Installation & Configuration Manual

Subaru Impreza WRX V10 2500cc Plugin

Product Warranty Statement

All products manufactured or distributed by Electronz Ltd are subject to the following, and only the following, LIMITED EXPRESS WARRANTIES, and no others.

For a period of one (1) year from and after the date of purchase of a new Electronz Ltd product, Electronz Ltd warranties and guarantees only to the original purchaser that such a product shall be free from defects of materials and workmanship in the manufacturing process. A product claimed to be defective must be returned to the place of purchase. Electronz Ltd, at its sole option, shall replace the defective product with a comparable new product or repair the defective product.

This expressive warranty shall be inapplicable to any product not properly installed or properly used by the purchaser or end user, or to any product damaged or impaired by external forces. This is the extent of warranties available on this product. Electronz Ltd shall have no liability whatsoever for consequential damages following from the use of any defective product or by reason of the failure of any product. Electronz Ltd specifically disclaims and disavows all other warranties, express or implied, including, without limitation, all warranties of fitness for a particular purpose, warranties of description, warranties of merchantability, trade usage or warranties of trade usage.

For off-road use only, not intended for highway vehicles.

Electronz Ltd License Agreement
The programme in this system is licensed not sold. Electronz Ltd grants the user a license for the programme only in the country where the programme was acquired. No other rights are granted under this license and the programme may only be used on one machine at a time. If the programme is transferred a copy of this license and all other documentation must be transferred at the same time. The license may be terminated by the user at any time. Electronz Ltd may terminate the licence if the user fails to comply with the terms and conditions of this license. In either event the copy of the programme must be destroyed.

Table of Contents

1 Introduction

Thank you for purchasing your Vi-PEC Plug-In Engine Control Unit (ECU). Vi-PEC VX ECUs are an advanced, fully programmable microprocessor controlled Engine Management System.

The VX software platform boasts an impressive list of features giving a new level of user adjustment. This flexibility allows the tuner to have complete control over the engine management system. VX software employs high resolution fuel and ignition tables with configurable load and RPM centres. When coupled with up to six dimensional fuel and ignition mapping, barometric pressure compensation and intake air temperature correction this gives an unprecedented level of tuning accuracy. All Vi-PEC VX ECUs are in field upgradeable, there is no need to return the unit for software updates.

All Vi-PEC VX Plug-In Engine Management Systems are designed with flexibility and ease of installation in mind. Vi-PEC Plug-In systems are designed to either replace the circuit board inside the factory ECU enclosure, or entirely replace the factory ECU. This provides an invisible install that requires minimal modification to vehicle wiring and ECU mounting.

Vi-PEC Engine Management Systems are designed with the final result in mind. Not only do they boast an impressive range of performance features, but are designed with a focus on safety, reliability and drive-ability. However, the ultimate success of your engine management upgrade is determined by how well the system is installed and tuned.

Installing and tuning any after market engine management system is not to be taken lightly. VX ECUs give the tuner the control & flexibility that only top after-market engine management systems in the world can provide. While every effort has been made to keep VX ECUs as user friendly as possible, it should be recognised that added features bring added complexity.

The complete setup of your ECU can be divided into two important tasks:

1. This manual covers the installation of your VX ECU. While it is not strictly essential that this work is performed by an automotive electrician, the knowledge and tools available to these professionals makes it highly recommended. Regardless of who does the installation, it is of utmost importance that instructions provided in this manual are followed exactly throughout the installation.

2. Once the VX ECU has been installed it will need to be tuned using a laptop computer with Vi-PEC Tuning Software software. Information on the configuration and tuning of the VX ECU is detailed in the online help section of Vi-PEC Tuning Software. VX ECUs are shipped pre-loaded with a base configuration that should be close enough to get most engines running after a few application specific adjustments have been made. While hearing the engine running on the new ECU for the first time is always a satisfying feeling, it is important to realise that the job is not complete. The amount of tuning performed and the experience of the tuner are the two most important factors in determining how happy you will be with your engine management system.

1.1 Safety Notice

Your Vi-PEC Plug-In ECU is designed to enhance the performance of your vehicle. However in all cases, your vehicle must be operated in a safe manner. Do not tune your vehicle while operating it on public roads. Obey road rules at all times.

<div align="center">

WARNING!

Failure to follow all installation and operating instructions may result in damage to the Vi-PEC ECU, personal injury, or harm to property.

