

WOLF3D

Version 4.49
Engine Management System

PC Software User Guide

Revision Number 1.016

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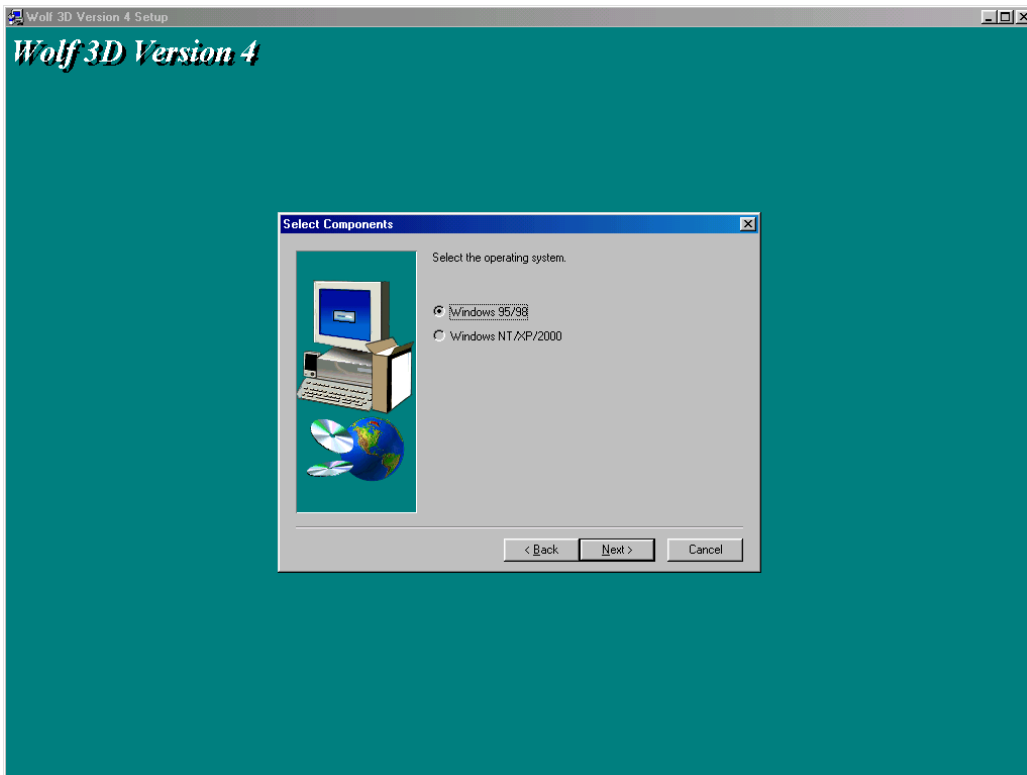
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1 Software Installation

From PC Software version 4.48 the licensing system has been removed. The software installation will work as before but no license disk or unlock code is required.

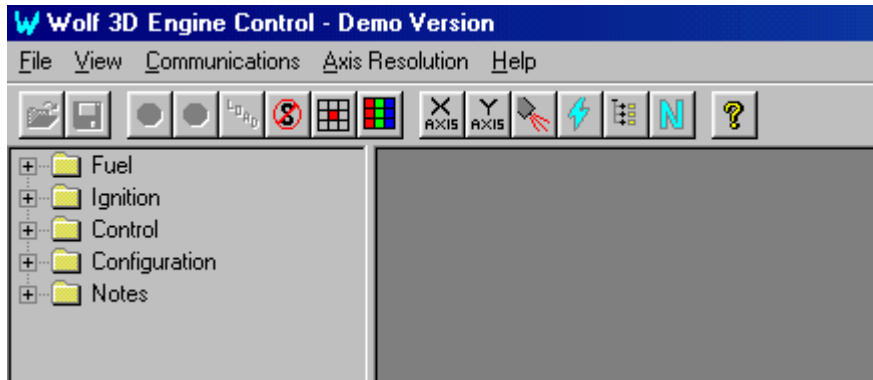
The software also works on all Windows platforms. During installation the software will ask which operating system you are using. Select the option that suits your operating system.



Earlier versions of Wolf3D Version 4 PC Software require Windows '95B – '98, or Windows ME.

If you are using Windows XP, you will have to run the Wolf3D.exe file as a Windows 98 application.

Earlier versions of software install as a demo version until licensed.



If you have any trouble during your installation or running the PC Software, please contact Advanced Engine Management P/L.

For Version 4.48 and on the PC Software is supplied on 3 separate floppy disks:

Disk 1 – Fifteen Files

Disk 2 – One File

Previous versions also had a license disk.

1.1 Installation Procedure

To install the PC software:

Start your computer and have Windows running.

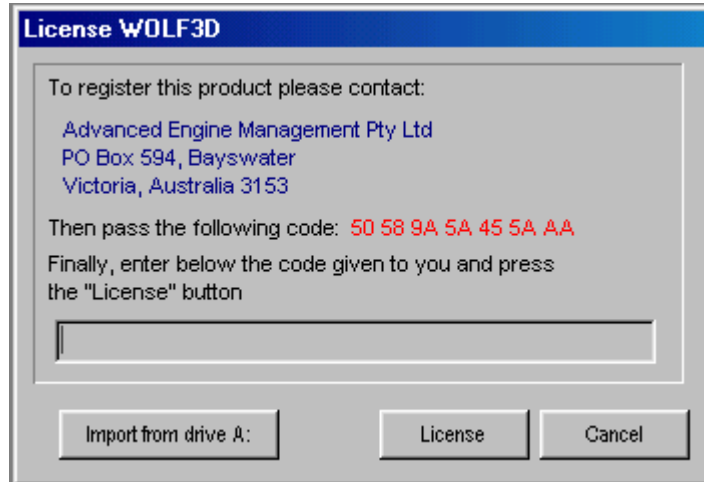
- Place Disk 1 in the floppy disk drive of your PC.
- From Disk 1, run "Setup"
- Follow the prompts to install the software.
- Place Disk 2 in the floppy disk drive when requested.

Once the software is installed, go to "Start", "Programs", "Wolf3D Version 4".

The PC Software needs to configure several files on your PC for the Gauges to work correctly. You may need to run it several times for all of the configurations to be installed.

For demo versions earlier than 4.48, go to the Help menu and click on License Import.

The software will give the option to import license from a floppy or pass a code in red to Advanced Engine Management.

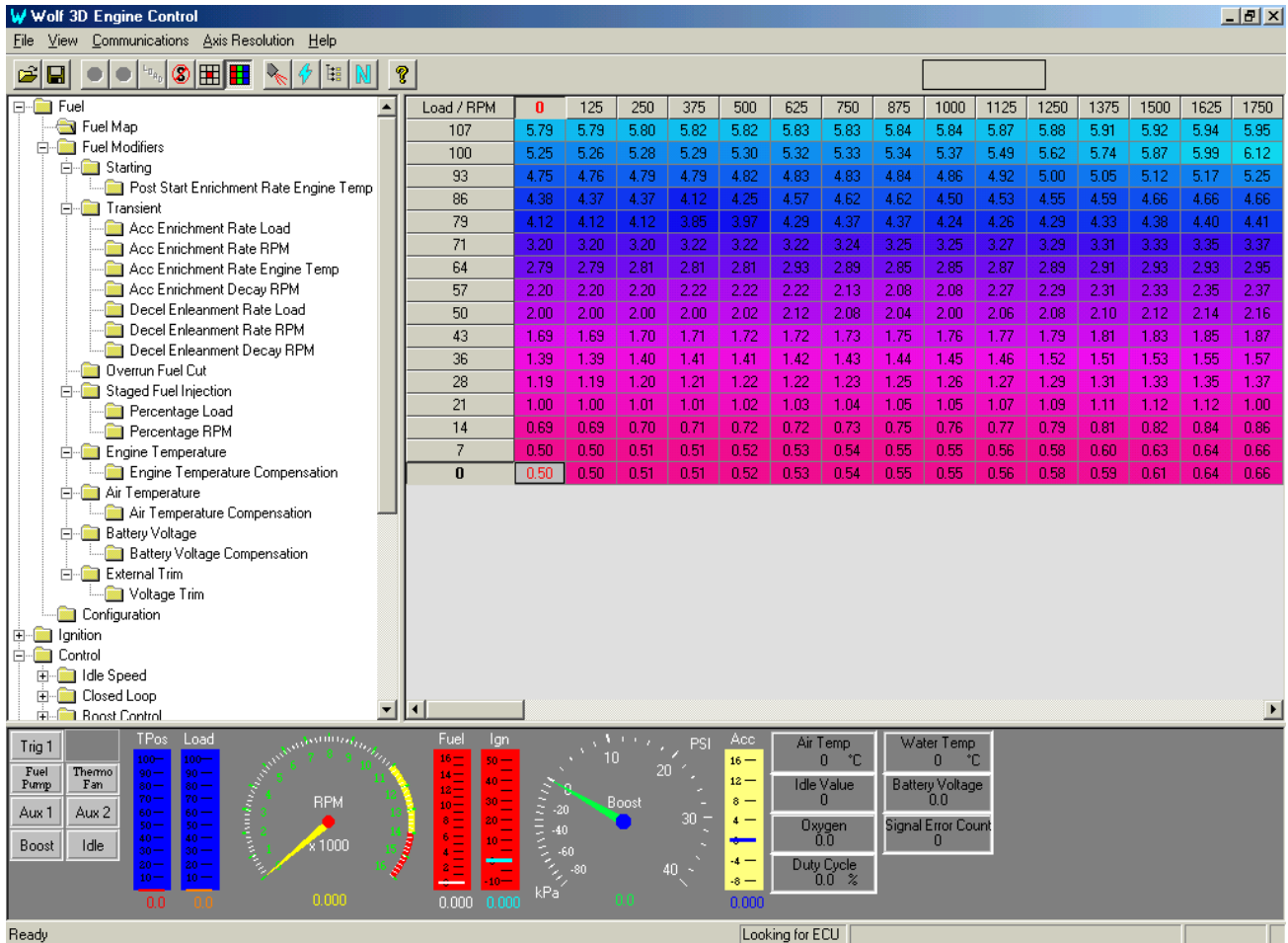


If you have a License Unlock Disc, Insert the disc and click the Import From Drive A: button.
If you don't have a License Unlock Disc note down the Code in red and contact Advanced Engine Management for an Unlock Code.

2 Over View

All the features described in this manual refer to ECU firmware version 4.56

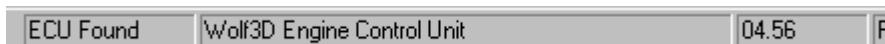
The Wolf3D Version 4 PC Software uses standard Windows systems to display the live engine data (gauges), and the ECU data.



The bottom bar of the screen has information relating to the online Wolf communication status.



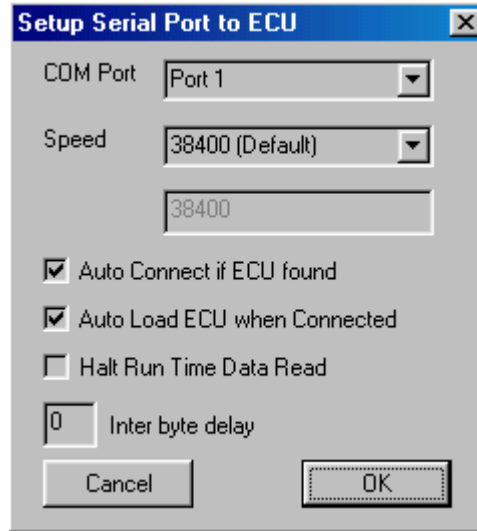
This information is displayed if there is no ECU connected to the PC. The "P" stands for Ping, which means the software is trying to get a response from an ECU.



When an ECU is found the display changes to display what product and version of ECU firmware is connected to the PC.

To download the fuel map from the ECU to the screen Click on the LOAD button on the top line of the screen.

The software can be setup to automatically download a connected ECU when it detects one. Go to the Communications Menu and select Serial Port Setup.

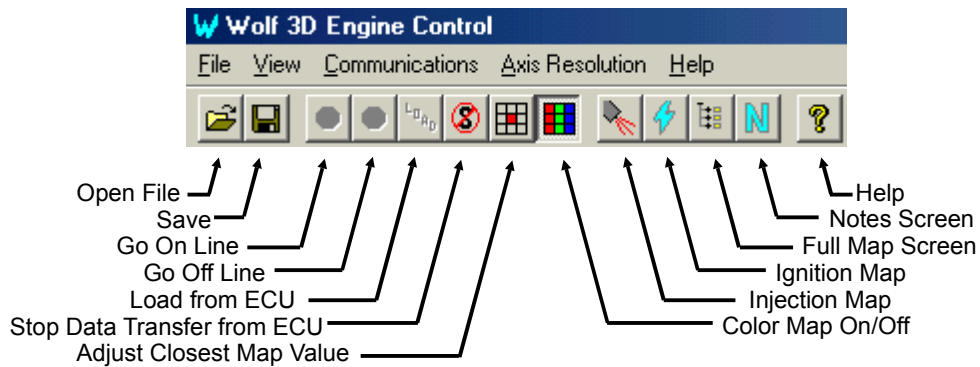


Make sure the Speed is set to default and the first 2 check boxes have ticks in them. Click OK.

The next time the software is run it will automatically load the information from any ECU that is connected.

2.1 Toolbar

The Toolbar has most of the functions that you will use when tuning your ECU.



2.2 Communications

The Wolf3D PC Software can be used in two modes, "OFF-LINE" and "ON-LINE".

OFF-LINE means: to use the software when it is not connected to a Wolf3D Version 4 ECU. In this condition, any changes you make are only within the PC software, and can be saved to a PC file, or saved to a Memory Cartridge.

ON-LINE means: to use the software while connected live to a Wolf3D Version 4 ECU. As you make changes the changes are made in the memory of the ECU.

To go ON-LINE, you will need a cable that connects from the Comm. port on your PC to the Memory Cartridge port on your ECU. The cable can be purchased from any Advanced Engine Management Dealer.

2.2.1 Talking to Cartridges

You can program the Wolf Memory Cartridges directly from the PC software. This allows you to load any existing maps into the cartridge to quick loading into the ECU, via the ECU Cartridge port.

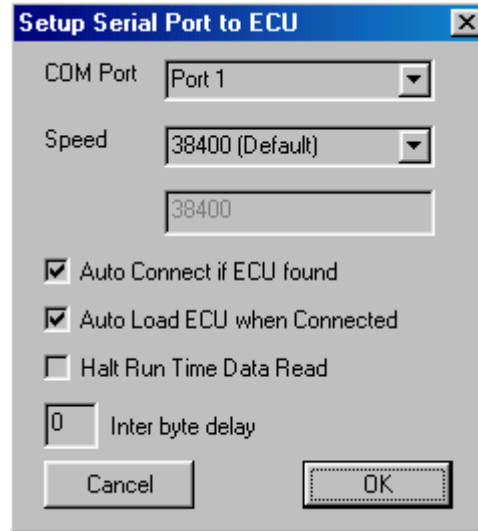
Each Wolf3D is supplied with a Cartridge Cable. This cable plugs into the parallel port of your PC. You can plug a Memory Cartridge into the end of this cable for PC to Cartridge communications.

The PC Software always communicates through LPT1 (Parallel Port 1).

2.2.2 Talking to ECU

You can make live changes to the maps in the ECU via the PC Software.

To configure the PC software to communicate with the ECU:



- Click on menu Communications.
- Click on menu Setup.

Most Laptop PC's are setup to use Port 1. Make sure you have chosen the correct communications port for your PC.

The communications speed that the Wolf3D ECU communicates at is 38400 Baud. Ensure that the PC software is configured for 38400 Baud.

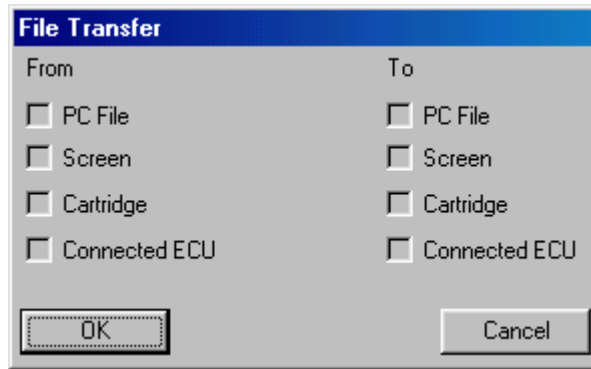
If you are having trouble communicating with the ECU, make sure that there are no other applications using the same communications port as you have chosen for the Wolf3D Version 4 PC software.

2.3 Transferring MAPS

Maps can be easily transferred using the Transfer function in the Fuel menu.

- Click on menu File
- Click on menu Transfer

The following box is displayed



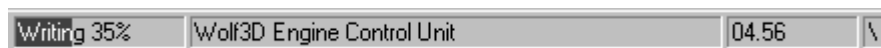
Check the boxes in the “From” and “To” which correspond to the transfer you wish to do. Then click OK.

