STRATIFIED MEGASQUIRT
PLUG AND PLAY ND64

Generic Plug and Play
Electronic Fuel Injection System

Installation and User Guide

Thank you and congratulations on the purchase of your new Stratified PNP ND64 Engine Controller. This document should be followed to ensure safe and proper installation and operation of your new ECU.

WARNINGS – PLEASE READ CAREFULLY

ALL parts are sold for OFF ROAD RACE-ONLY ground vehicle use only.
Aftermarket EFI/EMS systems are not for use on pollution controller vehicles. Alteration of emission related components constitutes tampering under most local emission regulation guidelines and can lead to fines and penalties.

Stratified Automotive Controls is not responsible for any fines, injuries, or damages incurred as a result of the installation or use of our products. It is the complete responsibility of the purchaser of such products to ensure that they are used in a legal and safe manner.

DISCONNECT THE NEGATIVE BATTERY TERMINAL BEFORE PERFORMING ANY OF THIS WORK. IF YOU DO NOT FEEL COMFORTABLE ABOUT MAKING THESE MODIFICATIONS, HAVE THEM PERFORMED BY A PROFESSIONAL.

WARNING: We take no responsibility for any damage you do to your car. We strongly recommend you learn how to tune and tune your car little by little watching all relevant gauges and data logging.

Table of Contents

1. Generic (Non Vehicle Specific) Setup

You have purchased a generic unit that is not specifically setup for your vehicle, and you must setup both the hardware, the firmware, and the calibration for your vehicle before you can attempt to start the car. **Stratified is not responsible for any tuning or setup errors that may damage your vehicle so please make sure you know what you are doing. The warranty strictly covers the functionality of the electronics inside the unit and nothing more. Stratified does not offer any end-customer support with the generic units as the vehicle specific setup and installation is left up to the buyer.**

In terms or hardware the generic PNP ND64 comes with ***fully assembled electronics*** and you must simply run the jumpers that allow it to be wired correctly for your vehicle's wiring harness. This guide does not have vehicle specific information but it assumes you have a good understanding of wiring and the information can be easily found online or in factory service manuals. In order to learn more about setting up the hardware, please consult the **Stratified PNP ND64 Hardware Guide** section.

In terms of firmware, the unit can have any MegasquirtII firmware installed. We recommend the latest MSII-Extra firmware that is released. More information and the latest released firmware can be found here: http://www.msextra.com/doc/ms2extra/. Flashing the firmware is covered in the How To Section.

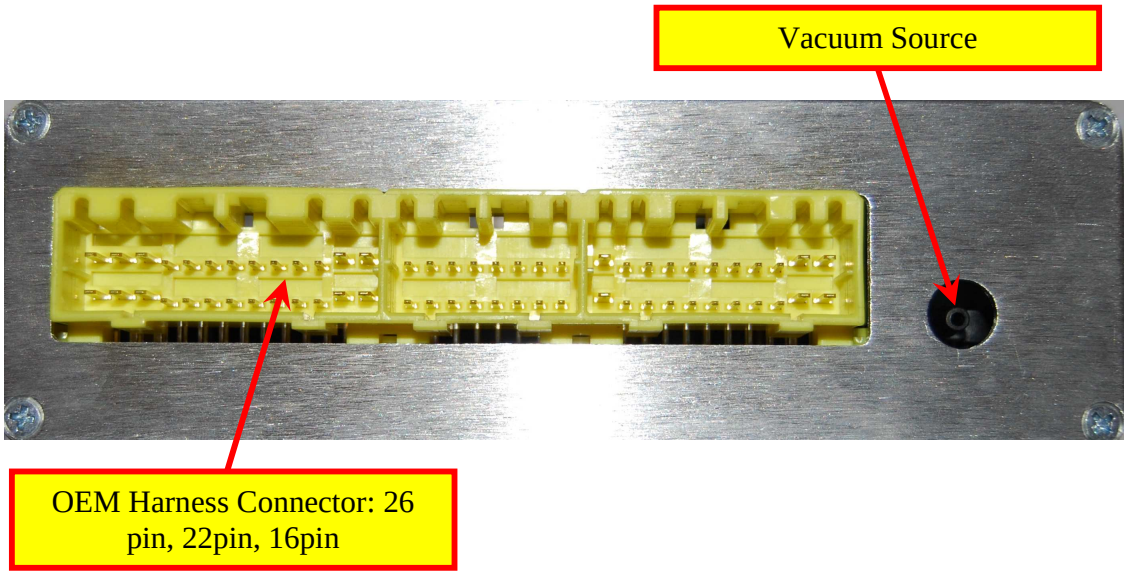
Each vehicle requires its own calibration for optimum performance and safety. This calibration must work with the stock hardware (ignition system, injectors, idle valve, etc.). The calibration is setup using a personal computer using one of the tuning software suites. This manual and most Megasquirt documentation refers to Megatune, but there are alternatives such as TunerStudio. The links below are for both tuning suites.

Megatune: http://www.megamanual.com/megatune.htm
TunerStudio: http://www.efianalytics.com/TunerStudio/

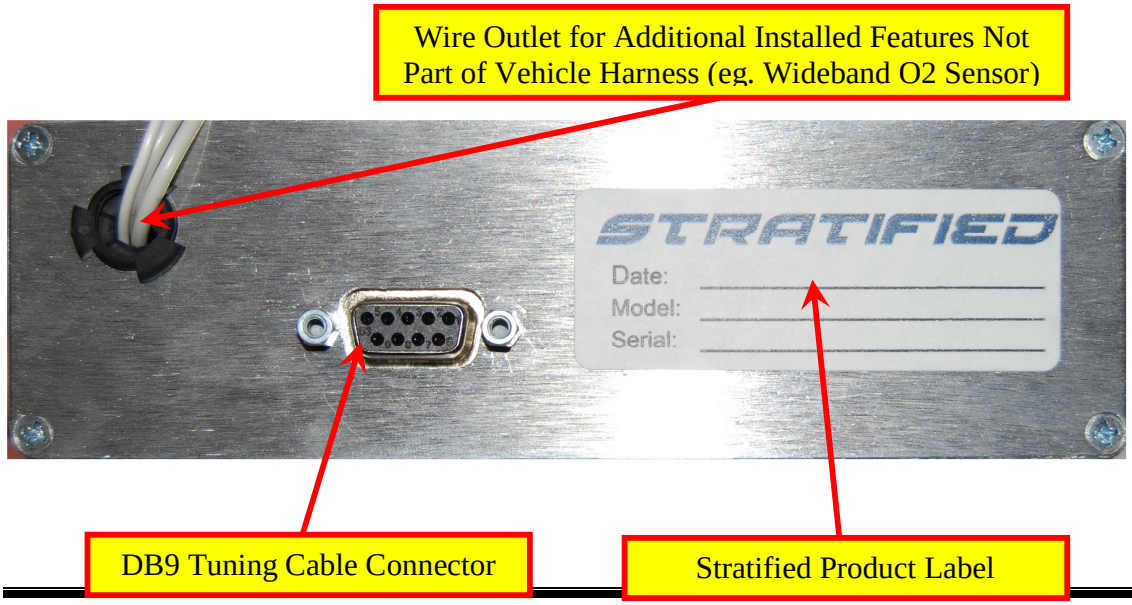
2. Stratified PNP ND64 Hardware Guide

The Hardware Guide will go through all the user-accessible features of the Stratified PNP ND64. We start with the outside of the unit.

