Instruction Manual

30-71XX
Infinity
Quick Start Guide

STOP!

THIS PRODUCT HAS LEGAL RESTRICTIONS.
READ THIS BEFORE INSTALLING/USING!

THIS PRODUCT MAY BE USED SOLELY ON VEHICLES USED IN SANCTIONED COMPETITION WHICH MAY NEVER BE USED UPON A PUBLIC ROAD OR HIGHWAY, UNLESS PERMITTED BY SPECIFIC REGULATORY EXEMPTION. (VISIT THE "EMISSIONS" PAGE AT HTTP://WWW.SEMASAN.COM/EMISSIONS FOR STATE BY STATE DETAILS.)

IT IS THE RESPONSIBILITY OF THE INSTALLER AND/OR USER OF THIS PRODUCT TO ENSURE THAT IT IS USED IN COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS. IF THIS PRODUCT WAS PURCHASED IN ERROR, DO NOT INSTALL AND/OR USE IT. THE PURCHASER MUST ARRANGE TO RETURN THE PRODUCT FOR A FULL REFUND.

THIS POLICY ONLY APPLIES TO INSTALLERS AND/OR USERS WHO ARE LOCATED IN THE UNITED STATES; HOWEVER CUSTOMERS WHO RESIDE IN OTHER COUNTRIES SHOULD ACT IN ACCORDANCE WITH THEIR LOCAL LAWS AND REGULATIONS.

WARNING: This installation is not for the tuning novice! Use this system with EXTREME caution! The AEM Infinity Programmable EMS allows for total flexibility in engine tuning. Misuse or improper tuning of this product can destroy your engine! If you are not well versed in engine dynamics and the tuning of engine management systems DO NOT attempt the installation. Refer the installation to an AEM-trained tuning shop or call 800-423-0046 for technical assistance.

NOTE: All supplied AEM calibrations, Wizards and other tuning information are offered as potential starting points only. IT IS THE RESPONSIBILITY OF THE ENGINE TUNER TO ULTIMATELY CONFIRM IF THE CALIBRATION IS SAFE FOR ITS INTENDED USE. AEM holds no responsibility for any engine damage that results from the misuse or mistuning of this product!

Table of Contents

Introduction

Software Download Notice

The latest firmware for your Infinity ECU is available at http://www.aeminfinity.com. Follow the instructions in this manual to install InfinityTuner then go directly to aeminfinity.com to download your firmware.

12 Month Limited Warranty

Advanced Engine Management Inc. warrants to the consumer that all AEM High Performance products will be free from defects in material and workmanship for a period of twelve (12) months from date of the original purchase. Products that fail within this 12-month warranty period will be repaired or replaced at AEM's option, when determined by AEM that the product failed due to defects in material or workmanship. This warranty is limited to the repair or replacement of the AEM part. In no event shall this warranty exceed the original purchase price of the AEM part nor shall AEM be responsible for special, incidental or consequential damages or cost incurred due to the failure of this product. Warranty claims to AEM must be transportation prepaid and accompanied with dated proof of purchase. This warranty applies only to the original purchaser of product and is non-transferable. All implied warranties shall be limited in duration to the said 12-month warranty period. Improper use or installation, accident, abuse, unauthorized repairs or alterations voids this warranty. AEM disclaims any liability for consequential damages due to breach of any written or implied warranty on all products manufactured by AEM. Warranty returns will only be accepted by AEM when accompanied by a valid Return Merchandise Authorization (RMA) number. Product must be received by AEM within 30 days of the date the RMA is issued.

Please note that before AEM can issue an RMA for any electronic product, it is first necessary for the installer or end user to contact the EMS tech line at 1-800-423-0046 to discuss the problem. Most issues can be resolved over the phone. Under no circumstances should a system be returned or a RMA requested before the above process transpires.

AEM will not be responsible for electronic products that are installed incorrectly, installed in a non-approved application, misused, or tampered with.

Any AEM electronics product can be returned for repair if it is out of the warranty period. There is a minimum charge of $50.00 for inspection and diagnosis of AEM electronic parts. Parts used in the repair of AEM electronic components will be extra. AEM will provide an estimate of repairs and receive written or electronic authorization before repairs are made to the product.

Kit Contents

1 x   INFINITY ECU (Varies depending on kit part number)
1 x   QUICK START GUIDE
2 x   USB CABLE
1 x   4GB FLASH MEMORY DEVICE
10 x   ECU HARNESS TERMINALS

Infinity-8/10/12 Kit Contents

Infinity-6/8h Kit Contents

Background

The Infinity platform is very different from previous generation AEM EMS products. The hardware (circuit board assembly) is designed around a very advanced automotive grade microcontroller (processor or "chip"). Several layers of software reside on this chip that allow for real time firmware programming without the need to write computer code. This technology has allowed AEM to develop advanced control models never before used on other AEM EMS products. We've listened to our customers over the years and have attempted to simplify the tuning process by employing an airflow based fuel control model eliminating many of the lookup and trim tables from previous generation ECUs. The look and feel is very different and it may take some time to adjust to the new tuning environment.

Our new tuning tool, Infinity Tuner is also a brand new product built from the ground up to interface with the new hardware. It features a modular design that allows users and developers to build completely customized templates and even design "plug in" applications that can automate many tuning tasks. Unlike previous AEM Setup Wizards in older products like AEM Pro and AEM Tuner, the Infinity Tuner Setup Wizard "plug in" is a completely stand-alone application that will evolve with Infinity Tuner. It is much more integrated with the ECU hardware and performs complex validation checks for all requested changes.

Among other things, Infinity Tuner is a powerful math processor. Special features allow users to create completely custom conversion channels for table data. Virtually any function can be employed to display data in different formats or units. Math functions are also used for table edits. ANY MATH function can be used not just a list of pre-defined selections. Advanced users will really enjoy the flexibility this feature adds.

A built-in logging playback/controls synchronization feature allows tuners to view live plot data and make changes to their calibration values on the fly, knowing exactly where the ECU was accessing table data. For more detailed post processing of data, AEM offers its new analysis package, AEMdata.

Software

Software Installation

All current Infinity Tuner software installations and drivers are available for download from AEM at http://www.aemelectronics.com/products/support

1. Run the setup.exe. Hit Next> and follow the instructions on each page.

2. Read and accept the terms of agreement and pick your desired location for Infinity Tuner to be installed. Hit Next> and allow the software to complete installation.

3. You may now exit the Infinity Tuner installer. You can now run Infinity Tuner. To use Infinity Tuner with an ECU connected first you will need to install the necessary drivers.

4. If desired, add a desktop link for InfinityTuner. Click the Windows Start button and navigate to All Programs\InfinityTuner. Right click on the InfinityTuner link and select Send to>Desktop (create shortcut).
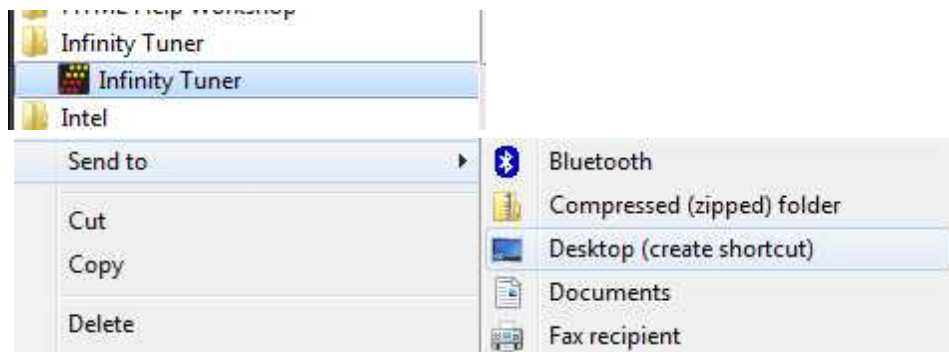
Device Driver Installation

USB drivers are installed automatically as of Infinity Tuner version 2.95.7043. If installation problems occur, follow the procedure below to manually install the drivers.

USB drivers are available for download from http://www.aemelectronics.com/products/support

A step by step guide for driver installation is documented in the following video...or copy and paste the following link into a web browser:
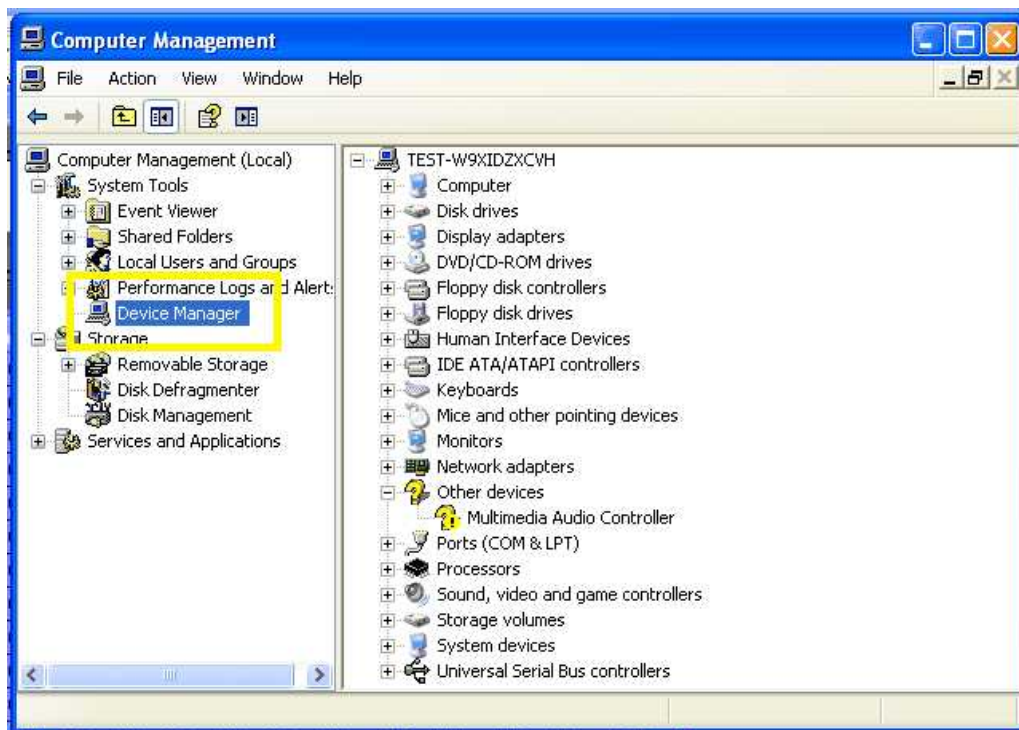
http://www.youtube.com/watch?v=i5AY2MFmnzl

1. For these next steps the Infinity ECU will need to be installed and powered up. Refer to your harness instructions details. You will need the ignition key in the on position. Connect your computer to the ECU via the USB cable.

2. Open the device manager. How to find your device manager is described below.
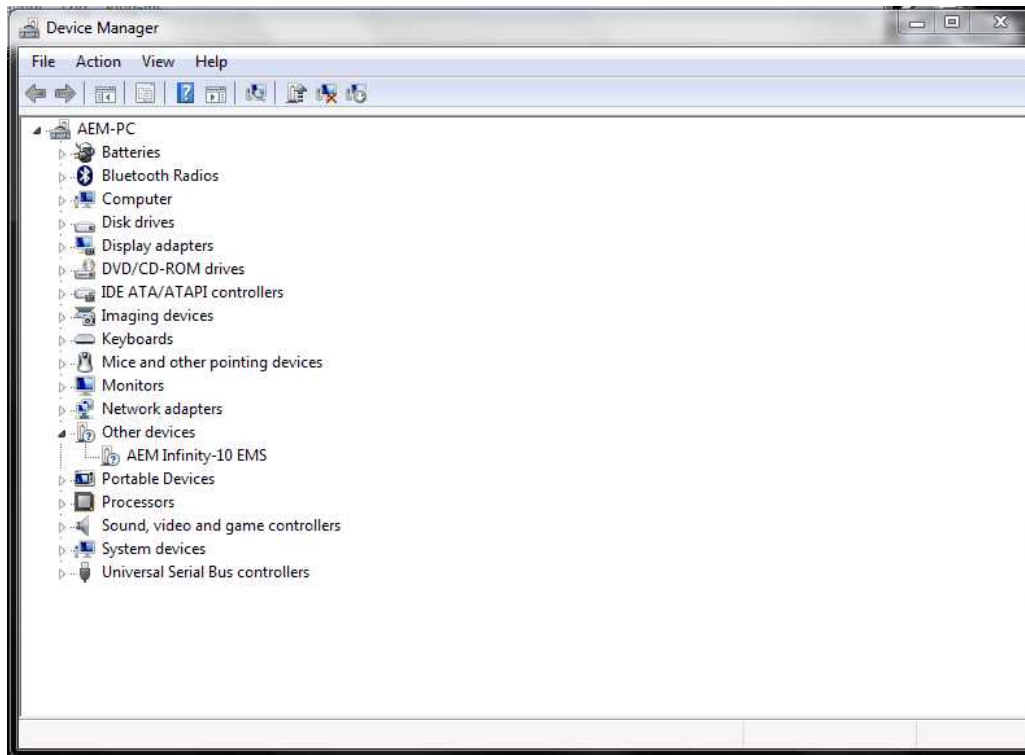

Windows7

WindowsXP

- For Windows 7 users you may simply search for and open the "Device manager" using the search bar under the start tab. You should see a window that looks similar to the Device manager shown above on the left hand side.
- For Window XP users right click on "My Computer" under the start tab. Click on "Manage." Select "Device Manager." You should see a window that looks similar to the Device manager shown above on the right hand side.
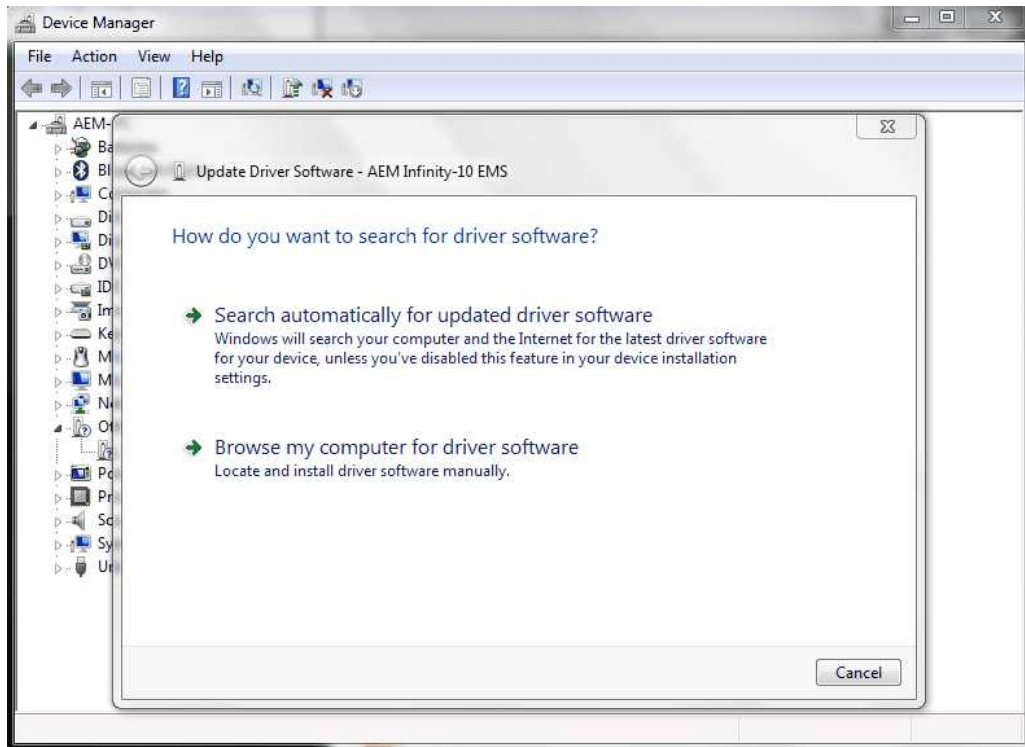
3. Next look for a device labeled something close to "AEM Infinity-10 EMS." It may be listed under "Other devices." Right click "AEM Infinity-10 EMS" and select Update Driver Software. When prompted with "How do you want to search for driver software?" select the second option, "Browse my computer for driver software Locate and install driver software manually." USB driver files can be downloaded from http://www.aemelectronics.com/catalog-software-downloads-72/