If the Cartridge or Connected ECU boxes are grayed out it means that the cartridge or ECU are not connected.

When Loading from ECU or cartridge the bottom bar of the software displays the Loading status.



When Writing to ECU or cartridge the bottom bar of the software display the Writing status.



2.4 Module File Directory

Module files are quick setup files for different parameters in the software. They have not been implemented as yet.

2.5 Folder Tree Options

Folder Tree Options is a function to store the new Adjustables that the ECU wakes up in the PC Software. New Adjustables are ECU features that cannot be seen without being Online with an ECU.

Folder Tree Options saves these New Adjustables, next time the software is opened without an ECU connected the New Adjustables are visible.

This feature has not been implemented yet.

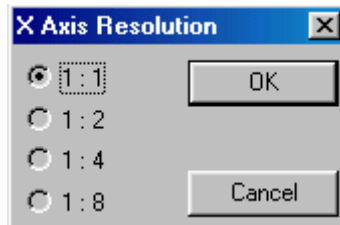
2.6 Map Resolution

The Fuel and Ignition Maps in the version 4 are very large with adjustment points every 125RPM. This can be changed to make it easier to start tuning.

The Load and RPM axis resolution can be changed to reduce the number of points to access.

- Click on Axis Resolution
- Click on X Axis for RPM
- Click on Y Axis for Load

The following dialogue box is displayed



1:1 is the default resolution. All map points are displayed.

Select the resolution required and click OK.

The PC software will fill in the Map points that are not displayed when in the low resolution modes. The software interpolates between the two visible map points to generate a smooth curve.

2.7 Alternate Map Values

The Alternate Map Values feature of the software is used to show what the alternate map value is for Ignition or Fuel when adjusting the other.

Eg: when in the fuel map the Alternate Map Values box displays the selected fuel point rate and the corresponding point ignition timing from the ignition map.

The screenshot shows the Wolf 3D Engine Control software interface. On the left is a tree view with folders for Fuel, Ignition, Control, and Notes. The main area displays a table of fuel map values. The table has columns for Load / RPM and RPM values (0, 1000, 2000, 3000, 4000, 5000, 6000). The 4000 RPM column is highlighted. An 'Alternate Map Values' dialog box is open, showing 'Fuel' at 9.31 mS and 'Ignition' at 12.7 BTDC.

Load / RPM	0	1000	2000	3000	4000	5000	6000
107	15.99	15.99	15.99	15.99	15.99	15.99	15.99
100	15.00	15.00	15.00	15.00	15.00	15.00	15.00
93	15.00	15.00	15.00	15.00	15.00	15.00	15.00
86	12.00	12.00	12.00	12.00	12.00	12.00	12.00
79	10.00	10.00	10.00	10.00	10.00	10.00	10.00
71	9.31	9.31	9.31	9.31	9.31	9.31	9.31
64	8.73	8.73	8.73	8.73	8.73	8.73	8.73
57	7.64	7.64	7.64	7.64	7.64	7.64	7.64
50	5.45	5.45	5.45	5.51	5.64	5.45	5.45
43	4.66	4.66	4.66	4.66	4.66	4.66	4.66
36	3.39	3.61	3.45	3.46	3.46	3.40	3.40
28	2.33	2.37	2.43	2.34	2.35	2.35	2.35
21	1.82	1.60	1.68	1.73	1.81	1.81	1.81
14	2.03	1.70	1.73	1.94	1.91	1.96	2.03
7	1.48	1.48	1.48	1.48	1.48	1.48	1.48
0	0.00	0.50	0.50	0.50	0.50	0.50	0.50

To display the Alternate Map Values

- Click on View
- Click on Alternate Map Values

If you go back into the View menu you will see that the Alternate Map Values has a tick beside it and the Alternate Map Values box will be displayed on the screen.

2.8 Calibration, Compensation and Trim Tables

The PC software allows the user to setup the Wolf to function in very specific ways. Many of the Compensation and trim tables can be setup with the handcontroller but, by using the handcontroller a specific curve or flat line is put into the respective table.

The PC software enables custom compensations and trims to suit the users requirements.

The sensor calibration tables, Configuration>Sensor Setup, allow any manufacturers sensor to be used in place of the standard Wolf sensor. OEM sensor curves can be

calibrated and used in the Wolf so the PC Software and handcontroller display is correct.

Sensor Calibration is a complex procedure, contact Advanced Engine Management for more information on the specific sensor you have.

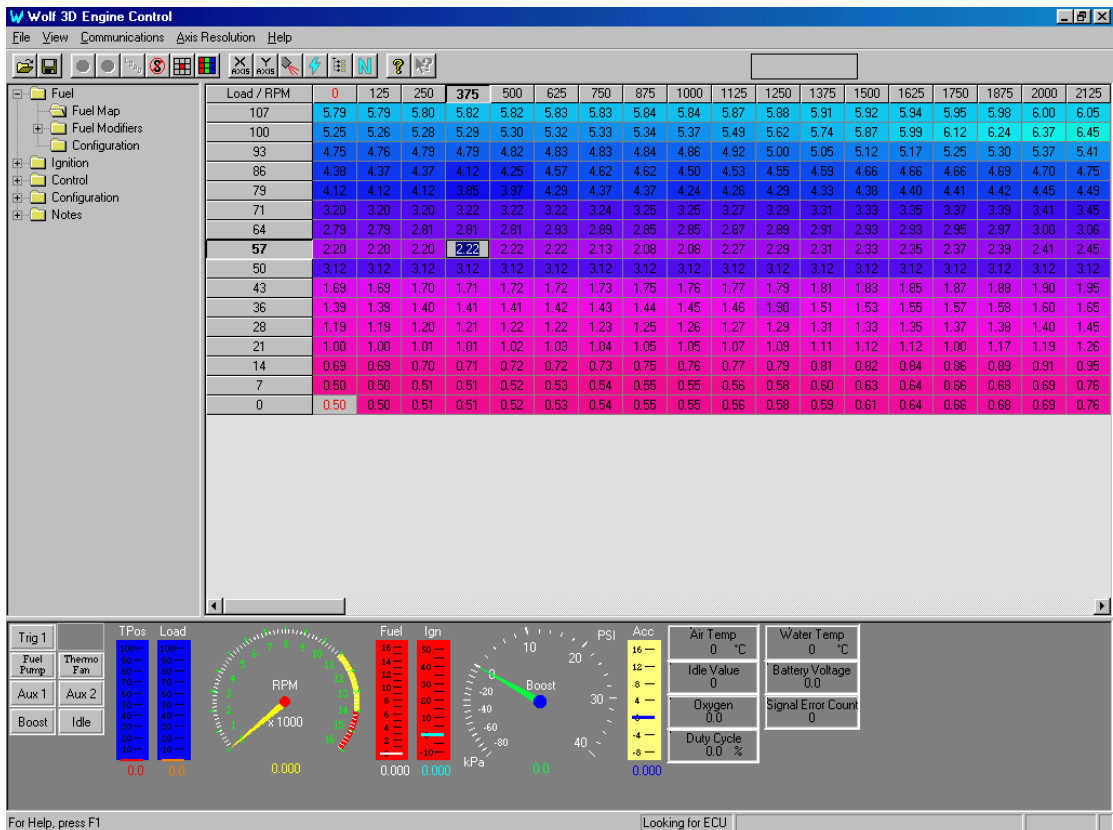
3 Fuel

All of the Fuel adjustments and compensations are under the Fuel folder.

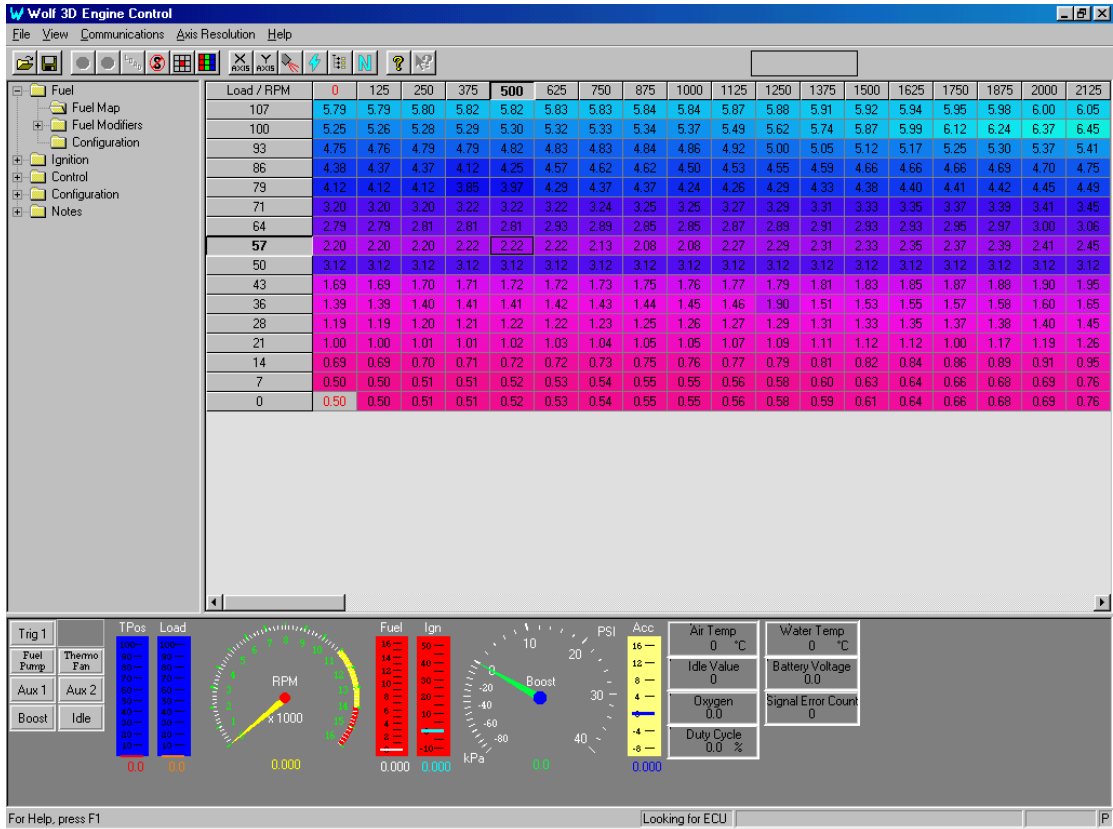
3.1 Fuel Map

There are several ways to modify the values in the Fuel Map.

- Double Click on a single Map Point – This highlights the chosen cell. You then type in the value you want.



- Single Click on a single Map Point – This makes the cell live. When the cell is live, you can modify its value by using the “<” and “>” keys on you PC keypad. You can hold down the **Shift** key and use the “<” and “>” keys to modify the value in steps 16 times greater than using the “<” and “>” keys alone.



- Double Click on a Load Index – The Load Indexes are the load values on the left hand side of the Map. A box will come up. You can type in the value you want, and all of the cells on that load band will be set to the same value, just as a Load Band Reset.

The screenshot shows the 'Wolf 3D Engine Control' software interface. The main window displays a fuel map grid with 'Load / RPM' on the y-axis and engine speed on the x-axis. A dialog box titled 'Enter New Value' is open, showing the value '3' entered. The bottom of the screen features several gauges and status indicators.

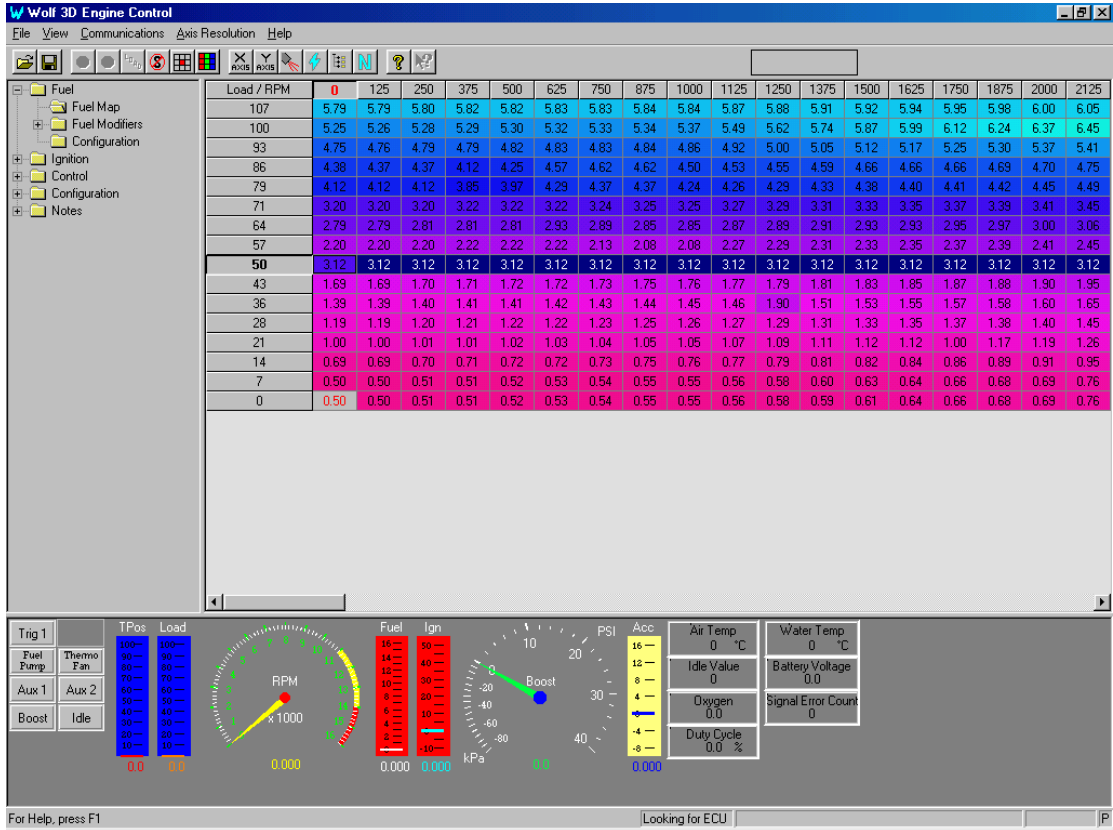
Load / RPM	0	125	250	375	500	625	750	875	1000	1125	1250	1375	1500	1625	1750	1875	2000	2125
107	5.79	5.79	5.80	5.82	5.82	5.83	5.83	5.84	5.84	5.87	5.88	5.91	5.92	5.94	5.95	5.98	6.00	6.05
100	5.25	5.26	5.28	5.29	5.30	5.32	5.33	5.34	5.37	5.49	5.62	5.74	5.87	5.99	6.12	6.24	6.37	6.45
93	4.75	4.76	4.79	4.79	4.82	4.83	4.83	4.84	4.86	4.92	5.00	5.05	5.12	5.17	5.25	5.30	5.37	5.41
86	4.38	4.37	4.37	4.12	4.25	4.57	4.62	4.62	4.50	4.53	4.55	4.59	4.66	4.66	4.66	4.69	4.70	4.75
79	4.12	4.12	4.12	3.85	3.97	4.29	4.37	4.37	4.24	4.26	4.29	4.33	4.38	4.40	4.41	4.42	4.45	4.49
71	3.20	3.20	3.20	3.22	3.22	3.22	3.24	3.25	3.25	3.27	3.29	3.31	3.33	3.35	3.37	3.39	3.41	3.45
64	2.79	2.79	2.81	2.81	2.81	2.93	2.89	2.85	2.85	2.87	2.89	2.91	2.93	2.93	2.95	2.97	3.00	3.06
57	2.20	2.20	2.20	2.22	2.22	2.22	2.13	2.08	2.08	2.27	2.29	2.31	2.33	2.35	2.37	2.39	2.41	2.45
50	2.00	2.00	2.00	2.00	2.02	2.12	2.08	2.04	2.00	2.06	2.08	2.10	2.12	2.14	2.16	2.18	2.20	2.25
43	1.69	1.69	1.70	1.71	1.72	1.72	1.73	1.75	1.76	1.77	1.79	1.81	1.83	1.85	1.87	1.88	1.90	1.95
36	1.39	1.39	1.40	1.41	1.41	1.42	1.43	1.44	1.45	1.46	1.90	1.51	1.53	1.55	1.57	1.58	1.60	1.65
28	1.19	1.19	1.20	1.21	1.22	1.22	1.23	1.25	1.26	1.27	1.29	1.31	1.33	1.35	1.37	1.38	1.40	1.45
21	1.00	1.00	1.01	1.01	1.02	1.03	1.04	1.05	1.05	1.07	1.09	1.11	1.12	1.12	1.00	1.17	1.19	1.26
14	0.69	0.69	0.70	0.70	0.70	0.70	0.70	0.70	0.76	0.77	0.79	0.81	0.82	0.84	0.86	0.89	0.91	0.95
7	0.50	0.50	0.51	0.51	0.51	0.51	0.51	0.51	0.55	0.56	0.58	0.60	0.63	0.64	0.66	0.68	0.69	0.76
0	0.50	0.50	0.51	0.51	0.51	0.51	0.51	0.51	0.55	0.56	0.58	0.59	0.61	0.64	0.66	0.68	0.69	0.76

At the bottom of the interface, there are several gauges and status indicators:

- Trig 1: Fuel Pump, Aux 1, Boost
- Thermo Fan: Aux 2, Idle
- RPM gauge: 0.000
- Fuel gauge: 0.000
- Ign gauge: 0.000
- Boost gauge: 0.00
- Acc gauge: 0.000
- Air Temp: 0 °C
- Water Temp: 0 °C
- Idle Value: 0
- Battery Voltage: 0.0
- Oxygen: 0.0
- Signal Error Count: 0
- Duty Cycle: 0.0 %

For Help, press F1 | Locking for ECU

- Single Click on a Load Index – The Load Indexes are the load values on the left hand side of the Map. If you single click on one of these values, you can use the “<” and “>” to do Load Band Moves. You can hold down the **Shift** key and use the “<” and “>” keys to modify the value in steps 16 times greater than using the “<” and “>” keys alone.