2.1. Front Panel

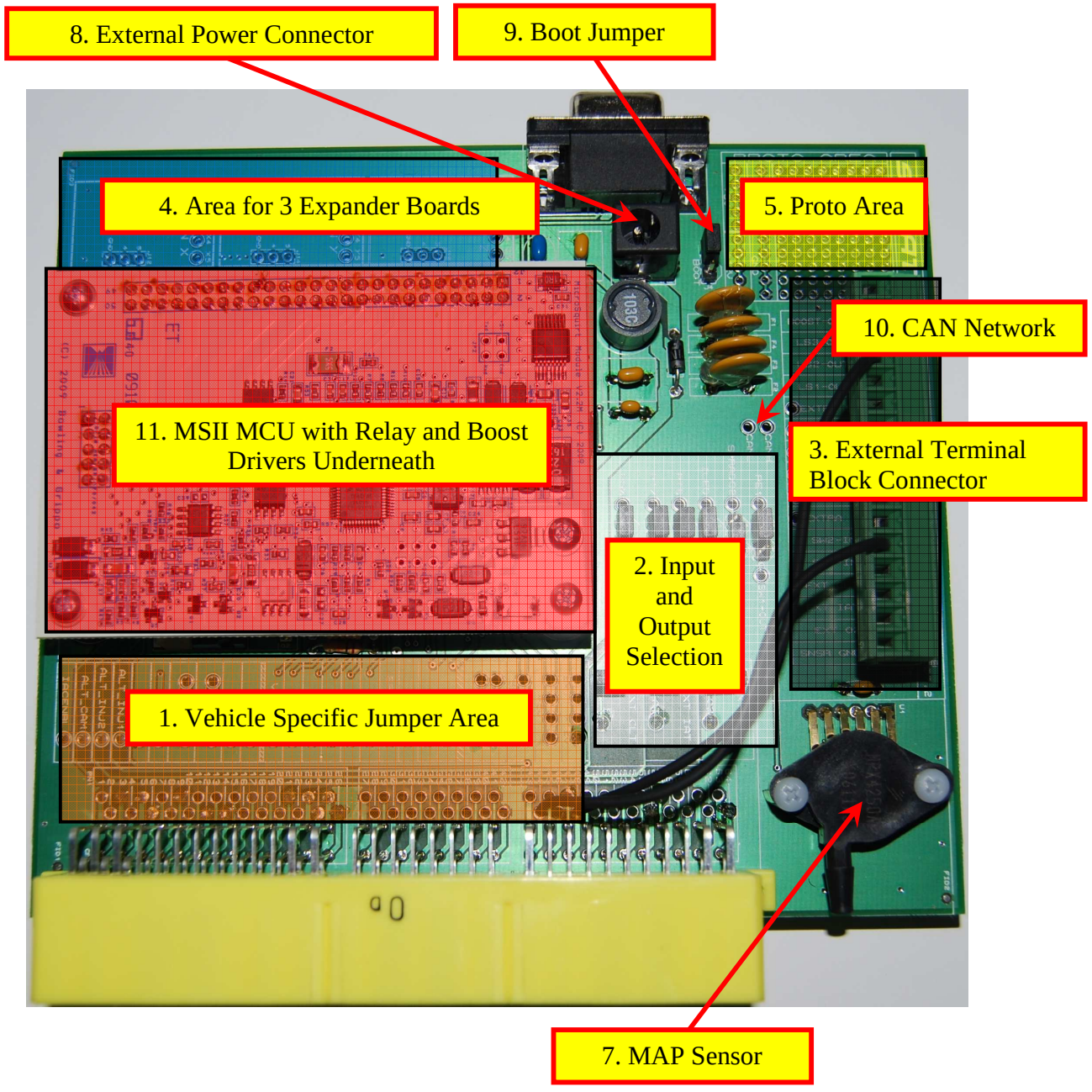


2.2. Rear Panel



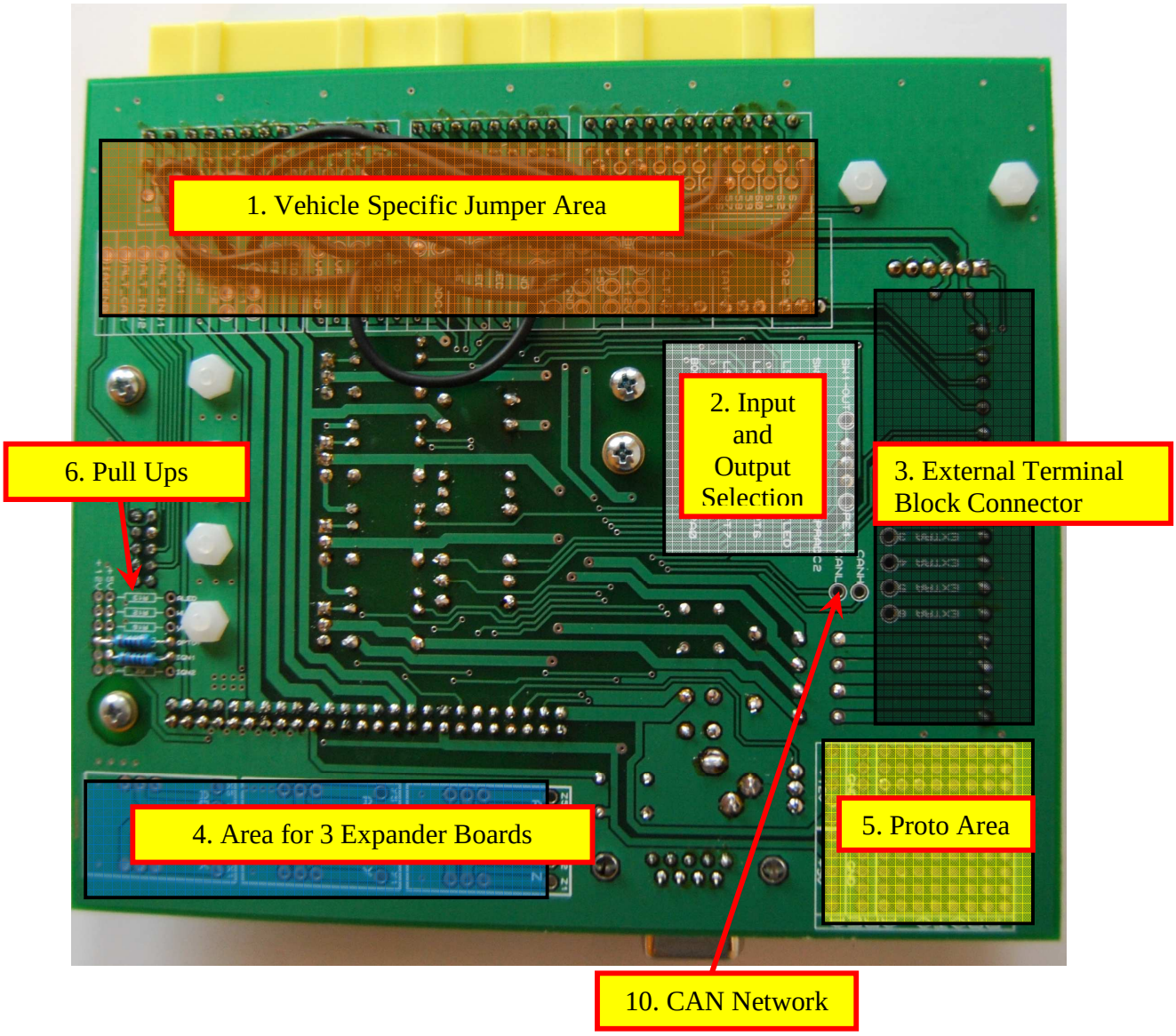
2.3. Inside - Top of Unit

Once you open the top of the case, you will see the internal electronics of the unit. Highlighted below are the key features of the PNP ND64. They are discussed in detail below.



2.4. Inside - Bottom of Unit

Once the case is fully disassembled and the main electronic board is slid out, the bottom is revealed. Here, the main features are once again highlighted and discussed below.



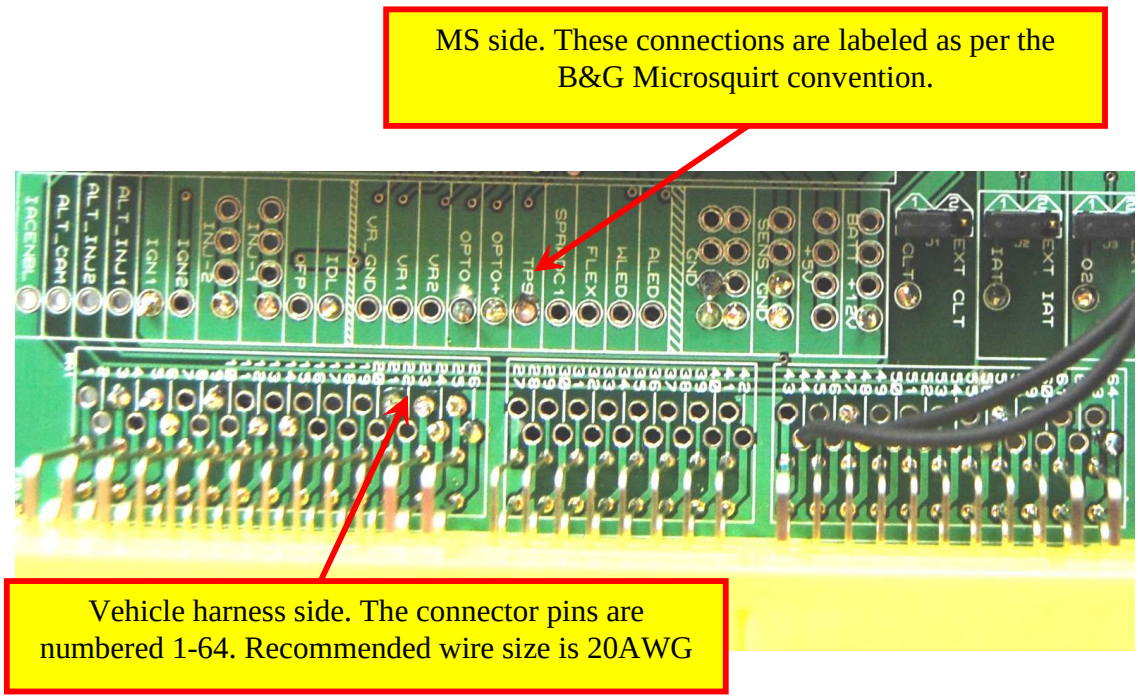
2.5. Vehicle Specific Jumper Area

The Stratified PNP ND64 can be adapted to work with the OEM harness of a large number of vehicles from different manufacturers including Mazda, Ford, Honda, Toyota, Subaru, Suzuki, Chrysler, and Mitsubishi.

Modifying the unit from one vehicle to another depends on how these jumpers are configured and the software configuration. If you bought the PNP ND64 already built for ***A SPECIFIC*** vehicle and model you don't have to worry about these and they should be set correctly.

If you bought a generic unit, you will need to connect the jumpers so that the PNP ND64 is connected correctly to your factory wiring.

Jumper connections can be made on both the top and bottom of the main boards - the markings are on both sides.



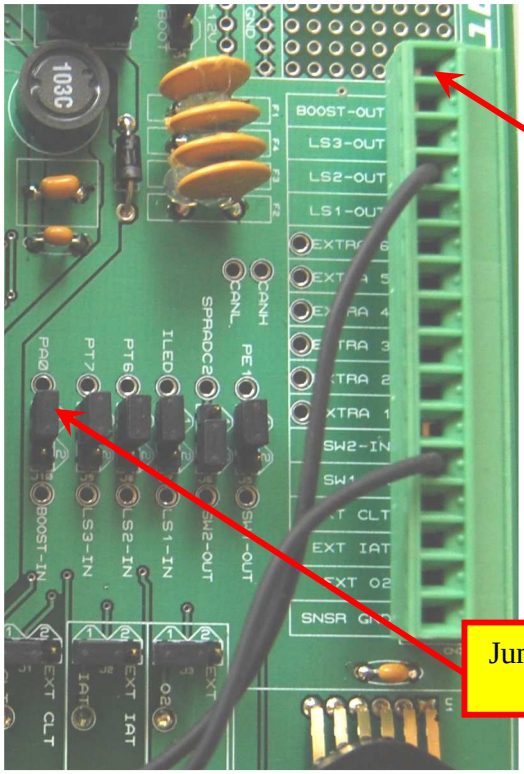
2.6. Input and Output Selection

The Stratified PNP ND64 is designed to be as flexible as possible in order to accommodate individual setups. The user is able to easily gain access to the following built-in features:

- 3 Relay Drivers
- 1 Boost Control Solenoid Driver
- 2 Digital Switches
- OEM or External CLT, IAT, O2 Sensors

Accessing these features involves the following steps:

1. Setting jumpers. In this section you will see there are 9 removable jumpers that can be set in position 1 or position 2. 6 of the jumpers deal with drivers and switches, and 3 of them handle the CLT, IAT, O2 sensors
2. For the drivers and switches, setting a jumper in position 1 directly connects the Microsquirt output to the External Connector. You can then bring a wire in and out of this connector without touching a soldering iron.



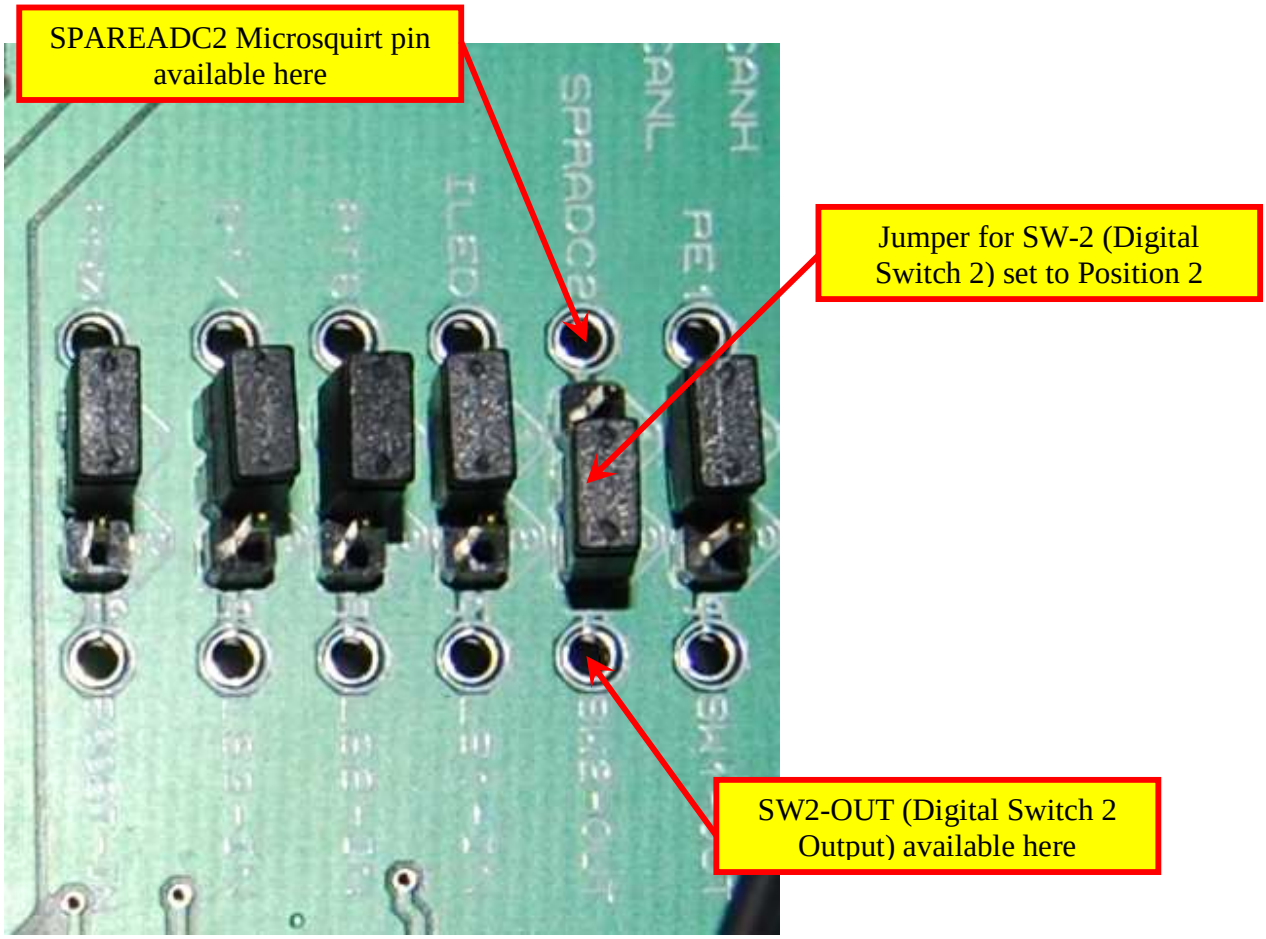
Output to boost control solenoid is here

Jumper for Boost Control set to Position 1

3. Because the Microsquirt has a limited number of inputs and outputs, a user may not want the exact configuration for the extra drivers as it is setup in the PNP ND64. This is when the jumper is moved to position 2.

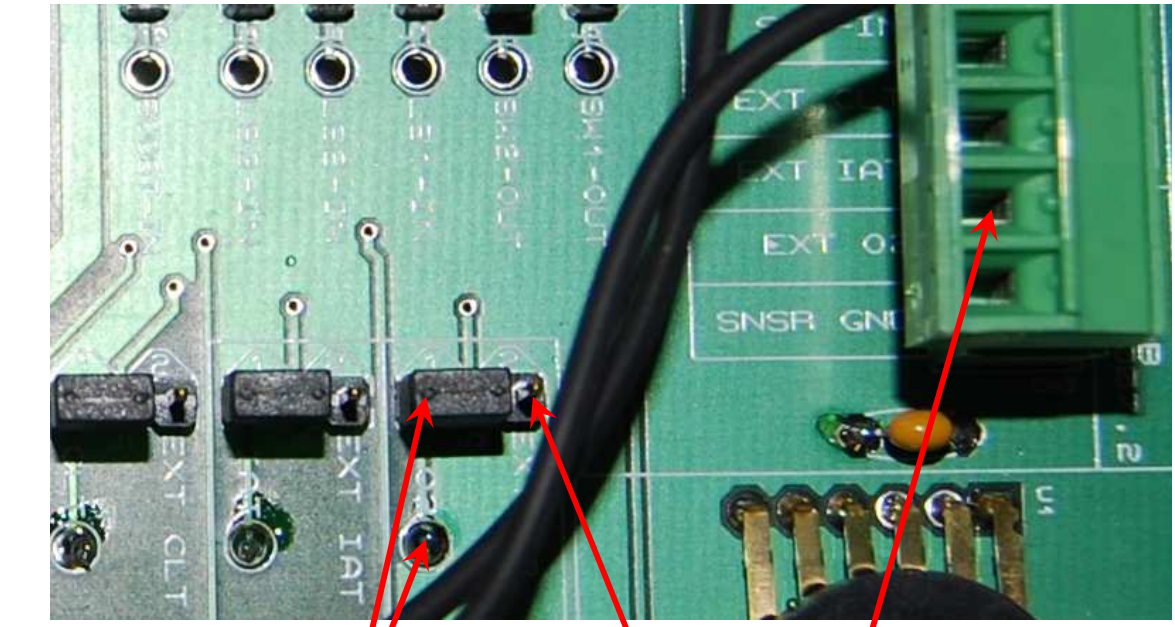
4. In the example with the Boost Controller, moving the jumper to position 2 makes the Microsquirt output PA0 available as well as the *input* to the boost controller (BOOST-IN) if it is desirable to use another Microsquirt pin to control the Boost Control Solenoid Driver.

