

THUNDER MAX

EFI made simple.

Part # 309-380, 2012-up Softail®/Dyna®

Thank you for purchasing a ThunderMax ECM! Please read through the following instructions before beginning the installation procedure. Following these instructions will ensure that the ECM is installed and setup properly for optimal results. If you have any problems or questions, please refer to the TmaxII Tuning .pdf Manual, included on the CD (Help Menu) with this package. . **Record serial number NOW on your warranty card, and below for your records!**

Serial # TMCM _____

Step 1 (All Models) Insert the included TmaxII CD into your computer. TmaxII will automatically open the InstallShield Wizard when the computer finds the CD-Rom. Follow the instructions and install the software on your computer.

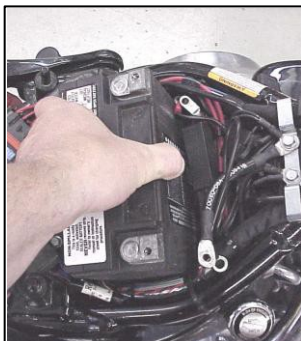


Step 2 - Module Installation - Softail® Models (Skip to page 3 for Dyna® models)

FX/FLST-A: Remove the seat to access the factory Electronic Control Module (ECM). Slide the fuse box to the left to release it from the plastic bracket. Open the fuse box and remove the main fuse.



FX/FLST-B: Remove the battery cables (negative first) and remove the battery from the motorcycle. **Remove any previously installed ancillary tuning device including oxygen sensor eliminators that may be plugged into the factory oxygen sensor harness.**



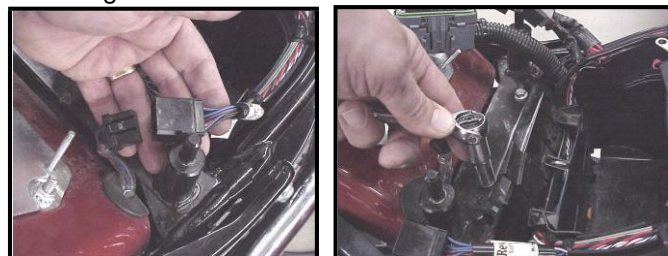
Installation / Setup Guide

Please Note: This product is Legal in California only for racing vehicles which may never be used upon a highway. The user shall determine suitability of the product for his or her use. Installation and use on a pollution-controlled vehicle constitutes tampering under the U.S. EPA guidelines and can lead to substantial fines. Review your application and check your local laws before installing.

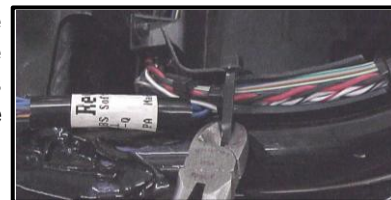
FX/FLST-C: Spread the plastic latches holding the factory ECM in place and lift the ECM from the mounting bracket. Depress the latch on the main connectors and remove the ECM from the wiring harness.



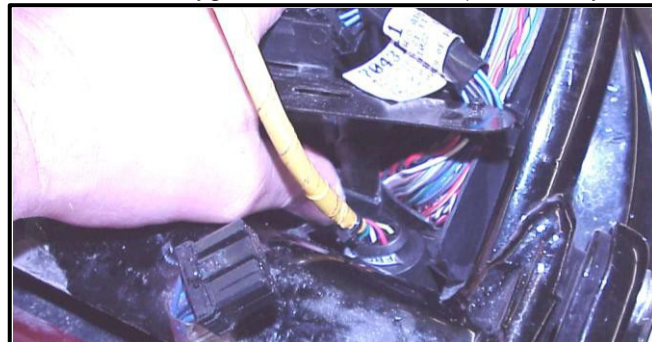
FX/FLST-D: Unplug the tail light harness connector plug. Remove the (2) bolts holding the steel fuse box mounting bracket.



FX/FLST-E: Clip the right rear wire tie holding the harness trough to the frame as shown.