- Double Click on an RPM Index – The RPM Indexes are the load values on the top of the Map. A box will come up. You can type in the value you want, and all of the cells on that RPM band will be set to the same value, just as an RPM Band Reset.

The screenshot displays the 'Wolf 3D Engine Control' interface. The main window shows a fuel map grid with a table of values. The columns represent Load / RPM (0, 125, 250, 375, 500, 625, 750, 875, 1000, 1125, 1250, 1375, 1500, 1625, 1750, 1875, 2000, 2125) and the rows represent RPM values (107, 100, 93, 86, 79, 71, 64, 57, 50, 43, 36, 28, 21, 14, 7, 0). A dialog box 'Enter New Value' is open over the 875 RPM column, with the value '0' entered. The bottom of the screen shows various engine gauges: Trig 1, Fuel Pump, Aux 1, Boost, TPos, Load, RPM (0.000), Fuel, Ign, PSI (0.0), Acc, Air Temp (0 °C), Water Temp (0 °C), Idle Value (0), Oxygen (0.0), Duty Cycle (0.0 %), Battery Voltage (0.0), and Signal Error Count (0). The status bar at the bottom indicates 'Looking for ECU'.

Load / RPM	0	125	250	375	500	625	750	875	1000	1125	1250	1375	1500	1625	1750	1875	2000	2125
107	5.79	5.79	5.80	5.82	5.82	5.83	5.83	5.84	5.84	5.87	5.88	5.91	5.92	5.94	5.95	5.98	6.00	6.05
100	5.25	5.26	5.28	5.29	5.30	5.32	5.33	5.34	5.37	5.49	5.62	5.74	5.87	5.99	6.12	6.24	6.37	6.45
93	4.75	4.76	4.79	4.79	4.82	4.83	4.83	4.84	4.86	4.92	5.00	5.05	5.12	5.17	5.25	5.30	5.37	5.41
86	4.38	4.37	4.37	4.12	4.25	4.57	4.62	4.62	4.50	4.53	4.55	4.69	4.66	4.66	4.66	4.69	4.70	4.75
79	4.12	4.12	4.12	3.85	3.97	4.29	4.37	4.37	4.24	4.26	4.29	4.33	4.38	4.40	4.41	4.42	4.45	4.49
71	3.20	3.20	3.20	3.22	3.22	3.22	3.24	3.25	3.25	3.27	3.29	3.31	3.33	3.35	3.37	3.39	3.41	3.45
64	2.79	2.79	2.81	2.81	2.81	2.93	2.89	2.85	2.85	2.87	2.89	2.91	2.93	2.93	2.95	2.97	3.00	3.06
57	2.20	2.20	2.20	2.22	2.22	2.22	2.13	2.08	2.08	2.27	2.29	2.31	2.33	2.35	2.37	2.39	2.41	2.45
50	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12
43	1.69	1.69	1.70	1.71	1.72	1.72	1.73	1.75	1.76	1.77	1.79	1.81	1.83	1.85	1.87	1.88	1.90	1.95
36	1.39	1.39	1.40	1.41	1.41	1.42	1.43	1.44	1.45	1.46	1.50	1.51	1.53	1.55	1.57	1.58	1.60	1.65
28	1.19	1.19	1.20	1.21	1.22	1.22	1.23	1.25	1.26	1.27	1.29	1.31	1.33	1.35	1.37	1.38	1.40	1.45
21	1.00	1.00	1.01	1.01	1.02	1.03	1.04	1.05	1.05	1.07	1.09	1.11	1.12	1.12	1.00	1.17	1.19	1.26
14	0.69	0.69	0.70	0.71	0.72	0.72	0.73	0.75	0.76	0.77	0.79	0.81	0.82	0.84	0.86	0.89	0.91	0.95
7	0.50	0.50	0.51	0.51	0.51	0.51	0.51	0.51	0.55	0.56	0.58	0.60	0.63	0.64	0.66	0.68	0.69	0.76
0	0.50	0.50	0.51	0.51	0.51	0.51	0.51	0.51	0.55	0.56	0.58	0.59	0.61	0.64	0.66	0.68	0.69	0.76

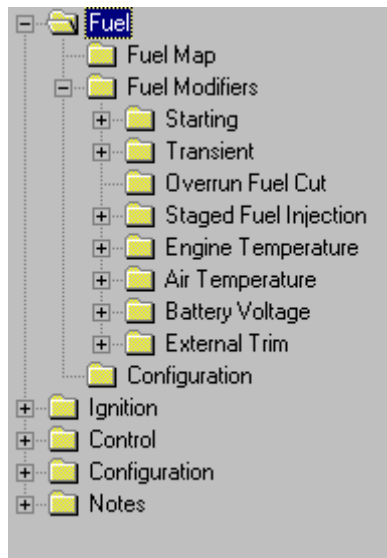
- Single Click on an RPM Index – The RPM Indexes are the RPM values on the top of the Map. If you single click on one of these values, you can use the “<” and “>” to do RPM Band Moves. You can hold down the **Shift** key and use the “<” and “>” keys to modify the value in steps 16 times greater than using the “<” and “>” keys alone.

The screenshot displays the 'Wolf 3D Engine Control' interface. At the top, there is a menu bar (File, View, Communications, Axis Resolution, Help) and a toolbar with various icons. On the left, a tree view shows folders for Fuel, Fuel Map, Fuel Modifiers, Configuration, Ignition, Control, and Notes. The main area is a fuel map table with 'Load / RPM' on the y-axis and RPM values on the x-axis. The current RPM is 107. Below the table are several engine status gauges: Trig 1, Fuel Pump, Aux 1, Boost, TPos, Load, RPM (x1000), Fuel, Ign, Boost, PSI, Acc, Air Temp (°C), Water Temp (°C), Idle Value, Oxygen, Duty Cycle, Battery Voltage, and Signal Error Count. The status bar at the bottom indicates 'Looking for ECU'.

Load / RPM	0	125	250	375	500	625	750	875	1000	1125	1250	1375	1500	1625	1750	1875	2000	2125
107	5.79	5.79	5.80	5.82	5.82	5.83	5.83	5.84	5.84	5.87	5.88	5.91	5.92	5.94	5.95	5.98	6.00	6.05
100	5.25	5.26	5.28	5.29	5.30	5.32	5.33	5.34	5.37	5.49	5.62	5.74	5.87	5.99	6.12	6.24	6.37	6.45
93	4.75	4.76	4.79	4.79	4.82	4.83	4.83	4.84	4.86	4.92	5.00	5.05	5.12	5.17	5.25	5.30	5.37	5.41
86	4.38	4.37	4.37	4.12	4.25	4.57	4.62	4.62	4.50	4.53	4.55	4.59	4.66	4.66	4.66	4.69	4.70	4.75
79	4.12	4.12	4.12	3.85	3.97	4.29	4.37	4.37	4.24	4.26	4.29	4.33	4.38	4.40	4.41	4.42	4.45	4.49
71	3.20	3.20	3.20	3.22	3.22	3.22	3.24	3.25	3.25	3.27	3.29	3.31	3.33	3.35	3.37	3.39	3.41	3.45
64	2.79	2.79	2.81	2.81	2.81	2.93	2.89	2.85	2.85	2.87	2.89	2.91	2.93	2.93	2.95	2.97	3.00	3.06
57	2.20	2.20	2.20	2.22	2.22	2.22	2.13	2.08	2.08	2.27	2.29	2.31	2.33	2.35	2.37	2.39	2.41	2.45
50	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12
43	1.69	1.69	1.70	1.71	1.72	1.72	1.73	1.75	1.76	1.77	1.79	1.81	1.83	1.85	1.87	1.88	1.90	1.95
36	1.39	1.39	1.40	1.41	1.41	1.42	1.43	1.44	1.45	1.46	1.50	1.51	1.53	1.55	1.57	1.58	1.60	1.65
28	1.19	1.19	1.20	1.21	1.22	1.22	1.23	1.25	1.26	1.27	1.29	1.31	1.33	1.35	1.37	1.38	1.40	1.45
21	1.00	1.00	1.01	1.01	1.02	1.03	1.04	1.05	1.05	1.07	1.09	1.11	1.12	1.12	1.00	1.17	1.19	1.25
14	0.69	0.69	0.70	0.71	0.72	0.72	0.73	0.75	0.76	0.77	0.79	0.81	0.82	0.84	0.86	0.89	0.91	0.95
7	0.50	0.50	0.51	0.51	0.52	0.53	0.54	0.55	0.55	0.56	0.58	0.60	0.63	0.64	0.66	0.68	0.69	0.76
0	0.50	0.50	0.51	0.51	0.52	0.53	0.54	0.55	0.55	0.56	0.58	0.59	0.61	0.64	0.66	0.68	0.69	0.76

3.2 Fuel Modifiers

The Fuel Modifiers folder contains Fuel Injection Trims.



3.2.1.1.1 Overall Trim

The Overall Trim allows you to increase or decrease the overall fuel delivery. The adjustment ranges by +/-50%.

During normal operation, this value should be set to zero. During engine tuning this value MUST be set to zero. This will ensure that all tuning is done with standard settings.

3.2.1.1.2 Injector Trims Activate

Activates the individual Injector Trims, this must be set to ON for the trim to work.

3.2.1.1.3 Injector 1 Trim

Increases or decreases the fuel injected by Injector Bank 1 but the set Percentage. The adjustment ranges by +/-50%.

3.2.1.1.4 Injector 2 Trim

Increases or decreases the fuel injected by Injector Bank 2 but the set Percentage. The adjustment ranges by +/-50%.

3.2.1.1.5 Injector 3 Trim

Increases or decreases the fuel injected by Injector Bank 3 but the set Percentage. The adjustment ranges by +/-50%.

3.2.1.1.6 Injector 4 Trim

Increases or decreases the fuel injected by Injector Bank 4 but the set Percentage. The adjustment ranges by +/-50%.

3.2.2 Starting

3.2.2.1.1 Starting Fuel Rate

This is the base Starting Fuel Injection Rate before modifiers such as Engine Temperature Compensation. It is the Injection rate when the engine RPM is lower than the Starting Below RPM number setup in the Configuration>Engine>Calibration Folder.

3.2.2.1.2 Initial Fuel Pulse Activate

To wet the intake manifold, it can be an advantage to increase the length of the very first fuel pulse. To use Initial Fuel Pulse Add-On, the Initial Fuel Pulse Activate must be turned on.

3.2.2.1.3 Initial Fuel Pulse Add-On

This is the amount of extra fuel that is added during the very first fuel pulse from each injector output.

3.2.2.1.4 Post Start Enrichment Activate

Engine heat soak can cause engines to stall or run roughly immediately after starting. Post start enrichment can reduce this problem.

3.2.2.1.5 Post Start Enrichment Decay Mode

There are several Post Start Enrichment Decay Modes.

- Inj1 Linear – Each engine revolution the Post Start Enrichment is reduced by the same number of mS each time. The number of mS is determined the first engine revolution.
- Inj1 % - Each engine revolution the number of mS is recalculated as the percentage of the current Post Start Enrichment amount. This means, as the amount of extra fuel decreases, the Decay amount gets smaller and smaller.
- 0.5Sec Linear – Each 0.5 Seconds, the Post Start Enrichment is reduced by the same number of mS each time. The number of mS is determined the first engine revolution.
- 0.5Sec % - Each 0.5 Seconds the number of mS is recalculated as the percentage of the current Post Start Enrichment amount. This means, as the amount of extra fuel decreases, the Decay amount gets smaller and smaller.

3.2.2.1.6 Flood Clear

Flood Clear can be used to clear the engine of excess fuel on starting if you think that you have set Starting Fuel values too high. Above the TPos that you determine, there will be no fuel injected.

3.2.3 Transient

3.2.3.1.1 Acceleration Enrichment

There are two ways of implementing the Acceleration Enrichment, via Throttle Position or MAP Sensor.

The Acceleration Enrichment increases the fuelling to the engine by a user definable amount dependent on the engines requirements. The Decay sets the rate at which the enrichment decreases over time. 0 means an extremely slow decay, 100 means a very fast decay. These two parameters allow the setting of a sharp throttle response. To make setting the Acceleration Enrichment easier, first set the Decay to 50.

It is vital that you set up the Fuel and Ignition Map points before you spend too much time on setting up the acceleration enrichment rate and decay. Acceleration enrichment modifies the amount of fuel being delivered, based on the Fuel Map and the amount of change in throttle position. If the fuel and ignition maps are incorrect, the acceleration enrichment will not be able to cover up these problems.

3.2.3.1.2 Decel Enleanment

Decel Enleanment is a very advanced function. Do not activate this function unless you have a high skill level with engine tuning.

3.2.4 Overrun Fuel Cut

This function is used to both increase economy and reduce backfires and afterburning while coasting. When the throttle is closed as when coasting down a hill or when changing gears it is not necessary to deliver fuel to the engine.

Fuel Cut on Over-run reduces the injection time to zero. It is implemented if the engine is above an RPM you determine (eg : 1200RPM or greater), and the throttle position is below a value you set. The Fuel Cut is cancelled below the RPM you determined. The User set throttle position level allows the sensitivity of the Fuel Cut to be tailored to the engine, driver, vehicle combination. If in doubt, set this function to zero.

3.2.5 Staged Injection

The Staged Injector Output on the Wolf3D Version 4 blends in with the Primary Injector Outputs, instead of stepping in or switching on at a particular engine RPM or Load. This means that there is no lean, then rich time, which can be the result of switching in Staged Injectors.

At idle it is best to have only Primary Injection, with no fuel coming from the Staged Injectors.

The Wolf3D Version 4 has a fully configurable Staged Injection Output. You are able to tune the amount of fuel required against both RPM and Engine Load.

3.2.6 Engine Temperature

Engine Temperature Injection Compensation is used to increase the amount of fuel delivered when the water temperature is low, decreasing as the water temperature increases, until there is no compensation when the engine is operating under normal operating temperature.

3.2.7 Air Temperature

Air Temperature Injection Compensation is used to make corrections for changes in intake air temperature. As the intake air temperature increases, there is less oxygen in the intake charge; hence the amount of fuel required is reduced to maintain the same air fuel ratio. The opposite is true as the intake air temperature decreases, there is more oxygen in the intake charge, hence more fuel is required to maintain consistent air fuel ratio.

3.2.8 Battery Voltage

As the battery voltage decreases the time the injectors take to open completely increases. This means the amount of fuel delivered decreases. Battery Voltage compensation help to alleviate this by adding extra opening time onto the map fuel value. The adjustment is from 0 mS to 1mS in 0.01mS increments.

3.2.9 External Trim

The External Trim can be used to add or subtract a fuel percentage based on a variable voltage applied to the aux input. The Aux input calibration table and external trim table must be setup before the function will operate correctly.

3.2.9.1.1 Activate

Enables the External Trim of the Fuel Map. Suggested Value : To Suit Application.

3.2.9.1.2 Input Used

Sets the Aux input used to trim the Fuel Map

3.2.9.1.3 Voltage Trim Table

This sets the percentage Fuel added or subtracted from the Fuel Map based on the Voltage at the selected Aux Input.

4 Ignition

All of the Ignition adjustments and compensations are under the Ignition folder.

4.1 Ignition Map

There are several ways to modify the values in the Ignition Map.

- Double Click on a single Map Point – This highlights the chosen cell. You then type in the value you want.

The screenshot displays the 'Wolf 3D Engine Control' interface. The main window shows a table of Ignition Map values. The table has columns for Load / RPM (0, 125, 250, 375, 500, 625, 750, 875, 1000, 1125, 1250, 1375, 1500, 1625, 1750, 1875, 2000, 2125) and rows for various RPM values (107, 100, 93, 86, 79, 71, 64, 57, 50, 43, 36, 28, 21, 14, 7, 0). The value 4.9 is highlighted in the cell for Load 0 and RPM 64.