Save this file in an easy to find location like the Windows Desktop. You will need this link below.
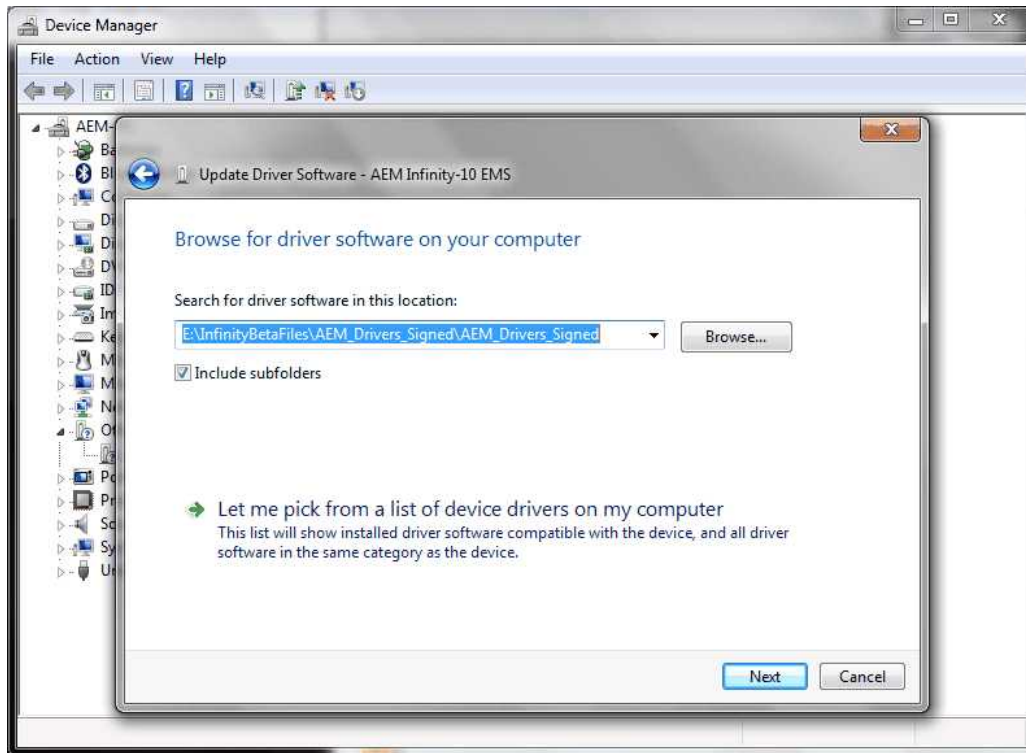
**If AEM Infinity-10 EMS does not appear on the list please verify that the USB plug is securely plugged into your computer and the ECU. Also make sure that the ECU is in fact powered up and connected correctly. If problem persists, try turning the key off and then back to the on position or try a different USB port on the PC.

4. Hit Browse and select the "AEM_Drivers_Signed" folder. Make sure to have the "Include subfolders" box checked. Hit next. This will install the driver software onto your computer. You will now be able to use the "Connect to USB" option in InfinityTuner.

AEM recommends restarting your PC after making changes to your device driver installation.

Note: To confirm the driver installed properly you can return to your device manager window. The "AEM Infinity-10 EMS" device will now be recognized and fall under the tab "AEM EMS Controllers."

Plot Data and Control

AEM supplied layout files will come pre-loaded with several "Plot Control" windows. (Users can always add, delete or edit them as desired.) These are special controls that allow real time data logging and playback. To begin a PC log, go to the *Log* menu and select *Start recording* or hit the "CTRL + L" hot key. Select *Stop recording* or hit the "CTRL + L" hot key again to stop logging. A dialog will ask if you want to save the data or not. If you select "Yes," you will be prompted to save the current session file. A session file contains all the current configuration and calibration data along with a log file. If you open that session file again, the file will be loaded and all plot controls will be populated with the recorded data.
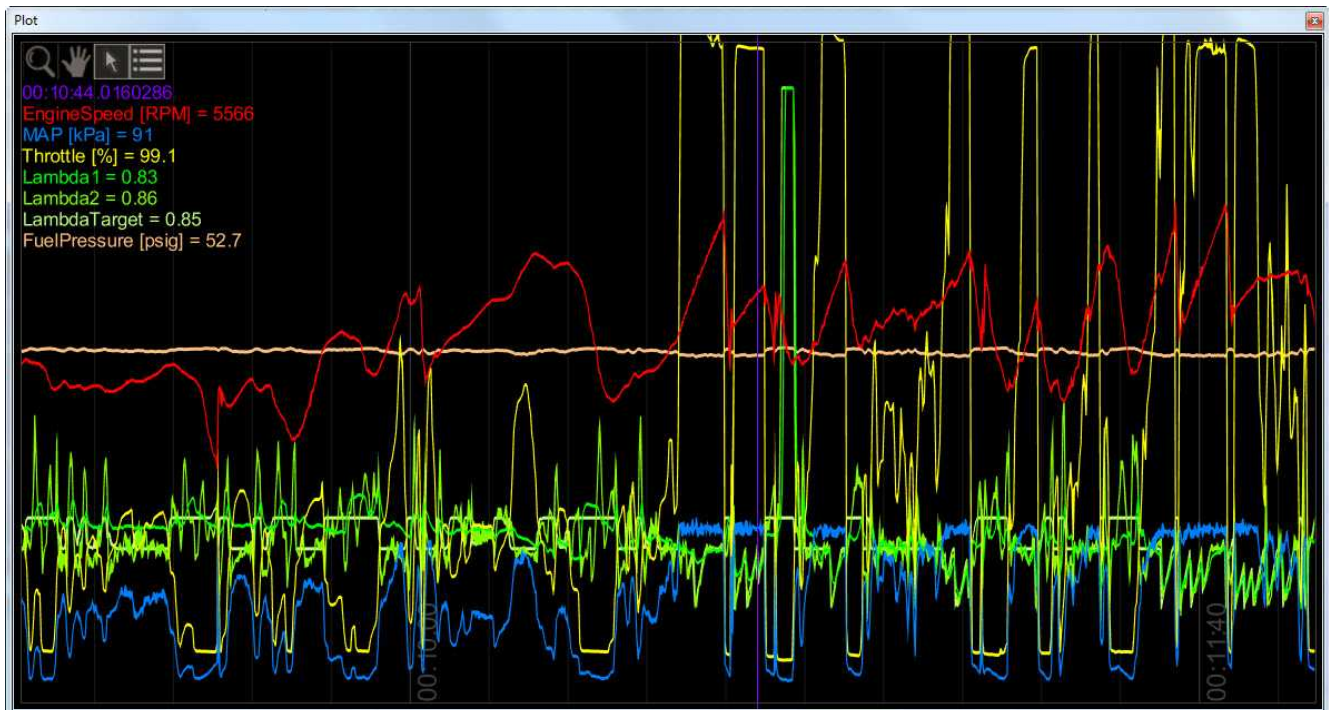
Plot Window Tools

Selection tool: Choose this icon by clicking on it then left click and drag through the plot window to view current data values.

Pan tool: Choose this icon by clicking on it then left click and drag through the plot window to pan the data left or right. Hot Key – Left/Right arrow

Zoom tool: Choose this icon by clicking on it then left click and drag up and down to zoom in and out. Alternatively, a mouse scroll wheel can be used after selecting the zoom tool. Hot Key – Up arrow/Page up, Down arrow/Page down

Show legend: Displays or hides the data legend.

Additional hot keys available in plot control window:

Home – Brings you to the start of the log
End – Brings you to the end of the log
For Home and End, the current display range is kept, so if viewing 10 seconds worth of data,
Home will display the first 10 seconds while End will display the last 10 seconds.

Controls Synchronization

When the plot control is populated with data, using the selection tool and dragging through the
plot will cause Infinity Tuner to synchronize all control windows to the plot data. This happens
when connected to the simulator offline or when connected to the ECU via USB. To go back to
viewing "live" data, go to the *Log* menu and select *Goto live data*.
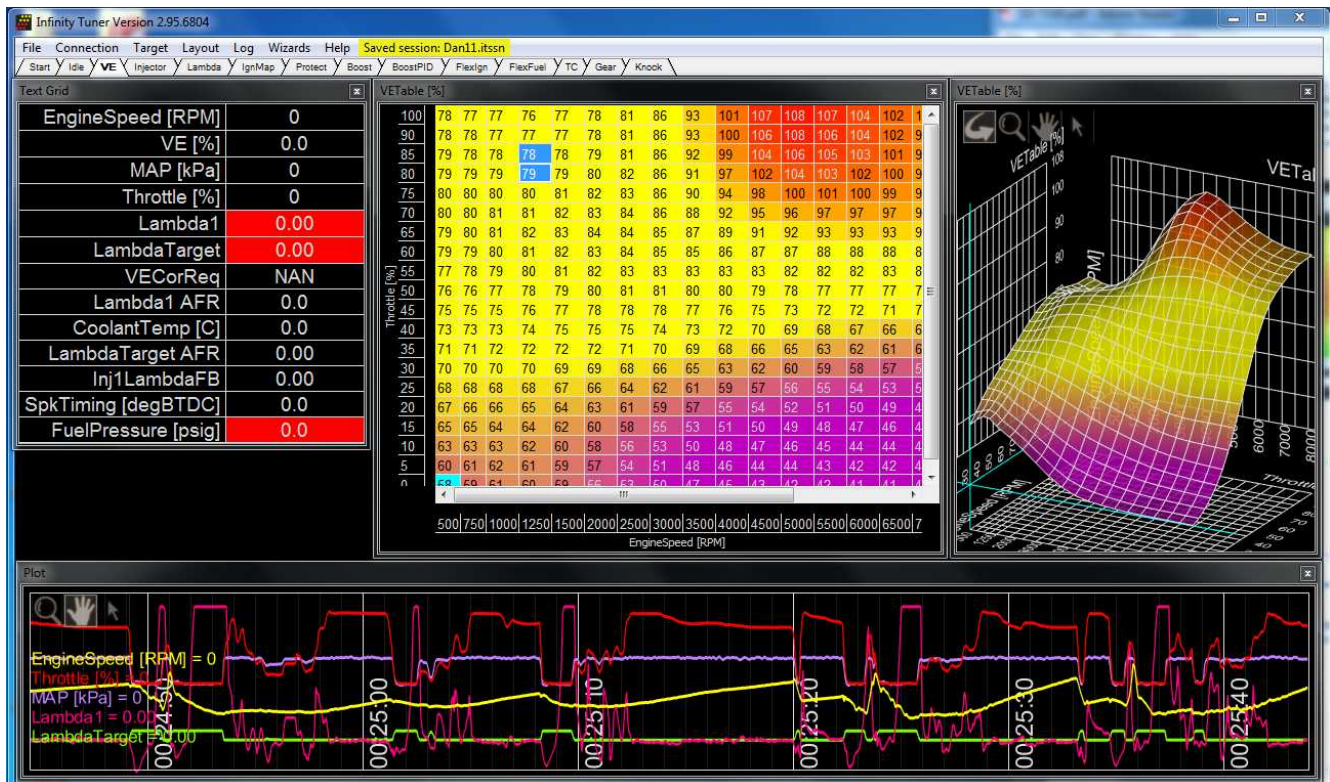
The image above shows plot data sync'd to control windows. All table cursors update with their
position relative to the logged data in the plot control. Note that in this mode, table edits are still
possible.

Hardware

Serial Number

All Infinity ECUs are serialized. Be sure this identification tag stays intact. Write the number down to be safe. Infinity ECUs are programmed with cryptographically secure firmware files and each ECU has a unique file set. The serial number is used to identify the correct files for your ECU.

Account Registration

Account Registration

Note: Hardware part numbers shown in the screen shots below are examples only. Refer to your individual ECU part number and serial number when filling out registration information.

1) Go to http://www.aeminfinity.com and click on the "Register Here" button.

2) Enter required information and click the "Register" button.

