Instruction Manual

AEM PERFORMANCE ELECTRONICS

AEM Infinity
V96.4 Update Notes

STOP!

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

WARNING! THIS IS A RACE ONLY PRODUCT MANUFACTURED AND SOLD FOR INSTALLATION ON VEHICLES DESIGNED TO BE USED SOLELY FOR COMPETITION PURPOSES. ONCE THIS PART IS INSTALLED, THE VEHICLE MAY NEVER BE USED, OR REGISTERED OR LICENSED FOR USE, ON A PUBLIC ROAD OR HIGHWAY. IF YOU INSTALL THIS PART ON YOUR VEHICLE AND USE THE VEHICLE ON A PUBLIC ROAD OR HIGHWAY, YOU WILL VIOLATE THE CLEAN AIR ACT AND MAY BE SUBJECT TO PERSONAL CIVIL OR CRIMINAL LIABILITY, INCLUDING FINES OF UP TO $4,819 PER DAY.

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!

NEW FOR SERIES 7 (v96.5 edit test SB):

Bug Fixes:
- Fixed a problem that sometimes caused freezes or lockups when battery voltage dropped very low during cranking.
- Improved start up wait time after engine stall, from 1.5 seconds to 0.3 seconds. The ECU will be ready to restart the engine more quickly in the event of an engine stall.
- Fixed a bug that in some cases caused inconsistent USB log writing to flash storage devices
- Fixed bug in MILOutput function, previous version was ignoring ErrorAirTemp
- Update Stepper Idle park routine, fix previous bugs that may have prevented stepper parking if idle position was near 0% or 100% open
- Update wizard 'Set Throttle Range' page, update sensor 'padding' to 5% beyond the measured values during normal operation. Fix minor bug in previous padding calculation, update should result in better accuracy for 0%and 100% setpoints.

Compatibility with old layouts:
- The following name changes were made. These will cause layout errors in older/existing layouts if not updated:

(Old name / New name)

OilTempCal / OilTempCal [C]
ModeSwitch_input / ModeSwitch_Input
BoostControlFreq [Hz] / LS1_Freq [Hz]

v96.4 Models/Tuning Changes:
- Updated MAP and Fuel Pressure sensor processing rate. This faster update rate reduces aliasing problems.
- Added an initial crank pulse option for the following timing patterns only: Any even spaced crank tooth pattern with single cam pulse. any crank missing-1 and crank missing-2 patterns with a single cam.
- Added a new cam ignore function that allows the user to ignore noisy cam signals above certain conditions. Applicable to the following timing patterns only: Any even spaced crank tooth pattern with single cam pulse. any crank missing-1 and crank missing-2 patterns with a single cam.
- New diagnostic channel that measures the number of crank edges per cam edge. This is useful for diagnosing various timing pattern sensor problems.
- New tables BoostTargetTable3 and BoostTargetTable4, additional flexibility for adjusting boost target
- New function 'IdleLearn', long-term trim for base idle position
- New function 'Throttle High Timer', allows changes to LambdaTarget, Boost Target, Ignition Timing during sustained throttle
- Change internal vs external lambda naming & setup - 'Lambda1' can be assigned to use Onboard sensor, or external 0-5V sensor inputs Lambda3/Lambda4., or CAN data received from X-Series wideband products. Whether assigned to onboard or external signals, Lambda1 and Lambda2 will always display the lambda values that are being used for feedback and LeanProtect functions.
- FuelPump function activates when any crankshaft signal is detected, to begin building fuel pressure before SyncState turns on
- New y-axis options 'throttle' for the following tables: CrankVE_Table, FI_TIming, IgnTrimAirTemp, IgnTrimCoolantTemp
- New option 'Oil Pressure Protection Minimum Engine Running Time', to prevent OilPressProtect function from activating immediately after starting the engine
- Add digital inputs for Gear Position table
- New options to trim idle position when Gear=0 (Neutral)
- New tables 'CrkMissThr' and 'CrkExtraThr', allows user to define plausibility ratios for min/max crankshaft acceleration that is not considered a sensor error

- New option 'Lambda Feedback Max Throttle Rate', to allow disabling lambda feedback if throttle position changes quickly
- MIL and EngineProtect warning functions can latch and remain on when triggered
- The following channels have been added to the AEMNet message list:

  o ECUAnalogInput08Voltage
  o ECUAnalogInput09Voltage
  o ECUAnalogInput10Voltage
  o ECUAnalogInput11Voltage
  o ECUAnalogInput12Voltage
  o ECUAnalogInput13Voltage
  o ECUAnalogInput14Voltage
  o ECUAnalogInput15Voltage
  o ECUAnalogInput16Voltage
  o ECUAnalogInput17Voltage
  o ECUAnalogInput18Voltage
  o ECUAnalogInput19Voltage
  o ECUAnalogInput20Voltage
  o ECUAnalogInput21Voltage
  o ECUAnalogInput22Voltage
  o ECUAnalogInput23Voltage

v2.96 Setup Wizard Changes:
- Expanded the list of available channels useable as inputs to lowside tuning tables. The following channels have been added:

ClutchSwitch
EngineProtectOut
KnockFB_Cyl1
LambdaTrim_Knock [Lambda]
LaunchRampTime [ms]
MILOutput
TC_SlipMeasured [MPH]
TC_SlipTarget [MPH]
GroundSpeed [MPH]

NEW FOR SERIES 5 AND SERIES 3:

Bug Fixes:
- Fixed a problem that sometimes caused freezes or lockups when battery voltage dropped very low during cranking.
- Improved start up wait time after engine stall, from 1.5 seconds to 0.3 seconds. The ECU will be ready to restart the engine more quickly in the event of an engine stall.

Compatibility with old layouts:
- The following name changes were made. These will cause layout errors in older/existing layouts if not updated:

(Old name / New name)

OilTempCal / OilTempCal [C]
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BoostControlFreq [Hz] / LS1_Freq [Hz]