Load / RPM	0	125	250	375	500	625	750	875	1000	1125	1250	1375	1500	1625	1750	1875	2000	2125
107	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
100	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
93	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
86	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
79	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
71	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
64	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
57	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
50	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
43	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
36	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
28	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
21	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
14	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
7	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
0	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0

The bottom panel of the software shows several engine gauges and sensors:

- Trig 1:** Fuel Pump, Thermo Fan, Aux 1, Aux 2, Boost, Idle.
- TPos:** 100%
- Load:** 0.00
- RPM:** 0.000
- Fuel:** 0.000
- Ign:** 0.000
- Boost:** 0.00 kPa
- Acc:** 0.000
- Air Temp:** 0 °C
- Water Temp:** 0 °C
- Idle Value:** 0
- Battery Voltage:** 0.0
- Oxygen:** 0.0
- Duty Cycle:** 0.0 %
- Signal Error Count:** 0

At the bottom of the window, it says "For Help, press F1" and "Looking for ECU".

- Single Click on a single Map Point – This makes the cell live. When the cell is live, you can modify its value by using the “<” and “>” keys on you PC keypad. You can hold down the **Shift** key and use the “<” and “>” keys to modify the value in steps 16 times greater than using the “<” and “>” keys alone.

The screenshot displays the 'Wolf 3D Engine Control' software interface. The main window features a map table with columns for Load / RPM (0, 125, 250, 375, 500, 625, 750, 875, 1000, 1125, 1250, 1375, 1500, 1625, 1750, 1875, 2000, 2125) and rows for various engine parameters. The values in the table range from 4.9 to 20.0. Below the map table, there are several gauges and indicators: a Trig 1 gauge, TPos and Load gauges, a Fuel gauge, an Ign gauge, a Boost gauge, an Acc gauge, Air Temp (0 °C), Water Temp (0 °C), Fuel Pump, Thermo Fan, Aux 1, Aux 2, Boost, and Idle gauges, and a Signal Error Count gauge. The bottom status bar shows 'For Help, press F1' and 'Looking for ECU'.

Load / RPM	0	125	250	375	500	625	750	875	1000	1125	1250	1375	1500	1625	1750	1875	2000	2125
107	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
100	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
93	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
86	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
79	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
71	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
64	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
57	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
50	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
43	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
36	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
28	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
21	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
14	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
7	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
0	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0

- Double Click on a Load Index – The Load Indexes are the load values on the left hand side of the Map. A box will come up. You can type in the value you want, and all of the cells on that load band will be set to the same value, just as a Load Band Reset.

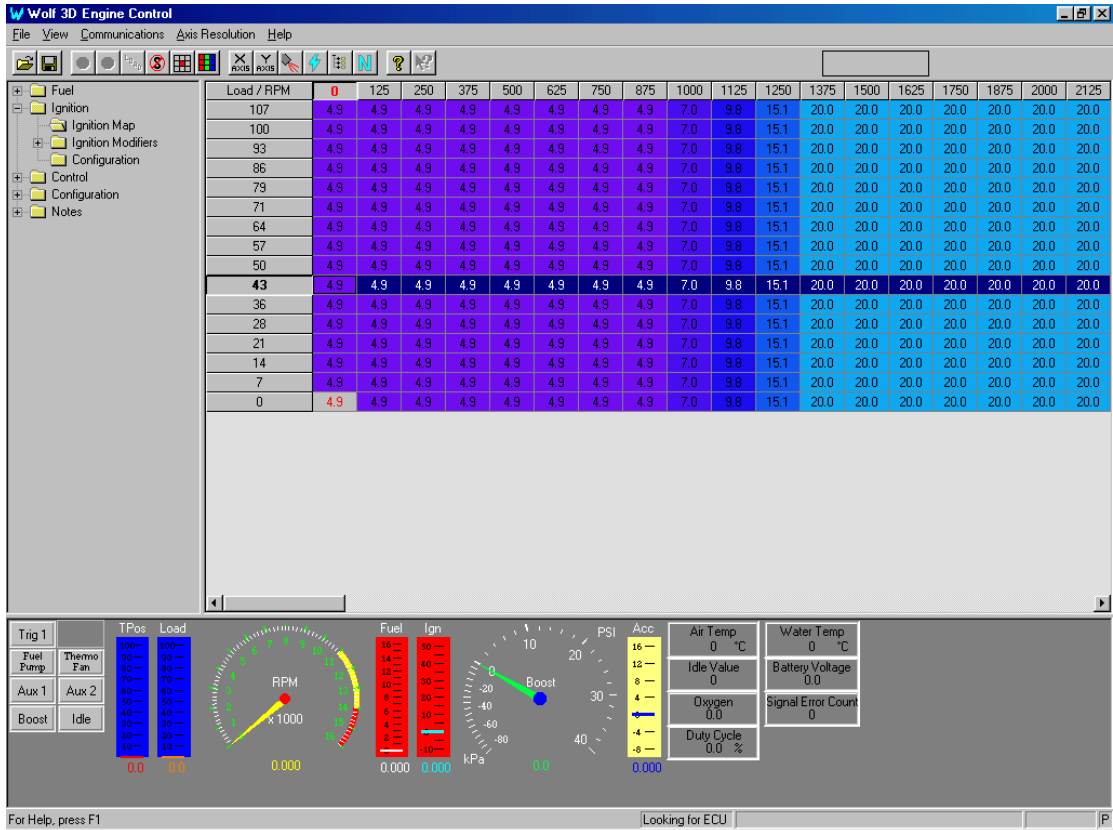
The screenshot displays the 'Wolf 3D Engine Control' interface. The main window shows a grid of load indexes with columns for Load / RPM (0, 125, 250, 375, 500, 625, 750, 875, 1000, 1125, 1250, 1375, 1500, 1625, 1750, 1875, 2000, 2125) and rows for various load indices (107, 100, 93, 86, 79, 71, 64, 57, 50, 43, 36, 28, 21, 14, 7, 0). A dialog box titled 'Enter New Value' is open, showing a text input field with the value '0' and 'Cancel' and 'OK' buttons.

At the bottom of the interface, there are several gauges and status indicators:

- Trig 1:** Fuel Pump, Thermo Fan, Aux 1, Aux 2, Boost, Idle.
- TPos:** 100, 90, 80, 70, 60, 50, 40, 30, 20, 10.
- Load:** 100, 90, 80, 70, 60, 50, 40, 30, 20, 10.
- RPM:** 0.000 (x1000).
- Fuel:** 0.000.
- Ign:** 0.000.
- Boost:** 0.0 (kPa).
- Acc:** 0.000.
- Air Temp:** 0 °C.
- Water Temp:** 0 °C.
- Idle Value:** 0.
- Battery Voltage:** 0.0.
- Oxygen:** 0.0.
- Signal Error Count:** 0.
- Duty Cycle:** 0.0 %.

At the bottom left, it says 'For Help, press F1'. At the bottom right, it says 'Looking for ECU'.

- Single Click on a Load Index – The Load Indexes are the load values on the left hand side of the Map. If you single click on one of these values, you can use the “<” and “>” to do Load Band Moves. You can hold down the Shift key and use the “<” and “>” keys to modify the value in steps 16 times greater than using the “<” and “>” keys alone.



- Double Click on an RPM Index – The RPM Indexes are the load values on the top of the Map. A box will come up. You can type in the value you want, and all of the cells on that RPM band will be set to the same value, just as an RPM Band Reset.

The screenshot displays the 'Wolf 3D Engine Control' software interface. The main window features a menu bar (File, View, Communications, Axis Resolution, Help) and a toolbar. On the left is a tree view with folders for Fuel, Ignition, Control, and Notes. The central area is a load map table with 'Load / RPM' on the y-axis and RPM values on the x-axis. A dialog box 'Enter New Value' is open over the 750 RPM column, showing a value of 0. The bottom of the screen contains a dashboard with various gauges and readouts.

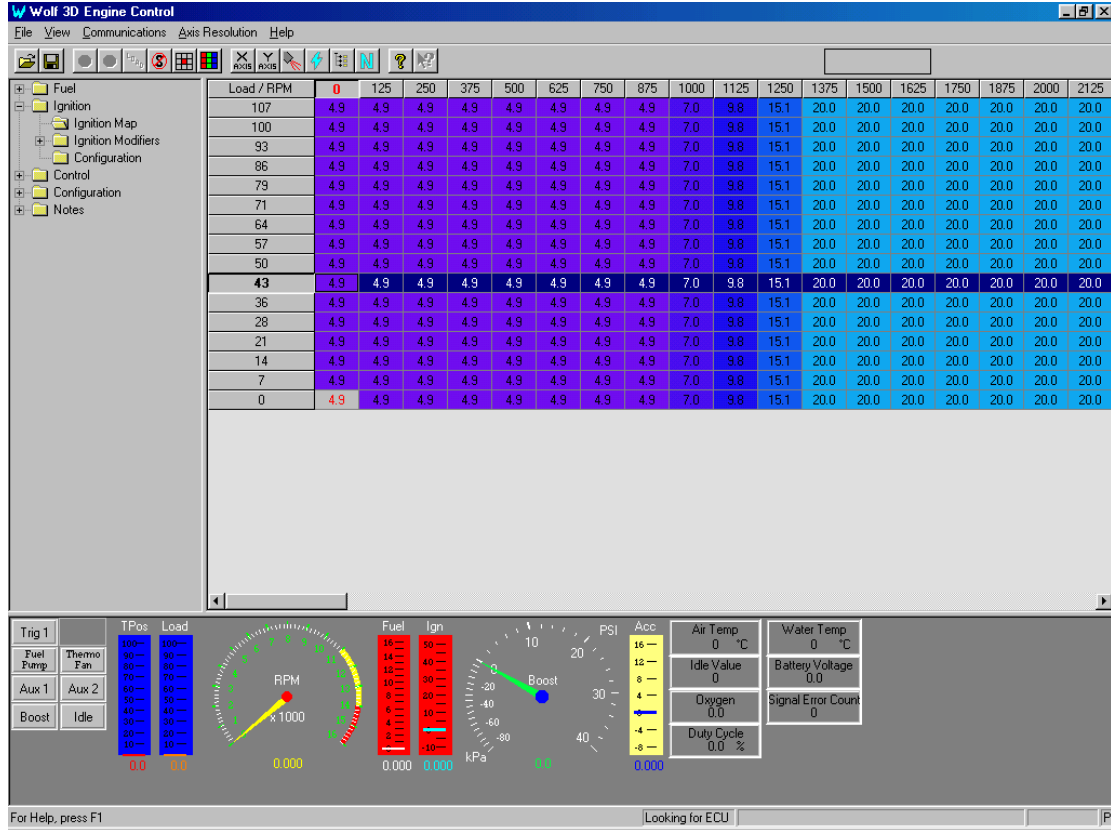
Load / RPM	0	125	250	375	500	625	750	875	1000	1125	1250	1375	1500	1625	1750	1875	2000	2125
107	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
100	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
93	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
86	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
79	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
71	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
64	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
57	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
50	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
43	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
36	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
28	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
21	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
14	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
7	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
0	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	7.0	9.8	15.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0

Dashboard Readouts:

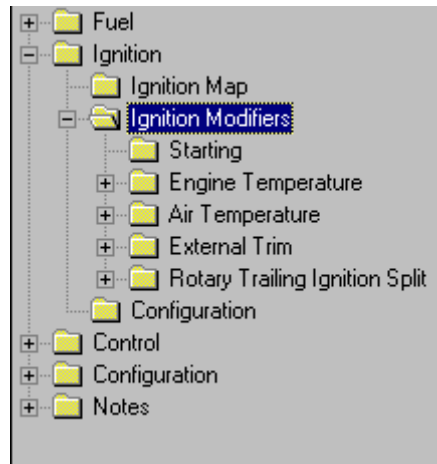
- Trip 1: 0.0
- Fuel Pump: 100%
- Thermo Fan: 100%
- Aux 1: 100%
- Aux 2: 100%
- Boost: 100%
- Idle: 100%
- RPM: 0.000 x1000
- Fuel: 0.000
- Ign: 0.000
- Boost: 0.00 kPa
- Acc: 0.000
- Air Temp: 0 °C
- Water Temp: 0 °C
- Idle Value: 0
- Battery Voltage: 0.0
- Oxygen: 0.0
- Signal Error Count: 0
- Duty Cycle: 0.0 %

For Help, press F1 | Looking for ECU | P

- Single Click on an RPM Index – The RPM Indexes are the RPM values on the top of the Map. If you single click on one of these values, you can use the “<” and “>” to do Load Band Moves. You can hold down the **Shift** key and use the “<” and “>” keys to modify the value in steps 16 times greater than using the “<” and “>” keys alone.



4.2 Ignition Modifiers



4.2.1.1.1 Overall Trim

Overall trim adds or subtracts ignition timing from the Ignition map

4.2.2 Starting

Starting Ignition Timing is the timing delivered to the engine when the RPM is below the Starting RPM, preset in Configuration>Engine>Calibration .

Set the Cranking Ignition Timing to 0°BTDC.

Crank the engine with a timing light on the crank, taking note of the timing position. The timing mark may be either before or after Top Dead Center, (TDC). To make sure the display shows the user the correct Ignition Timing, the display must show the same crank angle the timing light is showing. Since the Cranking Ignition Timing is set at 0° BTDC the timing light should show 0° BTDC.

If it is not 0°BTDC, you should either adjust the Trigger Degrees BTDC point, or move the Input Trigger Sensor.

The Cranking Ignition Timing can now be set to an appropriate value for the type of engine being installed.

4.2.3 Engine Temperature

Engine Temperature Ignition Compensation is used to increase or decrease the amount of timing delivered to the engine depending on the Engine Temperature. The timing can be adjusted for individual temperatures by using the trim table.

Engine Temperature Ignition Compensation must be activated before it will operate correctly.

4.2.4 Air Temperature

Air Temperature Ignition Compensation is used to increase or decrease the amount of timing delivered to the engine depending on the Air Temperature. The timing can be adjusted for individual temperatures by using the trim table.

Air Temperature Ignition Compensation must be activated before it will operate correctly.

4.2.5 External Trim

The External Trim can be used to add or subtract timing based on a variable voltage applied to the aux input. The Aux input calibration table and external trim table must be setup before the function will operate correctly.

4.2.5.1.1 Activate

Enables the External Trim of the Ignition Map. Suggested Value : To Suit Application.

4.2.5.1.2 Input Used

Sets the Aux input used to trim the Ignition Map

4.2.5.1.3 Voltage Trim Table

This sets the degrees timing added or subtracted from the Ignition Map based on the Voltage at the selected Aux Input.

4.2.6 Rotary Trailing Ignition Split

Different rotary engines are factory set at different trailing ignition splits between 10 and 20 degrees.

Ask the engine supplier for a recommendation on the correct Trailing Pulse angle for the engine being installed.

The trailing spark on a rotary engine is there primarily for emission purposes and to increase fuel economy. Approximately 95% of the engines power is produced by the leading sparkplugs.

The leading and trailing sparkplugs should not be fired at the same time, as at certain RPMs, there may be some detonation caused by the two flame fronts colliding.

4.2.7 Configuration

4.2.7.1.1 Coil Charge Time

The Coil Charge Time is used to optimize the engines ignition system by extracting the maximum energy from the ignition coil. The Coil Charge Time has a range of 1mS to 5 mS, adjustable in 0.1mS increments. To correctly set the Coil Charge Time, the engine must be under load with automotive ignition diagnostic equipment displaying the coil output.

If the coil charge time is set too low, the engine may miss-fire because the coil doesn't have enough time to fully charge. This means that there may not be enough spark energy to jump the plug gap at high engine loads. This is most common on turbo

engines running high boost (greater than 15PSI or 1 Bar). If the coil charge time is set high and there are still miss-fire problems, the sparkplug gaps may have to be reduced. If the engine has not been tuned correctly, lean fuel miss-fire might be confused with spark miss-fire. The only way to determine the type of miss-fire is to analyze the exhaust gasses, or the ignition system. Both tests are most easily done on a dyno so you can load the engine up until it miss-fires.

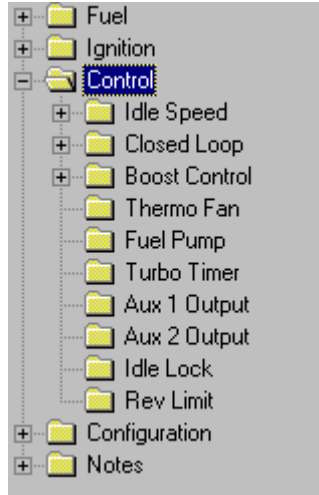
NOTE: If the ignition system is triggering Bosch Ignition Module/s P# 9 222 067 024, the charge value should be set to 3.8mS.