3) A confirmation email will be sent to the supplied email address. Choose one of the following options:

   a. Click on the "click here" link.

   b. Or, copy the code and enter it into the Confirmation Code Box.
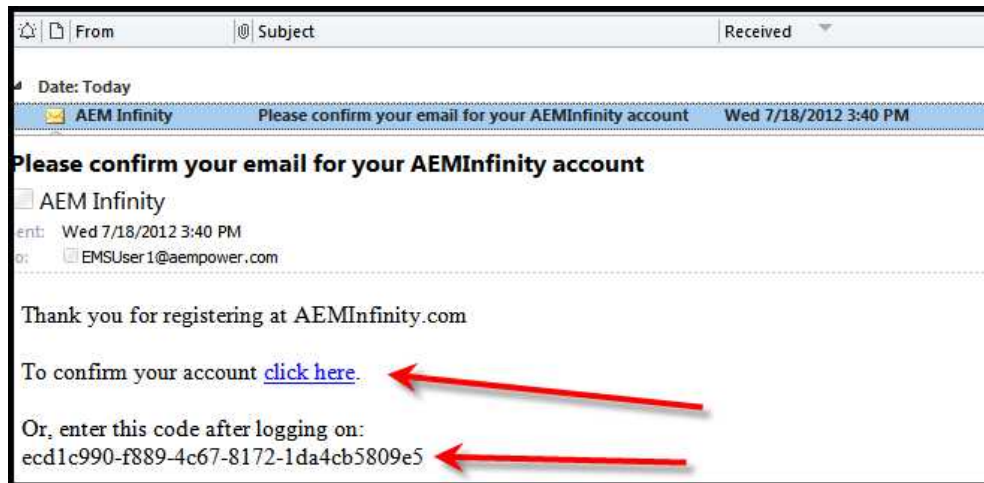
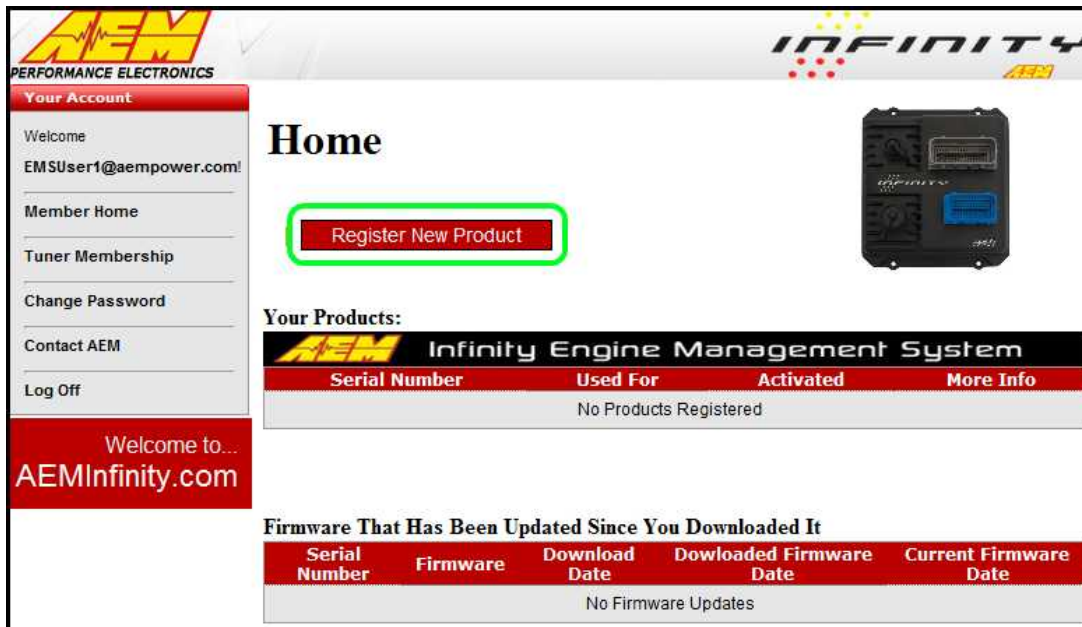
4) After entering the code, click on the "Confirm" button.
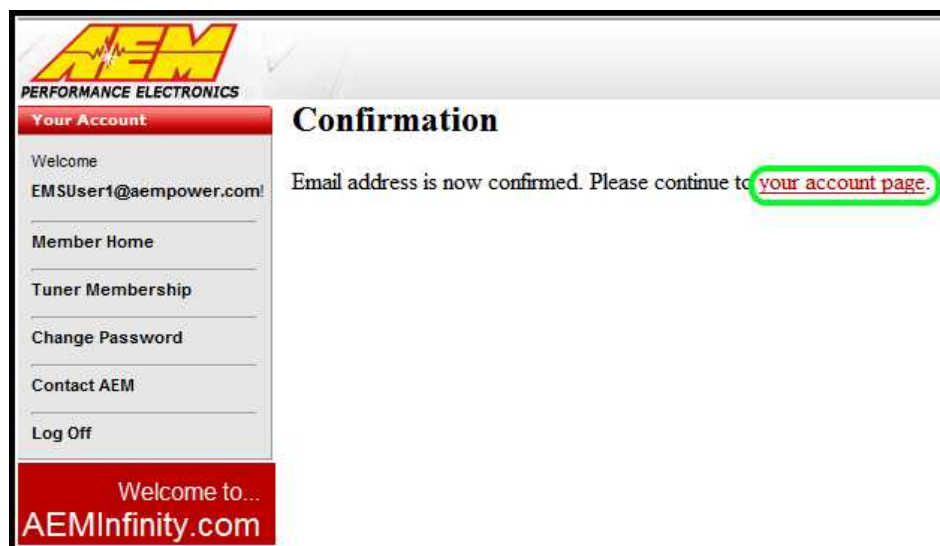
5) Click on the "your account page" to continue with ECU registration; otherwise click the "Log Off" button.

AEM Infinity ECU Registration

1) Go to http://www.aeminfinity.com and log in to your account.
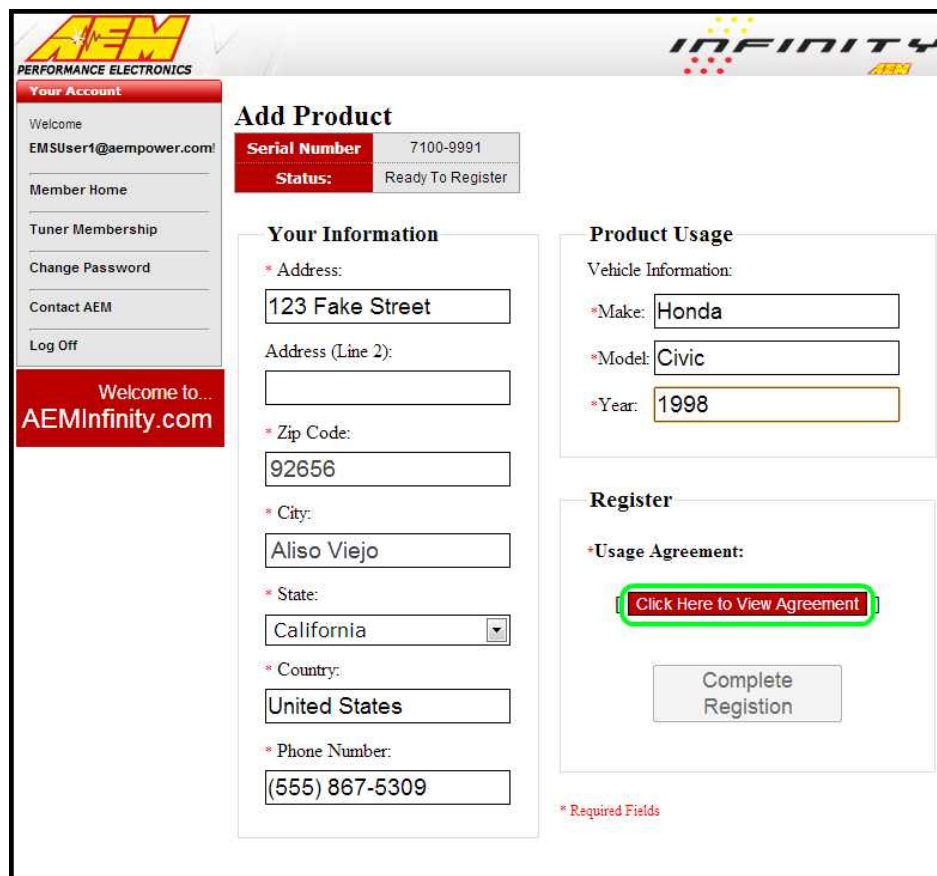

2) Click on the "Register New Product" button.

3) Enter the Serial Number and Security Code. Serial Number is found on sticker on ECU case. Security Code is included in ECU packaging.

4) Enter Product Registration Information. You must first read and accept the Agreement before completing registration.

5) Read and then accept Usage Agreement by selecting the "I Agree" button.

6) Click the "Complete Registration" button once the Usage Agreement has been accepted.

Firmware and Configuration Updates

1) Go to http://www.aeminfinity.com and log in to your account.

2) Locate Firmware and Configuration updates. Check for Firmware Updates since last downloaded. Click the "INFO" button to locate Firmware and Configuration files.
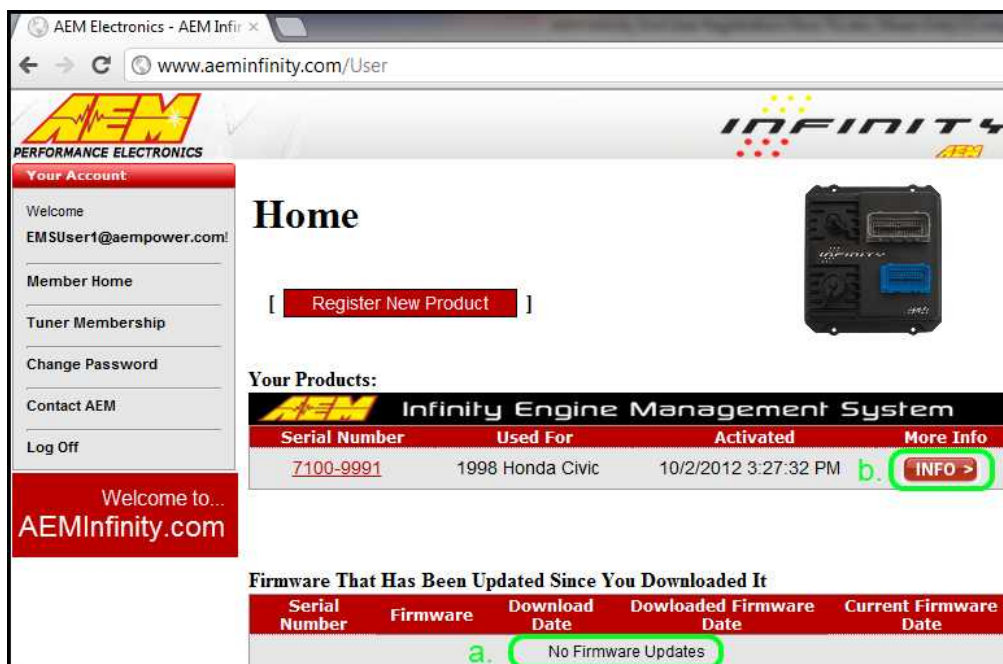
3) Locate the desired Configuration file and click the "Download" button. The Configuration file includes the Firmware and the Configuration files as a .pakgrp file.

4) Save the .pakgrp file in the AEM Infinity Tuner directory: *C:/Program Files (x86)/AEM/Infinity Tuner*

Firmware Update

1) Connect to Infinity Tuner.
   a. Plug the USB cable from the ECU into your computer USB port and key ignition ON.
   b. Open Infinity Tuner.

2) Click the Target drop-down list and select "Upgrade firmware…"
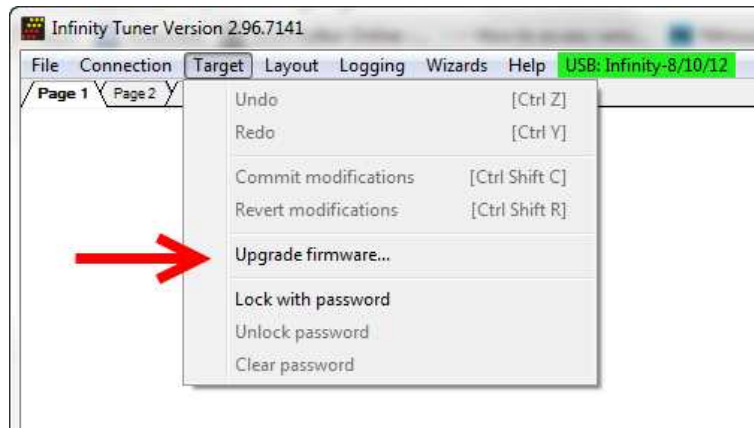
3) The ECU should not be running an engine at this time. Select "Yes" when the warning message appears.
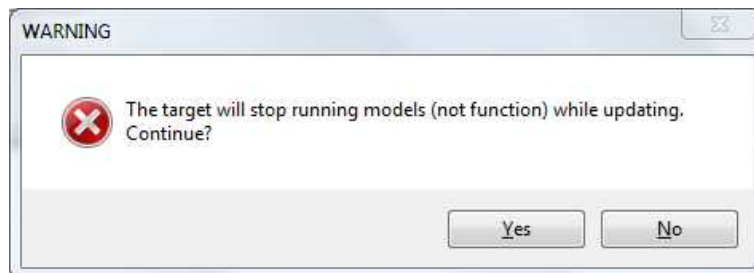
Note: The firmware update utility is periodically updated and may not match the descriptions below. In the event of a conflict, please follow the instructions provided in the dialog windows themselves or supplemental instructions provided by AEM.

Important Note: BEFORE beginning the update process, be sure to have a saved copy of your tuned session file. If a power failure occurs during the update process, this is the only way to ensure that the calibration data is not lost.