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  o ECUAnalogInput16Voltage
  o ECUAnalogInput17Voltage
  o ECUAnalogInput18Voltage
  o ECUAnalogInput19Voltage
  o ECUAnalogInput20Voltage
  o ECUAnalogInput21Voltage
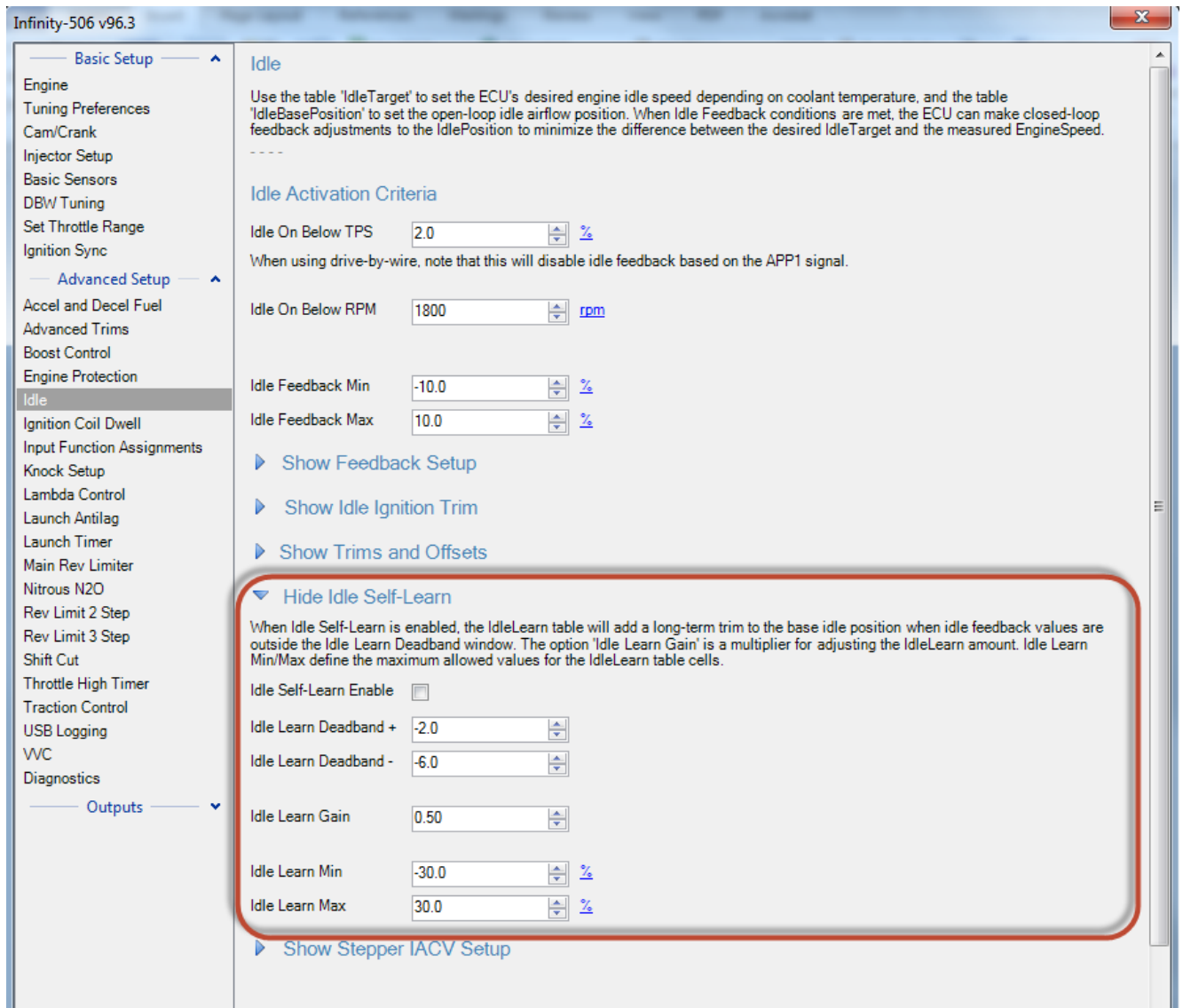 o ECUAnalogInput22Voltage
  o ECUAnalogInput23Voltage

Feature change summary:
See specific Setup Wizard pages for tuning instructions. The following screen shots will highlight the specific areas where changes were made.

1. Increased Boost Target Functionality
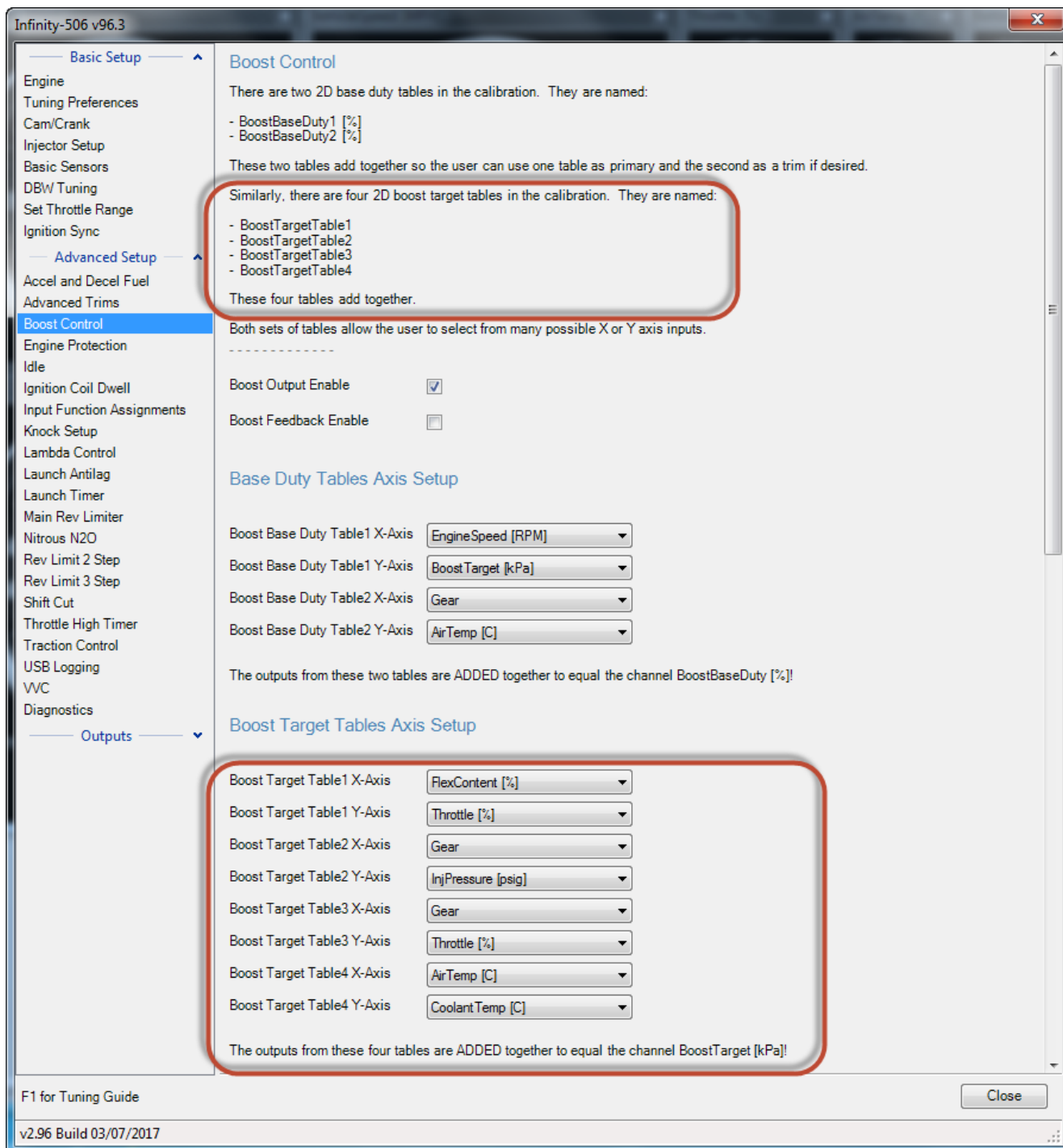
2. New Idle Learning Function

3. New Throttle High Timer Function

Throttle High Timer

The ECU can modify the target lambda to increase the safety margin during sustained periods of full throttle. The timer 'ThrottleHighTime [ms]' will count up while Throttle is greater than the 'Timer On Above' setting, and count down while Throttle is less than the 'Timer Off Below' setting. The timer 'ThrottleHighTime [ms]' can also be referenced by boost control and ignition trim tables for additional means of increasing safety margin.

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Throttle Timer On Above	99	%
Throttle Timer Off Below	50	%

LambdaTrim_ThrottleHi is a table for modifying the ECU's LambdaTarget. Note that LambdaTarget is used for both open-loop and closed-loop fueling calculations, so this table should be used to define when the engine should run an extra rich AFR.

