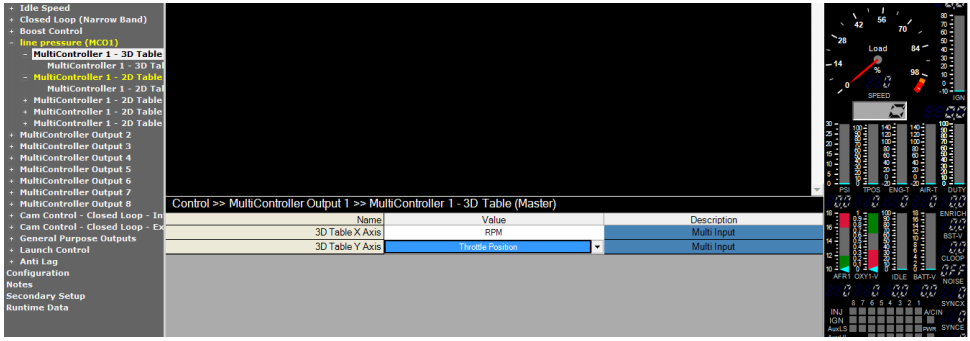
Control >> MultiController Output 1 >> MultiController 1 - 3D Table (Master) >> 3D Table X Axis

As this is line pressure the most common way of controlling it is RPM/TPOS so we will select RPM as our “X” axis.

Control >> MultiController Output 1 >> MultiController 1 - 3D Table (Master) >> 3D Table Y Axis

Now select Throttle position as your “Y” axis.

Now that these are set we will have control of the manifold RPM/TPOS.

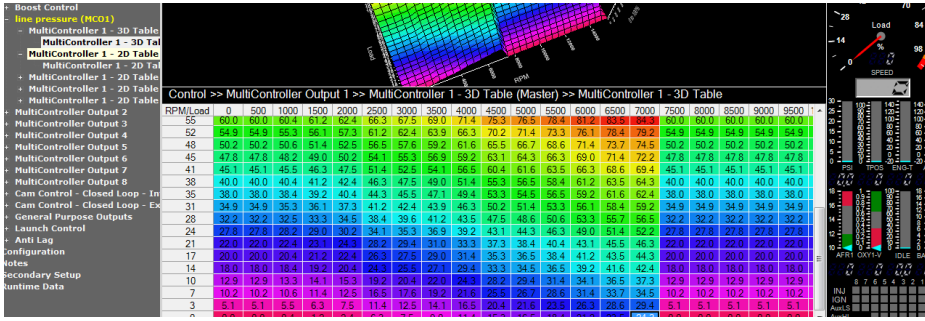


Go to the 3D table:

Control >> MultiController Output 1 >> MultiController 1 - 3D Table (Master) >> MultiController 1 - 3D Table

You will notice in here that we have a 3D table that has “RPM” across the top and “TPOS” up the left hand side. This should be all zeros in this map at this time.

In this example I have set the MCO 3D graph to show a range from 0-100. This is representative of the amount of duty cycle I wish to have driving the solenoid. At light throttle positions I have low numbers and as the RPM increases or throttle increases, I increase the amount of duty cycle to the solenoid.



This can now be adjusted by moving the values to find the best area for your line pressure to work.

Control >> MultiController Output 1 >> MultiController 1 - 2D Table 1

This table is a 2D table that allows another parameter to modify the value of the 3D table you have just made.

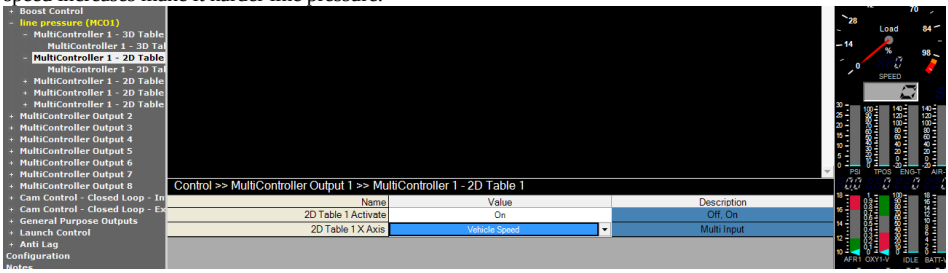
Control >> MultiController Output 1 >> MultiController 1 - 2D Table 1 >> 2D Table 1 Activate

“ON”/”OFF” - do you want it to affect the map or not?

Control >> MultiController Output 1 >> MultiController 1 - 2D Table 1 >> 2D Table 1 X Axis

What parameter do you want the 2D table to be controlled by?

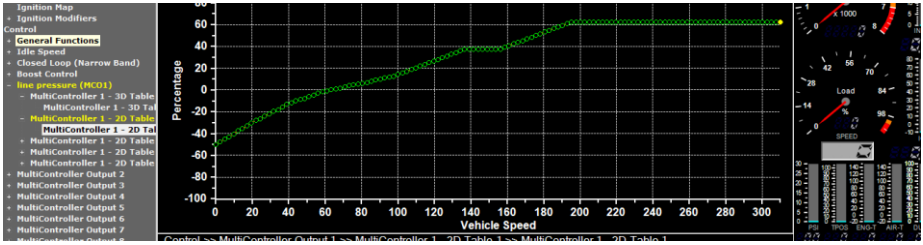
In this example we will use road speed. This will allow for soft line pressure at low vehicle speed and as the speed increases make it harder line pressure.



Control >> MultiController Output 1 >> MultiController 1 - 2D Table 1 >> MultiController 1 - 2D Table 1

You will now see a table that has Vehicle speed going across the screen and -100% to +100% on the left hand side. This means I can now add or subtract at different vehicle speed to the number on my 3D table.

So let's set this up so that at lower speed we are removing a percentage from our 3D graph number (so reducing duty cycle) and at higher speed adding to the number (increasing duty cycle) do this by highlighting the numbers in the text bar below and then using your "<"or ">" keys move the number to where you want it.



Control >> Cam Control - Closed Loop – Intake

The purpose of closed loop cam control is to allow the tuner to program in the desired amount of cam angle required at different points. The Wolf ECU takes into account the position of the crank and will pulse the solenoid to maintain perfect cam control.

This allows for quad cams to be tuned for maximum benefits out of your motor. In the 3D graph you can choose what parameters you wish to adjust the cams via e.g.: RPM/Load or RPM / Boost.

The cam's position can be watched in the centre gauges under cam angle inlet or exhaust, there is also an error parameter that will show how far out the cams are if they are mechanically out of range.

There are also four 2D graphs that can modify the cams to be effect in more parameters such as engine temperature, nitrous, boost, air temperature, EGTs...

Control >> Cam Control - Closed Loop - Intake >> Description

Names the cam you are controlling e.g.: left hand intake.

Control >> Cam Control - Closed Loop - Intake >> Activate

Turns the cam control either "on" or "off".

Control >> Cam Control - Closed Loop - Intake >> Type of Intake Cam Control

There are three options here: PWM, Switched and BMW Vanos.

PWM

PWM is a solenoid that can be pulsed to alter the advance/retard of the cam.

Switched

Switched is a solenoid that just gets turned "on" or "off" for activation of the cam (these are generally mechanically limited to a fixed position of cam timing)

BMW Vanos

BMW Vanos is used for this type of cam control.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 1 Sensor Input

This can be any of our inputs including trigger sync. Generally you will use the trigger sync to be the first cam sensor and then any other input for the other cams you wish to control.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 1 Sensor Signal Polarity

The edge of the sensor you are using to see - generally falling edge.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 1 Sensor Base Timing

The Base timing of the cam shaft can be set once the engine is running. Set the 3D graph up to read 0. Watch the Delivered intake cam timing. If this is showing 100 deg then fill this in at 100. Now use the intake cam error gauge and keep adding or reducing the degrees until you have no errors.

At this point it will be delivering “0” cam control.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 1 Controlled Output

Using LS. If PWM is required you can choose the output pin you are controlling the cam with.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 1 Output Control Polarity

If the solenoid has been wired up correctly then “Normal” will drive the solenoid correctly. If the solenoid has been wired incorrectly then turning this parameter to “Reverse” will drive the solenoid correctly. Wiring the solenoid incorrectly means 12v on the incorrect pin.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 1 Window Lower Tooth Count

This parameter should be done with an Oscilloscope. This is the window on the crank shaft that the cam sensor is in. This is the lower tooth number. When checking this, allow for cam movement. If the crank has 36 teeth on it, each tooth is worth 10 deg so your lower tooth count should be at least 6 teeth to the upper tooth count. This allows for 60 deg movement.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 1 Window Upper Tooth Count

This parameter should be done with an Oscilloscope. This is the window on the crank shaft that the cam sensor is in. This is the upper tooth number. When checking this, allow for cam movement. If the crank has

36 teeth on it, each tooth is worth 10 deg so your upper tooth count should be at least 6 teeth to the upper tooth count. This allows for 60 deg movement.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 2 Sensor Input

If using a second intake cam, what input pin are you using on that cam sensor?

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 2 Sensor Input Signal Polarity

The edge of the sensor you are using to see, generally falling edge.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 2 Sensor Base Timing

The Base timing of the cam shaft can be set once the engine is running. Set the 3D graph up to read 0. Watch the delivered intake cam timing. If this is showing 100 deg then fill this in at 100. Now use the intake cam error gauge and keep adding or reducing the degrees until you have no errors.

At this point it will be delivering “0” cam control.

Control >> Cam Control - Closed Loop - Intake >> intake Cam 2 Controlled Output

Using LS. If PWM is required you can choose the output pin you are controlling the cam with.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 2 Output Control Polarity

If the solenoid has been wired up correctly then “Normal” will drive the solenoid correctly. If the solenoid has been wired incorrectly then turning this parameter to “Reverse” will drive the solenoid correctly. Wiring the solenoid incorrectly means 12v on the incorrect pin.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 2 Window Lower Tooth Count

This parameter should be done with an Oscilloscope. This is the window on the crank shaft that the cam sensor is in. This is the lower tooth number. When checking this, allow for cam movement. If the crank has 36 teeth on it, each tooth is worth 10 deg so your lower tooth count should be at least 6 teeth to the upper tooth count. This allows for 60 deg movement.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 2 Window Upper Tooth Count

This parameter should be done with an Oscilloscope. This is the window on the crank shaft that the cam sensor is in. This is the upper tooth number. When checking this, allow for cam movement. If the crank has

36 teeth on it each tooth is worth 10 deg so your upper tooth count should be at least 6 teeth to the lower tooth count. This allows for 60 deg movement.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam Max Change

This enables the user to adjust the maximum amount of change allowed by the cam. So if 12 deg advance and 12 deg retard is what is required, then this is 24 deg of change allowed.

Control >> Cam Control - Closed Loop - Intake >> Switched Mode Threshold

When switched mode is selected then this is the threshold that once the cam control has gone past it will switch the output pin on or off.

Control >> Cam Control - Closed Loop - Intake >> PWM Mode Frequency

The frequency that your PWM solenoid will run at, all manufactures are different but a starting frequency is 120Hz.

Control >> Cam Control - Closed Loop - Intake >> P - PID Control

This is how fast you want the cam to react to changes. Suggested 0.0705

The larger the number the more steps it will allow to get to the desired cam position. If 15deg is required as the cam reaches 10 deg it will now look for 12.5 deg and then look for the desired amount.

The greater this number the faster your cams will move. **If this is set too fast over shooting will occur.**

Control >> Cam Control - Closed Loop - Intake >> I - PID Control

This function stops the fluctuation in cam control. Set the "P" and "D". If your cams are not staying stable, increase this number to help with stability. Suggested value 0.0030

Control >> Cam Control - Closed Loop - Intake >> D - PID Control

As "P" is starting to control the cam, and as it reaches its desired amount, "D" will take over and do the fine tuning closer to the required amount. Suggested value 0.0313.

The larger number entered will cause this to speed up.

Note: Too fast will cause over shooting and uncontrollable cam timing.

Control >> Cam Control - Closed Loop - Intake >> VNOS Tracking Speed

The speed that the Vanos works at. A greater number is faster and a smaller number is slower.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 3D Table (Master)

This is the 3D graph to set the cam timing up on. This works in -64 to +64 deg applying a number such as 10 in here will set the cam to 10 deg. At this point, you will be able to put the figure of 64 deg in here, but keep in mind that mechanically the cam may only be able to move 12 deg advanced, so this will now show errors on the screen when trying to move it this far.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 3D Table (Master) >> 3D Table X Axis

What Parameter you want to control the cams with in your "X" axis on the 3D table? An example would be RPM.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 3D Table (Master) >> 3D Table Y Axis

What Parameter you want to set to control the cams with in your "Y" axis on the 3D table? An example would be LOAD.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam 3D Table (Master) >> Intake Cam 3D Table

This is the 3D table you adjust to make changes.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam Trim 2D Table 1

This table can be used to modify your 3D table by another parameter. This can be set to use any parameter you require such as engine temperature or an input from your air intake to allow for switching when manifold is open or closed.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam Trim 2D Table 1 >> 2D Table 1 Activate
Turns the 2D table on/off

Control >> Cam Control - Closed Loop - Intake >> Intake Cam Trim 2D Table 1 >> 2D Table 1 X Axis
Sets what parameter you wish to use to control this 2D table.

Control >> Cam Control - Closed Loop - Intake >> Intake Cam Trim 2D Table 1 >> Intake Cam 2D Table 1

This is the table you will modify to change the 3D table. Depending on what you have chosen, it may be engine temperature. So you might minus cam timing until 50 deg engine temperature has been met and then have 0 modifications from there.

Control >> Cam Control - Closed Loop – Exhaust

The purpose of closed loop cam control is to allow the tuner to program in the desired amount of cam angle required at different points. The Wolf ECU takes into account the position of the crank and will pulse the solenoid to maintain perfect cam control.

This allows for quad cams to be tuned for maximum benefits out of your motor. In the 3D graph you can choose what parameters you wish to adjust the cams via e.g.: RPM/Load or RPM /Boost.

The cam's position can be watched in the centre gauges under cam angle inlet or exhaust, there is also an error parameter that will show how far out the cams are if they are mechanically out of range.

There are also four 2D graphs that can modify the cams to be effective in more parameters such as engine temperature, nitrous, boost, air temperature, EGT, etc...

Control >> Cam Control - Closed Loop - Exhaust >> Description

Names the cam you are controlling e.g.: left hand exhaust.

Control >> Cam Control - Closed Loop - Exhaust >> Activate

Turns the cam control "on" or "off".

Control >> Cam Control - Closed Loop - Exhaust >> Type of Intake Cam Control

There are three options here: PWM, Switched or BMW Vanos.

PWM PWM is a solenoid that can be pulsed to alter the advance/retard of the cam.

Switched Switched is a solenoid that just gets turned "on" or "off" for activation of the cam (these are generally mechanically limited to a fixed position of cam timing).

BMW Vanos BMW Vanos used for this type of cam control.

Control >> Cam Control - Closed Loop - Exhaust >> Cam 1 Sensor Input

This can be any of our inputs including trigger sync, generally you will use the trigger sync to be the first cam sensor and then any other input for the other cams you wish to control.

Control >> Cam Control - Closed Loop - Exhaust >> Cam 1 Sensor Signal Polarity

The edge of the sensor you are using to see, generally falling edge.

Control >> Cam Control - Closed Loop - Exhaust >> Cam 1 Sensor Base Timing

The Base timing of the cam shaft can be set once the engine is running. Set the 3D graph up to read 0. Watch the Delivered exhaust cam timing if this is showing 100 deg then fill this in at 100. Now use the exhaust cam error gauge and keep adding or reducing the degrees until you have no errors. At this point it will be delivering "0" cam control.