4) Begin the Firmware Upgrade process.
    a. Select the desired Configuration "Image" on the left.
        i. If no images are present check *C:\Program Files (x86)\AEM\Infinity Tuner* and verify .pakgrp file is there. If not, visit http://www.aeminfinity.com, log in, and download appropriate file.
    b. **Ensure "Keep Calibration Data" check-box is marked to save current calibration.**
    c. Click the "Begin" button to start the upgrade process.
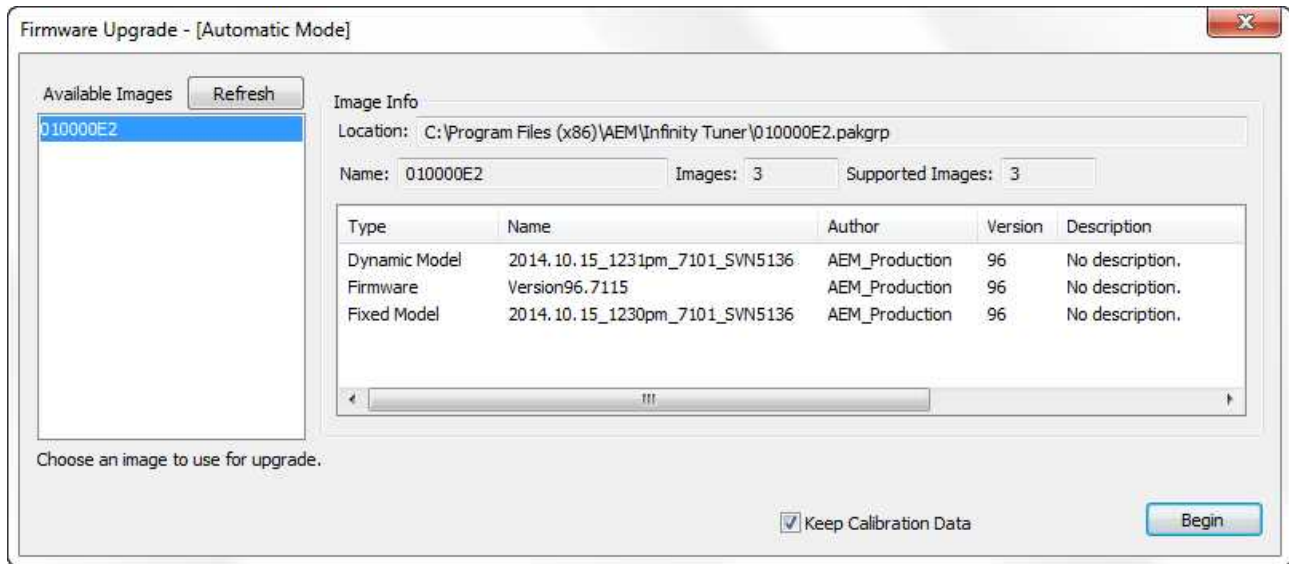
5) Follow the message at the bottom, and turn the ignition switch OFF when instructed to do so.
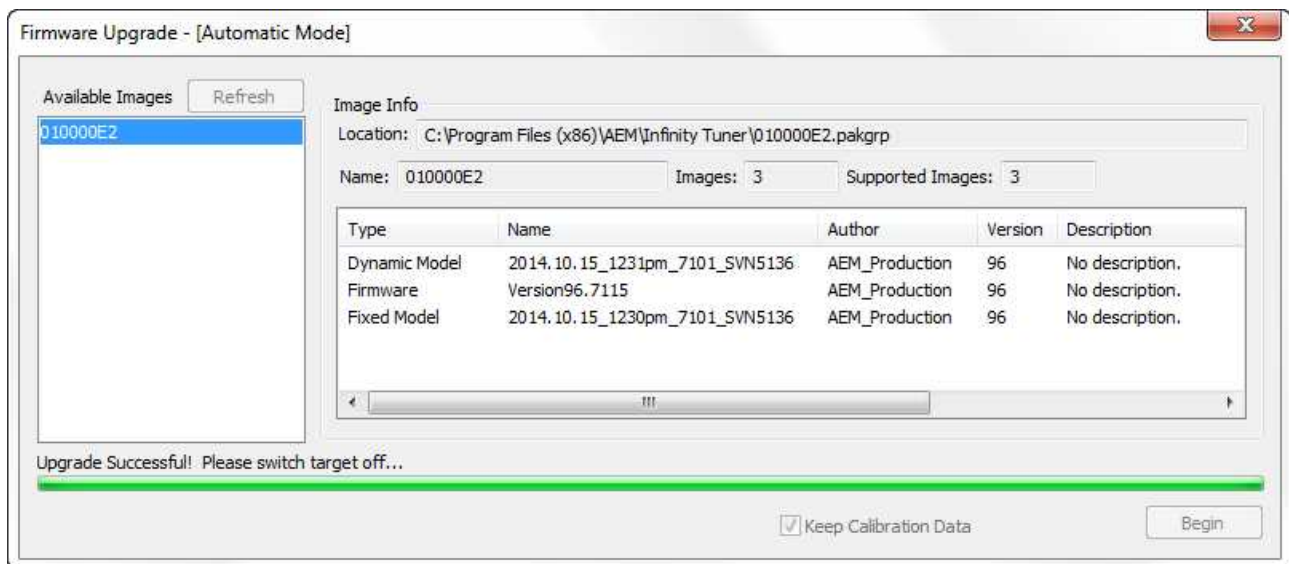
6) Follow the message at the bottom, and turn the ignition switch back ON when instructed to do so.

Firmware Upgrade - [Automatic Mode]					
Available Images	Refresh				
010000E2		**Image Info**			
		Location: C:\Program Files (x86)\AEM\Infinity Tuner\010000E2.pakgrp			
		Name: 010000E2	Images: 3	Supported Images: 3	
		Type	Name	Author	Version	Description
		Dynamic Model	2014.10.15_1231pm_7101_SVN5136	AEM_Production	96	No description.
		Firmware	Version96.7115	AEM_Production	96	No description.
		Fixed Model	2014.10.15_1230pm_7101_SVN5136	AEM_Production	96	No description.

Upgrade Successful! Please switch target on to validate upgrade...

☑ Keep Calibration Data   Begin

7) When the message at the bottom indicates that it's safe to close the window, click "X" button on the top right of the window.

Firmware Upgrade - [Automatic Mode]					
Available Images	Refresh				
010000E2		**Image Info**			
		Location: C:\Program Files (x86)\AEM\Infinity Tuner\010000E2.pakgrp			
		Name: 010000E2	Images: 3	Supported Images: 3	
		Type	Name	Author	Version	Description
		Dynamic Model	2014.10.15_1231pm_7101_SVN5136	AEM_Production	96	No description.
		Firmware	Version96.7115	AEM_Production	96	No description.
		Fixed Model	2014.10.15_1230pm_7101_SVN5136	AEM_Production	96	No description.

Validation Successful! Safe to close window.

☑ Keep Calibration Data   Begin

For applications that use a stepper motor idle valve, it's important that a full power reset be done prior to starting the engine. Turn the key off and wait at least 20 seconds before starting. This will allow the stepper valve to park and reset.

A firmware update will erase the USB log channel list stored in the ECU memory. This channel list will need to be reset before USB logging will function correctly. See Log Menu for more info.

Troubleshooting:
If the process hangs at any point, wait at least one minute for it to continue. Some PCs take longer to reconnect to to the ECU during this process. Some PCs may have other processes running that affect the response time of the USB ports. If the process has not continued as described above after one minute, do not cycle key power. Instead, remove the USB cable from the PC, wait a few seconds then plug it back in. Often this will force the OS to reset the port allowing the process to continue.

Tuning Guide

Basic Tuning

Calibration Data

Connecting, Saving and Importing Session Data

1) With the Ignition in the ON position and InfinityTuner Running, click on the *Connection* menu item and select *Connect to USB* from the dropdown list. A progress bar will be displayed as the laptop gets the calibration info from the ECU.

2) Open a layout file by clicking on the *Layout* menu item and select *Open*. Layout files have a .itlyt extension and should be saved in the *My Documents\InfinityTuner\Layouts* folder.

3) Save the session file by selecting *File – Save session*. Session files have a .itssn extension and should be saved in the *My Documents\InfinityTuner* folder.

The default calibration data provided by AEM should be sufficient to start an engine with similar displacement, sensor setup, and injectors. Every vehicle must be tuned before use. AEM provided base calibration data is installed to the *My Documents\AEM\Infinity Tuner\Sessions* folder. To import calibration data from a saved session file, go to File > Import calibration data.

Open saved session	[Ctrl Shift O]
Save session	[Ctrl Shift S]
Import calibration data	
Exit	
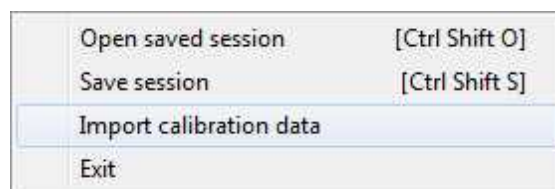
Wait a few moments for the operation to complete. Status messages are displayed during the

process notifying the user of each step along the way. If the import function is done while connected to an ECU, after the import is complete:

1) Turn the key off and wait for the main relay to power down completely. This usually takes about 10 seconds but depends on the model.

2) Turn the key back on.

Certain applications with CAN dash requirements must be powered down completely and restarted after an import calibration. If this is not done, error lights may appear on the dash.

Please be aware of cross-platform differences that may require additional attention after importing calibration data. For instance, the Digital7 pin is available on the Infinity-6 ECU but not available on the Infinity-8H ECU. After importing Infinity-6 session data to an Infinity-8, any input that was assigned to use Digital7 will be displayed as invalid in the wizard and needs to be reassigned to work properly.

Wizard Basic Setup

Wizard Design

The ECU setup wizard is designed to simplify the initial configuration of the Infinity ECU. ***AEM recommends using the wizard only when connected to the ECU via USB with the power on.*** Most of the setup wizards require the engine to NOT be running. Exceptions will be clearly stated in the function descriptions.

The setup wizard contains general and detailed descriptions with each major function. The most imperative functions are discussed below. Use the descriptions in the wizard to assist in the completion of all other setup features. New setup wizard features are being added constantly. Please follow the written descriptions on each wizard page as this document may not accurately represent the features included in the most recent versions.

The Setup Wizard is a stand alone application that runs in conjunction with Infinity Tuner. This software is updated periodically and its appearance and features may not completely match the descriptions below. In the event of a conflict, refer to the descriptions and instructions on the Setup Wizard pages themselves.

With the laptop connected to the Infinity ECU via USB and InfinityTuner connected, go to the Wizard menu at the top of the InfinityTuner layout and select Setup Wizard. Alternately, the hot key combination [ALT]-[w]-[w]-[w] will launch the setup wizard.

Wizard Organization

The wizard is organized into different sections with expandable menu items on the left hand pane. Use the highlighted arrow below in each section to expand the available sections.
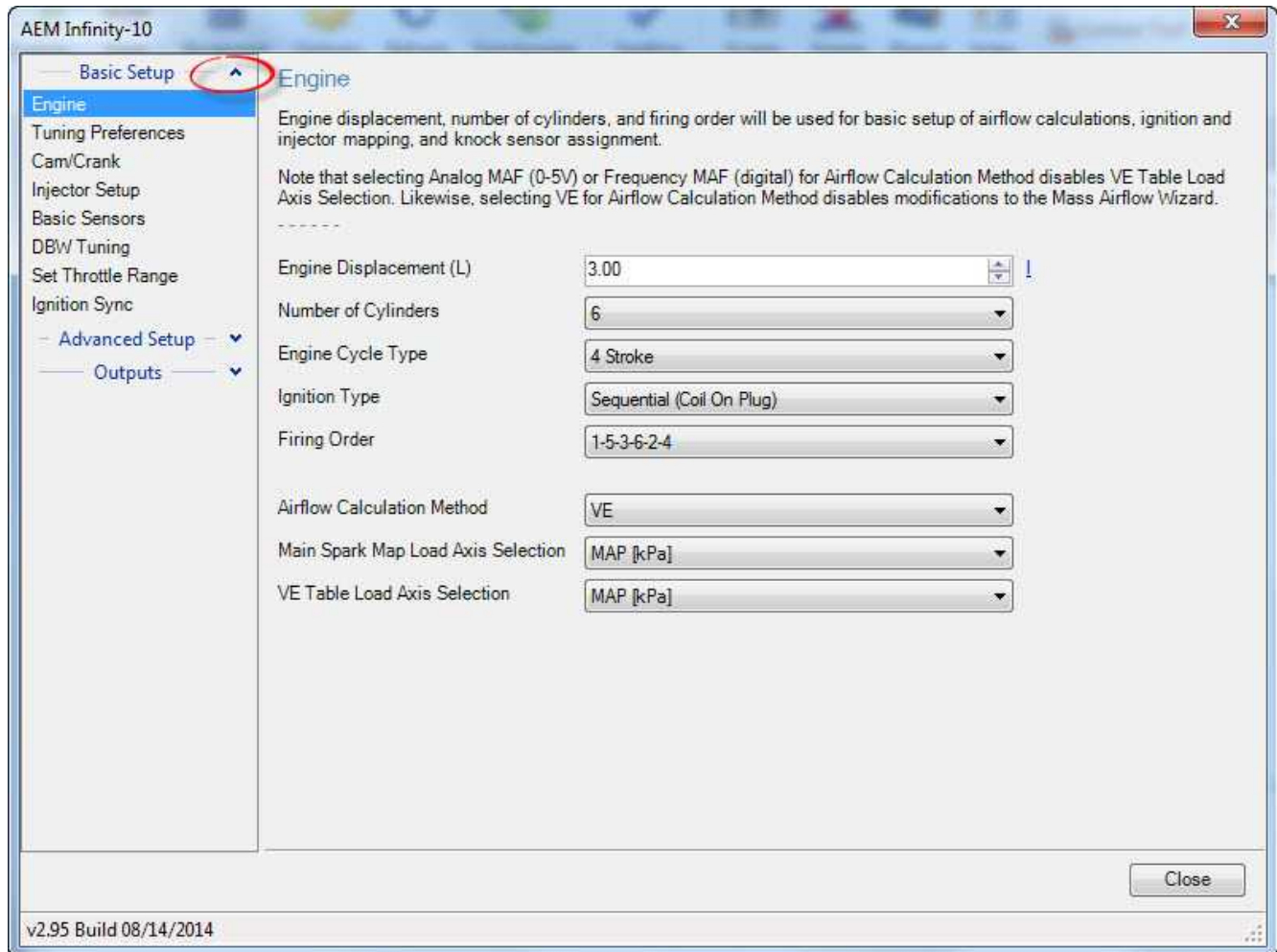
Engine

Basic

Engine displacement, number of cylinders, and firing order will be used for basic setup of airflow calculations, ignition and injector mapping, and knock sensor assignment.

Note that selecting Analog MAF (0-5V) or Frequency MAF (digital) for Airflow Calculation Method disables VE Table Load Axis Selection. Likewise, selecting VE for Airflow Calculation Method disables modifications to the Mass Airflow Wizard.

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Engine Displacement (L)	3.00
Number of Cylinders	6
Engine Cycle Type	4 Stroke
Ignition Type	Sequential (Coil On Plug)
Firing Order:	1-5-3-6-2-4
Airflow Calculation Method	VE
Main Spark Map Load Axis Selection	MAP [kPa]
VE Table Load Axis Selection	MAP [kPa]

Note: This wizard can not be used when the engine is running.

Engine Displacement (L)
Enter the engine displacement in liters.
Min value = 0.250, Max value = 10.0

Number of Cylinders:
Enter the number of cylinders within the engine.
Min value = 1, Max value = 10
Possible values: 1,2,3,4,5,6,8,10

Engine Cycle Type:
Enter the engine type: 2 Stroke or 4 Stroke.

Firing Order:
Select the firing order of the engine.

Airflow Calculation Method:

Select how the airflow calculation is processed. There are 3 options:

VE: This is the default configuration. Airflow is calculated using the speed density algorithm.

0–5V MAF: Airflow is calculated using a 1-axis lookup table that has an analog (0–5V) input from a typical OEM MAF sensor.