4.2.7.1.2 Coil Discharge Time

It is very important that there is some minimum coil discharge time. If this parameter was set to zero, there would be no time for the spark to be produced, and to burn the fuel completely.

5 Control

The Control folder contains Idle Speed, Closed Loop Control, Boost Control, Thermo Fan, Fuel Pump, Turbo Timer, Aux 1, Aux 2, Idle Lock and Rev Limit.



5.1 Idle Speed

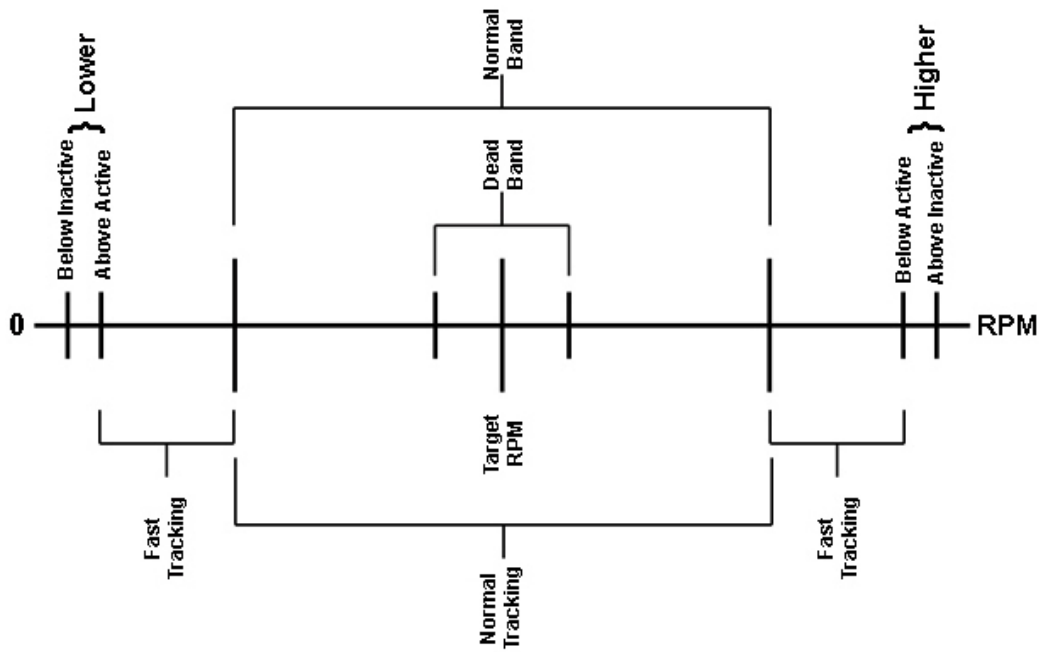
The Idle Speed control function of the Wolf3D Version 4 is a fairly complex system. There are several interlacing systems, and it is important that all of these systems are setup in the correct order to avoid any of the functions working in opposition to each other.

Here are some basic concepts that will allow you to minimize any problems that you might encounter as you are setting up the Idle Control System.

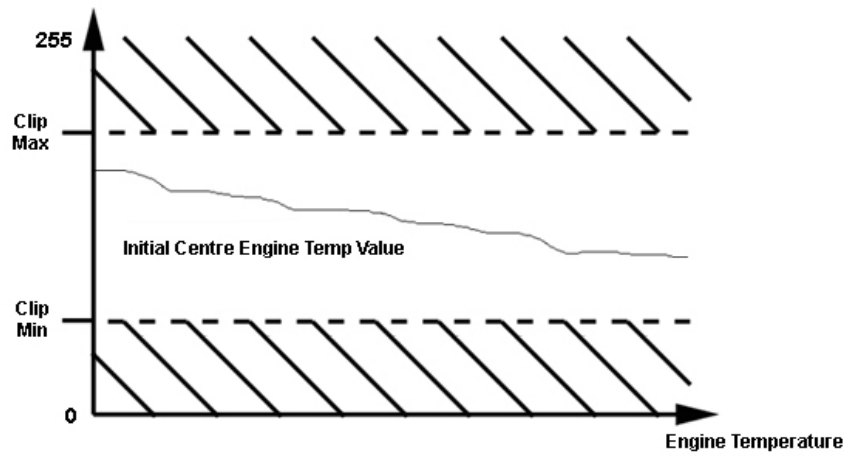
- Turn the Activation OFF. Turning the Activation off will make the Idle Control Solenoid or Stepper Motor use only the Initial Center at Engine Temperature numbers. It will not track to RPM at Engine Temperature.
- Set the "Initial Centre Engine Temp", when the engine is warm, to zero.
- The engine must idle in a stable manner at the RPM that you want, without the aid of any Idle Control Valve. To achieve this, use the throttles manual air bypass (usually a large screw on the throttle body itself).
 - Warm up the engine and tune both fuel and ignition until the engine has a stable idle.
 - Screw out the manual air bypass screw until the engine is idling at the RPM you want. Remember the engine must be up to full operating temperature, and the fuel mixtures and ignition timing must be checked and correct.
- Using the "Initial Centre Engine Temp" value, increase the value until the RPM increases by 50 to 100 RPM. This is the starting point for your idle speed control.

Now let the engine cool overnight. When you start the car in the morning, use the "Initial Center Engine Temp" values to keep the idle speed where you want it as the engine warms up. You will probably want to have the engine idle at a higher speed when the coolant temperature is lower, so put larger numbers in the lower temperature cells to make the engine idle at the RPM you require for that engine temperature. The Engine Temperature Compensation Value must be set to optimize engine running while the engine is warming up.

5.1.1 Idle Control Diagrams

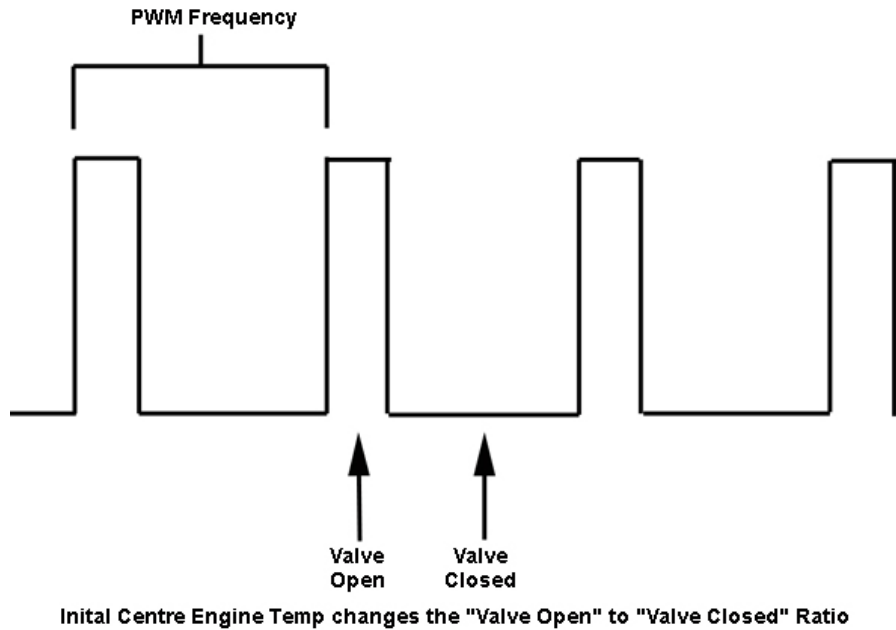


Activation Areas and Tracking Areas



Idle control will not track outside clip MAX & MIN value

Idle Control Clip MAX/MIN



PWM Diagram

5.1.2 Suggested Idle Control Values

5.1.2.1.1 Activation Folder

Activation	OFF	
Lower Inactive Below RPM	100	
Lower Active Above RPM	150	
Higher Active Below RPM	1500	
Higher Inactive Above RPM	1550	
Active Below TPOS	2.0	*depending on Closed TPOS reading
Inactive Above TPOS	4.1	*depending on Closed TPOS reading

5.1.2.1.2 Tracking Folder

Tracking Dead RPM Band	37
Tracking Normal RPM Band	85
Tracking Normal Speed	18
Tracking Fast Speed	4
Tracking Reset Speed	0
Tracking Step Size	1

5.1.2.1.3 Limits Folder

Idle Clip Activate	ON
Clip Minimum Value	1
Clip Maximum Value	255

5.1.2.1.4 Extra Opening Folder

***Setup after Idle Control is working successfully**

Fast Idle Activate	OFF	(Activate after Idle Control is setup)
Fast Idle Engine Temp Below	50	
Fast Idle Opening Extra	38	

Fast Idle Time	10	
Fast Idle Decay Speed	30	
Engine Starting Opening	204	
Aircon Opening Extra Activate	OFF	(Activate after Idle Control is setup)
Aircon Opening Extra	47	

5.1.2.1.5 Configuration Folder

Output Type	PWM	* Depending on valve type
PWM Valve Frequency	150	*Depending on valve type
PWM Mode Fast Reset and Centre	ON	

5.2 Closed Loop

The Wolf 3D has a Closed Loop Control function that enables the ECU to maintain a user preset Air : Fuel ratio, so that the function of a catalytic converter will work correctly and last its full life. Closed Loop Control is not a magic wand to cure all vehicles tuning problems. It is only of real use when a catalytic converter is being used.

It is important that the fuel map is tuned close to the desired Air : Fuel ratio as the Closed Loop function can only make small changes in fuel mixture.

5.2.1 Closed Loop Control Setup Procedure

5.2.1.1.1 Oxygen Sensor

The oxygen sensor voltages that the closed loop will track around need to be setup first. The calibration table is preset on shipping and should not need adjustment.

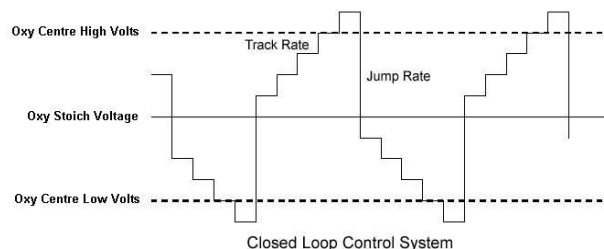
Oxygen sensor setup is located in the Calibration>Sensor Setup>Oxygen 1 folder.

Oxy Centre Low Volts – this is the lowest voltage the oxy sensor can generate before the closed loop jumps back to the Map fuel value

Oxy Centre High Volts – this is the highest voltage the oxy sensor can generate before the closed loop jumps back to the Map fuel value

Oxy Stoich Volts – This is the Oxy sensor voltage that the closed loop will track around.

If you want the closed loop to track to 12:1 the oxy Stoich Voltage should be setup to match the voltage the oxy sensor generates at 12:1 AFR.



The Oxy Voltage is displayed on the Oxy Sensor bargraph on the bottom right of the PC software. When the engine is running at the Air : Fuel ratio you require, the oxy voltage displayed will be the Oxy Stoich Voltage.

Air Temp 45 °C	Water Temp 84 °C
Idle Value 30	Battery Voltage 11.4
Oxygen 0.7	Signal Error Count 0
Duty Cycle 2.7 %	

5.2.2 Activation

5.2.2.1.1 Activate

Activates the Closed Loop Function

5.2.2.1.2 Track Frequency

Sets the frequency that the Closed Loop performs calculations and trims the fuel rate to suit.

Suggested Frequency 50

5.2.2.1.3 On < Load

Sets the Load that Closed Loop will operate below

Suggested Value 40

5.2.2.1.4 Off > Load

Sets the Load that Closed Loop will not operate Above

Suggested Value 42

5.2.2.1.5 On < RPM

Sets the RPM that Closed Loop will NOT operate Below

Suggested Value 1100

5.2.2.1.6 Off < RPM

Sets the RPM that Closed Loop will not operate Above

Suggested Value 5000

5.2.2.1.7 Off < mS Fuel

Specifies what mS injection time the Closed Loop will not operate below

Suggested Value 1mS

5.2.2.1.8 Off < Engine Temp

Sets at what engine temperature the Closed Loop will not operate below

Suggested Value 64

5.2.2.1.9 On > Engine Temp

Sets at what engine temperature the Closed Loop will operate above

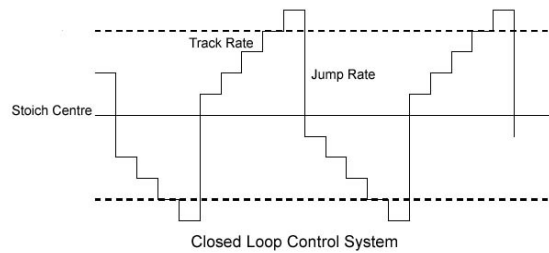
Suggested Value 70

5.2.2.1.10 On > Time

Sets how long the engine has to run before the Closed Loop will activate.

Suggested Value 40

5.2.3 Closed Loop Tracking



5.2.3.1.1 Track Rate

Suggested Value 1

5.2.3.1.2 Jump Rate (x Track)

Suggested Value 4

5.2.4 Closed Loop Limits

5.2.4.1.1 Change % Allowed

Change % allowed sets up the Maximum and Minimum change from the Mapped fuel value that the Closed Loop Control will allow before it generates an error count.

Suggested Value 9

5.2.4.1.2 Error Count Allowed

An error is generated every time the Closed Loop control tries to trim the fuel more than the Change % allowed. Error Count Allowed is the number of times these errors are allowed to occur before the Closed Loop Error handling is implemented. (This function is not Implemented)

5.2.4.1.3 Error Handling Mode

Error Handling Mode. Activates the Closed Loop error handling. (This function is not implemented)

5.3 Boost Control

To limit the total amount of turbo boost is quite good, but has its limitations when it comes to over speeding turbo chargers at high RPM and high boost levels. With the Wolf3D Version 4, you have control over the amount of turbo boost.

The Boost Control System in the Wolf3D Version 4 uses a PWM Output to control a wastegate bleed-off valve, allowing you to run the engine at higher boost levels than the wastegate was designed to run.

There are limits to the minimum and maximum boost levels you can run. If the original wastegate pressure was set to 6PSI boost, that will be the minimum boost that you will be able to run. The turbo charger and engine combination determine the maximum boost. Of course there are limits to the amount of boost that the engine can take before engine damage is the result. Make sure you consult a qualified engine builder or installer who has turbo charging experience before increasing your turbo boost level.

The Wolf3D Version 4 has a Boost Control point every 125 RPM. You can set varying boost levels right up to 16,000 RPM.

5.3.1.1.1 Activation

Enables the Boost Control feature. Suggested Value : ON.

5.3.1.1.2 Mode

This item is not currently used. Suggested Value : 0.

5.3.1.1.3 Overall Trim

Adds or subtracts the percentage from the Boost Valve Position Table value looked up during running. Suggested Value : 0%

5.3.1.1.4 Active Above Load

Sets the Load percentage that the Boost Control Valve starts to operate at. This should be set to a load point above atmospheric so the valve operates when the engine is under boost. Suggested Value : To suit application.

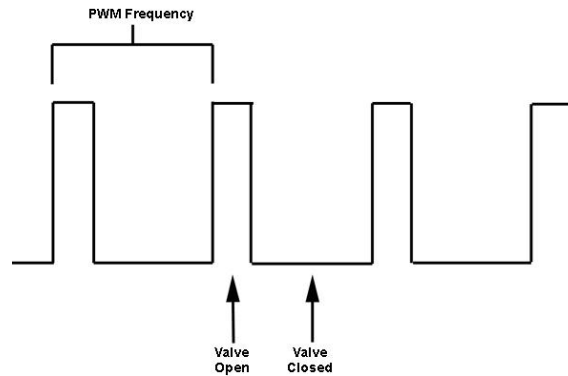
5.3.1.1.5 Valve Polarity

Sets the direction the Boost Control has to switch the valve to open it. Wire up the Boost Control Valve and with the Activation ON and the engine below the Active Above Load percentage the valve should allow all air to pass to the wastegate. This is also a failsafe if the valve or wiring become faulty the boost will default to stock wastegate pressure. Suggested Value : To Suit Installation.

5.3.1.1.6 Valve Frequency

Sets the base open and closed frequency of the Boost Control Valve. When the Boost Control Valve is operating you should be able to here the valve clicking quickly, if not adjust this value to suit.

Suggested Value : 100



5.3.2 Boost Pressure Valve Table

The values in this table represent the amount of air bled from the wastegate at different RPM points. There is adjustment every 125RPM making very fine adjustments of boost pressure possible.

The higher the number put in the table, the more time the valve is open hence the more air is bled off. Refer to the diagram above.

5.3.3 Over Boost Cut

Over Boost Cut can be used to limit total boost or a protection feature incase of Boost Valve failure. Boost Cut can be setup to switch off the fuel, return the boost to standard wastegate pressure or both when the boost reaches the preset level.

5.3.3.1.1 Activate

Enables the Over Boost Cut feature. Suggested Value : ON.