Control >> Cam Control - Closed Loop - Exhaust >> Cam 1 Controlled Output

Using an LS if PWM is required, you can choose the output pin you are controlling the cam with.

Control >> Cam Control - Closed Loop - Exhaust >> Cam 1 Output Control Polarity

If the solenoid has been wired up correct then "Normal" will drive the solenoid correctly. If the solenoid has been wired incorrectly then turning this parameter to "Reverse" will drive the solenoid correctly. Wiring the solenoid incorrectly means 12v on the incorrect pin.

Control >> Cam Control - Closed Loop - Exhaust >> Cam 1 Window Lower Tooth Count

This parameter should be done with an Oscilloscope. This is the window on the crank shaft that the cam sensor is in. This is the lower tooth number. When checking this, allow for cam movement. If the crank has 36 teeth on it each tooth is worth 10 deg so your lower tooth count should be at least 6 teeth to the upper tooth count, this allows for 60 deg movement.

Control >> Cam Control - Closed Loop - Exhaust >> Cam 1 Window Upper Tooth Count

This parameter should be done with an Oscilloscope. This is the window on the crank shaft that the cam sensor is in. This is the upper tooth number. When checking this, allow for cam movement. If the crank has 36 teeth on it each tooth is worth 10 deg so your upper tooth count should be at least 6 teeth to the upper tooth count. This allows for 60 deg movement.

Control >> Cam Control - Closed Loop - Exhaust >> Cam 2 Sensor Input

If using a second exhaust cam, this sets what input pin you are using for that cam sensor.

Control >> Cam Control - Closed Loop - Exhaust >> Cam 2 Sensor Input Signal Polarity

The edge of the sensor you are using to see, generally falling edge.

Control >> Cam Control - Closed Loop - Exhaust >> Cam 2 Sensor Base Timing:

The Base timing of the cam shaft can be set once the engine is running. Set the 3D graph up to read 0. Watch the Delivered exhaust cam timing. If this is showing 100 deg, then fill this in at 100. Now use the exhaust cam error gauge and keep adding or reducing the degrees until you have no errors.

At this point it will be delivering “0” cam control.

Control >> Cam Control - Closed Loop - Exhaust >> Cam 2 Controlled Output:

Using LS if PWM is required you can choose the output pin you are controlling the cam with.

Control >> Cam Control - Closed Loop - Exhaust >> Cam 2 Output Control Polarity

If the solenoid has been wired up correctly then “Normal” will drive the solenoid correctly. If the solenoid has been wired incorrectly then turning this parameter to “Reverse” will drive the solenoid correctly. Wiring the solenoid incorrectly means 12v on the incorrect pin.

Control >> Cam Control - Closed Loop - Exhaust >> Cam 2 Window Lower Tooth Count

This parameter should be done with an Oscilloscope. This is the window on the crank shaft that the cam sensor is in. This is the lower tooth number. When checking this, allow for cam movement. If the crank has 36 teeth on it, each tooth is worth 10 deg so your lower tooth count should be at least 6 teeth to the upper tooth count. This allows for 60 deg movement.

Control >> Cam Control - Closed Loop - Exhaust >> Cam 2 Window Upper Tooth Count

This parameter should be done with an Oscilloscope. This is the window on the crank shaft that the cam sensor is in. This is the lower tooth number. When checking this, allow for cam movement. If the crank has 36 teeth on it, each tooth is worth 10 deg so your lower tooth count should be at least 6 teeth to the upper tooth count. This allows for 60 deg movement.

Control >> Cam Control - Closed Loop - Exhaust >> Cam Max Change

This allows the user to adjust the maximum amount of change allowed by the cam. If 12 deg advance and 12 retard is what is required, this is 24 deg of change allowed.

Control >> Cam Control - Closed Loop - Exhaust >> Switched Mode Threshold

When "switch" mode is selected then this is the threshold that once the cam control has gone past it will switch the output pin "on" or "off".

Control >> Cam Control - Closed Loop - Exhaust >> PWM Mode Frequency

The frequency that your PWM solenoid will run at. All manufactures are different but a starting frequency is 120Hz.

Control >> Cam Control - Closed Loop - Exhaust >> P - PID Control

This is how fast you want the cam to react to changes. Suggested: 0.0705

The larger the number, the more steps it will allow to get to the desired cam position. If 15^0 is required, as the cam reaches 10^0, it will now look for 12.5^0, then look for the desired amount.

The greater this number the faster your cams will move. If this is set too fast, over shooting will occur.

Control >> Cam Control - Closed Loop - Exhaust >> I - PID Control

This function stops the fluctuation in cam control. Set the "P" and "D". Then if your cams are not staying stable, increase this number to help with stability. Suggested value: .0030

Control >> Cam Control - Closed Loop - Exhaust >> D - PID Control

As "P" is starting to control the cam as it reaches its desired amount, "D" will take over and do the fine tuning closer to the required amount. Suggested amount: 0.0313.

The larger number entered will cause this to speed up.

Note: Too fast will cause over shooting and uncontrollable cam timing.

Control >> Cam Control - Closed Loop - Exhaust >> VNOS Tracking Speed

The speed that the Vanos works at. A greater number is faster and a smaller number is slower.

Control >> Cam Control - Closed Loop - Exhaust >> Exhaust Cam 3D Table (Master)

This is the 3D graph to set the cam timing up on. This works in -64^0 to $+64^0$, applying a number such as 10 in here will set the cam to 10 deg. At this point, you will be able to put the figure of 64 deg in here but keep in mind that mechanically the cam may only be able to move 12 deg advanced, so this will now show errors on the screen when trying to move this far.

Control >> Cam Control - Closed Loop - Exhaust >> Exhaust Cam 3D Table (Master) >> 3D Table X Axis

Sets what parameter you want to control the cams with in your "X" axis on the 3D table. An example will be RPM.

Control >> Cam Control - Closed Loop - Exhaust >> Exhaust Cam 3D Table (Master) >> 3D Table Y Axis

Sets what parameter you want to control the cams with in your "Y" axis on the 3D table. An example will be LOAD.

Control >> Cam Control - Closed Loop - Exhaust >> Exhaust Cam 3D Table (Master) >> Intake Cam 3D Table

This is the 3D table you adjust to make changes.

Control >> Cam Control - Closed Loop - Exhaust >> Exhaust Cam Trim 2D Table 1

This table can be used to modify your 3D table by another parameter. This can be set to use any parameter you require such as engine temperature or an input from your air intake to allow for switching when manifold is open or closed.

Control >> Cam Control - Closed Loop - Exhaust >> Exhaust Cam Trim 2D Table 1 >> 2D Table 1 Activate

Turns the 2D table on/off.

Control >> Cam Control - Closed Loop - Exhaust >> Exhaust Cam Trim 2D Table 1 >> 2D Table 1 X Axis

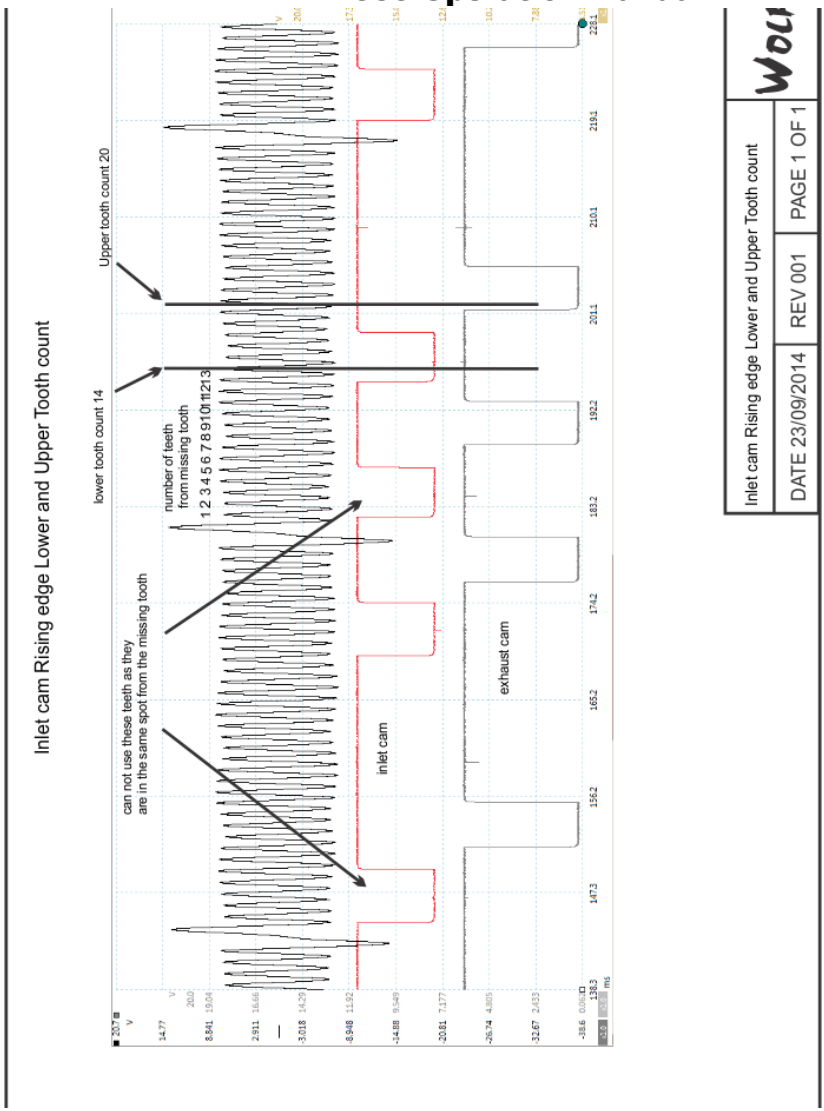
Sets what parameter you wish to use to control this 2D table.

Control >> Cam Control - Closed Loop - Exhaust >> Exhaust Cam Trim 2D Table 1 >> Exhaust Cam 2D Table 1

This is the table you will modify to change the 3D table. Depending on what you have chosen it may be engine temperature, so you might minus cam timing until 50^0 engine temperature has been met and then have 0 modifications from there.

This Illustration shows the Upper and Lower tooth count when setting up for closed loop cam control

This example shows both inlet and exhaust cams and is showing rising edge on the inlet



Control >> General Purpose Outputs

General Purpose Outputs (or GPO"s) are a switched output that can be controlled by 2 parameters.

Some examples of GPO usage:

- Input switches for NOS to activate warning light on dash.
- Switched cam timing.
- Water spray.
- Trans brake input.
- Automatic transmission control

As shown above, the GPO"s are very flexible and can control almost any project requirement.

Example of controlling water pump.

In this example we are switching a water pump on. We are using injector 7 to control a relay to turn the pump on. I am using both switch point A and B.

Switch point A is controlling the temperature that the water pump will start to work at. This has been set to 40 to allow the engine to warm up quicker.

Switch point B is controlling the RPM that the pump will start working at. This is set at 300 RPM so that the pump is not running when the key is just turned on and engine is not running.

Description: Water pump
Activate: On
Controlled Pin: Injector 7

GPO Switch Point A
Activated by: Engine Temperature
Switch Point: 40
Hysteresis: 3
Output Polarity: Normal

GPO Switch Point B
Activated by: RPM
Switch Point: 300
Hysteresis: 50
Output Polarity: Normal

The controlled output pin can be user defined and will turn this pin on if parameters are met. When in GPO switch point "A" and "B", there are 4 points to look at. The GPO will activate by using either switch point "A" or "A and B" together.

Activated by

This parameter can be activated by desired parameters such as engine temp, TPos or MCO"s. It can also be activated by an input pin such as an Aux LS.

Switch Point

This switch point, depending on the elected parameter will switch it "on" or "off". As an example if activated by engine temp we have a switch point of 89^0, this will turn the GPO on at this temperature.

Hysteresis

A hysteresis stops high speed relay shudder. As in our example of using engine temp, we have a switch point of 89^0. This is the temp that we are switching on at. Having a hysteresis of 3 means that the temperature has to cool down by 3^0 degrees before the GPO switches off.

Output Polarity

Normal and Reverse.

Normal means the GPO switch on above the setting in the switch point.

Reverse will mean it will be on up until the switch point.

Launch control function

Used generally with force fed engines. This allows for the vehicle to gain optimum power at a predetermined RPM. Allowing for maximum power at low RPM enables the vehicle to launch from the start line with maximum power. This is achieved by using rev limiters, over fuelling and retarding ignition timing. This

causes the exhaust to get hot and the turbo to spool harder and faster, allowing for more boost than normal at a lower RPM.

We need to look at certain parameters. TPos(Throttle Position) only wanting this function to work above a predetermined setting allows for operation to only happen at close to or on WOT (wide open throttle).

As you do not want this function to work all the time we need to have a secondary input. This will stop the function from working when the throttle is applied in normal operation or when racing after the launch control has been used. The secondary function can be wheel speed or an auxiliary input (such as a switch). We may use more than one secondary input as described below.

Example: Launch control is turned on, it will only work if the TPos is over 85% and wheel speed is under 10km/h (at this point we need another input as in normal driving these parameters can be met just taking off at the lights) therefore another secondary switch is needed. This can be a switch to activate launch control so if switch is not "on" then normal driving can be achieved. A third secondary input may be used which could also be an auxiliary input or a sensor input from the Wolf ECU. It could be an engine temperature input so launch control will not activate until engine is warm enough.

Control >> Launch Control >> Activate

Controls whether "Launch control" can be operated or not.

Control >> Launch Control >> Active Above TPos

Launch control will only work above this setting.

Control >> Launch Control >> Inactive Below TPos

Launch control will not operate under this parameter after being turned on by its "working above" settings. This allows for a hysteresis to be set so that the TPos function will turn "on" and "off" and not fluctuate between "on/off".

Control >> Launch Control >> Activate with Wheel Speed

This allows a secondary input of speed to be used. This does not have to be active to use the launch control. Set to "on" allows the launch control to use the speed input from the Wolf ECU.

Control >> Launch Control >> Active Below Wheel Speed

This allows the "launch control" to work below this speed.

Control >> Launch Control >> Inactive Above Wheel Speed

Launch control will not work above this speed, even if the other parameters are met.

Control >> Launch Control >> Launch Control Alert Output Pin

This allows for a warning light or device to be used to warn the driver that Launch control is being used. It can be defined as an "Auxiliary Output" or "Injector/Ignition Pin" that has been set up as an auxiliary.

Control >> Launch Control >> Launch Control Alert Pin Output Polarity

"Normal" (grounds the output pin in its normal state)

"Reverse" (grounds the output pin when activated) need to run a check on this.

Control >> Launch Control >> Launch Boost Pressure

If boost pressure is reached then rev limit should be activated to reduce boost. The rev limit is selected in the next section.

Control >> Launch Control >> Launch Rev Limit Type

In the **Control >> General Functions >> Rev Limit** area there are 4 different rev limits. This allows for different functions to be set and used throughout the program. Selecting one of the four rev limits can allow for desired rev limiting to work on launch control.

Control >> Launch Control >> Launch Delivered Fuel

When launch control is active it will deliver a desired amount of fuel. This allows for over fuelling for running on launch control.

Control >> Launch Control >> Ignition Delivery Type

When launch control is active we need to retard the ignition. Sometimes we need to go further than what it allows from the map so we put in a parameter that allows us to retard from zero as well as from the map.

Control >> Launch Control >> Launch Delivered Ignition (should be: Control >> Launch Control >> Launch Delivered Ignition retard)

The amount of ignition you wish to retard when launch is activated.