ThrottleHighTime [ms]	LambdaTrim ThrottleHi [Lambda] []
2000	0.0000
5000	0.0000
10000	0.0000
15000	0.0000
20000	0.0000
25000	0.0000
30000	0.0000

▼ Hide Advanced Setup

The lambda trim can be disabled at low RPM to avoid interfering with engine stability at idle.

Throttle Timer Lambda Trim Minimum Engine Speed	3000	rpm

Throttle Timer Time Out	30.000	s

The timer will stop counting when it reaches this value.

Throttle Timer Decay Gain	200	%

The timer will count down while Throttle is less than the 'Timer Off Below' setting. The option 'Throttle Timer Decay Gain' can be used to adjust how quickly the timer counts down. Setting this to 200% will make the timer count down twice as quickly as it counts up.

4. Simplified Lambda/Wideband Input & Naming Setup with option for feedback from AEM X-Series CAN data

5. Throttle as Input for Additional Tables for Alpha-N use
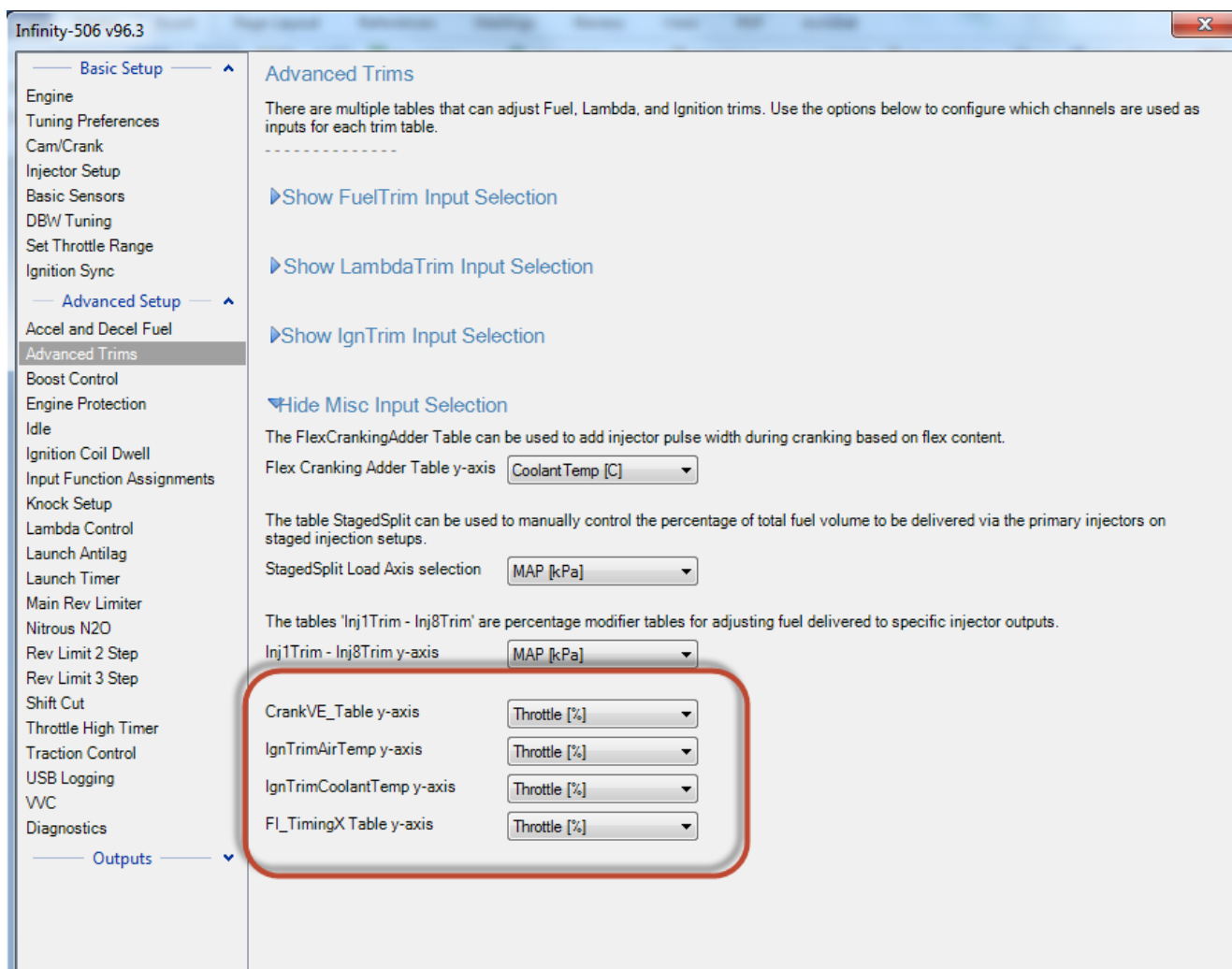
6. New Oil Pressure Protection Minimum Engine Running Time option
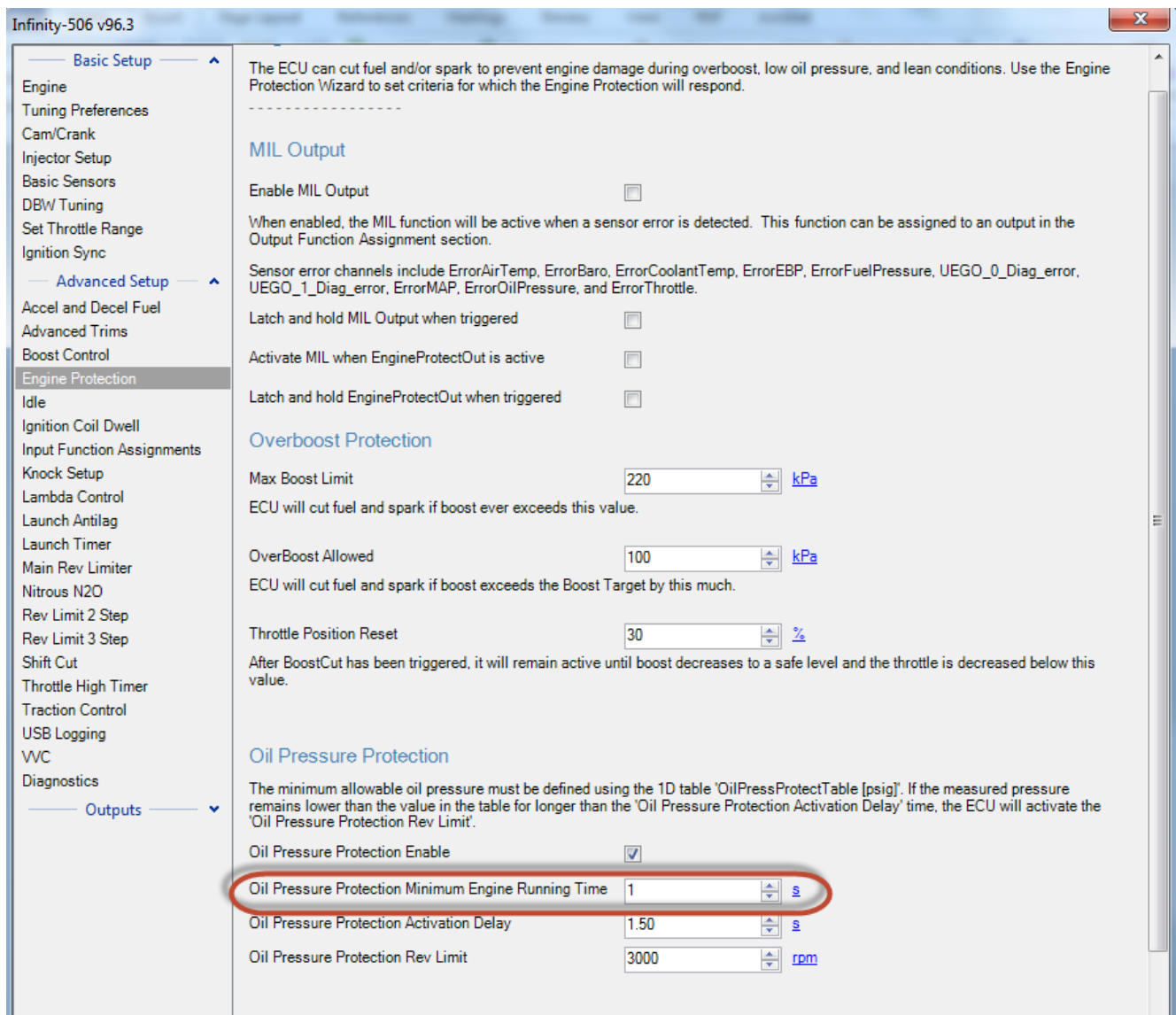
7. Additional Lambda Feedback Conditions
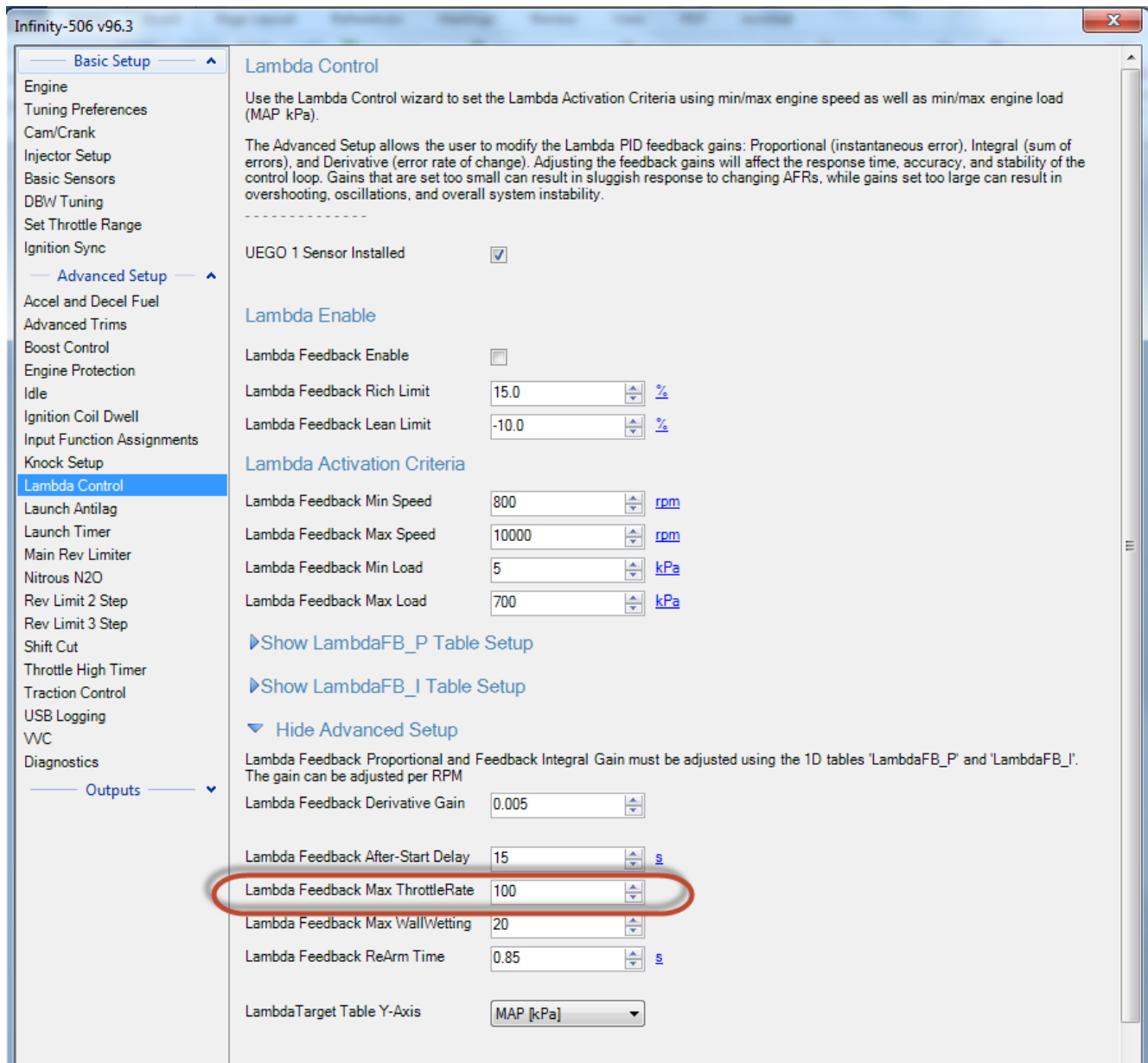
8. MIL and Engine Protect warning functions can latch and remain on when triggered
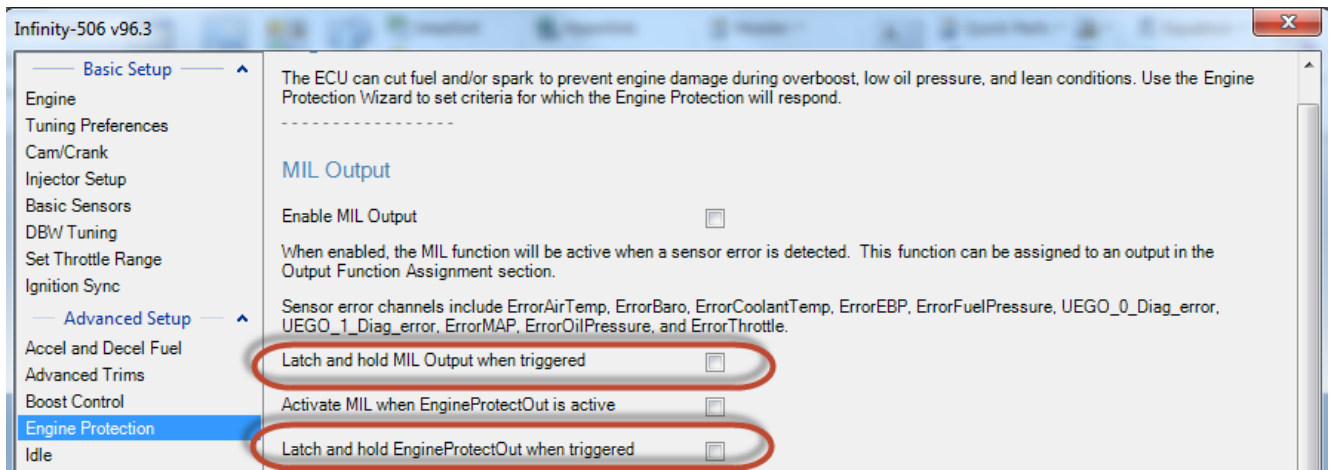
9. Initial Crank Pulse

