

WOLF3D

Version 4.0
Engine Management System

User Guide

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1 Introduction

This User Guide covers configuration and tuning of the Wolf3D V4 ECU. For information on wiring, and fuel system plumbing, see the Wolf3D Version 4 Installation Manual.

The Wolf3D Version 4 is a totally new hardware and software platform with greatly expanded fuel and ignition maps with vastly improved resolution, as well as superior compensation tables and auxiliary functions.

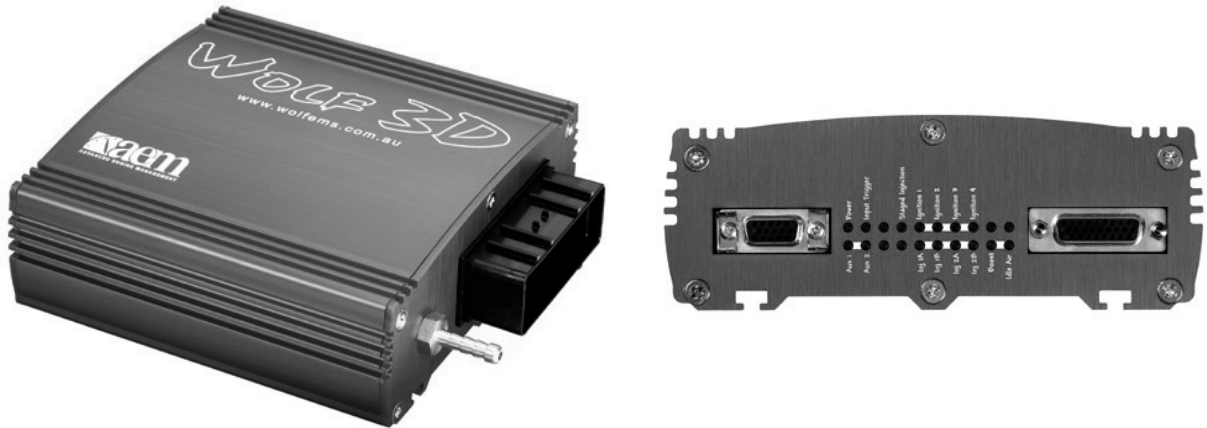
The original DIP Switch configuration system used in older Wolf ECU's has been removed and replaced entirely with software based configuration menus that can be setup either with the Hand Controller, or the PC Software.

These expanded functions and expanded tunability are the result of requests, suggestions and feedback from customers over the past 8 years.

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

2 ECU

The Wolf3D Version 4 ECU is the heart of the system, compatible with both Hand Controller and PC interfaces. The aluminum case is both light and very strong. The large array of diagnostic LED's at the end of the Wolf3D Version 4 case make diagnosing installation or sensor problems easier than ever before.



2.1 ECU Basics

Following is a list of the major features of the Wolf3D Version 4:

- Tune from either Hand Controller or PC Software
- Maximum Engine Speed 20,000RPM
- Fuel Map every 125RPM to 16,000RPM
- Fuel Map has 16 Load Bands
- Ignition Map every 125RPM to 16,000RPM
- Ignition Map has 16 Load Bands
- Boost Control adjustable every 125RPM
- Idle Speed Control with Water Temperature Compensation
- 2 Fully configurable Auxiliary Outputs
- Cam, Crank or Coil Negative Inputs
- Multi Coil Ignition Outputs
- Sequential Fuel Injection up to 4 cylinders

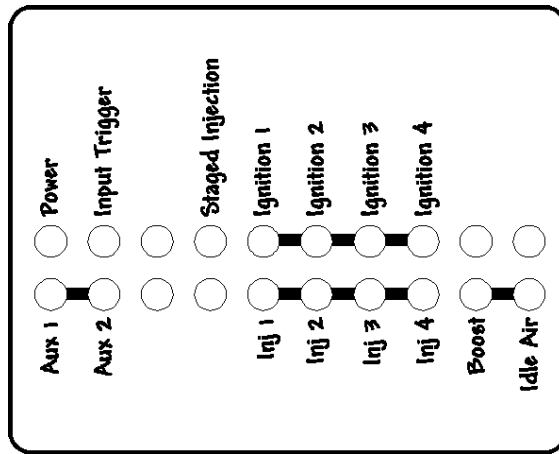
2.2 First Power Up

Refer to the Installation Manual for wiring and pre power up checklist before applying power to the ECU for the first time.

2.3 Diagnostic LED's

The ECU has a full complement of Diagnostic LED's at the end of the ECU between the Hand Controller connector and the Memory Cartridge/Communications connector.

These LED's allow you to see exactly what is going on with all of the inputs and outputs. You can "see" that the ECU is getting an Input Trigger, or that the Auxiliary Output that you are using is switching on and off, as you require.



There are bars between some of the LED's. These bars group together common functioning Outputs for easy reference. Below is a table of the Diagnostic LED colours.

LED Colours	
Top Row	
Power	Green
Input Trigger 1	Red
Input Trigger 2	Red(Version 4+)
Staged Injection	Yellow
Ignition 1	Red
Ignition 2	Red
Ignition 3	Red
Ignition 4	Red
Ignition 5	Red(Version 4+)
Ignition 6	Red(Version 4+)
Bottom Row	
Aux 1	Orange
Aux 2	Orange
Aux 3	Orange(Version 4+)
Aux 4	Orange(Version 4+)
Inj 1	Yellow
Inj 2	Yellow
Inj 3	Yellow
Inj 4	Yellow
Boost	Green
Idle Air	Green

3 Hand Controller

The Hand Controller can be used to configure and tune Wolf3D ECU.

If you wish to use the Wolf3D PC software, please go to the section on PC Software.

Some of the Advanced Mapping and Advanced Tuning functions are not accessible from the Hand Controller, and must be tuned using the PC Software.

3.1 Hand Controller Navigation

It may appear that moving around the Wolf3D Hand Controller to access so many functions is daunting. This is not the case. The Wolf3D Version 4 uses a simple set of menus that you can scroll around to easily locate the function that you wish to adjust.

The functions are grouped together logically to make sure you are always where you want to be.

First you push the button that corresponds to the Folder or Parameter you wish to adjust. Then scroll up and down the menu choices using either [1] and [2] to scroll up or, [3] and [4] to scroll down. The arrow on the left side of the display shows which Folder or Parameter you will select.

To choose a Parameter press [SET].

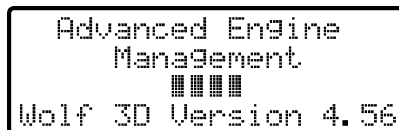
The [-] and [+] increase and decrease the values of the Parameter you have selected.

The adjustments are live, and are written to the ECU's memory each time you press an arrow.

Pressing [CLR] moves you back up one level in the hierarchy.

3.1.1 First Screen

The first screen to be displayed is the powerup screen. This screen contains the Firmware Version that the Wolf has been upgraded to. It is worth while to have the latest version possible.



```
Advanced Engine
Management
■■■■
Wolf 3D Version 4.56
```

If you get another screen on powerup refer to the Error Screens Section of this manual.

3.1.2 Main Screen

There are 3 main screens which can be toggled between by using the [CLR] key.

MAIN SCREEN 1

```
8000 45% 13.25 00°  
Temp 41° AirT 25°C  
Batt 14.5 Vac 43kPa  
Duty 9% Tpos 7
```

This screen contains the general running information of the engine.

Line 1 : RPM, Load, Injection Time(mS), Ignition Timing(degrees BTDC)

Line 2 : Engine Temperature (°C), Air Temperature (°C)

Line 3 : Battery Voltage, Vac(kPa)/Boost(PSI)

Line 4 : Injector Duty, Throttle Position

- A Black Block in between the RPM and Load values indicates noise or false triggering
- When running on external cartridge a 'C' is displayed between the Load and Injection Time.
- FCLR is displayed instead of the Injection Time when the Wolf is operating in Flood Clear Mode
- A '.' is displayed after the Throttle Position Value when the Wolf is operating in Idle Lock Mode

MAIN SCREEN 2

```
8000 45% 13.25 00°  
Idle 99 Oxy 0.70  
Noise 0 Cloop Off  
SyncX 0 Exe 12.47
```

This screen contains extra information for trouble shooting.

Line 1 : RPM, Load, Injection Time(mS), Ignition Timing(degrees BTDC)

Line 2 : Idle Control Initial Centre Value, Oxygen Sensor Voltage

Line 3 : Input Trigger Noise Count, Closed Loop Control Activation

Line 4 : Sync Pulse Expected Error Count, Main Loop Execution Time(mS)

MAIN SCREEN 3

```
8000 45% 13.25 00°  
AuxIn 1- 2- 3- 4-  
AuxOut 1- 2- 3- 4-  
IgnIn- AirConIn-
```

This screen contains the status of the Auxiliary Inputs/Outputs.

Line 1 : RPM, Load, Injection Time(mS), Ignition Timing(degrees BTDC)

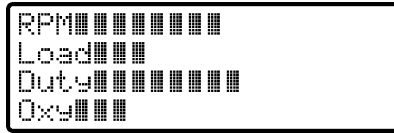
Line 2 : Auxiliary Input 1,2,3,4 OFF(-) ON (■)

Line 3 : Auxiliary Output 1,2,3,4 OFF(-) ON (■)

Line 4 : Ignition Sense Input OFF(-) ON (■), Aircon Request Input OFF(-) On (■)

3.1.3 BarGraph Screen

Pressing the [SET] key when in any of the main screens takes you to the BarGraph Screen

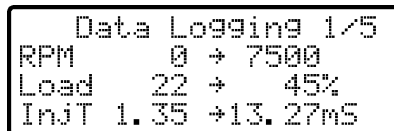


This screen has a bar representation of RPM, LOAD, Injector DUTY and OXYGEN sensor Voltage
Pressing [CLR] returns you to the main screen

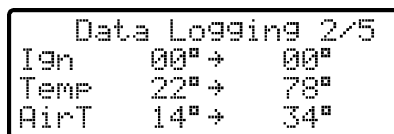
3.1.4 DataLogging Screen

Pressing the [SET] key when in the BarGraph Screen takes you to the Datalogging Screen

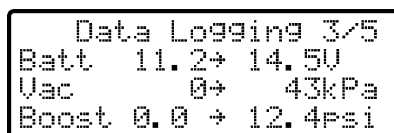
The on board Datalogging is Maximum and Minimum logging. Pressing the [▶] key scrolls through the logging screens. The [◀] key takes you to the Reset Datalogging Screen. Pressing [SET] clears all Datalogging information and starts the Datalogging again. [CLR] returns to the Logged Values screens.



Information Displayed :
RPM, Load, Injection Time



Information Displayed :
Ignition Degrees, Engine Temperature(°C),
Air Temperature (°C)



Information Displayed :
Battery Voltage, Vacuum (kPa),
Boost (PSI)

```
Data Logging 4/5
Duty    0 → 99%
TPos    7 → 25
Oxy     0.50 → 0.70V
```

Information Displayed :
Injector Duty, Throttle Position, Oxygen Sensor Voltage

```
Data Logging 5/5
Idle    99 → 145
Exe 11.60 → 26.47mS
Time Running 0:11:34
```

Information Displayed :
Idle Control Valve Initial Centre, Main Loop Execution Time,
Engine Running Time

Note: Engine Running Time is not reset with the other Datalogging. Engine Running Time starts when the engine starts and resets when the engine stops running.

3.1.5 Memory Cartridge Screen

Pressing [SET] when in the Datalogging screen takes you to the Memory Cartridge Screen

```
Switch&Copy Cart>1/4
→Run from Cartridge
Run from ECU
Copy ECU to Cart
```

```
Switch&Copy Cart>2/4
→Copy Cart To ECU
```

'Run From Cartridge' uses the Fuel/Ignition map stored on the cartridge to run the engine.

'Run From ECU' uses the Fuel/Ignition map stored in the Wolf to run the engine.

'Copy ECU To Cart' copies the Fuel/Ignition Map stored in the Wolf to the cartridge. This will overwrite any information on the cartridge.

'Copy Cart To ECU' copies the Fuel/Ignition Map stored on the cartridge to the Wolf . This will overwrite any information in the Wolf.

3.1.6 Configuration Screen

From any of the main screens holding down the [CLR] key for 5 seconds takes you to the Configuration Menu. This is where you setup the specific parameters relating to your engine.

Button	Folder	Parameter
CLR (5 Seconds)	Hand Controller	Display Contrast Backlight Mode Backlight Timeout
CLR (5 Seconds)	Map Switching	Activate Input Used Force Map Switch High Map Active When High
CLR (5 Seconds)	Trigger	Trigger Polarity Trigger Deg BTDC Trigger Coil Neg Filtering Trigger Coil Time Filter Trigger Voltage Level
CLR (5 Seconds)	Throttle Position	TPos Calibrate Mode TPos Closed Voltage TPos Open Voltage
CLR (5 Seconds)	Load and Transient	Load Internal/External Transient Sensor
CLR (5 Seconds)	Oxygen Sensor	Oxy Centre Low Volts Oxy Centre High Oxy Stoich Voltage
CLR (5 Seconds)	Sensor Filtering	Air Temp Filtering Engine Temp Filtering Internal MAP Filtering External MAP/F Filtering TPos Filtering Battery VoltsFiltering Oxygen Filtering Aux 1 Input Filtering Aux 2 Input Filtering
CLR (5 Seconds)	Engine	Engine Configuration

3.2 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.

[CLR] "5 Sec" - Configuration – Hand Controller – Display Contrast	
<pre> Configuration> 1/8 →Hand Controller > Map Switching > Trigger > </pre>	<p>To configure the Hand Controller, start from the Main Screen. Hold the [CLR] key down for 5 sec.. You will see the screen to the left displayed on the Hand Controller.</p>
<p>[SET] = ↓ [CLR] = Main Screen</p>	
<pre> Hand Controller > →Display Contrast Backlight Mode Backlight Timeout </pre>	<p>From here press [SET] to enter the editing screen</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre> 0 45% 8.98 07° Hand Controller > Display Contrast =High High/Low </pre>	<p>Use [←] and [→] buttons to change the Hand Controller Display Contrast value between High and Low until you are happy with the contrast level.</p>
<p>Suggested Value = High</p>	

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.

3.3 Backlighting

3.3.1 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.

[CLR] "5 Sec"- Configuration – Hand Controller – Backlight Mode	
<pre>Configuration> 1/8 →Hand Controller > Map Switching > Trigger ></pre>	<p>To configure the Hand Controller, start from the Main Screen. Hold the [CLR] key down for 5 sec.. You will see the screen to the left displayed on the Hand Controller.</p>
<p>[SET] = ↓ [CLR] = Main Screen</p>	
<pre>Hand Controller > →Display Contrast > Backlight Mode > Backlight Timeout ></pre>	<p>Press [4] to scroll down to Backlight Mode.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>Hand Controller > Display Contrast > →Backlight Mode > Backlight Timeout ></pre>	<p>From here press [SET] to enter the editing screen</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 8.98 07" Hand Controller > Backlight Mode > =On Off/On/Tim</pre>	<p>Use [←] and [→] buttons to change the Hand Controller Display Contrast value between High and Low until you are happy with the contrast level.</p> <p>Off = The Backlight will never come on. On = The Backlight is always on. Time = The Backlight will come on for a user set time each time a button is pressed. Refer to Backlight Timeout for more information.</p>
<p>Choose any value</p>	

3.3.2 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.

[CLR] "5 Sec"- Configuration – Hand Controller – Backlight Timeout	
<pre> Configuration> 1/8 →Hand Controller > Map Switching > Trigger > </pre>	<p>To configure the Hand Controller, start from the Main Screen. Hold the [CLR] key down for 5 sec. You will see the screen to the left displayed on the Hand Controller.</p>
<p>[SET] = ↓ [CLR] = Main Screen</p>	
<pre> Hand Controller > →Display Contrast Backlight Mode Backlight Timeout </pre>	<p>Scroll down two times using the [4] button to Backlight Timeout.</p>
<p>[4] = ↓ [CLR] = ↑↑</p>	
<pre> Hand Controller > Display Contrast Backlight Mode →Backlight Timeout </pre>	<p>Press [SET] to enter the editing screen</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre> 0 45% 8.98 07 Hand Controller > Backlight Timeout = 8 Seconds </pre>	<p>Use [←] and [→] buttons to increase or decrease the Hand Controller Backlight Timeout value.</p> <p>You can test the value to see if you are happy with the time you have set by waiting for the Backlight to turn off. You can then trim the amount of time increasing or decreasing the timeout until you are happy with the timeout value.</p>
<p style="text-align: center;">Suggested Value = 8 Seconds</p>	

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.

4 Configuration

The very best way to get your Wolf3D Version 4 ECU up and running quickly, is to follow these instructions through to the end.

You should have your engine running with a minimum of effort. The new menu system of the Wolf3D Version 4 is far simpler and easy to follow than earlier models.

Before you begin, fill in the table below with as many of you engine settings as you can.

Engine Configuration		
Cylinder Selection		Number of Cylinders or Rotors
Input Trigger Type		Cam, Crank, Distributor, Coil Neg
Load Sensor Type		MAP, MAF, TPS
Transient Sensor Type		TPS, MAP

4.1 Cylinder Selection

The Wolf3D Version 4 has specific configurations for 1, 2, 3, 4, 5, 6, 8, 10 and 12 Cylinders, and 2 and 3 rotor engines.

To choose the number of cylinders the engine has, go to the Configuration/Engine menu, and choose the type of engine you have. Be very careful to choose the correct one, paying careful note to both, the Trigger type and the Ignition output type. This setting configures the whole ECU to the type of engine you have. If set incorrectly, the engine will most probably not start at all, or even worse, it may start and run very badly. If this happens, you may spend more time chasing a problem that might have been simply fixed by choosing the correct engine type.

If you are unsure about the Cylinder selection, please revise using the Installation Manual, or contact the place of purchase for clarification.

[CLR] "5 Sec"- Configuration – Engine	
<pre> Configuration> 1/8 →Hand Controller > Mae Switching > Trigger > </pre>	<p>To configure the type of engine you have, start from the Main Screen. Hold the [CLR] key down for 5 sec. You will see the screen to the left displayed on the Hand Controller.</p>
<p>7 x [4] = ↓</p>	<p>[CLR] = Main Screen</p>
<pre> Configuration> 8/8 Sensor Filtering > →Engine > </pre>	<p>Scroll down seven times using the [4] button until you reach Engine.</p> <p>From here press [SET] to enter the editing screen</p>
<p>[SET] = ↓</p>	<p>[CLR] = ↑</p>
<pre> Engine > 4 TrigCamDual Cyl Inj4Seq IgnMulti2Bank </pre>	<p>Use [←] and [→] buttons to change the Engine Type until you reach the Engine Type that you have.</p> <p>To return to the Main Screen, press and hold down the [CLR] button for 5 Seconds.</p>

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

4.2 Input Trigger

There are many types of input triggers, from Camshaft, Distributor and Crankshaft Triggers.

To configure the Input Trigger Type:

Input Trigger Types		
	Single Pulse	Dual Pulse
Crankshaft Sensor	Yes	Yes
Camshaft Sensor	Yes	Yes
Distributor Sensor	Yes	Yes

Wolf3D's are shipped standard without a Coil Negative Input. If you do require this input, please contact the place of purchase to organize a Coil Negative input.

4.2.1 Input Trigger 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 recommend that you use “Rising Edge” Triggering for all Input Trigger Applications.

[CLR] “5 Sec”- Configuration – Trigger Polarity	
<pre>Configuration> 1/8 →Hand Controller > Map Switching > Trigger ></pre>	<p>To configure the Trigger Polarity, start from the Main Screen. Hold the [CLR] key down for 5 sec. You will see the screen to the left displayed on the Hand Controller.</p>
<p>2 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Configuration> 3/8 Hand Controller > Map Switching > →Trigger ></pre>	<p>Scroll down two times using the [4] button until you reach Trigger.</p> <p>Press [SET] to select Trigger.</p> <p>Do Not Set the Input Trigger to Falling Edge if you are using a Reluctor Trigger Sensor.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Trigger →Trigger 1 Polarity Trigger 2 Polarity Trigger Deg BTDC</pre>	<p>From here press [SET] to enter the editing screen</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00° Trigger Trigger 1 Polarity =Rising SignalEdge</pre>	<p>Use [←] and [→] buttons to change the Input Trigger Polarity to the type that you have.</p> <p>To return to the Main Screen, press and hold down the [CLR] button for 5 Seconds.</p>
<p>Suggested Value = Rising Signal Edge</p>	

If you are using a reductor input, the Input Trigger Polarity must be set to “Positive”, and the reductor waveform must be as per the instructions in the Installation Manual.

The Factory setting for Trigger Polarity is Rising Signal Edge. See the Installation Manual for more information about Input Triggering.

You can use an oscilloscope to determine the direction of the waveform.

4.2.2 Input Trigger Degrees BTDC

Input Trigger Degrees BTDC can be set from 78° BTDC to 11° ATDC. We recommend you should align your Input Trigger at 60° BTDC to ensure the most accurate ignition timing.

[CLR] "5 Sec" - Configuration – Trigger Degrees BTDC	
<pre>Configuration> 1/8 →Hand Controller > Map Switching > Trigger ></pre>	<p>To configure the Trigger Degrees BTDC, start from the Main Screen. Hold the [CLR] key down for 5 sec. You will see the screen to the left displayed on the Hand Controller.</p>
<p>2 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Configuration> 3/8 Hand Controller > Map Switching > →Trigger ></pre>	<p>Scroll down two times using the [4] button until you reach Trigger.</p> <p>From here press [SET] to select Trigger.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Trigger →Trigger 1 Polarity Trigger 2 Polarity Trigger Deg BTDC</pre>	<p>Scroll down two times using the [4] button until you reach Trigger Deg BTDC.</p>
<p>2 x [4] = ↓ [CLR] = ↑</p>	
<pre>Trigger Trigger 1 Polarity Trigger 2 Polarity →Trigger Deg BTDC</pre>	<p>Press [SET] to select Trigger Deg BTDC.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 43% 8.90 07° Trigger > Trigger Deg BTDC = 60.4 Deg BTDC</pre>	<p>Use [←] and [→] buttons to change the Input Trigger degrees BTDC until you reach the Trigger degrees that you have</p> <p>To return to the Main Screen, press and hold down the [CLR] button for 5 Seconds.</p>
<p>Suggested Value = 60</p>	

The recommended Trigger point is 60 Degrees Before Top Dead Center. This gives the ECU the trigger point for the most accurate ignition timing, and as much ignition advance as users will require.

The Trigger Deg BTDC will determine the absolute maximum advance that you can set in your ignition map.

For example, if you set the Trigger Deg BTDC to 30, the maximum ignition timing that the ECU will be able to deliver to the engine is 25 Deg. Please allow 5 Degrees of engine rotation. If you set the Trigger Deg BTDC to 60 Deg, you can use up to 55 Deg of ignition timing. This is enough for even the most eager tuners.

4.3 Input Trigger Degrees BTDC Extended 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

4.3.1 Activating The Trigger Extended Range

[CLR] "5 Sec"- Configuration – Trigger Extended Range	
<pre> Configuration> 1/8 →Hand Controller > Map Switching > Trigger > </pre>	To Activate the Trigger Extended Range Start from the Configuration Menu by holding the [CLR] key down for 5 seconds.
<div style="display: flex; justify-content: space-between;"> 2 x [4] = ↓ [CLR] = Main Screen </div>	
<pre> Configuration> 3/8 Hand Controller > Map Switching > →Trigger > </pre>	Scroll down two times using the [4] button until you reach Trigger. From here press [SET] to select Trigger.
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre> Trigger > →Trigger Polarity > Trigger Deg BTDC TriggerCoilNegFilt </pre>	Scroll down six times using the [4] button until you reach Trigger ExtendRange
<div style="display: flex; justify-content: space-between;"> 3 x [4] = ↓ [CLR] = ↑ </div>	
<pre> Trigger →Trigger ExtendRange Trigger Extend BTDC TriggerLevelRPMAuto </pre>	Press [SET] to select Trigger ExtendRange.
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre> 0 46% 13.35 00° Trigger Trigger ExtendRange =Off Off/On </pre>	Use [←] and [→] buttons to activate the Extended Range function. To return to the Main Screen, press and hold down the [CLR] button for 5 Seconds.
Suggested Value = To Suit Application	

4.3.2 Setting the Input Trigger Extended Range Degrees BTDC

[CLR] "5 Sec"- Configuration – Trigger Extended Range		
<pre>Configuration> 1/8 →Hand Controller > Map Switching > Trigger ></pre>	<p>To Set the Trigger Extended BTDC. Start from the Configuration Menu by holding the [CLR] key down for 5 seconds.</p>	
<p>2 x [4] = ↓ [CLR] = Main Screen</p>		
<pre>Configuration> 3/8 Hand Controller > Map Switching > →Trigger ></pre>	<p>Scroll down two times using the [4] button until you reach Trigger.</p> <p>From here press [SET] to select Trigger.</p>	
<p>[SET] = ↓ [CLR] = ↑</p>		
<pre>Trigger > →Trigger Polarity > Trigger Deg BTDC TriggerCoilNegFilt</pre>	<p>Scroll down seven times using the [4] button until you reach Trigger Extend BTDC</p>	
<p>3 x [4] = ↓ [CLR] = ↑</p>		
<pre>Trigger Trigger ExtendRange →Trigger Extend BTDC TriggerLevelRPMAuto</pre>	<p>Press [SET] to select Trigger Extend BTDC.</p>	
<p>[SET] = ↓ [CLR] = ↑</p>		
<pre>0 46% 13.35 00° Trigger Trigger Extend BTDC = 8.0 Degrees</pre>	<p>Use [←] and [→] buttons to set the degrees to add onto the standard trigger.</p> <p>To return to the Main Screen, press and hold down the [CLR] button for 5 Seconds.</p>	
<p>Suggested Value = To Suit Application</p>		

4.4 Input Filtering

The Wolf3D Version 4 has both hardware and software filtering to allow you to get the very cleanest, reliable signal into the ECU. Both of these settings are configured via the Hand Controller, or the PC Software.