FX/FLST-F: Lift the steel fuse box mounting bracket to expose rear of the plastic battery tray / wiring caddy. Firmly push the caddy forward to create space needed to feed the "Front" ThunderMax oxygen sensor harness (shown in yellow)



connector through the opening between the frame and the caddy, exiting behind the right wing of the oil tank.



FX/FLST-G: A packet of dielectric grease is included with your ThunderMax. When installing the ECM, apply the provided dielectric grease to the inside lip of the ThunderMax ECM to ensure the rubber weather seal does not bind upon installation, and across the pin casing on both 18 pin ECM connectors. Spread the grease across all of the female terminal openings, making sure the grease penetrates openings. This grease will greatly improve vital conductivity between the ThunderMax and the 18 pin connectors.



FX/FLST-H: Apply dielectric grease to the ThunderMax oxygen harness connector female terminals for improved conductivity, and to the outer housing to prevent binding upon installation to the ECM.

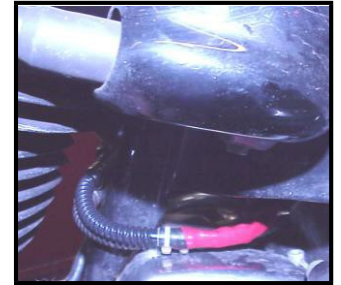


FX/FLST-I: Install the ThunderMax ECM onto the ECM caddy; insert the oxygen harness connector into the ECM with the imprinted "ThunderMax" logo facing up. Tighten the (2) Phillips connector screws. Lift ECM and install the two 18-pin connectors, ensuring they are fully seated and latched. Replace ECM into the caddy.



FX/FLST-J: **Unplug and remove factory oxygen sensors from the exhaust pipes** (rear sensor plug located under oil tank). If using an exhaust system equipped with 18mm sensor bungs ('07-'11 style), install the supplied sensors into the exhaust pipes and tighten. If retaining factory exhaust headpipes, 18mm bungs will need to be

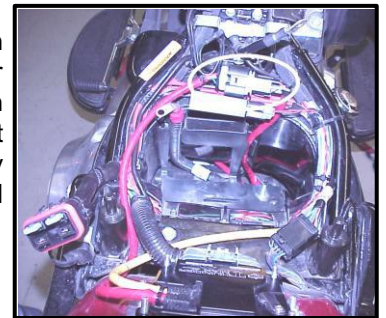
added to the headers in a similar location as '07-'11 models (3-4" from the cylinder head at the top of the pipe). Weld-in bungs are available in straight or angled style from many industry sources as well as plugs for the stock 12mm sensors (video installation link on page 8).



FX/FLST-K: Once your wide-band sensors are installed, route rear sensor harness under oil tank, feeding connector plug up through opening in the right front bottom of the battery cavity in the oil tank.



FX/FLST-L: Position rear oxygen sensor harness connector on top of oil tank, just forward of the battery under battery ground cable as shown.



FX/FLST-M: Route front oxygen sensor harness behind and under transmission with connector plug just under the engine/transmission mounting boss; connect to front oxygen sensor.



FX/FLST-N: Securely tie all harnesses to the frame and/or other harnesses. Avoid routing harnesses where engine movement, sharp edges, exhaust systems or hot engine components can contact and cut into the harnesses or connector plugs. Be aware that swingarm movement at full suspension compression reduces the clearance opening at the rear of the oil tank where the front oxygen sensor harness is routed (tie harness inboard of swingarm).

FX/FLST-O: Install steel fuse box mounting bracket. Plug in the tail light harness plug, re-install the battery (positive cable first). Re-install the main fuse. Replace the fuse box cap and attach the fuse box to the plastic fuse box bracket.



Step 2 - Module Installation - Dyna® Models

FXD-A: Remove seat. Disconnect fuel line from fuel tank by carefully pushing up the quick disconnect ring on the tank fitting while gently pulling the fuel line down. Loosen front fuel tank mounting bolt; remove rear mounting bolt, prop up tank rear 4-5" with a wood block.



FXD-B: Remove left side cover to expose electrical caddy. Remove fuse box cover and remove Maxi-fuse.