</div>

1.2 Disclaimer

All care has been taken to ensure the pin outs and interconnections of the ECU to the vehicles wiring harness are correct. However due to variations between vehicle models it is the installers responsibility to check wiring connections BEFORE installing the ECU. Vi-PEC will not be held responsible for any

damage caused by the incorrect installation of this product.

1.3   Support Options

Should any issues arise during installation, the following options exist for technical support:

1. Vi-PEC Tuning Software help, press F1 while running Vi-PEC Tuning Software

2. Contact your nearest Vi-PEC dealer. A Vi-PEC dealer list is available on our website.

3. Vi-PEC website: www.vi-pec.com

4. Technical Support Email: tech@vi-pec.com

5. Online Discussion Board: Available from the Vi-PEC website.

The majority of questions received by the technical support team are clearly answered in the manuals. To speed up your technical inquiry please consult the manuals to make sure that your question has not already been answered.

2   Pre-Installation

Before installing theVi-PEC VX ECU into the vehicle some pre-installation checks must be performed.

2.1   Board Switch Settings

Some Vi-PEC VX ECUs require switches on the board to be set before installation.

2.1.1   Subaru Impreza WRX V10 ECU

There are jumpers located on the circuit board inside the adapter case. These jumpers configure changes Subaru made between years.

The jumpers **MUST** be set before installing the adapter in the vehicle.

When the jumper consists of three pins in a row, correct selection is made by moving the jumper to the appropriate end of the three pins.

2006
2007
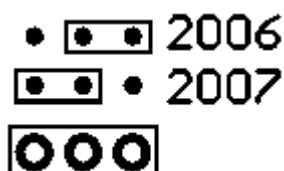
When the jumper consists of four pins in a square, correct selection is made by positioning the two jumpers in either vertical or horizontal orientation.

2005
2006   2004
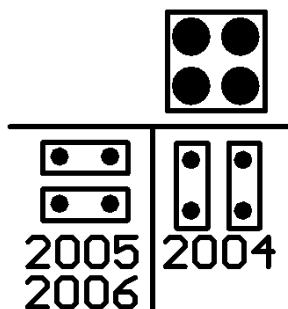
Information regarding the correct jumper position for the vehicle is printed on the PCB.

To access the jumpers, one end plate must be removed from the case and the PCB will slide out. Ensure the adapter is fully unplugged before removing the end plate.

2.2   Compatibility Check

It is essential that a compatibility check is performed before installing the ECU into the vehicle. Failure to do so may void the warranty.

2.2.1   Subaru Impreza WRX V10

There are two different Subaru Impreza WRX V10 ECUs available. These are categorised as *2004-2006 2500cc* and *2007 2500cc*. This maybe slightly misleading as some 2006 vehicles require a 2007 ECU.

It is critical that the correct adapter for the vehicle is installed, failure to install the correct adapter can result in engine component, engine wiring or ECU damage.

The correct ECU can be verified by studying the wiring loom.

If pins A1, A2 and A3 (see pinout section) contain no wires, then the correct ECU required is the *2007 2500cc* version. If these pins contain wires, then the correct ECU is the *2004-2006 2500cc* version.

2.3   Injector Impedance

Injector impedance is important and needs consideration before installing the ECU.

2.3.1   Subaru Impreza WRX V1-10 ECU

The Subaru V1-9 VX Plug-In ECUs are NOT designed to be used directly with low impedance injectors.

All models this ECU is designed for are fitted with high impedance injectors from factory. This ECU has been designed to be used with HIGH impedance (greater than 6 Ohms) injectors. Ballast resistors must be wired if low impedance injectors are to be used. This means that the ECU is plug-in compatible with factory fitted injector combinations on all models, however if fitting low impedance injectors then ballast resistors must be wired. Contact your nearest Vi-PEC dealer to purchase a ballast resistor pack if required.

3 Installation

This guide provides information on correctly and safely installing your new Vi-PEC VX Plug-In ECU.

3.1 ECU Handling Procedures

<div align="center">

WARNING!!!

The following installation process will require handling of both the Vi-PEC ECU and factory ECU. Both of these are highly sensitive to electrostatic discharge and are easily damaged. Follow the anti-static precautions given in this manual carefully to avoid damaging electronic components. Warranty claims for ECUs damaged by electrostatic discharge will NOT be accepted.

</div>

ANTI-STATIC HANDLING GUIDELINES

Your body builds up an electrical charge as you move around. This charge can reach very high voltages. Whenever given the opportunity this energy will attempt to discharge (usually through your finger tips!). This can be fatal to most electronic components. Most people have experienced an electrostatic discharge when they step out of their car or touch a metal bench top.