4.4.1 Coil Negative Filtering

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

[CLR] "5 Sec"- Configuration – Trigger Coil Negative Filtering	
<pre>Configuration> 1/8 →Hand Controller > Map Switching > Trigger ></pre>	<p>To Set the Trigger Coil Negative Filtering. Start from the Configuration Menu by holding the [CLR] key down for 5 seconds.</p>
<p>2 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Configuration> 3/8 Hand Controller > Map Switching > →Trigger ></pre>	<p>Scroll down two times using the [4] button until you reach Trigger.</p> <p>From here press [SET] to select Trigger.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Trigger →Trigger 1 Polarity Trigger 2 Polarity Trigger Deg BTDC</pre>	<p>Scroll down three times using the [4] button until you reach Trigger Coil Negative Filtering.</p>
<p>2 x [4] = ↓ [CLR] = ↑</p>	
<pre>Trigger →TriggerCoilNegFilt TriggerCoilTimeFilt TriggerVoltageLevel</pre>	<p>Press [SET] to select Trigger Coil Negative Filtering.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 43% 8.90 07° Trigger > TriggerCoilNegFilt =Off Off/On</pre>	<p>Use [←] and [→] buttons to switch the Trigger Coil Negative Filtering Off or On.</p> <p>To return to the Main Screen, press and hold down the [CLR] button for 5 Seconds.</p>
<p>Suggested Value = On</p>	

This is only used if you have a version of the ECU with a Coil Negative Input Trigger. If you do not have a Coil Negative Input Trigger, set this function to the Off position.

4.4.2 Coil Time Filtering

Coil Time 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.

[CLR] "5 Sec"- Configuration – Trigger Coil Time Filtering	
<pre>Configuration> 1/8 →Hand Controller > Map Switching > Trigger ></pre>	<p>To Set the Trigger Coil Time Filtering. Start from the Configuration Menu by holding the [CLR] key down for 5 seconds</p>
<p>2 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Configuration> 3/8 Hand Controller > Map Switching > →Trigger ></pre>	<p>Scroll down two times using the [4] button until you reach Trigger.</p> <p>From here press [SET] to select Trigger.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Trigger →Trigger 1 Polarity Trigger 2 Polarity Trigger Deg BTDC</pre>	<p>Scroll down four times using the [4] button until you reach Trigger Deg BTDC.</p>
<p>3 x [4] = ↓ [CLR] = ↑</p>	
<pre>Trigger > TriggerCoilNegFilt →TriggerCoilTimeFilt TriggerVoltageLevel</pre>	<p>Press [SET] to select Trigger Coil Time Filtering.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.16 02° Trigger > TriggerCoilTimeFilt =On Off/On</pre>	<p>Use [←] and [→] buttons to switch the Trigger Coil Time Filtering Off or On.</p> <p>To return to the Main Screen, press and hold down the [CLR] button for 5 Seconds.</p>
<p style="text-align: center;">Suggested Value = On</p>	

This is only used if you have a version of the ECU with a Coil Negative Input Trigger. If you do not have a Coil Negative Input Trigger, set this function to the Off position.

4.5 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.

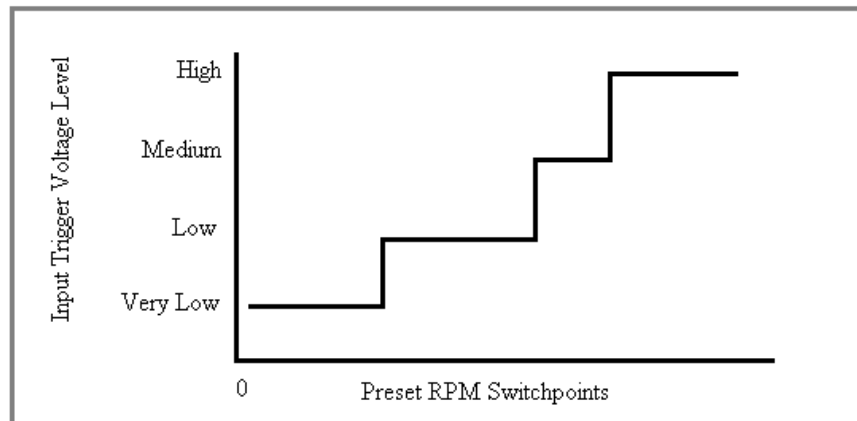
The best compromise is to set the value to the level that will allow the car to get an Input Trigger Pulse when the engine speed is around 70RPM. This is the same as if the battery is quite flat and the ambient temperature is quite low.

[CLR] "5 Sec"- Configuration – Trigger Voltage Level	
<pre> Configuration> 1/8 →Hand Controller > Map Switching > Trigger > </pre>	<p>To configure the type of engine you have, start from the Main Screen. Hold the [CLR] key down for 5 sec. You will see the screen to the left displayed on the Hand Controller.</p>
<p>2 x [4] = ↓</p>	<p>[CLR] = Main Screen</p>
<pre> Configuration> 3/8 Hand Controller > Map Switching > →Trigger > </pre>	<p>Scroll down two times using the [4] button until you reach Trigger.</p> <p>From here press [SET] to enter the editing screen</p>
<p>[SET] = ↓</p>	<p>[CLR] = ↑</p>
<pre> Trigger →Trigger 1 Polarity Trigger 2 Polarity Trigger Deg BTDC </pre>	<p>From here, scroll down five times using the [4] button until you reach Trigger Voltage Level.</p>
<p>4 x [4] = ↓</p>	<p>[CLR] = ↑</p>
<pre> Trigger > TriggerCoilNegFilt TriggerCoilTimeFilt →TriggerVoltageLevel </pre>	<p>Press [SET] to enter the editing screen.</p>
<p>[SET] = ↓</p>	<p>[CLR] = ↑↑</p>
<pre> 0 43% 8.90 07° Trigger > TriggerVoltageLevel =VeryLow VL/Low/M/H </pre>	<p>Use [←] and [→] buttons to change the Input Trigger Type until you reach the Trigger Type that you have.</p> <p>For Hall/Optical sensors, set to High For High Output Reluctor sensors, set to Medium or High For Low Output Reluctor sensor, set to Very Low or Low</p>
<p>Suggested Value = To Suit your installation</p>	

You should set this value, as high as possible, but still allow the engine to start when cold. Setting this value too high will mean that Input Trigger might not be picked up by the ECU. Setting it too low can mean that noise may effect the ECU, inducing engine misfires.

4.6 Auto Trigger Level

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.



NOTE: Do not set a Trigger Voltage Level step at an RPM where the engine may run for some time. This includes, Idle and cruise, as a switch point at these RPM's may result in Input Trigger noise counts as the engine slows, and the Voltage Level switches from higher to lower levels.

4.6.1 Auto Trigger Level Activation

[CLR] "5 Sec"- Configuration – Auto Trigger Level – Activate	
<pre>Configuration> 1/8 →Hand Controller > Map Switching > Trigger ></pre>	To Activate the Auto Trigger Level feature, start from the Main Screen. Hold the [CLR] key down for 5 sec. You will see the screen to the left displayed on the Hand Controller.
2 x [4] = ↓	[CLR] = Main Screen
<pre>Configuration> 3/8 Hand Controller > Map Switching > →Trigger ></pre>	Scroll down two times using the [4] button until you reach Trigger. From here press [SET] to enter the editing screen
[SET] = ↓	[CLR] = ↑
<pre>Trigger →Trigger 1 Polarity Trigger 2 Polarity Trigger Deg BTDC</pre>	From here, scroll down eight times using the [4] button until you reach Trigger Level RPM Auto.
8 x [4] = ↓	[CLR] = ↑

<pre>Trigger Trigger ExtendRange Trigger Extend BTDC →TriggerLevelRPMAuto</pre>	<p>Press [SET] to enter the Activation screen.</p>
<p>[SET] = ↓</p>	<p>[CLR] = ↑↑</p>
<pre>0 46% 13.35 00° Trigger TriggerLevelRPMAuto =On Off/On</pre>	<p>Use [←] and [→] buttons to turn the Activation On or Off.</p>
<p>Suggested Value = To Suit your installation</p>	

4.6.2 Setting The Auto Trigger Level RPM

Once Activated Scroll down to the next Trigger screen and use the 3 menus displayed to configure at what RPM the Trigger Voltage Level will switch from Very Low to Low, Low To Medium and from Medium To High.

<p>[CLR] "5 Sec"- Configuration – Auto Trigger Level RPM Switchpoint</p>	
<pre>Configuration> 1/8 →Hand Controller > Map Switching > Trigger ></pre>	<p>To set the RPM switchpoints, start from the Main Screen. Hold the [CLR] key down for 5 sec. You will see the screen to the left displayed on the Hand Controller.</p>
<p>2 x [4] = ↓</p>	<p>[CLR] = Main Screen</p>
<pre>Configuration> 3/8 Hand Controller > Map Switching > →Trigger ></pre>	<p>Scroll down two times using the [4] button until you reach Trigger.</p> <p>From here press [SET] to enter the editing screen</p>
<p>[SET] = ↓</p>	<p>[CLR] = ↑</p>
<pre>Trigger →Trigger 1 Polarity Trigger 2 Polarity Trigger Deg BTDC</pre>	<p>From here, scroll down eight times using the [4] button until you reach TriggerRPM Vlow>Low, TriggerRPM Low>Med, TriggerRPM Med>High.</p>
<p>8 x [4] = ↓</p>	<p>[CLR] = ↑</p>

<pre> Trigger +TriggerRPM VLow>Low TriggerRPM Low>Med TriggerRPM Med>High </pre>	<p>Press [SET] to enter the Adjustment screen.</p>
<p>[SET] = ↓</p>	<p>[CLR] = ↑↑</p>
<pre> 0 46% 13.35 00" Trigger TriggerRPM VLow>Low = 472 RPM </pre>	<p>Use [←] and [→] buttons to set the RPM switchpoint.</p>
<p>Suggested Value = To Suit your installation</p>	

4.7 TPS Calibration

The TPS must be calibrated to show 0% when closed, and 106% at Wide Open Throttle (WOT). Many functions are relative to the Closed and WOT, so care must be taken when calibrating the TPS.

TPS Calibration can only be used when a variable resistor type Throttle Position Sensor is being used.

Start this procedure with the throttle fully closed.

[CLR] "5 Sec"- Configuration – TPS Auto Calibration	
<pre>Configuration> 1/8 →Hand Controller > Map Switching > Trigger ></pre>	<p>To calibrate the TPS, start from the Main Screen. Hold down [CLR] for 5 Seconds. The display will scroll through the different display screens. You will see the screen to the left displayed on the Hand Controller.</p>
<p>3 x [4] = ↓ [CLR] = Main Screen</p>	<p>Start this procedure with the throttle fully closed.</p>
<pre>Configuration> 4/8 →Throttle Position > Load and Transient> Oxygen Sensor ></pre>	<p>Scroll down three times using the [4] button until you reach Throttle Position.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Throttle Position > →TPos Calibrate Mode TPos Closed Voltage TPos Open Voltage</pre>	<p>From here press [SET] to enter the editing screen</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 15.90 02° Throttle Position > TPos Calibrate Mode =SetMnMx Tb/MnMx/St</pre>	<p>Use [←] and [→] buttons to change the value until you reach the combination that you have.</p> <p>Fully open the throttle, then, let it return to the fully closed position.</p> <p>Turn off the power to the ECU.</p> <p>When you next power up the ECU, it will go to MinMax mode, and use the calibration values that you have just set.</p>
<p>Suggested Value = To Suit you application</p>	<p>To return to the Main Screen, press and hold down the [CLR] button for 5 Seconds.</p>

To Summarize Calibration of the TPS:

- Change the Throttle Position Mode to SetMnMx.
- Open the throttle to WOT.
- Close the throttle.
- Turn off the ECU
- Turn on the ECU. The throttle is now set, move the throttle through its full motion and check that the value ranges from 0 – 106%.

Once you have calibrated the TPS Closed and WOT positions, slowly move the throttle through its full range of movement and watch the Hand Controller to see if the TPos value moves smoothly through its entire range from 0% to 106%.

The Throttle Position Sensor calibration is now done.

4.8 Load and Transient Sensor Type

There are 3 main types of Load Sensing devices, Manifold Absolute Pressure (MAP) Sensor, Mass Air Flow (MAF) Sensor, and Throttle Position Sensor (TPS). The engine type determines the type of sensor to be used.

[CLR] "5 Sec"- Configuration – Load Sensor	
<pre>Configuration> 1/8 →Hand Controller > Map Switching > Trigger ></pre>	<p>To configure the type of Load and Transient Sensors you are using, start from the Main Screen. Hold the [CLR] key down for 5 sec. You will see the screen to the left displayed on the Hand Controller.</p>
<p>4 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Configuration> 5/8 Throttle Position > →Load and Transient> Oxygen Sensor ></pre>	<p>Scroll down four times using the [4] button until you reach Load and Transient.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Load and Transient> →Load Intern/Extern Transient Sensor</pre>	<p>From here press [SET] to enter the editing screen</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.16 02° Load and Transient> Load Intern/Extern =Internal Int/Extern</pre>	<p>Use [←] and [→] buttons to change the Load and Transient Sensor Type until you reach the combination that you have.</p> <p>To return to the Main Screen, press and hold down the [CLR] button for 5 Seconds.</p>
<p>Suggested Value = To Suit your application</p>	

If you choose Internal, you are choosing to use our Internal MAP Sensor. This MAP Sensor is capable of reading up to 23.5 PSI of boost.

To run your engine above 23.5 PSI of boost, you must either use a MAF (Mass Air Flow) Sensor, or an External MAP Sensor, such as a Delco 3 Bar MAP Sensor.

For more information about external MAP Sensors, contact your supplier of Wolf3D products.

4.9 Setting Up Load Calibration Table (Naturally Aspirated or Turbo)

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.

[CLR] "5 Sec"- Configuration – Load Calibration Mode	
<pre> Configuration> 1/8 +Hand Controller > Map Switching > Trigger > </pre>	<p>To configure the Load Table to suit your engine, start from the Main Screen. Press and Hold [CLR] . After 5 seconds you will see the screen to the left displayed on the Hand Controller.</p>
<p>4 x [5] = ↓ [CLR] = Main Screen</p>	
<pre> Configuration> 5/8 Throttle Position > +Load and Transient> Oxygen Sensor > </pre>	<p>Scroll down four times using the [4] button until you reach Load and Transient and press [SET] to enter the editing screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre> Load and Transient> +Wolf Sensor PSI External Sensor PSI </pre>	<p>Press [4] Six times to scroll down to Wolf Sensor PSI and press [SET] to enter the editing screen</p>
<p>1 x [6] = ↓ [CLR] = ↑</p>	
<pre> 0 46% 13.35 00° Load and Transient> Wolf Sensor PSI = 16 PSI </pre>	<p>Use [←] and [→] buttons to change the PSI value to suit your setup.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre> Load and Transient> TPos>MAP Changeover TPos>MAP SwitchPoint +LoadCalibrationMode </pre>	<p>Press [CLR] to go back to the Load Menu, scroll up one to LoadCalibrationMode and press [SET]</p>
<p>[SET] = ↓ [CLR] = ↑</p>	

<pre> 0 46% 13.35 00" Load and Transient> LoadCalibrationMode =WolfPSI Load Setup </pre>	<p>Press the [➡] button to display Wolf PSI Load Setup then press [SET]. This writes the new calibration table into the memory.</p> <p>Press [CLR] to exit</p>
<p>Suggested Value = To Suit your application</p>	

0 PSI = Naturally Aspirated

When using an external MAP/F sensor use External Sensor PSI instead of Wolf Sensor PSI and in the LoadCalibrationMode menu scroll through to Custom Load Setup and press [SET].

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.

4.10 Transient Sensor Type

The Transient Sensor is used to determine when enrichment or enleanment is required due to fast changes in engine load.

[CLR] "5 Sec"- Configuration – Transient Sensor	
<pre>Configuration> 1/8 →Hand Controller > Maf Switching > Trigger ></pre>	<p>To configure the type of Transient Sensor you are using, start from the Main Screen. Hold down [CLR] for 5 Seconds. The display will scroll through the different display screens. You will see the screen to the left displayed on the Hand Controller.</p>
<p>4 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Configuration> 5/8 Throttle Position > →Load and Transient> Oxygen Sensor ></pre>	<p>Scroll down four times using the [4] button until you reach Load and Transient.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Load and Transient> →Load Intern/Extern Transient Sensor</pre>	<p>Press [4] once to scroll down to Transient Sensor.</p>
<p>1 x [4] = ↓ [CLR] = ↑</p>	
<pre>Load and Transient> Load Intern/Extern →Transient Sensor</pre>	<p>From here press [SET] to enter the editing screen</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.16 02° Load and Transient> Transient Sensor =TPos TPos/MAF/P</pre>	<p>Use [←] and [→] buttons to change the Transient Sensor Type until you reach the combination that you have.</p> <p>To return to the Main Screen, press and hold down the [CLR] button for 5 Seconds.</p>
<p>Suggested Value = To Suit your application</p>	

The most often used sensor for these functions is the Throttle Position Sensor (TPS). This is because the output of the TPS is stable unless there is a change in the actual throttle position. As soon as the throttle moves, enrichment or enleanment compensation will occur, the amount of which is user defined.

5 Start

The Start Menu relates to anything to do with starting, or post start.

Button	Folder	Parameter
1-START		Start Fuel Rate
1-START		Start Ignition Timing
1-START	Initial Fuel Pulse	Activate Initial Fuel Addon
1-START	Post Start Enrich	Activate Enrich Rate Decay Mode Decay Rate
1-START	Flood Clear	Activate On > TPos Off < TPos

5.1 Starting Fuel Rate

The Starting Fuel Rate value only operates when the engine is at Starting RPM.

[1] - Start – Starting Fuel Rate	
<pre>Start> 1/5 →Start Fuel Rate Start Ign Timing Initial Fuel Pulse></pre>	To configure the Starting Fuel Rate, start from the Main Screen. Press [1] once. You will see the screen to the left displayed on the Hand Controller.
[SET] = ↓	[CLR] = ↑
<pre>0 43% 8.90 07° Start> Start Fuel Rate =08.06 milliSec</pre>	Use [←] and [→] buttons to change the Starting Fuel Rate. To return to the Main Screen, press and hold down the [CLR] button for 5 Seconds.
Suggested Value = 8mS	

We use a Starting Fuel Rate to overcome the widely fluctuating pressure pulses in the intake system that occur during cranking.

The Starting Fuel Rate should be set to allow the engine to start easily, but not more than is necessary. If too much fuel is injected during starting, the sparkplugs may foul, making starting very difficult.

5.2 Setting Cranking Ignition Timing

The Cranking Ignition Timing in degrees is shown in the top right-hand corner of the display.

[1] - Start – Start Ignition Timing	
<pre>Start> 1/5 →Start Fuel Rate Start Ign Timing Initial Fuel Pulse></pre>	<p>To set the Starting Ignition Timing, start from the Main Screen. Press [1] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>[4] = ↓</p>	<p>[CLR] = Main Screen</p>
<pre>Start> 2/5 Start Fuel Rate →Start Ign Timing Initial Fuel Pulse></pre>	<p>Scroll down using the [4] button until you reach Start Ignition Timing.</p> <p>From here press [SET] to enter the editing screen</p>
<p>[SET] = ↓</p>	<p>[CLR] = ↑</p>
<pre> 0 43% 8.90 07° Start> Start Ign Timing = 05 Deg BTDC</pre>	<p>Use [←] and [→] buttons to change the Starting Ignition Timing.</p>
<p>Suggested Value = 0°BTDC</p>	

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.

5.3 Initial Fuel Pulse

5.3.1 Initial Fuel Pulse Activate

The Initial Fuel Pulse is an advanced tuning feature that should only be adjusted once the engine starts and runs well.

[1] - Start – Initial Fuel Pulse Activate	
<pre>Start> 1/5 →Start Fuel Rate Start Ign Timing Initial Fuel Pulse></pre>	<p>To set the Initial Fuel Pulse Activate, start from the Main Screen. Press [1] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>[4] = ↓ [CLR] = Main Screen</p>	
<pre>Start> 3/5 Start Fuel Rate Start Ign Timing →Initial Fuel Pulse></pre>	<p>Scroll down using the [4] button until you reach Initial Fuel Pulse.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Initial Fuel Pulse> →Activate Initial Fuel Addon</pre>	<p>From here press [SET] to enter the editing screen</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre> 0 43% 8.90 07° Initial Fuel Pulse> Activate =On Off/On</pre>	<p>Use [←] and [→] buttons to switch ON or OFF.</p>
<p>Suggested Value = To Suit Application</p>	

5.3.2 Initial Fuel Pulse Addon

[1] - Start – Initial Fuel Pulse Addon	
<pre>Start> 1/5 →Start Fuel Rate Start Ign Timing Initial Fuel Pulse></pre>	<p>To set the Initial Fuel Pulse Addon, start from the Main Screen. Press [1] once. You will see the screen to the left displayed on the Hand Controller.</p>
<div style="display: flex; justify-content: space-between;"> [4] = ↓ [CLR] = Main Screen </div>	
<pre>Start> 3/5 Start Fuel Rate Start Ign Timing →Initial Fuel Pulse></pre>	<p>Scroll down using the [4] button until you reach Initial Fuel Pulse.</p>
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre>Initial Fuel Pulse> Activate →Initial Fuel Addon</pre>	<p>From here press [SET] to enter the editing screen</p>
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre>0 43% 8.90 07° Initial Fuel Pulse> Initial Fuel Addon =05.00 milliSec</pre>	<p>Use [←] and [→] buttons to change the Initial Fuel Pulse Addon value.</p>
<p>Suggested Value = To Suit Application</p>	

5.4 Post Start Enrichment

Many engines benefit from additional fuel for a few seconds after starting. If the engine tends to stall or stutter immediately after starting, some Post Start Enrichment may solve the problem. This problem is increased in turbo engines where heat soak can be a problem when starting a warm engine that has been left to sit for a few minutes. The engine temperature sensor is tricked into thinking the engine is much hotter than it really is. The ECU then tries to idle the engine slightly leaner than normal. Since idle fuel control is critical, this may mean the engine will not even idle with the slightly lean mixture.

5.4.1 Post Start Enrichment Activate

[1] - Start – Post Start Enrichment Activate	
<pre>Start> 1/5 →Start Fuel Rate Start Ign Timing Initial Fuel Pulse></pre>	To set the Post Start Enrichment Activate, start from the Main Screen. Press [1] once. You will see the screen to the left displayed on the Hand Controller.
<div style="display: flex; justify-content: space-between;"> 3 x [4] = ↓ [CLR] = Main Screen </div>	
<pre>Start> 4/5 →Post Start Enrich > Flood Clear ></pre>	Scroll down using the [4] button three times until you reach Post Start Enrichment.
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre>Post Start Enrich > →Activate Enrich Rate Decay Mode</pre>	From here press [SET] to enter the editing screen
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre>0 43% 8.90 07° Post Start Enrich > Activate =On Off/On</pre>	Use [←] and [→] buttons to switch ON or OFF.
Suggested Value = To Suit Application	

Trial and error is the only way to set the Post Start Enrichment. It will make the engine start and run far more smoothly when tuned than if it were not present, or if it were set incorrectly.

5.4.2 Post Start Enrichment Rate

[1] - Start – Post Start Enrichment Rate	
<pre>Start> 1/5 →Start Fuel Rate Start Ign Timing Initial Fuel Pulse></pre>	<p>To set the Post Start Enrichment Rate, start from the Main Screen. Press [1] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>3 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Start> 4/5 →Post Start Enrich > Flood Clear ></pre>	<p>Scroll down using the [4] button three times until you reach Post Start Enrichment.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Post Start Enrich > →Activate Enrich Rate Decay Mode</pre>	<p>Scroll down using the [4] button one time until you reach Enrich Rate.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>Post Start Enrich > Activate →Enrich Rate Decay Mode</pre>	<p>From here press [SET] to enter the editing screen</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 43% 8.90 07° Post Start Enrich > Enrich Rate = 31 Percent</pre>	<p>Use [←] and [→] buttons to change the Post Start Enrichment Rate.</p>
<p>Suggested Value = To Suit Application</p>	

5.4.3 Post Start Enrichment Decay Mode

Decay Mode describes the way the Wolf3D decreases the amount of Post Start Enrichment. Linear mode is a straight line from full enrichment down to no enrichment. Percentage decreases the amount of Post Start Enrichment by a percentage at each engine revolution.

[1] - Start – Post Start Decay Mode	
<pre>Start> 1/5 →Start Fuel Rate Start Ign Timing Initial Fuel Pulse></pre>	To set the Post Start Enrichment Decay Mode, start from the Main Screen. Press [1] once. You will see the screen to the left displayed on the Hand Controller.
<div style="display: flex; justify-content: space-between;"> 3 x [4] = ↓ [CLR] = Main Screen </div>	
<pre>Start> 4/5 →Post Start Enrich > Flood Clear ></pre>	Scroll down using the [4] button three times until you reach Post Start Enrichment.
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre>Post Start Enrich > →Activate Enrich Rate Decay Mode</pre>	Scroll down using the [4] button one time until you reach Decay Mode.
<div style="display: flex; justify-content: space-between;"> 2 x [4] = ↓ [CLR] = ↑ </div>	
<pre>Post Start Enrich > Activate Enrich Rate →Decay Mode</pre>	From here press [SET] to enter the editing screen
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre>0 43% 8.90 07° Post Start Enrich > Decay Mode =Linear Lin/Percent</pre>	Use [←] and [→] buttons to change the Post Start Enrichment Decay Mode.
Suggested Value = Linear	

5.4.4 Post Start Enrichment Decay Rate

The higher the Decay Rate, the quicker the fueling will return to standard fueling.