   Units: Injection volume vs Coolant Temp and Throttle
   Description: This pulse is calculated based on a desired initial pulse volume (cc's). The model also includes some logic to prevent a second priming pulse in the event that the engine does not start on the first attempt or stalls after it has been running. The next prime pulse will be allowed after the ECU has been powered off. *This feature is available for the following timing patterns only: Any even spaced crank tooth pattern with single cam pulse any crank missing-1 and crank missing-2 patterns with a single cam.*

CrankPrimePulse [cc]

Throttle [%]							
80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
40.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
20.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	32.0	50.0	68.0	104.0	140.0	176.0	212.0

CoolantTemp [F]

10. Cam Ignore - Used to ignore noisy, poor cam sensor signals above certain conditions. *This feature is available for the following timing patterns only: Any even spaced crank tooth pattern with single cam pulse any crank missing-1 and crank missing-2 patterns with a single cam.*

   CamIgnoreAboveRPM:
   The ECU will ignore cam errors above this RPM. Default: 2000 RPM
   (note, both the RPM and AfterStart conditions must be met for the ECU to ignore cam errors)

CamIgnoreAfterStart [s]:
The ECU will ignore cam errors after the engine has been running for this much time. Default: 3 seconds (note, both the RPM and AfterStart conditions must be met for the ECU to ignore cam errors)

CamIgnore_Latch:
If this is '1', the ECU will continue to ignore cam errors after the conditions for CamIgnore have been met once. Default: 0 (off)
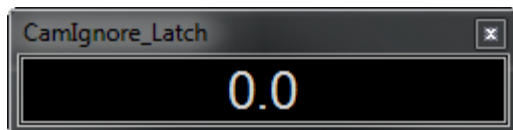
11. CrankPerCam - Channel added for use with timing pattern diagnostics.

The value should be 24 for the common 12-tooth-crank pattern or 70 for a 36-1 crank trigger or 68 for a 36-2 crank trigger. When an extra crank edge occurs, the value will be higher than normal. If an extra cam edge occurs, the value will be lower than normal.
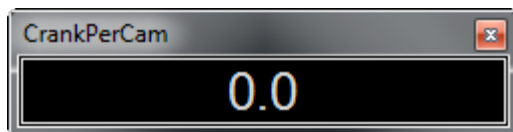
BEFORE beginning the update process, be sure to have a saved copy of your tuned session file (if needed). If a power failure occurs during the update process, this is the only way to ensure that the calibration data is not lost. A power failure at certain critical points in this process could render the ECU inoperative, requiring return and repair at AEM. Ensure the PC has a full battery charge and/or is connected to AC power. This process can take UP TO 4 MINUTES to complete, especially if the peripheral microcontroller is updated at the same time.

If the firmware version on the ECU is older than the version supported by your current version of Infinity Tuner, a firmware upgrade will be required when you connect. Otherwise, follow the procedure outlined below.

Note: The firmware update utility is periodically revised 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.

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 ECU drop-down list and select "Upgrade firmware…"
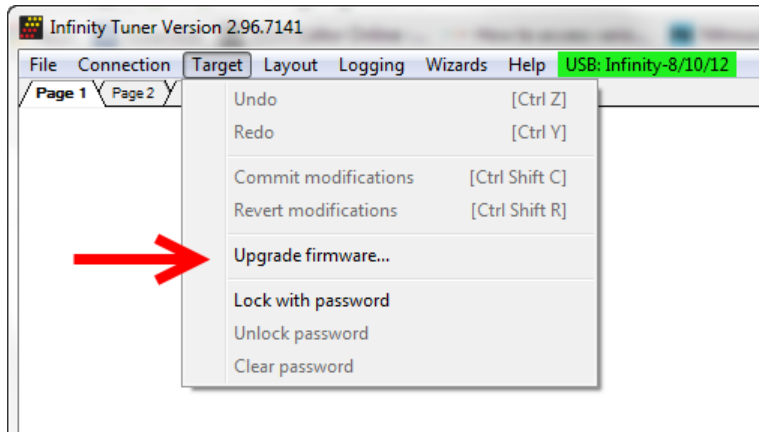
3) The ECU should not be running an engine at this time. Select "Yes" when the warning message appears.
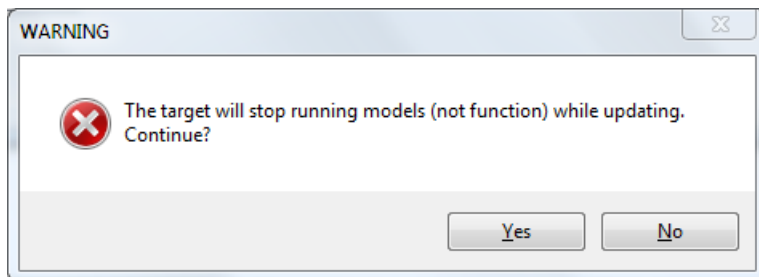
Begin the Firmware Upgrade process.
a. Select the desired Configuration "Image" on the left.
    i. If no images are present check C:\Program Files (x86)\AEM\Infinity Tuner\ and verify .pakgrp file is there. If not, visit http://www.aeminfinity.com, log in, and download appropriate file.
b. Ensure "Keep Calibration Data" check-box is marked to save current calibration.
c. Click the "Begin" button to start the upgrade process.

Firmware Upgrade - [Automatic Mode]

Available Images | Refresh

7101-0001-134
7101-0001-92
7101-0001-93

Target Info
Serial Number: 010005B0   Firmware: 96.7115   Peripheral: 96.8185:96.8185

Image Info
Location: C:\Program Files (x86)\AEM\Infinity Tuner\7101-0001-134.pakgrp
Name: 7101-0001-134   Images: 4   Supported Images: 4

Type	Name	Author	Version	Description
Dynamic Model	7101_6500a	AEM_Production	96	No description.
Firmware	Version96_full.8192	AEM_Production	96	No description.
Fixed Model	7101_6500f	AEM_Production	96	No description.
Peripheral Contr...	Zuma_Venice.8185	AEM_Production	96	No description.

Upgrade (1 of 2): Converting and Importing Calibration Data...

☑ Keep Calibration Data   Begin

4) Follow the message at the bottom, and turn the ignition switch OFF when instructed to do so.

Firmware Upgrade - [Automatic Mode]

Available Images | Refresh

7101-0001-134
7101-0001-92
7101-0001-93

Target Info
Serial Number: 010005B0   Firmware: 96.7115   Peripheral: 96.8185:96.8185

Image Info
Location: C:\Program Files (x86)\AEM\Infinity Tuner\7101-0001-134.pakgrp
Name: 7101-0001-134   Images: 4   Supported Images: 4

Type	Name	Author	Version	Description
Dynamic Model	7101_6500a	AEM_Production	96	No description.
Firmware	Version96_full.8192	AEM_Production	96	No description.
Fixed Model	7101_6500f	AEM_Production	96	No description.
Peripheral Contr...	Zuma_Venice.8185	AEM_Production	96	No description.

Upgrade (1 of 2): Successful! Please switch target off...