Control >> Launch Control >> Maximum Activation Seconds

As launch control is very dangerous and melting parts in the motor is quite a possibility. We want to be able to turn the launch control off when the desired time is reached even if all parameters are still met. When launch control has run its time it will just go into normal operation of the map.

Control >> Launch Control >> Activation Switch 1

A secondary input allowing for further control of launch control.

Control >> Launch Control >> Activation Switch 1 >> Launch Switch Activate

Activates secondary input “on/off” only. This allows for control of a secondary input by turning “on/off”.

Control >> Launch Control >> Activation Switch 1 >> Launch Switch Sensed By

Determines what pin or sensor is to be used.

Control >> Launch Control >> Activation Switch 1 >> Launch Activate Switch Point

The switch point of the input to be used e.g.: Aux LS1 switch point 500, so as it goes past 500 it will switch on.

Control >> Launch Control >> Activation Switch 1 >> Launch Activate Switch Hysteresis

This allows for a point that is less than the determined point to stop high speed switching between the “on/off” points.

Control >> Launch Control >> Activation Switch 1 >> Launch Switch Polarity

Want the secondary switch point to work up to the desired point or over the desired point.

“Negative” works over, while “Positive” works up to switch point.

Control >> Launch Control >> Activation Switch 2

A secondary input allowing for further control of launch control.

Control >> Launch Control >> Activation Switch 2 >> Launch Switch Activate

Activates secondary input “on/off” only. This allows for control of a secondary input and only turns the secondary input “on” or “off”.

Control >> Launch Control >> Activation Switch 2 >> Launch Switch Sensed By

Determines what pin or sensor is to be used.

Control >> Launch Control >> Activation Switch 2 >> Launch Activate Switch Point

The switch point of the input to be used e.g.: Aux LS1 switch point 500 - so as it goes past 500 it will switch on.

Control >> Launch Control >> Activation Switch 2 >> Launch Activate Switch Hysteresis

Allows for a point that is less than the determined point to stop high speed switching between the “on/off” points.

Control >> Launch Control >> Activation Switch 2 >> Launch Switch Polarity

Want the secondary switch point to work up to the desired point or over the desired point.

“Negative” works over, while “Positive” works up to switch point.

Control >> Antilag

Allows for engine power to remain while gear changes are made. This allows boost to be maintained and rev limiting to be implemented.

Control >> Antilag >> Activate

Turns “on/off” Antilag.

Control >> Antilag >> Active Above TPos

The Throttle position you want the Antilag to work above.

Control >> Antilag >> Inactive Below TPos

The throttle position, the Antilag turns “off” under this parameter.

Control >> Antilag >> Activate with Wheel Speed

If a wheel speed sensor is used, this parameter will allow you to turn “on/off” if wheel speed is being used.

Control >> Antilag >> Active Above Wheel Speed

The wheel speed above which the Antilag will work.

Control >> Antilag >> Inactive Below Wheel Speed

The lowest wheel speed that you want the Antilag to work, below this speed it will not work.

Control >> Antilag >> Antilag Alert Output Pin

If a light has been wired in, then dedicate the pin in this area or it can be used as internal value. This allows for use of the Antilag in the program for modifications to the map when Antilag is on.

Control >> Antilag >> Antilag Alert Pin Output Polarity

Do you want the output pin to be “on” until activation or turn on when activated?

“Normal” will turn on when activated, “reverse” will work up till it operates and then turn off.

Control >> Antilag >> Antilag Boost Pressure

Over boost cut will work if this pressure is reached.

Suggest 3 psi higher than running pressure.

Control >> Antilag >> Antilag Rev Limit Type

This allows you to select one of the four rev limit modes. You can then set that mode to be activated in the way you require to maintain boost. e.g.: Soft cut in at almost redline

Control >> Antilag >> Antilag Delivered Fuel

When Antilag is activated, you can nominate the amount of fuel you wish to give the engine. More fuel will heat the turbo up and allow for boosting to increase.

Control >> Antilag >> Ignition Delivery Type

When Antilag is activated you can give a nominated amount of ignition retard. In this area it will ask do you want to retard from the "Ignition" map or retard from "Zero". If you retard from map you might only want to retard by -10deg and this will still keep some form of timing in the map for torque on the motor. If you want to retard further you can retard from Zero and this will retard further.

Control >> Antilag >> Antilag Ignition Retard

The amount you wish to retard ignition timing by.

Control >> Antilag >> Activation Switch 1

You may want to use an Antilag switch so that Antilag will not activate unless this switch is on.

Control >> Antilag >> Activation Switch 1 >> Antilag Switch Activate

Changes the switch parameter "on" or "off".

Control >> Antilag >> Activation Switch 1 >> Antilag Switch Sensed By

What input pin you are using?

Control >> Antilag >> Activation Switch 1 >> Antilag Activate Switch Point

The switch point you want this parameter to work above, see input pin set up.

Control >> Antilag >> Activation Switch 1 >> Antilag Activate Switch Hysteresis

Set this so that high speed switching does not happen. If you happen to be close to the switch point it can turn “off/on/off”, so set this hysteresis to be at a point lower than your switch point.

Control >> Antilag >> Activation Switch 1 >> Antilag Switch Polarity

“Reverse” will work up to the switch point, “normal” will work over the switch point.

Control >> Antilag >> Activation Switch 2 (Clutch)

Along with a switch to activate Antilag, a clutch switch is suggested. This will work in conjunction with all of the other parameters.

Control >> Antilag >> Activation Switch 2 (Clutch) >> Clutch Switch Activate

Turns this parameter “on/off”.

Control >> Antilag >> Activation Switch 2 (Clutch) >> Clutch Switch Sensed By

What input pin is being used?

Control >> Antilag >> Activation Switch 2 (Clutch) >> Clutch Switch Point

What switch point you want to use, see input set up.

Control >> Antilag >> Activation Switch 2 (Clutch) >> Clutch Switch Hysteresis

Set this so that high speed switching does not happen. If you happen to be close to the switch point it can turn “off/on/off”, so set this hysteresis to be at a point lower than your switch point.

Control >> Antilag >> Activation Switch 2 (Clutch) >> Clutch Switch Polarity

“Reverse” will work up to the switch point, “normal” will work over the switch point.

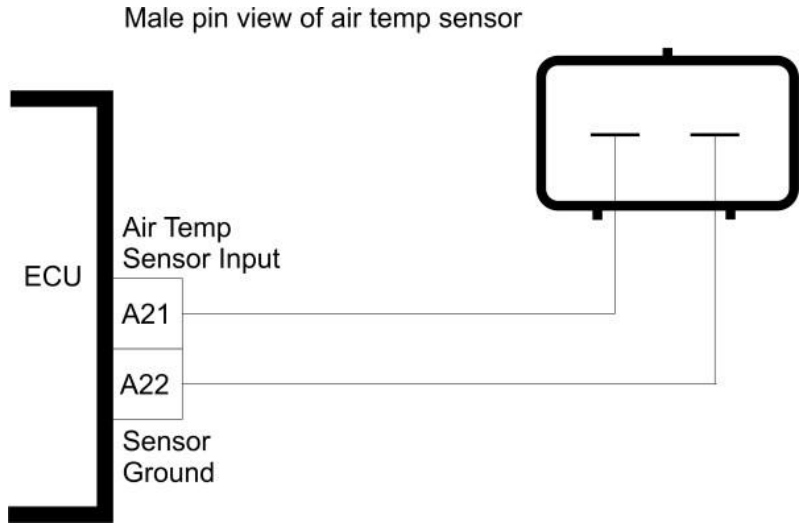
Configuration >> Sensor Setup >> Air Temperature

This section allows the user to setup the filtration level of the air temperature sensor.

Configuration >> Sensor Setup >> Air Temperature >> Filter Level (Jump to Target)

This is used to filter the input signal of the Air Temperature sensor. The Wolf ECU will average out the input signal voltage to maintain a smoother readout. A lower percentage will have a stronger averaging effect, filtering out noise and sudden spikes in input voltage. A higher percentage will mean a less averaging effect which will allow most of the input signal through.

Basic wiring schematic for 2 Pin Air Temp Sensor:



Note that this is the typical way that this component is wired and that some products may differ from the above schematic.

It is usual for an air temp sensor to not have a particular polarity (i.e. ground / sensor input can be put on either pin) however when wiring an engine bay it is good practice to keep a consistency. For example, keep the **ground** of the air temp sensor and engine temp sensor to the left pin.

Configuration >> Sensor Setup >> Air Temperature >> Calibration Table

This allows the user to calibrate the Air Temperature sensor.

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

On the "x" axis is the input sensor voltage. It ranges from 0 to 4.98 volts. The corresponding temperature is represented on the "y" axis. To calibrate the sensor, the user must link the output voltage to the corresponding correct real temperature.

When in this table, pressing the "x" button will adjust the degree of adjustability. The options are visible in the bottom middle of the screen.

"X" axis: 1:1 - Adjustments can be made every 0.02 volts.

"X" axis: 1:2 - Adjustments can be made every 0.04 Volts. Values will interpolate between adjustable points.

"X" axis: 1:4 - Adjustments can be made every 0.08 Volts. Values will interpolate between adjustable points.

"X" axis: 1:8 - Adjustments can be made every 0.16 Volts. Values will interpolate between adjustable points.

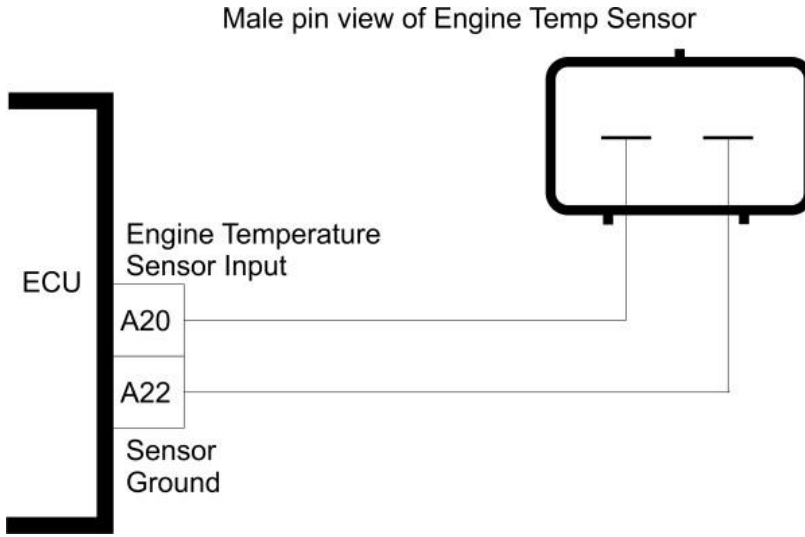
Configuration >> Sensor Setup >> Engine Temperature

This section allows the user to setup the filtration level of the Engine Temperature sensor.

Configuration >> Sensor Setup >> Engine Temperature >> Filter Level (Jump to Target)

This is used to filter the input signal of the Engine Temperature sensor. The Wolf ECU will average out the input signal voltage to maintain a smoother readout. A lower percentage will have a stronger averaging effect, filtering out noise and sudden spikes in input voltage. A higher percentage will mean a less averaging effect, which will allow most of the input signal through.

Basic wiring schematic for 2 Pin Engine Temp Sensor:



Note: this is the typical way that this component is wired and that some products may differ from the above schematic.

It is usual for an engine temperature sensor to not have a particular polarity (i.e. ground / sensor input can be put on either pin) however when wiring an engine bay it is good practice to keep a consistency. For example, keep the **ground** of the air temp sensor and engine temp sensor to the left

Configuration >> Sensor Setup >> Engine Temperature >> Calibration Table

This allows the user to calibrate the Engine Temperature sensor.

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

On the "x" axis is the input sensor voltage. It ranges from 0 to 4.98 volts. The corresponding temperature is represented on the "y" axis. To calibrate the sensor, the user must link the output voltage to the corresponding correct real temperature.

When in this table, pressing the "x" button will adjust the degree of adjustability. The options are visible in the bottom middle of the screen.

"X" axis: 1:1 - Adjustments can be made every 0.02 volts.

"X" axis: 1:2 - Adjustments can be made every 0.04 Volts. Values will interpolate between adjustable points.

"X" axis: 1:4 - Adjustments can be made every 0.08 Volts. Values will interpolate between adjustable points.

"X" axis: 1:8- Adjustments can be made every 0.16 Volts. Values will interpolate between adjustable points.

Configuration >> Sensor Setup >> Load

This page allows the user to select and setup the load sensor.

Configuration >> Sensor Setup >> Load >> Load Sensor

This offers the choice of which sensor will be used to reference all load related maps, tables and adjustments.

MAF: Mass Air Flow sensor.

This would be an external MAF sensor that is plumbed in the path of intake air, generally (but not always) directly after the air cleaner.

MAP: Manifold Absolute Pressure sensor.

The internal map sensor, which is suitable for pressures up to ~30psi, of the Wolf ECU is usually used. It should be joined into the plenum, between the throttle body(s) and intake runners of the head via a hose.

TPOS: Throttle position sensor.

This would be used as a load sensor for engines that do not have a great deal of vacuum, like engines with individual throttle bodies.

Configuration >> Sensor Setup >> Load >> Transient Enrichment Sensor

This dictates which sensor will be used for transient fuel modifiers. If MAP is used, it must be a smooth signal otherwise transients will be falsely activated through sudden spikes.

Configuration >> Sensor Setup >> Load >> MAP/MAF Sensor Used

This dictates whether the Wolf ECU internal MAP sensor is to be used, or if an external MAP sensor is to be used for load sensing (if selected) and for boost and vacuum readouts.

Configuration >> Sensor Setup >> Load >> Load TPos Special Control

This can be used for setups that have a poor or erratic vacuum signal at idle and hence the MAP sensor cannot be used for load sensing under idle conditions. This allows the ECU to use the TPOS sensor as the load signal source under idle/ near idle conditions and switch to the MAP sensor under normal driving conditions.

Configuration >> Sensor Setup >> Load >> Load TPos Special Control >> TPos to MAP Changeover Activate

This turns the Load TPos Special Control “on” or “off”.

Configuration >> Sensor Setup >> Load >> Load TPos Special Control >> TPos > Voltage changeover to MAP

This sets voltage level output of the TPos that the load sensor will switch over from the TPos to the MAP sensor. Below this figure TPos Voltage output will be used for load sensing. Above this figure the MAP voltage output will be used for load sensing.

Configuration >> Sensor Setup >> Load >> Load MAP Synchronised Reading

This setting is specifically for Harley REF/ SYNC mode.

Configuration >> Sensor Setup >> Load >> Load MAP Synchronised Reading >> MAP Synchronised Read

In the Harley REF/SYNC mode, this can be turned “On” to allow the MAP sensor to be read perfectly aligned with the cylinder locations, allowing the largely pulsing MAP sensor to still be used for the Load source.

Configuration >> Sensor Setup >> Load >> Load MAP Synchronised Reading >> MAP Synchronised Read Every 2 Revs

The MAP Synchronised Reading can be aligned every engine revolution, or every second revolution to compensate for non-symmetrical cylinder firing.

This is “On” for the Harley REF/SYNC mode that it applies to.

Configuration >> Sensor Setup >> Load >> Load MAP Synchronised Reading >> MAP Synchronised Read Every 2 Revs

Set the REF trigger tooth that the MAP sensor read is synchronised to. Used to align the sensor to read a clean wide signal range of the MAP sensor pulsing phase.

Configuration >> Sensor Setup >> Internal MAP

This page allows the user to adjust the settings for the Wolf ECU internal MAP sensor.