[1] - Start – Post Start Decay Mode	
<pre>Start> 1/5 →Start Fuel Rate Start Ign Timing Initial Fuel Pulse></pre>	<p>To set the Post Start Enrichment Decay Rate, start from the Main Screen. Press [1] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>3 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Start> 4/5 →Post Start Enrich > Flood Clear ></pre>	<p>Scroll down using the [4] button three times until you reach Post Start Enrichment.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Post Start Enrich > →Activate Enrich Rate Decay Mode</pre>	<p>Scroll down using the [4] button one time until you reach Decay Rate.</p>
<p>2 x [4] = ↓ [CLR] = ↑</p>	
<pre>Post Start Enrich > →Decay Rate</pre>	<p>From here press [SET] to enter the editing screen</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 43% 8.90 07° Post Start Enrich > Decay Rate = 1 Percent</pre>	<p>Use [←] and [→] buttons to change the Post Start Enrichment Decay Rate.</p>
<p>Suggested Value = 5%</p>	

5.5 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.

5.5.1 Flood Clear Activate

[1] - Start – Flood Clear Activate	
<pre>Start> 1/5 →Start Fuel Rate Start Ign Timing Initial Fuel Pulse></pre>	<p>To set Flood Clear Activate, start from the Main Screen. Press [1] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>4 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Start> 5/5 Post Start Enrich > →Flood Clear ></pre>	<p>Scroll down using the [4] button four times until you reach Flood Clear.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Flood Clear > →Activate On > TPos Off < TPos</pre>	<p>From here press [SET] to enter the editing screen</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 43% 8.90 07° Flood Clear > Activate =On Off/On</pre>	<p>Use [←] and [→] buttons to switch ON or OFF.</p>
<p>Suggested Value = On</p>	

5.5.2 Flood Clear On Above TPos

[1] - Start – Flood Clear On Above TPos	
<pre>Start> 1/5 →Start Fuel Rate Start Ign Timing Initial Fuel Pulse></pre>	<p>To set Flood Clear On Above TPos, start from the Main Screen. Press [1] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>4 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Start> 5/5 Post Start Enrich > →Flood Clear ></pre>	<p>Scroll down using the [4] button four times until you reach Flood Clear.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Flood Clear > →Activate > On > TPos Off < TPos</pre>	<p>Scroll down using the [4] button until you reach On Above TPos.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>Flood Clear > Activate > →On > TPos Off < TPos</pre>	<p>From here press [SET] to enter the editing screen.</p>
<pre>0 43% 8.90 07° Flood Clear > On > TPos = 79 % TPos</pre>	<p>Use [←] and [→] buttons to change Flood Clear On Above TPos.</p>
<p>Suggested Value = 80%</p>	

5.5.3 Flood Clear Off Below TPos

[1] - Start – Flood Clear Off Below TPos	
<pre>Start> 1/5 →Start Fuel Rate Start Ign Timing Initial Fuel Pulse></pre>	<p>To set Flood Clear Off Below TPos, start from the Main Screen. Press [1] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>4 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Start> 5/5 Post Start Enrich > →Flood Clear ></pre>	<p>Scroll down using the [4] button four times until you reach Flood Clear.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Flood Clear > →Activate > On > TPos Off < TPos</pre>	<p>Scroll down using the [4] button until you reach Off Below TPos.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>Flood Clear > Activate > On > TPos →Off < TPos</pre>	<p>From here press [SET] to enter the editing screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 43% 8.90 07° Flood Clear > Off < TPos = 72 % TPos</pre>	<p>Use [←] and [→] buttons to change Flood Clear Off Below TPos.</p>
<p>Suggested Value = 80%</p>	

6 Fuel

The Fuel Menu contains all the Fuel Trims and Fuel related adjustables.

Button	Folder	Parameter
3-FUEL	Trim	Overall Trim Inj Trims Activate Inj 1 Trim Inj 2 Trim Inj 3 Trim Inj 4 Trim
3-FUEL	Transient	Acc Enrich Activate Dec Enlean Activate Accel Enrich Rate Accel Enrich Decay Decel Enlean Rate Decel Enlean Decay
3-FUEL	Overrun Fuel Cut	Activate On < TPos Off > TPos On > Engine Temp Off < Engine Temp On > RPM Off < RPM Recover Fuel Active Recover Fuel Count Recover Fuel Addon
3-FUEL	Staged Injection	Activate Percentage of Inj 1
3-FUEL	Engine Temp Comp	Activate Compensation Rate
3-FUEL	Air Temp Comp	Activate Compensation Rate
3-FUEL	Battery Voltage Comp	Activate Compensation Rate
3-FUEL	External Trim	Activate Input Used

6.1 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.

6.1.1 Acceleration Enrichment Activate

[3] – Fuel – Transient – Acceleration Enrichment Activate	
<pre>Fuel> 1/8 →Trim > Transient > Overrun Fuel Cut ></pre>	To set Acceleration Enrichment Activate, start from the Main Screen. Press [3] once. You will see the screen to the left displayed on the Hand Controller.
<div style="display: flex; justify-content: space-between;"> [4] = ↓ [CLR] = Main Screen </div>	
<pre>Fuel> 1/8 Trim > →Transient > Overrun Fuel Cut ></pre>	Scroll down using button [4] to Transient
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑↑ </div>	
<pre>Transient > →Acc Enrich Activate Dec Enlean Activate Accel Enrich Rate</pre>	Press [SET] to enter the adjustment screen.
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre>0 43% 8.90 07° Transient > Acc Enrich Activate =On Off/On</pre>	Use [←] and [→] buttons to change the value.
Suggested Value = On	

For correct engine operation under changing throttle position, Acceleration Enrichment must be used. If you have this function turned off, the engine will go very lean when you quickly open the throttle, causing it to splutter, and in severe cases, the engine may backfire.

6.1.2 Decel Enleanment Activate

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

[3] – Fuel – Transient – Decel Enleanment Activate	
<pre>Fuel> 1/8 →Trim > Transient > Overrun Fuel Cut ></pre>	To set Decel Enleanment Activate, start from the Main Screen. Press [3] once. You will see the screen to the left displayed on the Hand Controller.
<div style="display: flex; justify-content: space-between;"> [4] = ↓ [CLR] = Main Screen </div>	
<pre>Fuel> 1/8 Trim > →Transient > Overrun Fuel Cut ></pre>	Press [SET] to enter the folder.
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑↑ </div>	
<pre>Transient > →Acc Enrich Activate > Dec Enlean Activate > Accel Enrich Rate ></pre>	Scroll down using button [4] to Decel Enleanment Activate.
<div style="display: flex; justify-content: space-between;"> [4] = ↓ [CLR] = ↑ </div>	
<pre>Transient > Acc Enrich Activate > →Dec Enlean Activate > Accel Enrich Rate ></pre>	Press [SET] to enter the adjustment screen.
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre>0 43% 8.90 07° Transient > Dec Enlean Activate > =On Off/On</pre>	Use [←] and [→] buttons to change the value.
Suggested Value = On	

6.1.3 Accel Enrichment Rate

[3] – Fuel – Transient – Accel Enrichment Rate	
<pre>Fuel> 1/8 →Trim > Transient > Overrun Fuel Cut ></pre>	<p>To set Accel Enrichment Rate, start from the Main Screen. Press [3] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>[4] = ↓ [CLR] = Main Screen</p>	
<pre>Fuel> 1/8 Trim > →Transient > Overrun Fuel Cut ></pre>	<p>Press [SET] to enter the folder.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Transient > →Acc Enrich Activate > Dec Enlean Activate > Accel Enrich Rate ></pre>	<p>Scroll down using button [4] to Accel Enrich Rate</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>Transient > Acc Enrich Activate > Dec Enlean Activate > →Accel Enrich Rate ></pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 43% 8.90 07° Transient > Accel Enrich Rate > =400 Percent</pre>	<p>Use [←] and [→] buttons to change the value.</p>
<p>Suggested Value = 800</p>	

6.1.4 Accel Enrichment Decay

[3] – Fuel – Transient – Accel Enrichment Rate	
<pre>Fuel> 1/8 →Trim > Transient > Overrun Fuel Cut ></pre>	To set Accel Enrichment Decay, start from the Main Screen. Press [3] once. You will see the screen to the left displayed on the Hand Controller.
<div style="display: flex; justify-content: space-between;"> [4] = ↓ [CLR] = Main Screen </div>	
<pre>Fuel> 1/8 Trim > →Transient > Overrun Fuel Cut ></pre>	Press [SET]
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑↑ </div>	
<pre>Transient > →Acc Enrich Activate Dec Enlean Activate Accel Enrich Rate</pre>	Scroll down using button [4] to Accel Enrich Decay.
<div style="display: flex; justify-content: space-between;"> [4] = ↓ [CLR] = ↑ </div>	
<pre>Transient > →Accel Enrich Decay Decel Enlean Rate Accel Enrich Decay</pre>	Press [SET] to enter the adjustment screen.
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre>0 43% 8.90 07° Transient > Accel Enrich Decay = 30 Percent</pre>	Use [←] and [→] buttons to change the value.
Suggested Value = 20	

If the Acceleration Enrichment Decay is set too low (for long lasting Acceleration Enrichment), the engine may load up with all of the additional fuel. The idea is to use the Enrichment Rate, and the Enrichment Decay, to make the engine as responsive as possible when the throttle is quickly opened.

6.1.5 Decel Enleanment Rate

[3] – Fuel – Transient – Decel Enleanment Rate	
<pre>Fuel> 1/8 →Trim > Transient > Overrun Fuel Cut ></pre>	<p>To set Decel Enleanment Rate, start from the Main Screen. Press [3] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>[4] = ↓ [CLR] = Main Screen</p>	
<pre>Fuel> 1/8 Trim > →Transient > Overrun Fuel Cut ></pre>	<p>Press [SET]</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Transient > →Acc Enrich Activate Dec Enlean Activate Accel Enrich Rate</pre>	<p>Scroll down using button [4] to Decel Enleanment Rate.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>Transient > Accel Enrich Decay →Decel Enlean Rate Accel Enrich Decay</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 43% 8.90 07° Transient > Decel Enlean Rate = 30 Percent</pre>	<p>Use [←] and [→] buttons to change the value.</p>
<p>Suggested Value = 20</p>	

6.1.6 Decel Enleanment Decay

[3] – Fuel – Transient – Decel Enleanment Decay	
<pre>Fuel> 1/8 →Trim > Transient > Overrun Fuel Cut ></pre>	<p>To set Decel Enleanment Decay, start from the Main Screen. Press [3] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>[4] = ↓ [CLR] = Main Screen</p>	
<pre>Fuel> 1/8 Trim > →Transient > Overrun Fuel Cut ></pre>	<p>Press [SET]</p>
<p>[SET] = ↓ [CLR] = ⬆⬆</p>	
<pre>Transient > →Acc Enrich Activate Dec Enlean Activate Accel Enrich Rate</pre>	<p>Scroll down using button [4] to Decel Enleanment Decay.</p>
<p>[4] = ↓ [CLR] = ⬆</p>	
<pre>Transient > Accel Enrich Decay Decel Enlean Rate →Decel Enlean Decay</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ⬆</p>	
<pre>0 43% 8.90 07° Transient > Decel Enlean Decay = 10 Percent</pre>	<p>Use [←] and [→] buttons to change the value.</p>
<p>Suggested Value = 10</p>	

6.2 Fuel Cut on Over-run

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.

6.2.1 Overrun Fuel Cut Activate

[3] – Fuel – Overrun Fuel Cut –Activate	
<pre>Fuel> 1/8 →Trim > Transient > Overrun Fuel Cut ></pre>	<p>To set Overrun Fuel Activate, start from the Main Screen. Press [3] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Press [SET] to enter the menu.</p>
<p>2 x[4] = ↓ [CLR] = Main Screen</p>	
<pre>Fuel> 1/8 Trim > Transient > →Overrun Fuel Cut ></pre>	<p>Scroll down using button [4] to Overrun Fuel Cut.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Overrun Fuel Cut > →Activate On < TPos Off > TPos</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 43% 8.90 07° Overrun Fuel Cut > Activate =On Off/On</pre>	<p>Use [←] and [→] buttons Activate the Fuel Cut On Overrun.</p>
<p>Suggested Value = To Suit Application</p>	

Fuel Cut on Over-run reduces the injection time to zero. It is implemented if the engine is above an RPM you determine (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.

6.2.2 Overrun Fuel Cut On Below Tpos

[3] – Fuel – Overrun Fuel Cut – On Below TPos	
<pre>Fuel> 1/8 →Trim > Transient > Overrun Fuel Cut ></pre>	<p>To set Overrun Fuel On Below TPos, start from the Main Screen. Press [3] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Overrun Fuel Cut.</p>
<p>2 x[4] = ↓ [CLR] = Main Screen</p>	
<pre>Fuel> 1/8 Trim > Transient > →Overrun Fuel Cut ></pre>	<p>Press [SET] to enter the menu.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Overrun Fuel Cut > →Activate On < TPos Off > TPos</pre>	<p>Scroll down using button [4] to On Below TPos.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>Overrun Fuel Cut > Activate →On < TPos Off > TPos</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 43% 8.90 07° Overrun Fuel Cut > On < TPos = 1 % TPos</pre>	<p>Use [←] and [→] buttons to change the TPOS position that Fuel Cut Switches on below.</p>
<p>Suggested Value = 1%</p>	

6.2.3 Overrun Fuel Cut Off Above TPos

[3] – Fuel – Overrun Fuel Cut – Off Above TPos	
<pre>Fuel> 1/8 →Trim > Transient > Overrun Fuel Cut ></pre>	<p>To set Overrun Fuel On Below TPos, start from the Main Screen. Press [3] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Overrun Fuel Cut.</p>
<p>2 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Fuel> 1/8 Trim > Transient > →Overrun Fuel Cut ></pre>	<p>Press [SET] to enter the menu.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Overrun Fuel Cut > →Activate On < TPos Off > TPos</pre>	<p>Scroll down using button [4] to Off Above TPos.</p>
<p>2 x [4] = ↓ [CLR] = ↑</p>	
<pre>Overrun Fuel Cut > Activate On < TPos →Off > TPos</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 43% 8.90 07° Overrun Fuel Cut > Off > TPos = 2 % TPos</pre>	<p>Use [←] and [→] buttons to change the value.</p>
<p>Suggested Value = 1%</p>	

6.3 Staged Injection

6.3.1 Staged Injector Activate

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.

[3] - Fuel – Staged Injection – Activate	
<pre>Fuel> 1/8 →Modifiers > Transient > Overrun Fuel Cut ></pre>	<p>To configure the Staged Injection, start from the Main Screen. Press [3] once. You will see the screen to the left displayed on the Hand Controller.</p>
<div style="display: flex; justify-content: space-between;"> 3 x [4] = ↓ [CLR] = Main Screen </div>	
<pre>Fuel> 4/8 →Staged Injection > Engine Temp Comp > Air Temp Comp ></pre>	<p>Scroll down three times using the [4] button until you reach Staged Injection.</p> <p>From here press [SET] to enter the editing screen</p>
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre>Staged Injection > →Activate Percentage of Inj 1</pre>	<p>Press [SET] to move to the adjustment screen. Press [CLR] to move back to the main menu.</p>
<div style="display: flex; justify-content: space-between;"> ← = [4] [SET] = ↓ [CLR] = ↑ </div>	
<pre>0 43% 8.90 07° Staged Injection > Activate =Off Off/On</pre>	<p>Use [←] and [→] buttons to turn on or off the Staged Injection. The values are changed live; you do not need to press [SET] to store the value.</p>
<p>Suggested Value = To Suit Your Installation</p>	

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.

6.3.2 Percentage of Inj 1

You can set up the Staged Injection to be a percentage of the primary injection time.

The PC Software has a more detailed adjustment system for the Staged Injection.

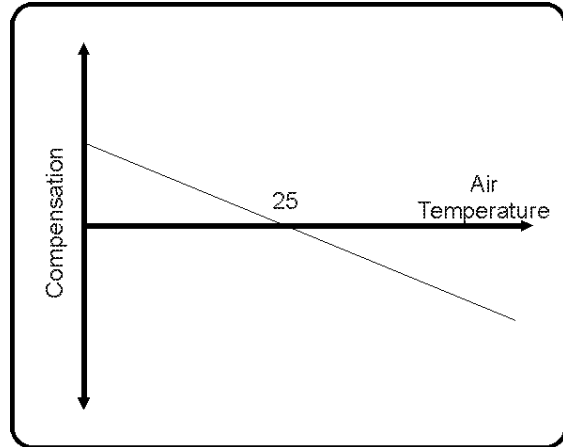
[3] - Fuel – Staged Injection – Activate		
<pre>Fuel> 1/8 *Modifiers > Transient > Overrun Fuel Cut ></pre>		<p>To configure the Staged Injection, start from the Main Screen. Press [3] once. You will see the screen to the left displayed on the Hand Controller.</p>
3 x [4] = ↓	[CLR] = Main Screen	
<pre>Fuel> 4/8 →Staged Injection > Engine Temp Comp > Air Temp Comp ></pre>		<p>Scroll down three times using the [4] button until you reach Staged Injection.</p> <p>From here press [SET] to enter the editing screen</p>
[SET] = ↓	[CLR] = ↑	
<pre>Staged Injection > →Activate Percentage of Inj 1</pre>		<p>Scroll down to Percentage of Inj 1, Press [SET] to enter the adjustment screen</p>
← = [4]	[SET] = ↓	
<pre>0 46% 13.35 00° Staged Injection > Percentage of Inj 1 = 99 Percent</pre>		<p>Use [←] and [→] buttons to turn change the percentage of Inj 1 that is injected by the staged injector.</p>
Suggested Value = To Suit Your Installation		

6.4 Air Temperature Injection Compensation

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.

There is a zero compensation point at 25°C with increased fuel below this temperature, and the fuel decreasing as the intake air temperature increases.

When using the Hand Controller, the Air Temperature Injection Compensation curve operates in a similar way to earlier versions of the Wolf3D, with a single value increasing and decreasing the amount of compensation.



The Air Temperature Injection Compensation is used progressively reduce the fuelling as the intake air temperature increases to maintain the same air fuel ratio.

You are able to set the amount of Air Temperature Injection Compensation. The lower the value of compensation you set, the less the Wolf3D will decrease the fuel as the intake air temperature rises. You may decide that in a particularly stressful application, it is not worth the risk of reducing the amount of fuel delivered at all. We recommend setting the Air Temperature Compensation to 75. This is the theoretically correct.

Sometimes this may be too much compensation. If the intake air temperature sensor is not in the correct position, it may not read the correct intake air. It is important that the intake air temperature sensor reads the intake air as late as possible. If possible mount the air temperature sensor in the plenum chamber. In this position air heated from the manifold will be measured as the correct intake air temperature. It is vital on turbo applications to measure the intake air temperature **after** the turbo. On non-intercooled engines the after turbo air temperature can be as high as 100 Degrees Celsius, while the ambient air temperature may be as low as 25 Degrees Celsius. As you can see, the incorrect placement of the air temperature sensor can lead to incorrect fuelling over a wide range of intake air temperatures.

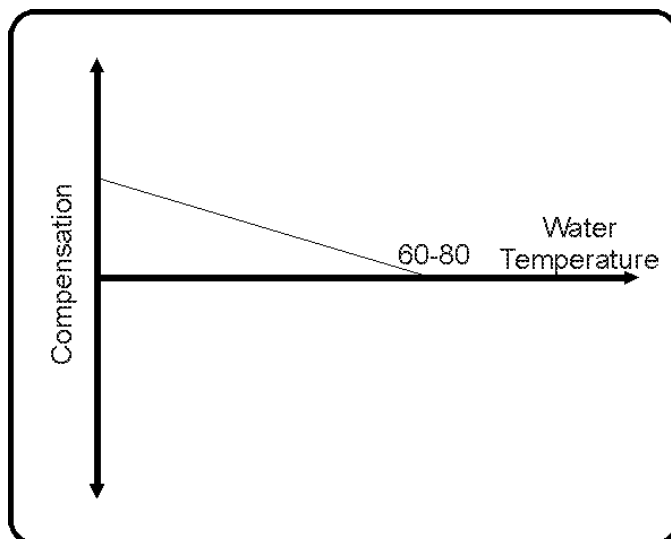
For advanced tuning features of the Air Temperature Injection Compensation function, refer to the PC Software Water Temperature Injection Compensation function.

6.5 Engine Temperature Injection Compensation

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.

When using the Hand Controller, the Engine Temperature Injection Compensation curve operates in a similar way to earlier versions of the Wolf3D, with a single value increasing and decreasing the amount of compensation.

For advanced tuning features of the Engine Temperature Injection Compensation function, refer to the PC Software Engine Temperature Injection Compensation function.

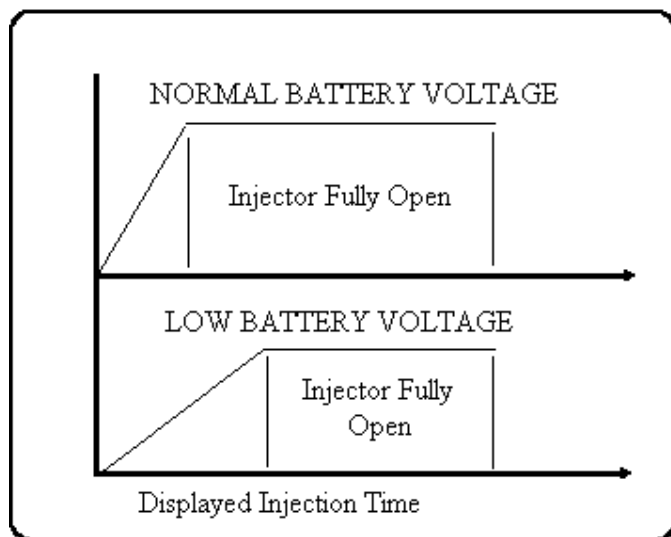


Functions the same as the choke on a carbureted car. The Cold Enrichment threshold is 75°C. As the temperature drops below this level enrichment begins. The enrichment increases as the temperature approaches 0°C. The Cold Enrichment value can only be tuned when the engine is cold. That would be when the engine has not been run for at least 8 hours.

6.6 Battery Voltage Compensation

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.

Battery Voltage Compensation should be setup using the PC software as a proper curve can be generated.

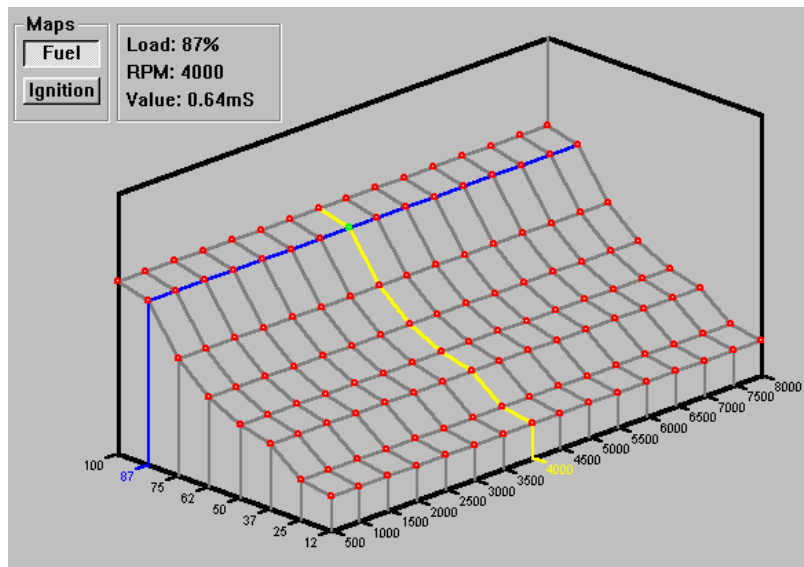


6.7 Fuel Trim

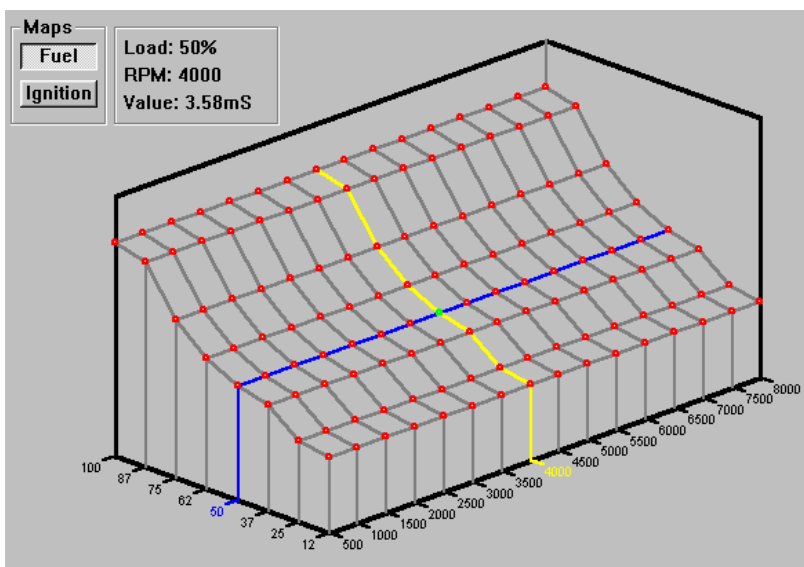
The Wolf3D has Both Overall Trims, and Individual Injector Output Trims. These trims are only for very advanced users, and will cause problems if used without the correct test equipment. Before proceeding, you must understand the problems that can be associated with changing any of these settings.

6.7.1 Overall Trim

Overall trim works as a global percentage increase or decrease in the amount of fuel delivered. This feature can be used to trim a slightly rich or lean map.



Fuel Map Before Positive Percentage Overall Trim



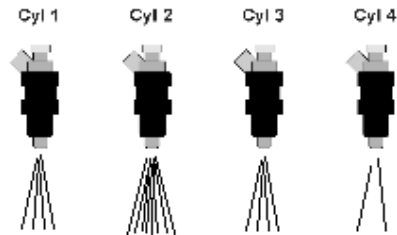
Fuel Map After Positive Percentage Overall Trim

6.7.2 Individual Injector Trims

Individual Injector Trims add or subtract the specified percentage from the injection time of only that injector channel. Unlike the overall trim, which does all injector channels, the individual trims only effect the specified injector.