☑ Keep Calibration Data   Begin

5) Follow the message at the bottom, and turn the ignition switch back ON when instructed to do so.
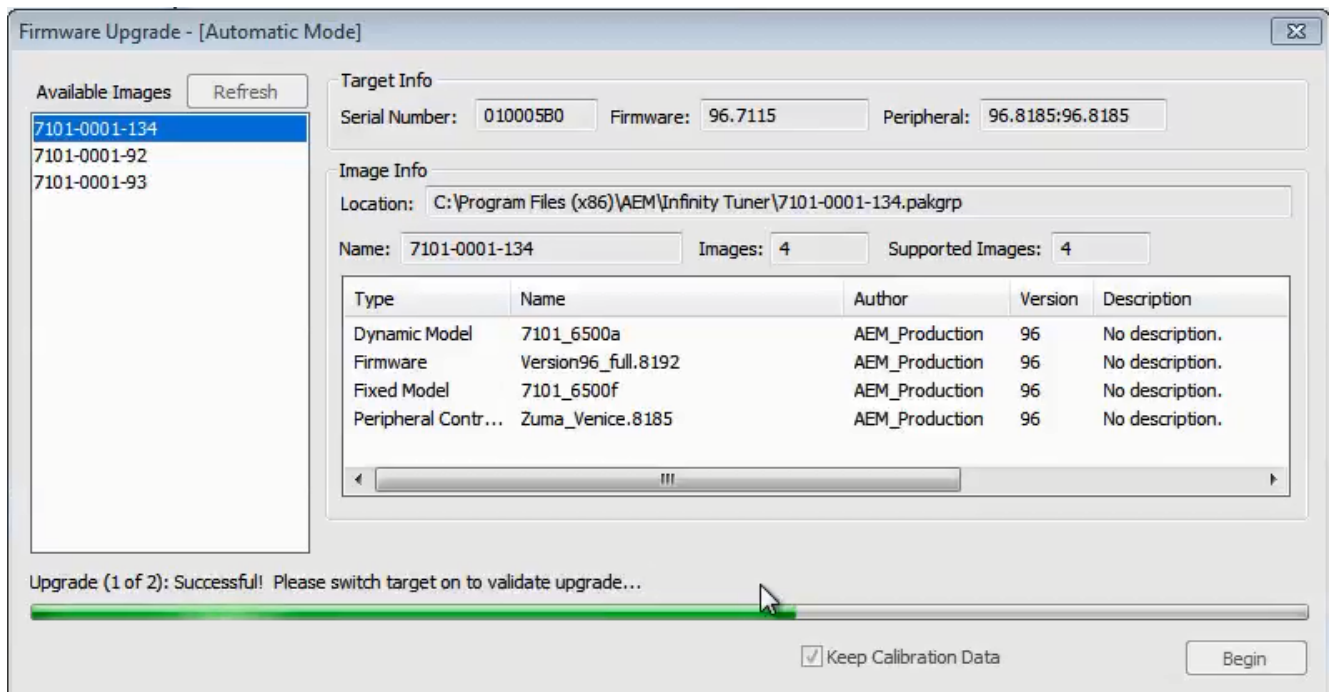
If Keep Calibration Data is checked, the system will upgrade and load all usable calibration data as shown below.
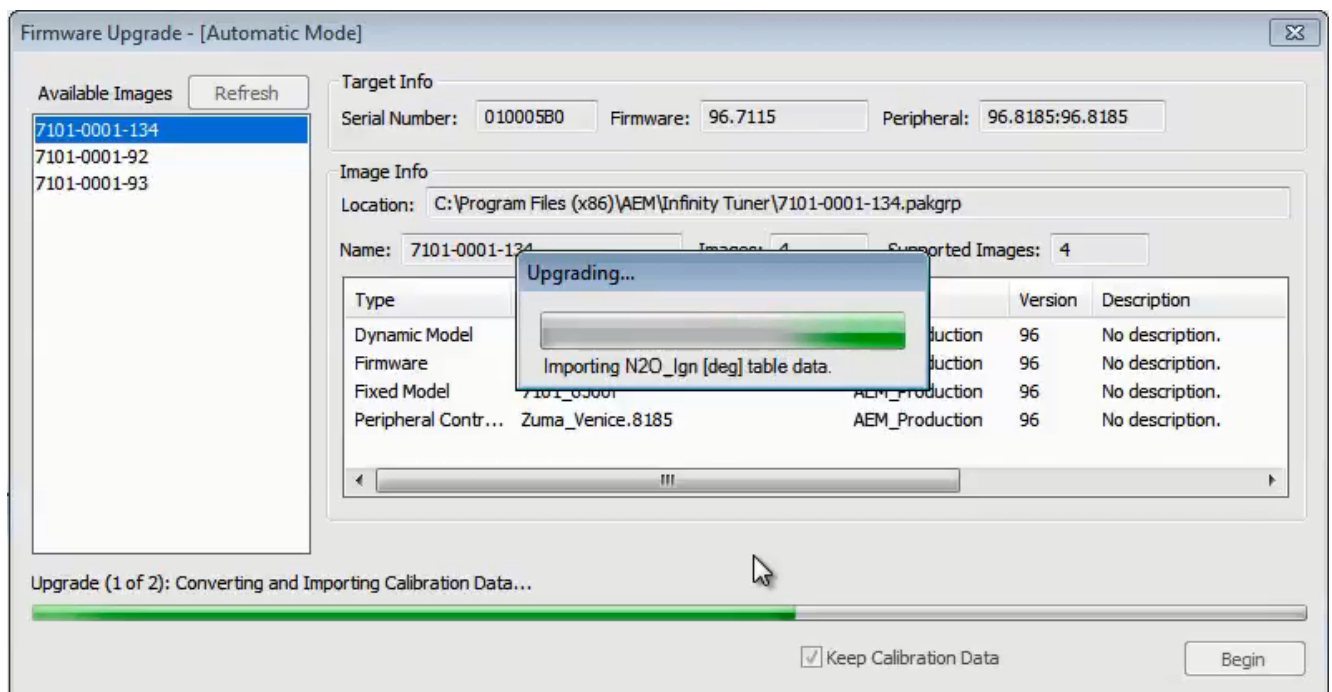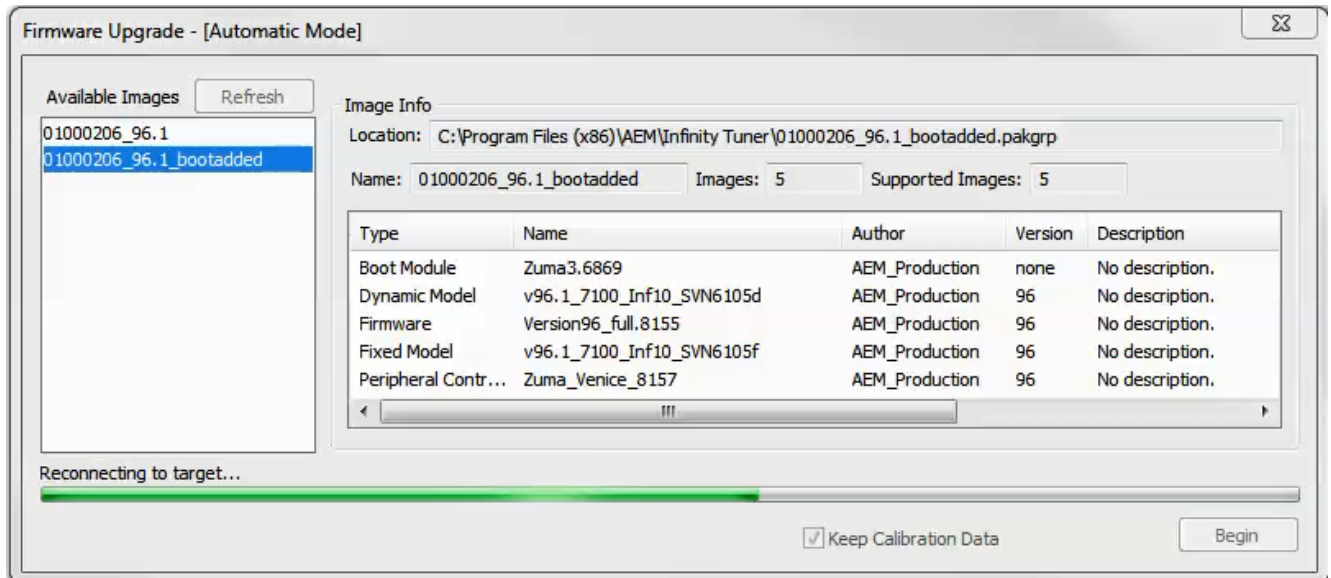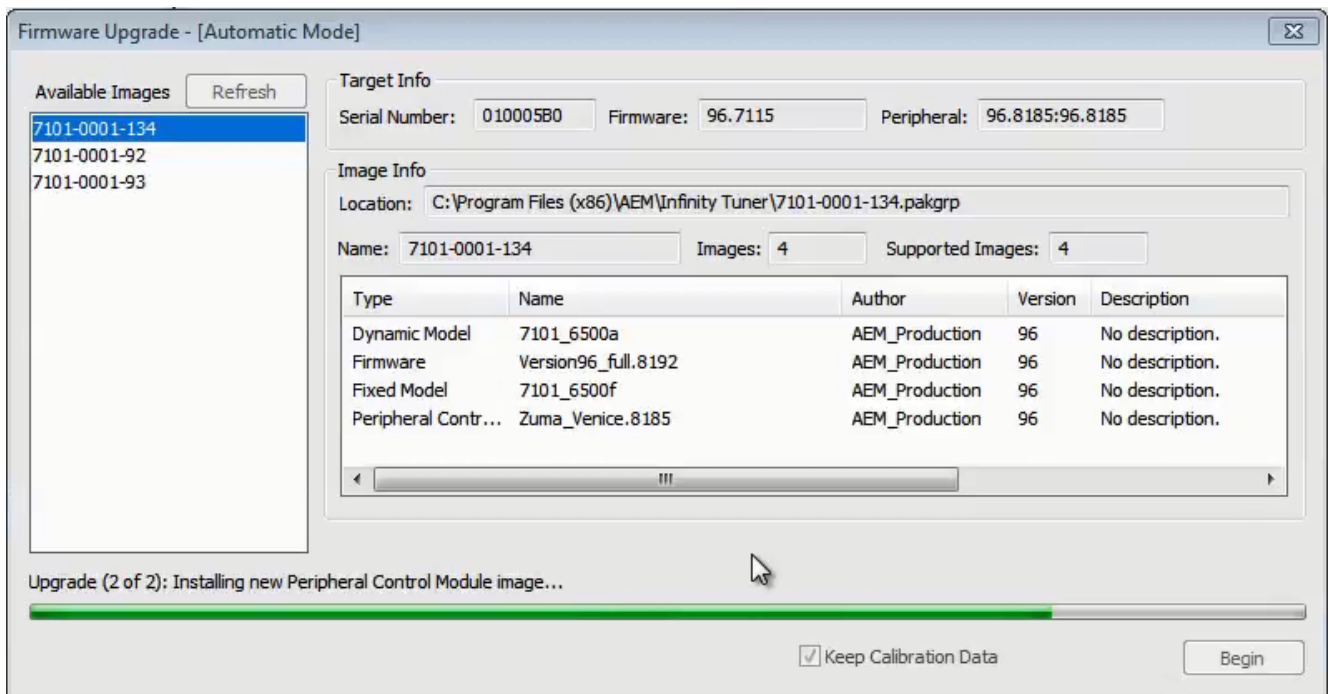
Firmware Upgrade - [Automatic Mode]

