Instruction Manual

AEM
PERFORMANCE ELECTRONICS

AEM Infinity
V96.5 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!

Improper installation and/or adjustment of this product can result in major engine/vehicle damage. For technical assistance visit our dealer locator to find a professional installer/tuner near you.

Note: AEM holds no responsibility for any engine damage or personal injury that results from the misuse of this product, including but not limited to injury or death.

*Note that some of these updates were also present in v96.4 builds, which were not released to all customers

NEW FOR SERIES 7:

Bug Fixes:

- Fixed a problem where logs would sometimes not save to the USB flash drive, or the USB flash drive would not always be recognized by the ECU.
- Fixed a problem that sometimes caused freezes or lockups when battery voltage dropped very low during cranking.
- Other bug fixes, changes, and improvements from the 96.3 update were added to the v96.5 builds for the Infinity-708, -710, and -712 hardware. Please see the Change Log V96.3 document for additional details.

NEW FOR SERIES 7 AND SERIES 5 AND SERIES 3:

Bug Fixes:

- 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.

v96.5 Models/Tuning Changes:

- Faster MAP and Fuel Pressure sensor processing rate reduces aliasing issues.
- New option 'Boost Feedback Enable Below Error', to avoid overshoot when the turbo first spools up.
- FlexSensorCal table input can be assigned to use Digital on/off switch pins.
- New option 'Lambda Feedback Gain x-axis', allows the user to select MassAirflow [g/sec] instead of RPM for the Lambda feedback PID breakpoints.
- Channels 'CrkMissThr' and 'CrkExtraThr' allow the user to define the allowable acceleration ratio between crank edges for the even-spaced cam/crank patterns (such as 12-tooth crank and single-pulse cam).
- Cam Error Ignore function, to use the cam signal for sync at low RPM but ignore noisy cam signals at high RPM.
- New channel 'CrankPerCam', intended to help with crank/cam error troubleshooting and diagnosis.
- New diagnostic channel 'EAL_TimingError', this indicates which cam- or crank-related error has occurred most recently, even if that error was ignored.
- Fuel pressure/flow calculations will assume Baro Pressure is 99 kPa if the wizard option 'Baro Sensor Installed' is unchecked. This is an important part of fuel delivery math.
- New table 'CrankPrimePulse [uL]', which is active 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 pulse.
- New CAN support for controlling one AEM PDU-8 module.

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. Faster MAP and Fuel Pressure sensor processing rate, to reduce aliasing issues.
    It is recommend to use higher numbers for MAP smoothing filter and Fuel Pressure smoothing filter, beta testers have found good results with 90-95%. This allows for a smooth signal without sacrificing response time.