Frequency MAF: Airflow calculated using a 1-axis lookup table that has a digital input from a typical OEM MAF sensor

Main Spark Map Load Axis Selection:

This selection will set the load (y-axis) of the ignition maps. Note: The BaseIgnMap and FlexIgnMap must have the same load channel.

Load Axis Channels:

MAP [kPa]
Throttle [%]
MassAirflow [gms/s]
MassAirflow [gms/rev]
MAP/EBP
MAP/Baro

VE Table Load Axis Selection:

This is only available if the Airflow Calculation Method is selected. It will set the load (y-axis) of the VE Table.

Load Axis Channels:

MAP [kPa]
Throttle [%]
MassAirflow [gms/s]
MassAirflow [gms/rev]
MAP/EBP
MAP/Baro
DBW_APP1 [%] Filtered

Tuning Preferences

Calibration data is automatically saved to ECU flash memory at key off if the "Key Off Commit" function is selected in the Tuning preferences wizard page. Proper power sequencing is critical in order to avoid problems. If power is removed from both pins C1-10 and C2-50 (Infinity 8/10/12 hardware) before this action is completed, the ECU may become inoperable and require reprogramming at AEM.

Tuning Preferences

Key Off Commit:
If Key Off Commit is selected, the ECU will automatically save any unsaved changes when the ignition power input, Pin C1 -65 is turned off.
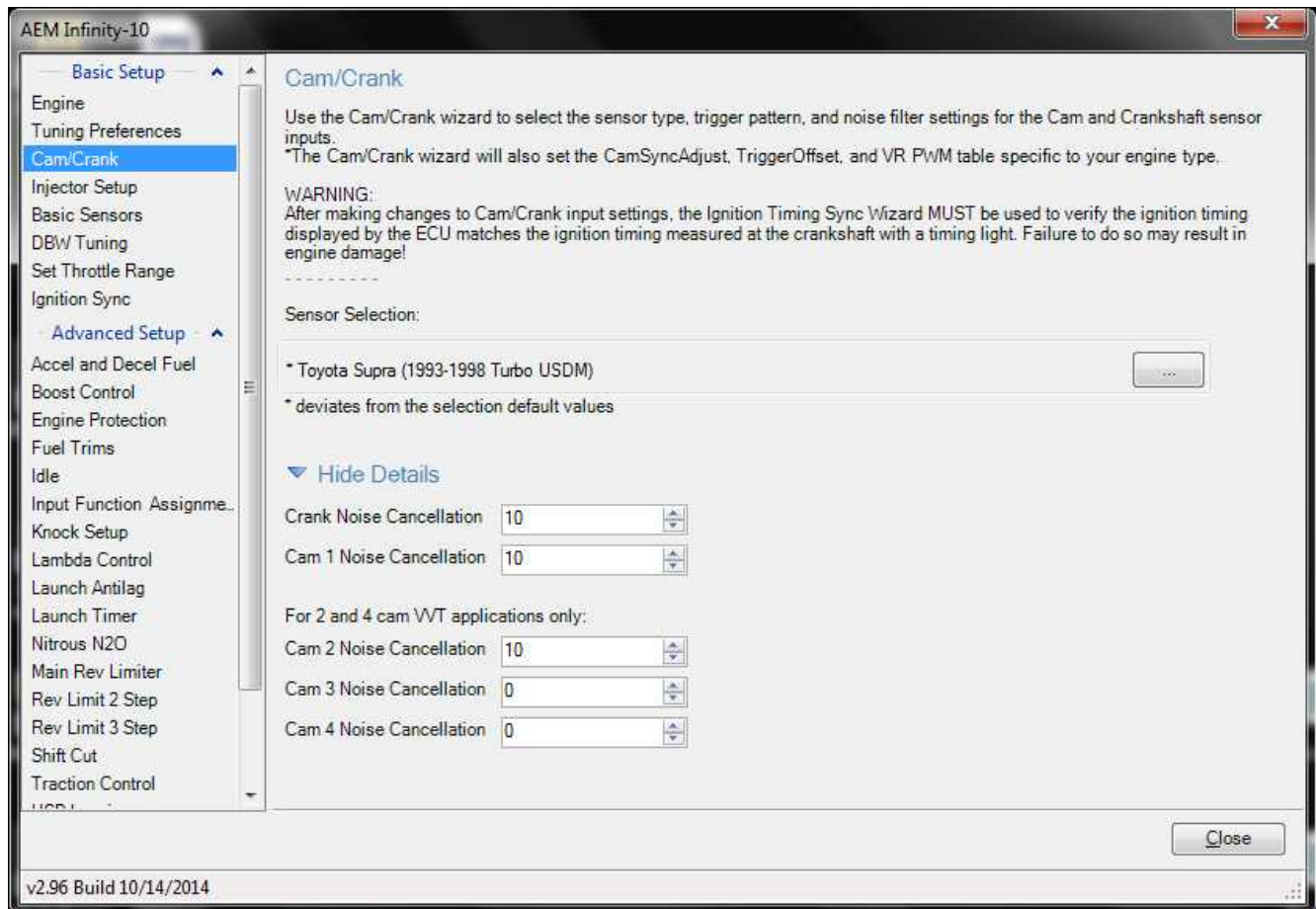This function could take several seconds to complete.
If power is removed from both pins C1-10 and C2-50 before this action has completed, the ECU may become inoperable and require reprogramming at AEM.
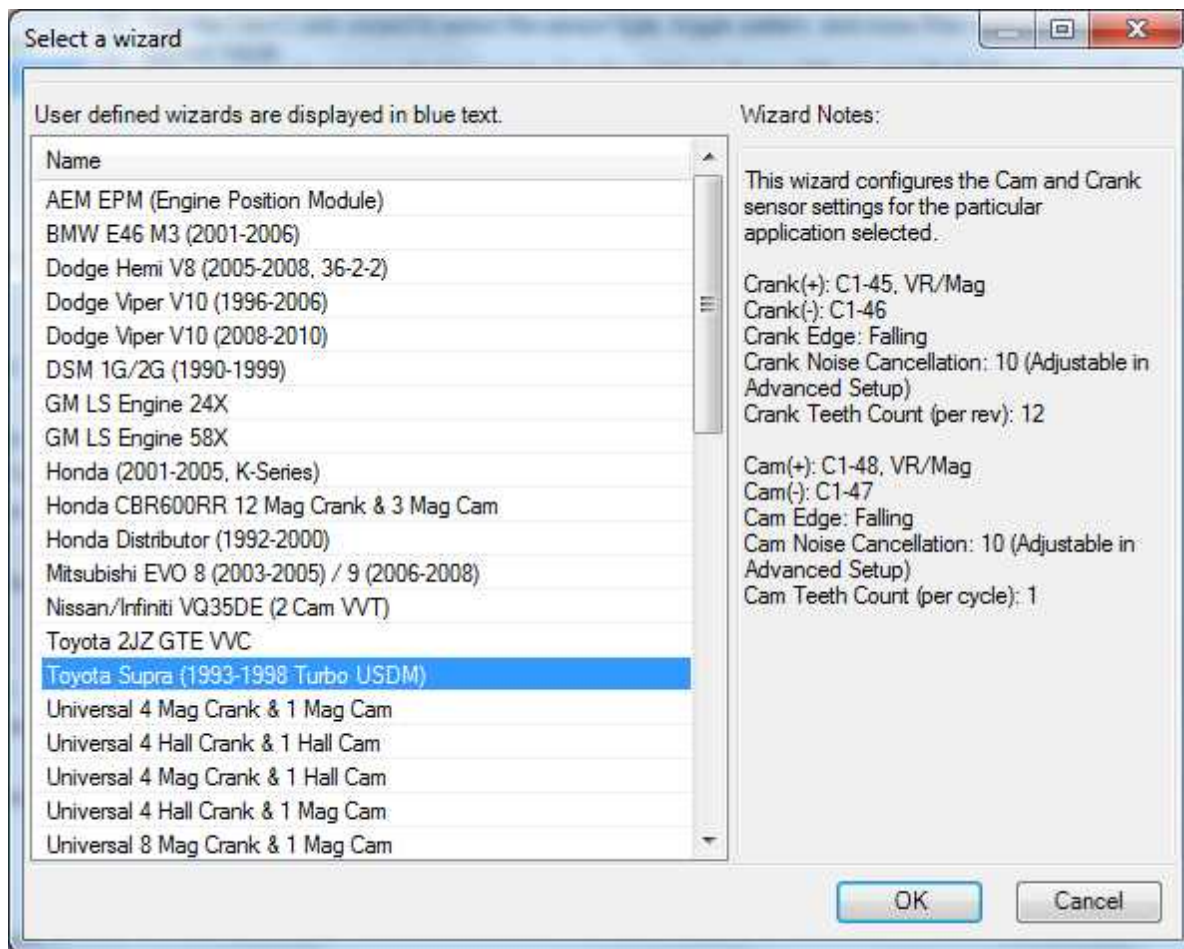
- - - - - - - - - - - - - - - - - - -

Key Off Commit ☑

Cam/Crank

Choose the Cam/Crank timing type that will be used. The description field notes important information about edge selections and wiring requirements.

Select a wizard

User defined wizards are displayed in blue text.

Name

AEM EPM (Engine Position Module)
BMW E46 M3 (2001-2006)
Dodge Hemi V8 (2005-2008, 36-2-2)
Dodge Viper V10 (1996-2006)
Dodge Viper V10 (2008-2010)
DSM 1G/2G (1990-1999)
GM LS Engine 24X
GM LS Engine 58X
Honda (2001-2005, K-Series)
Honda CBR600RR 12 Mag Crank & 3 Mag Cam
Honda Distributor (1992-2000)
Mitsubishi EVO 8 (2003-2005) / 9 (2006-2008)
Nissan/Infiniti VQ35DE (2 Cam VVT)
Toyota 2JZ GTE VVC
Toyota Supra (1993-1998 Turbo USDM)
Universal 4 Mag Crank & 1 Mag Cam
Universal 4 Hall Crank & 1 Hall Cam
Universal 4 Mag Crank & 1 Hall Cam
Universal 4 Hall Crank & 1 Mag Cam
Universal 8 Mag Crank & 1 Mag Cam

Wizard Notes:

This wizard configures the Cam and Crank
sensor settings for the particular
application selected.

Crank(+): C1-45, VR/Mag
Crank(-): C1-46
Crank Edge: Falling
Crank Noise Cancellation: 10 (Adjustable in
Advanced Setup)
Crank Teeth Count (per rev): 12

Cam(+): C1-48, VR/Mag
Cam(-): C1-47
Cam Edge: Falling
Cam Noise Cancellation: 10 (Adjustable in
Advanced Setup)
Cam Teeth Count (per cycle): 1

OK   Cancel

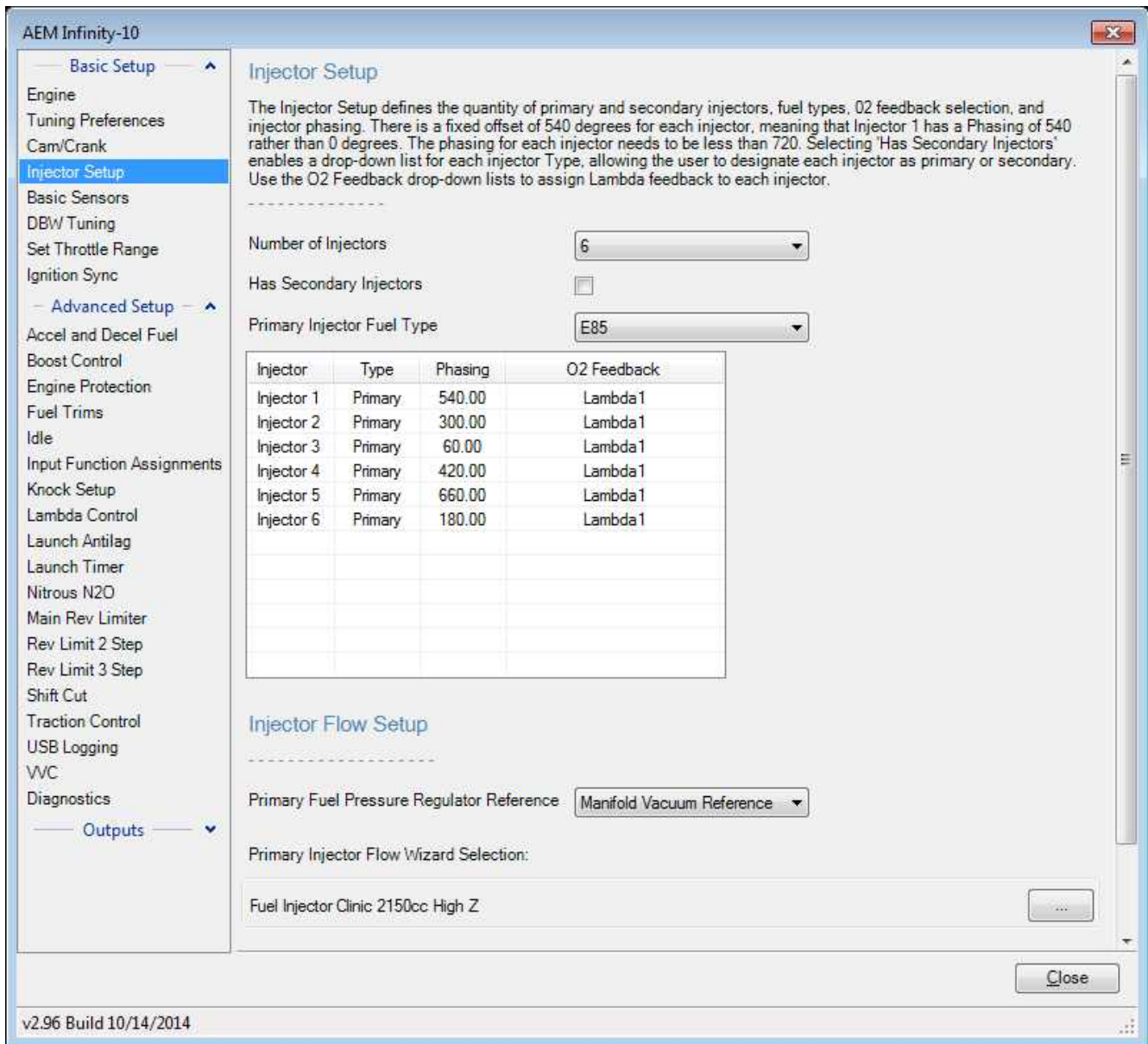Additional settings exist to adjust noise cancellation. For more details see Noise Cancellation

Injector Setup

Number of Injectors
The drop down box allows the user to select the desired Number of Injectors.
Min value = 4, Max value = 12

Has Secondary Injectors

If secondary injectors will be used, select this check box. A new fuel type menu is now visible labeled Fuel Type (Secondary Injectors).