1. The following guidelines describe precautions that can be taken to reduce the possibility of damaging your ECU:
2. Work only on a conductive surface. A clean steel bench is suitable.
3. Always wear a wrist strap that is electrically connected to the conductive working surface.
4. Touch the working surface regularly.
5. Do NOT touch components on the circuit board.
6. Where possible, only handle the ECU by its plastic header.
7. Do NOT carry the ECU around without anti-static packaging.
8. Do NOT touch the bare terminals in the ECU header.

Observing the above procedures will minimise the chance of damaging the ECU. Note that failure due to static damage often does not appear until well after it was caused.

3.2 Fitting the ECU

Information is provided to assist in fitting the ECU into the vehicle.

3.2.1 Fitting a Subaru Plug-In ECU

The following steps outline the installation procedure for Subaru Plug-In ECUs:

1. Remove the factory ECU from the vehicle: Ensure the key is in the OFF position. The factory ECU is located under a steel cover on the passengers side floor (below the passengers feet). Lift the carpet, remove the cover panel. Unplug the wiring harness from the factory ECU. Remove the 6mm bolts (10mm socket) that retain the ECU and remove the ECU from the vehicle. DO NOT touch the exposed pins in the factory ECU connector.

2. Remove the factory ECUs circuit board from its enclosure: Ensure you are following the given anti-static guidelines and ARE WEARING A CONDUCTIVE WRIST STRAP connected to a conductive working surface. Remove the top and cover from the ECU enclosure by removing the side retaining screws. Remove the circuit board by removing the retaining screws. Hold it only by the plastic header and place it aside.

3. Fit the Vi-PEC Plug-In ECU: Remove the ECU from its packaging and place it immediately in the factory enclosure. Place the factory ECU in the packaging your Vi-PEC ECU came in for its protection.

4. If the ECUs USB tuning cable is to be left permanently connected, a slot will need to be cut in the top cover. The best place to do this is usually beside the factory header.

5. Reassemble the enclosure and fit the ECU back to the vehicle.

6. Connect the ECU to the factory wiring loom.

7. Do NOT attempt to start the vehicle. Proceed to read through the remaining sections of this manual first.

Note: The Subaru Version 10 (2004-2006) Plug-in ECU can fit two case sizes. If the ECU PCB is too large for the case, carefully snap the PCB extensions off at the lines shown in the image below.

4 Additional Sensors

VX Plug-In ECUs offer various options for the installation of additional sensors and devices. As a minimum it is recommended that all ECUs are installed with a Manifold Absolute Pressure (MAP) sensor and Intake Air Temperature (IAT) sensor. These parts can be purchased if required from your nearest Vi-PEC dealer.

4.1 Expansion Connector

The expansion connector is provided to allow easy connection of additional ECU inputs. An "expansion cable" needs to be purchased from your Vi-PEC dealer.

Important points when wiring to the expansion connector:

- Do not overload the +5V Out pin. Although this is protected against ECU damage the +5V out signal also provides power for other sensors.

- Do not connect the ground pin to chassis ground. This could cause ground loops and introduce unnecessary interference. Use this pin only to ground external sensors that are isolated from chassis ground.

4.1.1 Subaru Impreza WRX V10
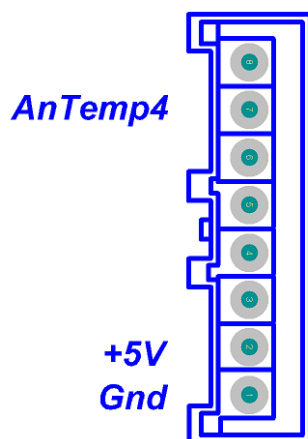
The Subaru Impreza WRX V10 ECU has two expansion connectors.

Eight pin Expansion Connector

The following expansion connector inputs are provided:

Blank	No function
An Temp 4	Temperature sensor input
Blank	No function
Blank	No function
Blank	No function
Blank	No function
+5V Out	Low Current +5V Supply
Gnd	Sensor Ground Only

Wideband Lambda Expansion Connector

The wideband lambda expansion connector is included as an easy way to connect an after market lambda sensor system. The connector provides +14V, two grounds and a connection to analogue channel ANVolt11. The benefits of using a wideband lambda input are as follows:

• Closed loop fuel control during cruise resulting in greater fuel economy

• Quick tune (automatic fuel table tuning) is possible during the tuning process

• General purpose limiting configured to monitor the fuel mixtures under boost. If the mixtures become undesirably lean, then the engine speed will be limited. See Vi-PEC Tuning Software help for more examples on how this can be applied.