2. New option 'Boost Feedback Enable Below Error'

   Setting this to small numbers (5-10 kPag) can help avoid overshoot when the turbo first spools up. The default setting (900 kPag) will behave the same as the previous builds, but this often resulted in the PID feedback calculating too-high values at low RPM when the turbo can't make full boost.
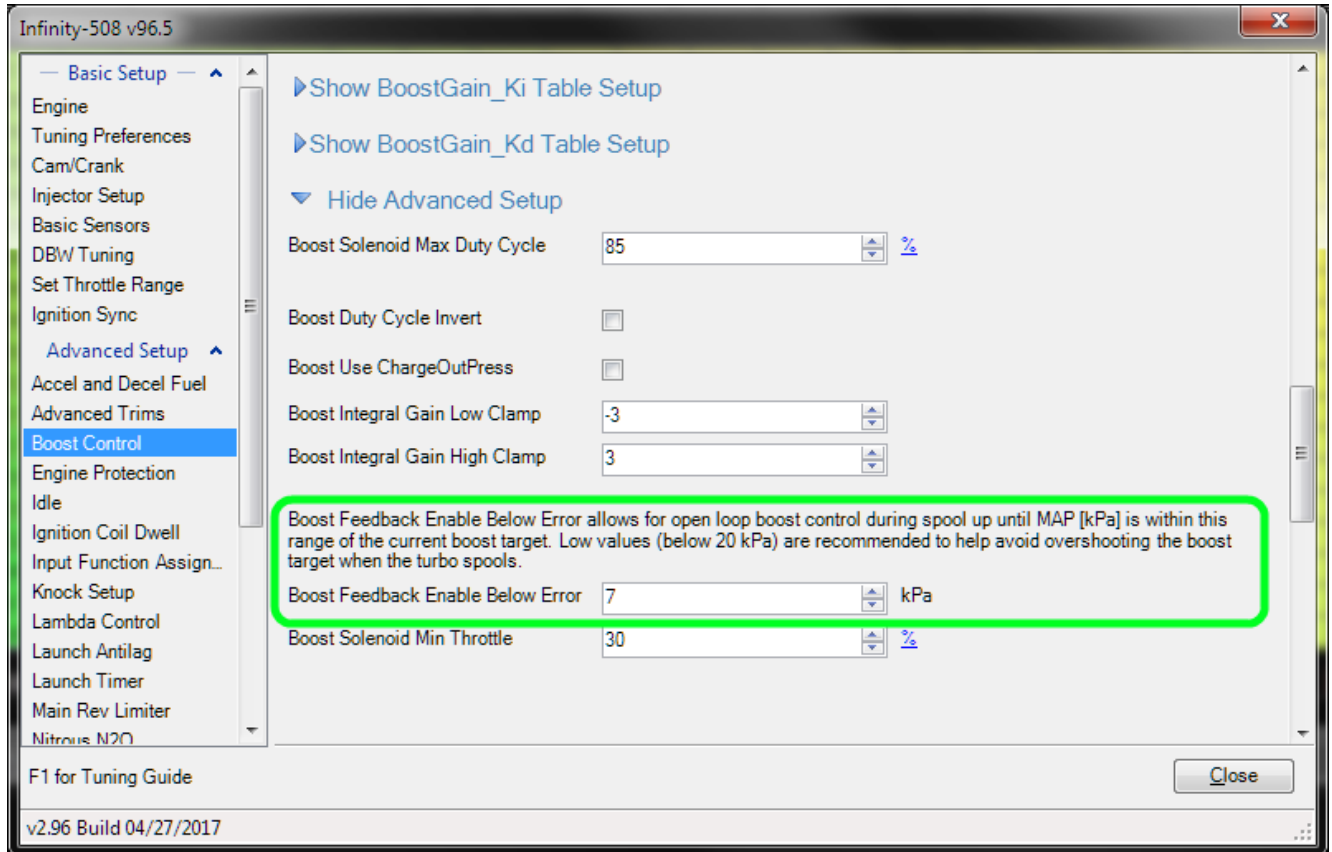
3. FlexSensorCal table input can be assigned to use Digital on/off switch pins.
    This can be used for adding a simple 'Gas/Ethanol' switch if the user does not want to plumb an actual sensor into the fuel system.