Configuration >> Sensor Setup >> Internal MAP >> Filter Level (Jump to Target)

This is used to filter the input signal of the internal MAP sensor. The Wolf ECU will average out the input signal voltage to maintain a smoother readout. A lower percentage will have a stronger averaging effect, filtering out noise and sudden spikes in input voltage. A higher percentage will mean a less averaging effect, which will allow most of the input signal through.

Configuration >> Sensor Setup >> Internal MAP >> MAP Sensor Atmospheric (Voltage)

This sets what output voltage of the internal MAP sensor the Wolf ECU will recognise as atmospheric pressure. This is used in calculating Boost and Vacuum readouts.

Configuration >> Sensor Setup >> Internal MAP >> MAP Sensor Full Range (kPa)

This is the functional range of the internal MAP sensor. This is used in calculating Boost and Vacuum readouts. It is measured from complete vacuum to the maximum pressure the sensor can read.

The default value for this is 304 kPa.

Configuration >> Sensor Setup >> Internal MAP >> Calibration Table

This allows the user to calibrate the Internal MAP sensor.

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

On the “X” axis is the input sensor voltage. It ranges from 0 to 4.98 volts. The corresponding load percentage is represented on the “Y” axis. To calibrate the sensor, the user must link the output voltage to the corresponding correct load percentage.

It is generally recommended that a straight line be used from 0.0% at 0 Volts to 106.6% at 4.98 Volts.

When in this table, pressing the “X” button will adjust the degree of adjustability. The options are visible in the bottom middle of the screen.

Configuration >> Sensor Setup >> Throttle Position:

In this parameter you will set up the throttle position sensor, the Wolf ECU uses the throttle position sensor for things such as idle control and transients.

Configuration >> Sensor Setup >> Throttle Position >> Calibration Mode:

There are two modes you can use: “calibration table” or “min/max”.

Calibration table

You can use the calibration table to set the way the Wolf ECU sees the throttle move. You may have a throttle that is very sensitive or multi throttle, so little movement gives big changes in air quantity. In this graph you can make the throttle look and perform any way you require.

Min/Max

Sets throttle to read minimum voltage and maximum voltage and set a lineal line between the two.

Configuration >> Sensor Setup >> Throttle Position >> Closed Throttle Voltage Cal

Sets the “closed throttle” voltage. With the throttle closed, use “< >” to set the voltage your TPos is reading. You work the value down until you have just gone to “0” so moving the throttle slightly it will register on the gauge.

Note: If you have the TPos Min/Max Mode Invert Signal turned on, this parameter now becomes your “OPEN” throttle voltage.

Configuration >> Sensor Setup >> Throttle Position >> Open Throttle Voltage Cal

With key on and engine off, go wide open throttle. Now set this voltage using “< >”. You want the throttle gauge to read 107. Set this back off slightly and the throttle gauge should move down with this movement.

Note: If you are using TPos Min/Max Mode Invert Signal on, then this parameter is your “CLOSED” voltage.

Configuration >> Sensor Setup >> Throttle Position >> Filter Level (Jump to Target)

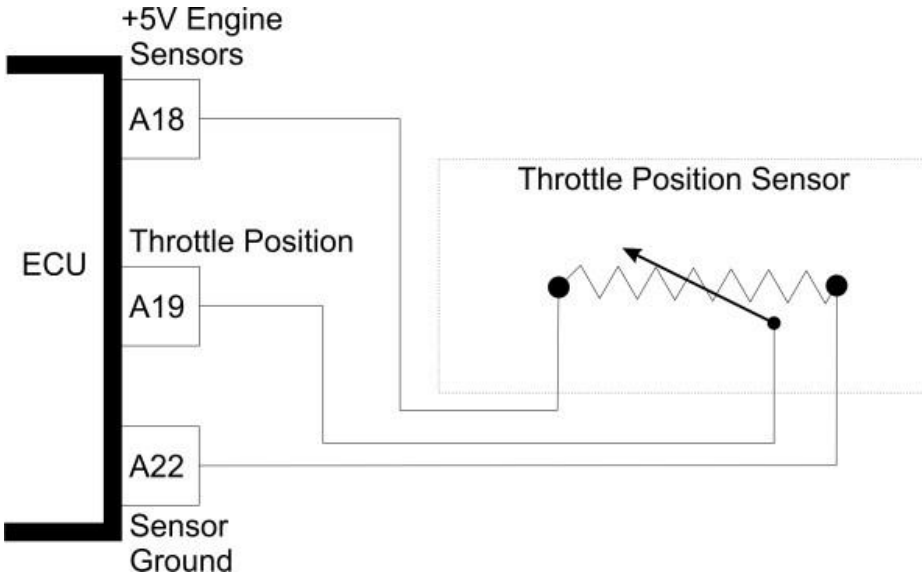
How quick you want the Wolf EU to sample the TPos. If you have a sensor that is a bit erratic, you can slow this down and it may help the situation.

Suggested value: 87.5%

Configuration >> Sensor Setup >> Throttle Position >> TPos Min/Max Mode Invert Signal

If throttle position switch has been wired incorrectly, you can still read the value by inverting the signal. Turning this on will read the throttle inverted.

Basic wiring schematic for throttle position sensor:



Note: This is the typical way that this component is wired and that some products may differ from the above schematic.

Configuration >> Sensor Setup >> Trigger REF

This allows the user to set up the Trigger Reference sensor.

Configuration >> Sensor Setup >> Trigger REF >> REF Degrees BTDC

This is used to set the trigger point (in degrees BTDC of cylinder 1) of the REF trigger sensor to gain pin point accuracy in ignition and timing delivery systems.

This can be set by using ignition lock to a suitable value. Use a timing light to inspect delivered timing then adjust the “REF Degrees BTDC” value until the inspected timing matches that of the ignition lock.

REF Degrees BTDC must not be greater than the number of degrees between cylinder events e.g. 4 cylinder has 180 deg between events, 6 cylinder has 120 deg between events, V8 has 90 deg between events.

Configuration >> Sensor Setup >> Trigger REF >> REF Polarity

Choose the appropriate trigger edge that the Wolf ECU will use as a trigger point. When using a reluctor, it is recommended to use “falling edge” however this may be different for various vehicles.

Configuration >> Sensor Setup >> Trigger REF >> REF Input Type

Sets the type of trigger sensor. Options are “Reluctor” sensors and “Hall Effect” sensors. Optical sensors should generally be classed as a Hall sensor. As a rule of thumb, Reluctor sensors are generally two wire. If unsure, contact Wolf EMS Pty Ltd to see if a listing is available.

Configuration >> Sensor Setup >> Trigger REF >> REF Pull-up Enabled

This enables the internal pull-up resistor on the REF input pin. This will need to be “On” when using a Hall Effect or optical Trigger sensor.

Configuration >> Sensor Setup >> Trigger REF >> REF Threshold Type:

There are 3 REF Threshold Types used when using a Reluctor Trigger Sensor: Adaptive, Fixed and Zero Crossing.

Adaptive

As the engine speed and reluctor input voltage rises, the reluctor trigger threshold rises to adaptively filter out growing input signal wobble and noise.

Fixed

A fixed low voltage is used for the reluctor trigger threshold.

Zero Crossing

The zero voltage crossing point is used for the reluctor trigger threshold.

Suggested value: Adaptive

Configuration >> Sensor Setup >> Trigger REF >> REF RC Filter

An extra RC based filter can be applied to the REF input trigger signal processor to filter out unwanted electrical or trigger noise.

Configuration >> Sensor Setup >> Trigger SYNC

This allows the user to set up the trigger synchronising sensor.

Configuration >> Sensor Setup >> Trigger SYNC >> SYNC Polarity

Choose the appropriate trigger edge that the Wolf ECU will use as a trigger point. When using a reluctor, it is recommended to use **falling edge**, however this may be different for various vehicles.

Configuration >> Sensor Setup >> Trigger SYNC >> SYNC Input Type

This sets the type of trigger sensor. Options are “Reluctor” sensors and “Hall Effect” sensors. Optical sensors should generally be classed as “Hall”. As a rule of thumb, “Reluctor” sensors are two wire but not in all cases. If unsure, contact Wolf EMS Pty Ltd to see if a listing is available.

Configuration >> Sensor Setup >> Trigger SYNC >> SYNC Pull-up Enabled

This enables the internal pull-up resistor on the SYNC input pin. This will need to be “On” when using a Hall Effect or optical Trigger sensor.

Configuration >> Sensor Setup >> Trigger SYNC >> SYNC Threshold Type

There are 3 SYNC Threshold Types used when using a Reluctor Trigger Sensor: Adaptive, Fixed and Zero Crossing.

Adaptive

As the engine speed and reluctor input voltage rises, the reluctor trigger threshold rises to adaptively filter out growing input signal wobble and noise.

Fixed

A fixed low voltage is used for the reluctor trigger threshold.

Zero Crossing

The zero voltage crossing point is used for the reluctor trigger threshold.

Suggested value: Adaptive

Configuration >> Sensor Setup >> Trigger SYNC >> SYNC RC Filter

An extra RC based filter can be applied to the SYNC input trigger signal processor to filter out unwanted electrical or trigger noise.

Configuration >> Sensor Setup >> Battery Voltage

This section allows the user to setup the filtration level of the Battery Voltage sensor.

Configuration >> Sensor Setup >> Battery Voltage >> Calibration Table

This allows the user to calibrate the Battery Voltage sensor.

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

On the "x" axis is the input sensor voltage. It ranges from 0 to 4.98 volts. The corresponding Battery Voltage is represented on the "y" axis. To calibrate the sensor, the user must link the output voltage to the corresponding correct real battery voltage.

When in this table, pressing the "x" button will change the degree of adjustability. The options are visible in the bottom middle of the screen.

"X" axis: 1:1 - Adjustments can be made every 0.02 volts.

"X" axis: 1:2 - Adjustments can be made every 0.04 Volts. Values will interpolate between adjustable points.

"X" axis: 1:4 - Adjustments can be made every 0.08 Volts. Values will interpolate between adjustable points.

"X" axis: 1:8 - Adjustments can be made every 0.16 Volts. Values will interpolate between adjustable points.

Configuration >> Sensor Setup >> Lambda 1

This page allows the user to configure the settings for the first Lambda sensor.

Configuration >> Sensor Setup >> Lambda 1 >> Description

This lets the user name the sensor i.e.: “left bank” or “right bank”.

Configuration >> Sensor Setup >> Lambda 1 >> External Input Pin Source

Selects which pin will be used as the sensor input.

Configuration >> Sensor Setup >> Lambda 1 >> Filter Level (Jump to Target)

This is used to filter the input signal of the lambda sensor. The Wolf ECU will average out the input signal voltage to maintain a smoother readout.

A lower percentage will have a stronger averaging effect, filtering out noise and sudden spikes in input voltage.

A higher percentage will mean a less averaging effect, which will allow most of the input signal through.

Configuration >> Sensor Setup >> Lambda 1 >> Fuel Type

This Fuel Type can be used for your own reference. Choose the relevant Fuel Type that the engine is running on.

Configuration >> Sensor Setup >> Lambda 1 >> PC Software Dash Lambda Gauge

This selects what is displayed on the relevant bar graph on the dash on the right or gauges at the top.

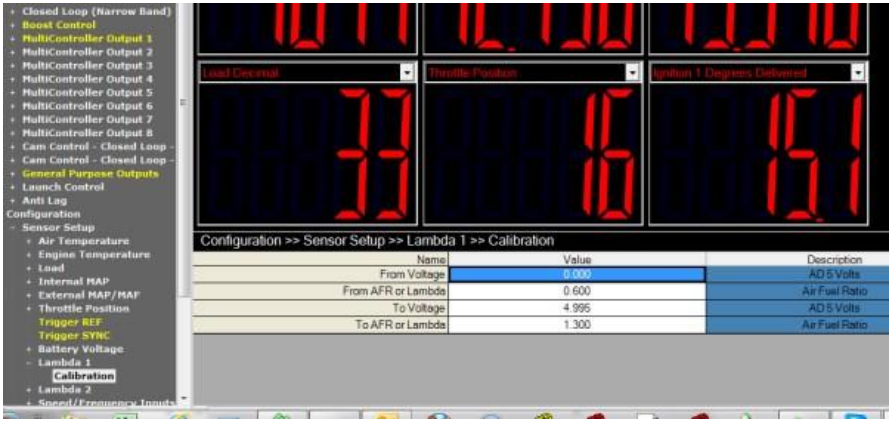
The options are as follows:

Voltage gauge: This displays the sensor output voltage.

Lambda gauge: This displays the sensors lambda value, but requires the Wolf ECU be calibrated to suit the 02 sensor. See “Configuration >> Sensor Setup >> Lambda 1 >> Calibration” for details.

AFR gauge: This displays the air-fuel ratio for engines using unleaded petrol.

Configuration >> Sensor Setup >> Lambda 1 >> Calibration



Must be set to use Lambda voltages

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Vehicle Speed

This section is used to select which input source will be used for vehicle speed by the Wolf ECU.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Vehicle Speed >> Vehicle Speed Input Source

This section is used to select which input source will be used for vehicle speed by the Wolf ECU. Options available are Speed/ Frequency 1 to Speed/ Frequency 4. They are setup in the following sections.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Speed/Frequency 1

Allows the user to calibrate the Speed/ Frequency inputs.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Speed/Frequency 1 >> Description

Allows the user to type in a brief description for their own reference.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Speed/Frequency 1 >> Display Name (5 chars)

Allows the user to add a brief friendly display name.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Speed/Frequency 1 >> Units/Scale

This allows the user to input a reference for vehicle speed units i.e. km/h or m/h

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Speed/Frequency 1 >> Polarity

This is used to choose the appropriate signal edge that the Wolf ECU will use for the speed input.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Speed/Frequency 1 >> Input Pin Used

This is used to select which input pin will be used for Speed/ Frequency 1.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Speed/Frequency 1 >> Calibrator 1 (Transition Count Measured)

If a value of 2 is used, this will count every second tooth.

Suggested value: 2, although if noise is an issue, the user may try a value of 5 or 8.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Speed/Frequency 1 >> Calibrator 2 (Divider to Final Value)

This is a divider value that is used to calibrate the speedo on the Wolf software, for calibration 1. This may range from any value from one thousand to one billion. After a value has been entered in this parameter and the user has pressed enter, the key will need to be turned "off" and "on" again to take effect.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Speed/Frequency 1 >> Cal 2 Modifier Activated By

This dictates what will activate the second calibration. This can be a useful feature for certain low range mode drive trains.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Speed/Frequency 1 >> Cal 2 Modifier Switch Point

Dictates the switch point that causes Calibration 2 to be active.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Speed/Frequency 1 >> Cal 2 Modifier Hysteresis

This value creates a gap between the "on" and "off" state at the "Cal 2 Modifier Switch Point" to prevent the Cal 2 rapidly turning on and off if the input value is close to the switch point and fluctuating.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Speed/Frequency 1 >> Cal 2 Modifier Polarity

This lets the user decide if the value above the "Cal 2 Modifier Switch Point" will turn on Cal 2, or the value below the "Cal 2 Modifier Switch Point" will turn on Cal 2.

The two options are as follows:

Normal: Cal 2 will turn on ABOVE the Cal 2 Modifier Switch Point.

Reverse: Cal 2 will be on UP TO the Cal 2 Modifier Switch Point.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Speed/Frequency 1 >> Cal 2 Modifier Value (Divider to Final Value)

This is a divider value that is used to calibrate the speedo on the Wolf ECU software, for calibration 2. This may range from any value from one thousand to one billion. After a value has been entered in this parameter and the user has pressed "enter", the key will need to be turned "off" and "on" again to take effect.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Wheel Speed Divider

This feature is used when a vehicle speed gauge requires an electronic signal from the Wolf ECU. This feature can be used to convert the wheel speed sensor input into a different value for the vehicle speed output.