See Staged Injection for additional tuning information.

Note: If secondary injectors are being used, the option *Has Secondary Injectors* must be selected and the table must be filled out indicating any injector number greater than the number of engine cylinders as secondary. These selections must be made before restarting the ECU and closing the form; otherwise an error will occur. See image below for a typical 6 cylinder engine setup with 6 additional injectors classified as secondary. Note also the option to select a different fuel type for primary and secondary.

Fuel Type

This drop down menu contains the following setup information for primary (and secondary fuel types, if selected).
- Gasoline
- Ethanol
- Methanol
- E85
-Flex Fuel

Phasing

The default injector phasing for the primary injectors is determined from the Firing Order information from the Ignition Wizard. There is a fixed offset of 540 for injectors. After this offset is added, the system checks to see if the result is less than 720. If the result of the calculation is greater than or equal to 720, it is subtracted by 720 from that result

Example:
4 cylinder 1-3-4-2 firing order:
Injector 1 phasing = 0 + 540 (offset) = 540
Injector 3 phasing = 180 + 540 (offset) = 0
Injector 4 phasing = 360 + 540 (offset) = 180
Injector 2 phasing = 540 + 540 (offset) = 360

O2 Feedback

Lambda sensor assignment is determined by assigning a value of 1 or 2 to the InjXLambdaFB channels. A value of 1 will assign the Lambda 1 sensor and a value of 2 will assign the Lambda 2 sensor. Min value = 1, Max value = 2
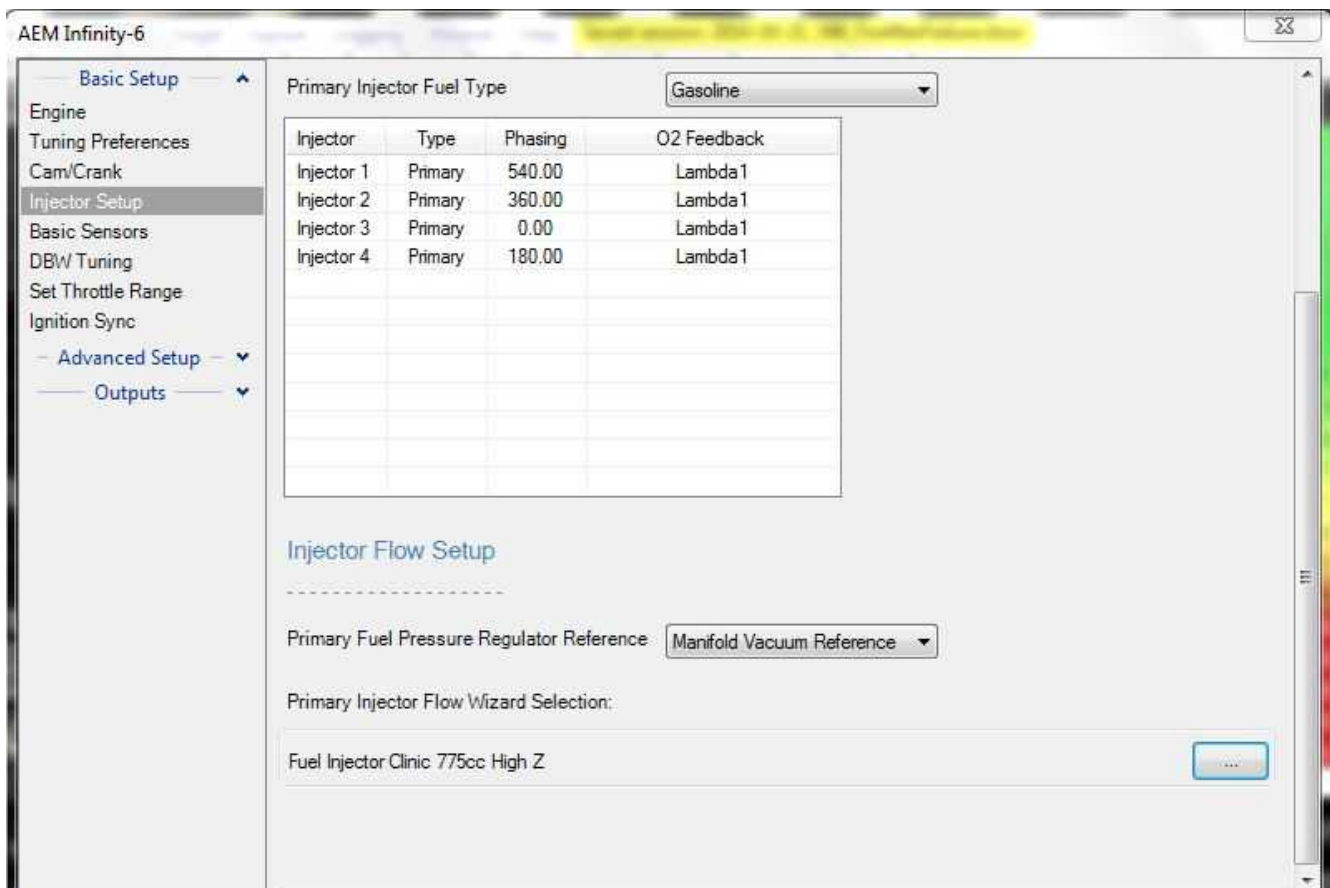
Fuel Pressure Regulator Reference

Allows the user to choose the proper reference pressure for the fuel pressure regulator. The drop down menu has the following options:

Manifold Vacuum Reference: This should be selected if the fuel pressure regulator's port is connected to a vacuum or vacuum/boost source.

Atmospheric Reference: This should be selected if the fuel pressure regulator's port is open to atmosphere or if a dead end fuel system is used where fuel pressure is constant.
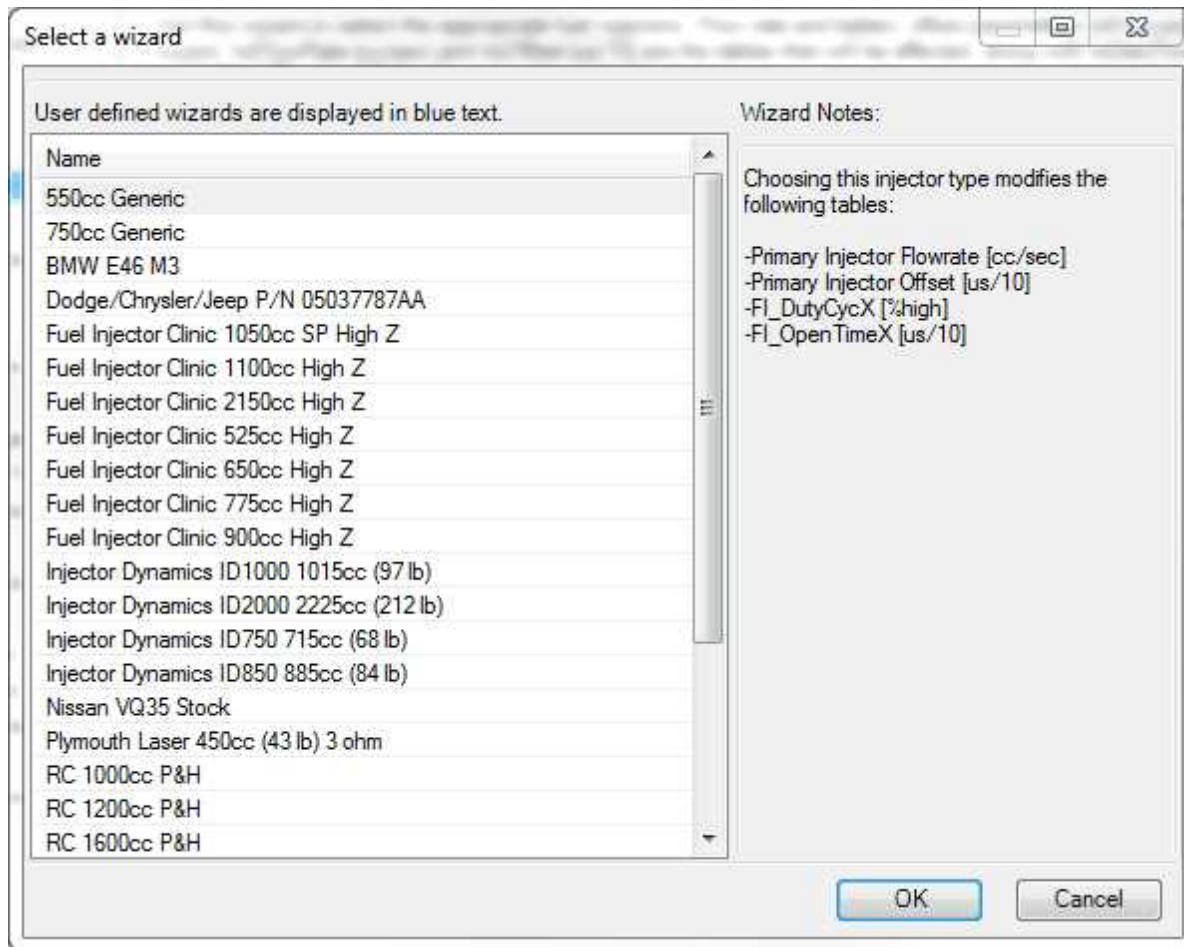
Primary Injector Flow Selection

This database allows the user to select proper primary injector flow data.

InjFlowRate [cc/sec], 1-Axis lookup table of flow vs injector pressure.

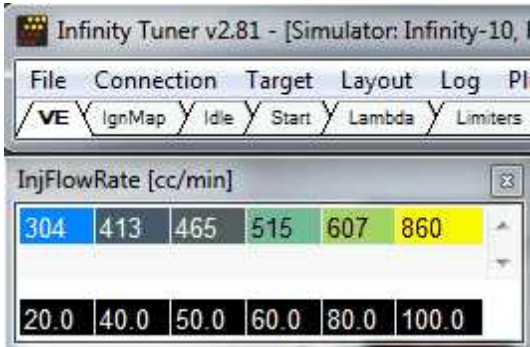InjOffset [us/10], 2-Axis lookup table of PW offset vs battery voltage and injector pressure

Secondary Injector Flow Selection

If Secondary Injectors were selected in the Injector Setup Wizard, this Secondary Injector Flow Selection database will be enabled. This allows the user to select proper secondary injector flow data.
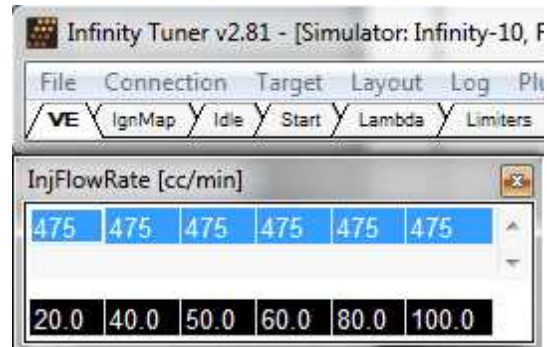
InjSecFlowRate [cc/sec], 1-Axis lookup table of flow vs injector pressure.

InjSecOffset [us/10], 2-Axis lookup table of PW offset vs battery voltage and injector pressure

NOTE: If the Setup Wizard does not contain your specific fuel injector type, you can modify the InjFlowRate table manually. If you do not know the different flow rates at different fuel pressures, choose a flow rate (based on Manufacturers specs) at a known pressure and populate the entire row with that value. For example, you have a fuel injector that is not listed in the Wizard Selection. You know that it flows 475 cc/min at 45 psi. Select the cells in the upper row of the InjFlowRate [cc/min] table and manually input 475. This will suffice to get the car up and running, though proper flow data is ideal.

Set Throttle Range

The wizard displays a warning message to the user if the software is not connected to a hardware target.

Live TPS Volts

Text and graphical representation of the raw analog voltage is shown.

Steps

Set TPS Volts Min

Press this button when the throttle pedal is fully released. This will write the current value of Analog7 [V] to the Throttle_raw [%] Analog In conditioner and display the resultant value on the TPS Min Volts: X.XX display.

Set TPS Volts Max

Press this button after the throttle pedal is fully depresses. This will write the current value of Analog7 [V] to the Throttle_raw [%] Analog In conditioner and display the resultant value on the TPS Max Volts: X.XX display.

Ignition Sync

The engine's ignition timing must be synchronized with the Infinity Tuner's ignition timing display. This is crucial with older vehicles that have adjustable distributors, adjustable cam angle sensors, etc. Most modern engines do not utilize a manual adjustment for ignition timing. However, this wizard should always be used for verification as sensors can be frequently installed backwards or upside down. This can catch a problem before damage occurs.

Note: This wizard can only be used when the engine speed is greater than 50 RPM.

Ignition Timing

> For synchronizing, the ignition timing can be locked by checking the box.
> Allowable values: Min value = 0, Max value = 45

Sync Adjustment

> The window includes 4 buttons. Two buttons are used to Advance Timing and TWO buttons are used to Retard Timing.

The button labeled Large edits the CamSyncAdjustment TrigOffset [degBTDC] channel in 1.0 deg steps. The range is 0 to 719 degrees. The button labeled Small edits the TrigOffset [degBTDC] channel in 0.1 deg steps.

The TrigOffset [degBTDC] is adjustable by Resolution. The Resolution setting has a range of 0.25 deg to 2.0 degrees in 0.25 degree increments. This "stepping" function allows the user to make TrigOffset [degBTDC] adjustments with the Small button up to the range limit.

Advanced Setup

Pickup sensor delay
The More and Less buttons increase/decrease the SpkDelayComp [us] value in increments/decrements of 5.
Min value = 0, Max value = 500

Two separate procedures are required depending on the Infinity application: Plug and Play or Universal Application.

Plug and Play
a. In the Ignition Sync wizard, select the checkbox "Lock ignition timing at" and set the "degrees BTDC" (10.0 deg BTDC is the default).
b. Start the engine and use a timing light to verify that the crankshaft timing matches the locked ignition timing set point (10.0 deg BTDC if using the default setting).
c. If there is a deviation between the locked set point and the actual timing observed with the timing light, use the Sync Adjustment arrows to match the wizard-displayed value with the actual value. As the Sync Adjustment arrows are advanced or retarded, the timing observed on the crankshaft will change, while the "Lock ignition timing at 10.0 degrees BTDC" will remain constant.