	Map mS Time		Individual Trim %		Total Injection Time
Injector #1	4.23mS	X	0%	=	4.23mS
Injector #2	4.23mS	X	20%	=	5.08mS
Injector #3	4.23mS	X	0	=	4.23mS
Injector #4	4.23mS	X	-15%	=	3.59mS

The Individual trims must be activated before they will function correctly. They can be used to cure inherent under fueling some engines have on specific cylinders due to design problems etc.



Individual Injectors With Trims Applied

6.7.3 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. This can only be done with the PC software.

Refer to the External Trim Setup in the PC Software Manual.

6.8 Fuel Map

The WOLF3D allows the user to move around the Fuel and Ignition Maps. This allows the setting up of Maps and diagnosing any 'flat spots' very quick and simple, as the whole Map can be stepped through without having to run the engine.

When in Map Adjust Mode, the [1], [2], [3], and [4] buttons function as left and right arrows to move around the Map.

1- LOAD down 2- LOAD up
3- RPM down 4- RPM up

To step through the Fuel Map choose [<-INJ], [1], which picks the nearest Injection Map point. The nearest Injection Map point is the closest point to which the engine is running.

If the engine is not running the EMC chooses the 500RPM point at the LOAD the engine experiences while not running.

To enter the Fuel Map press [← Fuel Map]

Button	Folder	Parameter
<-FUEL MAP		Nearest Inj Map Point Load Band Move Load Band Reset

Then step through the Fuel Map using [3], [4] for RPM points, and [1], [2] for LOAD Points. The value of each Fuel Map point is displayed on the screen. The Ignition Map points can be seen just as easily by choosing [IGN->], [1] and then moving throughout the Ignition Map in the same way is in the Injection Map.

Try out this function by pressing [<-INJ], [1], and then press [1], [2], [3] and [4]. Press [CLR] when finished to ensure you don't change any Map values.



If an adjustment is to be saved press [SET] to write it before stepping away from that point by pressing buttons [1], [2], [3] or [4], or pressing [CLR].

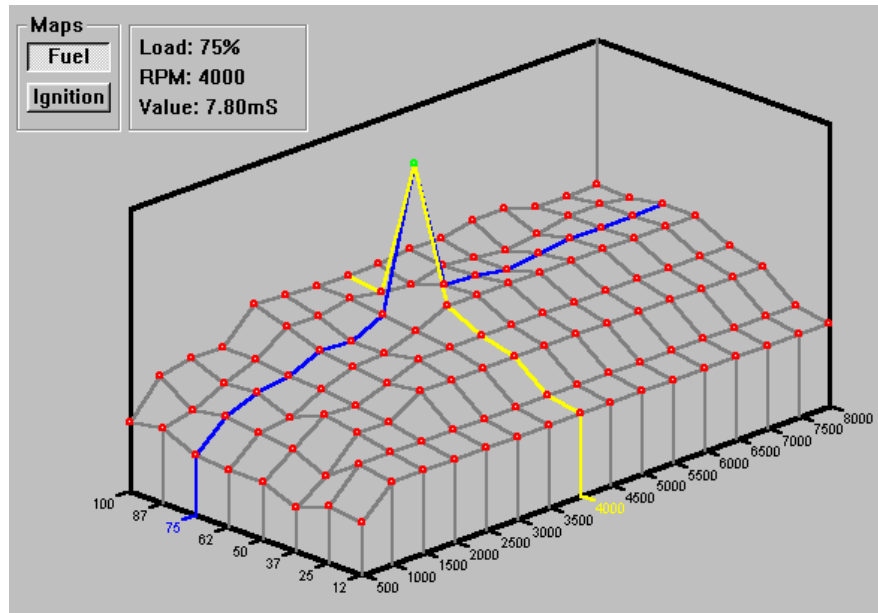
The display will stay in the current mode unless [CLR] is pressed to return to the main screen.

There are three ways of modifying the Fuel Maps in the WOLF3D.

Nearest Injection Map Point
LOAD Band Move
LOAD Band Reset

6.8.1 Nearest Injection Map Point

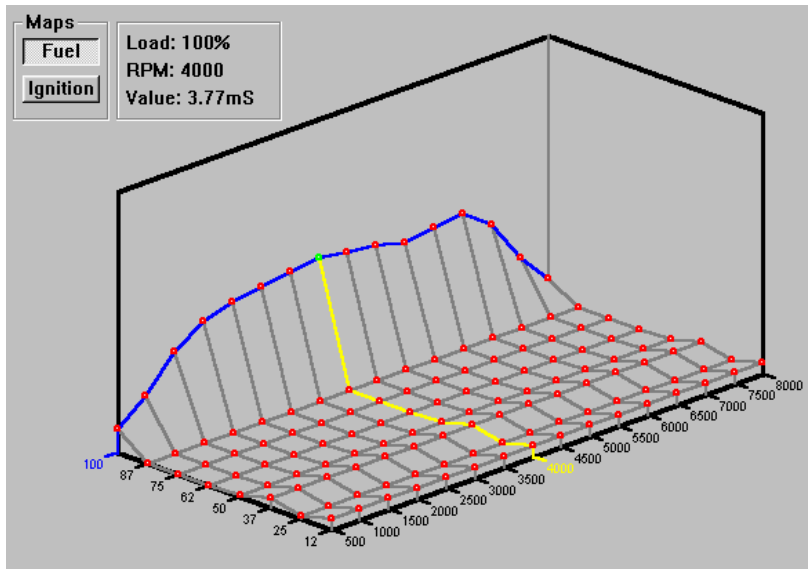
This function allows the user to set **one** Map Point at a time. This function should be used as a final tuning tool to trim and adjust specific points in the map.



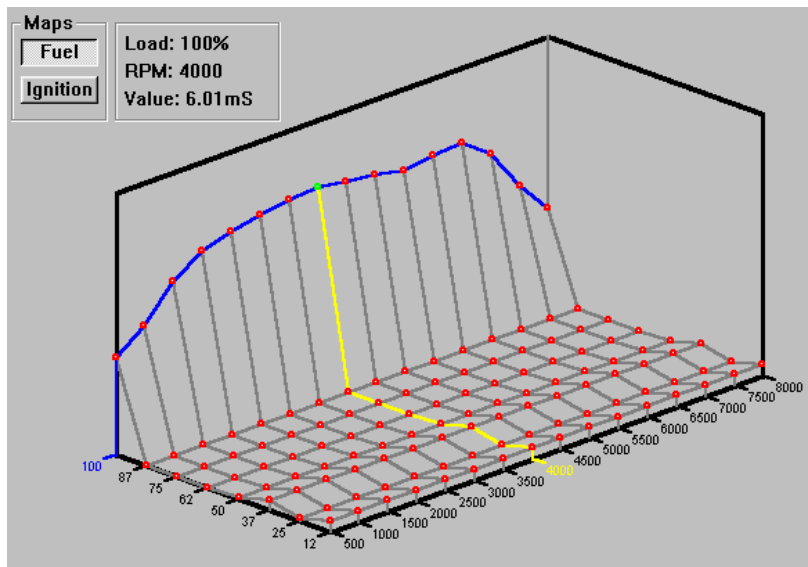
Adjusting the Nearest Map Point

6.8.2 LOAD Band Move

This function allows the user to raise or lower an entire LOAD Band, maintaining the Fuel curve over the entire RPM range. This function can be used to change and air : fuel ratio of a particular Load Band at each RPM.



Load Band Before Adjustment

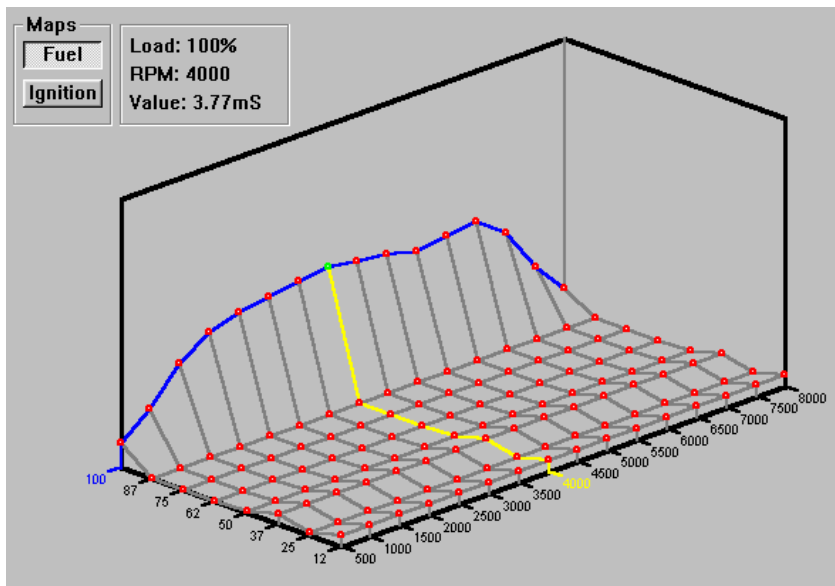


Load Band After Adjustment

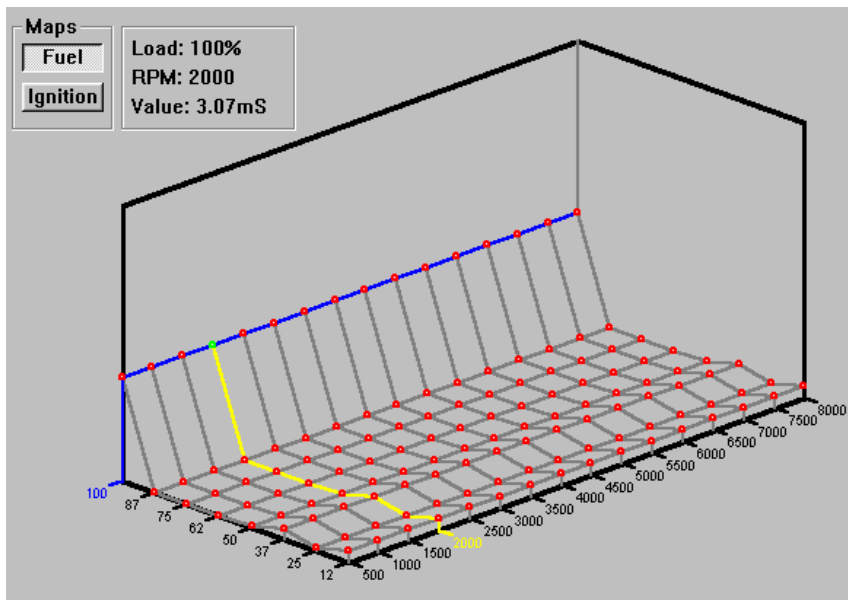
6.8.3 LOAD Band Reset

LOAD Band Reset flattens the Fuel curve at all RPM Points on the particular LOAD Band. This is a powerful function that should only be used either before any fine-tuning has begun, or if the user is completely 'lost', ie. cannot find the correct fuelling and the injection times at each RPM site on a Load Band are inconsistent. As a safety feature the function will only work if the Injection time has been changed while in LOAD Band Reset mode. If the value has not been changed, when [SET] is pressed, all original Injection times will remain.

Load Band Reset is very useful if you have lost your way when programming a fuel map. It can be far quicker to do a Load Band Reset, then modify a few points, than it would be to have to step through every point on a Load Band and change all but a few of the points.



Before Load Band Reset



After Load Band Reset

7 Ignition

The IGN menu contains the Ignition Trims and setup

Button	Folder	Parameter
4-IGN	Trim	Overall Trim
4-IGN	Rotary Trailing Ignition	Trailing Ignition Split
4-IGN	Configuration	Max Ign Charge Time Min Ign Discharge Time
4-IGN	Engine Temp Comp	Activate Compensation Rate
4-IGN	Air Temp Comp	Activate Compensation Rate
4-IGN	External Trim	Activate Input Used Compensation Rate

7.1 Trail Pulse – Rotary

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

[4] - Ignition – Rotary Ignition Timing	
<pre>Ignition> 1/3 →Modifiers > Rotary Trail Ign > Configuration ></pre>	<p>To set the Rotary Ignition Timing, start from the Main Screen. press [4] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>[4] = ↓ [CLR] = Main Screen</p>	
<pre>Ignition> 2/3 Modifiers > →Rotary Trail Ign > Configuration ></pre>	<p>Scroll down using the [4] button until you reach Rotary Trailing Ignition.</p> <p>Press [SET].</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Rotary Trail Ign > →Trailing Ign Split</pre>	<p>From here press [SET] to enter the editing screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 43% 8.90 07° Rotary Trail Ign > Trailing Ign Split = 0.0 Degrees</pre>	<p>Use [←] and [→] buttons to change the Rotary Trailing Ignition Timing.</p> <p>Suggested Value = 10° to 15°</p>
<p>Suggested Value = To Suit Application</p>	

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.

7.2 Configuration

7.2.1 Max Ignition Charge Time

[4] - Ignition – Configuration – Max Ignition Charge Time	
<pre>Ignition> 1/3 →Modifiers > Rotary Trail Ign > Configuration ></pre>	To set the Maximum Ignition Charge Time, start from the Main Screen. press [4] once. You will see the screen to the left displayed on the Hand Controller.
<div style="display: flex; justify-content: space-between;"> 2 x [4] = ↓ [CLR] = Main Screen </div>	
<pre>Ignition> 3/3 Modifiers > Rotary Trail Ign > →Configuration ></pre>	Scroll down using the [4] button until you reach Configuration. Press [SET].
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre>Configuration > →Max Ign Charge Time Min Ign Disch9 Time</pre>	From here press [SET] to enter the editing screen.
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre>0 43% 8.90 07° Configuration > Max Ign Charge Time =04.20 milliSec</pre>	Use [←] and [→] buttons to change the Maximum Ignition Charge Time
Suggested Value = 3.8mS	

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.

7.2.2 Min Ignition Discharge Time

[4] - Ignition – Configuration – Min Ignition Discharge Time	
<pre>Ignition> 1/3 →Modifiers > Rotary Trail Ign > Configuration ></pre>	<p>To set the Minimum Ignition Discharge Time, start from the Main Screen. press [4] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>2 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Ignition> 3/3 Modifiers > Rotary Trail Ign > →Configuration ></pre>	<p>Scroll down using the [4] button until you reach Configuration.</p> <p>Press [SET].</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Configuration > →Max Ign Charge Time Min Ign Dischg Time</pre>	<p>Scroll down using the [4] button until you reach Minimum Discharge Time.</p> <p>Press [SET].</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>Configuration > Max Ign Charge Time →Min Ign Dischg Time</pre>	<p>From here press [SET] to enter the editing screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 43% 8.90 07° Configuration > Min Ign Dischg Time =01.00 milliSec</pre>	<p>Use [←] and [→] buttons to change the Minimum Ignition Discharge Time.</p>
<p>Suggested Value = 1mS for Distributor Systems 0.5mS for Multicoil Systems</p>	

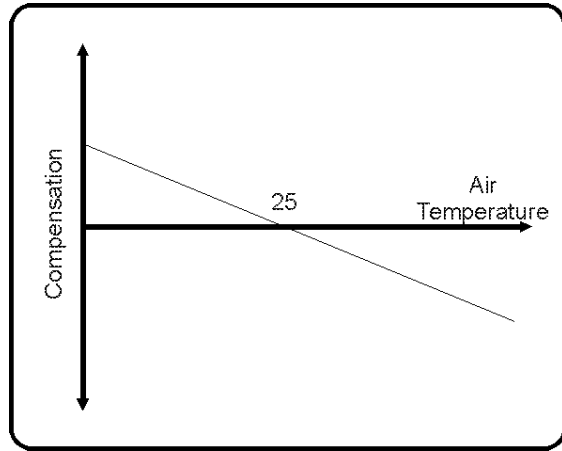
It is very important that there is some minimum coil discharge time. If this parameter was set to zero, there would be no time for the spark to be produced, and to burn the fuel completely.

7.3 Air Temperature Ignition Compensation

Air Temperature Compensation is used to make corrections for changes in intake air temperature. There is a zero compensation point at 25°C with increased timing below this temperature and decreased timing above as the intake air temperature increases.

When using the Hand Controller, the Air Temperature Compensation curve operates in a similar way to the Fuel trim, with a single value increasing and decreasing the amount of compensation.

For advanced tuning features of the Air Temperature Ignition Compensation function, refer to the PC Software Manual.



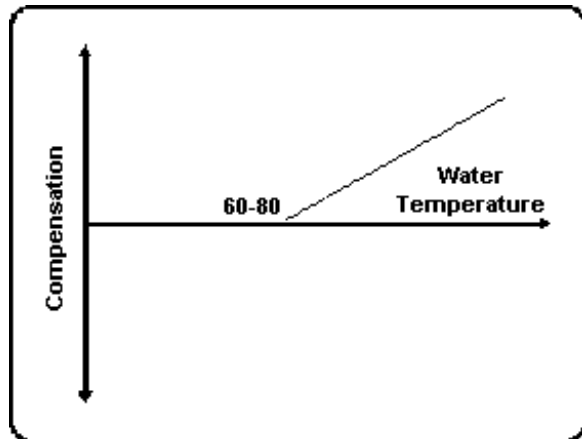
Air Temperature Ignition Compensation

7.4 Engine Temperature Ignition Compensation

Engine Temperature Ignition Compensation is used to increase or decrease the amount of timing delivered when the water temperature is high, increasing as the water temperature increases, there is no compensation when the engine is operating under 70 degrees.

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

For advanced tuning features of the Engine Temperature Ignition Compensation function, refer to the PC Software Manual.

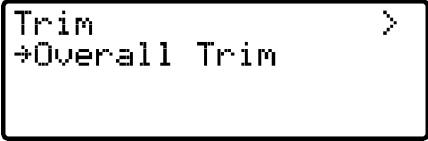
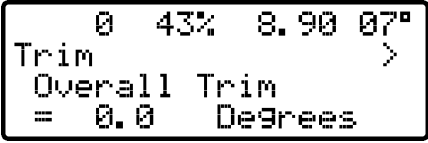


Engine Temperature Ignition Compensation

7.5 Ignition Trims

7.5.1 Overall Trim

This feature adds or subtracts the Overall Trim Degrees from the entire Ignition MAP.

[4] – Ignition – Overall Trim	
	<p>To set Overall Trim, start from the Main Screen. Press [4] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Press [SET] to enter the menu.</p>
<p>[SET] = ↓ [CLR] = Main Screen</p>	
	<p>Use [←] and [→] buttons to increase and decrease the Ignition Overall Trim.</p>
Suggested Value = 0.0°	

This Feature should not be used to align the displayed ignition timing on the handcontroller to what a timing light shows the engine is doing. That is done with the Trigger Degrees BTDC function.

7.5.2 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. This can only be done with the PC software.

Refer to the External Trim Setup in the PC Software Manual.

7.6 Ignition Map

The Ignition Map of the Wolf3D Version 4 is vast, and as such, care must be taken when tuning this system. The Ignition Map has 2048 map points, all the way up to 16,000RPM. When using the Hand Controller you are able to access 1024 map points, with the ECU interpolating between these points to make an extremely smooth and accurate Ignition Map.

It was decided to reduce the number of map points that the Hand Controller could modify was that such a huge number of map points would be very difficult to modify successfully. For finer tuning, use the PC software, and have access to every map point in the Ignition Map.

To enter the Ignition Map press [Ign ➡]

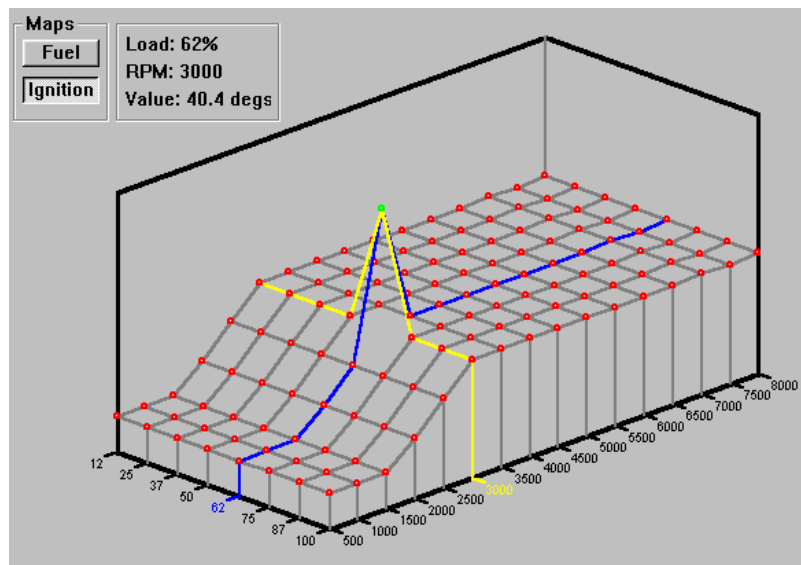
Button	Folder	Parameter
IGN MAP ->		Nearest Inj Map Point
		RPM Band Move
		RPM Band Reset
		Load Band Move

There are four ways of modifying the Ignition Maps in the WOLF3D.

Nearest Ignition Map Point
 RPM Band Move
 RPM Band Reset
 Load Band Move

7.6.1 Nearest Ignition Map Point

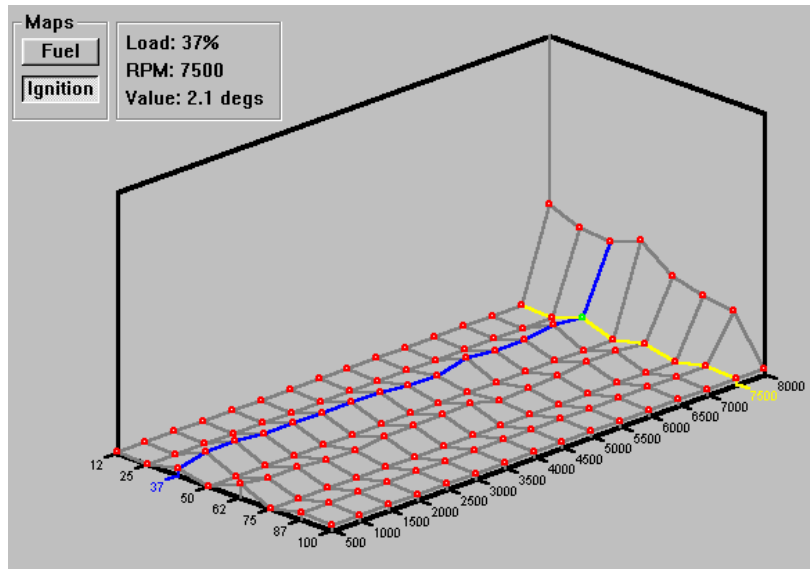
This function allows the user to set **one** Map Point at a time.



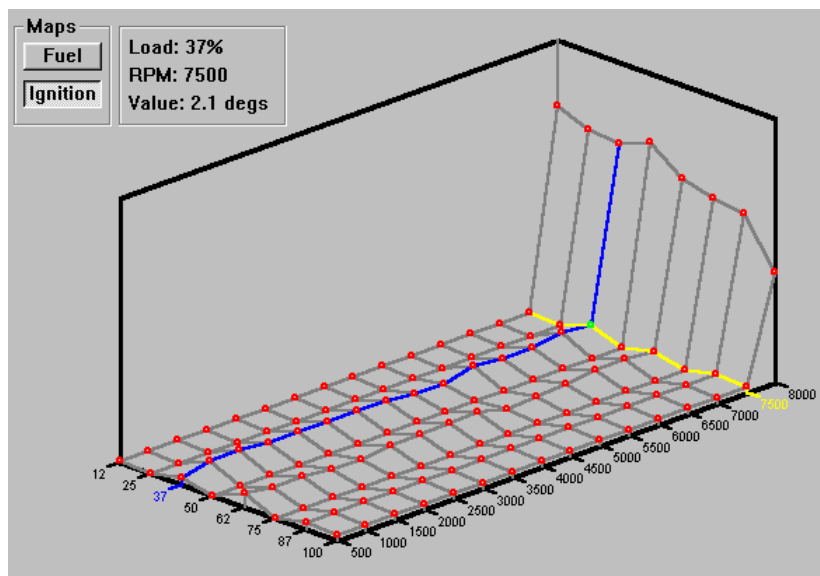
Adjusting the Nearest Map Point

7.6.2 RPM Band Move

RPM Band Move allows the user to raise or lower all eight LOAD Points on the RPM Band, maintaining the Ignition Curve or the entire LOAD range.