FXD-C: Remove factory ECM from caddy by pushing up ECM from bottom and sliding it out towards you. Depress locking tab on connectors and remove the ECM from the wire harnesses.

FXD-D: Remove the three caddy mounting bolts (do not remove caddy from bike) to allow caddy to drop down slightly towards primary cover. Pull caddy slightly towards you to allow room for oxygen sensor harness routing.



FXD-E: Starting at the rear cylinder head, route the oxygen sensor harness behind the coil and ECM caddy up through the frame opening as shown, then



back down through the frame opening, through the back of the ECM opening of the ECM caddy. Pull the harness through far enough to allow it to be attached to the ThunderMax ECM. Apply dielectric grease (see page 2, G&H) and attach the harness to the ECM using screws provided; plug black and gray harness plugs into ThunderMax ECM. With ECM still "out" of its home



position as shown, reinstall (3) caddy mounting screws. Verify that oxygen sensor harness moves freely (not pinched by caddy reattachment). Enough slack must be left in harness to allow ECM to be pulled out far enough for temporary attachment of the ECM communication cable for map programming and adjustments.



FXD-F: **Unplug** and remove factory oxygen sensors from the exhaust pipes. **Remove any previously installed ancillary tuning device including oxygen sensor eliminators that may be plugged into the factory oxygen sensor harness.** If using an exhaust system equipped with 18mm sensor bungs ('06-'11 style), install the supplied sensors into the exhaust pipes and tighten. If retaining factory exhaust headpipes, 18mm bungs will

need to be added to the headers in a similar location as '06-'11 models (3-4" from the cylinder head at the top of the pipe). Weld-in bungs are available in straight or angled style from many industry sources as well as plugs for the stock 12mm sensors (video installation link on page 8).

FXD-G: Route front sensor harness along left frame backbone under gas tank; position sensor plug just forward of engine mount top link. Run front sensor harness up left frame tube to connector as shown. Check that connector position does not interfere with gas tank when in position before securing harnesses with plastic wire ties.



FXD-H: You will have excess harness on the rear sensor; gently bundle it together with a wire tie, connect it to the harness and tie it away from the engine and exhaust into the cavity between the battery and ECM caddy. After checking that all harnesses are securely tied down (away from any sharp edges that could chaff or cut harnesses), re-install the, gas tank, fuel line and seat. Re-install the maxi-fuse.

Oxygen Sensor Installation Tips

Remove any previously installed ancillary tuning device including oxygen sensor eliminators that may be plugged into the factory oxygen sensor harness.

Starting in 2012, H-D® Softail® and Dyna® models are supplied with 12mm narrow-band oxygen sensors, instead of 18mm NB sensors used in previous years. Your ThunderMax uses 18mm wide-band sensors and will require the 12mm ports to be plugged and 18mm bungs added to your stock head pipes or a 2007-2011 style exhaust system with 18mm sensor ports. Bungs should be located no more than 3-4" from the head/pipe connection (for ideal location, refer to the factory '07-'11 location). Weld-in bungs are available in straight or angled style from many industry sources; video installation link on page 8. Installation of the wide band sensors into most '07-'11 headpipes presents no clearance problems; however, some brand pipes may require exhaust pipe modification or sensor bung relocation for interference-free installation. The sensors must mount freely without contacting surrounding components. **If this is not possible, do not attempt to**

bend or modify the sensor in any way as it is a sensitive electronic component and will be damaged if you do.

Modify the pipe if required for clearance. After installation, route the sensor harness away from the engine and along the frame when possible, above the lowest frame point to avoid the possibility of dragging ground during operation.

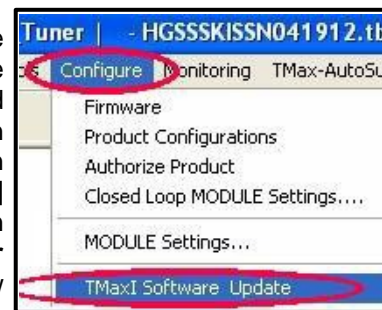
Avoid routing harnesses where engine movement or sharp edges can contact and cut into the harnesses or connector plugs. Tie the harnesses to the frame or existing component harnesses, taking care to avoid contact with any vibrating component that may chaff the sheathing or wires. Some disassembly of bike components may be required for best harness routing.