4. New option 'Lambda Feedback Gain x-axis', allows the user to select MassAirflow [g/sec] instead of RPM for the Lambda feedback PID breakpoints. This might allow aggressive/fast feedback when the engine is loaded at low RPM, and slower feedback to avoid overshoot at medium RPM but part throttle / light load. The option is at the bottom of the Lambda Control wizard page, in the advanced section.
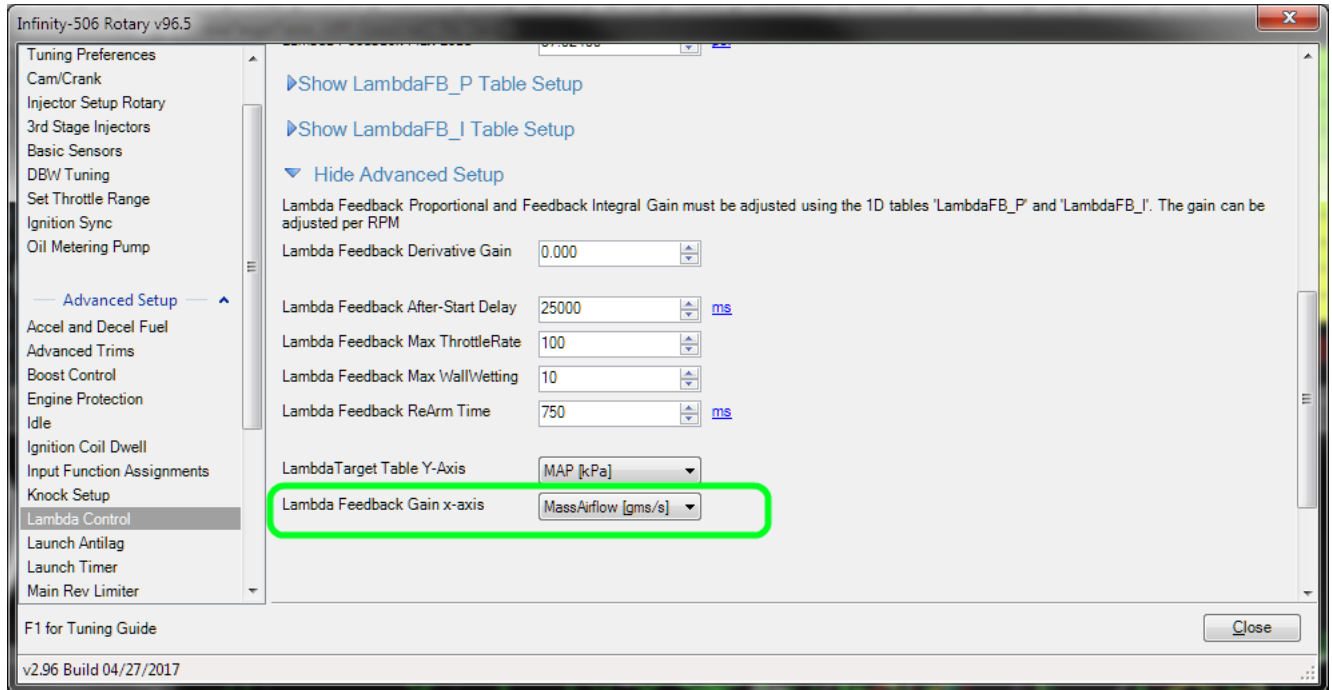
5. Channels 'CrkMissThr' and 'CrkExtraThr' allow the user to define the allowable acceleration ratio between crank edges for the even-spaced cam/crank patterns (such as 12-tooth crank and single-pulse cam). If the crank speed accelerates or decelerates too fast, this will