An example is the Holden Commodore generally requires a speed input reduction ratio of 9 to 1. This means that for every 9 pulses of the wheel speed sensor, the vehicle speed gauge requires 1 pulse to offer an accurate vehicle speed.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Wheel Speed Divider >> Activate

Turns the Wheel Speed Divider “on” or “off”.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Wheel Speed Divider >> Divide By Value

This value is what the wheel speed input value is divided by. Following the Holden Commodore example, this value would need to be 9. This would then create an output that pulses once every nine input pulses.

Configuration >> Sensor Setup >> Speed/Frequency Inputs >> Wheel Speed Divider >> Controlled Pin

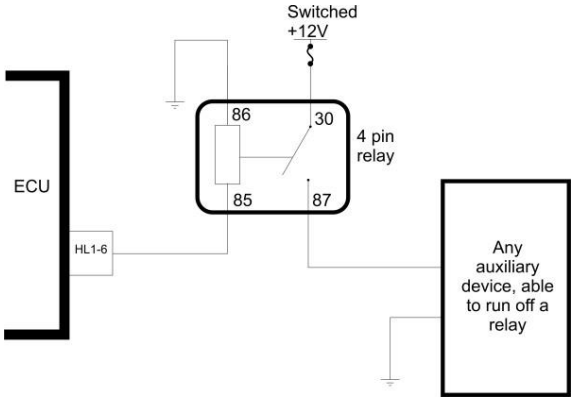
Allows the user to dictate which pin they will use as a vehicle speed output for their vehicle speed gauge. Note that on certain applications, a Wolf Speed Adapter may be required.

Configuration >> Aux Input & Pin Setup

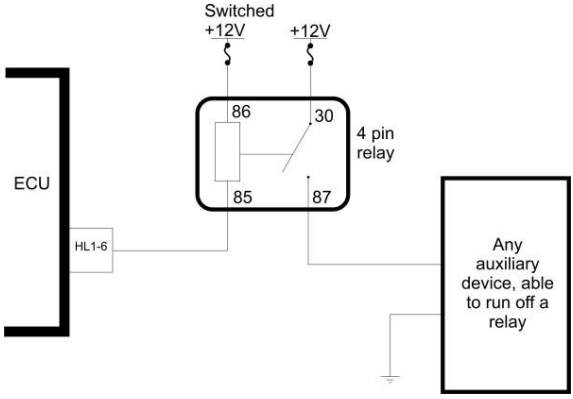
This section is used to setup the Aux Inputs and pins.

HL and LS drivers can be used for many different purposes. Some wiring schematics are given below, giving examples of their purposes. Note that proper configuration for the HL and LS drivers must be achieved for each example to function correctly.

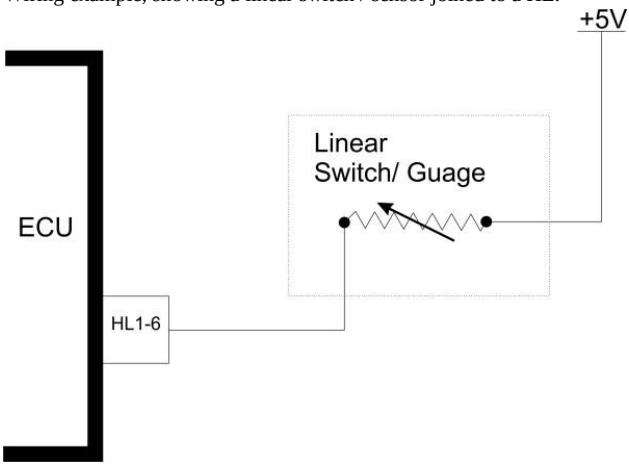
Wiring example, showing a HL driving the coil of a relay to turn on an auxiliary device:



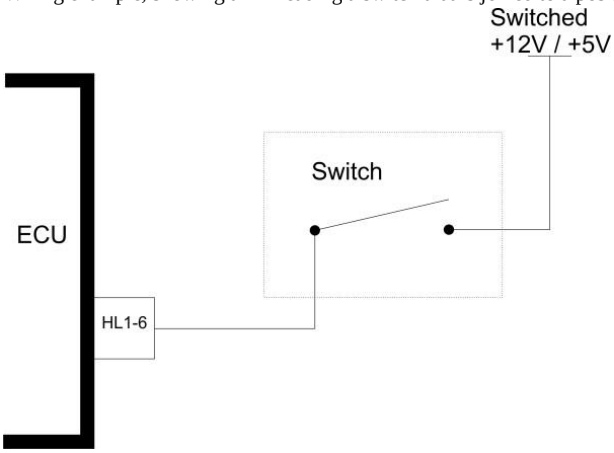
Wiring example, showing a HL grounding the coil of a relay to turn on an auxiliary device:



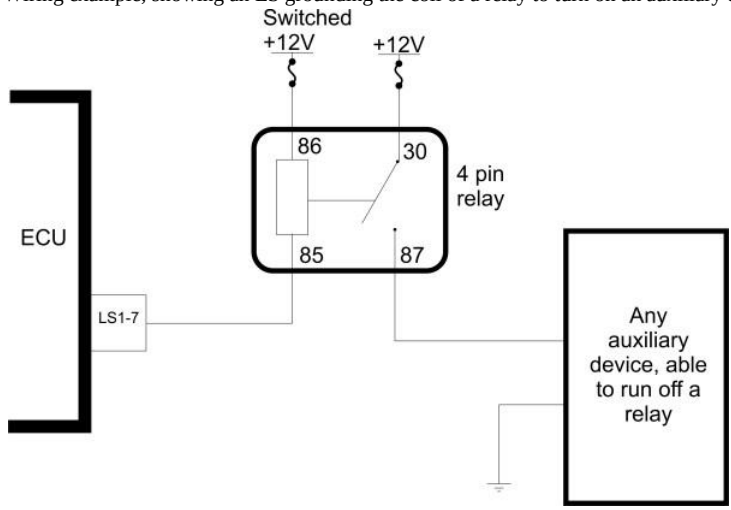
Wiring example, showing a linear switch / sensor joined to a HL:



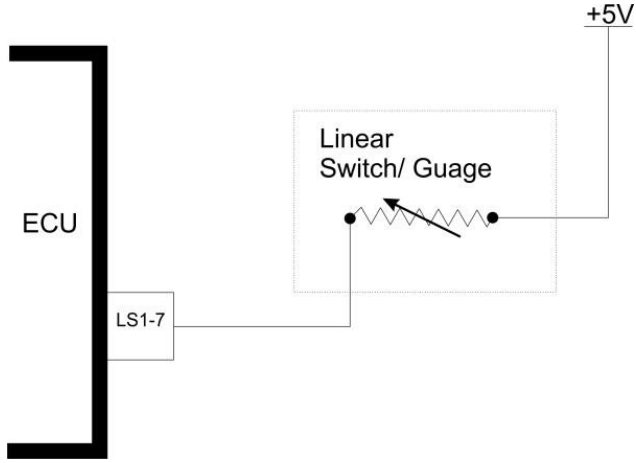
Wiring example, showing a HL reading a switch that is joined to a positive voltage:



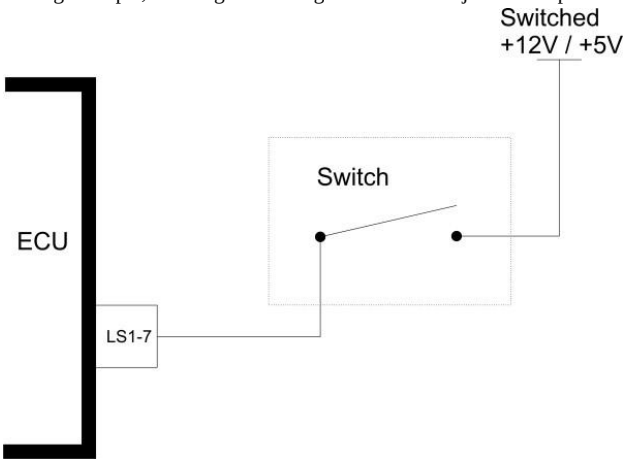
Wiring example, showing an LS grounding the coil of a relay to turn on an auxiliary device:



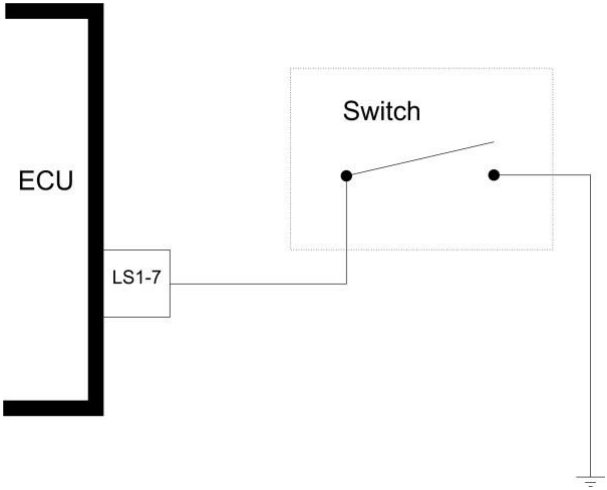
Wiring example, showing a linear switch / sensor joined to a LS:



Wiring example, showing LS reading a switch that is joined to a positive voltage:



Wiring example, showing an LS reading a switch that is joined to ground:



Configuration >> Aux Input & Pin Setup >> Aux LS1

Allows the user to setup Aux LS1.

Configuration >> Aux Input & Pin Setup >> Aux LS1 >> Description

Allows the user to type a brief description of what the Aux pin is used for. This can be handy for later reference, particularly if many Auxiliaries are used.

Configuration >> Aux Input & Pin Setup >> Aux LS1 >> Display Name (5 chars)

The friendly display name for this Aux Input

Configuration >> Aux Input & Pin Setup >> Aux LS1 >> Units/Scale

Allows the user to write the Units/ Scale that the auxiliary is using. This is for reference only.

Configuration >> Aux Input & Pin Setup >> Aux LS1 >> Display Decimal Place Position

Adjusts the decimal place position displayed, the user can then see input values with a greater accuracy if required.

Configuration >> Aux Input & Pin Setup >> Aux LS1 >> Filter Level (Jump to Target)

This is used to filter the input signal of the Aux pin. The Wolf ECU will average out the input signal voltage to maintain a smoother readout. A lower percentage will have a stronger averaging effect, filtering out noise and sudden spikes in input voltage. A higher percentage will mean a less averaging effect, which will allow most of the input signal through.

Configuration >> Aux Input & Pin Setup >> Aux LS1 >> Pull-up Resistor Active

This turns the internal Pull-up Resistor “On” or “Off”.

Configuration >> Aux Input & Pin Setup >> Aux LS1 >> Input Calibration Table

This allows the user to calibrate the Auxiliary input.

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

On the “x” axis is the Auxiliary pin input voltage. It ranges from 0 to 4.98 volts. The corresponding arbitrary value is represented on the “y” axis, ranging from -1024 to +1023.

When in this table, pressing the "x" button will adjust the degree of adjustability. The options are visible in the bottom middle of the screen.

"X" axis: 1:1 - Adjustments can be made every 0.02 volts.

"X" axis: 1:2 - Adjustments can be made every 0.04 Volts. Values will interpolate between adjustable points.

"X" axis: 1:4 - Adjustments can be made every 0.08 Volts. Values will interpolate between adjustable points.

"X" axis: 1:8 - Adjustments can be made every 0.16 Volts. Values will interpolate between adjustable points.

Configuration >> Aux Input & Pin Setup >> Aux HL1

Allows the user to setup Aux HL1.

Configuration >> Aux Input & Pin Setup >> Aux HL1 >> Description

Allows the user to type a brief description of what the Aux pin is used for. This can be handy for later reference, particularly if many Auxiliaries are used.

Configuration >> Aux Input & Pin Setup >> Aux HL1 >> Display Name (5 chars)

The friendly display name for this Aux Input

Configuration >> Aux Input & Pin Setup >> Aux HL1 >> Units/Scale

Allows the user to write the Units/ Scale that the auxiliary is using. This is for reference only.

Configuration >> Aux Input & Pin Setup >> Aux HL1 >> Display Decimal Place Position

Adjusts the decimal place position displayed, the user can then see input values with a greater accuracy if required.

Configuration >> Aux Input & Pin Setup >> Aux HL1 >> Filter Level (Jump to Target)

This is used to filter the input signal of the Aux pin. The Wolf ECU will average out the input signal voltage to maintain a smoother readout. A lower percentage will have a stronger averaging effect, filtering out noise and sudden spikes in input voltage. A higher percentage will mean a less averaging effect, which will allow most of the input signal through.

Configuration >> Aux Input & Pin Setup >> Aux HL1 >> HL Output Drive Method

Allows the user to choose the output Drive Method of this HL pin.

Low Side: The pin will pull low to ground when active, and float when inactive.

High Side: The pin will source high from +12V when active, and float when inactive.

Push-Pull: The pin will pull low to ground when inactive, and source high from +12V when inactive.

Configuration >> Aux Input & Pin Setup >> Aux HL1 >> Input Calibration Table

This allows the user to calibrate the Auxiliary input.

On this screen there is a graph in the top half and a table in the lower half. They are both directly related to each other. Adjusting one will cause the same change in the other.

On the "x" axis is the Auxiliary pin input voltage. It ranges from 0 to 4.98 volts. The corresponding arbitrary value is represented on the "y" axis, ranging from -1024 to +1023.

When in this table, pressing the "x" button will adjust the degree of adjustability. The options are visible in the bottom middle of the screen.

"X" axis: 1:1 - Adjustments can be made every 0.02 volts.

"X" axis: 1:2 - Adjustments can be made every 0.04 Volts. Values will interpolate between adjustable points.

"X" axis: 1:4 - Adjustments can be made every 0.08 Volts. Values will interpolate between adjustable points.

"X" axis: 1:8 - Adjustments can be made every 0.16 Volts. Values will interpolate between adjustable points.

Configuration >> SID8 Smart Injector Driver

This area allows the user to configure the injector drivers.

Configuration >> SID8 Smart Injector Driver >> Peak Current:

In this area you set the peak current you want this injector pin to have. Different injectors may require more current to drive them. Some Gas injectors require 6Amps to drive them, while some petrol injectors may only need 1Amps. This can be seen in the gauges on the centre screen under "SID Peak Reached time", this is how long it took to get to peak current.

Suggested Value: 4.00

Configuration >> SID8 Smart Injector Driver >> Hold Current

Once the Peak current has been reached, this value is the required current it takes to maintain holding the injector open. This will generally, if not always, be less than the peak current.

Suggested value: 1.00

Configuration >> SID8 Smart Injector Driver >> Fault Short Reporting

If the Peak Current is reached in less than this time, a short circuit fault is flagged and drive on this pin will be immediately removed for the remainder of the pulse.
Suggested value: 0.016

Configuration >> SID8 Smart Injector Driver >> Hold Current Timing:

Allows the user to set the operation frequency of the Injector pin when in "Hold Current".
Suggested value: 0.208

Configuration >> SID8 Smart Injector Driver >> Setup >> Force Clamp Enable Bits [8:1]
Suggested value: 00000000

Configuration >> SID8 Smart Injector Driver >> Setup >> Open and NPR Alarm Hold off Delay
Suggested value: 3.008

Configuration >> SID8 Smart Injector Driver >> Setup >> Rewrite Setup - Choose On

"On" will mean any changes made in this section does not require the key to be cycled. Cycling the key with this turned on will still save the changes made.