If you purchased a pre-mapped system, you may skip steps 3-6 and proceed to Initializing (step 7).

Map Loading & Set-Up

Step 3 - Programming the ThunderMax ECM

Now it's time to turn your attention back to your computer. Open your TMaxII Tuner software. There is no need to link to the module at this time. To ensure you are working with the latest version of TMaxII Tuner software and have the most up-to-date selection of base maps, it is suggested that you establish an Internet connection and click **[Configure]** on the tool bar, then **[TMaxII Update]** and follow the prompts.



After uploading new software (if found), next click **[EFI Maps]** **[EFI Map Listings (Throttle Cable)]**, double-click any map; when Base Map Name Encoding window appears, click the **[Check Internet For Updates]** button and follow the prompts. Close window after updating.



Loading Interface Drivers and VIN Number

Next, the TMaxII Tuner software for the ThunderMax EFI systems contains the correct Windows® drivers required for USB interface with the ECM. Connect the USB cable to the specific port on your PC that the driver will be



configured to, and the ThunderMax ECM connection port located under the retainer plate (loosen retainer screw, rotate retainer plate and open rubber weather seal). Open the TMaxII Tuner software and turn the bike's ignition and handlebar switches to the on/run positions. Follow the prompt instructions for installing the driver. Next, go to the menu bar and select **[Tuning Maps] [Module Configuration] [Module Service Data]**. Under the Module Information tab, click **[Edit VIN/SRN]** and enter your motorcycle's serial number in **CAPITAL LETTERS**, click **[OK]** then **[Close]**. Turn off ignition; once your software, map databases and USB driver are verified as up-to-date, move to selecting your base map.

Selecting A Base Map File from the Database

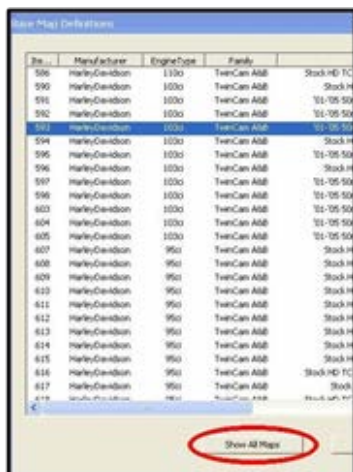
Note: The map selection process for this ThunderMax is the same as the original ThunderMax system; if you are familiar with the map selection process, select your map and proceed to Initializing (step 7, page 6). If you purchased a pre-mapped system, you may also skip these steps and proceed to Initializing (step 7).

The TMaxII Tuner EFI Map Database will help you chose a Base Map for your application. To open the Map Database, select from the toolbar **[EFI Maps] [EFI Map Listings (Throttle Cable)]**.



Available base maps will be shown (if the **[Show All Maps]** button at the lower left of the screen is highlighted, click it to clear any filtered maps so all maps will be shown).

You will now be able to select the closest Base Map for your engine combination. Please read the following section on Key Elements before proceeding; this will help you quickly narrow down the selection of available Base Maps and find the right one for your application.



Base Map "Key Elements"

The reason for selecting a Base Map by "Key Elements" is to find the closest Base Map match available for your combination, identified by the most critical components. These include:

Engine Size. A correct match to the engine's stroke is more important than an exact match of engine

displacement. Stroke and cam timing influence engine pumping pressures. The correct shape of spark curves in the base map will be best matched by engine stroke.

Throttle Body / Injector Size. Choose the throttle body and injectors being used for your application (most applications will be "stock" unless performance parts have been installed).

Camshaft. Many popular short duration aftermarket cams (less than 240° intake duration) perform well when using a stock-cam base map. With broader timing cams (more than 240° intake duration) you may find that choosing a base map calibration developed for an aftermarket cam to be a better choice.