5. If position 2 is selected for any of the 6 drivers and switches, wire jumpers are used to connect the now-available Microsquirt I/O pins as well as the drivers/switches themselves. See example below



6. A similar selection can be made for the 3 sensors: Coolant (CLT), Intake Air Temperature (IAT), Oxygen Feedback (O2). If the jumper is in position 1, the sensor signal is going to be coming from the stock vehicle harness. If the jumper is in position 2, the sensor signal is routed to the terminal block entry point labelled for that sensor. This makes adding external sensors such as Wideband O2 sensors, IAT sensors, or CLT sensors easy and without having to solder anything.

7. See the example below involving the O2 sensor.



IF O2 sensor jumper set to Position 1, O2 sensor signal connected to stock vehicle harness

IF O2 sensor jumper set to Position 2, O2 sensor signal is routed to the Terminal Block making adding a Wideband O2 very easy

8. Below is a table of all the optional inputs and outputs available on the Stratified PNP ND64. Remember that enabling these features also requires turning them on in the software (Megatune).

Feature	Description	Use	Microsquirt I/O Name
Digital Switch 1 (SW1)	Digital switch, active (ON) when SW1-IN pulled to ground	Table Switching, NOS Input,	PE1
Digital Switch 2 (SW2)	Digital switch, active (ON) when SW1-IN pulled to ground	Launch Control, Flat Shift	SPAREADC_2, AD7, JS4
Relay Driver 1 (LS1)	When activated, it makes connection to ground. Can be used for relays, solenoids, should not exceed 3A current continuous	Secondary intake runners, fans, water injection, intercooler sprayer, shift lights, etc.	TACHOUT, PM-3, Injection LED
Relay Driver 2 (LS2)	When activated, it makes connection to ground. Can be used for relays, solenoids, should not exceed 3A current continuous	Secondary intake runners, fans, water injection, intercooler sprayer, shift lights, etc.	PT6
Relay Driver 3 (LS3)	When activated, it makes connection to ground. Can be used for relays, solenoids, should not exceed 3A current continuous	Secondary intake runners, fans, water injection, intercooler sprayer, shift lights, etc.	PT7
Boost Control Solenoid Driver	When activated, it drives a boost control solenoid that controls a turbocharger waste gate	Boost control	PA0, JS11

9. As mentioned above in step 5, you can use these Microsquirt I/O pins for something else simply by setting the selection jumpers to position 2. The table on the next page is sourced from the Megasquirt documentation website and shows all the possible uses for the I/O pins.

Note: Any function in the same row (A B C D E or F) can NOT be used together!
(e.g. if you are using the stepper motor you cannot use the additional injector channels as they require the same pads, etc)

Pad	A	B	C	D	E	F
PT7 (m)	**Stepper Motor †**	Programmable Output (3)	Tacho Output	NOS Relay Output (Stage 1) (3)	Boost Control PWM Output (2)	Injector channel 4
PT6 (m)	**Stepper Motor †**	Programmable Output (3)	Tacho Output	NOS Relay Output (Stage 2) (3)	Boost Control PWM Output (2)	Injector channel 3
IACEnbl (m)	**Stepper Motor †**	...	...	...	...	...
SPAREADC (AD6)	**Constant Barometric Correction** (1)	Knock Input (4)	Launch Control Input (4)	Second O2 input (1)	NOS Input (4)	...
SPAREADC_2 (AD7)	**Constant Barometric Correction** (1) (m)	Knock Input (4)	Launch Control Input (4) (m)	Second O2 input (1) (m)	NOS Input (4) (m)	...
PE1 (m)	...	...	Launch Control Input (4)	...	NOS Input (4)	**Switch VE and or Ignition map Tables**
FLEX	...	...	Launch Control Input (4)	...	NOS Input (4)	...
TACHOUT	...	Programmable Output (3)	Tacho Output	...	...	...
PA0 (m)	...	Launch Control Input (4)	Tacho Output	Programmable Output (3)	Boost Control PWM Output (2)	NOS Input (4)
IGNOUT (IGN)	Spark A (All ignition setups)	...	Tacho Output	...	...	...
IGNOUT2	Spark B (any COP, 4+cyl wasted spark)	...	...	...	...	...
WLED	Spark C (3+cyl COP, 6+cyl wasted spark)	Programmable Output (3)	Tacho Output	NOS Relay Output (Stage 2) (3)	...	...
ALED	Spark D (4cyl COP, 8cyl wasted spark)	Programmable Output (3)	Tacho Output	...	...	...
IDL (FIdle)	PWM Idle Valve Control *(2 or 3 wired valves)* (2)	Tacho output	Programmable Output (3)	NOS Relay Output (Stage 1) (3)	Boost Control PWM Output (2)	...

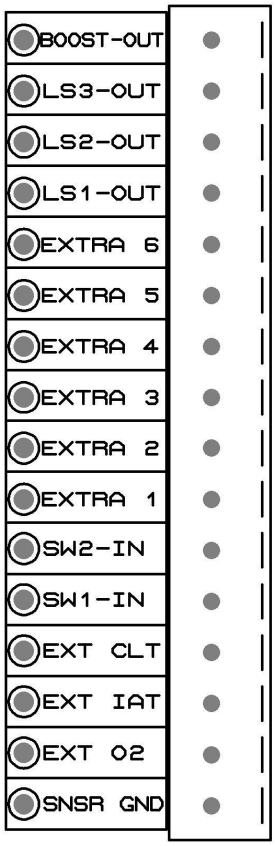
Source: http://www.msextra.com/doc/ms2extra/MS2-Extra_Hardware.htm

2.7. External Terminal Block Connector

This connector allows the easy (solder free) addition of wiring to and from the Stratified PNP ND64 unit.

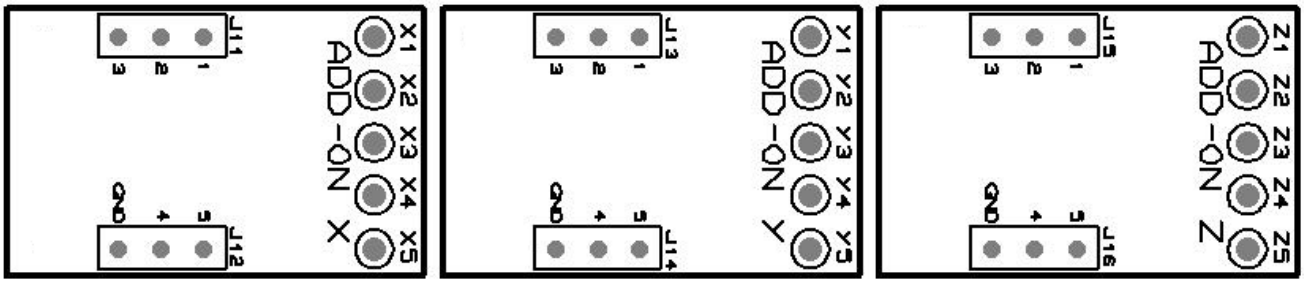
It has 16 positions divided and labelled as follows:

Remember that these outputs are affected by the position of the removable jumpers described in Section 2. Input and Output Selection.



- **BOOST-OUT** - Boost controlled solenoid output connection
- **LS1-OUT** to **LS3-OUT** - Relay drivers output connections (eg. fan control)
- **SW1-IN** and **SW2-IN** - Digital switch inputs (eg. clutch switch)
- **EXT CLT** - External coolant sensor connection
- **EXT IAT** - External intake air temperature sensor connection
- **EXT O2** - External oxygen sensor connection
- **SNSR GND** - Ground connection for ANY of the 3 external sensors
- **EXTRA 1** to **EXTRA 6** - Can be used for any other wires that need to be brought in or out of the PNP and are not part of the stock wiring harness (eg. adding COP ignition, or Sequential injection)

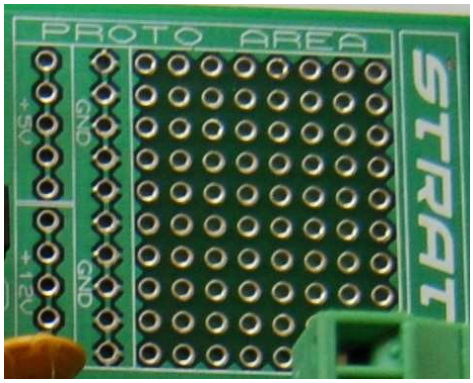
2.8. Area for 3 Expander Boards



This area is designed to allow for the expansion of the Stratified PNP ND64 unit for unique applications and different platforms. Although the PNP ND64 is a very complete unit as-is, since it covers so many different platforms and applications, we wanted to have room to grow.

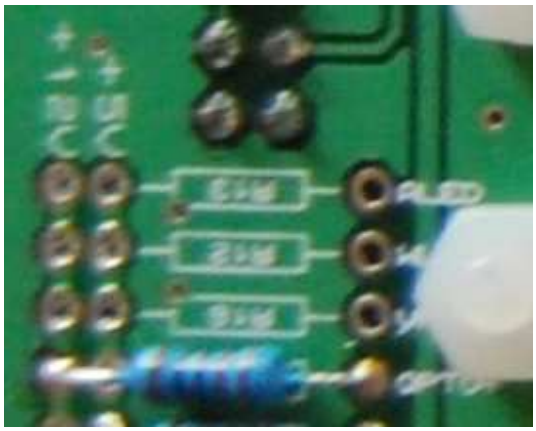
The Stratified Expander Boards will include extra injector drivers for sequential injection, knock controllers, signal conditioners ... we want to make our unit as versatile as possible and we will sell these expansion boards separately as each platform develops unique needs.

2.9. Proto Area



Similar to the Expander Board area, the Proto area allows for unique customizations of the unit. 12V, 5V and GND pads are available nearby. *Please note that the 5V source should not be loaded with any more than 200mA of current. The 12V source should not be loaded with any more than 3A of current.*

2.10. Pull-ups

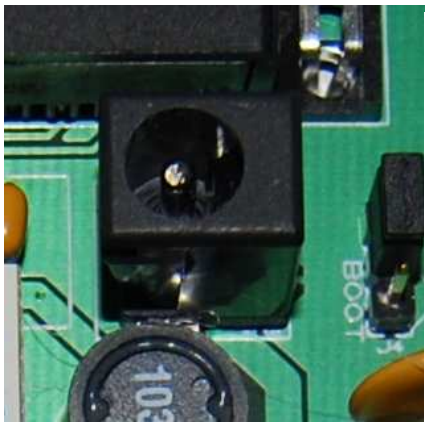


In some applications the ignition inputs require pull-up resistors to either 5V or 12V or the outputs require flyback diodes. The OPTO+, VR2, ALED, WLED pins are located here next to 12V and 5V pull-up locations for convenience.

2.11. MAP Sensor

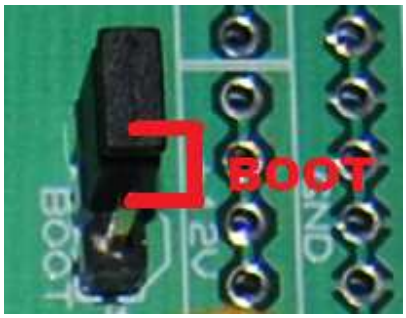
The Stratified PNP ND64 base unit comes with a pre-installed 2.5 bar MAP sensor good for up to 21psi of boost. We offer upgraded sensors if this is not enough for your application.