Available Images | Refresh

01000206_96.1
01000206_96.1_bootadded

Image Info

Location: C:\Program Files (x86)\AEM\Infinity Tuner\01000206_96.1_bootadded.pakgrp

Name: 01000206_96.1_bootadded   Images: 5   Supported Images: 5

Type	Name	Author	Version	Description
Boot Module	Zuma3.6869	AEM_Production	none	No description.
Dynamic Model	v96.1_7100_Inf10_SVN6105d	AEM_Production	96	No description.
Firmware	Version96_full.8155	AEM_Production	96	No description.
Fixed Model	v96.1_7100_Inf10_SVN6105f	AEM_Production	96	No description.
Peripheral Contr...	Zuma_Venice_8157	AEM_Production	96	No description.

Reconnecting to target...

☑ Keep Calibration Data   Begin

*Note: at certain points in the process, the Infinity ECU will re-boot and attempt to connect with the PC. The time it takes to connect might vary for different PCs. If the process appears to hang at this stage, simply unplug and replug the USB comms connector. Often this will force the PC to re-enumerate the USB port and connect.*

Firmware Upgrade - [Automatic Mode]

Available Images | Refresh

7101-0001-134
7101-0001-92
7101-0001-93

Target Info

Serial Number: 010005B0   Firmware: 96.7115   Peripheral: 96.8185:96.8185

Image Info

Location: C:\Program Files (x86)\AEM\Infinity Tuner\7101-0001-134.pakgrp

Name: 7101-0001-134   Images: 4   Supported Images: 4

Type	Name	Author	Version	Description
Dynamic Model	7101_6500a	AEM_Production	96	No description.
Firmware	Version96_full.8192	AEM_Production	96	No description.
Fixed Model	7101_6500f	AEM_Production	96	No description.
Peripheral Contr...	Zuma_Venice.8185	AEM_Production	96	No description.

Upgrade (2 of 2): Installing new Peripheral Control Module image...