Universal Application
a. In the Ignition Sync wizard, select the checkbox "Lock ignition timing at" and set the "degrees BTDC" (10.0 deg BTDC is the default).
b. Do NOT attempt to start the engine. Disable (unplug) the fuel injectors and/or fuel pump.
c. While cranking the engine, use a timing light to verify that the crankshaft timing matches the locked ignition timing set point (10.0 deg BTDC if using the default setting).
d. If there is a deviation between the locked set point and the actual timing observed with the timing light, use the Sync Adjustment arrows to match the wizard-displayed value with the actual value. As the Sync Adjustment arrows are advanced or retarded, the timing observed on the crankshaft will change, while the "Lock ignition timing at 10.0 degrees BTDC" will remain constant.
e. Reconnect the fuel injectors and fuel pump.
f. Once the remaining Setup Wizards have been configured, repeat the Ignition Sync process with the engine running to ensure that the crankshaft timing matches the locked ignition timing set point.

Modified Values

Calibration table changes that haven't been committed to flash memory are highlighted as shown below. Conditions that will reset the display are as follows:

1. Manually committing changes through the Target > Commit modifications menu command
2. Manually committing changes using the hot key combination [Ctrl Shift C]
3. Opening and closing the Setup Wizard. Note the Setup Wizard automatically commits ALL changes to memory every time it is closed.
4. Turning the ignition switch off when the tuning preference Key Off Commit is selected
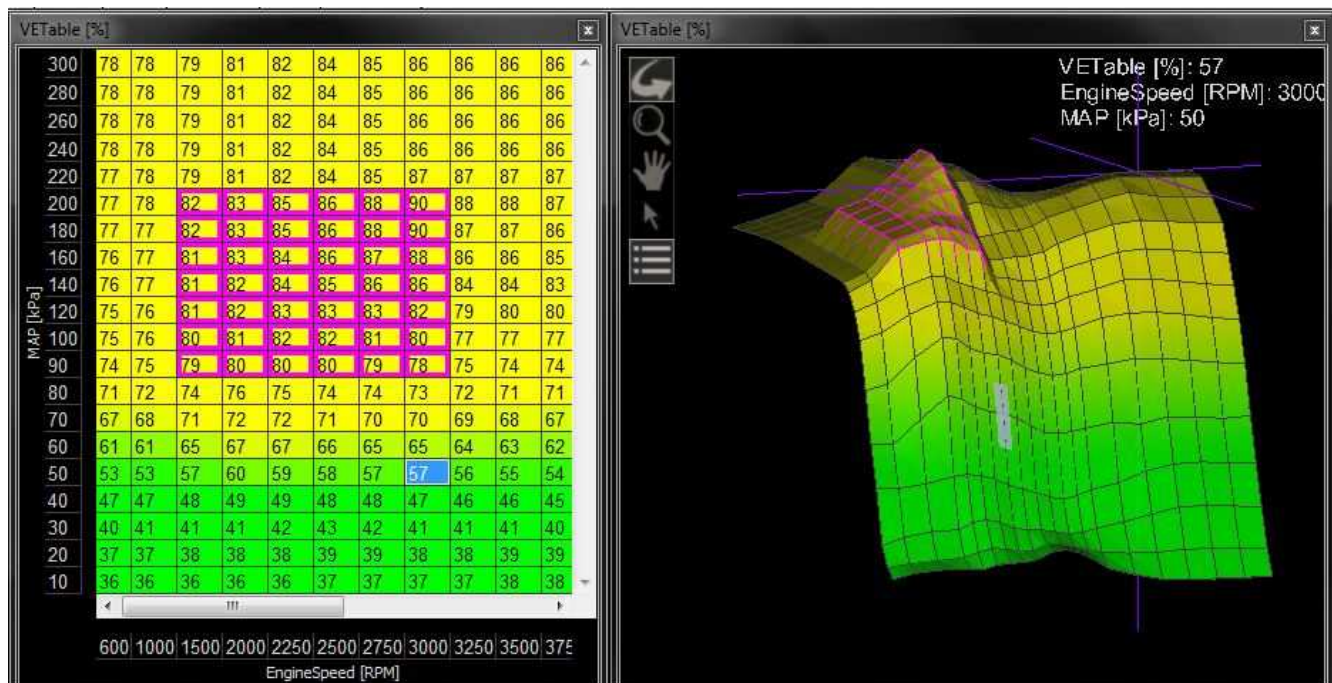
VE & Airflow Based Tuning

The Infinity ECU uses significantly different methods of calculating the fuel delivery requirements and outputs than previous AEM products.

Measured data from sensors, i.e., Manifold Absolute Pressure (MAP [kPa]), Air Temperature, Coolant Temperature, and Engine RPM, are acquired. The ECU uses this sensor data in combination with Volumetric Efficiency (VE%) to estimate airflow.

The Volumetric Efficiency is a percentage of air and fuel that actually enters the cylinder during induction relative to the volumetric capacity (rated displacement) of the cylinder under static conditions. The VE lookup table is a 2-axis lookup table, with load values (typically MAP [kPa]) versus Engine RPM. In each table cell, the Engine RPM corresponds with a specific MAP [kPa], and a Volumetric Efficiency is defined for that cell.
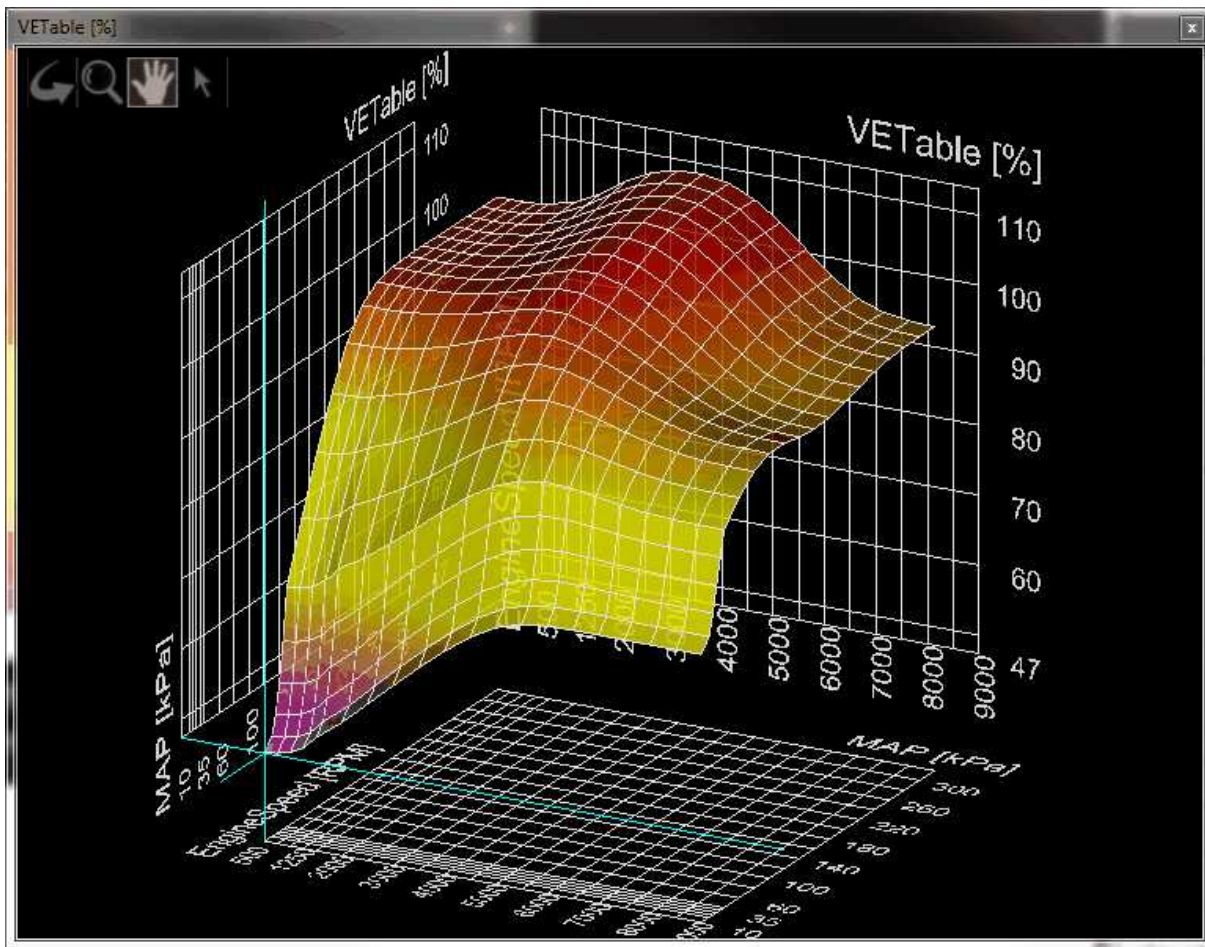
The Volumetric Efficiency is combined with temperature sensor data to estimate a compensated Mass Airflow. The ChargeTempBlend table dictates what ratio of air temperature to coolant temperature is used at specific Engine RPM to adjust the density of the inducted air. A higher number gives priority to Coolant Temperature, and is seen at lower Engine RPM.

ChargeTempBlend															
0.800	0.800	0.800	0.700	0.600	0.500	0.400	0.300	0.200	0.100	0.100	0.100	0.100	0.100	0.100	0.100
500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000

EngineSpeed [RPM]

Once Mass Airflow has been calculated using the tables above, the Infinity ECU will look up the Target Lambda (AFR) and then calculate the fuel requirements. Target AFR will be used as a main parameter in determining fuel injector flow rate. The LambdaTargetTable (below Left) and AFR Target Table conversion table (below Right) will have default values. Based on the calculated Mass Airflow, the Infinity ECU will attempt to add enough fuel to hit the target AFR.

Note: The calculated LambdaTarget influences the fuel delivered to the engine at all times, even when closed-loop 02 feedback is disabled.

LambdaTargetTable

MAP [kPa]	500	1000	1500	2000	2500	3000	3500	4000	6000	8000
220	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750
200	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750
175	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750
150	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750
125	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750
100	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850
80	0.920	0.920	0.940	0.990	0.990	0.990	0.920	0.920	0.920	0.920
60	0.950	0.950	0.980	0.990	0.990	0.990	0.920	0.920	0.920	0.920
40	0.980	0.980	0.980	0.990	0.990	0.990	0.920	0.920	0.920	0.920
30	0.980	0.980	0.980	0.990	0.990	0.990	0.920	0.920	0.920	0.920

EngineSpeed [RPM]

AFRTargetTable Gasoline

MAP [PSIG]	500	1000	1500	2000	2500	3000	3500	4000	6000	8000
17	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95
14	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95
11	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95
7	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95
3	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95	10.95
-0	12.41	12.41	12.41	12.41	12.41	12.41	12.41	12.41	12.41	12.41
-3	13.43	13.43	13.72	14.45	14.45	14.45	13.43	13.43	13.43	13.43
-6	13.87	13.87	14.31	14.45	14.45	14.45	13.43	13.43	13.43	13.43
-9	14.31	14.31	14.31	14.45	14.45	14.45	13.43	13.43	13.43	13.43
-10	14.31	14.31	14.31	14.45	14.45	14.45	13.43	13.43	13.43	13.43

EngineSpeed [RPM]

The suggested tuning method is to set the AFR using the LambdaTargetTable or AFR Target Table to a value safe and suitable for the engine. For normally aspirated engines a value of 13.0:1 or 0.887 lambda is usually sufficient at all operating conditions. For boosted applications, the operating conditions dictate a safe AFR. Please consult a tuner knowledgeable in your engine's requirements for help. Once the target lambda (AFR) values are chosen, run the engine at as many operating conditions as possible and adjust the VE Table to reach the AFR Target Table values. Once the VE Table has been tuned to accurately reach the AFR Target Table values at all operating ranges, then you can change the AFR Target Table to use different AFR settings later. Never adjust VETable to run a different AFR, only to achieve the LambdaTarget

value.

The Injector Flowrate is very important in determining the fuel requirements. The Infinity ECU uses actual Injector Flowrate [cc/min] to determine the proper injector pulse width. The InjFlowRate [cc/min] table is calibrated from the Setup Wizard: Injector Flow, however the table can be modified manually for unlisted injectors.

Now that the base injector flow rate has been determined, the Infinity ECU applies a few more compensating factors. Wall Wetting is a function of fuel condensing in the intake manifold at the injection point. At different rates of change in the MAP [kPa] values, and at different Coolant Temperatures, fuel enrichment compensations are used to prevent lean and rich conditions during rapid manifold pressure changes. Note that this table has several different functions. It can be used for dynamic transients by nature of its "MAP Rate" x-axis. It can also be used for more steady state compensations by adjusting the values in the "middle band" of the table where MAP rate changes are very small. Positive numbers in this table will effectively add fuel to enrichen the mixture. Negative numbers have the opposite effect.

The X and Y axis inputs of the WallWetting table can be set to several different variables. These settings are found in the Setup Wizard page for Accel and Decel Fuel. Axis selections include:

Map Rate
Throttle Rate
Coolant Temp
MAP [kPa]
EngineSpeed [RPM]

A second WallWetting table is also available for even more transient fuel compensation functionality. See the WallWetting2 Table topic for more information.

LamdaAfterStartTrim is a 2-axis table that is used to modify the Lambda (AFR) for specified time after starting the engine. This table adds a lambda offset for a small period of time after the engine is started. By allowing a slightly richer mixture target, it will keep the engine from stalling or running rough immediately after starting and the lambda correction to a minimum. The last column should be populated with "0" trim at operating temperatures to prevent a continuous lambda offset.

Target Lambda

To control the engine's fuel delivery system, the Infinity can be programmed to run open loop and/ or closed loop O2 feedback. Closed loop uses feedback from the oxygen sensor to make temporary, but immediate, corrections to the injection to maintain a target air fuel ratio (AFR) or lambda. The type of the O2 sensor will determine how lambda target can be controlled. Due to the nature of standard narrow band O2 sensors, the only accurate measurement that can be maintained in closed loop is Lambda 1.0. However, wideband O2 sensors can be used in almost every feedback condition.

Note that 14.64:1 is called the stoichiometric AFR for gasoline. It is the ratio where all available fuel is burned completely. For most performance applications, it is not the ideal AFR to operate the engine at all the time nor is it the AFR that creates the most power or even economy under all conditions.

When the fuel system is open loop, the O2 sensor is ignored and the injector pulse width relies on the VE Table and fuel compensators to adjust injection duration. Open loop is necessary during engine starts, when the O2 sensor has cooled below its operating temperature. It may also be necessary when coolant temperatures are low. In this state, the fuel vaporization is poor and the engine will require a richer mixture to properly operate. When under heavy load, the engine typically requires an air fuel ratio that is out of a narrow band oxygen sensor's standard range and open loop will be necessary. When the accelairflow function is triggered during hard accelerations, open loop may be necessary to help stabilize the Target Lambda. Also, when the deceleration function cuts fuel completely, target lambda will not be necessary.