trigger the error CrankTimingError0 or CrankTimingError1. These tables were already present and used for missing-tooth gap detection on some patterns like 36-2, and the firmware has been expanded in this version to include signal error detection for even-spaced crank patterns. Note these table values will be auto-populated based on crank pattern when you import from a previous version calibration, and the calibration will be changed to resync when CrankTimingErrors occur (even if the previous calibration was set to ignore). If you experience no-start or start-then-stall conditions, please save & email datalogs so we can help adjust these table settings to work well with your engine.
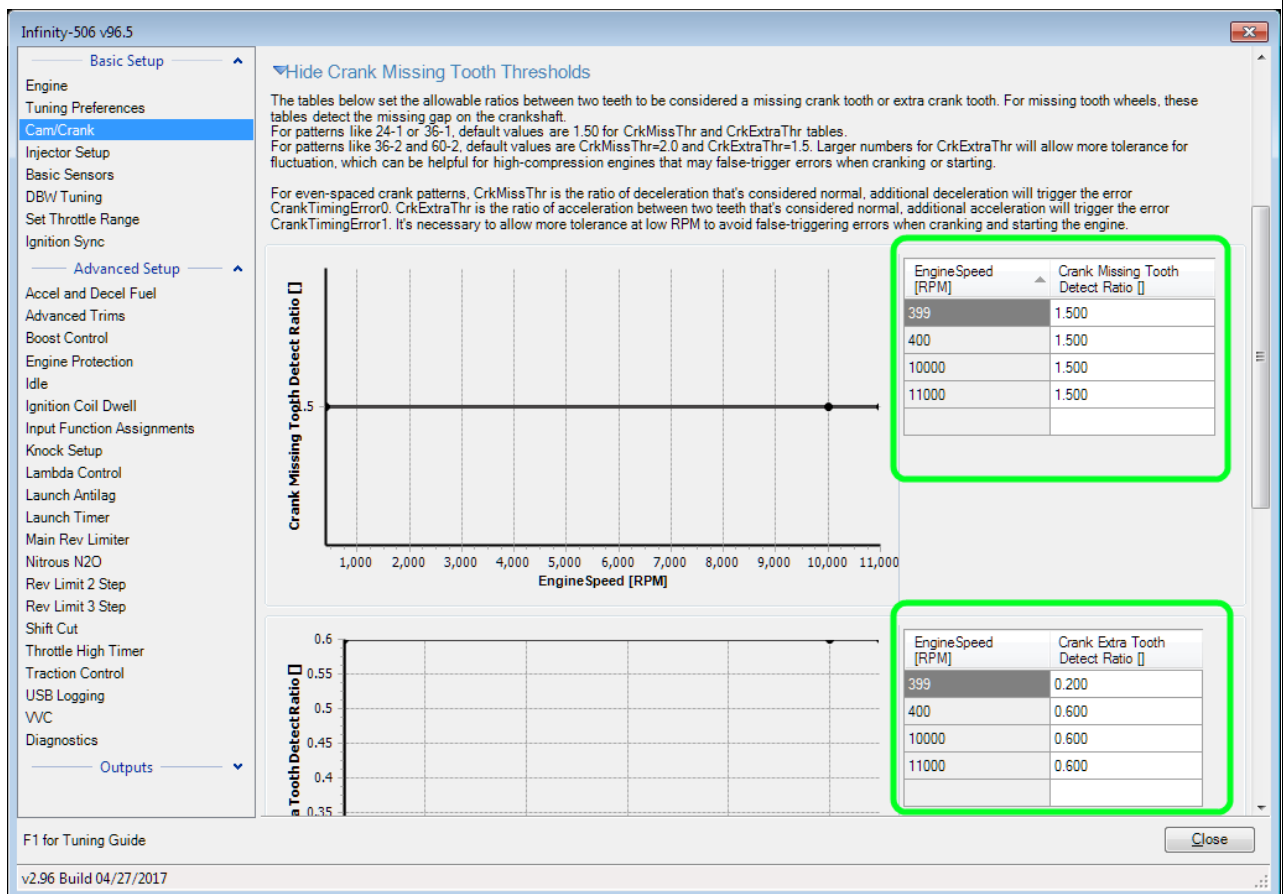