The following expansion connector wiring information is as follows:

Pin	Function
1	AnVolt11
2	+14V from Main Relay
3	Power Ground
4	Signal Ground
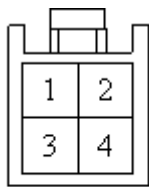
View from wire side of connector

5 PC Tuning

VX ECUs require PC/laptop tuning using the Vi-PEC Tuning Software Tuning Software application running on a Windows based computer. Vi-PEC Tuning Software may be downloaded from www.vi-pec.com. Note that when new versions of Vi-PEC Tuning Software are released they are posted on the website and may be downloaded at no cost. Also note that VX ECUs must be used with the correct version of Vi-PEC Tuning Software.

<p align="center">**IMPORTANT!**</p>
<p align="center">The VX ECU has on board USB.
BEFORE connecting the ECU to your laptop, the USB drivers must be
installed. Failure to install the drivers on your laptop first may result in
windows assigning incorrect drivers. These drivers will not work with the VX
ECU and are difficult to uninstall. The correct USB drivers are installed as part
of Vi-PEC Tuning Software installation, as described in the following section.
Should internet download not be practical, a copy of the drivers on CD can be
obtained from your nearest Vi-PEC dealer.</p>

5.1 Installing Vi-PEC Tuning Software

Due to the frequent updates Vi-PEC Tuning Software is no longer shipped with each ECU. You will be required to download the latest version of Vi-PEC Tuning Software from: www.vi-pec.com

Should access to an Internet connection be impractical, the latest version of Vi-PEC Tuning Software can be requested from your nearest Vi-PEC dealer on CD.

Installing from the web

1. Go to the above website and navigate to the downloads and software updates section.
2. Download the latest version of Vi-PEC Tuning Software. When prompted to run or save the file, select save. It is recommended to save this file on the desktop.
3. Double click the saved file and follow on screen instructions.
4. When prompted to install USB drivers, select yes. This may take some time.
5. When installed, open Vi-PEC Tuning Software by double clicking on the icon that has been placed on the desktop.

Installing from a CD

1. Insert the Vi-PEC Tuning Software disk into you computer's CD ROM drive.
2. Open 'My Computer'
3. Double click your CD ROM drive.
4. Double click the file labelled Vi-PEC Tuning SoftwareSetup.exe (or similar name).
5. Follow the on screen instructions.
6. When prompted to install USB drivers, select yes. This may take some time.
7. When installed, open Vi-PEC Tuning Software by double clicking on the icon that has been placed on the desktop.

5.2 Communicating With Your ECU

After Vi-PEC Tuning Software installation, you will be able to connect the VX ECU to the laptop to perform set-up and tuning work.

1. Connect the ECU to your laptop using a Vi-PEC VX ECU USB Cable. If not supplied with the ECU, these can be purchased from a Vi-PEC dealer. No other adapter or cabling is required. Connect the cable to the connector labelled USB.
2. If this is the first time you have connected a VX USB ECU to your laptop follow the driver installation instructions that appear. When prompted if you want to install drivers select 'Continue Anyway'.
3. Start Vi-PEC Tuning Software by double clicking on the Vi-PEC Tuning Software icon on the windows desktop.
4. Switch the key to the ON position. This will provide power to the ECU.
5. In Vi-PEC Tuning Software, under the 'Options' menu, select 'Connection'. The connection options

dialogue will open. Select the correct COM Port number from the drop down list or select auto for automatic com port detection.

6. Vi-PEC Tuning Software offers both mouse and keyboard control. To establish a connection between the PC and ECU press the F3 key. The same process can be used to disconnect. If a successful connection is established, Vi-PEC Tuning Software will download settings from the ECU, otherwise you will be warned that an error has occurred.

7. Make sure the connection shows "ONLINE" in the top right corner of Vi-PEC Tuning Software.

8. To permanently STORE any changes made to the ECU press F4. If this is not done before turning the ECUs power off all changes made will be lost.

6 Pre-Start Configuration

Before starting the vehicle, important pre-start configurations need to be made.

6.1 Firmware Version

It is recommended that the Vi-PEC VX ECU is running the most up to date firmware. Firmware version information can be obtained by connecting to the ECU with Vi-PEC Tuning Software and selecting 'ECU Information' under the Help menu.