2.12. External Power Connector



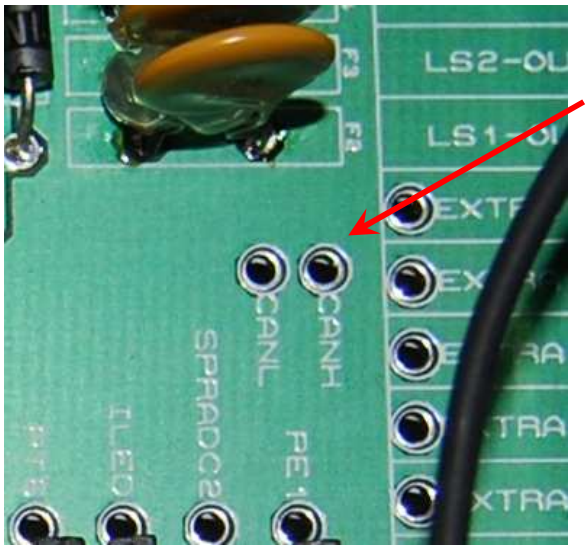
If you would like to flash the flash a new calibration on the unit at home or re-flash the firmware with the unit out of the vehicle, you will need to power the PNP ND64 using a 12V AC adapter similar to the one pictured above. The connector specifications are: 2.1mm ID, 5.5mm OD.

2.13. Boot Jumper



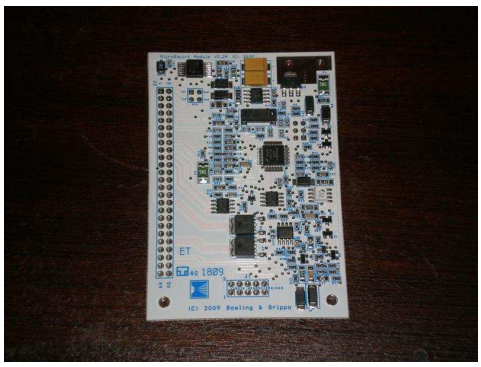
If for some reason the firmware needs to be re-flashed and processor put into boot mode, move this jumper into the boot position as shown. Follow the procedure in Section 3.3 above.

2.14. CAN Network



The MSII Processor has CAN integration and the backbone can be reached at these two pins. A terminating 120 ohm resistor is already included.

2.15. MSII ECU - Microsquirt Module



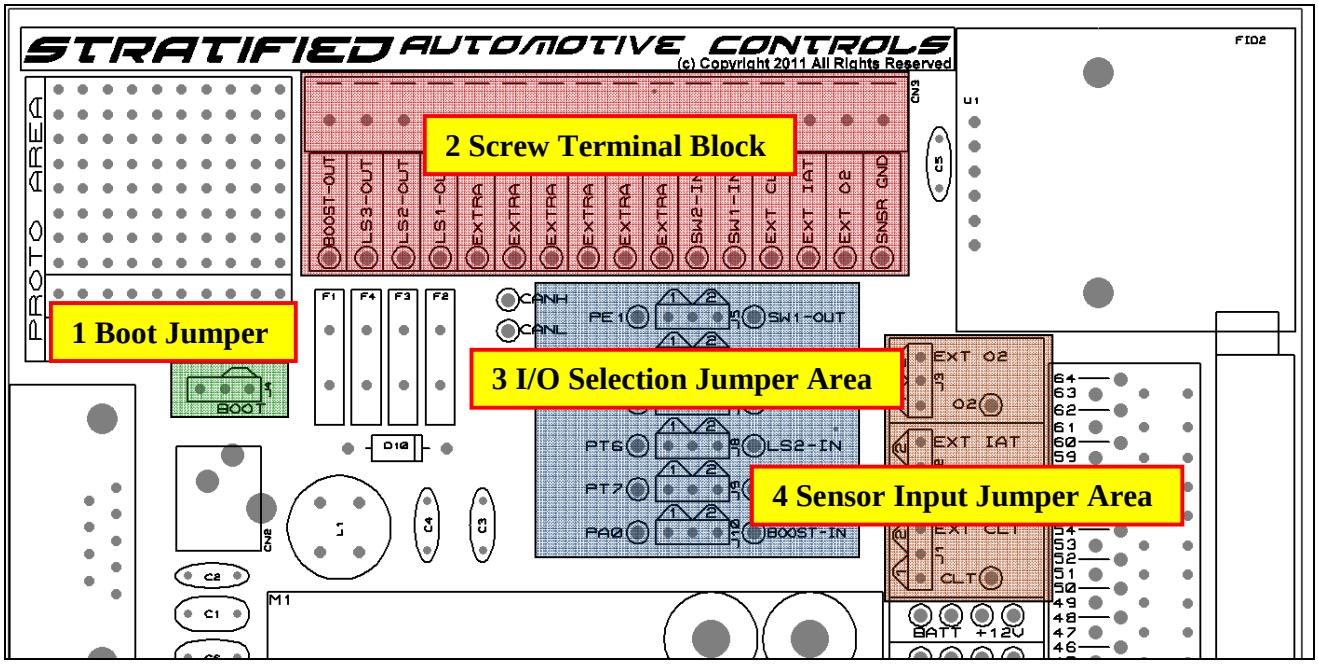
The Stratified PNP ND64 is powered by a fast and proven Megasquirt II (MSII) processor on a Microsquirt module board. This powerful processor is driven by MSII-Extra firmware and it supports and MSII firmware.

A detailed firmware feature list, firmware downloads and setup instructions can be found here: http://www.msextra.com/doc/ms2extra/

3. How-To Procedures

To complete the following how to procedures, you need to be familiar with the following parts of the PNP circuit board:

1. Boot Jumper
2. Screw Terminal Block
3. I/O Selection Jumper Area
4. Sensor Input Jumper Area



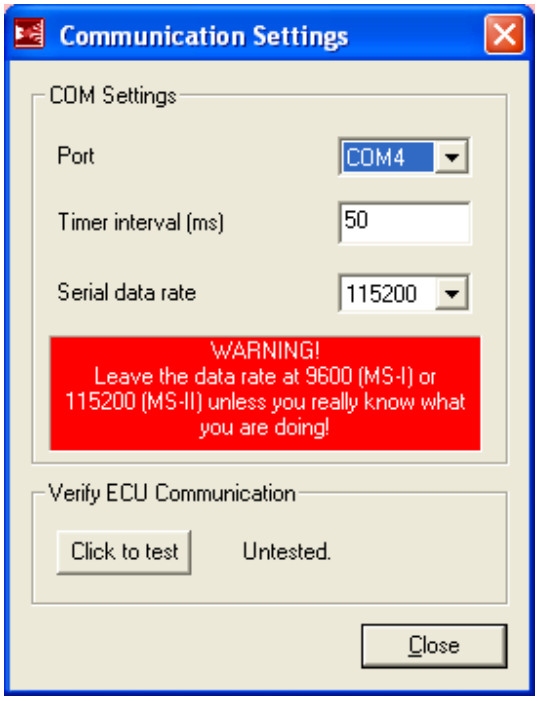
3.1. Establishing Communications with the PNP ECU

1. Ensure your tuning computer or laptop is connected to the Stratified PNP with the supplied serial tuning cable. The cable connects to the DB9 Tuning Cable Connector, located on the rear panel of the enclosure.

2. With the PNP installed in your vehicle, turn the vehicle's key to the "ignition on" position. This will turn on the power to the PNP, and it will begin to send data to your computer.

3. If the MegaTune gauges do not respond, this means the communications is not setup properly.

4. Go to the **Communications** Menu → **Settings…**



5. Ensure the selected Port is correct. For computers with a DB9 serial COM port, the Port setting should be set to **COM1**.

6. For computers with a USB serial port, where a USB-to-RS232 cable is used, the Port number must be verified by viewing the Window's Device Manager. In the case shown above, **COM4** is selected.

7. The **Serial date rate** must be set to **115200**.

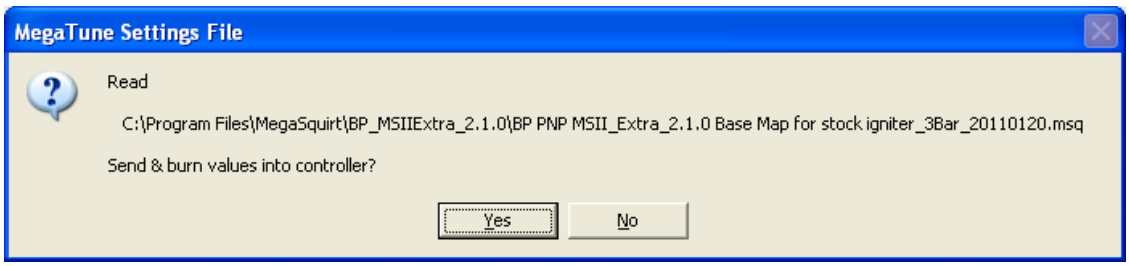
8. Once these settings have been properly selected, click the "Click to test" button. You should see "Success" to indicate that communications has now been established. Close the window.

3.2. Looking at and Burning a Calibration/Map to the PNP ECU

1. If you want to burn a saved calibration/map on your ECU or just look at the values in a different map you will need to open it using MegaTune. *Please note that you can only properly view maps that are saved from ECUs with the same firmware installed. If you are opening a calibration saved using different firmware, MegaTune will show a number of warnings.*

2. Go to **File Menu → Open**… and select the Engine Calibration msq file.
3. After opening this file, MegaTune will ask to send the entire set calibration value to the Megasquirt. If you would like to flash this calibration on your ECU, ensure the ignition key is ON and hit "Yes".

4. If you want to just look at the values in MegaTune, hit "No." To just look at a calibration/map you don't need to be connected to the ECU.



5. After hitting "Yes", MegaTune will send all the calibration values to the Megasquirt processor. This process may take several minutes, and MegaTune will be completely unresponsive during this time. **Do NOT** interrupt the communication or shut off MegaTune.

6. Once completed, the Megasquirt processor and the MegaTune software will be synchronized.

3.3. Flashing the Megasquirt Base Firmware

You will need to flash the firmware on the Stratified PNP ECU in the following scenarios:

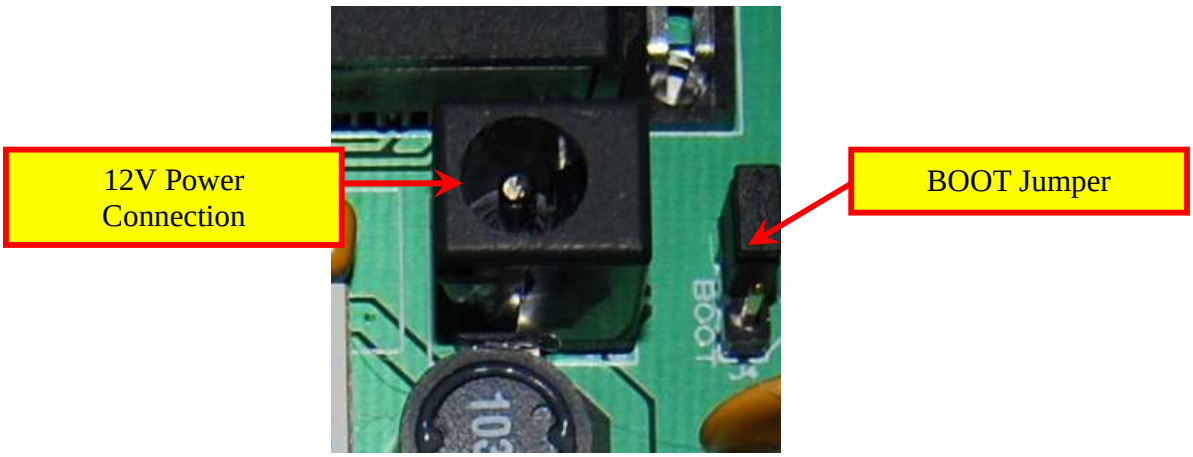
- You bought a generic unit and would like to run the firmware of your choice
- You would like to upgrade to a new code base because new features are available
- The PNP becomes unresponsive and you can no longer communicate using MegaTune although all the settings are correct.

Before you start, you will need a wall wart type **DC 12V power supply**. The power connectors is very generic (2.1mm ID, 5.5mm OD) and the power supply can be found at most electronics stores or online

1. Disconnect and remove the Stratified PNP from your vehicle.

2. Remove the top half of the PNP enclosure by removing the upper screws on each end panel.

3. Plug in the 12V wall wart power supply into the power jack located near the DB9 serial connector.

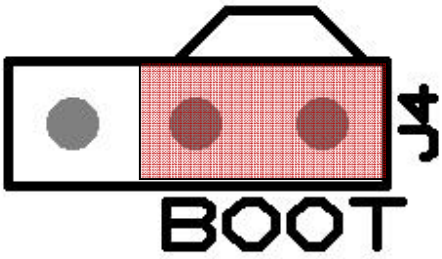


4. Ensure the serial communications cable is connected between the PNP and your computer.

5. Locate the folder on your PC where the new firmware is stored. *If you bought a vehicle specific PNP unit from Stratified, the installed firmware is included on the Installation and Instructions CD in the folder called Firmware. The firmware*

version originally installed on the ECU is printed on the label on the back of the ECU.