Configuration >> Engine

This folder contains the means for the user to configure engine specific parameters, including Ref/Sync setups, Injection setup and Ignition setup.

Configuration >> Engine >> REF/SYNC Trigger Setup

In this area you will find the configuration files for setting up your Wolf ECU to run.

The files set up in here are extremely important and if you are not confident in what changes need to be made, contact our dealers or Wolf EMS Pty Ltd directly.

We suggest that you read all the help files in this area as one incorrect setting can be the difference between starting and not starting.

Throughout this section there are help files with examples, please note **these are only examples**. As the Wolf ECU can be adapted to suit most configurations we cannot put examples of every possible combination.

Once Again you must know what you are adjusting in this area as the motor may start and run but incorrect timing or injection can be delivered.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode

In this area you will find the configuration files for setting up your Wolf ECU to run.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> RPM Calibration

Must be set for the type of engine you have e.g.: 4cyl, 2REF/REV (120000). This means you have a 4 cylinder engine and need 2 Reference points per revolutions. The number in the (0) is the custom calibration.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Custom RPM Calibration

This number should be identical to the number that is in "**Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> RPM Calibration**". This should only be changed if instructed by Wolf EMS Pty Ltd.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Velocity Tracking Rate (2)

The default value for this input is 2. It should **NOT** be changed unless instructed to by a Wolf Dealer or Wolf EMS Pty Ltd directly.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Starting Below RPM

This is the RPM limit you want to set that the Wolf ECU works in its start-up mode to. If this is set to 350 RPM then on cranking and up to 350 RPM the Wolf ECU will deliver its starting fuel and starting ignition timing.

Over this RPM the Wolf ECU is working on its normal parameters.

Note: keep in mind when setting this up - what motor do I have and does it crank fast or slow?

If you set this too low e.g.: 200RPM and the engine cranks over this, you may not have the desired starting fuel or ignition and it may be hard to start.

If you set this too high e.g.: 600 RPM, the engine will start and run fine, but if idle dips on decel (off the throttle) and goes below 600 RPM, then you are running on the start-up fuel. Stalling of the engine is likely to occur.

A suggested setting is 350RPM but check how fast your engine cranks over and go about 50 RPM over this.

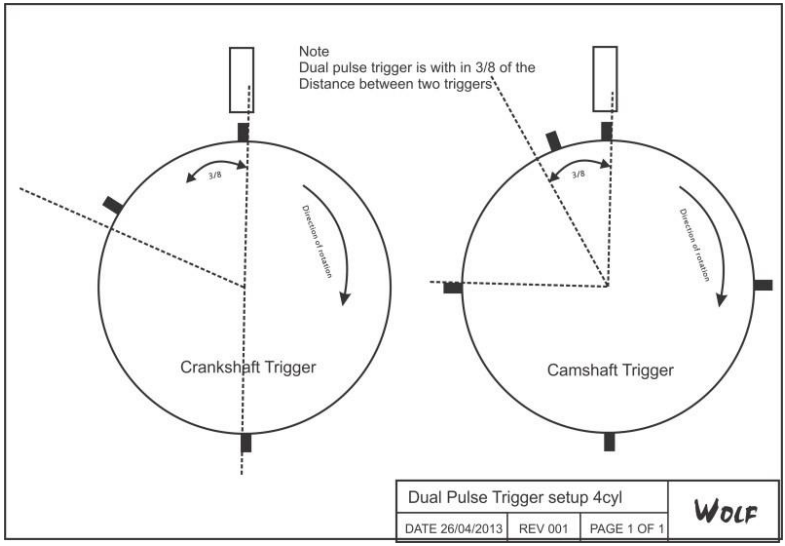
Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Trigger Mode

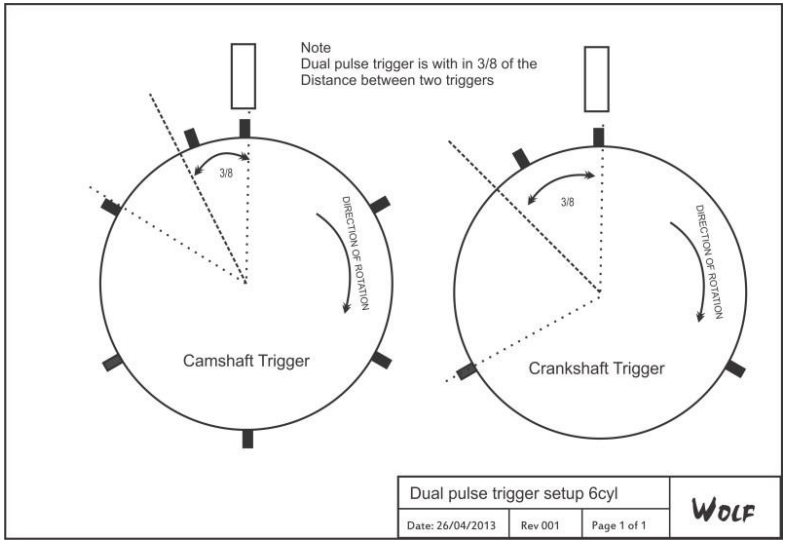
There are three settings: Single pulse, Dual pulse and Ref & Sync.

Single pulse: When in this mode, for every pulse the Wolf ECU will fire an event.

In single pulse mode the Wolf ECU cannot “Sync” up so it does not know where cylinder number 1 is. This mode must be using a distributor for spark and equal amount of trigger teeth as per the number of cylinders that your engine has.

Dual pulse: This is a trigger mode that allows you to have a sync signal incorporated with the ref signal The way this works is your triggers are evenly spaced. Your dual pulse tooth is located after one of the triggers, within 3/8 of the distance to that trigger tooth from the next trigger tooth. The two images below are





Ref and sync: This can be used for two different setups. One setup is where two sensors are used - one is "REF" and the other is "SYNC". Another possible setup is when using a single sensor, missing tooth is used for "SYNC".

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Trigger REF Count Reset & Rev Multiplier

How many events do you want from the Wolf ECU? Your setup will decide these settings.

As an example, a 4 cylinder will want 4.

You need to consider your triggering. If you only have a crank trigger and are not running in sequential mode the Wolf ECU will be syncing up every revolution not every second revolution. So the number of events you want is 2 not 4.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Trigger Sync Every 2 Revolutions

This tells the Wolf ECU your sync event will occur every revolution or every two revolutions of the crankshaft.

If you are using a cam sensor this will be synced every 2 revolutions as the cam turns at 1/2 the pace of the crankshaft. This also applies when using a Distributor which turns at 1/2 the speed of the crankshaft. Turned "on", the Wolf ECU will be looking for a sync point every 2 rotations of the crank. Turned "off", it will be looking for a sync point every rotation of the crankshaft.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Trigger REF Single Pulse Noise Detect

A noise filter is used to help with filtering noise over time when in single pulse mode. This number should never exceed the amount of trigger teeth being used. The higher the number the more filtering is applied, suggested starting point of 3.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Trigger REF No Noise above REF Period

This is a noise filter that is used to help with filtering noise over time when in Ref/Sync mode. This is a time based filter in ms (milliseconds), this parameter looks for noise in a time period and over looks it and this can be adjusted for extreme cases of noise.

Suggested value 67.000

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Trigger REF Dual Pulse Window

When in "Dual Pulse Mode" the Wolf ECU needs to be told which tooth is the dual pulse tooth. As explained in "Dual Pulse Mode", the dual pulse tooth should be within 3/8 of the distance between trigger teeth. This value is the number in 1/8th that equal where the dual pulse tooth syncs between triggers.

Suggested value is 3 however if the gap is bigger you may need 4.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Trigger REF/SYNC Mode

When using your Wolf ECU in "Ref/Sync" mode, the mode needs to be selected:

Ref=Multi Tooth, Sync = Pulse

This is when you have multiple teeth on the crank shaft and a single pulse on the camshaft.

An example: Ref = Subaru3, Sync = Subaru Pattern.

This is for standard Subaru triggering up to 2004 models. In this mode you will need to set the "number of teeth" to 12.

Ref = Multi Tooth, Sync = missing tooth.

This is used when a crankshaft trigger wheel is used with multi teeth and missing teeth as part of this trigger wheel. When using this mode Sync every 2 revolutions must be turned off.

An example: Harley 32-2: this is a dedicated Harley mode.

Ref = Multi tooth, Sync = Pulse + missing tooth

This is used when a crankshaft trigger wheel is used with multi teeth with missing teeth as part of this trigger wheel and a single cam shaft sync point. When using this mode, Sync every 2 revolutions must be turned on. This mode allows the Wolf ECU to sync up by seeing the sync point from the cam, it then looks for the missing tooth and syncs up.

Some examples:

Harley/Buell 6-cut: this is a dedicated Buell trigger mode.

Multi Sync Mitsubishi GTO: this uses the standard Mitsubishi GTO triggers 6+4 triggering. This mode allows the Wolf to sync up and run sequential injection and ignition in this mode.

Ford AU36-1+sync: this is a Ford dedicated trigger mode. This looks for the cam sensor as well as the missing tooth and allows for quick syncing up for quick start. This will work on Ford models Au 6 cylinder and V8.

Dual Sync Landcruiser 6 Cylinder FZJ105R: this dedicated setup is to be used with Toyota Landcruiser 105 series. This is designed to sync up and allow quick starting.

BMW M3 60-2 + dual Vanos: to be used only with this model engine, must use trigger sync on the inlet cam sensor.

Ford NL/EL 8 Cylinder, narrow tooth: this mode is designed to be used with Ford factory distributor with one narrow tooth. The sync wire must be wired directly to the Ref input wire as well. This will work on both 6 cylinder and V8 distributors.

Ford BA Falcon 6 Cylinder: dedicated mode to see the missing teeth plus three sync points on the cam shaft, this will only work on 6 cylinder engines.

Missing Tooth – Sync in Ref window: this allows for the use of missing tooth trigger wheel with cam triggering of many teeth. This allows you to program what teeth on the crank, after missing tooth, to look at for the sync teeth you want to see.

Ref = Subaru missing tooth, Sync = Subaru Dual Pulse**:**

Is a dedicated Subaru mode using standard trigger sensors, this is designed for Subaru 2004 and more recent.

Some examples:

MX5 – 2001: dedicated for MX5 crank triggering dual pulse plus cam sensor. This is designed to be used with standard trigger sensors.

Evo 6: Designed to be used with standard EVO 6 triggering 4+2.

Hemi SRTA V8: late model Hemi V8 Missing tooth on crank and 8 pulses on cam, this is designed to be used with standard trigger sensors.

Ford NL 8cy Narrow Pulse Ice: to be used with Ford Narrow tooth distributor (ICE Brand) this will start in single pulse mode and switch over to sequential so single coil is the only way the ignition will work with this setup.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Trigger REF/SYNC Offset

When using a multi tooth pick up, you can offset where the Wolf ECU sees the teeth for triggering. By offsetting a tooth, this will affect ignition timing depending on the amount of teeth. This electronically

moves the first trigger point around by the number of teeth you want it to. The following section has 3 diagrams that will assist in explaining this setup.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Trigger REF/SYNC Skip

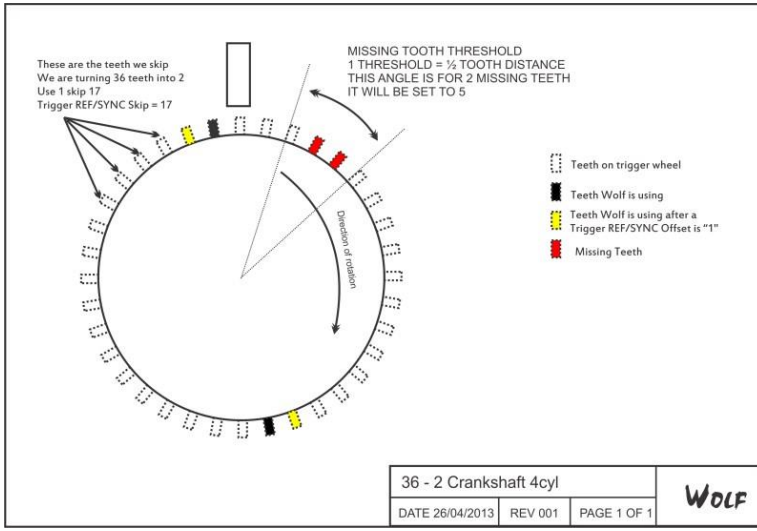
When using a multi tooth trigger wheel, electronically you need to turn the multi teeth into the amount of teeth you need to use. You calculate how many trigger events you need and divide that into how many teeth you have.

In our example, we have 24 teeth but we want to only use 4.

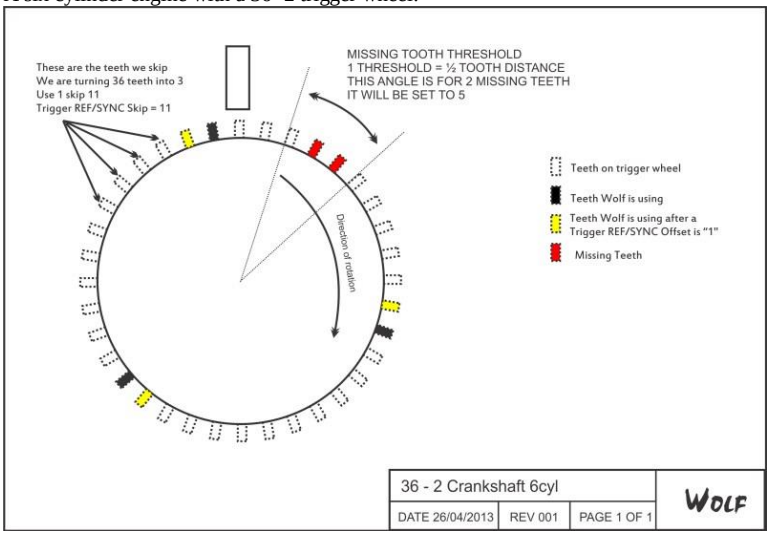
24 divided by 4 trigger events = 6. Therefore every 6th tooth is evenly spaced for our trigger input. For the Wolf ECU to use these teeth, we have to tell the Wolf ECU to skip the teeth in between the trigger events – skip 5, use 1.

Extra examples are shown in the following three images:

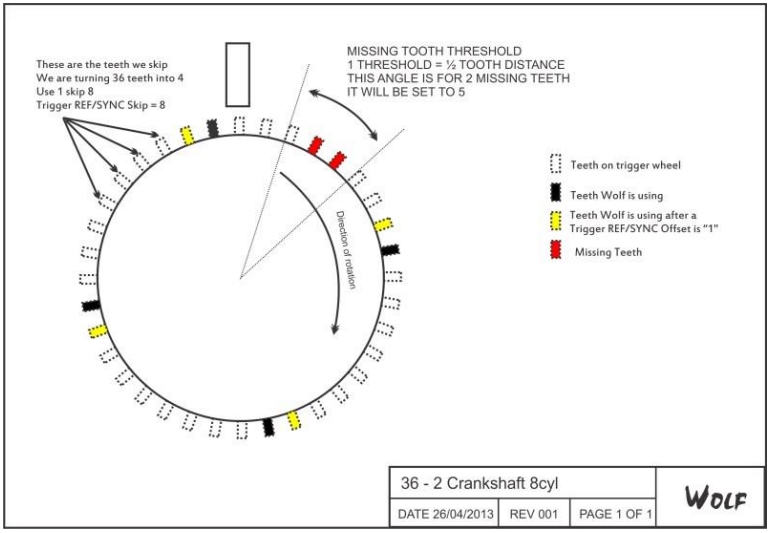
A four cylinder engine with a 36 - 2 trigger wheel:



A six cylinder engine with a 36- 2 trigger wheel:



An eight cylinder engine with a 36- 2 trigger wheel:



Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Number of Teeth

This is the number of teeth between sync events.