Ignition MAP Before RPM Band Move

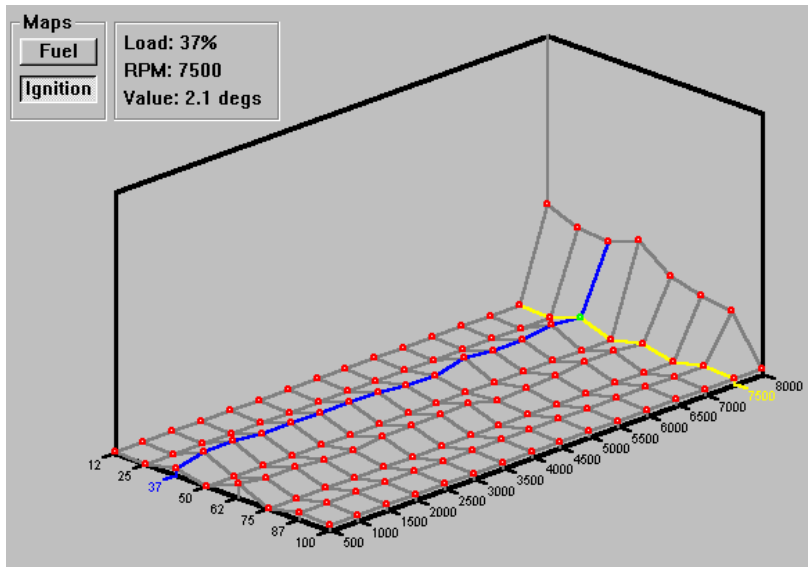


Ignition MAP After RPM Band Move

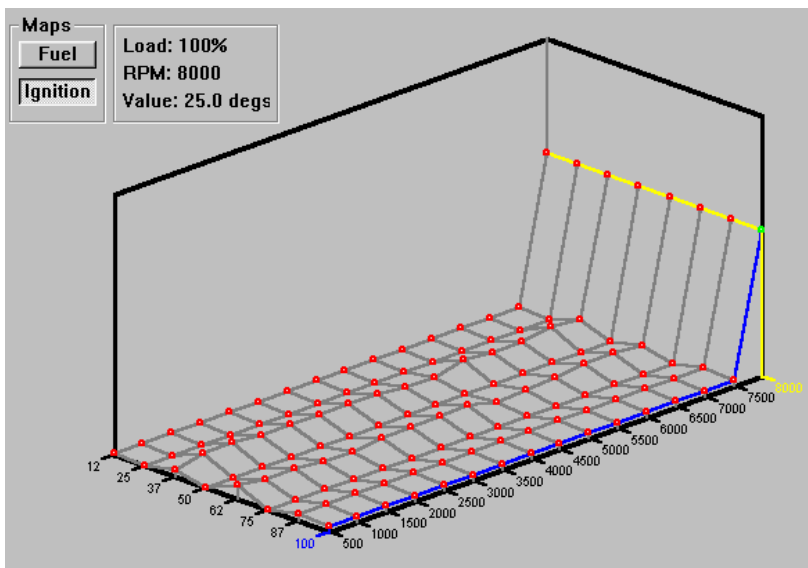
7.6.3 RPM Band Reset

RPM Band Reset flattens the Ignition curve at all LOAD Points on that RPM Band. As with LOAD Band Reset, this function should be used with caution.

As a safety precaution, this function will only work if the Ignition Timing has been changed while in RPM Band Reset mode. If the value has not been changed, before [SET] is pressed, all original Ignition values will remain.



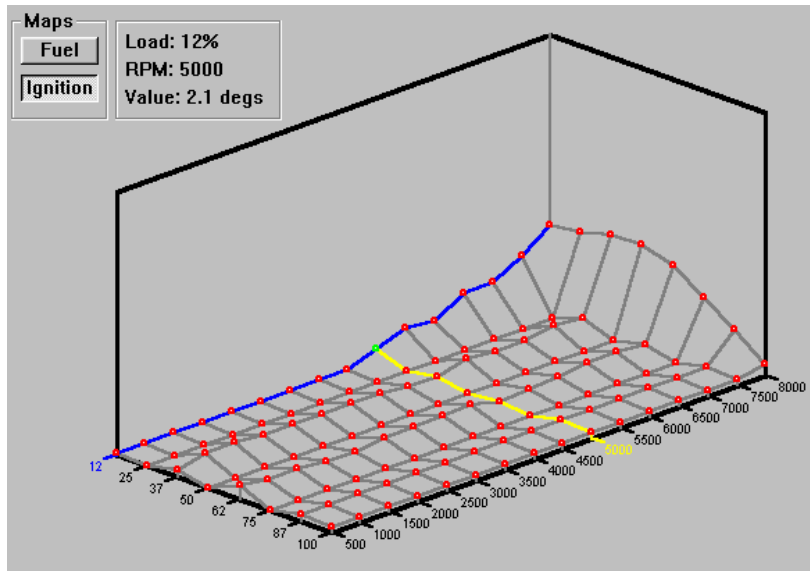
Ignition Map Before RPM Band RESET



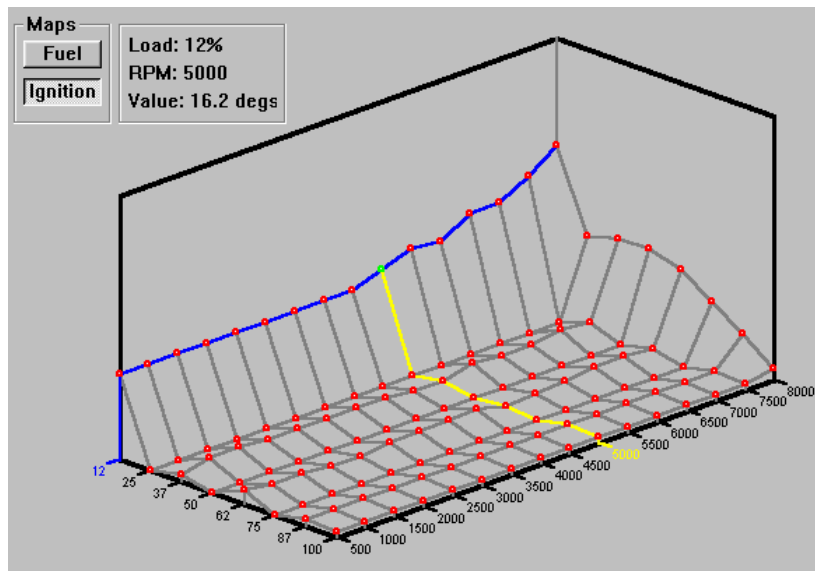
Ignition Map After RPM Band RESET

7.6.4 LOAD Band Move

This function allows the user to raise or lower an entire LOAD Band, maintaining the Ignition curve over the entire RPM range. This function can be used to change the Ignition timing of a particular Load Band at each RPM.



Ignition Map Before LOAD Band MOVE



Ignition Map After LOAD Band MOVE

8 Control (Limits) Functions

Control(Limits) Functions covers everything from Fuel Pumps to Auxiliary Outputs.

Button	Folder	Parameter
2-LIMITS (Control)	Fuel Pump	Activate
		First Activation Time
2-LIMITS (Control)	Thermo Fan	Activate
		On > Engine Temp Off < Engine Temp
2-LIMITS (Control)	Rev Limit	Activate
		Rev Limit RPM
		Redline Indicated
		Yellowline Indicated
2-LIMITS (Control)	Turbo Timer	Activate
		On > Engine Temp
		On > Time Running
		Rev Limit RPM
2-LIMITS (Control)	Idle Lock	Activate
		On < RPM
		Off > RPM
		On < TPos
		Off > TPos
		Delivered Fuel Delivered Ignition
2-LIMITS (Control)	Aux 1 Output	Activate
		Mode
		Polarity
		Off < RPM
		On > RPM
		Off < Load
		On > Load
		Off < TPos
		On > TPos
		Off < Engine Temp
		On > Engine Temp
		Off < Air Temp
		On > Air Temp
		Off < Batt Voltage
On > Batt Voltage		
Off < Oxy Voltage		
On > Oxy Voltage		
2-LIMITS (Control)	Aux 2 Output	As Above
2-LIMITS (Control)	Aux 3 Output	As Above
2-LIMITS (Control)	Aux 4 Output	As Above
2-LIMITS (Control)	Aux 5 Output	As Above
2-LIMITS (Control)	Idle Cntrl Activate	Activate
		Lower Off < RPM
		Lower On > RPM
		Higher On < RPM

		Higher Off > RPM On < Tpos Off > Tpos
2-LIMITS (Control)	Idle Cntrl Settings	Target RPM Valve Initial Center
2-LIMITS (Control)	Idle Cntrl Tracking	Dead RPM Band Normal RPM Band Track Normal Speed Track Fast Speed Track Reset Speed Track Step Size Track On > Run Time Track On > Eng Temp
2-LIMITS (Control)	Idle Cntrl Limits	Idle Clip Activate Clip Minimum Clip Maximum
2-LIMITS (Control)	Idle Cntrl Xtra Open	Fast Idle Activate Fast Idle < Eng Temp Fast Idle Opening Fast Idle Time Fast Idle Decay Speed Engine Start Opening AirCon Open Activate Aircon Opening
2-LIMITS (Control)	Idle Cntrl Steps	Direction to Open Reverse Steps at Reset Step Mode Full Open
2-LIMITS (Control)	Idle Cntrl Config	Output Type PWM Valve Frequency
2-LIMITS (Control)	Closed Loop Activate	Activate Track Frequency On < Load Off > Load On < RPM Off > RPM Off < mS Fuel Off < Engine Temp On > Engine Temp On > Time
2-LIMITS (Control)	Closed Loop Tracking	Track Rate Jump Rate
2-LIMITS (Control)	Closed Loop Limits	Change % Allowed Error Count Allowed Error Handling Mode
2-LIMITS (Control)	Boost Cntrl Activate	Activate Mode and Polarity Overall Trim Valve Frequency

2-LIMITS (Control)	Boost Cntrl Setting	Valve Position
2-LIMITS (Control)	Boost Cntrl BoostCut	Activate Mode Activation Pressure Activation Delay BoostCut Valve Pos
2-LIMITS (Control)	Boost Cntrl Temp Trim	Compensation Rate
2-LIMITS (Control)	Boost Cntrl Air Trim	Compensation Rate
2-LIMITS (Control)	Boost Cntrl Trim	Compensation Rate
2-LIMITS (Control)	Boost Cntrl External Trim	Activate

8.1 Fuel Pump

You can set the amount of time that the Fuel Pump will run when the ECU is powered up. This time is called the First Activation Time.

8.1.1 Fuel Pump Activation

[2] – Control/Limits – Fuel Pump - Activation	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Fuel Pump Activation, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Press [SET] to enter the Fuel Pump menu.</p>
<p>[SET] = ↓ [CLR] = Main Screen</p>	
<pre>Fuel Pump > →Activate FirstActivationTime</pre>	<p>Press [SET] to go to the Fuel Pump Activate adjustment screen.</p> <p>Use [←] and [→] buttons to switch ON or OFF.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 8.98 07° Fuel Pump > Activate =On Off/On</pre>	
Suggested Value = On	

8.1.2 Fuel Pump First Activation Time

[2] – Control/Limits – Fuel Pump – First Activation Time	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Fuel Pump Activation Time, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Press [SET] to enter the Fuel Pump menu.</p>
<p>[SET] = ↓ [CLR] = Main Screen</p>	
<pre>Fuel Pump > →Activate FirstActivationTime</pre>	<p>Scroll down using button [4] to First Activation Time</p>
<p>[4] = ↓ [CLR] = ↑↑</p>	
<pre>Fuel Pump > Activate →FirstActivationTime</pre>	<p>Press [SET] to enter the First Activation Time adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 8.98 07° Fuel Pump > FirstActivationTime = 3 0 to 255</pre>	<p>Use [←] and [→] buttons to change the Fuel Pump First Activation Time.</p>
<p>Suggested Value = 3 Seconds</p>	

8.2 Thermo Fan

8.2.1 Thermo Fan Activation

[2] – Control/Limits –Thermo Fan - Activation	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To Activate the Thermo Fan, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>[4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 2/21 Fuel Pump > →Thermo Fan > Rev Limit ></pre>	<p>Press [SET] to move to the Thermo Fan screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Thermo Fan > →Activate On > Engine Temp Off < Engine Temp</pre>	<p>Press [SET] to go to the Thermo Fan Activate adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00° Thermo Fan > Activate =On Off/On</pre>	<p>Use [←] and [→] buttons to switch ON or OFF.</p>
<p>Suggested Value = On</p>	

8.2.2 Thermo Fan On Above Engine Temp

[2] – Control/Limits –Thermo Fan – On > Engine Temp	
<pre>Control/Limits> 2/21 Fuel Pump > →Thermo Fan > Rev Limit ></pre>	<p>To set the Thermo Fan On Above Temperature, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll Down Once and press [SET] to enter the Thermo Fan menu.</p>
<p>[SET] = ↓ [CLR] = Main Screen</p>	
<pre>Thermo Fan > →Activate On > Engine Temp Off < Engine Temp</pre>	<p>Scroll down to On > Engine Temp using button [4] .</p>
<p>[4] = ↓ [CLR] = ↑↑</p>	
<pre>Thermo Fan > Activate →On > Engine Temp Off < Engine Temp</pre>	<p>Press [SET] to enter the On > Engine Temp Screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00° Thermo Fan > On > Engine Temp = 82 Celsius</pre>	<p>Use [←] and [→] buttons to change the On Above Engine Temperature.</p>
<p>Suggested Value = To Suit Your Application</p>	

The red TEMP LED on the handcontroller will turn on when the temperature is above the ON > ENGINE TEMP.

8.2.3 Thermo Fan Off Below Engine Temp

[2] – Control/Limits –Thermo Fan – Off < Engine Temp	
<pre>Control/Limits> 2/21 Fuel Pump > →Thermo Fan > Rev Limit ></pre>	<p>To set the Thermo Fan Off Below Temperature, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll Down Once and press [SET] to enter the Thermo Fan menu.</p>
<p>[SET] = ↓</p>	
<pre>Thermo Fan > →Activate On > Engine Temp Off < Engine Temp</pre>	<p>Scroll down to Off < Engine Temp using button [4] .</p>
<p>[4] = ↓</p>	
<pre>Thermo Fan > Activate On > Engine Temp →Off < Engine Temp</pre>	<p>Press [SET] to enter the Off < Engine Temp Screen.</p>
<p>[SET] = ↓</p>	
<pre>0 46% 13.35 00° Thermo Fan > Off < Engine Temp = 78 Celsius</pre>	<p>Use [←] and [→] buttons to change the Off Below Engine Temperature.</p>

The red TEMP LED on the handcontroller will turn off when the temperature is below the OFF < ENGINE TEMP.

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

8.3 Rev Limit

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

8.3.1 Rev Limit Activation

[2] – Control/Limits – Rev Limit Activation	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	To set the Rev Limit, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.
<div style="display: flex; justify-content: space-between;"> [4] = ↓ [CLR] = Main Screen </div>	
<pre>Control/Limits> 3/21 Fuel Pump > Thermo Fan > →Rev Limit ></pre>	Scroll down using button [4] to Rev Limit
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑↑ </div>	
<pre>Rev Limit > →Activate Rev Limit RPM</pre>	Press [SET] to enter the Rev Limit screen.
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre>0 45% 12.16 02° Rev Limit > Activate =On Off/On</pre>	Use [←] and [→] buttons to switch ON or OFF.
Suggested Value = On	

8.3.2 Rev Limit RPM

[2] – Control/Limits – Rev Limit RPM	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Rev Limit RPM, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>2 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 3/21 Fuel Pump > Thermo Fan > →Rev Limit ></pre>	<p>Scroll down using button [4] to Rev Limit</p>
<p>[4] = ↓ [CLR] = ↑↑</p>	
<pre>Rev Limit > →Activate Rev Limit RPM</pre>	<p>Scroll Down to Rev Limit RPM.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Rev Limit > Activate →Rev Limit RPM</pre>	<p>Press [SET] to enter the Rev Limit screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre> 0 45% 12.16 02° Rev Limit > Rev Limit RPM = 6000 RPM</pre>	<p>Use [←] and [→] buttons to change the RPM you wish to rev limit at.</p>
<p>Suggested Value = To Suit Application</p>	

8.4 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.



Under normal operating conditions this message is not displayed.

8.4.1 Turbo Timer Activate

[2] – Control/Limits – Turbo Timer - Activate	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Turbo Timer Activation, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Turbo Timer.</p>
<p>3 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 4/21 →Turbo Timer > Idle Lock > Aux 1 Output ></pre>	<p>Press [SET] to enter the Turbo Timer screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Turbo Timer > →Activate > Activation Time > On > Engine Temp</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° Turbo Timer > Activate =Off Off/On</pre>	<p>Use [←] and [→] buttons to switch ON or OFF.</p>
<p>Suggested Value = To Suit Application</p>	

8.4.2 Turbo Timer Activation Time

[2] – Control/Limits – Turbo Timer – Activation Time	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Turbo Timer Activation Time, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Turbo Timer.</p>
<p>3 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 4/21 →Turbo Timer > Idle Lock > Aux 1 Output ></pre>	<p>Press [SET] to enter the Turbo Timer screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Turbo Timer > →Activate > Activation Time On > Engine Temp</pre>	<p>Press [4] to scroll down to Activation Time.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>Turbo Timer > Activate > →Activation Time On > Engine Temp</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° Turbo Timer > Activation Time = 4 Seconds</pre>	<p>Use [←] and [→] buttons to turn the Turbo Timer Activation Time higher or lower.</p>
<p>Suggested Value = 120 Seconds</p>	

8.4.3 Turbo Timer On Above Engine Temp

[2] – Control/Limits – Turbo Timer – On Above Engine Temp	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Turbo Timer On Above Engine Temp, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Turbo Timer.</p>
<p>3 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 4/21 →Turbo Timer > Idle Lock > Aux 1 Output ></pre>	<p>Press [SET] to enter the Turbo Timer screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Turbo Timer > →Activate > Activation Time On > Engine Temp</pre>	<p>Press [4] to scroll down to Activation Time.</p>
<p>2 x [4] = ↓ [CLR] = ↑</p>	
<pre>Turbo Timer > Activate > Activation Time →On > Engine Temp</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° Turbo Timer > On > Engine Temp = 70 Celsius</pre>	<p>Use [←] and [→] buttons to turn the Turbo Timer On Above Engine Temperature higher or lower.</p>
<p>Suggested Value = 70 Celsius</p>	

8.4.4 Turbo Timer On 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.

[2] – Control/Limits – Turbo Timer – On Above Time Running	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Turbo Timer On Above Time Running, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Turbo Timer.</p>
<p>3 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 4/21 →Turbo Timer > Idle Lock > Aux 1 Output ></pre>	<p>Press [SET] to enter the Turbo Timer screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Turbo Timer > →Activate > Activation Time On > Engine Temp</pre>	<p>Press [4] to scroll down to On Above Time Running.</p>
<p>3 x [4] = ↓ [CLR] = ↑</p>	
<pre>Turbo Timer > →On > Time Running Rev Limit RPM</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° Turbo Timer > On > Time Running = 70 Seconds</pre>	<p>Use [←] and [→] buttons to turn the Turbo Timer On Above Time Running higher or lower.</p>
<p>Suggested Value = 30 Seconds</p>	

8.4.5 Turbo Timer Rev Limit RPM

[2] – Control/Limits – Turbo Timer – Rev Limit RPM	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Turbo Timer Rev Limit RPM, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Turbo Timer.</p>
<p>3 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 4/21 →Turbo Timer > Idle Lock > Aux 1 Output ></pre>	<p>Press [SET] to enter the Turbo Timer screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Turbo Timer > →Activate > Activation Time On > Engine Temp</pre>	<p>Press [4] to scroll down to Rev Limit RPM.</p>
<p>4 x [4] = ↓ [CLR] = ↑</p>	
<pre>Turbo Timer > →On > Time Running Rev Limit RPM</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° Turbo Timer > Rev Limit RPM = 2000 RPM</pre>	<p>Use [←] and [→] buttons to turn the Turbo Timer Rev Limit RPM higher or lower.</p>
<p>Suggested Value = 2000 RPM</p>	

8.5 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.

8.5.1 Idle Lock Activate

[2] – Control/Limits – Idle Lock - Activate	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Lock Activate, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Lock.</p>
<p>4 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 5/21 Turbo Timer > →Idle Lock > Aux 1 Output ></pre>	<p>Press [SET] to enter the Idle Lock screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Idle Lock > →Activate > On < RPM > Off > RPM ></pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02⁰ Idle Lock > Activate > =On Off/On</pre>	<p>Use [←] and [→] buttons to switch ON or OFF.</p>
<p>Suggested Value = To Suit Application</p>	

8.5.2 Idle Lock On Below RPM

[2] – Control/Limits – Idle Lock – On Below RPM		
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Lock, On Below RPM, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Lock.</p>	
<p>4 x [4] = ↓ [CLR] = Main Screen</p>		
<pre>Control/Limits> 5/21 Turbo Timer > →Idle Lock > Aux 1 Output ></pre>	<p>Press [SET] to enter the Idle Lock screen.</p>	
<p>[SET] = ↓ [CLR] = ↑↑</p>		
<pre>Idle Lock > →Activate > On < RPM > Off > RPM ></pre>	<p>Press [4] to scroll down to On Below RPM.</p>	
<p>[4] = ↓ [CLR] = ↑</p>		
<pre>Idle Lock > Activate > →On < RPM > Off > RPM ></pre>	<p>Press [SET] to enter the adjustment screen.</p>	
<p>[SET] = ↓ [CLR] = ↑</p>		
<pre>0 45% 12.88 02° Idle Lock > On < RPM > = 1100 RPM ></pre>	<p>Use [←] and [→] buttons to turn the Idle Lock On Below RPM higher or lower.</p>	
<p>Suggested Value = to Suit Application</p>		

8.5.3 Idle Lock Off Above RPM

[2] – Control/Limits – Idle Lock – Off Above RPM	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Lock, Off Above RPM, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Lock.</p>
<p>4 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 5/21 Turbo Timer > →Idle Lock > Aux 1 Output ></pre>	<p>Press [SET] to enter the Idle Lock screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Idle Lock > →Activate > On < RPM > Off > RPM ></pre>	<p>Press [4] to scroll down to Off Above RPM.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>Idle Lock > Activate > On < RPM > →Off > RPM ></pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° Idle Lock > Off > RPM > = 1200 RPM</pre>	<p>Use [←] and [→] buttons to turn the Idle Lock Off Above RPM higher or lower.</p>
<p>Suggested Value = to Suit Application</p>	

8.5.4 Idle Lock On Below TPos

[2] – Control/Limits – Idle Lock – On Below TPos	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Lock, On Below TPos, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Lock.</p>
<p>4 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 5/21 Turbo Timer > →Idle Lock > Aux 1 Output ></pre>	<p>Press [SET] to enter the Idle Lock screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Idle Lock > →Activate > On < RPM > Off > RPM ></pre>	<p>Press [4] to scroll down to On Below TPos.</p>
<p>3 x [4] = ↓ [CLR] = ↑</p>	
<pre>Idle Lock > →On < TPos > Off > TPos > Delivered Fuel</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° Idle Lock > On < TPos > = 1 % TPos</pre>	<p>Use [←] and [→] buttons to turn the Idle Lock On Below TPos higher or lower.</p>
<p>Suggested Value = 1%</p>	

8.5.5 Idle Lock Off Above TPos

[2] – Control/Limits – Idle Lock – Off Above TPos	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Lock, Off Above TPos, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Lock.</p>
<p>4 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 5/21 Turbo Timer > →Idle Lock > Aux 1 Output ></pre>	<p>Press [SET] to enter the Idle Lock screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Idle Lock > →Activate > On < RPM > Off > RPM ></pre>	<p>Press [4] to scroll down to Off Above TPos.</p>
<p>4 x [4] = ↓ [CLR] = ↑</p>	
<pre>Idle Lock > On < TPos > →Off > TPos > Delivered Fuel</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02[□] Idle Lock > Off > TPos > = 2 % TPos</pre>	<p>Use [←] and [→] buttons to turn the Idle Lock Off Above TPos higher or lower.</p>
<p>Suggested Value = 2%</p>	

8.5.6 Idle Lock Delivered Fuel

[2] – Control/Limits – Idle Lock – Delivered Fuel	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Lock, Delivered Fuel, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Lock.</p>
<p>4 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 5/21 Turbo Timer > →Idle Lock > Aux 1 Output ></pre>	<p>Press [SET] to enter the Idle Lock screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Idle Lock > →Activate > On < RPM > Off > RPM ></pre>	<p>Press [4] to scroll down to Delivered Fuel.</p>
<p>5 x [4] = ↓ [CLR] = ↑</p>	
<pre>Idle Lock > On < TPos > Off > TPos > →Delivered Fuel</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02" Idle Lock > Delivered Fuel =02.20 milliSec</pre>	<p>Use [←] and [→] buttons to turn the Idle Lock Delivered Fuel higher or lower.</p>
<p>Suggested Value = To suit Application</p>	

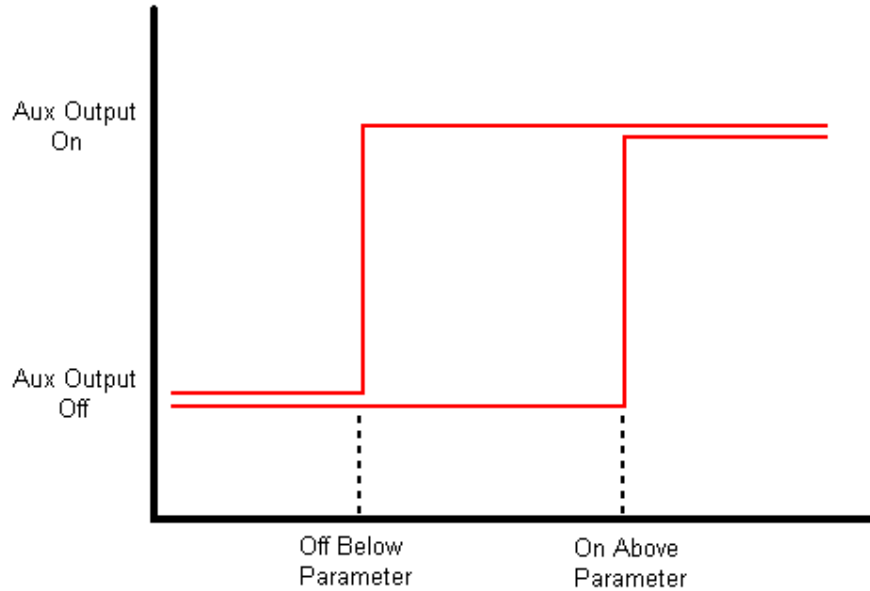
8.5.7 Idle Lock Delivered Ignition

[2] – Control/Limits – Idle Lock – Delivered Ignition	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Lock, Delivered Ignition, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Lock.</p>
<p>4 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 5/21 Turbo Timer > →Idle Lock > Aux 1 Output ></pre>	<p>Press [SET] to enter the Idle Lock screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>Idle Lock > →Activate > On < RPM > Off > RPM ></pre>	<p>Press [4] to scroll down to Delivered Ignition.</p>
<p>6 x [4] = ↓ [CLR] = ↑</p>	
<pre>Idle Lock > →Delivered Ignition</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° Idle Lock > Delivered Ignition = 10.0 Degrees</pre>	<p>Use [←] and [→] buttons to turn the Idle Lock Delivered Ignition higher or lower.</p>
<p>Suggested Value = To suit Application</p>	

8.6 Aux Outputs

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 input.