5.3.3.1.2 Activation Pressure

Sets the pressure that the Boost Cut function operates at. Suggested Value : Max Boost Level Required.

5.3.3.1.3 Activation Time Delay

Sets the time between Activation Pressure being reached and the Boost Cut Function operating to cut fuel/boost etc. If you want some overshoot bring the number up slowly otherwise until the desired effect is obtained otherwise set to zero.

Suggested Value : 0

5.3.3.1.4 Mode

Boost Cut Mode is Mode 0 is fuel cut. Mode 1 is fuel cut and valve position change and Mode 2 is valve position change.

Suggested Value : To Suit Application

5.3.3.1.5 Boost Cut Valve Position

This value is what the Boost Cut function uses when in mode 1 and 2. This number should be setup to stop bleeding air away from the wastegate actuator when in overboost. This will open the wastegate and reduce the boost level. The value stored is used instead of the lookup table when boost is over the Cut Activation Pressure.
Suggested Value : 0

5.3.4 External Trim

The External Trim can be used to add or subtract a percentage of the valve position table based on a variable voltage applied to the aux input. The Aux input calibration table and external trim table must be setup before the function will operate correctly. Refer to the Installation Manual for wiring details.

5.3.4.1.1 Activate

Enables the External Trim of Boost Control feature. Suggested Value : ON.

5.3.4.1.2 Input Used

Sets the Aux input used to trim the Boost Control Valve Position value

5.3.4.1.3 Voltage Trim Table

This sets the percentage added or subtracted from the Boost Control Valve Position Table based on the Voltage at the selected Aux Input.

5.4 Thermo Fan

It is Important to make sure your On Above Temp is a higher temperature than the Off Below Temp. If setup incorrectly the thermo fan relay will chatter or not switch on correctly.

5.4.1.1.1 Activate

Enables the Thermo Fan output. Suggested Value : ON.

5.4.1.1.2 Active Above Engine Temperature

Sets the Temperature that the Thermo Fan output and Red LED on the handcontroller switch ON at.

5.4.1.1.3 Inactive Below Engine Temperature

Sets the Temperature that the Thermo Fan output and Red LED on the handcontroller switch OFF at.

5.5 Fuel Pump

Controls the Fuel Pump operation

5.5.1.1.1 Activate

Can be used to turn the Fuel Pump OFF. This feature is not currently implemented.

5.5.1.1.2 Initial Activation Seconds

Sets the time the fuel pump primes the system for when the ECU is first switched on

5.6 Turbo Timer

The Turbo Timer function will only operate with the WOLF3D Turbo Timer Option. When the engine is running on the Turbo Timer the engine can be “killed” at any time by pressing any button the handcontroller. When the ignition switch is turned off the turbo timer relay cuts in maintaining power to the vehicles ignition relay. With the ignition switch off , a “T” will appear on the main screen, on the top line in between the RPM and Load display.

The turbo timer bypass link must be unplugged and replaced with the WOLF3D Turbo Timer Option. If there is a power glitch or faulty wiring the following error message is displayed.

5.6.1.1.1 Activate

Enables the Turbo Timer Function. Suggested Value : To Suit Application.

5.6.1.1.2 Activation Time

Sets the time the Turbo Timer runs the engine for after the ignition is switched off.
Suggested Value : 120 seconds

5.6.1.1.3 Active Above Engine Temp

Sets the Engine Temperature that the Turbo Timer will operate above.
Suggested Value : 70

5.6.1.1.4 Active Above Time Running

Turbo Timer On Above Time Running stops the turbo timer from activating until the engine has been running for the preset amount of time. This prevents the turbo timer from activating if the engine is being repeatedly started and only run for a short period of time.

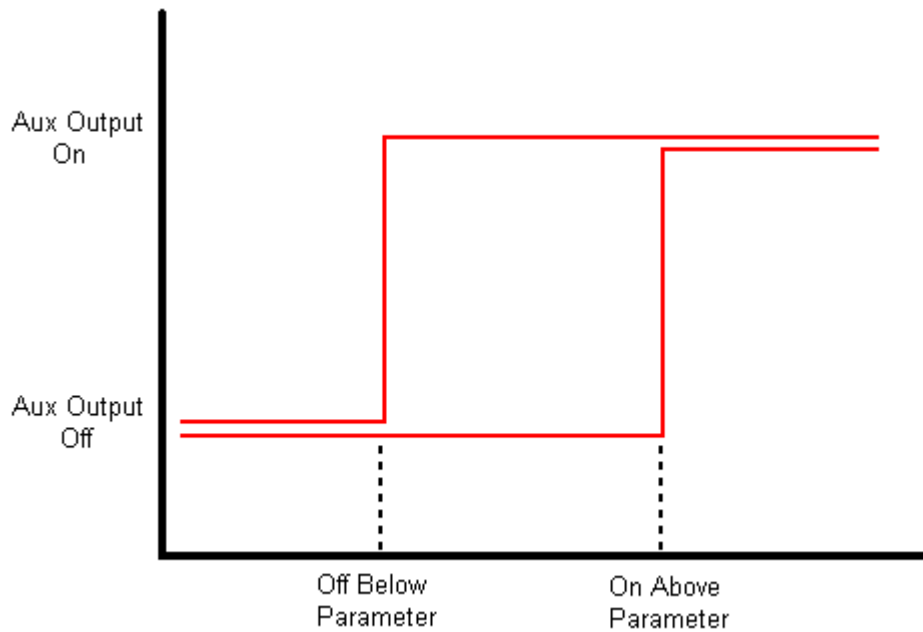
5.6.1.1.5 Rev Limit RPM

Limits the Engine RPM during the turbo timer engine cool down period.
Suggested Value : 3000RPM

5.7 Aux 1,2,3,4,5 Output

The Auxiliary Outputs are fully configurable. Every input device can be used to turn on an output. For example, you can turn the output on above a certain throttle position, and above a certain load, and below a certain engine temperature, all at the same time.

Each parameter has user set hysteresis. Set an upper and lower hysteresis value for each type of switching input.



If you wish to not use any of the outputs, set both the upper and lower values to zero and turn the activation off.

Setting the Auxiliary Mode to Positive means that whenever the input parameters are valid, the Auxiliary Output will turn on.

Setting the Auxiliary Mode to Negative means that whenever the input parameters are valid, the Auxiliary Output will turn off.

The Auxiliary Output Mode function is not currently implemented.

The Auxiliary Output does not supply power; it grounds the ECU pin.

The Version 4 only has 2 Auxiliary Outputs, if the full 5 auxiliary outputs are required you can upgrade your Version 4 to a Version 4+. The Version 4+ has the extra circuitry and connector for all 5 outputs. Contact your local dealer or Advanced Engine Management about upgrading.

5.8 Idle Lock

The Idle Lock function can be used on engines when manifold vacuum is being used for Load calculations. The engine must have a throttle position sensor. This feature uses the throttle position sensor to determine when the throttle is closed and if the engine speed is below the specified RPM, the ECU disregards the manifold vacuum and delivers a preset fuel and ignition amount. This is most useful on engines with large cams or rotary engines with radical porting. If idle has been a problem because of poor vacuum at idle, Idle Lock will overcome this.

5.8.1.1.1 Activate

Enables the Idle Lock Function. Suggested Value : To Suit Application.

5.8.1.1.2 Active Below RPM

Sets The RPM that the Idle Lock Function will switch ON below. Suggested Value 1200RPM

5.8.1.1.3 Inactive Above RPM

Sets The RPM that the Idle Lock Function will switch OFF below. Suggested Value 1300RPM

5.8.1.1.4 Active Below Tpos

Sets The Tpos value that the Idle Lock Function will switch ON below.
Suggested Value : To Suit Tpos Setup

5.8.1.1.5 Inactive Above Tpos

Sets The Tpos value that the Idle Lock Function will switch OFF above.
Suggested Value : To Suit Tpos Setup

5.8.1.1.6 Delivered Fuel

Sets the Injection mS time that will be delivered when Idle Lock is operating.
Suggested Value : To Suit Application

5.8.1.1.7 Delivered Ignition

Sets the Ignition Degrees that will be delivered when Idle Lock is operating
Suggested Value : To Suit Application

5.9 Rev Limit

The Rev Limit function operates as a fuel cut. At the specified RPM all the fuel injector outputs are switched off.

Redline is the indicator on the PC Software graphical display. It starts at the specified RPM and covers upwards from there.

Yellowline is the indicator on the PC Software graphical display. It starts at the specified RPM and covers the distance to the redline RPM.

If the Yellowline is above the Redline, the Yellowline is not displayed.

5.9.1.1.1 Activate

Enables the Rev Limit Function. Suggested Value : ON

5.9.1.1.2 Rev Limit RPM

Sets the RPM the at Rev Limit operates at. Suggested Value : To Suit Application

5.9.1.1.3 Rev Limit Mode

This feature is not currently used. Suggested Value : 0

5.9.1.1.4 RedLine

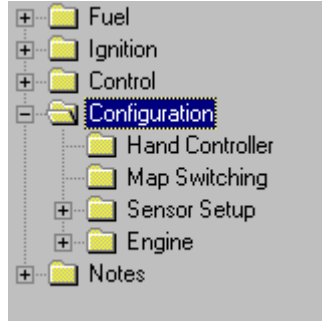
Sets the point on the graphical RPM display where the Red bar starts. Suggested Value : To Suit Application

5.9.1.1.5 YellowLine

Sets the point on the graphical RPM display where the Yellow bar starts. Suggested Value : Lower than the Redline value

6 Configuration

The Configuration folder contains the Hand Controller setup, Map Switching functions, all of the Sensor Setups and calibrations, and the Engine Type.



6.1 Hand Controller

6.1.1.1.1 Hand Controller Contrast

The Wolf3D Version 4 uses one of the highest quality extended temperature range LCD displays available. This enables the display contrast to remain constant over an extremely wide temperature range.

It also has a 2-stage contrast control. As the LCD warms up, the screen will become slightly darker. The opposite applies when the temperature decreases greatly. To maintain a consistent screen appearance, it might be desirable to change from the high to low contrast or visa versa.

Most LCD Displays fade when the ambient temperature is lower, and they go darker when the temperature goes higher.

Because of the high temperature stability of the LCD display that is used on the Wolf3D Hand Controller, there should be no need to switch between High and Low contrast modes.

Most people prefer to use the High contrast mode. This allows them to see very clearly from a distance, exactly what is on the screen.

6.1.1.1.2 Backlighting Mode

The Hand Controller Backlighting is turned on as soon as the ECU power is turned on. It remains on for 10 seconds, or until you turn it off.

The Backlight has three modes:

Off – In this mode the Backlighting will not turn on under any conditions.

On – In this mode the Backlighting is on whenever the ECU is powered up.

Timeout – In this mode the Backlighting will turn on when the ECU is powered up, and times out after a user-defined amount of time.

6.1.1.1.3 Backlight Timeout

When you have the Backlight Mode set to Timeout, you can set the number of seconds that the Backlight is turned on at power up, and after the last button is pressed.

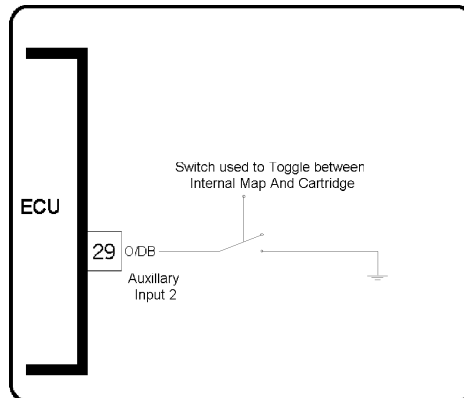
You can set the timeout to any value that you want. It is better to have a reasonably long timeout, rather than one that is too short. It can be more frustrating, if the timeout is set too low, and you are constantly having to press one of the buttons, just to see what is displayed on the screen.

6.2 Map Switching

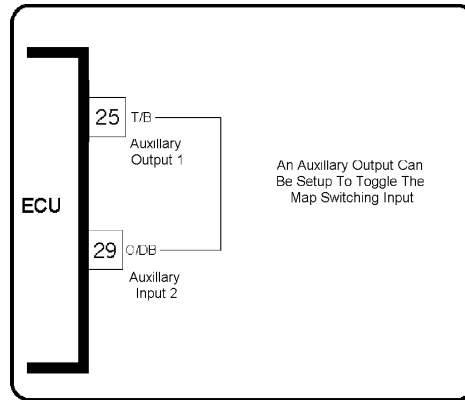
The Map switch function is very useful if you wish to have two different Maps. You can use an external switch to flip between the internal memory and the external cartridge. It is often used for dual fuel vehicles. The internal map can have 0.00mS fuel delivery for when LPG is used, with an ignition map to suit. The external Map can then be used as the Petrol Map.

6.2.1 Wiring Diagram

Map switching either can be done with an external switch, mounted on the dash, shift lever or the LPG/Petrol switch



Or you can use an Auxiliary Output to toggle the Auxiliary Input to Switch Maps. The Auxiliary Output is setup to switch using any of the available inputs at the desired state. When the Aux Out toggles to switches maps.



6.2.2 Setting Up The Wolf

The Internal MAP needs to be setup in map switching mode, this exact setup needs to be copied onto the cartridge for Map Switching to work correctly.

6.2.2.1.1 Activate

The Internal MAP needs to be setup in map switching mode, this exact setup needs to be copied onto the cartridge for Map Switching to work correctly.

6.2.2.1.2 Input Used

You have a choice of Aux Input 1 or Aux Input 2 that the Wolf will use to trigger the Map Switch.

6.2.2.1.3 Force Map Switching High

This function sets the Map Switching Input High which selects the MAP chosen in the MAP Active When High menu. This feature can be used as a test function to make sure the Map Switching function is working correctly, it can also be used to hold the Wolf in switched mode for tuning purposes.

6.2.2.1.4 Map Active When High

This sets up which MAP is used when +12V is applied to the Aux Input selected in Aux Input Used.

6.3 Sensor Setup

Plugin Units will have specific calibration tables and setups that will relate to the Engine they are designed to control. Modification of the data in the Sensor Setup Folder Can cause the ECU to function incorrectly resulting in failure to start or major engine damage.

6.3.1.1.1 Filter Jump To Target

Filter Jump To Target is the frequency that the Wolf samples input to get a reading. A high percentage number means the Wolf samples the input more often than a low percentage.

A temperature sensor, where the readings would not change dramatically in a short period of time, can have the Filter Jump To Target value set low eg: 6.25%. Whereas the Throttle Position Sensor, which can sweep from 0 to full open very quickly, requires the Wolf to sample its input more often. It is best to set quick moving inputs to a high percentage eg: 87.5%

6.3.2 Air Temperature

The Air Temperature Calibration Table is set on shipping for the Delco air temperature sensor included in the Wolf 3D Version 4 complete kit.

6.3.3 Engine Temperature

The Engine Temperature Calibration Table is set on shipping for the VDO temperature sensor included in the Wolf 3D Version 4 complete kit.

6.3.4 Load

6.3.4.1.1 Sensor Type

MAP, MAF or TPos. Select the type of sensor you are using for the main Load sensing.

6.3.4.1.2 Sensor Location

The built in MAP sensor is an Internal Sensor. A MAF sensor or any other MAP sensor are External. When using TPos for Load Sensing changing from Internal To External does not effect the Load Sensing.

6.3.4.1.3 Transient Enrichment Sensor

Select the Sensor to be used for Acceleration Enrichment and Deceleration Enleanment. Typically TPos is used as a transient sensor but

6.3.4.1.4 External Sensor Calibration

Used to Calibrate the Load table for the External Sensor. Refer to the section of the manual called Setting Up Load Cal Table for more information.

6.3.4.1.5 Internal Sensor Calibration

Used to Calibrate the Load table for the Internal Sensor. Refer to the section of the manual called Setting Up Load Cal Table for more information.

6.3.4.1.6 Rewrite Load Table Next Powerup

Used to Calibrate the Load table for the Internal and External Sensor. Refer to the section of the manual called Setting Up Load Cal Table for more information.

6.3.5 Internal MAP

This folder has the setup information for the Internal Map Sensor. It is preset on shipping and does not require modification.

6.3.6 External MAP/MAF

6.3.6.1.1 Sensor Type

Setup the type of External Sensor to be used.

6.3.6.1.2 Filter Jump To Target

The MAP sensor is a fast moving sensor so the Filter Jump To Target should be set to a high number. Eg: 87.5%

6.3.6.1.3 Map Sensor Atmospheric

This is the Voltage the Map Sensor generates when it is at atmospheric. Measure the voltage at the signal pin of the MAP sensor and input the value. You can trim this value up and down until the VAC/Boost Gauge on the software reads 0 when the sensor is at atmospheric.

6.3.6.1.4 Boost Pressure Cal Multiplier & DivideBy2

These two adjustables are the calibration values for the Boost half of the Gauge on the PC software and Handcontroller.