6. Cam Error Ignore function, to use the cam signal for sync at low RPM but ignore noisy cam signals at high RPM. If the CrkMissThr and CrkExtraThr tables are configured to detect crank errors, it can be safe to ignore cam errors at high RPM.
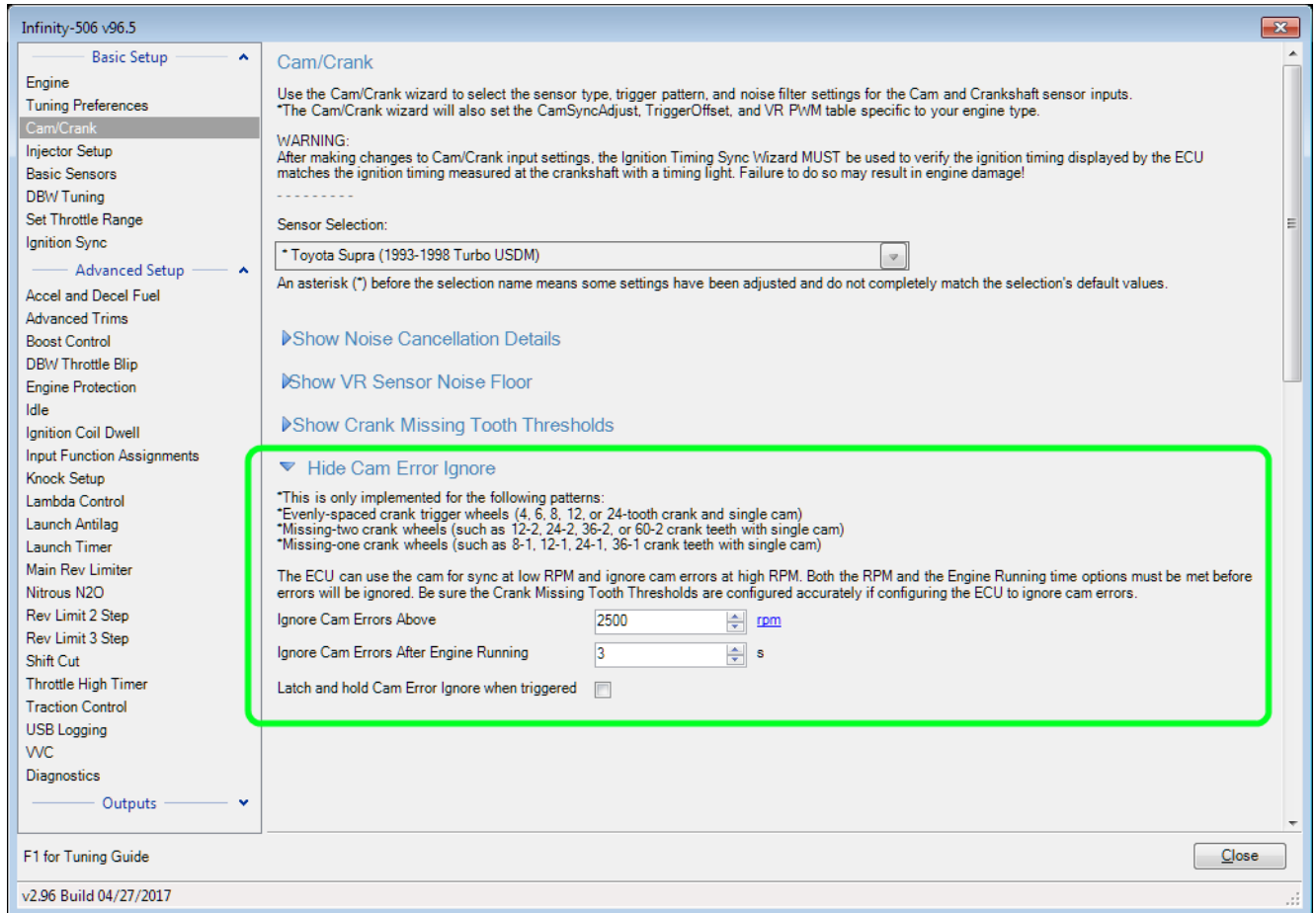
7. New channel 'CrankPerCam', intended to help with crank/cam error troubleshooting and diagnosis. This is the ECU's count of how many crank edges happened between cam edges. Should be '24.0' (without any fluctuation) for a 12-tooth crank wheel, or '48.0' for a 24-tooth crank wheel, or '116.0' for a 60-2. Will change in a repeating pattern for multi-tooth cam signals. Please add this to USB datalogs and layouts.