The latest firmware can be downloaded from our website with Vi-PEC Tuning Software.

It is recommended that this is performed by an experienced Vi-PEC dealer as new features may need to be properly configured.

The firmware can be updated by selecting 'Update Firmware' under the 'ECU Controls' menu in Vi-PEC Tuning Software. Follow the on screen instructions to complete the firmware update process.

6.2 Base Configuration

All VX Plug-In ECUs are shipped with base configuration settings.   Note that these are provided to reduce initial setup and tuning times. They are NOT recommended tuning values. Vi-PEC Tuning Software includes base configurations for various models. Download the appropriate base configuration into your ECU with Vi-PEC Tuning Software by connecting to the ECU (described in the Connecting To Vi-PEC Tuning Software section of this manual), then selecting 'Open' under the 'File' menu. Select the appropriate .pcl file and then select 'Open'. Downloading large configuration files can take up to a few minutes. Be patient and acknowledge any messages Vi-PEC Tuning Software shows.

6.3 MAP Sensor Calibration

At key on and engine not running the Manifold Absolute Pressure (MAP) Sensor should always match the Barometric Absolute Pressure (BAP) Sensor. As well as providing altitude correction, the BAP sensor also allows the MAP sensor to be calibrated prior to tuning.

Vi-PEC VX ECUs use an on-board barometric sensor that is calibrated prior to dispatch. This ensures that all Vi-PEC Tuning Software Tuning Software programs (pcl Files) give a consistent state of tune throughout the ECU range. This allows a PCL file to be transferred between VX based ECUs giving an equivalent state of tune providing all factors affecting volumetric efficiency are equal.

Without the ability to calibrate all the available types of MAP Sensors to the BAP Sensor there would be significant affects on the accuracy of the resulting tune, especially when tuning with Manifold Gauge Pressure (MGP) as a load index.

To calibrate the MAP sensor:

1. Connect a laptop/notebook PC to the ECU and connect to the ECU using Vi-PEC Tuning Software.
2. Under the Analog Channels menu, select the An Volt channel that has been wired to the MAP sensor. Select the correct MAP Sensor Type.
3. Under the 'Options' menu, select 'MAP sensor calibration'.
4. Follow the on screen instructions.
5. Select the 'Analog Inputs' tab in the runtime values section of Vi-PEC Tuning Software (lower part of the screen).
6. Compare the MAP and BAP values and ensure they have a similar reading (within 1 kPa).
7. Perform a 'Store' by pressing F4.

6.4 TPS Calibration

The Throttle Position Sensor (TPS) is used by the ECU to calculate various engine management parameters used by functions such as idle speed control,acceleration enrichment and motor sport features. It is important that the ECU knows when the throttle is open and closed (or part way in between). The following procedure calibrates the ECU to match the TPS:

1. Connect a laptop/notebook PC to the ECU and connect to the ECU using Vi-PEC Tuning Software.
2. Under the Analog Channels menu, ensure that the correct An Volt channel is set to 'TPS (Main)'. Refer to the pin functions section of this manual for details.
3. Under the 'Options' menu, select 'TPS calibration'.
4. Follow the on screen instructions.
5. Select the 'Analog Inputs' tab in the runtime values section of Vi-PEC Tuning Software (lower part of the screen).
6. Ensure the Throttle Position value reads 0% when the throttle is closed and 100% when fully open.
7. Perform a 'Store' by pressing F4.

6.5 IAT Sensor Selection

This section only applies when an Intake Air Temperature (IAT) sensor has been wired and fitted to the intake system. It is important that the ECU is calibrated to match the sensor installed in the engine. This procedure is as simple as selecting the correct sensor type as follows:

1. Connect a laptop/notebook PC to the ECU and connect to the ECU using Vi-PEC Tuning Software.
2. Click on 'Analogue Channel' in the configuration tree.
3. Select the An Temp channel the sensor has been wired to.
4. Ensure that channel (and only that channel) is set to 'Inlet Air Temperature'.
5. Select the correct 'Temp Sensor Type'.
6. Select the 'Analog Inputs' tab in the runtime values section of Vi-PEC Tuning Software (lower part of the screen).
7. Ensure that IAT reads the correct temperature.
8. Perform a 'Store' by pressing F4.

6.6 Input and Output Setup

As the Vi-PEC VX Plug-In ECUs are designed to run several models there are a few items that must be set-up to make the ECU specific to your model.