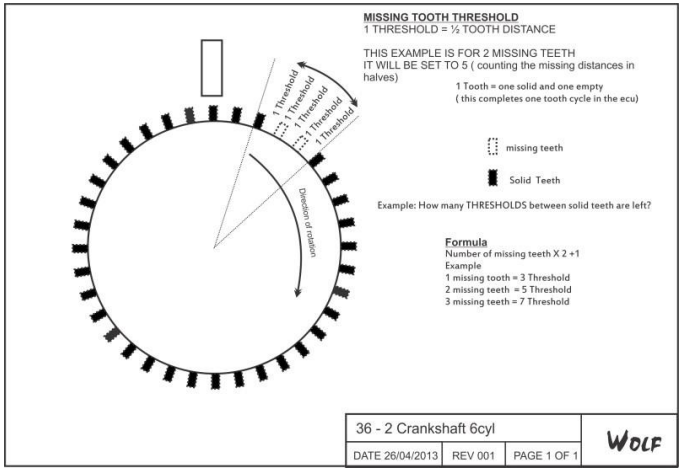
Examples are:

If you have 12 teeth on a crank and your sync point is on the cam shaft, this equals 24 teeth before the sync event happens.

If you have 12 teeth on the cam shaft and sync on the cam shaft, then the number of teeth is only 12. If you have a 36-2 teeth on the crank shaft plus sync on the cam shaft. This will still only add up to 34 teeth as you are using the missing tooth one of the sync teeth.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Missing Tooth Threshold 1/2

The image below offers a visual explanation of how to calculate the Missing Tooth Threshold value:



This is the threshold that the Wolf ECU sees for the missing tooth. This is calculated in 1/2 spaces. One missing tooth will have 3 spaces – one before the tooth, one where the tooth should be and one after.

The simplest way to work out the "Missing Tooth Threshold" is using the following formula: **Take the number of missing teeth, multiply by two and then add one.**

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Crank Sensor SYNC Threshold 1/16

Contact Wolf EMS Pty Ltd for advice on this area.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Rev Delay to Crank Sensor SYNC

Contact Wolf EMS Pty Ltd for advice on this area.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Crank Sensor First Teeth Ignored

Contact Wolf EMS Pty Ltd for advice on this area.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Charge Start Tooth Offset 1

Contact Wolf EMS Pty Ltd for advice on this area.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Trigger Tooth Offset 1

Contact Wolf EMS Pty Ltd for advice on this area.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Charge Start Tooth Offset 2

Contact Wolf EMS Pty Ltd for advice on this area.

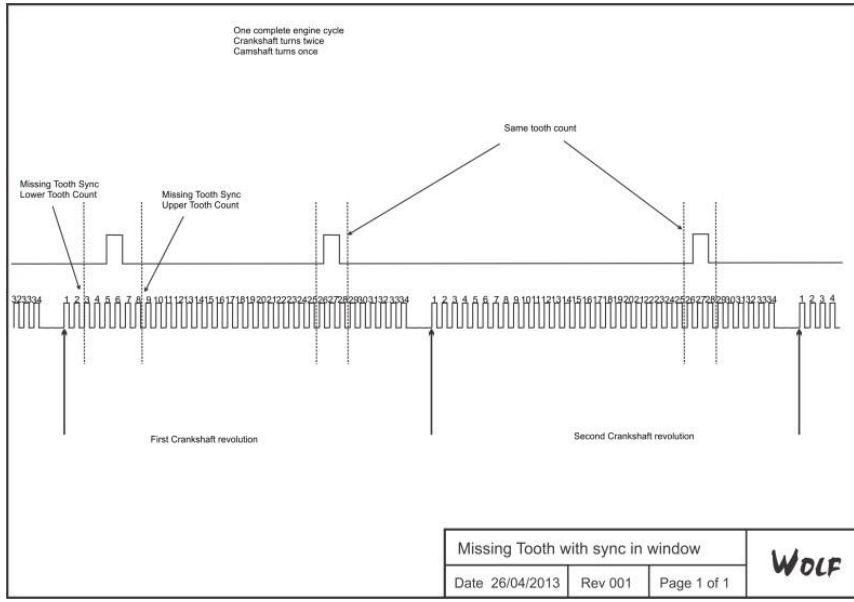
Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Trigger Tooth Offset 2

Contact Wolf EMS Pty Ltyd for advice on this area.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Number of Missing Teeth

When using missing tooth mode, this tells the Wolf ECU how many missing teeth to expect.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Missing Tooth Sync Lower Tooth Count



The above image pertains to “Missing Tooth Sync Lower Tooth Count”, “Missing Tooth Sync Upper Tooth Count” and “Number of Teeth in Ref Window on SYNC Input”.

When using missing tooth with Sync in Ref window mode, you need to set the upper and lower tooth count for the sync window. This lower count is the lowest number of tooth count that you want the Wolf ECU to start to look for the sync.

The Wolf ECU will start at this numbered tooth looking for the sync point and stop at the upper tooth count.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Missing Tooth Sync Upper Tooth Count

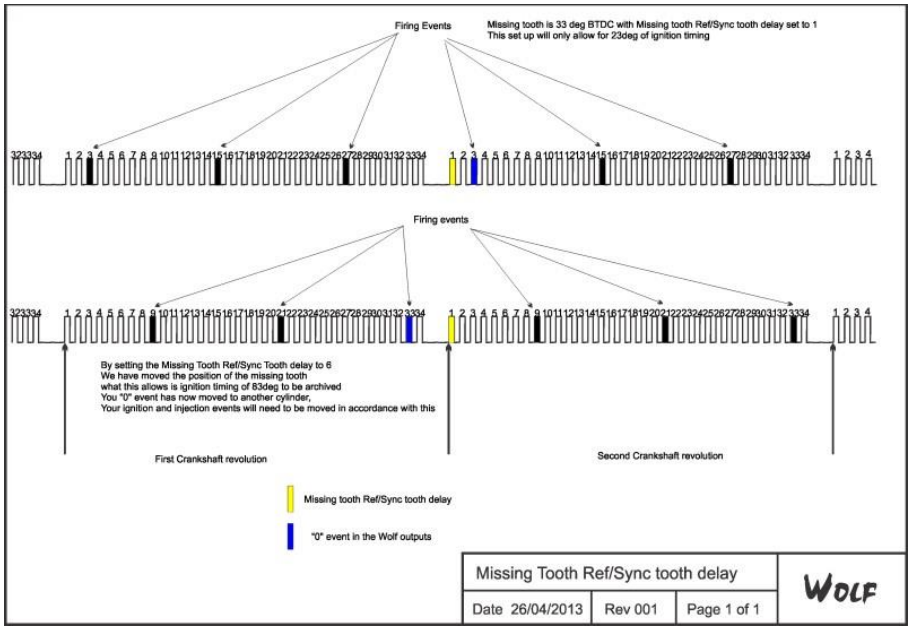
When using missing tooth with Sync in Ref window mode you need to set the upper and lower tooth count for the sync window. This upper count is the highest numbered tooth count that you want the Wolf ECU to stop looking for the sync. The Wolf ECU will start at the lower tooth count looking for the sync point and stop at the upper tooth count.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Missing Tooth Crank, Number of Teeth in Ref Window on SYNC Input

When using the missing tooth sync in Ref Window mode, the Wolf ECU needs to know how many triggers are expected in the Sync window. This number will determine what it is looking for. In the above image example, this would need to be 1 as there is only one trigger in the Sync window.

Configuration >> Engine >> REF/SYNC Trigger Setup >> Advanced Mode >> Missing Tooth Ref/Sync Tooth Delay

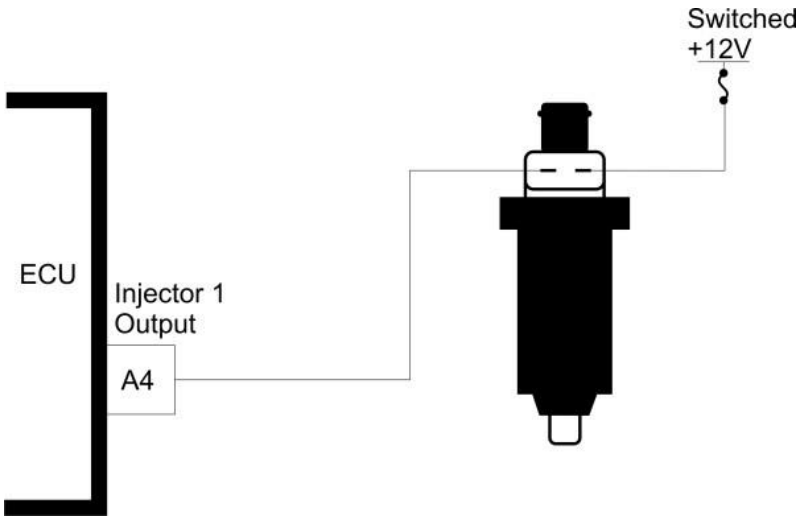
When using missing tooth this needs to be set at 1. If the missing tooth is too close to BTDC, this value can be increased to virtually move the position of the missing tooth. This allows for a greater ignition advance.



Configuration >> Engine >> Injection

This area is used to configure injector pins and to setup the injector sequencing.

Basic wiring schematic for fuel injectors:



Note that this is the typical way that this component is wired and that some products may differ from the above schematic.

It is typical that injector pins do not have a specific polarity, so +12v can be on either pin, however it is good practice to wire an engine bay with consistency.

As an example: wire all injectors with +12v on the left hand pin. This can be handy when later testing injector outputs.

Configuration >> Engine >> Injection >> Injector Pin Setup

In this area you can configure the injector pin to be used as an injector driver or to be used as an auxiliary pin. If used as an auxiliary pin, this will ground when turned on.

Note: make sure that the "injector outputs" you have are wired up to injectors are turned on to "Injector".

Configuration >> Engine >> Injection >> Injector Pin Setup >> Injector # Output Used As Injector/ Auxiliary

Selecting “Injector” will control this pin as an injector. Selecting as “Auxiliary” will allow control of this pin from any of the control sources in the program.

Configuration >> Engine >> Injection >> Sequencing

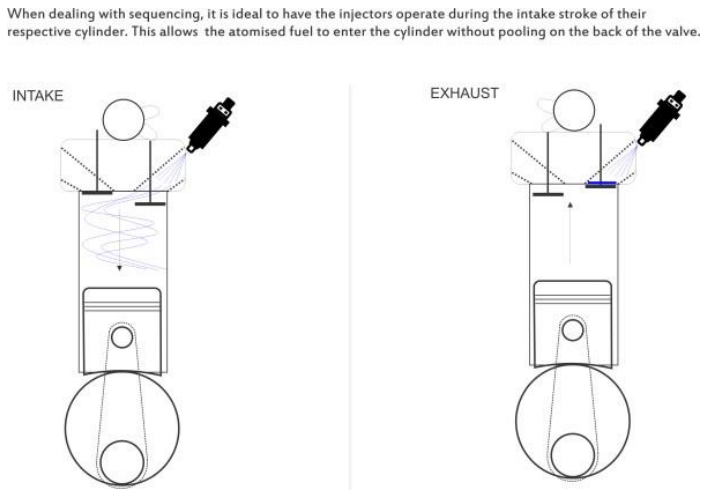
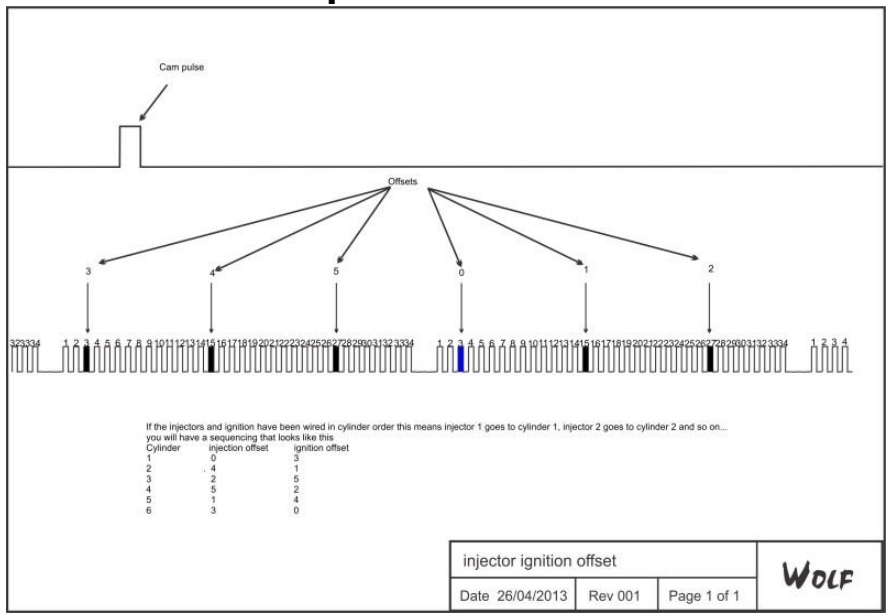


Diagram above explaining the ideal time for injectors to fire.



The above image relates to the example given below.

In this area you can configure when and where the injector fires in relation to TDC.

In our example we have taken a 36-2 plus one on the cam. This has then been turned into 6+1 (6 on the crank 1 on the cam). The Wolf ECU sees the sync and then looks for the next tooth to be used

The next tooth to be used is known as “0” event. This starts the sequencing pattern.

To find the “0” point see **“Configuration >> Engine >> Ignition”**

At any time if you put “255” in these parameters it will turn that line off.

Now the next tooth to be used after “0” is number “1”. This is known as offset 1.

In this example the Wolf ECU will require 6 offsets, 0, 1, 2,3,4,5.

Motor firing order is 1 5 3 6 2 4

If the injectors have been wired up in cylinder order e.g.: injector 1 to cylinder 1, injector 2 to cylinder 2...

You will want to fire injector 1 first so the offset will be “0”. Now the next injector you want to fire will be the 2nd in firing order that is - cylinder number 5. So injector 5 will now have an offset of 1.

The next injector you will want to fire is cylinder number 3. This will have an offset of “2”.

In this example you will end up with the injector offsets looking like this:

Injector 1 pulse offset “0”

Injector 2 pulse offset “4”

Injector 3 pulse offset “2”

Injector 4 pulse offset “5”

Injector 5 pulse offset “1”

Injector 6 pulse offset “3”

Injector 7 pulse offset “255”

Injector 8 pulse offset “255”

Now in a perfect world this would be easy to just use the above sequence in every situation, but this does not happen.

Let’s see two more examples.

If the injectors have been wired up in firing order being injector 1 to cylinder 1, injector 2 to cylinder 5, injector 3 to cylinder 3...

This now means that your offsets are going to need be set up different, as follows:

Injector 1 pulse offset “0”

Injector 2 pulse offset “1”

Injector 3 pulse offset “2”

Injector 4 pulse offset “3”

Injector 5 pulse offset “4”

Injector 6 pulse offset “5”

Injector 7 pulse offset “255”

Injector 8 pulse offset “255”

The next example now shows how an engine that has been wired in cylinder order but the cam sensor does not happen on cylinder1 - it happens on cylinder 4. So now our “0” point has moved.