8. New diagnostic channel EAL_TimingError, this indicates which error has occurred most recently, even if that error was ignored. Each number represents a different possible error:

   0 = (no errors)
   2 = CrankTimingError0 (not enough crank edges, or crank decelerated faster than the limits set in the 'CrkMissThr' table)
   3 = CrankTimingError1 (too many crank edges, or crank accelerated faster than the limits set in the 'CrkExtraThr' table)
   4 = Cam0_SyncError0   (extra cam edge, within the same 'missing crank' window for missing tooth crank patterns)
   5 = Cam0_SyncError1   (extra cam edge, in the other 'missing crank' window for missing tooth crank patterns)
   6 = Cam0_SyncError2   (missing cam edge or disconnected cam signal)

9. New table 'CrankPrimePulse [uL]'
   Units: Injection volume vs Coolant Temp and FlexContent
   Description: This pulse is calculated based on a desired initial pulse volume (in microLiters), which will be injected on all injectors when the ECU detects the first crank signal edge. This can allow some fuel to be injected before the ECU syncs and begins firing the ignition coils. Note there is also 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. Another prime pulse will only 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 [uL]

FlexContent [%]	32	50	68	104	140	176	212
0.80	60	30	30	30	0	0	0
0.60	57	28	28	28	0	0	0
0.40	53	27	27	27	0	0	0
0.20	50	25	25	25	0	0	0
0.10	50	25	25	25	0	0	0

CoolantTemp [F]

10. New CAN support for controlling one AEM PDU-8 module.

      PDU Channels 1-4 are simple on/off functions, with a dropdown selection in the wizard page. Use the wizard to set the Overcurrent and retry settings.
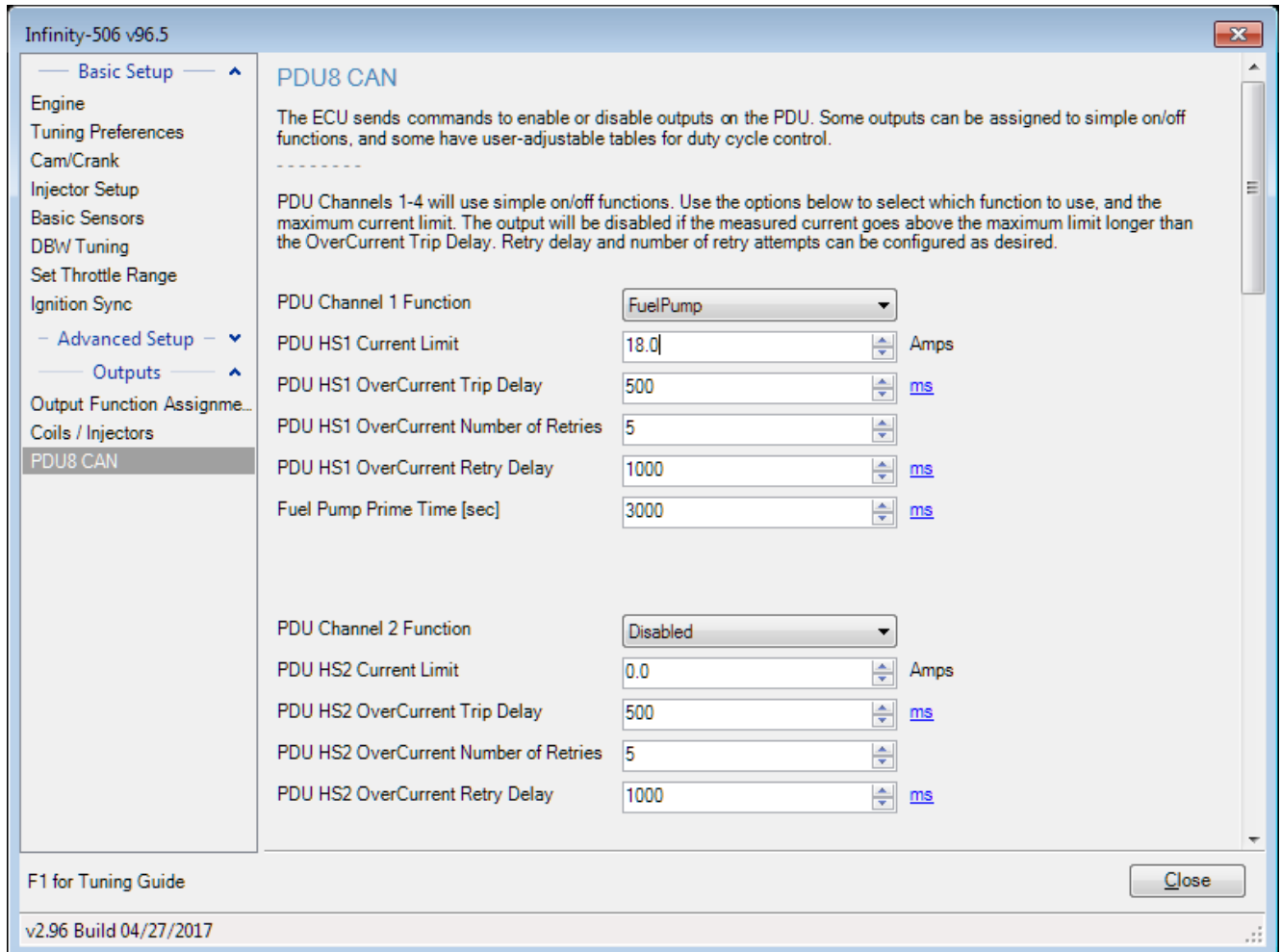
      In the screenshot above, The HS1 output will turn off if the measured current is above 18.0 amps for 500ms (0.50 seconds). The output will stay off for 1000ms (1.0 second) and then retry. The output will only retry 5 times, after the fifth overcurrent event it will stay off until the ECU turns off and restarts.