The Pin Functions section of this manual gives a list of the functions of each channel based on the target vehicle.

It is the tuners responsibility to make sure that the following channels are set-up correctly for the vehicle model the ECU is fitted to:

All Auxiliary Output Channels

Use the 'Test On' or 'Test PWM' (at 10 Hz) functions to test the wiring of channels.

All Digital Inputs

Look at the Digital Inputs runtime values (lower section of the Vi-PEC Tuning Software screen) to confirm each channels operation.

All Analogue Volt and Temperature Inputs

Look at the Analogue Inputs runtime values (lower section of the Vi-PEC Tuning Software screen) to confirm each channels operation.

6.7   Trigger Calibration

The following instructions assume that all pre-start set-up instructions given in previous sections have been completed. Only after all pre-start checks have been made should an attempt be made to crank the engine. The following steps must be performed before an attempt is made to start the engine to ensure the VX ECU is calibrated to precisely measure engine position.

1. Connect the ECU to Vi-PEC Tuning Software.

2. Select 'Fuel', then 'Fuel Set-up':
   a. Set 'Injection Mode' to OFF. This will prevent the engine from trying to start while the triggers are calibrated.
   b. Perform a Store (press F4) to make sure fuelling is not re-enabled if power to the ECU is lost.
3. Click on 'Triggers' then 'Calibrate Triggers'.
4. Perform the correct trigger calibration procedure specific to your vehicle as described in the Vi-PEC Tuning Software online help (Press F1).

Note that trigger calibration must be performed again once the engine is running. Due to the acceleration and deceleration of the crankshaft at low speeds, an inaccurate measurement of engine timing is usually made. Also it is often harder to see timing marks with a timing light at slow engine speeds. Trigger calibration should be checked again at between 2000-4000 RPM where engine speed is stable and a more consistent timing reading can be obtained.

7   First Time Startup

After performing all set-up instructions given in previous sections, including trigger calibration, the engine is now ready to be started. The following procedure should be used for first time start-up.

1. Turn the ignition key OFF then ON. The fuel pump should prime momentarily upon power up.

2. Connect the ECU to Vi-PEC Tuning Software.

3. Access the runtimes values by pressing the F12 Key, click the 'Analog' tab:

   a. TPS – spans from 0 to 100% when throttle is pressed. If not, perform a TPS Calibration.

   b. MAP – should read approx 101 kPa (at sea level) with the engine not running. If not, check the MAP Sensor Type setting and perform a MAP Calibration.

   c. ECT – should read current engine temperature.

   d. IAT – should read current intake air temperature.

   e. Digital Inputs (click the 'Digital' tab) – Operate switches connected to any digital inputs while watching the runtime value to ensure they operate as expected.

4. Rectify any faults found in Step 3.

5. Locate the 'Master Fuel' setting. This can be found in the ECU Settings Menu under: *Fuel > Fuel Setup > Fuel Main*.

   a. This will need to be adjusted during or just after start-up.

6. Crank the engine until it starts. Some throttle may be required for first time start-up due to imperfect tuning. If necessary adjust the Master setting to enrich/lean the engine (increase to enrich).

7. If the engine fails to start after several attempts, do not crank it endlessly. Stop and determine the problem before continuing.

8. Check the Trigger Error Counter (found under the Triggers runtime values tab). If this value increases during cranking/running then there is a trigger setup fault. It is not unusual for this number to count one or two on the first engine revolution.

9. Once the engine starts, adjust the 'Master' (under fuel settings) setting to achieve best possible running.

10. The engine should now be allowed to fully warm up. It may be necessary to readjust 'Master' several times to maintain smooth running. Don't forget to keep an eye on engine temperature.

11. Once the engine is warmed up and running well, perform another trigger calibration (known "as setting the base timing").

12. Perform a Store by pressing F4.

7.1   Final Checks

To avoid potential engine damage and wasted time, the adjustments presented in the following sections must be made before attempting to start the engine.

For further help on any of the settings discussed below, consult the online Help in the Vi-PEC Tuning Software Tuning Software. Online help can be invoked by pressing F1, or right clicking any item and selecting 'What's this?'.

Pre-set-up Checks

Before attempting to configure the ECU, ensure the following tasks have been completed:

1. Ensure the ECU and all associated components are connected and correctly wired/installed.
2. Fully charge the vehicle's battery, as the engine will be required to be cranked during the set-up procedure.
3. Check all oil and water levels are correct.