Exhaust System Design. There is no need for concern if an exact brand match does not appear in the Base Map library. Simply select the Base Map with the closest style of exhaust system (Slip-ons, 2:1, True Duals). Choosing the closest style will yield excellent results. Group your exhaust system in one of the following three categories:

Factory Head Pipe with Crossover: Dual exhaust systems with a cross over pipe that connects the front and rear exhaust pipes. Typically used with accessory slip-on mufflers. **Bikes with stock catalyst-equipped mufflers require maps designed for use with catalyst-equipped systems or damage to the catalyst can result.** ThunderMax maps for use with 96" and 103" internally stock engines are catalyst-safe maps.

2 into 1: Both head pipes converge into one collector.

True Dual Exhaust: 100% separate exhaust pipes.

ThunderMax's AutoTune system allows you to choose a Base Map that isn't an exact match of components and still have excellent results. Even if your combination isn't listed, select the closest Map match and let the AutoTune create your custom Base Map while you ride. The closer the match that the Base Map is to your combination, the faster the system will achieve the desired AFR Targets. This simply means less time to establish and maintain a great tune. Once you have allowed the system to establish custom AFR fuel-flow adjustments, you can use the AutoMap function to create an all-new Base Map based upon the AutoTuned learned adjustments. To use the AutoMap feature, see the tuning manual for the procedure on how to create your custom base map using AutoMap.

Base Map File Browsing / Selection

With your Base Map Definitions window open, you may begin narrowing down the list of maps for your application. To sort the map files by a particular key element, left-click on the column heading to arrange the Base Maps in 'key element' alpha/numeric order. All of the columns can be sorted in this manner for filtering purposes. Filter the maps to identify the base map that best matches your application by following these steps:

Item	Manufacturer	EngineType	Family
591	HarleyDavidson	103ci	TwinCam A&B
592	HarleyDavidson	103ci	TwinCam A&B
593	HarleyDavidson	103ci	TwinCam A&B

Item	Manufacturer	EngineType
237	Harley Davidson	96
238	Harley Davidson	103

Throttle

Cam
Stock
Stock

Exhaust
Stock HD FXD Head Pipe
Stock HD FXST Head Pipe

Base Map Name Encoding

Engine Manufacturer	Valley Davidson	H
Engine Type / Family	96 / TwinCam TBC (Cable)	G
Cylinder head type	Stock	S
Piston Type	Stock	S
Cam	Stock	S
Exhaust	Stock F1 Stag Duals	K
Throttle	Stock 46mm (3.04 3/16)	I
Air Cleaner	Stock Air Cleaner	S
Muffler	Stock Slip One	S
Modification	None	N

Base Map File Name: H2559TSSM041912.tbw

Check Internet For Updates Select BaseMap

Close Load BaseMap

Note - If you're still unsure of which Base Map to select, please

Load Map

- Fuel Calculator File
- Flow Calculator File
- Idle Curve
- Ignition Map File
- Ignition Timing Map File
- Ignition Timing Map File
- Vehicle Configuration
- Vehicle Configuration File
- Engine Map
- Engine Map File

Basic Settings

Rev Limit	First Drive Pulse	Engine term alarm threshold
5000 rpm	200%	234.0 deg F
Accel Limit	Gear 4 Mile Type	"Hardware" (0.000 sec)
50.0 m/sec	200%	200.0 sec
Speeds Cat	Initial Drive Pulse	"Hardware" (0.000 sec)
43000	100%	"Hardware" (0.000 sec)
Idle Type	Cooling Fuel	Camp Revolutions Delay
500 rpm	0.0 m/sec	1.0 revs
TAC Home Position	Decel Fuel Cut	"EIO Sensor Type"
70 steps	0.000%	2.000 sec
MAC Step Target	Decel Fuel Cut Pwm Low	Ignition Timing
0.000 steps	0.000%	200.0 sec
MC Min Learning Offset	Decel Fuel Cut Pwm High	
-25 steps	2000 rpm	
MC Max Learning Offset	Decel Fuel Cut Enrichment	
25 steps	0.02% Fuel	