LambaTargetTable
Units: Engine Load vs Engine Speed vs Lambda
Description: This table sets the target lambda for various engine conditions.

LambdaTargetTable										
220.0	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710
200.0	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710
175.0	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710
150.0	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710
125.0	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710
100.0	0.820	0.820	0.820	0.820	0.820	0.820	0.820	0.820	0.820	0.820
80.0	0.990	0.990	0.990	0.990	0.990	0.990	0.990	0.990	0.990	0.990
60.0	0.940	0.940	0.940	0.980	0.950	0.940	0.940	0.940	0.940	0.940
40.0	0.940	0.940	0.940	0.980	0.950	0.940	0.940	0.940	0.940	0.940
30.0	0.940	0.940	0.940	0.980	0.950	0.940	0.940	0.940	0.940	0.940
	500	1000	2000	3000	4000	5000	6000	7000	8000	9000

:Pa]

EngineSpeed [RPM]

Tuning Target Lambda

The first step before tuning:

1. Open **Infinity Tuner** and connect to the ECU.
2. Open the **Lambda Tab** and confirm the **Lambda1Cal Table** is set up for the oxygen sensor used.
3. Open the **Lambda Control Wizard** and check the **Lambda 1 Feedback Enable** and/or **Lambda Feedback Enable** boxes.
4. Set the **Lambda Feedback Max Speed**. Wideband O2 sensors are accurate in most situations so this can be activated all the time, if need be.
5. Set the **Lambda Feedback After Start Delay** (typical –10 seconds).

The Infinity Tuner functions are located in the **TargetLambda** tab.

1. Use the **Lambda Control Proportional Gain** by itself and set the **Lambda Control Integral Gain** and **Lambda Control Derivative Gain** to zero.
2. Log the channels **Lambda1** (or 2) and **ErrorLambda1** (or 2).
3. Increase the **Lambda Control Proportional Gain** until the point of instability or a sustained oscillation is reached.
4. From here, the ultimate proportional (Ku) is found.
5. From the log, measure the period of oscillation from peak to peak, in seconds, to obtain the critical time constant or ultimate period (Pu).
6. Once the values for Ku and Pu are obtained, the PID parameters can be calculated from the following equations.

Proportional, Integral, and Derivative Feedback
Lambda Control Proportional Gain = 0.60 (Ku)
Lambda Control Integral Gain = 2 (Kp) / Pu
Lambda Control Derivative Gain = (Kp)(Pu) / 8

Note that these values are not optimal values and additional fine tuning may be required to obtain the best target lambda performance.

Wiring, Pinouts and Schematics

Wiring

Wire Harness Options

Universal
Several harness build options are available for the Infinity.

Universal Wiring Options
- 30-3705 – Harness, Infinity-6 and Infinity-8H Flying Lead (sold separately)
- 30-3704 – Connector Kit, Infinity-6 and Infinity-8H
- 30-3703 – Harness, Infinity-10 Flying Lead (sold separately)
- 30-3702 – Harness, Infinity-10 Mini Flying Lead (sold separately)
- 30-3701 – Connector Kit, Infinity-10 (sold separately)

Plug and Play Wiring Options (Infinity-10 and Infinity-8)
- 30-3500 – Harness Kit, Infinity Supra (sold separately)
- 30-3510 – Harness Kit, BMW E46 M3 (sold separately)
- 30-3520 – Harness Kit, Nissan 350Z / G35 (sold separately)

Plug and Play Wiring Options (Infinity-6 and Infinity-8H)
- 30-3501 – Harness Kit, Infinity Honda OBD1 (sold separately)
- 30-3501-00 – Coil adapter Honda distributor applications (sold separately)
- 30-3502 – Harness Kit, Honda K Series engines (sold separately)
- 30-3508 – Harness Kit, Honda S2000 '00–'05 (sold separately)
- 30-3509 – Harness Kit, Honda OBD2B (sold separately)

Plug and Play Wiring Options (GM LS Engines)
- 30-3532 – Harness Kit, Infinity LS 24X engines (sold separately)
- 30-3530 – Harness Kit, Infinity LS 58X engines (sold separately)

Accessories
- 30-3600 – O2 Sensor Ext Harness, Infinity
- 30-3601 – IP67 Comms Cable, Infinity
- 30-3602 – IP67 Logging Cable, Infinity
- 30-3604 – IP67 Comms Cable, 9.8' Infinity

Tools

AEM recommends using the following proper crimp tool for all Infinity ECU terminations, **Molex Part No:** 63811-4200. This tool is available in many places. One is shown below. Web address: http://www.newark.com

A cheaper, but lower quality, alternative is the following crimp tool, **Molex Part No:** 63811-1000. This tool is available in many places. One is shown below. Web address: http://www.newark.com

Newark element14.

Product Search
Keyword/Part# Search   Find
☐ RoHS compliant items only | Advanced Search

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New to Newark/element14? Start here

HOME > Connectors > Accessories > Crimp Tools > 63811-1000
MOLEX - 63811-1000 - Hand Crimp Tool
Customer Rating: ☆☆☆☆☆ Be the first one to review this product
There is **1** question and **1** answer on this product Read all the Q&As | Ask a question about this product

Image is for illustrative purposes only. Please refer to product description

molex®

Manufacturer: MOLEX
Newark Part Number: 85C2464
Manufacturer Part No: 63811-1000

| Availability	
Availability: 33	
33 available to ship today	
▶ Check more stock...	
Price For: 1 Each	
Minimum Order Quantity: 1	
Order Multiple Quantity: 1	
Price: $49.49	
Qty [1] 🛒 Buy	
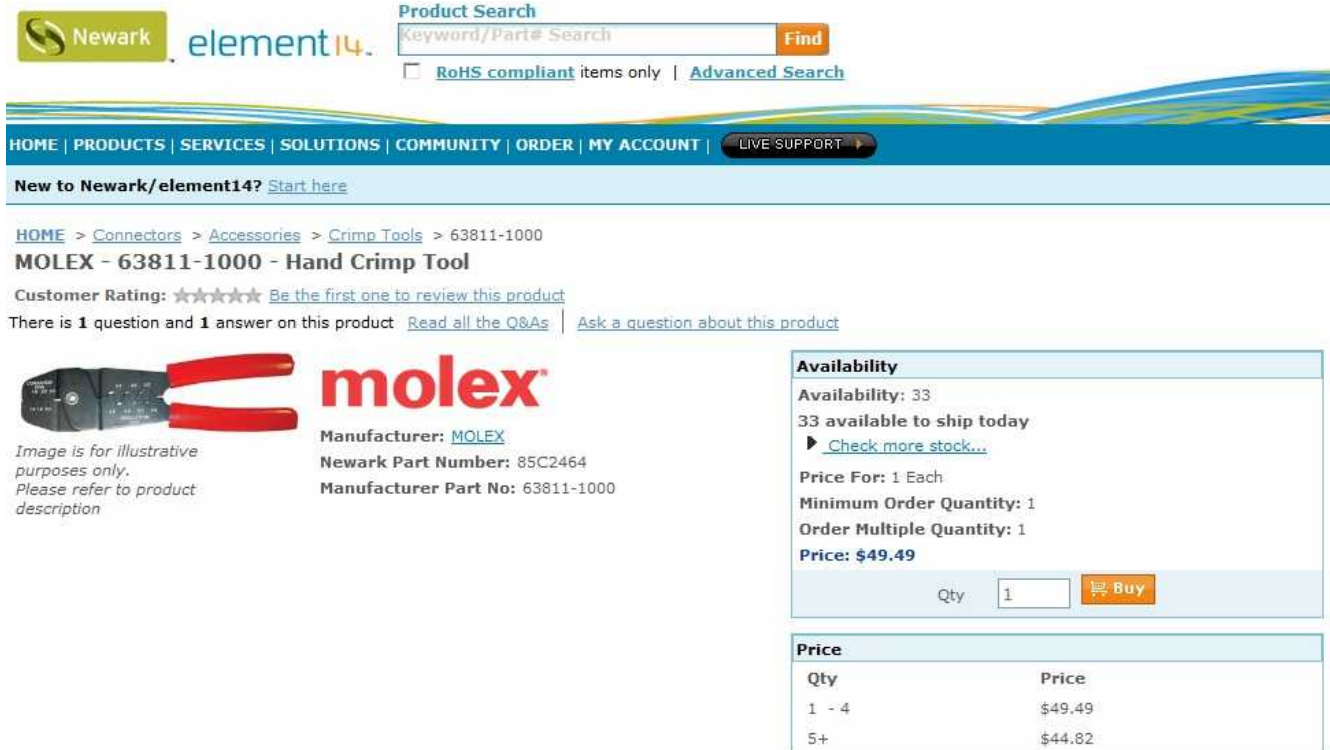
Price	
Qty	**Price**
1 - 4	$49.49
5+	$44.82

Product Information

- **Hand Crimp Tool**
- **Crimp Size:** 24AWG to 18AWG
- **For Use With:** Molex 0.062" Pin & Socket Crimp Terminals
- **Series:** 63811
- **RoHS Compliant:** NA

Idle Air Control Valve Requirements

Many Toyota, Mitsubishi, and other vehicles use an Idle Air Control Valve with a Unipolar Stepper Motor (6-pin connector) and MUST be modified. See picture below. A Bipolar Stepper Motor (e.g., GM) will have a 4-pin connector and DOES NOT need to be modified. *This info does not apply to vehicles that utilize IACV solenoids.
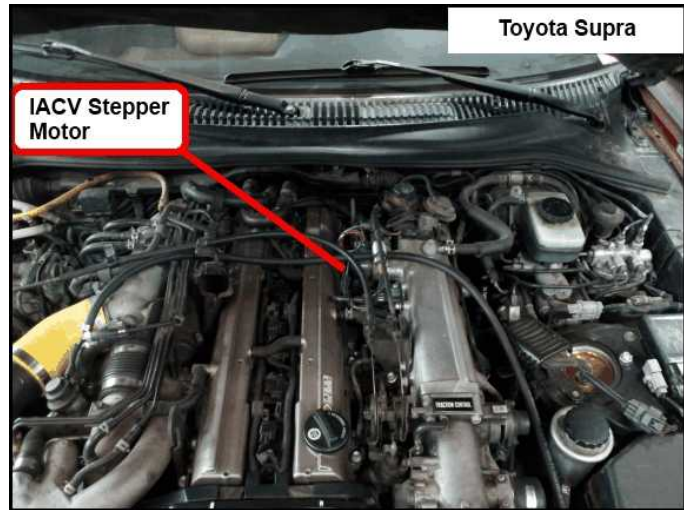

The 2 center pins (Black-Red wires) supply 12V power to the stepper motor in the factory setup, however these pins MUST BE DISCONNECTED before powering on the AEM Infinity ECU.

Step 1: Disconnect connector from IACV housing and gently remove the retainer from the connector.
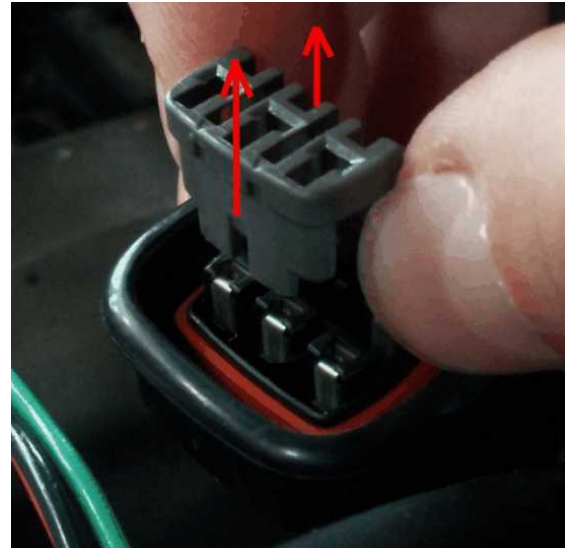
Step 2: Use a small flat-blade screwdriver/pick to move the terminal locks while pulling the Black-Red wires out from the backside of the connector.

Black with Red Stripe wires removed
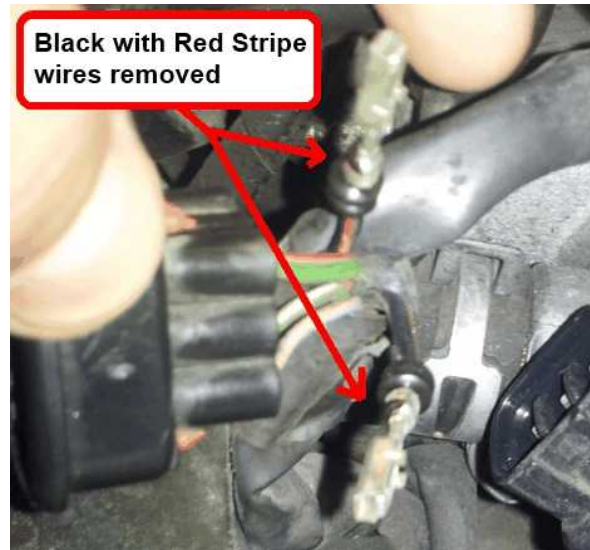
Step 3: Use heat shrink to insulate both 12V wires and then zip-tie the insulated wires to a nearby loom.
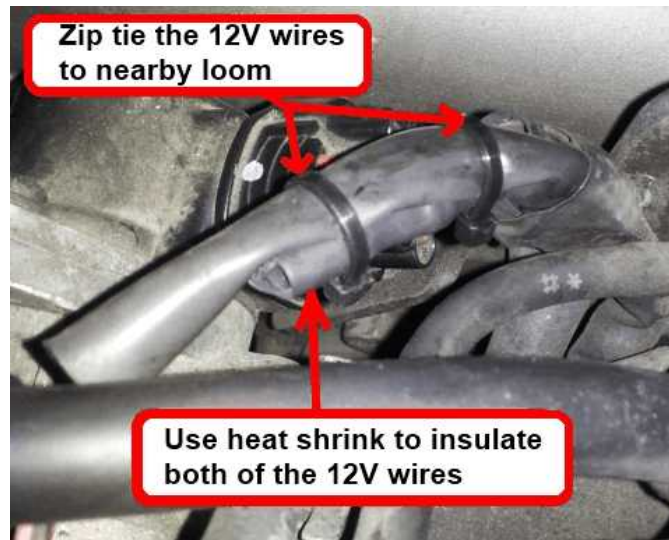
Step 4: Reinstall the retainer, and then plug the connector back into the IACV.