If you wish to not use any of the inputs, set both the upper and lower values to zero.

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 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.

8.7 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.

8.7.1 Boost Control Activate – Activate

[2] – Control/Limits – Boost Control – Activate – Activate	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Boost Control Activate, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to BoostCtrl Activate.</p>
<p>17 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>18/21 ClosLoop Tracking > ClosLoop Limits > →BoostCtrl Activate></pre>	<p>Press [SET] to enter the Boost Cntrl Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>BoostCtrl Activate> →Activate Mode Overall Trim</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 8.98 07° BoostCtrl Activate> Activate =On Off/On</pre>	<p>Use [←] and [→] buttons to switch ON or OFF.</p>
<p>Suggested Value = To Suit Application</p>	

8.7.2 Boost Control Activate – Mode

[2] – Control/Limits – Boost Control – Activate – Mode	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Boost Control Activate Mode, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to BoostCtrl Activate.</p>
<p>17 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>18/21 ClosLoop Tracking > ClosLoop Limits > →BoostCtrl Activate></pre>	<p>Press [SET] to enter the Boost Cntrl Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>BoostCtrl Activate> →Activate Mode Overall Trim</pre>	<p>Press [4] to scroll down to Mode.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>BoostCtrl Activate> Activate →Mode Overall Trim</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 8.98 07° BoostCtrl Activate> Mode = 0 0 to 255</pre>	<p>Use [←] and [→] buttons to adjust the Boost Control Mode.</p>
<p>Suggested Value = To Suit Application</p>	

8.7.3 Boost Control Activate – Overall Trim

[2] – Control/Limits – Boost Control – Activate – Overall Trim	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Boost Control Activate Overall Trim, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to BoostCtrl Activate.</p>
<p>17 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>18/21 ClosLoop Tracking > ClosLoop Limits > →BoostCtrl Activate></pre>	<p>Press [SET] to enter the Boost Cntrl Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>BoostCtrl Activate> →Activate Mode Overall Trim</pre>	<p>Press [4] to scroll down to Overall Trim.</p>
<p>2 x [4] = ↓ [CLR] = ↑</p>	
<pre>BoostCtrl Activate> Activate Mode →Overall Trim</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 8.98 07° BoostCtrl Activate> Overall Trim = 0 Percent</pre>	<p>Use [←] and [→] buttons to adjust the Boost Control Overall Trim.</p>
<p>Suggested Value = 0</p>	

8.7.4 Boost Control Activate – On Above Load

[2] – Control/Limits – Boost Control – Activate – On Above Load	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Boost Control Activate On Above Load, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to BoostCtrl Activate.</p>
<p>17 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>18/21 ClosLoop Tracking > ClosLoop Limits > →BoostCtrl Activate></pre>	<p>Press [SET] to enter the Boost Cntrl Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>BoostCtrl Activate> →Activate Mode Overall Trim</pre>	<p>Press [4] to scroll down to On Above Load.</p>
<p>3 x [4] = ↓ [CLR] = ↑</p>	
<pre>BoostCtrl Activate> →On > Load Valve Polarity Valve Frequency</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 8.98 07° BoostCtrl Activate> On > Load = 49 % Load</pre>	<p>Use [←] and [→] buttons to adjust the Boost Control On Above Load.</p>
<p>Suggested Value = To Suit Application</p>	

The On Above Load is the point at which the Boost Control Valve stops bleeding off all of the air to the wastegate, and starts to pulse the valve. Below the On Above Load level, the valve is open 100%.

You generally want to set this value 5 – 10% below the highest load that you are after.

If you want the highest load to be 75%, set the On Above Load to 65 – 70%.

Setting this value correctly eliminates wastegate creep, while reducing boost overshoot as the turbo spools up for the first time.

8.7.5 Boost Control Activate – Valve Polarity

[2] – Control/Limits – Boost Control – Activate – Valve Polarity	
<pre>Control/Limits> 1/21 ↳Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Boost Control Activate Valve Polarity, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to BoostCtrl Activate.</p>
<p>17 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>18/21 ClosLoop Tracking > ClosLoop Limits > ↳BoostCtrl Activate></pre>	<p>Press [SET] to enter the Boost Cntrl Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>BoostCtrl Activate> ↳Activate Mode Overall Trim</pre>	<p>Press [4] to scroll down to Valve Polarity.</p>
<p>4 x [4] = ↓ [CLR] = ↑</p>	
<pre>BoostCtrl Activate> On > Load ↳Valve Polarity Valve Frequency</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 8.98 07° BoostCtrl Activate> Valve Polarity =Positiv Neg/Pos</pre>	<p>Use [←] and [→] buttons to adjust the Boost Control Valve Polarity.</p>
<p>Suggested Value = Positive</p>	

If you setup the boost control valve as per the installation instructions in the installation manual, you must set the Valve Polarity to Positive. This does not mean that the Wolf will provide power to the boost control valve, but that, as you set a higher number in the Valve Frequency, the valve will have a higher duty cycle, and hence it will bleed off more wastegate air, creating more boost.

This is the safest way to set up the boost control system. This means that if the valve, or wiring to the valve fails, the boost level will fall back to the pressure of the wastegate.

8.7.6 Boost Control Activate – Valve Frequency

[2] – Control/Limits – Boost Control – Activate – Valve Frequency	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Boost Control Activate Valve Frequency, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to BoostCtrl Activate.</p>
<p>17 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>18/21 ClosLoop Tracking > ClosLoop Limits > →BoostCtrl Activate></pre>	<p>Press [SET] to enter the Boost Cntrl Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>BoostCtrl Activate> →Activate Mode Overall Trim</pre>	<p>Press [4] to scroll down to Valve Frequency.</p>
<p>5 x [4] = ↓ [CLR] = ↑</p>	
<pre>BoostCtrl Activate> On > Load Valve Polarity →Valve Frequency</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 8.98 07° BoostCtrl Activate> Valve Frequency = 95 0 to 255</pre>	<p>Use [←] and [→] buttons to adjust the Boost Control Valve Frequency.</p>
<p>Suggested Value = 95</p>	

The PWM Valve Frequency value is a frequency divider. This means, that as the number increases, the valve pulses more slowly. As the number decreases, the valve pulses more quickly.

We recommend that you set the PWM Valve frequency to 95 for most Boost Control Valves.

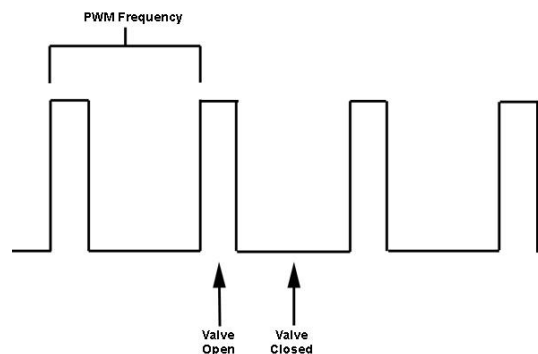
For other valves, we recommend using a similar value. Please contact your Wolf3D supplier for more information regarding your specific valve.

8.7.7 Boost Control Setting – Valve Position

[2] – Control/Limits – Boost Control – Setting – Valve Position	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Boost Control Setting Valve Position, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to BoostCtrl Setting.</p>
<p>18 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>19/21 →BoostCtrl Setting > BoostCtrl BoostCut> BoostCtrl ExtnTrim></pre>	<p>Press [SET] to enter the Boost Cntrl Setting screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>BoostCtrl Setting > →Valve Position</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 8.98 07° BoostCtrl Setting > Valve Position = 1 0 to 255</pre>	<p>Use [←] and [→] buttons to adjust the Boost Control Valve Position.</p> <p>The higher the number, the more the valve will be open.</p>
<p>Suggested Value = To Suit Application</p>	

The Valve Position changes the “valve open” to “valve closed” ratio”. So a 0 will mean no air is bled off and a 255 will mean all the air is bled off. The table is based on RPM. If you use the PC software you can adjust specific RPM points to limit boost at lower RPM etc.

Using the handcontroller adjusts the table already in the Wolf up or down.



8.8 Boost Cut

Boost Cut operates to limit the maximum boost that can be reached by the engine. When the engine reaches the preset boost cut level there are three different modes of boost cut. Mode 0 is fuel cut. Mode 1 is fuel cut and valve position change and Mode 2 is valve position change.

8.8.1 Boost Cut – Activate

[2] – Control/Limits – Boost Control – Boost Cut – Activate	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Boost Control Boost Cut Activate, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to BoostCtrl Boost Cut.</p>
<p>19 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>20/21 BoostCtrl Setting > →BoostCtrl BoostCut> BoostCtrl ExtnTrim></pre>	<p>Press [SET] to enter the Boost Cntrl Boost Cut screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>BoostCtrl BoostCut> →Activate Mode Activation Pressure</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 8.98 07° BoostCtrl BoostCut> Activate =Off Off/Dn</pre>	<p>Use [◀] and [▶] buttons to turn the Boost Cut On or Off.</p>
<p>Suggested Value = To Suit Application</p>	

8.8.2 Boost Cut – Mode

Mode 0 Fuel Cut : Fuel is cut after the activation delay

Mode 1 Fuel Cut & Valve Position Change : Fuel is cut and the Boost Control Solenoid Valve Position Table Value goes to the preset value.

Mode 2 Valve Position Change : The Boost Control Solenoid Valve Position Table Value goes to the preset value.

[2] – Control/Limits – Boost Control – Boost Cut – Mode	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Boost Control Boost Cut Mode, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to BoostCtrl Boost Cut.</p>
<p>19 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>20/21 BoostCtrl Setting > →BoostCtrl BoostCut> BoostCtrl ExtnTrim></pre>	<p>Press [SET] to enter the Boost Cntrl Boost Cut screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>BoostCtrl BoostCut> Activate →Mode Activation Pressure</pre>	<p>Press [4] to scroll down to Mode and Press [SET] to enter menu.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00" BoostCtrl BoostCut > Mode = 0 0 to 255</pre>	<p>Use [←] and [→] buttons to adjust the Boost Cut Mode.</p>
<p>Suggested Value = To Suit Application</p>	

8.8.3 Boost Cut – Activation Pressure

[2] – Control/Limits – Boost Control – Boost Cut – Activation Pressure	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Boost Control Boost Cut Activation Pressure, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to BoostCtrl Boost Cut.</p>
<p>19 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>20/21 BoostCtrl Setting > →BoostCtrl BoostCut> BoostCtrl ExtnTrim></pre>	<p>Press [SET] to enter the Boost Cntrl Boost Cut screen.</p>
<p>[SET] = ↓ [CLR] = ⬆⬆</p>	
<pre>BoostCtrl BoostCut> Activate Mode →Activation Pressure</pre>	<p>Press [4] to scroll down to Activation Pressure. Press [SET] to enter the adjustment screen.</p>
<p>[4] = ↓ [CLR] = ⬆</p>	
<pre>0 45% 8.98 07° BoostCtrl BoostCut> Activation Pressure = 10.3 Psi</pre>	<p>Use [◀] and [▶] buttons to adjust the Boost Cut Activation Pressure.</p>
<p>Suggested Value = To Suit Application</p>	

8.8.4 Boost Cut – Activation Delay

[2] – Control/Limits – Boost Control – Boost Cut – Activation Delay	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Boost Control Boost Cut Activation Delay, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to BoostCtrl Boost Cut.</p>
<p>19 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>20/21 BoostCtrl Setting > →BoostCtrl BoostCut> BoostCtrl ExtnTrim></pre>	<p>Press [SET] to enter the Boost Cntrl Boost Cut screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>BoostCtrl BoostCut> →Activate Mode Activation Pressure</pre>	<p>Press [4] to scroll down to Activation Delay.</p>
<p>2 x [4] = ↓ [CLR] = ↑</p>	
<pre>BoostCtrl BoostCut> →Activation Delay BoostCut Valve Pos</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 8.98 07" BoostCtrl BoostCut> Activation Delay = 0 Seconds</pre>	<p>Use [←] and [→] buttons to adjust the Boost Cut Activation Delay.</p>
<p>Suggested Value = 0</p>	

8.8.5 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.

[2] – Control/Limits – Boost Control – Boost Cut Valve Pos	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Boost Control Boost Cut Valve Pos, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to BoostCtrl Boost Cut.</p>
<p>19 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>20/21 BoostCtrl Setting > →BoostCtrl BoostCut> BoostCtrl ExtnTrim></pre>	<p>Press [SET] to enter the Boost Cntrl Boost Cut screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>BoostCtrl BoostCut> →Activate Mode Activation Pressure</pre>	<p>Press [4] to scroll down to BoostCut Valve Pos.</p>
<p>2 x [4] = ↓ [CLR] = ↑</p>	
<pre>BoostCtrl BoostCut> Activation Delay →BoostCut Valve Pos</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00" BoostCtrl BoostCut > BoostCut Valve Pos = 0 0 to 255</pre>	<p>Use [←] and [→] buttons to adjust the Boost Cut Valve Position.</p>
<p>Suggested Value = To Suit Application</p>	

8.9 Boost Control 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. This can only be done with the PC software.

Refer to the External Trim Setup in the PC Software Manual.

9 Idle Speed Control

The Wolf3D Version 4 can control most solenoid based Idle Speed systems. To control the Idle Speed, the Wolf3D uses a Pulse Width Modulated (PWM) Output. Control is achieved by changing the duty cycle of the signal going to the solenoid. Higher duty cycles mean more air bypass, and higher RPM.

9.1 Idle Speed Control setup procedure

The engine must have a stable idle to begin with. If it does not, find out why and rectify the problem. This means, that at correct operating temperature, the engine must not hunt or miss-fire. Both of these conditions indicate other problems that may be caused by dirty injectors, vacuum leak, old or oily sparkplugs, or any other fuel delivery or ignition system problem.

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.

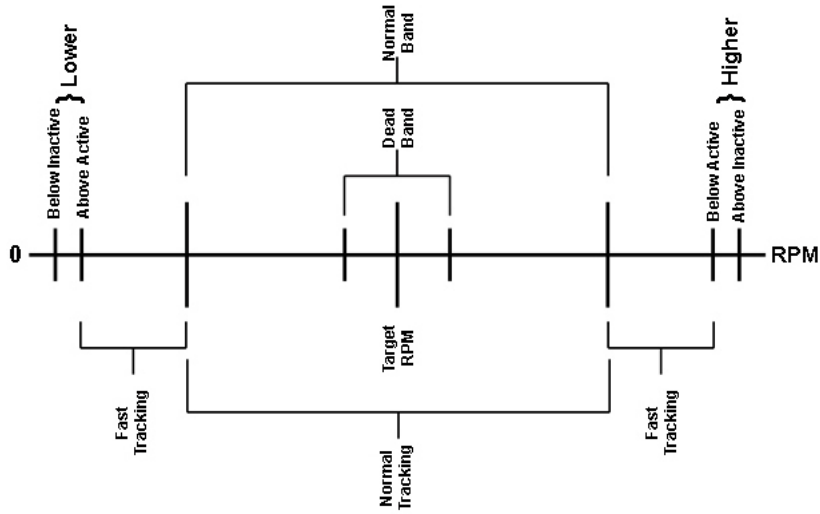
Now let the engine cool overnight. When you start the car in the morning, use the "Initial Center Engine Temp" values to keep the idle speed where you want it as the engine warms up. You will probably want to have the engine idle at a higher speed when the coolant temperature is lower, so put larger 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.

Bring the engine up to operating temperature (70°C or higher)

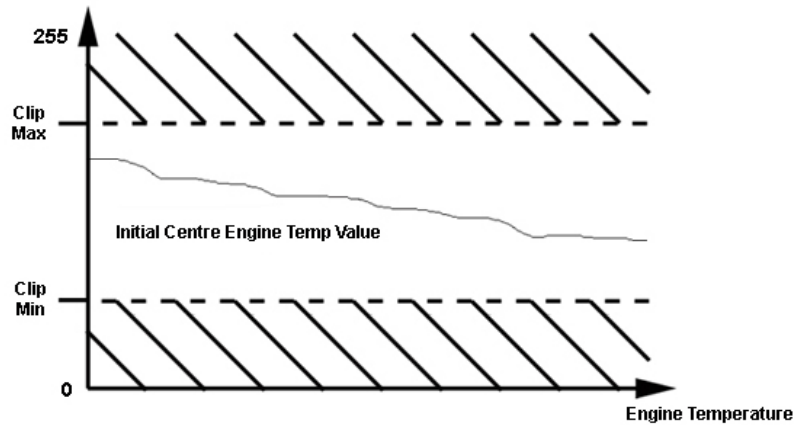
Most engines water temp is maintained at approximately 82 Degrees Celsius. The engine must be idling at or near its normal stable idle temperature before continuing to the next step.

9.2 Idle Control Diagrams

The following diagrams give an overview of what each of the idle control settings affects.

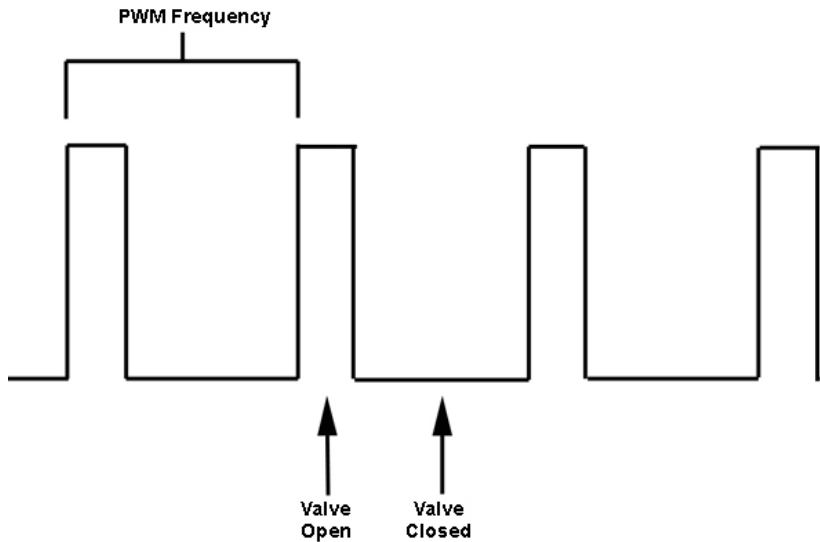


Target RPM , Tracking Areas, Bands, Higher RPM and Lower RPM.



Idle control will not track outside clip MAX & MIN value

Idle Clip Max & Min



Initial Centre Engine Temp changes the "Valve Open" to "Valve Closed" Ratio

PWM Frequency and Initial Centre Engine Temp

9.3 Suggested Idle Control Values

The following is some suggested values to get the idle control working. You will have to trim some values to suit your specific setup.

9.3.1 Suggested Idle Control Values

9.3.1.1.1 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

9.3.1.1.2 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

9.3.1.1.3 Limits Folder

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

9.3.1.1.4 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	

9.3.1.1.5 Configuration Folder

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

9.3.2 Idle Control Activate - Activate

[2] – Control/Limits – Idle Control – Activate – Activate	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control Activate, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to IdleCntrl Activate.</p>
<p>7 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 8/21 Aux 2 Output > →IdleCntrl Activate> IdleCntrl Setting ></pre>	<p>Press [SET] to enter the Idle Cntrl Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Activate> →Activate Lower Off < RPM Lower On > RPM</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre> 0 45% 12.88 02° IdleCntrl Activate> Activate =On Off/On</pre>	<p>Use [←] and [→] buttons to switch ON or OFF.</p>
<p>Suggested Value = To Suit Application</p>	

9.3.3 Idle Control Activate – Lower Off Below RPM

[2] – Control/Limits – Idle Control – Activate – Lower Off Below RPM	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Lower Off Below RPM, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Activate.</p>
<p>7 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 8/21 Aux 2 Output > →IdleCntrl Activate> IdleCntrl Setting ></pre>	<p>Press [SET] to enter the Idle Control Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Activate> →Activate Lower Off < RPM Lower On > RPM</pre>	<p>Press [4] to scroll down to Lower Off Below RPM.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntrl Activate> Activate →Lower Off < RPM Lower On > RPM</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl Activate> Lower Off < RPM = 100 RPM</pre>	<p>Use [◀] and [▶] buttons to turn the Idle Control Lower Off Below RPM higher or lower.</p>
<p>Suggested Value = 100</p>	

9.3.4 Idle Control Activate – Lower On Above RPM

[2] – Control/Limits – Idle Control – Activate – Lower On Above RPM		
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Lower On Above RPM, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Activate.</p>	
<p>7 x [4] = ↓ [CLR] = Main Screen</p>		
<pre>Control/Limits> 8/21 Aux 2 Output > →IdleCntrl Activate> IdleCntrl Setting ></pre>	<p>Press [SET] to enter the Idle Control Activate screen.</p>	
<p>[SET] = ↓ [CLR] = ↑↑</p>		
<pre>IdleCntrl Activate> →Activate Lower Off < RPM Lower On > RPM</pre>	<p>Press [4] to scroll down to Lower On Above RPM.</p>	
<p>2 x [4] = ↓ [CLR] = ↑</p>		
<pre>IdleCntrl Activate> Activate Lower Off < RPM →Lower On > RPM</pre>	<p>Press [SET] to enter the adjustment screen.</p>	
<p>[SET] = ↓ [CLR] = ↑</p>		
<pre> 0 45% 12.88 02° IdleCntrl Activate> Lower On > RPM = 500 RPM</pre>	<p>Use [←] and [→] buttons to turn the Idle Control Lower On Above RPM higher or lower.</p>	
<p>Suggested Value = 400</p>		

9.3.5 Idle Control Activate – Higher On Above RPM

[2] – Control/Limits – Idle Control – Activate – Higher On Below RPM		
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Higher On Below RPM, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Activate.</p>	
<p>7 x [4] = ↓ [CLR] = Main Screen</p>		
<pre>Control/Limits> 8/21 Aux 2 Output > →IdleCntrl Activate> IdleCntrl Setting ></pre>	<p>Press [SET] to enter the Idle Control Activate screen.</p>	
<p>[SET] = ↓ [CLR] = ↑↑</p>		
<pre>IdleCntrl Activate> →Activate Lower Off < RPM Lower On > RPM</pre>	<p>Press [4] to scroll down to Higher On Below RPM.</p>	
<p>3 x [4] = ↓ [CLR] = ↑</p>		
<pre>IdleCntrl Activate> →Higher On < RPM Higher Off > RPM On < TPos</pre>	<p>Press [SET] to enter the adjustment screen.</p>	
<p>[SET] = ↓ [CLR] = ↑</p>		
<pre>0 45% 12.88 02° IdleCntrl Activate> Higher On < RPM = 3000 RPM</pre>	<p>Use [←] and [→] buttons to turn the Idle Control Higher On Below RPM higher or lower.</p>	
<p>Suggested Value = 400</p>		

9.3.6 Idle Control Activate – Higher Off Above RPM

[2] – Control/Limits – Idle Control – Activate – Higher Off Above RPM	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Higher On Below RPM, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Activate.</p>
<p>7 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 8/21 Aux 2 Output > →IdleCntrl Activate> IdleCntrl Setting ></pre>	<p>Press [SET] to enter the Idle Control Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Activate> →Activate Lower Off < RPM Lower On > RPM</pre>	<p>Press [4] to scroll down to Higher On Below RPM.</p>
<p>4 x [4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntrl Activate> →Higher On < RPM Higher Off > RPM On < TPos</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl Activate> Higher On < RPM = 3000 RPM</pre>	<p>Use [←] and [→] buttons to turn the Idle Control Higher On Below RPM higher or lower.</p>
<p>Suggested Value = 2200</p>	

9.3.7 Idle Control Activate – On Below TPos

[2] – Control/Limits – Idle Control – Activate – On Below TPos	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, On Below TPos, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Activate.</p>
<p>7 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 8/21 Aux 2 Output > →IdleCntrl Activate> IdleCntrl Setting ></pre>	<p>Press [SET] to enter the Idle Control Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Activate> →Activate Lower Off < RPM Lower On > RPM</pre>	<p>Press [4] to scroll down to On Below TPos.</p>
<p>5 x [4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntrl Activate> Higher On < RPM Higher Off > RPM →On < TPos</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl Activate> On < TPos = 2 % TPos</pre>	<p>Use [←] and [→] buttons to turn the Idle Control On Below TPos higher or lower.</p>
<p>Suggested Value = 1%</p>	

9.3.8 Idle Control Activate – Off Above TPos

[2] – Control/Limits – Idle Control – Activate – Off Above TPos	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, On Below TPos, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Activate.</p>
<p>7 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 8/21 Aux 2 Output > →IdleCntrl Activate> IdleCntrl Setting ></pre>	<p>Press [SET] to enter the Idle Control Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Activate> →Activate Lower Off < RPM Lower On > RPM</pre>	<p>Press [4] to scroll down to On Below TPos.</p>
<p>5 x [4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntrl Activate> Higher On < RPM Higher Off > RPM →On < TPos</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl Activate> On < TPos = 2 % TPos</pre>	<p>Use [←] and [→] buttons to turn the Idle Control On Below TPos higher or lower.</p>
<p>Suggested Value = 1%</p>	

9.3.9 Idle Control Setting – Target RPM

[2] – Control/Limits – Idle Control – Settings – Target RPM		
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Settings – Target RPM, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Settings.</p>	
<p>8 x [4] = ↓ [CLR] = Main Screen</p>		
<pre>Control/Limits> 9/21 Aux 2 Output > IdleCntrl Activate> →IdleCntrl Setting ></pre>	<p>Press [SET] to enter the Idle Control Setting screen.</p>	
<p>[SET] = ↓ [CLR] = ↑↑</p>		
<pre>IdleCntrl Setting > →Target RPM Valve InitialCentre</pre>	<p>Press [SET] to enter the adjustment screen.</p>	
<p>[SET] = ↓ [CLR] = ↑</p>		
<pre>0 45% 12.88 02° IdleCntrl Setting > Target RPM = 1000 RPM</pre>	<p>Use [←] and [→] buttons to turn the Idle Control Target RPM higher or lower.</p>	
<p>Suggested Value = To Suit Application</p>		

9.3.10 Idle Control Setting – Valve Initial Centre

[2] – Control/Limits – Idle Control – Settings – Valve Initial Centre	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Settings – Valve Initial Centre, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Settings.</p>
<p>8 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 9/21 Aux 2 Output > IdleCntrl Activate> →IdleCntrl Setting ></pre>	<p>Press [SET] to enter the Idle Control Setting screen.</p>
<p>[SET] = ↓ [CLR] = ⬆⬆</p>	
<pre>IdleCntrl Setting > →Target RPM Valve InitialCentre</pre>	<p>Scroll down using button [4] to Valve Initial Centre.</p>
<p>[4] = ↓ [CLR] = ⬆</p>	
<pre>IdleCntrl Setting > Target RPM →Valve InitialCentre</pre>	<p>Press [SET] to enter the adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ⬆</p>	
<pre> 0 45% 12.88 02° IdleCntrl Setting > Target RPM = 1000 RPM</pre>	<p>Use [←] and [→] buttons to turn the Idle Control Valve Initial Centre higher or lower.</p>
<p>Suggested Value = To Suit Application</p>	

By increasing this value, the duty cycle of the solenoid is increased, and allows more air to flow through the idle bypass valve. Once the idle is at the RPM you want, press the set button and continue on to the next step.