      PDU Channels 5-8 include duty cycle tables. Users can select the table axis in the wizard, but must configure the table values manually in the layout. Note that some raw Digital and Analog   inputs can be selected for the table axis. Note the output frequency is fixed at 100 Hz.

PDU Channels 5-8 have duty cycle tables to allow user-configured behavior. Use the options below to set the x- and y-axis inputs for the tables, then adjust the table values in the 'PDU' page of the layout.

PDU5 Duty X-Axis   EngineSpeed [RPM]

PDU5 Duty Y-Axis   CoolantTemp [C]

CoolantTemp [C]	
EngineProtectOut	
EngineSpeed [RPM]	
FuelPressure [psig]	
FuelPump	
Gear	
GroundSpeed [MPH]	
Idle Position	
IgnitionPower	
KnockFB_Cyl1	
Lambda1 [Lambda]	
LambdaTrim_Knock [Lambda]	
LaunchRampTime [ms]	
MAP [kPa]	
MILOutput	
ModeSwitch	
N2O_Output	
OilPressure [psig]	
OilTemp [C]	
PrimaryInjDuty [%]	
SecondaryInjDuty [%]	
TC_SlipMeasured [MPH]	
TC_SlipTarget [MPH]	
TransTemp [C]	
Throttle [%]	
VehicleSpeed [MPH]	
VTEC_Active	
Digital5	
Analog10 [V]	
Analog11 [V]	

PDU HS5 Current Limit   Amps

PDU HS5 OverCurrent Trip Delay   ms

PDU HS5 OverCurrent Number of Retries

PDU HS5 OverCurrent Retry Delay   ms

PDU6 Duty X-Axis

PDU6 Duty Y-Axis

PDU HS6 Current Limit   Amps

PDU HS6 OverCurrent Trip Delay   ms

PDU HS6 OverCurrent Number of Retries

PDU HS6 OverCurrent Retry Delay   ms

Close

The layout page also displays measured current, maximum allowed current, and the raw status flag (0, 1, 2, or 3) for all channels.