6. Move the BOOT Jumper so the black jumper is positioned directly above the word BOOT.



7. On your computer, run the download file located in the firmware folder. This file is often called **download-MS2-firmware**

8. When asked, select Microsquirt Module.

9. When asked if you are upgrading from standard code, select No

10. Follow the procedure as prompted by the software.

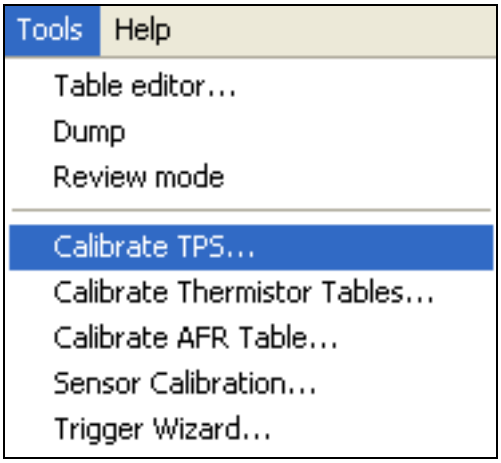
11. If there are any problems, where the process does not complete successfully, RESTART the process from the start. The firmware download is also documented online at: http://www.msextra.com/doc/ms2extra/upgrade.html#download

IMPORTANT NOTE:
You must open and install your vehicles engine calibration following re-flashing the base firmware. This procedure has been described previously in the section titled "Opening and Installing an Engine Calibration"

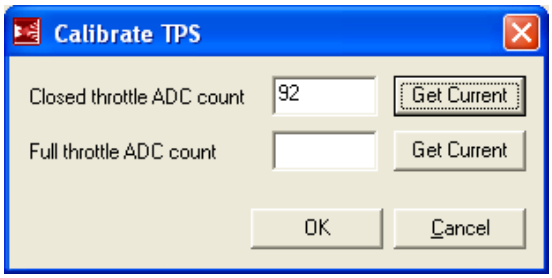
3.4. Calibrating the Throttle Position Sensor (TPS)

1. Many of the Megasquirt fuelling processes depend on precise measurement of your vehicle's throttle position. If your vehicle has such a variable TPS sensor, follow the directions below to send its calibration to the Megasquirt processor. *Please note: not all vehicles have a variable TPS. If this is the case the PNP ECU is setup to use the other sensors (MAP) to compensate for this.*

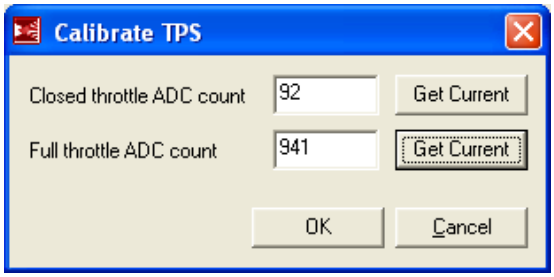
2. Go to: Tools **Menu → Calibrate TPS…**



3. Without pressing on the throttle pedal, click the **Get Current** button next to the C**losed throttle ADC count**.

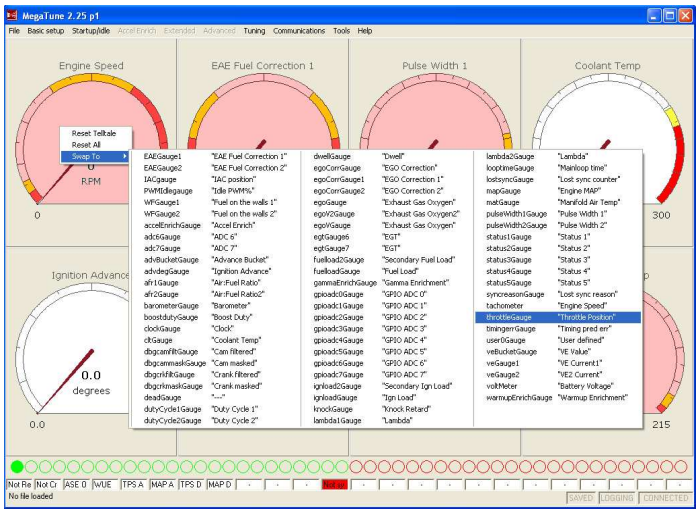


4. Next, press down completely on the throttle pedal and click the **Get Current** button next to the **Full throttle ADC count**.



5. Click **OK**.

6. To verify the calibration, right click one of the gauges and switch it to show the **Throttle Position**.



7. Press your foot on your throttle pedal and make sure the gauge value corresponds properly.

3.5. Adding a Wideband Oxygen Senor

A wideband oxygen sensor is strongly recommended for tuning your vehicles volumetric efficiency (VE) table. The Stratified PNP ND64 easily allows for the addition of a wideband oxygen sensor. In order to add the Wideband sensor, follow the instructions below.

3.5.1. Hardware Setup

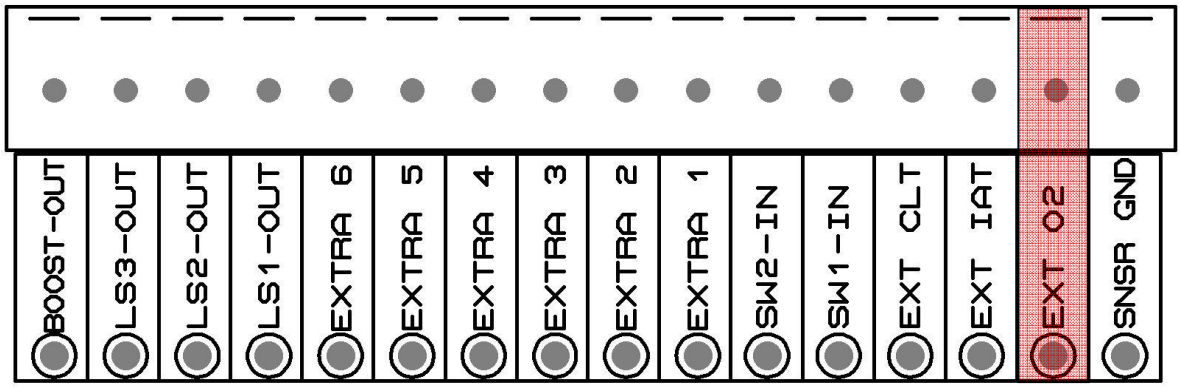
To change the initial hardware configuration to send the wideband sensor's signal to the Megasquirt processor please do the following:

1. On your wideband sensor's wire harness, determine the wire which is the 0V-5V analog voltage signal representing the wideband AFR.

2. Strip approx ¼" (6mm) of wire insulation from this wire.

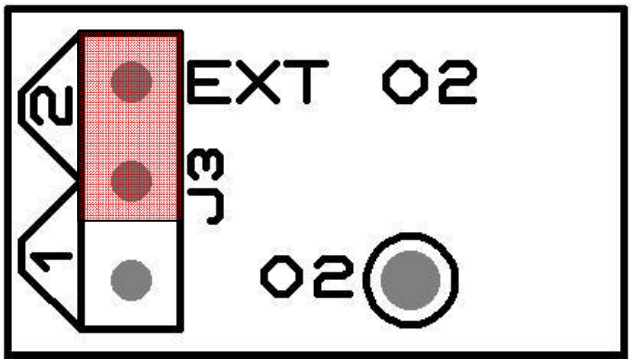
3. Remove the top half of the Stratified PNP enclosure by removing the top two screws on each end panel.

4. On the large green screw terminal connector block, locate the **EXT O2**.



5. Insert the wideband signal wire through the rubber grommet on the rear panel and into the screw terminal block position. Tighten the screw to hold the wire steady.

6. Locate the jumper **J3**, and move the black jumper to position 2, to select **EXT O2**.



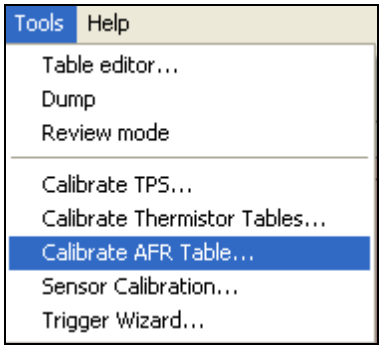
Note that when the jumper is position 1, the sensor inputs are routed to the stock vehicle harness.

The wideband sensor signal is now properly routed to the Megasquirt's sensor input.

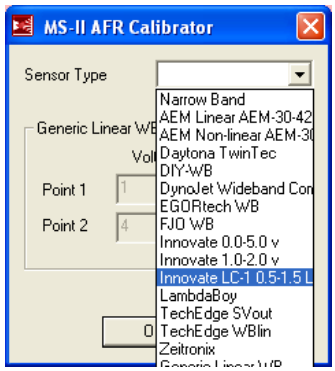
3.5.2. Software Setup

The newly installed wideband sensor must have its signal calibration values sent to the Megasquirt processor in order to be interpreted properly. To setup the software, please do the following:

1. In Megatune navigate to **Tools → Calibrate AFR Table…**



2. Select the Oxygen **Sensor Type** from the list available, and click OK. You will see the software count up to 1023 as it writes the values to the ECU



3. In the example below, an Innovate LC-1 wideband sensor has been selected. Ensure you select your particular brand of senor.

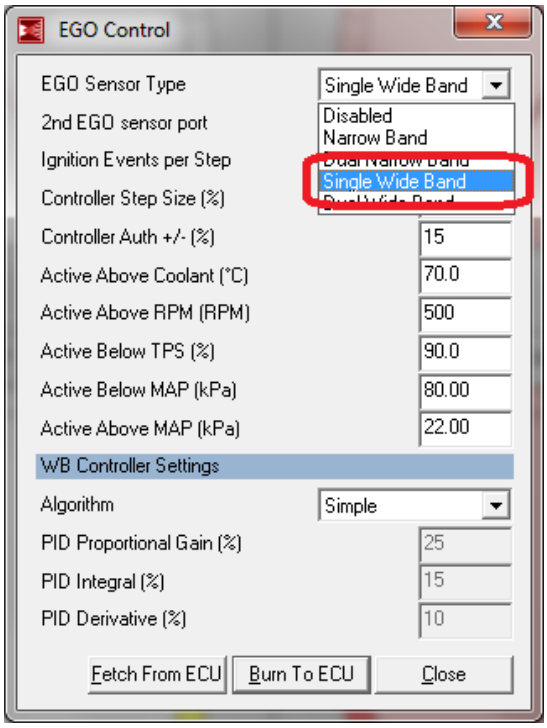
4. If your particular wideband sensor does not appear on this list, you may select the bottom option “Generic Linear WB”. In this case, you must enter the sensor voltage and corresponding AFR values, for the bottom and the top of the sensor’s range.

5. If the calibration stalls, or the does not completely count up to 1023 values, repeat the sensor selection.

6. Once the calibration has been completely sent, close the window.

7. Go to **Basic setup** Menu → **EGO Control**

8. Select the **EGO Sensor Type** as **Single Wide Band.**



9. Set the other settings as desired. *Also note that your Wide Band sensor in closed loop will now target the values in your AFR table located under **Basic Setup -> AFR Table 1**. Set this table as desired.*

10. Click **Burn To ECU**. Close the window.

11. Go to **Basic Settings → AFR Table 1**
Adjust the target AFR values for your vehicle.

3.6. Using an External Air or Coolant Temperature Sensor

If you have opted to use a separate 2-wire air temperature sensor, other than your vehicle's stock sensor, you will need to follow this simple procedure to ensure the temperature signal is properly setup.

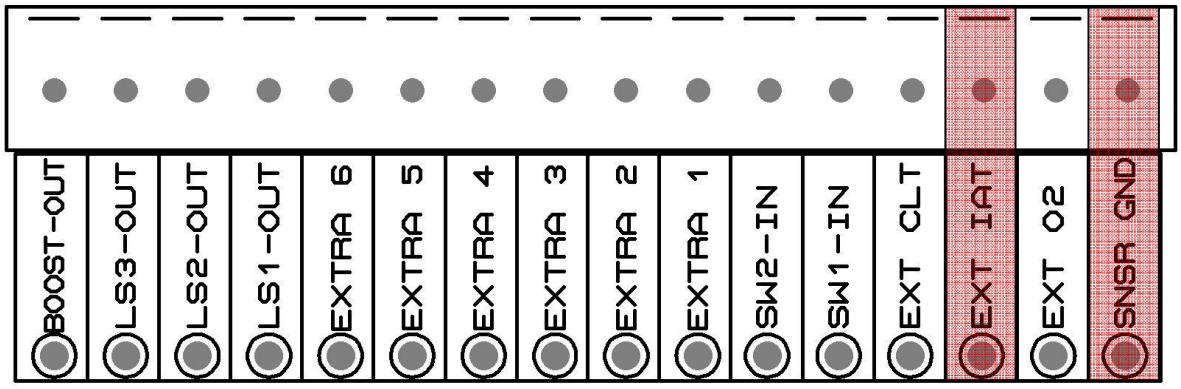
Note: If you vehicle uses a VAF air flow meter with an integrated air temperature sensor, you may now completely remove the VAF system from your vehicle. Please see Section 3.11 below and follow the procedure to perform this operation. Improper removal of your vehicle's VAF system can result in disabling vehicle's fuelling system.