☑ Keep Calibration Data   Begin

6. When the "Peripheral Control Module image" is updated, a full power reset may be required meaning either the battery needs to be disconnected and re-connected or all harness connectors need to be removed from the ECU for at least 5 seconds, then re-connected.
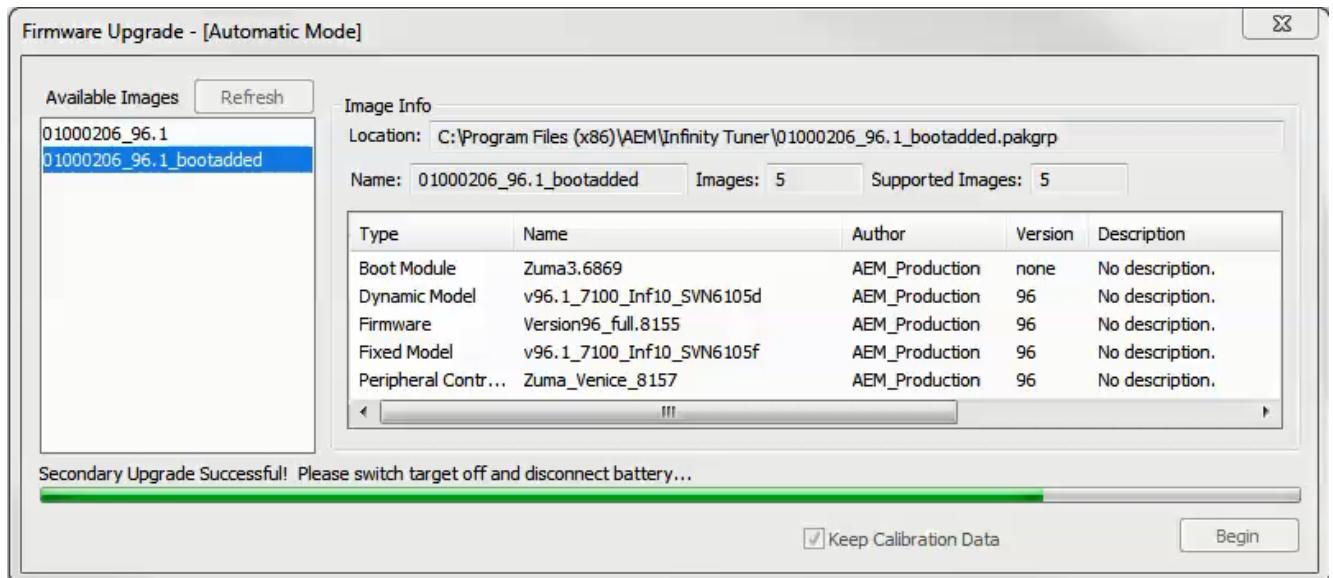
7. When the message below is displayed, turn the ignition switch back on.
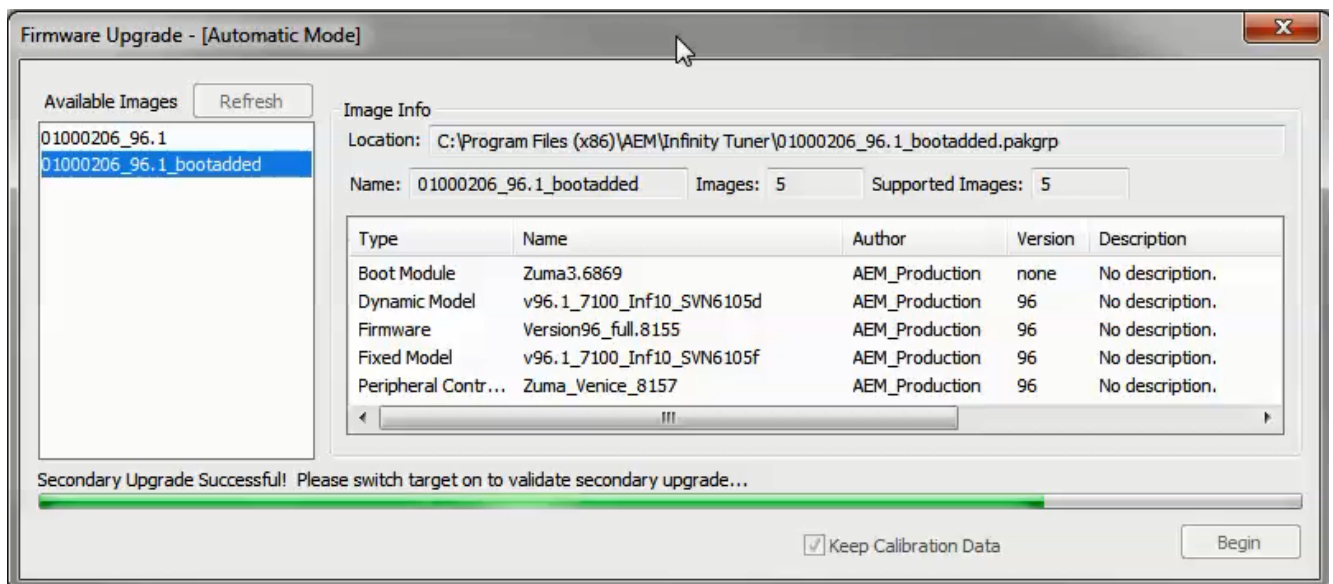
8. When the message at the bottom indicates that it's safe to close the window, click "X" button on the top right of the window.
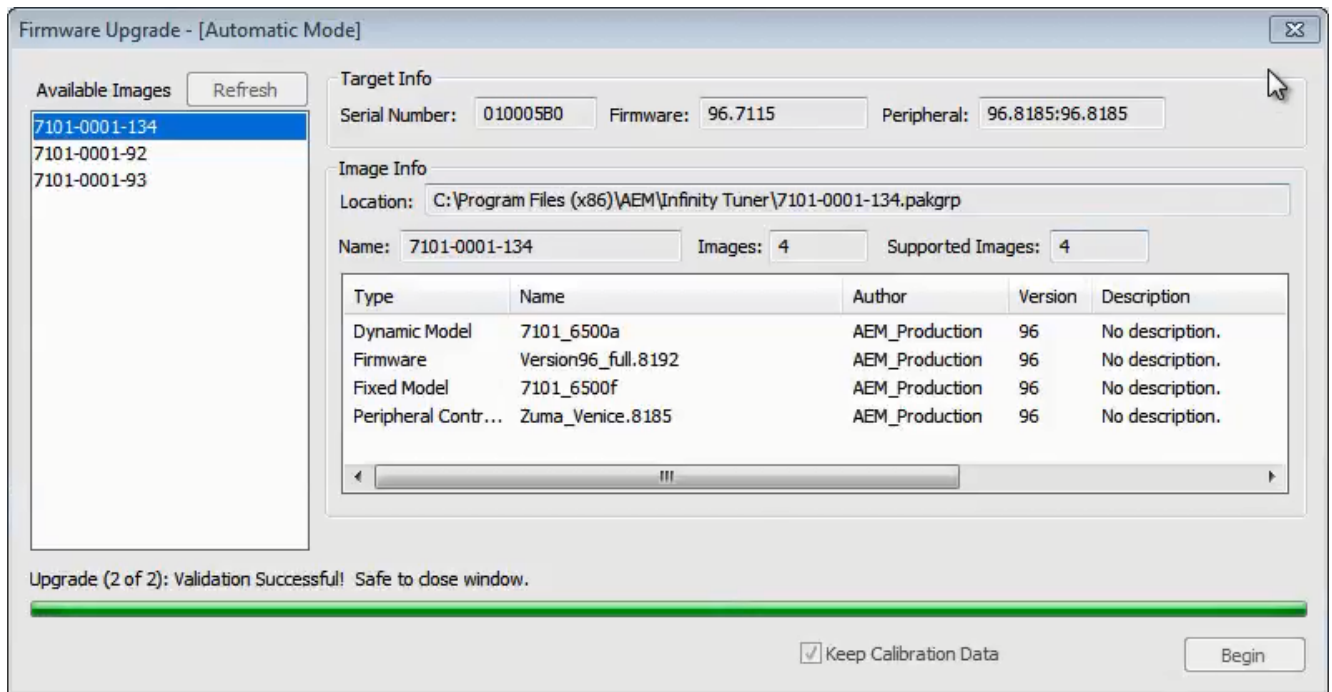
Once the update is complete, it's good practice to cycle the ignition switch to reset the hardware. Once that is done, you can connect and begin monitoring data and/or tuning again. **For applications that use a stepper motor idle valve, it's important that a full power reset be done prior to starting 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. Go to Logging>USB Logging – Channel Setup. This dialog allows the user to select channels for USB logging. Manually select channels by left clicking on the check box or alternately by using the arrow keys to scroll through the list and the space bar key to select. Logging lists can be saved for later use by using the Save button. The Load button will load previously saved lists of channels. The Append button will append a different list of channels onto the existing list of selected channels. Note that the list of channels for logging is saved in ECU memory. Channels can't be selected offline. They can only be selected when connected to an ECU.