9.3.11 Idle Control Tracking – Dead RPM Band

[2] – Control/Limits – Idle Control – Tracking – Dead RPM Band		
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Tracking – Dead RPM Band, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Tracking.</p>	
<p>9 x [4] = ↓ [CLR] = Main Screen</p>		
<pre>Control/Limits>10/21 →IdleCntrl Tracking> IdleCntrl Limits > IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Idle Control Tracking screen.</p>	
<p>[SET] = ↓ [CLR] = ↑↑</p>		
<pre>IdleCntrl Tracking> →Dead RPM Band Normal RPM Band Track Normal Speed</pre>	<p>Press [SET] to enter the Dead RPM Band screen.</p>	
<p>[SET] = ↓ [CLR] = ↑</p>		
<pre>0 45% 12.88 02° IdleCntrl Tracking> Dead RPM Band = 40 RPM</pre>	<p>Use [←] and [→] buttons to turn the Idle Control Dead RPM Band higher or lower.</p>	
<p>Suggested Value = 40 RPM</p>		

9.3.12 Idle Control Tracking – Normal RPM Band

[2] – Control/Limits – Idle Control – Tracking – Normal RPM Band	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Tracking – Normal RPM Band, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Tracking.</p>
<p>9 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>10/21 →IdleCntrl Tracking> IdleCntrl Limits > IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Idle Control Tracking screen.</p>
<p>[SET] = ↓ [CLR] = ⬆⬆</p>	
<pre>IdleCntrl Tracking> →Dead RPM Band Normal RPM Band Track Normal Speed</pre>	<p>Scroll down using button [4] to Normal RPM Band.</p>
<p>[4] = ↓ [CLR] = ⬆</p>	
<pre>IdleCntrl Tracking> Dead RPM Band →Normal RPM Band Track Normal Speed</pre>	<p>Press [SET] to enter the Normal RPM Band screen.</p>
<p>[SET] = ↓ [CLR] = ⬆</p>	
<pre>0 45% 12.88 02° IdleCntrl Tracking> Normal RPM Band = 100 RPM</pre>	<p>Use [←] and [→] buttons to turn the Idle Control Normal RPM Band higher or lower.</p>
<p>Suggested Value = 100 RPM</p>	

9.3.13 Idle Control Tracking – Tracking Normal Speed

[2] – Control/Limits – Idle Control – Tracking – Track Normal Speed	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Tracking – Track Normal Speed, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>9 x [4] = ↓ [CLR] = Main Screen</p>	<p>Scroll down using button [4] to Idle Control Tracking.</p>
<pre>Control/Limits>10/21 →IdleCntrl Tracking> IdleCntrl Limits > IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Idle Control Tracking screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Tracking> →Dead RPM Band Normal RPM Band Track Normal Speed</pre>	<p>Scroll down using button [4] to Track Normal Speed.</p>
<p>2 x [4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntrl Tracking> Dead RPM Band Normal RPM Band →Track Normal Speed</pre>	<p>Press [SET] to enter the Track Normal Speed screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl Tracking> Track Normal Speed = 15 0 to 255</pre>	<p>Use [←] and [→] buttons to turn the Idle Control Track Normal Speed higher or lower.</p> <p>The lower the number, the faster the tracking speed.</p>
<p>Suggested Value = 20</p>	

9.3.14 Idle Control Tracking – Tracking Fast Speed

[2] – Control/Limits – Idle Control – Tracking – Track Fast Speed	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Tracking – Track Fast Speed, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Tracking.</p>
<p>9 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>10/21 →IdleCntrl Tracking> IdleCntrl Limits > IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Idle Control Tracking screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Tracking> →Dead RPM Band Normal RPM Band Track Normal Speed</pre>	<p>Scroll down using button [4] to Track Fast Speed.</p>
<p>3 x [4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntrl Tracking> →Track Fast Speed Track Reset Speed Track Step Size</pre>	<p>Press [SET] to enter the Track Fast Speed screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl Tracking> Track Fast Speed = 6 0 to 255</pre>	<p>Use [←] and [→] buttons to turn the Idle Control Track Fast Speed higher or lower.</p> <p>The lower the number, the faster the tracking speed.</p>
<p>Suggested Value = 9</p>	

9.3.15 Idle Control Tracking – Tracking Reset Speed

[2] – Control/Limits – Idle Control – Tracking – Track Reset Speed	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Tracking – Track Reset Speed, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Tracking.</p>
<p>9 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>10/21 →IdleCntrl Tracking> IdleCntrl Limits > IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Idle Control Tracking screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Tracking> →Dead RPM Band Normal RPM Band Track Normal Speed</pre>	<p>Scroll down using button [4] to Track Reset Speed.</p>
<p>4 x [4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntrl Tracking> Track Fast Speed →Track Reset Speed Track Step Size</pre>	<p>Press [SET] to enter the Track Fast Reset screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl Tracking> Track Reset Speed = 0 0 to 255</pre>	<p>Use [←] and [→] buttons to turn the Idle Control Track Reset Speed higher or lower.</p> <p>The lower the number, the faster the tracking speed.</p>
<p>Suggested Value = 0</p>	

9.3.16 Idle Control Tracking – Tracking Step Size

[2] – Control/Limits – Idle Control – Tracking – Track Step Size		
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Tracking – Track Step Size, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p>	
<p>9 x [4] = ↓</p>	<p>[CLR] = Main Screen</p>	<p>Scroll down using button [4] to Idle Control Tracking.</p>
<pre>Control/Limits>10/21 →IdleCntrl Tracking> IdleCntrl Limits > IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Idle Control Tracking screen.</p>	
<p>[SET] = ↓</p>	<p>[CLR] = ↑↑</p>	
<pre>IdleCntrl Tracking> →Dead RPM Band Normal RPM Band Track Normal Speed</pre>	<p>Scroll down using button [4] to Track Step Size.</p>	
<p>4 x [4] = ↓</p>	<p>[CLR] = ↑</p>	
<pre>IdleCntrl Tracking> Track Fast Speed Track Reset Speed →Track Step Size</pre>	<p>Press [SET] to enter the Track Step Size screen.</p>	
<p>[SET] = ↓</p>	<p>[CLR] = ↑</p>	
<pre> 0 45% 12.88 02° IdleCntrl Tracking> Track Step Size = 1 0 to 255</pre>	<p>Use [←] and [→] buttons to turn the Idle Control Track Step Size higher or lower.</p> <p>The lower the number, the smaller the Step Size.</p>	
<p>Suggested Value = 1</p>		

9.3.17 Idle Control Limits – Idle Clip Activate

[2] – Control/Limits – Idle Control – Limits – Idle Clip Activate	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Limits – Idle Clip Activate, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Limits.</p>
<p>10 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>11/21 IdleCntrl Tracking> →IdleCntrl Limits > IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Idle Control Limits screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Limits > →Idle Clip Activate Clip Minimum Clip Maximum</pre>	<p>Press [SET] to enter the Idle Clip Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl Limits > Idle Clip Activate =On Off/On</pre>	<p>Use [←] and [→] buttons to Activate the Idle Clip</p>
<p>Suggested Value = On</p>	

9.3.18 Idle Control Tracking – Clip Minimum

Clip Minimum is the lowest value that the Valve Initial Centre value will track down to. If the Clip is not activated this should be set to 1.

[2] – Control/Limits – Idle Control – Limits – Idle Clip Minimum	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Limits – Idle Clip Minimum, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Limits.</p>
<p>10 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>11/21 IdleCntrl Tracking> →IdleCntrl Limits > IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Idle Control Limits screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Limits > →Idle Clip Activate Clip Minimum Clip Maximum</pre>	<p>Scroll down using button [4] to Clip Minimum.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntrl Limits > Idle Clip Activate →Clip Minimum Clip Maximum</pre>	<p>Press [SET] to enter the Idle Clip Minimum screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl Limits > Clip Minimum = 98 0 to 255</pre>	<p>Use [←] and [→] buttons to adjust the Idle Clip Minimum higher or lower.</p>
<p>Suggested Value = 1</p>	

9.3.19 Idle Control Tracking – Clip Maximum

Clip Maximum is the highest value that the Valve Initial Centre value will track up to. If the Clip is not activated this should be set to 255.

[2] – Control/Limits – Idle Control – Limits – Idle Clip Maximum	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Limits – Idle Clip Maximum, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Limits.</p>
<p>10 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>11/21 IdleCntrl Tracking> →IdleCntrl Limits > IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Idle Control Limits screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Limits > →Idle Clip Activate Clip Minimum Clip Maximum</pre>	<p>Scroll down using button [4] to Clip Maximum.</p>
<p>2 x [4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntrl Limits > Idle Clip Activate Clip Minimum →Clip Maximum</pre>	<p>Press [SET] to enter the Idle Clip Maximum screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl Limits > Clip Maximum = 255 0 to 255</pre>	<p>Use [←] and [→] buttons to adjust the Idle Clip Maximum higher or lower.</p>
<p>Suggested Value = 255</p>	

9.3.20 Idle Control Extra Opening – Fast Idle - Activate

[2] – Control/Limits – Idle Control – Extra Open – Fast Idle - Activate	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Extra Open – Activate, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Extra Open.</p>
<p>11 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>12/21 IdleCntrl Tracking> IdleCntrl Limits > →IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Extra Opening screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl XtraOpen> →FastIdle Activate FastIdle < EngTemp FastIdle Opening</pre>	<p>Press [SET] to enter the Fast Idle Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl XtraOpen> FastIdle Activate =On Off/On</pre>	<p>Use [←] and [→] buttons to turn the Fast Idle Activate On and Off.</p>
<p>Suggested Value = To Suit Application</p>	

If you want to use the Fast Idle feature, you must have the Fast Idle Activation turned On.

Fast Idle can help in starting and in the first few seconds of engine run time.

9.3.21 Idle Control Extra Opening – Fast Idle Below Engine Temperature

[2] – Control/Limits – Idle Control – Extra Open – Fast Idle – Below Engine Temp	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Extra Open – Below Engine Temp, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Extra Open.</p>
<p>11 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>12/21 IdleCntrl Tracking> IdleCntrl Limits > →IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Fast Idle Extra Open screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl XtraOpen> →FastIdle Activate FastIdle < EngTemp FastIdle Opening</pre>	<p>Press [SET] to enter the Idle Clip Maximum screen.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntrl XtraOpen> FastIdle Activate →FastIdle < EngTemp FastIdle Opening</pre>	<p>Scroll down using button [4] to Fast Idle Below Engine Temp.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl XtraOpen> FastIdle < EngTemp = 50 Celsius</pre>	<p>Use [←] and [→] buttons to turn the Fast Idle Activate On and Off.</p>
<p>Suggested Value = To Suit Application</p>	

9.3.22 Idle Control Extra Opening – Opening

[2] – Control/Limits – Idle Control – Extra Open – Fast Idle – Opening		
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Extra Open – Opening, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Extra Open.</p>	
<p>11 x [4] = ↓ [CLR] = Main Screen</p>		
<pre>Control/Limits>12/21 IdleCntrl Tracking> IdleCntrl Limits > →IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Idle Extra Open screen.</p>	
<p>[SET] = ↓ [CLR] = ↑↑</p>		
<pre>IdleCntrl XtraOpen> →FastIdle Activate FastIdle < EngTemp FastIdle Opening</pre>	<p>Scroll down using button [4] to Fast Idle Opening.</p>	
<p>2 x [4] = ↓ [CLR] = ↑</p>		
<pre>IdleCntrl XtraOpen> FastIdle Activate FastIdle < EngTemp →FastIdle Opening</pre>	<p>Press [SET] to enter the Idle Extra Open adjustment screen.</p>	
<p>[SET] = ↓ [CLR] = ↑</p>		
<pre>0 45% 12.88 02° IdleCntrl XtraOpen> EngineStart Opening = 213 0 to 255</pre>	<p>Use [←] and [→] buttons to turn the Fast Idle Opening Higher or Lower.</p>	
<p>Suggested Value = To Suit Application</p>		

9.3.23 Idle Control Extra Opening – Time

[2] – Control/Limits – Idle Control – Extra Open – Fast Idle – Time	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Extra Open – Time, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Extra Open.</p>
<p>11 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>12/21 IdleCntrl Tracking> IdleCntrl Limits > →IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Idle Extra Open screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl XtraOpen> →FastIdle Activate FastIdle < EngTemp FastIdle Opening</pre>	<p>Scroll down using button [4] to Fast Idle Time.</p>
<p>3 x [4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntrl XtraOpen> →FastIdle Time FastIdle DecaySpeed EngineStart Opening</pre>	<p>Press [SET] to enter the Fast Idle Time adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl XtraOpen> FastIdle Time = 6 Seconds</pre>	<p>Use [←] and [→] buttons to turn the Fast Idle Time Higher or Lower.</p>
<p>Suggested Value = 5 – 20 Seconds</p>	

9.3.24 Idle Control Extra Opening – Decay Speed

[2] – Control/Limits – Idle Control – Extra Open – Fast Idle – Decay Speed		
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Extra Open – Decay Speed, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Extra Open.</p>	
<p>11 x [4] = ↓ [CLR] = Main Screen</p>		
<pre>Control/Limits>12/21 IdleCntrl Tracking> IdleCntrl Limits > →IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Idle Extra Open screen.</p>	
<p>[SET] = ↓ [CLR] = ↑↑</p>		
<pre>IdleCntrl XtraOpen> →FastIdle Activate FastIdle < EngTemp FastIdle Opening</pre>	<p>Scroll down using button [4] to Fast Idle Decay Speed.</p>	
<p>4 x [4] = ↓ [CLR] = ↑</p>		
<pre>IdleCntrl XtraOpen> FastIdle Time →FastIdle DecaySpeed EngineStart Opening</pre>	<p>Press [SET] to enter the Fast Idle Decay Speed adjustment screen.</p>	
<p>[SET] = ↓ [CLR] = ↑</p>		
<pre>0 45% 12.88 02° IdleCntrl XtraOpen> FastIdle DecaySpeed = 32 0 to 255</pre>	<p>Use [←] and [→] buttons to turn the Fast Idle Decay Speed Higher or Lower.</p>	
<p>Suggested Value = 10 – 50</p>		

9.3.25 Idle Control Extra Opening – Engine Starting Opening

[2] – Control/Limits – Idle Control – Extra Open – Engine Start Opening		
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Extra Open – Engine Start Opening, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p>	
<p>11 x [4] = ↓</p>	<p>[CLR] = Main Screen</p>	<p>Scroll down using button [4] to Idle Control Extra Open.</p>
<pre>Control/Limits>12/21 IdleCntrl Tracking> IdleCntrl Limits > →IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Idle Extra Open screen.</p>	
<p>[SET] = ↓</p>	<p>[CLR] = ↑↑</p>	
<pre>IdleCntrl XtraOpen> →FastIdle Activate FastIdle < EngTemp FastIdle Opening</pre>	<p>Scroll down using button [4] to Engine Start Opening.</p>	
<p>5 x [4] = ↓</p>	<p>[CLR] = ↑</p>	
<pre>IdleCntrl XtraOpen> FastIdle Time FastIdle DecaySpeed →EngineStart Opening</pre>	<p>Press [SET] to enter the Engine Start Opening adjustment screen.</p>	
<p>[SET] = ↓</p>	<p>[CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl XtraOpen> EngineStart Opening = 213 0 to 255</pre>	<p>Use [←] and [→] buttons to turn the Engine Start Opening value Higher or Lower.</p>	
<p>Suggested Value = To Suit Application</p>		

This is the base amount of air that is allowed through the Idle Speed Control Solenoid when the engine is in starting mode.

This value can be set quite high (100 – 255).

9.3.26 Idle Control Extra Opening – AirConOpen Activate

[2] – Control/Limits – Idle Control – Extra Open – AirCon Open Activate		
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Extra Open – AirCon Open Activate, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p>	
<p>11 x [4] = ↓</p>	<p>[CLR] = Main Screen</p>	<p>Scroll down using button [4] to Idle Control Extra Open.</p>
<pre>Control/Limits>12/21 IdleCntrl Tracking> IdleCntrl Limits > →IdleCntrl XtraOpen></pre>	<p>Press [SET] to enter the Idle Extra Open screen.</p>	
<p>[SET] = ↓</p>	<p>[CLR] = ↑↑</p>	
<pre>IdleCntrl XtraOpen> →FastIdle Activate FastIdle < EngTemp FastIdle Opening</pre>	<p>Scroll down using button [4] to AirCon Open Activate.</p>	
<p>6 x [4] = ↓</p>	<p>[CLR] = ↑</p>	
<pre>IdleCntrl XtraOpen> →AirConOpen Activate AirCon Opening</pre>	<p>Press [SET] to enter the AirCon Open Activate adjustment screen.</p>	
<p>[SET] = ↓</p>	<p>[CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl XtraOpen> AirConOpen Activate =Off Off/On</pre>	<p>Use [←] and [→] buttons to turn the AirCon Open Activate value Off or On.</p>	
<p>Suggested Value = To Suit Application</p>		

AirCon Opening is used by the ECU to instantly increase the amount of airflow to the engine as the Air Conditioner compressor is engaged.

The Air Conditioner compressor is usually supplied +12V from a relay to engage an electro-magnetic clutch. You take this +12V signal, and feed it into the ECU, so that the ECU knows when the Air Conditioner clutch is engaged.

Wire the Air Conditioner +12V wire to Pin 4 (AirCon Request) on the Wolf3D Version 4.

9.3.27 Idle Control Extra Opening – AirCon Opening

[2] – Control/Limits – Idle Control – Extra Open – AirCon Opening	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Extra Open – AirCon Opening, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Extra Open.</p>
<p>11 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>12/21 IdleCntl Tracking> IdleCntl Limits > →IdleCntl XtraOpen></pre>	<p>Press [SET] to enter the Idle Extra Open screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntl XtraOpen> →FastIdle Activate FastIdle < EngTemp FastIdle Opening</pre>	<p>Scroll down using button [4] to AirCon Opening.</p>
<p>7 x [4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntl XtraOpen> AirConOpen Activate →AirCon Opening</pre>	<p>Press [SET] to enter the AirCon Opening adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntl XtraOpen> AirCon Opening = 15 0 to 255</pre>	<p>Use [←] and [→] buttons to turn the AirCon Opening value Off or On.</p>
<p>Suggested Value = To Suit Application</p>	

The amount of AirCon Opening is dependant on the amount of load the air Conditioner Compressor places on the engine.

In some installations, only a small amount of extra air is required, on others a lot of extra air is required to stop the engine from stalling, or slowing to the point where the idle becomes rough.

You may wish to have the engine idle a little faster than normal when the Air Conditioner is turned on.

9.3.28 Idle Control Steps – Direction To Open

[2] – Control/Limits – Idle Control – Steps - Direction To Open	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Direction To Open, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Steps.</p>
<p>12 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>10/21 →IdleCntrl Steps > IdleCntrl Config > ClosLoop Activate ></pre>	<p>Press [SET] to enter the Idle Control Steps screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Steps > →Direction to Open ReverseStepsAtReset Step Mode</pre>	<p>Press [SET] to enter the Direction to Open adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl Steps > Direction to Open =Forward Fwd/Rev</pre>	<p>Use [←] and [→] buttons to swap between Forward and Reverse direction.</p>
<p>Suggested Value = Forward</p>	

Direction To Open for almost all applications is Forward. If you feel that your Idle Speed Solenoid is moving the wrong way, change this value to Reverse.

9.3.29 Idle Control Steps – Reverse Steps At Reset

[2] – Control/Limits – Idle Control – Steps – Reverse Steps At Reset	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Reverse Steps At Reset, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Steps.</p>
<p>12 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>10/21 →IdleCntrl Steps > IdleCntrl Config > ClosLoop Activate ></pre>	<p>Press [SET] to enter the Idle Control Steps screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Steps > →Direction to Open ReverseStepsAtReset Step Mode</pre>	<p>Scroll down using button [4] to Reverse Steps At Reset.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntrl Steps > Direction to Open →ReverseStepsAtReset Step Mode</pre>	<p>Press [SET] to enter the Reverse Steps At Reset adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl Steps > Direction to Open =Forward Fwd/Rev</pre>	<p>Use [←] and [→] buttons to decrease or increase the number of Reverse Steps At Reset.</p>
<p>Suggested Value = 0</p>	

Reverse Steps at Reset must be set to 0. If this value is set higher than 0, the ECU will spend time forcing the Idle Speed Control Solenoid to its closed position. Almost all Idle Speed Control Solenoids are spring loaded to the closed position, meaning that you can set this value to zero. This speeds up the Idle Control reset time significantly.

9.3.30 Idle Control Steps – Step Mode

[2] – Control/Limits – Idle Control – Steps – Step Mode	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Step Mode, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Steps.</p>
<p>12 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>10/21 →IdleCntrl Steps > IdleCntrl Config > ClosLoop Activate ></pre>	<p>Press [SET] to enter the Idle Control Steps screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Steps > →Direction to Open ReverseStepsAtReset Step Mode</pre>	<p>Scroll down using button [4] to Step Mode.</p>
<p>2 x [4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntrl Steps > Direction to Open ReverseStepsAtReset →Step Mode</pre>	<p>Press [SET] to enter the Step Mode adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 12.88 02° IdleCntrl Steps > Step Mode = 0 0 to 255</pre>	<p>Use [←] and [→] buttons to change the number of Step Mode.</p>
<p>Suggested Value = 0</p>	

The Step Mode must be set to 0.

9.3.31 Idle Control Steps – Full Open

[2] – Control/Limits – Idle Control – Steps – Full Open		
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Full Open, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Steps.</p>	
<p>12 x [4] = ↓ [CLR] = Main Screen</p>		
<pre>Control/Limits>10/21 →IdleCntrl Steps > IdleCntrl Config > ClosLoop Activate ></pre>	<p>Press [SET] to enter the Idle Control Steps screen.</p>	
<p>[SET] = ↓ [CLR] = ↑↑</p>		
<pre>IdleCntrl Steps > →Direction to Open ReverseStepsAtReset Step Mode</pre>	<p>Scroll down using button [4] to Full Open.</p>	
<p>3 x [4] = ↓ [CLR] = ↑</p>		
<pre>IdleCntrl Steps > →Full Open</pre>	<p>Press [SET] to enter the Full Open adjustment screen.</p>	
<p>[SET] = ↓ [CLR] = ↑</p>		
<pre>0 45% 12.88 02° IdleCntrl Steps > Full Open = 254 0 to 255</pre>	<p>Use [←] and [→] buttons to change the Full Open value.</p>	
<p>Suggested Value = 255</p>		

The Full Open Value must be set to 255.

9.3.32 Idle Control Config – Output Type

[2] – Control/Limits – Idle Control – Config – Output Type	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, Output Type, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Configuration.</p>
<p>13 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>10/21 IdleCntrl Steps > →IdleCntrl Config > ClosLoop Activate ></pre>	<p>Press [SET] to enter the Idle Control Config screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Config > →Output Type PWM Valve Frequency</pre>	<p>Press [SET] to enter the Idle Control Output Type adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 15.90 02° IdleCntrl Config > Output Type =PWM Step/PWM</pre>	<p>The Wolf3D Version 4.0 only has Pulse Width Modulation to control the Idle Speed. This value is not adjustable.</p>
<p>Suggested Value = PWM</p>	

The Wolf3D Version 4 can only control a solenoid type Idle Speed Control Solenoid. This value is forced to PWM.

9.3.33 Idle Control Config – PWM Valve Frequency

[2] – Control/Limits – Idle Control – Config – PWM Valve Frequency	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Idle Control, PWM Valve Frequency, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to Idle Control Configuration.</p>
<p>13 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>10/21 IdleCntrl Steps > →IdleCntrl Config > ClosLoop Activate ></pre>	<p>Press [SET] to enter the Idle Control Config screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>IdleCntrl Config > →Output Type PWM Valve Frequency</pre>	<p>Scroll down using button [4] to PWM Valve Frequency.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>IdleCntrl Config > Output Type →PWM Valve Frequency</pre>	<p>Press [SET] to enter the Idle Control PWM Valve Frequency adjustment screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 45% 15.90 02° IdleCntrl Config > PWM Valve Frequency = 77 0 to 255</pre>	<p>Use [←] and [→] buttons to change the PWM Valve Frequency value.</p> <p>The greater the number here, the slower the valve will pulse.</p>
<p>Suggested Value = 77</p>	

The PWM Valve Frequency value is a frequency divider. This means, that as the number increases, the valve pulses more slowly. As the number decreases, the valve pulses more quickly.