Boost Pressure Cal Multiplier makes small changes to the gauge position. A higher number moves the needle HIGHER.

Boost Pressure Cal Divide By 2 makes large changes to the gauge position. A higher number moves the needle LOWER.

With a pressure gauge tee'd into the sensor hose between the MAP sensor and the Wolf, pressurize the system and adjust the Multiplier and Divide By 2 until the PC gauge reads the same as the external gauge.

6.3.6.1.5 Manifold Vacuum Cal Multiplier & DivideBy2

These two adjustables are the calibration values for the Vacuum half of the Gauge on the PC software and Handcontroller.

Manifold Vacuum Cal Multiplier makes small changes to the gauge position. A higher number moves the needle HIGHER.

Manifold Vacuum Cal Divide By 2 makes large changes to the gauge position. A higher number moves the needle LOWER.

With a pressure gauge tee'd into the sensor hose between the MAP sensor and the Wolf, put the system under vacuum and adjust the Multiplier and Divide By 2 until the PC gauge reads the same as the external gauge.

6.3.7 Throttle Position

6.3.7.1.1 Calibration Mode

Used By the Handcontroller to Calibrate the Throttle Position Sensor.

6.3.7.1.2 Closed Throttle Voltage Cal

The Voltage that the Throttle Position Sensor generates when the Throttle is fully CLOSED.

6.3.7.1.3 Open Throttle Voltage Cal

The Voltage that the Throttle Position Sensor generates when the Throttle is fully OPEN.

6.3.7.1.4 Filter Jump To Target

The TPos is a fast moving sensor so the Filter Jump To Target should be set to a high number. Eg: 87.5%

6.3.7.1.5 Tpos Mode 1 Invert Signal

For use with prewired Throttle Position Sensors that decrease the Tpos reading rather than increase when the throttle is depressed.

Acceleration Enrichment and Deceleration Enleanment rely on the Throttle Position Sensor reading, this function inverts the reading of the calibration table so those functions can work correctly.

6.3.8 Trigger 1

Refer to the Installation Manual for information on what settings you need.

6.3.8.1.1 Trigger 1 Polarity

When using a hall or optical sensor, the Wolf3D Version 4 can sense either rising or falling waveforms. To maintain original Wolf standards, it is recommended that you use "Rising Edge" Triggering for all Input Trigger Applications.

6.3.8.1.2 Trigger Degrees BTDC

Input Trigger Degrees BTDC can be set from 78° BTDC to 11° ATDC.

6.3.8.1.3 Trigger 1 Coil Negative Filter

Only use Coil Negative Filtering if you are using the signal from the negative side of the ignition coil to trigger the Wolf3D.

6.3.8.1.4 Trigger 1 Coil Time Lockout Filter

Coil Time Lockout Filtering should only be used when you are using the signal from the negative side of the ignition coil to trigger the Wolf3D.

In all other situations turn this value to Off.

6.3.8.1.5 Trigger Voltage Level

This is one of the most important settings to do with the Input Trigger system. For best interference reduction, you want to set the value to High. But many sensors have a very low output voltage when the engine is being started, so the value has to be set lower.

The best compromise is to set the value to the level that will allow the car to get an Input Trigger Pulse when the engine speed is around 70RPM. This is the same as if the battery is quite flat and the ambient temperature is quite low.

6.3.8.1.6 Trigger 1 BTDC Extend Range

The Input Trigger can be set from 11 degrees ATDC to 78.4 degrees BTDC. If your trigger occurs before 78 degrees BTDC you can use the Trigger Extended Range feature. With the Trigger Extended Range activated the Degrees setup in Trigger Extended BTDC are added onto the Trigger BTDC degrees.

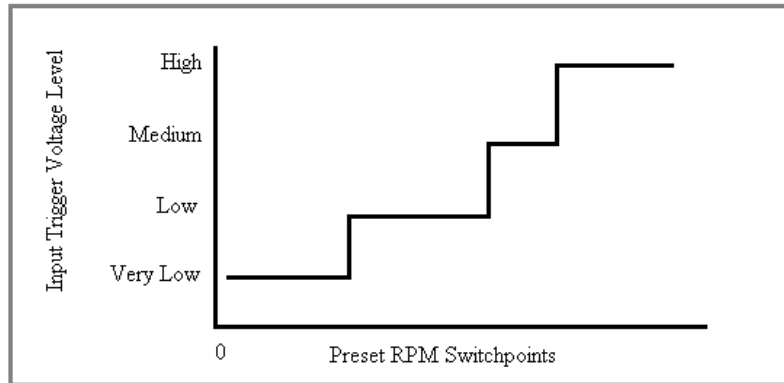
Eg: Trigger BTDC set at 70degrees, Trigger Extended BTDC set at 20 degrees.
Effective Trigger BTDC = 90 degrees BTDC

6.3.8.1.7 Trigger 1 BTDC Extend Value 0-90

The extra degrees added onto the Trigger BTDC for the extended range.

6.3.8.1.8 Trigger Level RPM Switching

The Auto Trigger Level feature changes the Input Trigger Voltage Level at the preset RPM points. If you have any trouble with either engine starting, or the engine having high RPM misfires, Auto Trigger Level can be used to eliminate interference noise generated at different engine speeds.



6.3.8.1.9 Trigger Level RPM Point Medium->High

Sets the switchpoint from Medium to High

6.3.8.1.10 Trigger Level RPM Point Low->Medium

Sets the switchpoint from Low to Medium

6.3.8.1.11 Trigger Level RPM Point VeryLow->Low

Sets the switchpoint from Very Low to Low

6.3.9 Battery Voltage

The battery voltage calibration table is preset and does not require modification.

6.3.10 Oxygen 1

The Oxygen Sensor calibration table is preset and does not require modification. To setup the Stoich voltages refer to the Closed Loop Section of this Manual.

6.3.11 Aux 1 & 2 Input

The Aux Input folders are for setting up the trims based on voltages applied to the Auxiliary Inputs on the Wolf. The Calibration Table should be setup give a number representation from 0-255 to match the 0-5V input. Other tables can be setup by the user if required.

6.3.11.1 Input Type

This feature is not implemented

6.3.11.2 Filter Jump to Target

Setup depending on the frequency that you want the Wolf to sample the Auxiliary Input

6.4 Engine

Plugin Units will have specific calibration tables and setups that will relate to the Engine they are designed to control. Modification of the data in the Engine Folder Can cause the ECU to function incorrectly resulting in failure to start or major engine damage.

6.4.1.1.1 Handcontroller Module Used

Displays the engine type selected. Refer to the section of this manual on Setting Up Engine Type.

NOTE : Handcontroller Module Used is set to 255 is the Engine Config lockout. It is used on Plugin and pretuned units to stop engine type modifications from the Handcontroller that will cause the engine to stop running.

6.4.1.1.2 Update Engine Config Next Powerup

Used to setup the engine type. Refer to the section of this manual on Setting Up Engine Type.

6.4.2 Calibration

6.4.2.1.1 Velocity Tracking Rate (2)

Must be set to 2

6.4.2.1.2 Starting below RPM

Functions Like Idle Control Starting Opening use this value to determine when the engine is starting.

6.4.2.1.3 Starting Mode

This function is not implemented.

6.4.2.1.4 RPM Divider

Setup for the internal calculation of RPM.

1 Cylinder : 240000

2 Cylinder : 120000

3 Cylinder : 160000

4 Cylinder : 120000

5 Cylinder : 100000

6 Cylinder : 80000

8 Cylinder : 60000

10 Cylinder : 50000

12 Cylinder : 40000

2 Rotor : 120000

3 Rotor : 80000

6.4.3 Trigger Sequencing

6.4.3.1.1 Trigger Mode

There are three trigger modes. Single Pulse, Dual Pulse and Reference+Sync. Refer to the Installation Manual to determine your Trigger Mode

6.4.3.1.2 Trigger Sequence Reset Count

This is set to the number of trigger teeth for one complete rotation of the disc, excluding dual pulse teeth.

6.4.3.1.3 Trigger Sync Every 2 Revolution

6.4.3.1.4 Trigger 1 Single Pulse Noise Detect

This adjustable sets up the time after a trigger pulse that any pulses received will be considered noise.

1 = within 1/8 of previous Pulse Time
2 = within 2/8 of previous Pulse Time
3 = within 3/8 of previous Pulse Time
4 = within 4/8 of previous Pulse Time
etc

Pulse Time is the time between trigger pulses.

6.4.3.1.5 Trigger 1 No Noise Above Pulse Time

Set to 66.664mS

6.4.3.1.6 Trigger 1 Dual Pulse Window

In Dual Pulse Mode this adjustable sets up the window of time after a trigger pulse that the Dual Pulse can occur.

The standard setup using the handcontroller or PC software sets this value at 3.

1 = within 1/8 of previous Pulse Time
2 = within 2/8 of previous Pulse Time
3 = within 3/8 of previous Pulse Time
4 = within 4/8 of previous Pulse Time
etc

Pulse Time is the time between trigger pulses.

6.4.3.1.7 Trigger Ref/Sync Mode

In Reference+Sync trigger mode there are two different modes.

Mode 0 is Multi tooth Reference, Single Sync. EG : Mazda RX7, Toyota.

Mode 1 is Subaru WRX 94-00 Crank & Cam trigger.

6.4.3.1.8 Mode 0 Trigger Ref/ Sync Offset

Refer to Setting Up Reference+Sync in this manual

6.4.3.1.9 Mode 0 Trigger Ref Sync Skip

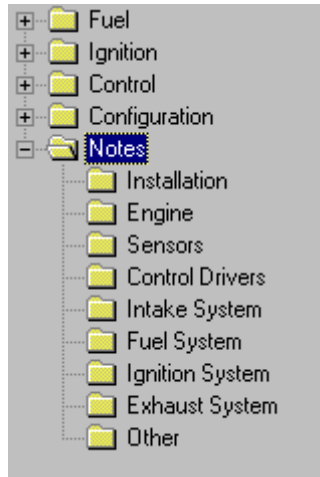
Refer to Setting Up Reference+Sync in this manual

6.4.3.1.10 Mode 0 Trigger 2 Sync Polarity

Refer to Setting Up Reference+Sync in this manual

7 Notes Folder

The Wolf3D Version 4 has extensive notes fields to allow you to write all of the engine setup and configuration, and any other notes that will make this file most relevant to the particular engine or tune.



8 Configuring the Wolf For Your Engine

8.1 Setting Up Engine Type

Engine Type can be setup using the PC software. Select Engine Config from the table below that best suits your engine setup. Take the Handcontroller Module Used number from the right hand column.

Go to Configuration>Engine in the PC software and put the Handcontroller Module Number into the Handcontroller Module Used Box.

The screenshot shows the 'Wolf 3D Engine Control' software interface. The 'Configuration' menu is expanded to 'Engine', which is further expanded to 'Update Engine Config Next Powerup'. A table displays the configuration settings:

Name	Value	Description
Hand Controller Module Used	17	0 to 255
Update Engine Config Next Powerup	Off	Off, On

The bottom of the interface features several gauges and status indicators: Trig 1, Fuel Pump, Aux 1, Boost, TPos, Load, RPM (0.000 x1000), Fuel (15.240), Ign (0.000), PSI (0.00), Acc (0.000), Air Temp (24 °C), Water Temp (23 °C), Idle Value (99), Battery Voltage (11.4), Oxygen (0.5), Signal Error Count (0), and Duty Cycle (0.0 %).

Change the Update Engine Config Next Powerup to “ON” and turn the ECU off. Power the ECU back up and the configuration you have selected will be updated to the ECU.

The Update Engine Config Next Powerup will be changed back to OFF on powerup.

Below is a list of all possible engine types. Choose the type that represents the engine that you have.	
<pre> Engine > 1 TrigCrankSingle Cyl Inj1Bank IgnMultiSeq </pre>	<p>1 Cylinder Engine 1 Trigger Point per Crankshaft revolution 1 Injector Output Single Ignition Coil HandController Module #1</p>
<pre> Engine > 2 TrigCrankSingle Cyl Inj2Seq IgnMulti1Bank </pre>	<p>2 Cylinder Engine 2 Trigger Points per Crankshaft revolution 2 Injector Output Single Dual Output Ignition Coil HandController Module #2</p>
<pre> Engine > 2 TrigCrankDual Cyl Inj2Seq IgnMulti2Bank </pre>	<p>2 Cylinder Engine 2+1 Trigger Points per Crankshaft revolution 2 Injector Output 2 Single Output Ignition Coils HandController Module #3</p>
<pre> Engine > 3 TrigCamSingle Cyl Inj3Seq IgnDist </pre>	<p>3 Cylinder Engine 3 Trigger Point per Camshaft revolution 3 separate Injector Outputs Single Ignition Coil and Distributor HandController Module #4</p>
<pre> Engine > 3 TrigCamDual Cyl Inj3Seq IgnDist </pre>	<p>3 Cylinder Engine 3+1 Trigger Point per Camshaft revolution 3 separate Injector Outputs Single Ignition Coil and Distributor HandController Module #5</p>
<pre> Engine > 3 TrigCamDual Cyl Inj3Seq IgnMulti3Seq </pre>	<p>3 Cylinder Engine 3+1 Trigger Point per Camshaft revolution 3 separate Injector Outputs 3 separate Ignition Coils HandController Module #6</p>
<pre> Engine > 4 TrigCrankSingle Cyl Inj2Bank IgnDist </pre>	<p>4 Cylinder Engine 2 Trigger Point per Crankshaft revolution (4 per Cam rev) 2 separate Injector Outputs Single Ignition Coil and Distributor HandController Module #7</p>
<pre> Engine > 4 TrigCrankDual Cyl Inj2Bank IgnDist </pre>	<p>4 Cylinder Engine 2+1 Trigger Point per Crankshaft revolution (4+2 per Cam rev) 2 separate Injector Outputs Single Ignition Coil and Distributor HandController Module #8</p>
<pre> Engine > 4 TrigCrankDual Cyl Inj2Bank IgnMulti2Bank </pre>	<p>4 Cylinder Engine 2+1 Trigger Point per Crankshaft revolution (4+2 per Cam rev) 2 separate Injector Outputs 2 separate Ignition Coil Outputs HandController Module #9</p>
<pre> Engine > 4 TrigCamDual Cyl Inj4Seq IgnDist </pre>	<p>4 Cylinder Engine 4+1 Trigger Point per Camshaft revolution 4 separate Injector Outputs Single Ignition Coil and Distributor HandController Module #10</p>

<pre> Engine > 4 TrigCamDual Cyl Inj4Seq IgnMulti2Bank </pre>	<p>4 Cylinder Engine 4+1 Trigger Point per Camshaft revolution 4 separate Injector Outputs 2 separate Ignition Coil Outputs HandController Module #11</p>
<pre> Engine > 4 TrigCamDual Cyl Inj4Seq IgnMulti4Seq </pre>	<p>4 Cylinder Engine 4+1 Trigger Point per Camshaft revolution 4 separate Injector Outputs 4 separate Ignition Coil Outputs HandController Module #12</p>
<pre> Engine > 5 TrigCamSingle Cyl Inj5Seq IgnDist </pre>	<p>5 Cylinder Engine 5 Trigger Point per Camshaft revolution 5 separate Injector Outputs Single Ignition Coil and Distributor HandController Module #13</p>
<pre> Engine > 5 TrigCamDual Cyl Inj5Seq IgnDist </pre>	<p>5 Cylinder Engine 5+1 Trigger Point per Camshaft revolution 5 separate Injector Outputs Single Ignition Coil and Distributor HandController Module #14</p>
<pre> Engine > 6 TrigCrankSingle Cyl Inj3Bank IgnDist </pre>	<p>6 Cylinder Engine 3 Trigger Point per Crankshaft revolution 3 separate Injector Outputs Single Ignition Coil and Distributor HandController Module #15</p>
<pre> Engine > 6 TrigCrankDual Cyl Inj3Bank IgnDist </pre>	<p>6 Cylinder Engine 3+1 Trigger Point per Crankshaft revolution 3 separate Injector Outputs Single Ignition Coil and Distributor HandController Module #16</p>
<pre> Engine > 6 TrigCrankDual Cyl Inj3Bank IgnMulti3Bank </pre>	<p>6 Cylinder Engine 3+1 Trigger Point per Crankshaft revolution 3 separate Injector Outputs 3 separate Ignition Coil Outputs HandController Module #17</p>
<pre> Engine > 8 TrigCrankSingle Cyl Inj4Bank IgnDist </pre>	<p>8 Cylinder Engine 4 Trigger Point per Crankshaft revolution 4 separate Injector Outputs Single Ignition Coil and Distributor HandController Module #18</p>
<pre> Engine > 8 TrigCrankDual Cyl Inj4Bank IgnDist </pre>	<p>8 Cylinder Engine 4+1 Trigger Point per Crankshaft revolution 4 separate Injector Outputs Single Ignition Coil and Distributor HandController Module #19</p>
<pre> Engine > 8 TrigCrankDual Cyl Inj4Bank IgnDistDual </pre>	<p>8 Cylinder Engine 4+1 Trigger Point per Crankshaft revolution 4 separate Injector Outputs Dual Ignition Coils and Distributors HandController Module #20</p>