Fuel Model Settings **Ignition Map Settings**

[Load Fuel Model Settings](#) [Load Ignition Map Settings](#)

Close

STD: Throttle Pos. (deg)

Softail® / Dyna®	2011-up	44750
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IMPORTANT STEP BEFORE STARTING

6

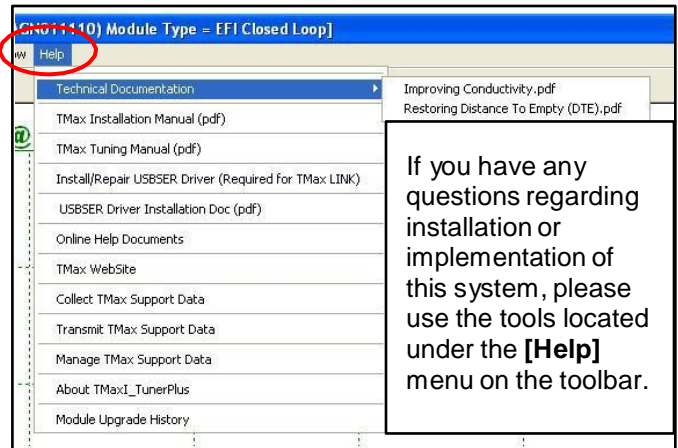
takes place. Example: battery change, removal of maxi fuse, etc. Turn the ignition switch on and the handlebar rocker switch to run (without starting the engine) for 30 seconds, uninterrupted. Cycle the ignition switch off for 30 seconds (time it) and then back on for 30 seconds. Repeat the 30 on / 30 off cycles three times; after the 3rd off cycle, start the engine. Let the motorcycle idle on its own for 15 seconds. Cycle the ignition off, then restart the motorcycle; normal idle speed should be attained depending on engine temperature. Warm-up cycle will have slightly elevated idle speed (approximately 1200 rpm) until engine reaches operating temperature. To disconnect from the PC, click the Unlink button (turns to red), remove the USB cable and snap the weather seal plug into the USB cable port. Position the retainer plate over the weather seal and tighten the retainer plate screw.

If during this process you encounter wandering or unstable idle, the map selected may not be the best match for your application, or a mechanical problem may be present on your motorcycle. Please contact Product Support (from your toolbar, select [TMax AutoSupport] [Collect TMax Support Data] and follow the prompts (Internet connection required). This process copies your map and adjustments and automatically transmits the data to Product Support for evaluation.

Congratulations! You have successfully installed and set up your ThunderMax ECM. Now it's time to ride the bike and let ThunderMax optimize your EFI system! Several riding sessions that allow the engine to reach normal operating temperature should be completed with as much variation in terrain and RPM as possible. During this process, the IAC virtual stops are further refined and your air/fuel ratio is automatically adjusted to the map's targets. Your ThunderMax customizes your map based on your engine, ambient conditions and your riding habits. Once several sessions have been logged, link to your ThunderMax and select [TMax Module

Control Center] for an automatic analysis of the adjustments that have been made, and follow prompts for further action if more optimization is suggested.

Need Help?



We have included many easy-to-use features for supporting and enriching your ThunderMax experience. A full tuning manual, links to online support documents and sites as well as the ability for you to easily attach a map or recorded engine monitoring log to an email directly to our support department are found here.

Special Note for International Model Bikes with Active Exhaust Enabled: *If your bike is equipped with a working Active Exhaust Valve, you must unplug the active exhaust harness before linking to the module, as the AEV circuitry conflicts with the communication stream. You can re-connect the harness after unlinking. If the stock exhaust has been changed, disregard this step. ThunderMax does not support active exhaust*