3.6.1. Hardware Setup

1. Strip approx ¼" (6mm) of wire insulation from each wire on the temperature sensor harness.

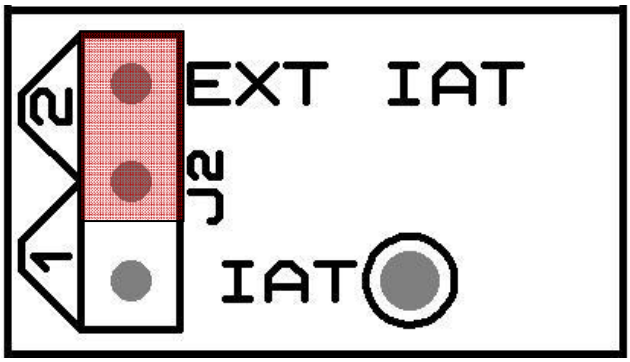
2. Remove the top half of the Stratified PNP enclosure by removing the upper screws on each end panel.

3. On the large green screw terminal connector block, locate the terminals **EXT IAT** and **SNSR GND**.



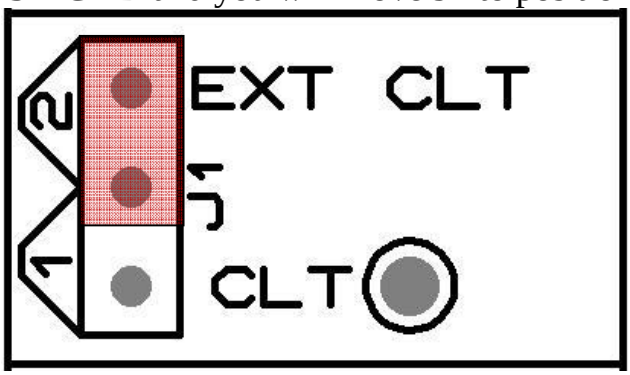
4. Insert both wires through the rubber grommet on the rear panel and into the **EXT IAT** and **SNSR GND** terminal positions. It does not matter which wire goes into which position. Tighten the screws to hold the wires steady.

5. Located the jumper **J2**, and move the black jumper to **Position 2**, labelled **EXT IAT**.



Note that when the jumper is position 1, the sensor inputs are routed to the stock vehicle harness.

6. If you are installing an **external coolant sensor** the procedure is the same except you will insert the coolant sensor wires in the terminal block connector positions **EXT CLT** and **SNSR GND** and you will move **J1** to position 2.



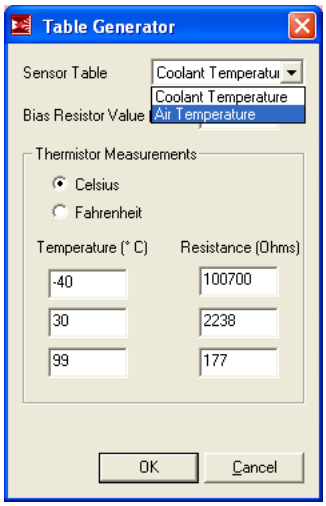
The external air temperature or coolant temperature sensor signal is now properly routed to the Megasquirt's sensor input.

3.6.2. Software Setup

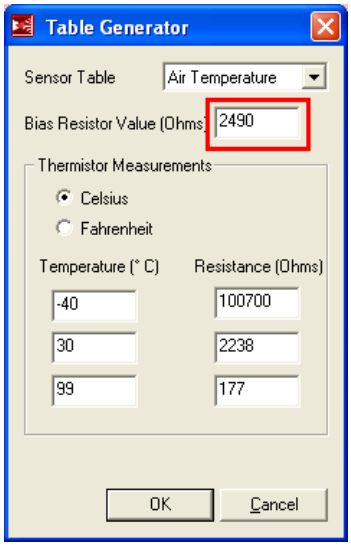
The newly installed temperature sensor must have its signal calibration values sent to the Megasquirt processor in order to be interpreted properly. To setup the software, please do the following:

7. Go to **Tools** Menu → **Calibrate Thermistor Tables…**

8. When the window opens, select **Air Temperature** from the list box



9. Ensure the bias resistor value is set to **2490 ohms**. This value should not be adjusted.



12. Now, using your specific air temperature sensor resistance values which you will find from your vendor or manufacturer of the sensor, enter three points into the **Thermistor Measurements** section, and hit OK when finished.

13. Setting the software for the **coolant temperature sensor** happens the same way, you just need to select Coolant Temperature in step 10 and enter the correct Thermistor Measurements in step 12.

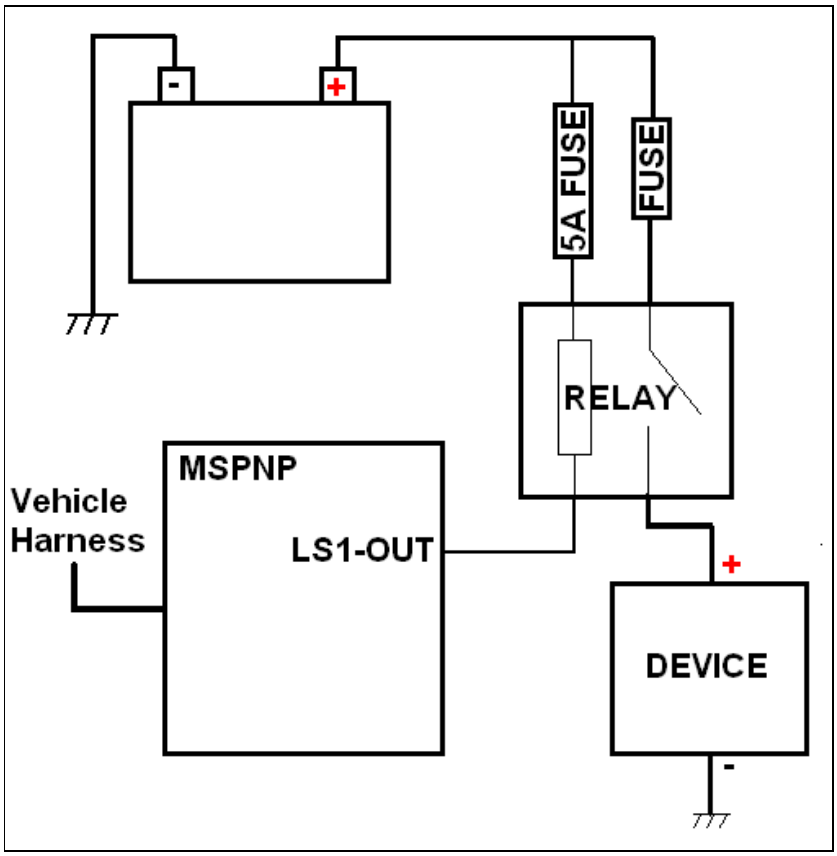
3.7. Enabling an Output for a Fan, Shift Light or Other Device

In order to use the Megasquirt to control other devices in your vehicle, the Stratified PNP comes fully equipped with 3 output low side drivers, which are intended to drive relays or other low current loads such as solenoids. Each driver can support up to 3 Amps.

IMPORTANT NOTE:
If you are using a low side driver for a fan or other type of motor, you must use a relay. LED shift lights and secondary intake runners or other solenoids with a ~10ohm or above resistance can be powered directly from the PNP circuit.

3.7.1. Hardware Setup

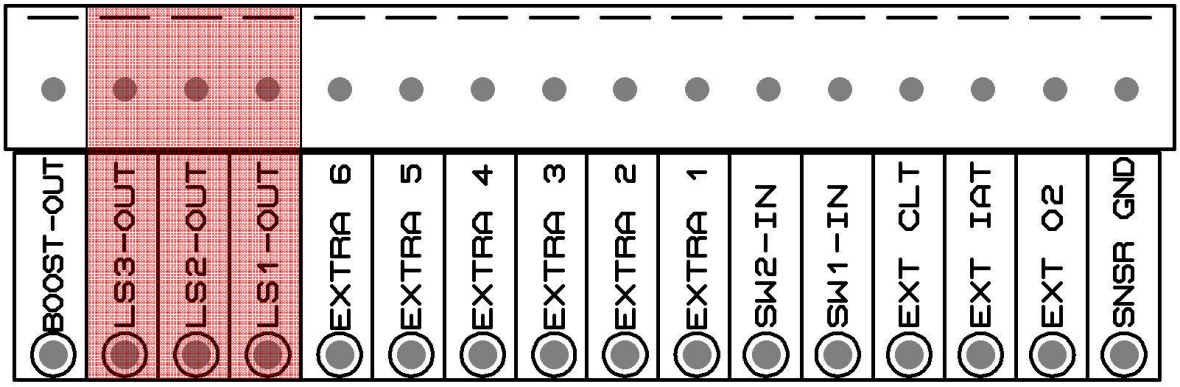
This hardware setup shows you how to connect your device through a relay to the PNP drivers. The image below shows a typical circuit involving a relay being controlled with the PNP though the LS1-OUT control signal.



1. From the circuit seen above, connect the one side of the relay coil through a 5A fuse to the battery terminal, or an ignition switched power source.

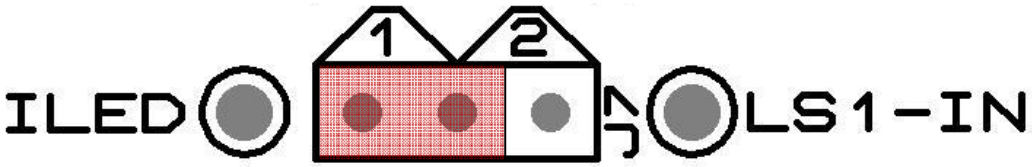
2. Remove the top half of the Stratified PNP enclosure by removing the upper screws on each end panel.

3. On the large green screw terminal connector block, locate the **LS1-OUT** terminal. You may optionally use **LS2-OUT** or **LS3-OUT**.



4. Connect a wire to the other side of the relay coil, insert it through the rubber grommet on the rear panel and into the **LS1-OUT** terminal and tighten the screw to hold the wire steady.

5. In the Input and Output Selection area of the circuit board, ensure the jumper **J7** is in **Position 1**, in the ILED position.



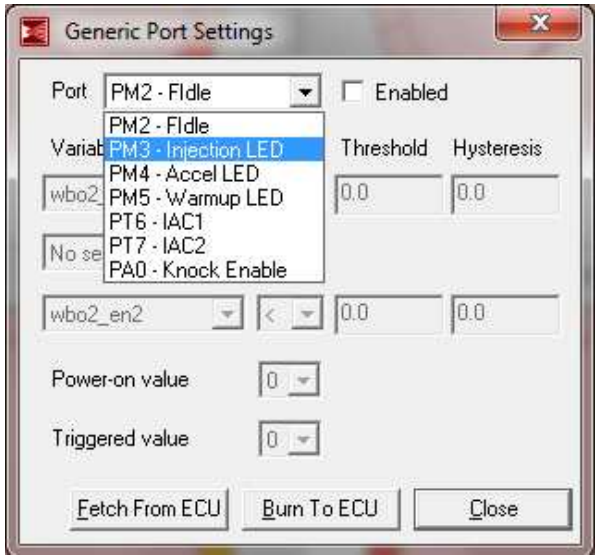
NOTE: If you wish to access an I/O port directly from the Megasquirt and want to decouple it from its low side driver circuit, this is done by setting the jumper for that port to position 2. Read more about this in the later section of this document named: ***Stratified MSNPN ND64 Hardware - 2. Input and Output Selection Section***

3.7.2. Software Setup

In MegaTune, setup the output control with the following procedure:

6. Go to **Extended** Menu → **Output Port Settings**

7. From the **Port** selection box, choose one of the following:
   For LS1-OUT connection, select: "PM3 – Injection LED"
   For LS2-OUT connection, select: "PT6 – IAC1"
   For LS3-OUT connection, select: "PT7 – IAC2"



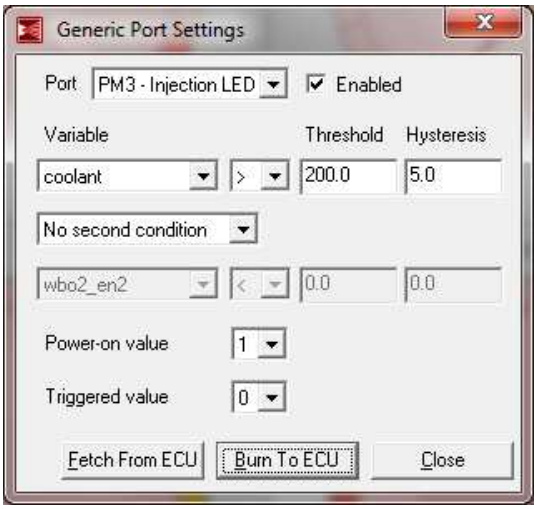
8. Ensure the "Enable" box is checked.

9. Select the variable and the corresponding thresholds you would like to govern when the output is turned on and off.

   NOTE: You must turn the Megasquirt off and on in order for the settings to properly take effect.