<pre> Engine > 8 TrigCrankDual Cyl Inj4Bank IgnMulti4Bank </pre>	<p>8 Cylinder Engine 4+1 Trigger Point per Crankshaft revolution 4 separate Injector Outputs 4 separate Ignition Coil Outputs HandController Module #21</p>
<pre> Engine > 10 TrigCrankSingle Cyl Inj5Bank IgnDist </pre>	<p>10 Cylinder Engine 5 Trigger Point per Crankshaft revolution 5 separate Injector Outputs Single Ignition Coil and Distributor HandController Module #22</p>
<pre> Engine > 10 TrigCamDual Cyl Inj5Bank IgnDistDual </pre>	<p>10 Cylinder Engine 10+1 Trigger Point per Camshaft revolution 5 separate Injector Outputs Dual Ignition Coils and Distributors HandController Module #23</p>
<pre> Engine > 12 TrigCrankSingle Cyl Inj4Bank IgnDist </pre>	<p>12 Cylinder Engine 6 Trigger Point per Crankshaft revolution 4 separate Injector Outputs Single Ignition Coil and Distributor HandController Module #24</p>
<pre> Engine > 12 TrigCrankDual Cyl Inj4Bank IgnDist </pre>	<p>12 Cylinder Engine 6+1 Trigger Point per Crankshaft revolution 4 separate Injector Outputs Single Ignition Coil and Distributor HandController Module #25</p>
<pre> Engine > 12 TrigCrankDual Cyl Inj4Bank IgnDistDual </pre>	<p>12 Cylinder Engine 6+1 Trigger Point per Crankshaft revolution 4 separate Injector Outputs Dual Ignition Coils and Distributors HandController Module #26</p>
<pre> Engine > 2 TrigCrankSingle Rot Inj2Bank IgnDist </pre>	<p>2 Rotor Engine 2 Trigger Point per Eccentric shaft revolution 2 separate Injector Outputs Dual Ignition Coils and Distributor HandController Module #27</p>
<pre> Engine > 2 TrigCrankDual Rot Inj2Seq IgnDist </pre>	<p>2 Rotor Engine 2+1 Trigger Point per Eccentric shaft revolution 2 separate Injector Outputs Dual Ignition Coils and Distributor HandController Module #28</p>
<pre> Engine > 2 TrigCrankDual Rot Inj2Seq IgnMulti2Seq </pre>	<p>2 Rotor Engine 2+1 Trigger Point per Eccentric shaft revolution 2 separate Injector Outputs Multi Ignition Coils HandController Module #29</p>
<pre> Engine 4 SubaruOEM Cyl Inj2Bank IgnMulti2Bank </pre>	<p>4 Cylinder Subaru OEM 2 separate Injector Outputs 2 separate Ignition Coil Outputs HandController Module #30</p>

<pre> Engine 4 SubaruOEM Cyl Inj2Bank IgnMulti4Seq </pre>	<p>4 Cylinder Subaru OEM 2 separate Injector Outputs 4 separate Ignition Coil Outputs HandController Module #31</p>
<pre> Engine 4 SubaruOEM Cyl Inj4Seq IgnMulti2Bank </pre>	<p>4 Cylinder Subaru OEM 4 separate Injector Outputs 2 separate Ignition Coil Outputs HandController Module #32</p>
<pre> Engine 4 SubaruOEM Cyl Inj4Seq IgnMulti4Seq </pre>	<p>4 Cylinder Subaru OEM 4 separate Injector Outputs 4 separate Ignition Coil Outputs HandController Module #33</p>

8.2 Setting Up Load Cal Table

If you have a naturally aspirated engine or turbo car running less than 23PSI you can configure the Load Calibration table to fully utilize the 16 load bands for tuning. The Wolf Sensor PSI adjustment relates to the VAC/BOOST reading at 100% load. The maximum presetable boost level is 20PSI at 100% load. Max boost at this setting is 23 PSI at 107% load.

This setup should be done before any tuning is done as the fuel map is not automatically readjusted to suit the new load calibration table therefore any tuning done before the calibration setup will be incorrect.

Go to Configuration>Sensor Setup>Load. If you are using the Internal Sensor type the boost level you want into the Wolf Sensor PSI box. Putting a “0” in the box will give you a Naturally Aspirated Load table.

Set the Rewrite Load Table Next Powerup to “1” and turn the ECU off.

Power the ECU back up the Load Calibration table will be rewritten.

If you are using an external sensor. The External Sensor PSI value should be changed and Rewrite Load Table Next Powerup should be set to “2”

The External Sensor PSI value does not relate to PSI as the Wolf Sensor PSI does. Consult Advanced Engine Management for information regarding your specific sensor.

The screenshot shows the 'Wolf 3D Engine Control' software interface. The main window displays a configuration table for the 'Load' sensor setup. The table has three columns: Name, Value, and Description. The 'Internal Sensor PSI (20PSI Max)' is set to 20, and 'Rewrite Load Table Next Powerup' is set to 0. The 'External Sensor Calibration' is set to 0.

Name	Value	Description
Sensor Type	MAP	MAF, MAP, TPos
Sensor Location	Internal	Internal, External
Transient Enrichment Sensor	TPos	TPos, MAF, MAP
TPos to MAP Changeover Activate	Off	Off, On
TPos to MAP Changeover Voltage	0.00	AD Volts
Rewrite Load Table Next Powerup	0	0 to 255
Internal Sensor PSI (20PSI Max)	20	0 to 255
External Sensor Calibration	0	0 to 65535

The dashboard at the bottom shows various engine parameters: RPM (0.000), Fuel (15.240), Ign (0.000), PSI (0.0), Acc (0.000), Air Temp (24 °C), Water Temp (23 °C), Idle Value (39), Battery Voltage (11.5), Oxygen (0.5), Signal Error Count (0), and Duty Cycle (0.0 %).

8.3 Setting Up Mode 0 Reference+Sync Triggering

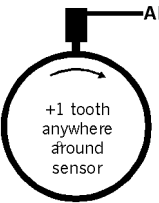
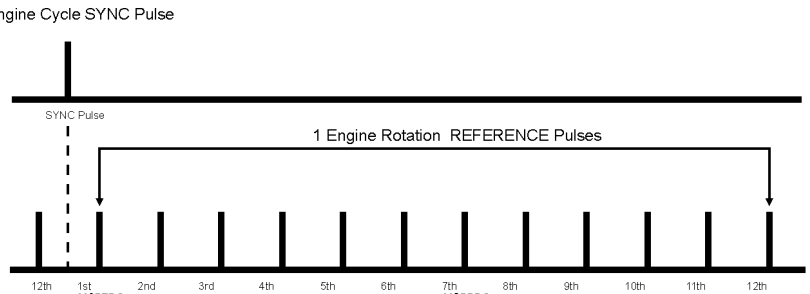
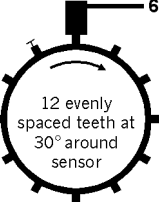
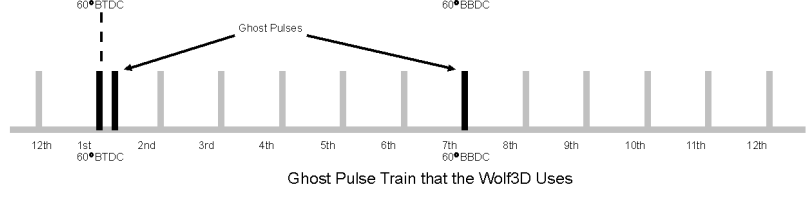
The Wolf3D Version 4 has a very flexible input triggering system, which allows us to configure the inputs to most sensor types. One of the most common triggering systems used by engine manufacturers is Reference and Sync, where there are many pulses on the crank or cam to determine engine position, and one or two pulses per camshaft revolution to tell the ECU where cylinder 1 is.

Because of the flexibility of Reference and Sync trigger systems, there is no setup at time of writing from the Hand Controller, only via the PC software. There are many new parameters required to setup this triggering system. As such, you will not be able to see many of these unless your PC is connected to an ECU. When you load in the map, the ECU sends these new adjustables to the PC so you can see and change them.

Below are some diagrams showing how Reference and Sync works.

This diagram shows a Reference and Sync system that allows the ECU to do Banked Ignition and Injection. It does not have a sensor for cylinder 1 on the camshaft, hence the ECU cannot tell if the engine is at cylinder 1 or cylinder 4.

The same Pulse Train is used by 2 Rotor engines, such as Series 4, 5 and 6 RX7.

Reference and Sync Pulses 12 + 1 (4 Cylinder)																																				
Crankshaft Sensor	Distributor Compatible - Yes	Multicoil Compatible - 2 Banks	Injection - 2 Banks																																	
																																				
Crankshaft Sensor T = TDC 																																				
Notes	PC Software Configuration																																			
The SYNC Pulse does not have to happen directly before the first REFERENCE Pulse that is 60° BTDC. It can happen earlier than that. Use the function "Trigger Ref/Sync Offset" if the SYNC Pulse happens earlier than in this diagram.	<table border="1"> <thead> <tr> <th>Function</th> <th>Value</th> <th>Note</th> </tr> </thead> <tbody> <tr> <td>Trigger Mode</td> <td>Reference+Sync</td> <td></td> </tr> <tr> <td>Trigger Sequence Reset Count</td> <td>2</td> <td></td> </tr> <tr> <td>Trigger Sync Every 2 Revolutions</td> <td>Off</td> <td>Must be turned on for sequential operation</td> </tr> <tr> <td>Trigger 1 Single Pulse Noise Detect</td> <td>0</td> <td></td> </tr> <tr> <td>Trigger 1 No Noise Above Pulse Time</td> <td>66.664</td> <td></td> </tr> <tr> <td>Trigger 1 Dual Pulse Window</td> <td>3</td> <td></td> </tr> <tr> <td>Trigger Ref/Sync Mode</td> <td>0</td> <td></td> </tr> <tr> <td>Trigger Ref/Sync Offset</td> <td>0</td> <td>Can be set up to a value of 5 depending on where the Sync pulse is</td> </tr> <tr> <td>Trigger Ref/Sync Skip</td> <td>5</td> <td></td> </tr> <tr> <td>Trigger 2 Sync Polarity</td> <td>Rising Edge</td> <td>Must be set to match the input trigger polarity</td> </tr> </tbody> </table>	Function	Value	Note	Trigger Mode	Reference+Sync		Trigger Sequence Reset Count	2		Trigger Sync Every 2 Revolutions	Off	Must be turned on for sequential operation	Trigger 1 Single Pulse Noise Detect	0		Trigger 1 No Noise Above Pulse Time	66.664		Trigger 1 Dual Pulse Window	3		Trigger Ref/Sync Mode	0		Trigger Ref/Sync Offset	0	Can be set up to a value of 5 depending on where the Sync pulse is	Trigger Ref/Sync Skip	5		Trigger 2 Sync Polarity	Rising Edge	Must be set to match the input trigger polarity		
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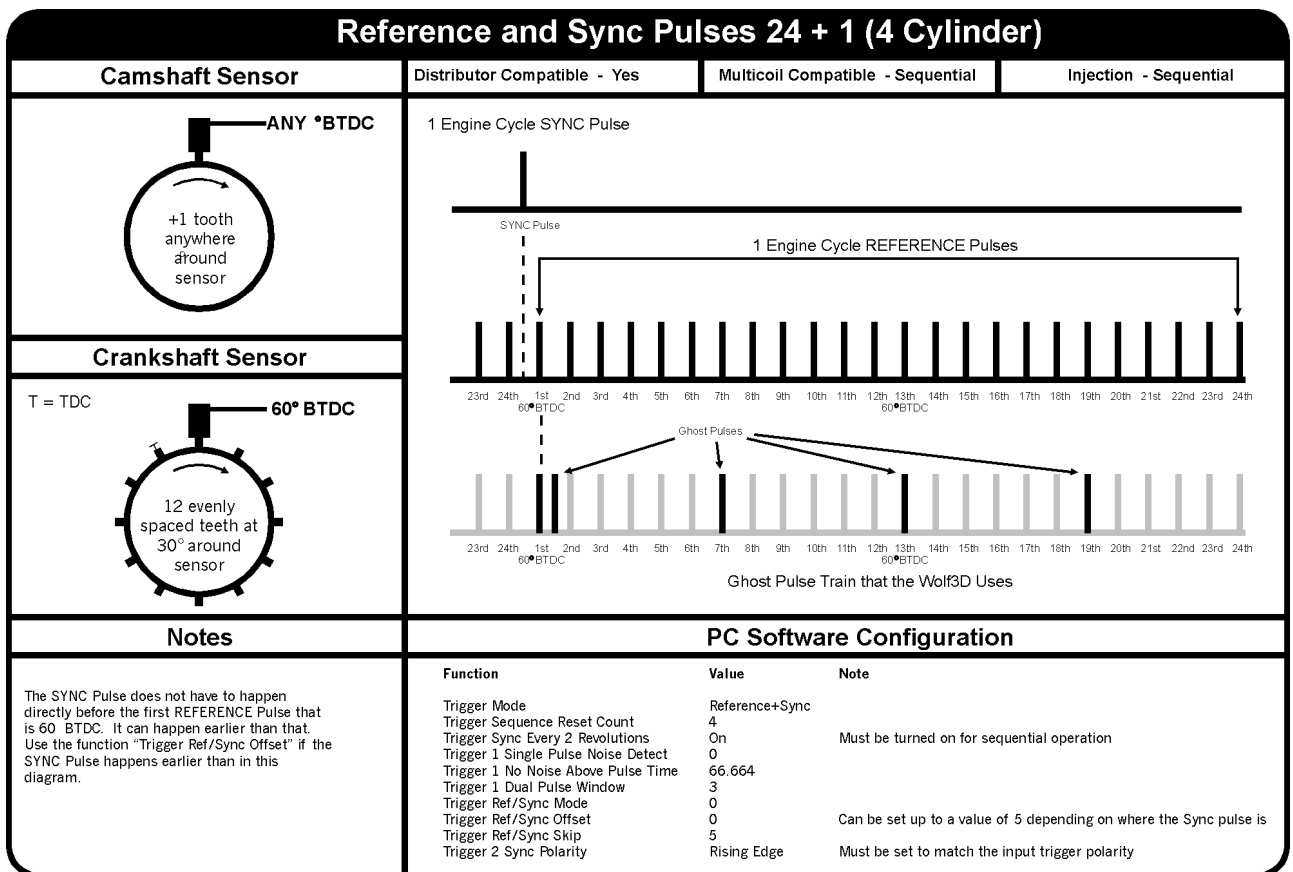
One very important point to note here, is the relationship between the Sync and Reference pulses. This relationship must remain stable.

Problems can arise when reluctor sensors are used and the trigger polarities are not set up correctly. If either the Reference or Sync signal is set the wrong way around (Rising Edge/Falling Edge), the Sync may move from just before one Reference signal, to just before another Reference signal. This causes the ECU to stop injecting, or firing the ignition until the system is correctly synchronized again.

This will usually happen as the engine speed rises. There will be a particular RPM at which the timing mark suddenly moves by the angle between the Reference teeth.

When using a reluctor sensor, it is vital to make sure that both the Reference and Sync waveforms are the right way around. If you are not sure, check with an oscilloscope.

The Diagram below shows a setup that allows full sequential Ignition and Injection configurations, since there is a single pulse per camshaft rotation. This gives the ECU a cylinder 1 reference. Later model Toyota, Honda and Subaru engines use this system.



One important thing to note here is the Trigger Ref/Sync Offset value. In the example above, it is set to 0. This is because, in this case, the Sync Pulse comes just before the pulse that is at 60 degrees BTDC.

If the Sync Pulse comes earlier, for example between the 23rd and 24th teeth, the Ref/Sync Offset should be set to 1.

If the Sync Pulse comes between the 22nd and 23rd teeth, the Ref/Sync Offset should be set to 2.

This shows just how flexible the system is, and how important it is that every adjustment is set up correctly.

8.3.1.1.1 Mode 0 Trigger Ref/ Sync Offset

Offset is the number of Reference Pulses that occur after the Sync Pulse until the Wolf considers the next Reference Pulse as the Dual Pulse(Ghost Pulse).

8.3.1.1.2 Mode 0 Trigger Ref Sync Skip

Skip is the number of Reference Pulses that occur after the Ghost Dual Pulse until the Wolf considers the next Reference Pulse as the next Ghost Pulse.

8.3.1.1.3 Mode 0 Trigger 2 Sync Polarity

Trigger 2 polarity needs to be setup in the same way as Trigger 1 Polarity. Refer to the Installation Manual for more information.