Connecting to Vi-PEC Tuning Software Tuning Software

   Use the following procedure to establish a connection between your Vi-PEC ECU and Vi-PEC Tuning Software Tuning Software tuning software.

1. Make sure your laptop battery is fully charged or plugged in to mains power.
2. Connect the ECU to your laptop and connect to Vi-PEC Tuning Software Tuning Software as described in the 'Communicating with your ECU' section of this manual.

7.2   Essential Tuning Adjustments

It is assumed that at this stage all set-up procedures described in previous sections have been completed and the engine is running. The following steps detail correct set-up procedures for some of the more critical ECU parameters (note that MAP Sensor Calibration should have already been completed by now):

Injector Voltage (Dead-time) Correction

There is always a delay between the injector being energised and the injector actually opening. Likewise, there is a small delay between the injector being de-energised and the injector closing. The opening time is considerably longer than the closing time, however the overall result is that less fuel will flow for a given pulse width than would be expected with an 'ideal injector'. To compensate for this the injector pulse widths are increased to compensate for this 'dead-time'. The dead-time for a given injector is a function of the battery voltage, differential fuel pressure and the type of injector driver (saturated or peak and hold). A typical dead-time at 3 Bar differential fuel pressure and 14 volts is just under 1ms (ms = millisecond = 1 thousandth of a second).

In applications with a linear 1:1 fuel pressure regulator (i.e. not a rising rate regulator), the differential fuel pressure (difference between manifold pressure and fuel pressure) will be constant. Therefore the only variable that is changing will be the battery voltage (this changes with electrical load and sometimes engine speed). Without correction, the changes in dead-time will cause the engine to run lean when the voltage drops. If the Injector Voltage Correction is properly set-up then changes in the battery voltage will not affect the air/fuel ratio.

The injector dead-time table allows the dead-time for different battery voltages to be entered. The values represent the dead-time in milliseconds. These should increase with falling system voltage.

Injector dead-time for a particular set of injectors can be determined using a flow bench or on a running engine.

To determine the injector dead-time using a flow bench, the injectors need to be operated at the intended operating pressure (normally three bar) and at a constant duty cycle as well as a set voltage. Vary the supply voltage to the injector and measure minimum pulse width at which the injectors will flow for a particular voltage. This is the required dead-time for that injector at that tested voltage.

To determine injector dead-time on a running engine, with the engine fully warmed and operating at stable air/fuel ratios (a very precise AFR meter is required – a narrow band O2 sensor will not suffice), electrical drain needs to be applied to the system; the preferred method is disconnecting the alternator main fuse. Battery load testers are also useful here too.

Watching the air fuel ratios change while the battery voltage drops, the dead-time table can be trimmed to maintain the same stable air/fuel ratio. Injector dead-time can be viewed as a row graph. A smooth curve needs to be maintained at all times.

NOTE: any change to the fuel pressure or injectors will require a recalibration of the injector dead-times.

Master

Master should be set so that the numbers in the middle of the fuel table end up around a value of 50. This is to allow sufficient span of the numbers in the main fuel table.

8   Pin Functions

A list of pin functions is provided, this is useful when configuring your ECU through Vi-PEC Tuning Software.

8.1   Subaru Impreza WRX V10 Plugin

PCB V1.x (Plug-in)	Subaru V10 WRX/STi
Auxiliary Outputs	
Aux 1	LH AVCS Solenoid
Aux 2	RH AVCS Solenoid
Aux 3	Tachometer
Aux 4	EThrottle Signal 1
Aux 5	Wastegate Solenoid
Aux 6	FP Speed
Aux 7	Tumble Valves Open (LH & RH wired in series)
Aux 8	Tumble Valves Close
Aux 9	EThrottle Signal 2
Aux – Injection Outputs	
Aux - Inj 5	Purge Solenoid
Aux - Inj 6	Cruise Light
Aux - Inj 7	Rear Oxy Heater
Aux - Inj 8	CE Light
Aux – Ignition Outputs	
Aux - Ign 5	AC Fan
Aux - Ign 6	AC Relay
Aux - Ign 7	Engine Fan
Aux - Ign 8	E-Throttle Relay
Analog Channels	
An Volt 1	MAP
An Volt 2	TPS (Main)
An Volt 3	TPS (Sub)
An Volt 4	Left Tumble Position
An Volt 5	Right Tumble Position
An Volt 6	Power Steer Switch
An Volt 7	Rear Oxy Signal
An Volt 8	MAF Signal
An Volt 9	FPS (Sub)
An Volt 10	FPS (Main)
An Volt 11	Wideband Lambda Expansion Plug
An Temp 1	ECT
An Temp 2	IAT from MAF
An Temp 3	Fuel Temperature
Digital Inputs	