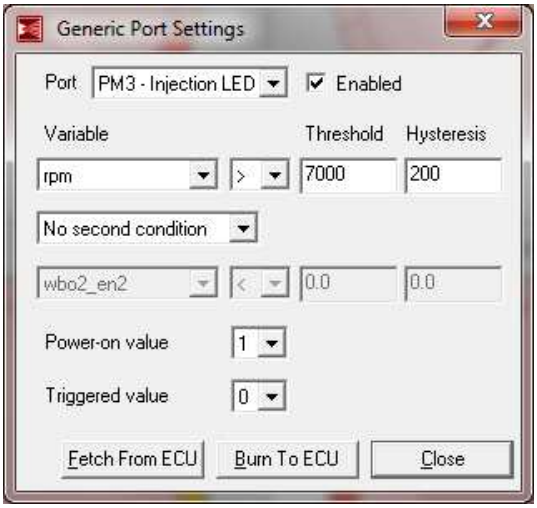
   Example Radiator Fan setting:

   If you have a radiator fan you want to turn on at 200°F, and turn back off at 195°F, you would choose the following settings.



Example Shift Light setting:

If you would like your shift light to turn on above 7000rpm, you would choose the following settings:



3.8. Adding a Clutch Switch for Launch Control or Flat Shifting

To enable more advanced features such as launch control, flat shift, or other input control mechanisms, the Stratified PNP offers 2 separate inputs. The Stratified PNP is compatible with digital inputs that are active when the input is connected to the vehicle's chassis ground.

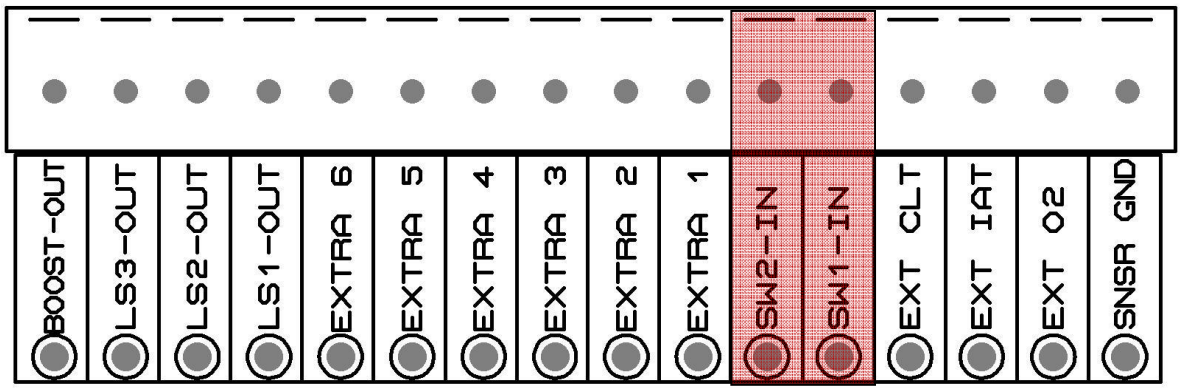
To enable an input switch, such as a clutch switch, follow the procedure below:

3.8.1. Hardware Setup

1. Strip approx ¼" (6mm) of wire insulation from the wire coming from the input switch.

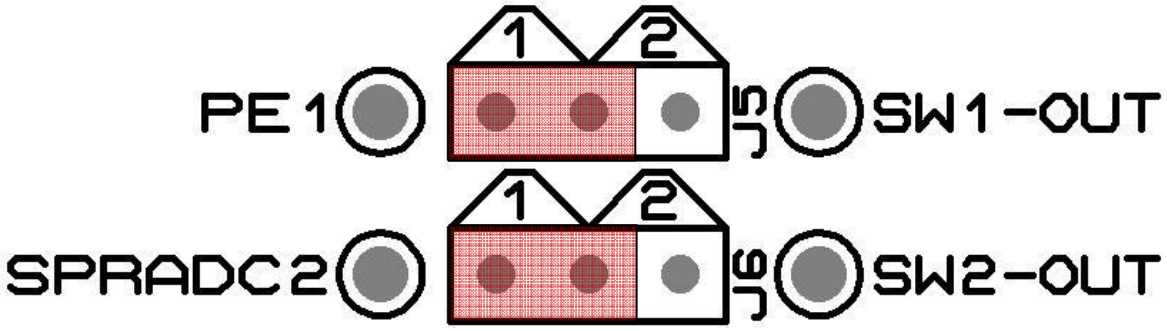
2. Remove the top half of the Stratified PNP enclosure by removing the upper screws on each end panel.

3. On the large green screw **terminal connector block**, locate the terminals **SW1-IN** or **SW2-IN**. You may use either one as an input.



4. Insert the wire through the rubber grommet on the rear panel and place it into the screw terminal position and tighten the screw to hold the wire steady.

5. Locate the jumper **J5** (if using SW1-IN) or **J6** (if using SW2-IN), and ensure the black jumper is in **position 1**.



For SW1-IN, ensure the jumper is in position 1 for **PE1**.
For SW2-IN, ensure the jumper is in position 1 for **SPRADC2**.

The input switch signal is now properly routed to the Megasquirt's input.

NOTE: If you wish to access an I/O port directly from the Megasquirt and want to decouple it from its digital input conditioning circuitry, this is done by setting the jumper for that port to position 2. Read more about this in the later section of this document named: ***Stratified MSNPN ND64 Hardware - 2. Input and Output Selection Section***

3.8.2. Software Setup

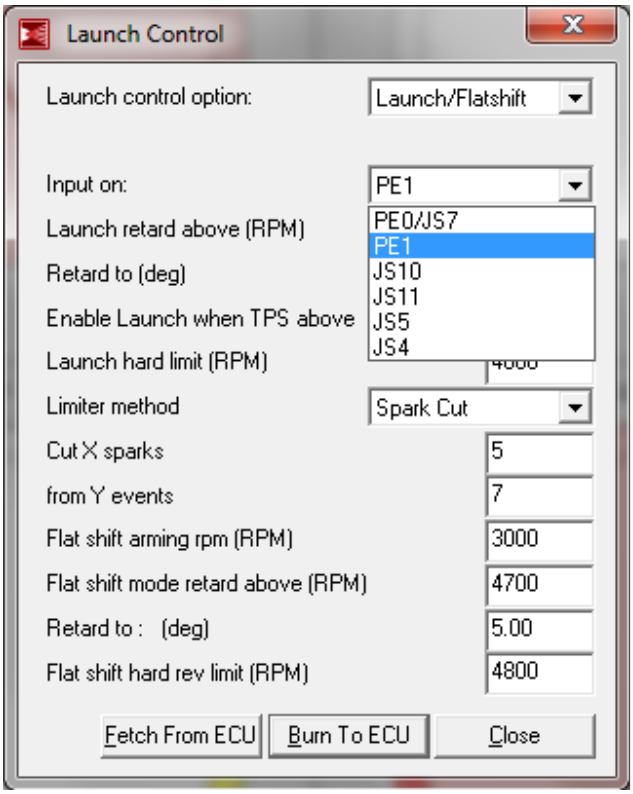
In MegaTune, the following procedure must be followed to enable the input for the megasquirt processor.

1. Ensure MegaTune is connected to your Megasquirt, and your Megasquirt is powered.

2. Go to **Extended** Menu → **Launch Control**

3. Select the Launch Control Option to either **Launch** or **Launch/Flatshift**.

4. If you wired your clutch switch to SW1-IN, select Input On: **PE1**
   If you wired your clutch switch to SW2-IN, select Input On: **JS4**



5. Set the remaining Launch control and Flatshift settings, and click **Burn to ECU**. Close the window.

3.9. Adding a Boost Control Solenoid Valve

If you intend to use the Megasquirt as an electronic boost controller, you will need to use the following procedure to properly set this up:

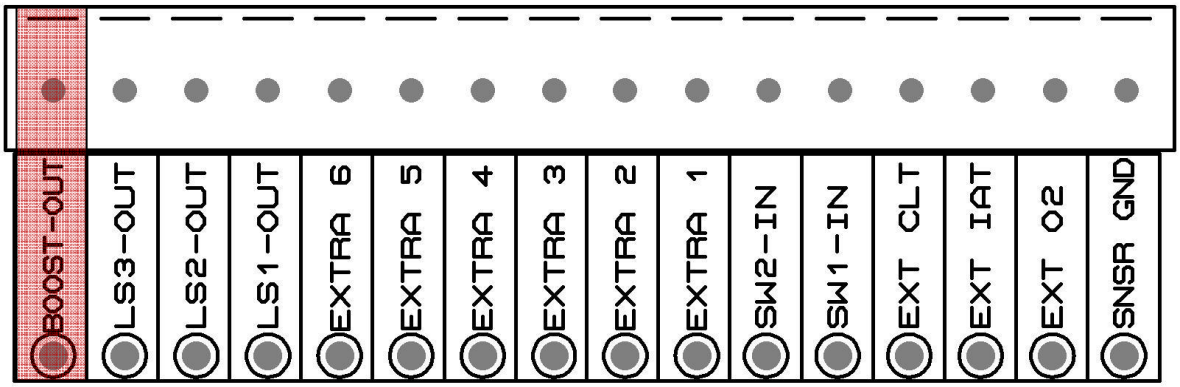
3.9.1. Hardware Setup

1. Using a 2-wire solenoid valve, connect one wire to a 12V source that is switched on with the ignition switch.

2. Strip approx ¼" (6mm) of wire insulation from the other wire

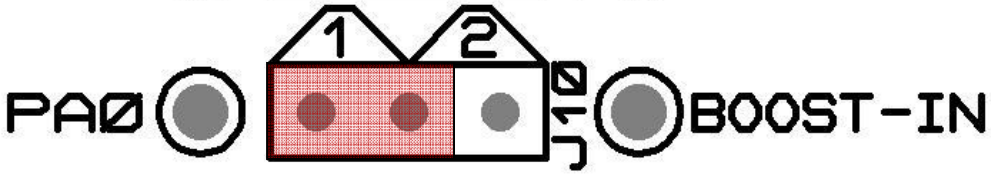
3. Remove the top half of the Stratified PNP enclosure by removing the upper screws on each end panel.

4. On the large green screw terminal connector block, locate the terminal: **BOOST-OUT**.



5. Insert the wire through the rubber grommet on the rear panel and place it into the screw terminal position and tighten the screw to hold the wire steady.

6. Located the jumper **J10**, and ensure the black jumper is located in **position 1**, **PA0**.



The boost control signal is now properly routed from the Megasquirt to your boost solenoid valve.

NOTE: If you wish to access an I/O port directly from the Megasquirt and want to decouple it from the boost control circuitry, this is done by setting the jumper for that port to position 2. Read more about this in the later section of this document named: ***Stratified MSNPN ND64 Hardware - 2. Input and Output Selection Section***

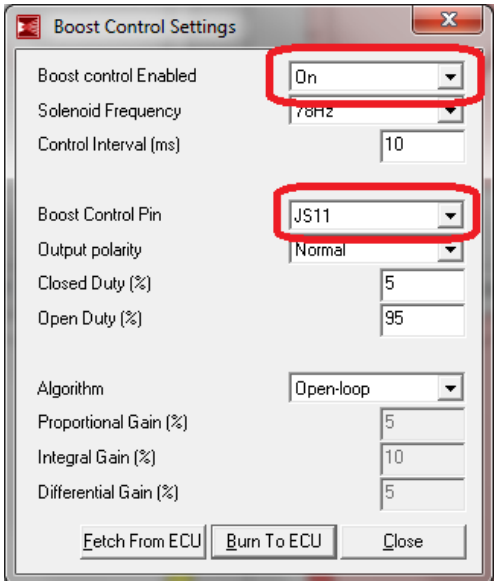
3.9.2. Software Setup

1. Ensure MegaTune is connected to your Megasquirt, and your Megasquirt is powered.

2. Go to **Advanced** Menu → **Boost Control Settings**

3. Change **Boost control Enabled** to **On**.

4. Select the **Boost Control Pin** as **JS11**.



5. Adjust the solenoid frequency and other settings based on your selection of solenoid valve.

6. Click **Burn To ECU**. Close the window.

7. Go to **Advanced** Menu → **Boost Control Duty Table**

8. Enter the desired Duty Cycle Values within this table. This will be an interative process that will take an understanding of your solenoid valve's characteristics.

3.10. Changing Injector Sizes

The base engine calibration that comes with the Stratified PNP is setup for the vehicle's stock injector size. If you have changed your fuel injector size, you will need to make adjustments in MegaTune in order to recalibrate Megasquirt's fuel maps. Follow the instructions below to change your injector size.