Injector 1 pulse offset “1”

Injector 2 pulse offset “5”

Injector 3 pulse offset “3”

Injector 4 pulse offset “0”

Injector 5 pulse offset “2”

Injector 6 pulse offset “4”

Injector 7 pulse offset “255”

Injector 8 pulse offset “255”

As in our example, we are using 6 injectors. If wanting to fire your injectors sequentially, this means you want to fire each injector only once a cycle of the engine. Knowing that in our example we have 6 events, we are using one to fire the first injector with an offset of “0”. You now do not want to fire it until it comes back to that point, so you will need to “skip 5” events.

In another example we want to batch fire the injectors. This means firing them twice in a cycle. You would use one “skip 2” then use the next 1 and then skip 2. This has used all six events.

Note: If you get any of these settings incorrect it can make it very hard to find a small fuelling problem.

Configuration >> Engine >> Injection Dead Time

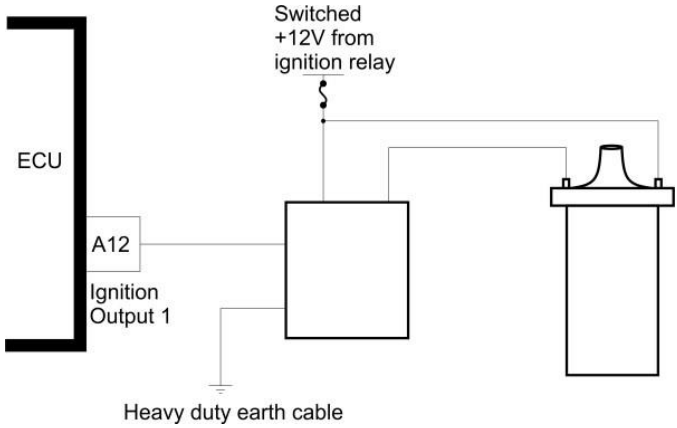
Enter the injector dead time in to this parameter. This will affect the delivered injector time delivered and shown on the dashboard. If the injector dead time is known it is recommended to use this.

Configuration >> Engine >> Ignition:

In this area you can configure the ignition pin to be used as an Ignition Driver or to be used as an auxiliary pin. If used as an auxiliary pin, this will ground when turned on.

Note: Make sure that you have the ignition outputs you have wired up to ignition devices, such as igniters, turned on to "ignition".

Basic wiring schematic for single coils with igniter:



Note that this is the typical way that this component is wired and that some products may differ from the above schematic.

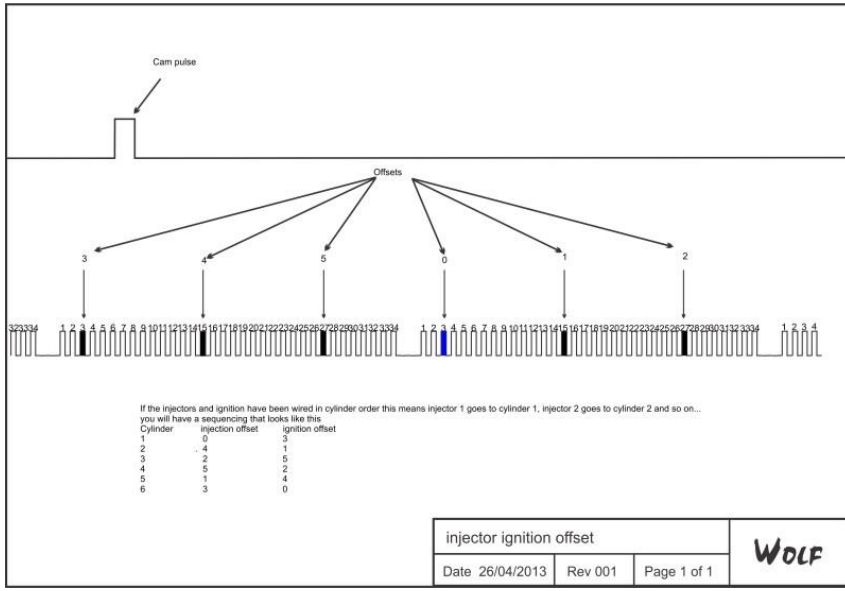
Configuration >> Engine >> Ignition >> Ignition Pin Setup

Sets up the Ignition Pin configuration.

Configuration >> Engine >> Ignition >> Ignition Pin Setup >> Ignition # Output Used As

Represents an Ignition Pin number from 1 to 8.

Either can be selected "Ignition" or "Auxiliary". Having this set to Ignition will set this pin to be used as an Ignition Driver. Where being set to Auxiliary will set this pin to be used as an Auxiliary pin. This will ground the pin when being switched on as an Auxiliary.



The above image relates to the example given below.

In this area you can configure when the Ignition fires in relation to TDC and the sequence in which the coils will fire.

In our example we have taken a 36-2 plus one on the cam, this has then been turned into 6+1 (6 on the crank 1 on the cam), now the Wolf ECU sees the sync and then looks for the next tooth to be used.

The next tooth to be used is known as “0” event. This starts the sequencing pattern.

Finding the “0” point can be very easy to find. After reading further in the instructions setting your “Offsets” and “Skips”, we can find out the “0” point.

The “0” point is the first tooth the Wolf ECU uses as an event. This may not always be on cylinder 1. It can vary depending on manufacture and modifications made to the engine.

Turn and set your Injection as per required.

Now turn on Ignition 1 to have an Offset to “0”. Hit “enter”. Set the skips to required amount. In our example we are using 6 + 1, so there are 6 events so the skips will be 5.

Now turn the ignition key off/on to reset the Wolf ECU. Try to crank the engine. If it has not tried to fire on cylinder 1 in the first few cranks, stop cranking. Change the offset to “1”. Turn the Ignition off/on and retry to start. See if it tries to fire on cylinder 1. If this does not fire, repeat previous steps changing the Offset every time until correct one is found.

Now that you have this offset you can set the rest using the below settings.

When setting the injection sequencing you should set it to be opposite to the ignition in the sequencing. If you have a “0” point on cylinder 2 ignition then, in our example of the 6 cylinder engine, the opposing cylinder is 5, so in your injection sequencing the “0” point would be on injection 5.

Note: At any time if you put “255” in these parameters it will turn that line off.

Now the next tooth to be used after “0” is number “1”, this is known as offset 1.

In this example the Wolf ECU will require 6 offsets, 0, 1, 2,3,4,5.

Motor firing order is 153624

Now if the ignitions have been wired up in cylinder order e.g.: ignition 1 to cylinder 1, ignition 2 to cylinder 2...

You will want to fire ignition 1 first so the offset will be “0”. Now the next ignition you want to fire will be the 2nd in the firing order - that is cylinder number 5. So ignition 5 will now have an offset of 1.

The next ignition you will want to fire is cylinder number 3. This will have an offset of “2”.

In this example you will end up with the ignition offsets looking like this:

Ignition 1 pulse offset “0”

Ignition 2 pulse offset “4”

Ignition 3 pulse offset “2”

Ignition 4 pulse offset “5”

Ignition 5 pulse offset “1”

Ignition 6 pulse offset “3”

Ignition 7 pulse offset “255”

Ignition 8 pulse offset “255”

Now in a perfect world, this would be easy to just say use the above sequence in every situation. But this does not happen.

Here are two more examples.

If the ignition has been wired up in firing order being ignition 1 to cylinder 1, ignition 2 to cylinder 5, ignition 3 to cylinder 3...

This now means that your offsets are going to need be set up different, as follows:

Ignition 1 pulse offset “0”

Ignition 2 pulse offset “1”

Ignition 3 pulse offset “2”

Ignition 4 pulse offset “3”

Ignition 5 pulse offset “4”

Ignition 6 pulse offset “5”

Ignition 7 pulse offset “255”

Ignition 8 pulse offset “255”

The next example shows how an engine that has been wired in cylinder order - but the cam sensor does not happen on cylinder 1, it happens on cylinder 4. So now our “0” point has moved.

Ignition 1 pulse offset “1”

Ignition 2 pulse offset “5”

Ignition 3 pulse offset “3”

Ignition 4 pulse offset “0”

Ignition 5 pulse offset “2”

Ignition 6 pulse offset “4”

Ignition 7 pulse offset “255”

Ignition 8 pulse offset “255”

As in our example we are using 6 ignitions. If wanting to fire your ignition sequentially, this means you want to fire each ignition only once a cycle of the engine. So knowing that in our example we have 6 events, we are using one. So to fire the first ignition with an offset of “0”, you now do not want to fire it until it comes back to that point - so you will need to “skip 5” events.

So you will set all of your “skips” to 5.

Now in another example you want to batch fire the coils. This means firing them twice in a cycle. You would use one “skip 2” then use the next 1 and then skip 2. This has used all six events.

Note: If you get any of these settings incorrect it can make it very hard to find a small ignition problem.

If in the event that a distributor is being used, in our example there is 6 events. So we want to use the first tooth. This is called the “0” point. Now as there is only 6 events, we do not want to skip any so our skip will be set to “0” - so use “1” skip none.

Output mode:

This determines the mode that the ignition runs in. The ignition can be controlled in normal or rotary trailing mode:

Normal: this will control the ignition as per normal ignition firing all ignition events in order with each ignition event.

Rotary Trailing: Allows for leading and trailing ignition to be achieved. This will now fire in order with all the ignition outputs but can now be adjusted in the ignition modifiers under “rotary trailing”.

Configuration >> Engine >> Ignition >> Configuration

This folder allows the user to configure the advanced aspects of the Ignition setup.

Configuration >> Engine >> Ignition >> Configuration >> Minimum Ignition Discharge Time

This is the time programmed in to allow for the coil to discharge, suggested: 0.500

Configuration >> Engine >> Ignition >> Configuration >> Ignition 1-8 Pull-up Drive Enable

Most ignition systems require a pull-up on the input to the igniter, this is most commonly set to "On". In the rare case or been advised by Wolf EMS Pty Ltd to turn this off you will set it to "Off ", this will turn the pull up off.

Turning the pull up off with a normal ignition system can cause ignition damage.

Configuration >> Engine >> Ignition >> Configuration >> Ignition Output Polarity

Using normal polarity inductive systems use the polarity Normal. Reverse will invert this signal, this is required with systems that run on inverted ignition signals such as Hondas, or if using some models of MSD CD I systems.

Configuration >> Engine >> Ignition >> Ignition Charge Time Table

This table represents the coil charge time you wish to give to the coil. This should be set to manufacturers specs of the coil.

Configuration >> Engine >> Ignition >> Ignition Charge Time Table >> Battery Voltage Compensation Activate

Turn on the Battery Compensation for coil charge time. As battery voltage drops, the ignition spark becomes weak so an increase of coil charge time can help maintain smoother operation with low battery voltage.

Configuration >> Engine >> Ignition >> Ignition Charge Time Table >> Battery Voltage Compensation Table

This table has battery voltage going across the bottom of the screen with an increase and decrease of Ms for coil charge time going up the left hand side.

Secondary Setup >> Activation

This section enables the user to turn the secondary setup on, define what parameters activate the secondary setup and which aspects of the secondary setup are to be used, including Fuel, Ignition and Control folders.

Secondary Setup >> Activation >> Activation Setup

This section allows the user to setup the activation of the secondary setup.

Secondary Setup >> Activation >> Activation Setup >> Activate

Turns the secondary setup “On” or “Off”. Note that while “On” is selected, the secondary setup will only be activated when the parameters below are met.

Secondary Setup >> Activation >> Activation Setup >> Activated By

This lets the user dictate what input will be used to engage the secondary setup.

Secondary Setup >> Activation >> Activation Setup >> Activation Point

This lets the user dictate the switching point to engage the secondary setup.

Secondary Setup >> Activation >> Activation Setup >> Hysteresis

The hysteresis allows a value to be made that will act as a gap between switching on and switching off at the nominated “Activation Point”

This prevents the Secondary setup from rapidly switching on and off if there is a fluctuation in the input value around the “Activation Point”.

Secondary Setup >> Activation >> Activation Setup >> Activation Polarity

Determines what side of the input value activates the Secondary Setup. Two options are available:

- Low = On: This will mean that if the input value is LOWER than the activation point, the Secondary Setup will be active.
- High = On: This will mean that if the input value is HIGHER than the activation point, the Secondary Setup will be active.

Secondary Setup >> Activation >> Activation Setup >> Activation Forced On

This allows the user to force the secondary setup to be active, regardless if the activate parameters have been met. This is useful for testing the configuration of the secondary setup.

Secondary Setup >> Activation >> Folders Enabled to Switch

This allows the user to decide which aspects of the secondary setup will actually be used and come into effect.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Fuel

Allows the user to dictate which aspects of the **"Secondary setup >> Fuel"** will be active - if the Secondary Setup has been enabled.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Fuel >> Fuel Map

Turns the Secondary Setup Fuel Map "On" or "Off". If "On" is selected and the Secondary Setup is active the "Secondary Setup" values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Fuel >> Fuel Modifiers >> Trims

Turns the Secondary Setup Fuel Modifier folder "On" or "Off". If "On" is selected and the Secondary Setup is active the "Secondary Setup" values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Fuel >> Fuel Modifiers >> Starting

Turns the Secondary Setup Starting "On" or "Off". If "On" is selected and the Secondary Setup is active the "Secondary Setup" values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Fuel >> Fuel Modifiers >> Transient

Turns the Secondary Setup Transients "On" or "Off". If "On" is selected and the Secondary Setup is active the "Secondary Setup" values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Fuel >> Staged Fuel Injection

Turns the Secondary Setup Staged Fuel Injections On or Off. If "On" is selected and the Secondary Setup is active the "Secondary Setup" values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Ignition

Allows the user to dictate which aspects of the "Secondary setup >> Ignition" will be active - if the Secondary Setup has been enabled.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Ignition >> Ignition Map

Turns the Secondary Setup Ignition Map "On" or "Off". If "On" is selected and the Secondary Setup is active the "Secondary Setup" values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Ignition >> Ignition Modifiers >> Trims

Turns the Secondary Setup Ignition Trims On or Off. If "On" is selected and the Secondary Setup is active the "Secondary Setup" values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Ignition >> Ignition Modifiers >> Starting

Turns the Secondary Setup Starting Ignition Modifiers "On" or "Off". If "On" is selected and the Secondary Setup is active the "Secondary Setup" values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Control

Allows the user to dictate which aspects of the **"Secondary setup >> Control"** will be active - if the Secondary Setup has been enabled.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Control >> Thermo Fan

Turns the Secondary Setup Thermo Fan "On" or "Off". If "On" is selected and the Secondary Setup is active the "Secondary Setup" values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Control >> Fuel Pump

Turns the Secondary Setup Fuel Pump "On" or "Off". If "On" is selected and the Secondary Setup is active the "Secondary Setup" values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Control >> Idle Lock

Turns the Secondary Setup Idle Lock "On" or "Off". If "On" is selected and the Secondary Setup is active the "Secondary Setup" values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Control >> Rev Limit

Turns the Secondary Setup Rev Limit “On” or “Off”. If “On” is selected and the Secondary Setup is active the “Secondary Setup” values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Control >> Shift Light

Turns the Secondary Setup Shift Light On or Off. If “On” is selected and the Secondary Setup is active the “Secondary Setup” values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Control >> Idle Speed >> Trims

Turns the Secondary Setup Idle Speed Trims On or Off. If “On” is selected and the Secondary Setup is active the “Secondary Setup” values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Control >> Closed Loop >> Configuration

Turns the Secondary Setup Closed Loop Configuration On or Off. If “On” is selected and the Secondary Setup is active the “Secondary Setup” values will be used instead of the normal Primary values.

Secondary Setup >> Activation >> Folders Enabled to Switch >> Control >> Boost Control

Turns the Secondary Setup Boost Control “On” or “Off”. If “On” is selected and the Secondary Setup is active the “Secondary Setup” values will be used instead of the normal Primary values.



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