DI 1	Speed
DI 2	Right Cam Position
DI 3	A/C Request
DI 4	Clutch Switch
DI 5	Brake Switch
DI 6	Cruise Cancel OR Resume
DI 7	Cruise Set OR Cancel
DI 8	Start Signal
DI 9	Neutral Signal
DI 10	Cruise Main

9   Pinouts

Pin information is provided to assist when troubleshooting. All pinouts are looking into the ECU (wire side).

9.1   Subaru Impreza WRX V10

The following pin diagram is provided as a support reference. Please contact your nearest Vi-PEC dealer for specific pin information.
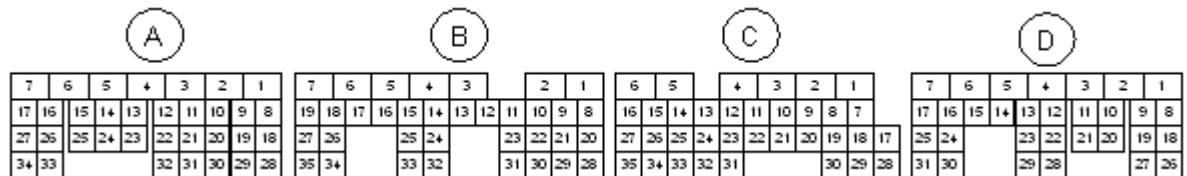
Pin	2004 - 2006 ECU Function
A1	DI4
A8	Aux8
A11	Aux7
A14	Inj5
A15	Inj6
A17	Aux6
A23	Aux3
A28	Aux2
A28	Aux1
B2	Inj7
B8	Trig2
B9	DI2
B10	Trig1
B15	Ign4
B16	Ign3
B17	Ign2
B18	Ign1
B24	Ign5
B25	Ign7
B26	DI1/Aux4 (Jumper Setting)
B27	DI1/Aux4 (jumper Setting)
B33	Ign6
B35	Ign8
C3	Inj4
C4	Inj3
C5	Inj2
C6	Inj1
C7	DI10
C9	DI5
C10	DI6
C11	DI7
C12	Temp3
C13	Temp2
C14	Temp1
C17	AnVolt10
C18	AnVolt2
C22	AnVolt1
C23	AnVolt8
C25	Knock1
C26	AnVolt4
C27	AnVolt5
C28	AnVolt9
C29	AnVolt3
D4	Aux9
D5	Aux10
D8	DI8
D9	DI9
D10	AnVolt6
D25	AnVolt7

Pin	2007 ECU Function
A6	AnVolt1
A11	DI2
A13	Trig1
A15	Knock1
A16	AnVolt4
A18	AnVolt2

Pin	2007 ECU Function
A21	Trig2
A26	AnVolt5
A28	AnVolt3
A33	AnVolt6
A34	Temp1
B4	AnVolt7
B6	Inj6
B12	DI10
B13	DI6
B17	Temp3
B18	Temp2
B20	DI5
B23	AnVolt10
B24	DI7
B26	AnVolt8
B31	AnVolt9
B33	Aux4 ('06)
C4	Inj7
C9	Ign6
C11	Aux6
C12	Aux4 ('07)
C13	DI1
C18	Ign7
C21	Ign8
C22	Aux3
C23	DI3 ('07)
C24	DI3 ('06)
C25	DI4
C29	Ign5
C31	DI9
C32	DI8
D4	Aux9
D5	Aux10
D8	Inj1
D9	Inj2
D10	Inj3
D11	Inj4
D13	Aux8
D14	Aux1
D16	Aux2
D18	Ign1
D19	Ign2
D20	Ign3
D21	Ign4
D22	Aux7
D27	Aux5
D29	Inj5

10 Known Issues

All plug-in ECUs are fully tested on a range of relevant vehicles, although there are often variations that have not been tested. For this reason issues can arise.

WARNING: Always download the latest Installation Manual from vi-pec.com and check the latest status of known issues before installing the ECU.

Please contact your nearest Vi-PEC dealer when suspecting a compatibility issue.

10.1 Subaru Impreza WRX V10

There are currently no known issues.