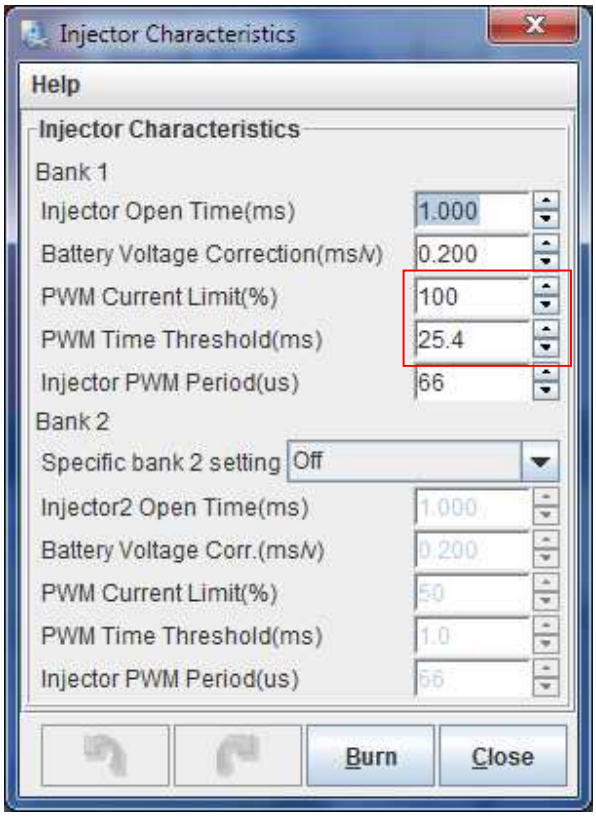
3.10.1. Software Setup

1. Ensure MegaTune is connected to your Megasquirt, and your Megasquirt is powered.

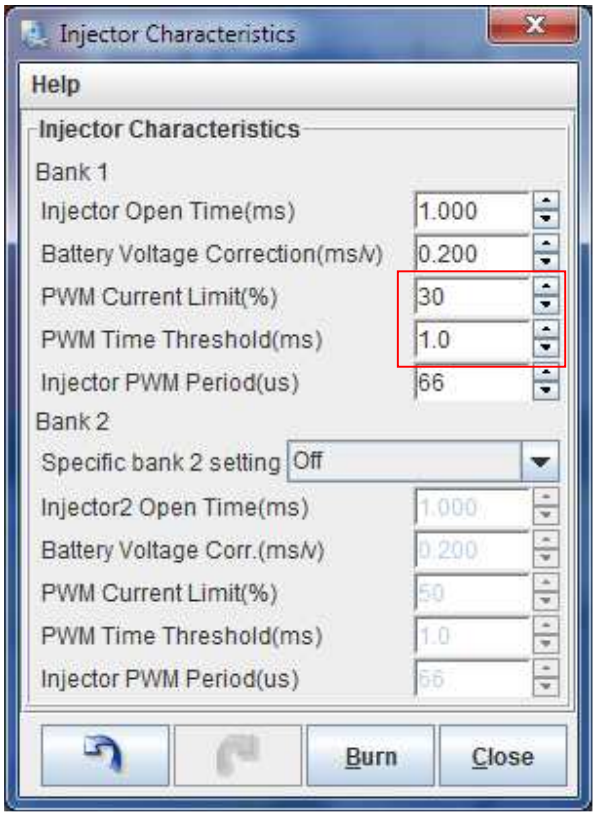
2. First, find out if your injectors are HIGH Impedance or LOW Impedance.

3. Go to **Basic Setup** Menu → **Injector Characteristics**

4. If the injectors are **HIGH** impedance, make sure the following values are entered



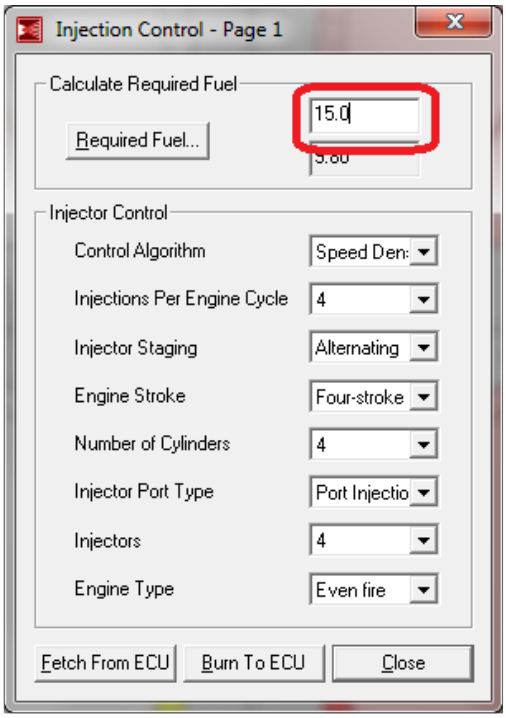
5. If the injectors are **LOW** impedance, make sure the following values are entered



6. Go to **Basic Setup** Menu → **Engine Constants**

7. Change the Required Fuel value using the following formula:
   New Req. Fuel = Old Req. Fuel × Old Injector Size ÷ New Injector Size

Example: original injector size = 230cc, new injector size is 460cc
New Req. Fuel = 15.0 × 230 ÷ 460 = **7.5**



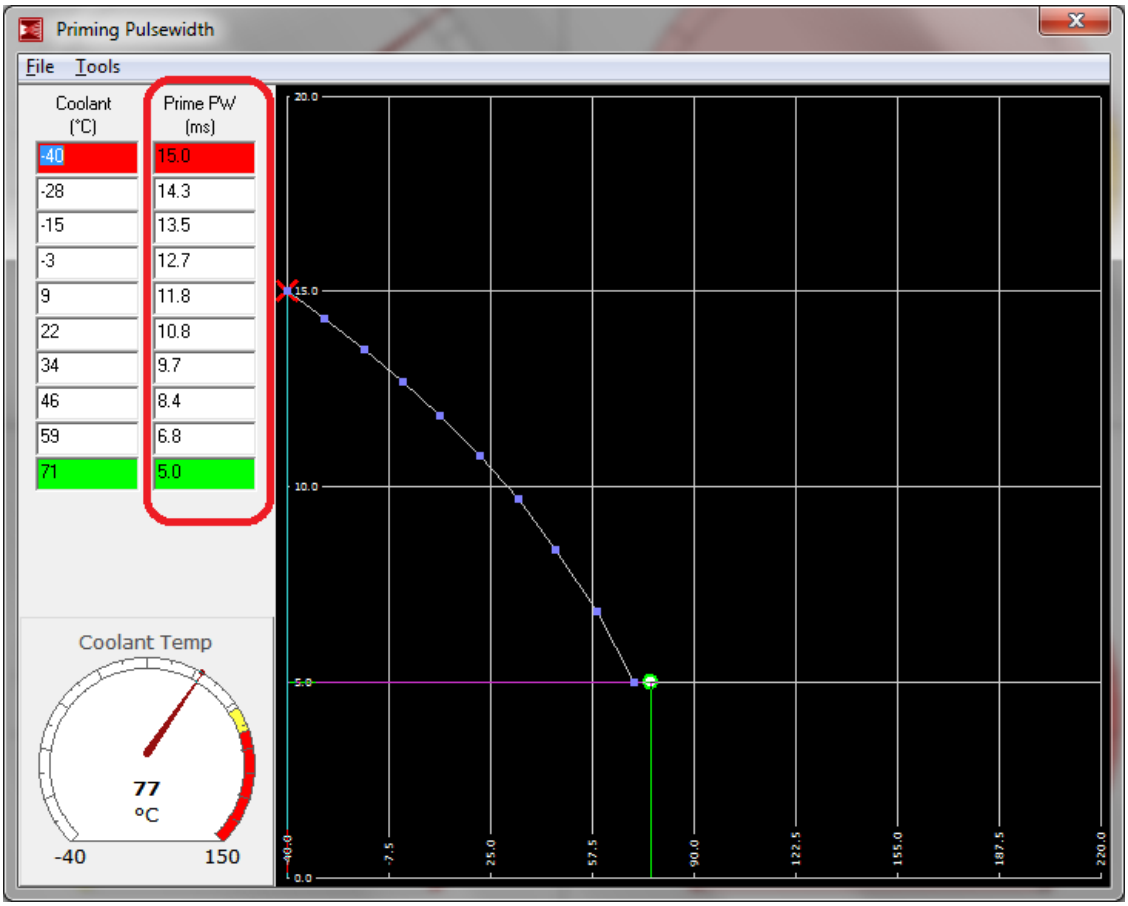
8. Click “Burn To ECU”. Close the window.

9. Adjust your Fueling Priming Pulses as follows

10. Go To **Startup/Idle** Menu → **Priming Pulse**

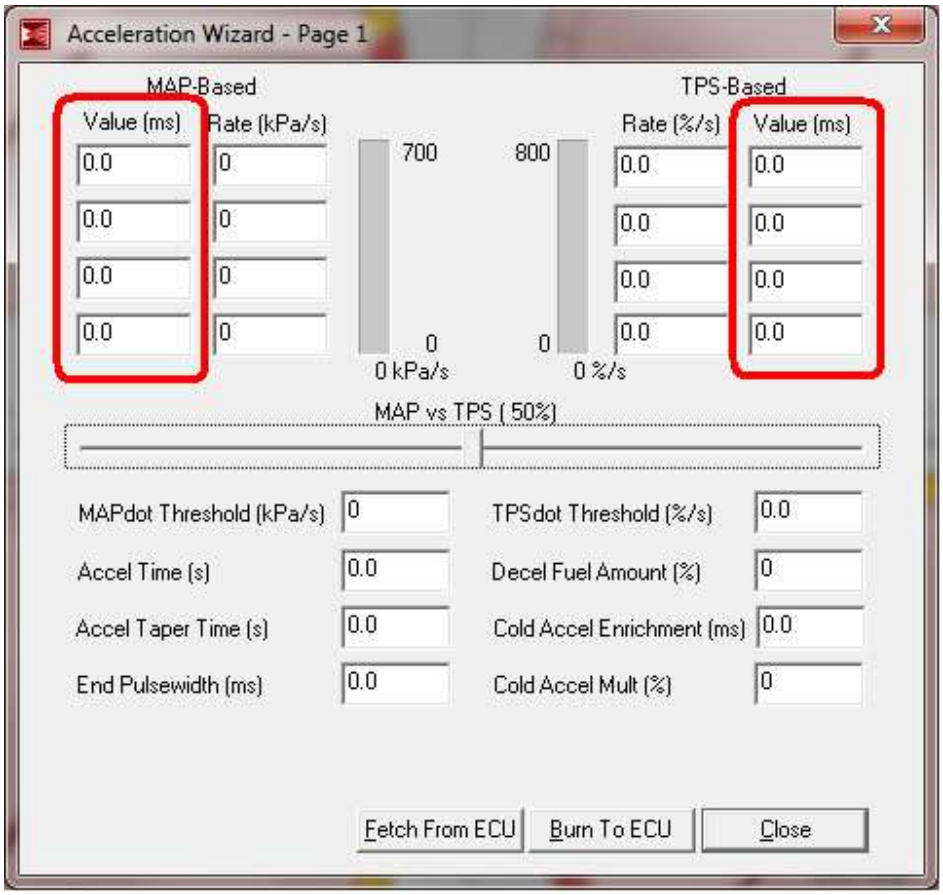
11. Adjust all the pulse widths as indicated below using the following formula:
New Pulse = Old Pulse × Old Injector Size ÷ New Injector Size.

Example: Old Injector Size = 230cc, New Injector Size = 460cc
New Pulse = 15.0ms × 230 ÷ 460 = **7.5ms**



12. Go to **Accel Enrich** Menu → **Acceleration Wizard**

13. Adjust the **Value (ms)** values using the same formula as shown above.



Note that All CRANKING PULSES are based on your fueling VE table and the required fuel value previously setup. So the injector cranking pulse widths do not need to be adjusted.

3.11. Removing the Vehicle's VAF Air Meter System

If your vehicle uses a Vane Air Flow (VAF) meter system you may be able to completely remove this system from the intake air stream.

If you ordered the Stratified VAF removal kit, this kit comes with a replacement air temperature sensor and a Fuel Pump Jumper Wire. Please follow the directions below to properly perform the VAF removal.

Some VAF meters contain an integrated air temperature sensor. This is common on Ford and Mazda systems. If your system does contain an integrated air temperature sensor, in order to remove the VAF system you will need to replace this air temperatures sensor with an external temperature sensor.

1. If needed, install the external Air Temperature Sensor as described in the procedure Section 3.6 above.
2. Locate the VAF in your engine bay and unplug the VAF electrical connector.
3. Remove any intake air tubing connected to the VAF meter.
4. Remove all fasteners that mount the VAF into your vehicle and remove the VAF meter.

The next steps are for Mazda/Ford vehicles powered by a B series engine. If you don't have such a vehicle skip this.

5. The Mazda B engine-series (BP, B8, B6) vehicles have a fuel pump cutoff switch inside the VAF. If you are removing the VAF on one of these vehicles, you must jump this switch. On the VAF connector, insert the Fuel Pump Jumper Wire between Pin 1 and Pin 2, as shown below. This jumper wire allows your vehicle's fuel pump to remain operational.

6. If your vehicle's VAF connector does not contain wires in the Pin 1 and Pin 2 positions, you will need to install the Fuel Pump Jumper Wire in the vehicle's Diagnostic connector port.