TIPS AND GENERAL INFORMATION

- **Several support features** are located under the [Help] menu:
 - A comprehensive tuning manual
 - Links to allow transmission of module and map data via E-mail directly to ThunderMax support
 - Links to allow transmission of monitor logs (recorded riding sessions) via E-mail directly to ThunderMax support (see video link page 8)
 - Links to Thunder-Max.com web site for support documents and videos
- **Enter your VIN (motorcycle serial number)** into your module as described in Step 3 to allow your ThunderMax to be compatible with H-D®'s Digital Tech as well as certain H-D® add-ons such as accessory speedometers.
- **System Updates are available** through TmaxII with an internet connection. Software, Firmware and Map updates can be downloaded; dealers, tuners and end users should check frequently for updates.
- **TMax-ModuleControlCenter** provides a snapshot of AutoTuned fuel flow adjustments, RPM time logs in increments of 100 RPM's, engine temperature logs and diagnostic codes. Valuable information about the

condition of your tune and how you ride. **AutoMap**, located within the **[TMax-ModuleControlCenter]**, creates a custom base map based on AutoTuned fuel flow adjustments. Create a custom base map with just a few clicks!

- **International (non-US) model notes –** ThunderMax does not support active intake/exhaust functions or Jiffy stand safety switch.
- **When the TmaxII program is opened,** it will automatically retrieve and open the last map that was open.
- **Any time you link to your motorcycle:** Read the map that is installed in the ThunderMax ECM by selecting **[File]** then **[Read Module Maps and Settings]** on the TmaxII toolbar. This will synchronize the map file loaded into the ThunderMax ECM with the TmaxII software.
- **AFR Correction vs. Engine Temperature** page is used to adjust warm-up AFR's. If the engine requires more fuel during warm-up (start to 200°), use this function to adjust. See TmaxII Tuning Manual for procedures.
- **AFR vs. Engine Temperature** - During warm-up, the AFR on both cylinders will show richer than the target AFR at operating temperatures; this is a normal part of the warm-up map. No permanent changes to AFR targets and adjustments are made below 200 degrees. See TmaxII Tuning Manual for applications and procedures.
- **Air/Fuel-TPS @ RPM** These pages reflect desired targets of AFR to throttle position at every 256 RPM. Example: if you desire a leaner mixture for added fuel economy then you can easily enhance multi-tiered AFR targets at specific throttle positions and RPM's that will be learned during closed loop processing. When these pages are open, you can view the target AFR by clicking on a dot and tapping the space bar to view the target at a specific throttle position for that RPM. Use arrow keys to raise/lower targets.
- **Interrupting 12v power** to the module (battery service/replacement) requires system to be re-initialized (**Step 7**). Check battery terminal tightness as part of routine service (like during oil changes); avoid stacking accessory power leads onto main battery cables. If equipped with dual battery post ports, connect accessories separately.
- **When a new map is installed** any existing learned fuel adjustments need to be cleared **[Map Editing] [Clear Learned Fuel Adjustments]**. Linking or editing an existing map within the module does not require above steps.
- **System Updates are available** through your software with an internet connection **[Configure] [TmaxII Software Update]**. Software, Firmware and Map updates can be downloaded; check frequently for updates.
- **In-Tank Fuel Filters** should be inspected as a part of routine maintenance. The filter is small and one bad load of fuel can compromise it. The factory recommended service interval is 25K miles.
- **Fuel Pressure Should Be Checked** during periodic service; this is also the first thing to check should you experience sudden or gradual decreasing performance. For any EFI system to operate properly, your fuel system should build and maintain 55-62 PSI of fuel pressure; your dealer can perform this simple test quickly.
- **Save your edited maps** to your hard drive using the **[Save As]** command. Document the changes in **[Map Notes]** located under **[EFI Maps]** on the toolbar. These notes are stored with the saved map; remember to edit them when making changes for future reference.
- **Oxygen Sensor Care:** Items that can damage or shorten the life of your sensors:
 - Leaded fuel – Race fuel
 - Oil deposits from oil consumption problems
 - Excessive moisture exposure
 - Excessive (extreme) heatThere is no warranty on sensors. Replacement P/N is 309-355.

For additional information, scan the QR-codes below with your smart phone for links to video instructions or go to:

<http://www.youtube.com/user/ThunderMaxAV>



Auto Support



How T-Max Works



Installing Exhaust Bungs