We can supply an appropriate valve for you to use as an Idle Control Valve. We recommend that you set the PWM Valve frequency to 77 when using our recommended valve.

For other valves, we recommend using a similar value. Please contact your Wolf3D supplier for more information regarding your specific valve.

10 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.

10.1 Closed Loop Control Setup Procedure

10.1.1 Oxygen Sensor

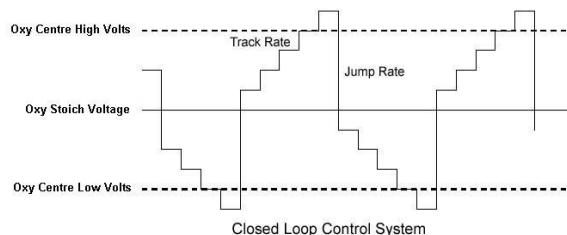
The oxygen sensor voltages that the closed loop will track around need to be setup first. From the main screen hold the [CLR] key down for 5 sec to enter the Configuration screen.

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 Second Main Handcontroller Screen. When the engine is running at the Air : Fuel ratio you require, the oxy voltage displayed will be the Oxy Stoich Voltage.

```
0000 45% 13.25 00"  
Idle 99 Oxy 0.70  
Noise 0 Cloop Off  
SyncX 0 Exe 12.47
```

10.2 Closed Loop Activation

10.2.1 Activation

Activates the Closed Loop Function

[2] – Control/Limits – Closed Loop Control – Activation	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Closed Loop Activate, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to ClosLoop Activate.</p>
<p>17 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>18/27 IdleCntl Steps > IdleCntl Config > →ClosLoop Activate ></pre>	<p>Press [SET] to enter the Closed Loop Activation screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>ClosLoop Activate > →Activate Track Frequency On < Load</pre>	<p>Press [SET] to enter the Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00° ClosLoop Activate > Activate =On Off/On</pre>	<p>Use [←] and [→] buttons to turn the Closed Loop Activation Off or On.</p>
<p>Suggested Value = To Suit Application</p>	

10.2.2 Track Frequency

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

[2] – Control/Limits – Closed Loop Control – Track Frequency		
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Closed Loop Control, Track Frequency, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to ClosLoop Activate.</p>	
<p>7 x [4] = ↓</p>	<p>[CLR] = Main Screen</p>	
<pre>Control/Limits>18/27 IdleCntrl Steps > IdleCntrl Config > →ClosLoop Activate ></pre>	<p>Press [SET] to enter the Closed Loop Activate screen.</p>	
<p>[SET] = ↓</p>	<p>[CLR] = ↑↑</p>	
<pre>ClosLoop Activate > Activate > →Track Frequency > On < Load</pre>	<p>Press [4] to scroll down to Track Frequency and press [SET] to enter adjustment screen.</p>	
<p>[4] = ↓</p>	<p>[CLR] = ↑</p>	
<pre>0 46% 13.35 00° ClosLoop Activate > Track Frequency = 50 0 to 255</pre>	<p>Use [←] and [→] buttons to set the Track Frequency higher or lower.</p>	
<p>Suggested Value = 50</p>		

10.2.3 On < Load

Sets the Load that Closed Loop will operate below

[2] – Control/Limits – Closed Loop Control – On < Load		
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Closed Loop Control, On < Load, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p>	
<p>7 x [4] = ↓</p>	<p>[CLR] = Main Screen</p>	<p>Scroll down using button [4] to ClosLoop Activate.</p>
<pre>Control/Limits> 18/27 IdleCntrl Steps > IdleCntrl Config > →ClosLoop Activate ></pre>	<p>Press [SET] to enter the Closed Loop Activate screen.</p>	
<p>[SET] = ↓</p>	<p>[CLR] = ↑↑</p>	
<pre>ClosLoop Activate > Activate Track Frequency →On < Load</pre>	<p>Press [4] to scroll down to On < Load and press [SET] to enter adjustment screen.</p>	
<p>[4] = ↓</p>	<p>[CLR] = ↑</p>	
<pre>0 46% 13.35 00^m ClosLoop Activate > On < Load = 40 % Load</pre>	<p>Use [←] and [→] buttons to set the On < Load higher or lower.</p>	
<p>Suggested Value = 40</p>		

10.2.4 Off > Load

Sets the Load that Closed Loop will not operate Above

[2] – Control/Limits – Closed Loop Control – Off > Load	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Closed Loop Control, Off > Load, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to ClosLoop Activate.</p>
<p>7 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>18/27 IdleCntrl Steps > IdleCntrl Config > →ClosLoop Activate ></pre>	<p>Press [SET] to enter the Closed Loop Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>ClosLoop Activate > →Off > Load On < RPM Off > RPM</pre>	<p>Press [4] to scroll down to Off > Load and press [SET] to enter adjustment screen.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00^h ClosLoop Activate > Off > Load = 42 % Load</pre>	<p>Use [←] and [→] buttons to set the Off > Load higher or lower.</p>
<p>Suggested Value = 42</p>	

10.2.5 On < RPM

Sets the RPM that Closed Loop will NOT operate Below

[2] – Control/Limits – Closed Loop Control – On < RPM	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Closed Loop Control, On < RPM, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to ClosLoop Activate.</p>
<p>7 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>18/27 IdleCntrl Steps > IdleCntrl Config > →ClosLoop Activate ></pre>	<p>Press [SET] to enter the Closed Loop Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>ClosLoop Activate > Off > Load →On < RPM Off > RPM</pre>	<p>Press [4] to scroll down to On < RPM and press [SET] to enter adjustment screen.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00^m ClosLoop Activate > On < RPM = 1104 RPM</pre>	<p>Use [←] and [→] buttons to set the On < RPM higher or lower.</p>
<p>Suggested Value = 1100</p>	

10.2.6 Off < RPM

Sets the RPM that Closed Loop will not operate Above

[2] – Control/Limits – Closed Loop Control – Off > RPM	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Closed Loop Control, Off > RPM, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to ClosLoop Activate.</p>
<p>7 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 18/27 IdleCntrl Steps > IdleCntrl Config > →ClosLoop Activate ></pre>	<p>Press [SET] to enter the Closed Loop Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>ClosLoop Activate > Off > Load On < RPM →Off > RPM</pre>	<p>Press [4] to scroll down to Off > RPM and press [SET] to enter adjustment screen.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre> 0 46% 13.35 00° ClosLoop Activate > Off > RPM = 5000 RPM</pre>	<p>Use [←] and [→] buttons to set the Off > RPM higher or lower.</p>
<p>Suggested Value = 5000</p>	

10.2.7 Off < mS Fuel

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

[2] – Control/Limits – Closed Loop Control – Off < mS Fuel	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Closed Loop Control, Off < mS Fuel, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to ClosLoop Activate.</p>
<p>7 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits>18/27 IdleCntrl Steps > IdleCntrl Config > →ClosLoop Activate ></pre>	<p>Press [SET] to enter the Closed Loop Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>ClosLoop Activate > →Off < mS Fuel Off < Engine Temp On > Engine Temp</pre>	<p>Press [4] to scroll down to Off < mS Fuel and press [SET] to enter adjustment screen.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00^m ClosLoop Activate > Off < mS Fuel = 1.00 milliSec</pre>	<p>Use [←] and [→] buttons to set the Off < mS Fuel higher or lower.</p>
<p>Suggested Value = 1mS</p>	

10.2.8 Off < Engine Temp

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

[2] – Control/Limits – Closed Loop Control – Off < Engine Temp	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Closed Loop Control, Off < Engine Temp, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to ClosLoop Activate.</p>
<p>7 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 18/27 IdleCntrl Steps > IdleCntrl Config > →ClosLoop Activate ></pre>	<p>Press [SET] to enter the Closed Loop Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>ClosLoop Activate > Off < mS Fuel > →Off < Engine Temp > On > Engine Temp</pre>	<p>Press [4] to scroll down to Off < Engine Temp and press [SET] to enter adjustment screen.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00° ClosLoop Activate > Off < Engine Temp = 64 Celcius</pre>	<p>Use [←] and [→] buttons to set the Off < Engine Temp higher or lower.</p>
<p>Suggested Value = 64</p>	

10.2.9 On > Engine Temp

Sets at what engine temperature the Closed Loop will operate above

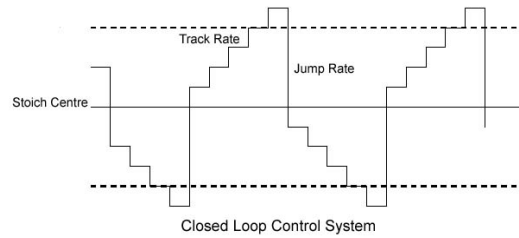
[2] – Control/Limits – Closed Loop Control – On > Engine Temp	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Closed Loop Control, On > Engine Temp, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to ClosLoop Activate.</p>
<p>7 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 18/27 IdleCntrl Steps > IdleCntrl Config > →ClosLoop Activate ></pre>	<p>Press [SET] to enter the Closed Loop Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>ClosLoop Activate > Off < mS Fuel Off < Engine Temp →On > Engine Temp</pre>	<p>Press [4] to scroll down to On > Engine Temp and press [SET] to enter adjustment screen.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00° ClosLoop Activate > On > Engine Temp = 66 Celcius</pre>	<p>Use [←] and [→] buttons to set the On > Engine Temp higher or lower.</p>
<p>Suggested Value = 70</p>	

10.2.10 On > Time

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

[2] – Control/Limits – Closed Loop Control – On > Time	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Closed Loop Control, On > Time, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to ClosLoop Activate.</p>
<p>7 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 18/27 IdleCntrl Steps > IdleCntrl Config > →ClosLoop Activate ></pre>	<p>Press [SET] to enter the Closed Loop Activate screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>ClosLoop Activate > →On > Time</pre>	<p>Press [4] to scroll down to On > Time, and press [SET] to enter adjustment screen.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00° ClosLoop Activate > On > Time = 40 Seconds</pre>	<p>Use [←] and [→] buttons to set the On > Time higher or lower.</p>
<p>Suggested Value = 40</p>	

10.3 Closed Loop Tracking



10.3.1 Track Rate

[2] – Control/Limits – Closed Loop Tracking – Track Rate	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Closed Loop Control, Track Rate, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to ClosLoop Activate.</p>
<p>7 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Control/Limits> 19/27 →ClosLoop Tracking > ClosLoop Limits > BoostCtrl Activate></pre>	<p>Press [SET] to enter the Closed Loop Tracking screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>ClosLoop Tracking > →Track Rate Jump Rate (x Track)</pre>	<p>Press [SET] to enter the Track Rate adjustment screen.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00^m ClosLoop Tracking > Track Rate = 1 Percent</pre>	<p>Use [←] and [→] buttons to set the Track Rate higher or lower.</p>
<p>Suggested Value = 1</p>	

10.3.2 Jump Rate (x Track)

[2] – Control/Limits – Closed Loop Tracking – Jump Rate (x Track)		
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Closed Loop Control, Jump Rate (x Track), start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p> <p>Scroll down using button [4] to ClosLoop Activate.</p>	
<p>7 x [4] = ↓ [CLR] = Main Screen</p>		
<pre>Control/Limits>19/27 →ClosLoop Tracking > ClosLoop Limits > BoostCtrl Activate></pre>	<p>Press [SET] to enter the Closed Loop Tracking screen.</p>	
<p>[SET] = ↓ [CLR] = ⬆⬆</p>		
<pre>ClosLoop Tracking > Track Rate > →Jump Rate (x Track)</pre>	<p>Press [SET] to enter the Jump Rate (x Rate) adjustment screen.</p>	
<p>[4] = ↓ [CLR] = ⬆</p>		
<pre>0 46% 13.35 00° ClosLoop Tracking > Jump Rate (x Track) = 4 0 to 255</pre>	<p>Use [←] and [→] buttons to set the Jump Rate (x Track) higher or lower.</p>	
<p>Suggested Value = 4</p>		

10.4 Closed Loop Limits

10.4.1 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.

[2] – Control/Limits – Closed Loop Limits – Change % Allowed	
<pre>Control/Limits> 1/21 →Fuel Pump > Thermo Fan > Rev Limit ></pre>	<p>To set the Closed Loop Control, Change % Allowed, start from the Main Screen. Press [2] once. You will see the screen to the left displayed on the Hand Controller.</p>
<p>7 x [4] = ↓ [CLR] = Main Screen</p>	<p>Scroll down using button [4] to ClosLoop Activate.</p>
<pre>Control/Limits> 19/27 →ClosLoop Tracking > ClosLoop Limits > BoostCtrl Activate></pre>	<p>Press [SET] to enter the Closed Loop Limits screen.</p>
<p>[SET] = ↓ [CLR] = ↑↑</p>	
<pre>ClosLoop Tracking > Track Rate →Jump Rate (x Track)</pre>	<p>Press [SET] to enter the Change % Allowed adjustment screen.</p>
<p>[4] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00" ClosLoop Limits > Change % Allowed = 9 Percent</pre>	<p>Use [←] and [→] buttons to set the Change % Allowed higher or lower.</p>
<p>Suggested Value = 9</p>	

10.4.2 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)

10.4.3 Error Handling Mode

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

11 Error Screens

11.1 Powerup Screens

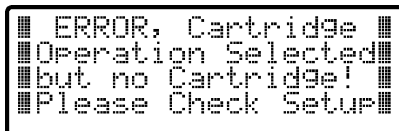


This screen is caused by the turbo timer loop back plug not being installed. If you are not running a turbo timer you need to install the 3pin plug, with the loop of wire in it from the plug kit, into the turbo timer plug on the main loom.



This screen is caused by a power supply glitch during switch on, cranking or when running the engine. A faulty ignition switch can cause this error when powering up the ECU. During cranking the battery voltage can drop dramatically, a tired or low voltage battery can drop below the required voltage to keep the ECU powered up. If this error occurs when running the engine there is some problem with the +12v or grounding for the ECU which is causing the power supply line to

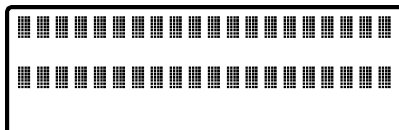
11.2 Other Screens



This error means there is no memory cartridge connected to the Memory Cartridge plug on the ECU and the ECU is trying to use the Memory Cartridge Map. Make sure there is a cartridge plugged in.



This error means the Map Switching Function has been activated but there is no Cartridge plugged into the Wolf to switch to. Plug a cartridge into the cartridge port or goto the Configuration Menu>Map Switching and turn the Activation Off



2 Bars on the LCD means the handcontroller has been plugged into the Wolf after powerup. Switch the power to the Wolf off and then back on again an the screen will display the correct information.

12 PIN Security

The WOLF 3D has a security feature which stops both the engine from being started as well as denying unauthorized access to any of the user adjustable parameters. When in security mode, on powerup the user has to type in a four digit PIN to disarm the security function. This allows the engine to start and allows access to adjustable parameters. The vehicle cannot be hotwired, since the ECU simply will not inject any fuel or produce any spark while in security mode.

The user does not have to set the PIN for normal operation. The WOLF 3D will operate normally without a PIN ever having to be initialized.

At any time the PIN can be initialized by the user. THE PIN IS ONE TIME PROGRAMMABLE. That is, once it has been set by the user, it cannot be changed without returning the WOLF 3D to the place of purchase.

12.1 Setting the Security PIN

1. Turn the power to the WOLF 3D OFF for at least 10 seconds.
2. Press the [SET] key and keep it pressed.
3. Turn the power to the WOLF back on.

The display will now show the following screen.

```
■ Setup PIN# for the ■  
■ first time ■■■■ ■  
■ Note you PIN#! ■  
■ PIN# OnlyDoneOnce ■
```

The new PIN may contain any combination of buttons on the Handcontroller except the [SET] key. The new PIN will be printed in the four black squares on the second line.

When all 4 boxes are filled the screen changes to the following screen.

```
■ Setup PIN# for the ■  
■ first time 1111 ■  
■ Press SET to save ■  
■ or CLR to exit ■
```

At this point you can decide if the PIN you have typed in is the one you want. If the PIN is correct press [SET]. If it is not press [CLR] and the PIN security function exits without setting the PIN.

There are two modes for the security function, ARMED and DISARMED.

12.2 Arming The Security Function

1. Turn the power to the WOLF 3D OFF for at least 10 seconds.
2. Press the [SET] key and keep it pressed.
3. Turn the power to the WOLF back on.

The Handcontroller will now display.

```
#####  
| Wolf 3D Security |  
|           ARMED           |  
#####
```

When the WOLF security function is armed, every time the power to the ECU is turned off, then on again, the PIN must be entered to allow the ECU to function normally.

When the ECU is turned on, the following screen will be shown.

```
|| Wolf 3D Security ||  
|| Enter PIN#   ||  
|| Press SET to ARM ||  
||   CLR to Disarm   ||
```

To keep the WOLF security mode ARMED, type in the PIN# and press [SET]. Next time the ignition is turned on the ECU will still be in security mode.

12.3 Disarming The Security Function

When the security function is DISARMED the unit functions without the PIN# having to be entered.

1. Turn the power to the WOLF 3D OFF for at least 10 seconds.
2. Turn the power to the WOLF back on.

The Handcontroller will now display.

```
|| Wolf 3D Security ||  
|| Enter PIN#   ||  
|| Press SET to ARM ||  
||   CLR to Disarm   ||
```

Enter your PIN# and press the [CLR] key.

```
.....  
| Wolf 3D Security |  
|   DISARMED   |  
|.....|
```

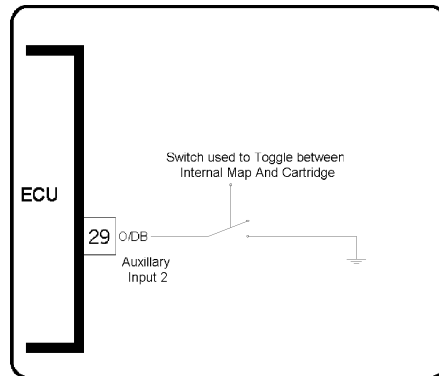
The ECU will now operate without asking for a PIN#.

13 Map Switching

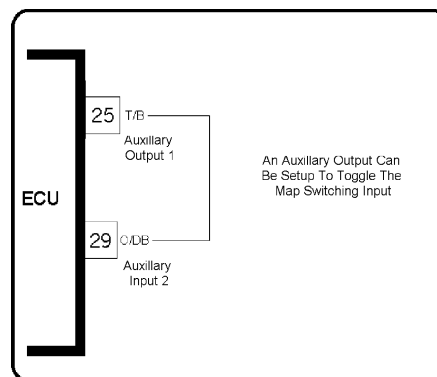
The Map switch function is very useful if you wish to have two different Maps. You can use an external switch to flip between the internal memory and the external cartridge. It is often used for dual fuel vehicles. The internal map can have 0.00mS fuel delivery for when LPG is used, with an ignition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

13.1 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.



13.2 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.

13.2.1 Activate Map Switching

[CLR] "5 Sec"- Configuration – Map Switching – Activate	
<pre>Configuration> 1/8 →Hand Controller > Map Switching > Trigger ></pre>	<p>To Activate Map Switching, Start from the Configuration Menu by holding the [CLR] key down for 5 seconds.</p>
<p>2 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Configuration> 2/8 Hand Controller > →Map Switching > Trigger ></pre>	<p>Scroll down once using the [4] button until you reach Map Switching.</p> <p>From here press [SET] to select.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>Map Switching > →Activate Input Used ForceMapSwitch High</pre>	<p>Press [SET] to select Activate.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00" Map Switching > Activate =Off Off/On</pre>	<p>Use [←] and [→] buttons to activate the Map Switching function.</p> <p>To return to the Main Screen, press and hold down the [CLR] button for 5 Seconds.</p>
<p>Suggested Value = To Suit Application</p>	

13.2.2 Select Input Used

You have a choice of Aux Input 1 or Aux Input 2.

[CLR] "5 Sec" - Configuration – Map Switching – Input Used	
<pre> Configuration> 1/8 →Hand Controller > Map Switching > Trigger > </pre>	<p>To select the Map Switching Input Used, Start from the Configuration Menu by holding the [CLR] key down for 5 seconds.</p>
<div style="display: flex; justify-content: space-between;"> 2 x [4] = ↓ [CLR] = Main Screen </div>	
<pre> Configuration> 2/8 Hand Controller > →Map Switching > Trigger > </pre>	<p>Scroll down once using the [4] button until you reach Map Switching.</p> <p>From here press [SET] to select.</p>
<div style="display: flex; justify-content: space-between;"> [= ↓ SET] [CLR] = ↑ </div>	
<pre> Map Switching > Activate →Input Used ForceMapSwitch High </pre>	<p>Scroll down once using the [4] button until you reach Input Used.</p> <p>From here press [SET] to select.</p>
<div style="display: flex; justify-content: space-between;"> [SET] = ↓ [CLR] = ↑ </div>	
<pre> 0 46% 13.35 00° Map Switching > Input Used =Aux 1 Aux1/Aux2 </pre>	<p>Use [←] and [→] buttons to Select the Input used.</p> <p>To return to the Main Screen, press and hold down the [CLR] button for 5 Seconds.</p>
<p>Suggested Value = To Suit Application</p>	

13.2.3 Select Map Active When High

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

[CLR] "5 Sec"- Configuration – Map Switching – Map Active When High	
<pre>Configuration> 1/8 →Hand Controller > Map Switching > Trigger ></pre>	<p>To select the Map Active When High, Start from the Configuration Menu by holding the [CLR] key down for 5 seconds.</p>
<p>2 x [4] = ↓ [CLR] = Main Screen</p>	
<pre>Configuration> 2/8 Hand Controller > →Map Switching > Trigger ></pre>	<p>Scroll down once using the [4] button until you reach Map Switching.</p> <p>From here press [SET] to select.</p>
<p>[= ↓ SET] [CLR] = ↑</p>	
<pre>Map Switching > →MapActive When High</pre>	<p>Scroll down three times using the [4] button until you reach Map Active When High.</p> <p>From here press [SET] to select.</p>
<p>[SET] = ↓ [CLR] = ↑</p>	
<pre>0 46% 13.35 00° Map Switching > MapActive When High =Cartrdg ECU/Cart</pre>	<p>Use [←] and [→] buttons to Select the Map Active When High.</p> <p>To return to the Main Screen, press and hold down the [CLR] button for 5 Seconds.</p>
<p>Suggested Value = To Suit Application</p>	

The Internal Map is now ready for Map Switching. You can either copy the ECU to the Cartridge or edit the map on the cartridge to get the same setup on both maps.

NOTE: THE MAP SWITCHING SETUP MUST BE THE SAME ON THE ECU AND THE CARTRIDGE.

13.2.4 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.

14 Appendix 1

Use the table below to choose the type of Load Sensing that best suits your application.

Engine Type	Induction System	Load Sensor Type
1 Cylinder	Naturally Aspirated/Single Throttle with Plenum Chamber/Mild Camshaft	MAP
1 Cylinder	Naturally Aspirated/Multi Throttle	TPS/MAF
1 Cylinder	Turbo/Super Charged Multi/Single Throttle	MAP/MAF
2 Cylinder	Naturally Aspirated/Single Throttle with Plenum Chamber/Mild Camshaft	MAP
2 Cylinder	Naturally Aspirated/Multi Throttle	TPS/MAF
2 Cylinder	Turbo/Super Charged Multi/Single Throttle	MAP/MAF
3 Cylinder	Naturally Aspirated/Single Throttle with Plenum Chamber/Mild Camshaft	MAP
3 Cylinder	Naturally Aspirated/Multi Throttle	TPS/MAF
3 Cylinder	Turbo/Super Charged Multi/Single Throttle	MAP/MAF
4 Cylinder	Naturally Aspirated/Single Throttle with Plenum Chamber/Mild Camshaft	MAP
4 Cylinder	Naturally Aspirated/Multi Throttle	TPS/MAF
4 Cylinder	Turbo/Super Charged Multi/Single Throttle	MAP/MAF
5 Cylinder	Naturally Aspirated/Single Throttle with Plenum Chamber/Mild Camshaft	MAP
5 Cylinder	Naturally Aspirated/Multi Throttle	TPS/MAF
5 Cylinder	Turbo/Super Charged Multi/Single Throttle	MAP/MAF
6 Cylinder	Naturally Aspirated/Single Throttle with Plenum Chamber/Mild Camshaft	MAP
6 Cylinder	Naturally Aspirated/Multi Throttle	TPS/MAF
6 Cylinder	Turbo/Super Charged Multi/Single Throttle	MAP/MAF
8 Cylinder	Naturally Aspirated/Single Throttle with Plenum Chamber/Mild Camshaft	MAP
8 Cylinder	Naturally Aspirated/Multi Throttle	TPS/MAF
8 Cylinder	Turbo/Super Charged Multi/Single Throttle	MAP/MAF
10 Cylinder	Naturally Aspirated/Single Throttle with Plenum Chamber/Mild Camshaft	MAP
10 Cylinder	Naturally Aspirated/Multi Throttle	TPS/MAF
10 Cylinder	Turbo/Super Charged Multi/Single Throttle	MAP/MAF
12 Cylinder	Naturally Aspirated/Single Throttle with Plenum Chamber/Mild Camshaft	MAP
12 Cylinder	Naturally Aspirated/Multi Throttle	TPS/MAF
12 Cylinder	Turbo/Super Charged Multi/Single Throttle	MAP/MAF
2 Rotor	Naturally Aspirated/Single Throttle with Plenum Chamber/Mild Porting	MAP
2 Rotor	Naturally Aspirated/Multi Throttle	TPS/MAF
2 Rotor	Turbo/Super Charged Multi/Single Throttle	MAP/MAF

15 Glossary

Baud – The speed at which computers communicate. Commonly called Baud Rate.

Comm Port - Communications Port on your PC.

Hysteresis – A dead zone at a switch point that is designed to stop on/off flutter occurring when an input such as a MAP Sensor (that outputs vacuum pulses) is used.

LPT – Printer or Parallel Port on you PC.