

Part 1: Module Installation



#309-562 for 2014 -16 Touring & Trike Models

****Allow fuel pump to shut off prior to starting engine!**
this will allow enough time for the bikes HD LAN system to completely power up and properly sync all control modules.**

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 TMax Tuner.pdf Manual. The manual can be found in the software (see part 2), under the Help button in the menu. Record serial number NOW, in the space below for later use registering your ECM.

Serial # TMTM _____



309-562

****NOTE:** The 309-562 module is set as a default to an air cooled model. When the VIN is entered the system will change to the appropriate model per the VIN definition. Depending on when you check your Diagnostic Trouble Codes it is possible to have historic codes because of this. After you enter the VIN, clear the (DTC's) codes and if there are any historic codes they will be cleared. This procedure is covered in the section 2 Thunder Setup instructions. **The 309-562 is not interchangeable with a 309-588.**

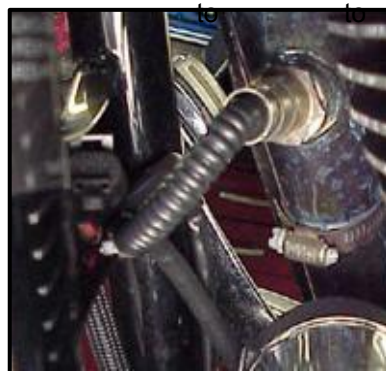
Module Installation

FL-A: Remove seat and both side covers. Remove the Battery fuse/ECM fuse or the main 50A fuse (as shown below, both located under the left side cover). On bikes with security, turn the ignition switch on prior to removing the 50 A fuse (or consult manual) so not to activate alarm.



“DISCLAIMER: NOT LEGAL FOR SALE OR USE IN CALIFORNIA ON ANY POLLUTION CONTROLLED MOTOR VEHICLES” 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.
* CA Proposition 65 “known to the state of CA to cause [cancer] [birth defects or other reproductive harm]” see www.p65warnings.ca.gov for details

FL-B: Remove the stock 12mm narrow band sensors from the exhaust pipe and plug ports. If you wish to cap off the bike side of the harness connector, protective caps are provided. See Tips and General Information section on page 3 for further detail. **Special Note– If you have previously installed another tuning device such as a Power Commander**, be sure to remove the device and any “O₂ Sensor Eliminators” that may have been installed at the sensor harness plugs at that time! If replacing the factory exhaust system, ensure the system you purchase has 18mm exhaust oxygen sensor bungs, as used on 2009 models. H-D® switched to 12mm narrow-band sensors on FL's® in 2010. Most pipe manufacturers now install both size ports in their factory locations, if not purchase a head pipe for a 2009 model, it will be correct for use with ThunderMax 18mm wide-band sensors. All other pipe dimensions and mounting points are the same as 2010-2016 touring model exhaust systems; just the sensor bungs are different. If retaining factory catalyst-equipped headpipes, 18mm bungs will need be added the headpipes.



Bungs should be located no more than 3 - 4” from the head pipe connection (for ideal location, refer to the factory location on 2009 models). Weld-in bungs are available from many sources in straight or angled designs.

See Video on adding new bungs on the web at [Youtube.com](https://www.youtube.com) (search ThunderMaxAV).

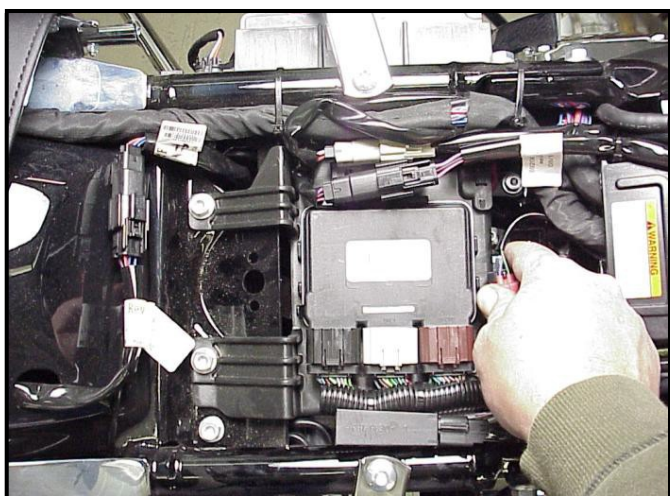
Stock 12mm O₂ sensors are located downstream on the factory header pipes, between the engine and transmission; unplug and remove them as they will affect your ThunderMax system performance if left plugged in. Stock sensor connectors are located under the bike's right side cover (black and gray plugs). 12 mm pipe bung O₂ caps are available from many sources.

FL-C: Install supplied wide-band sensors into the pipes; route the front sensor along the cross brace on the frame in front of the engine and down the lower frame rail on the right side of the motorcycle.

FL-D: Route the rear sensor lead between transmission top cover and the starter, then towards the ABS caddy located under the right side cover. Place the sensor connector under the ABS caddy.



FL-E: Remove factory ECM located under the seat from the caddy by spreading the plastic caddy latches at the sides of the ECM. Lift the ECM up and to the right to release it from the caddy.



FL-F: Disconnect the ECM from the three connectors by depressing the tab on the top of each connector. Some models have a red locking slide on the connectors. If equipped the red lock must be slid outward towards the harness before the the connector tab is depressed.



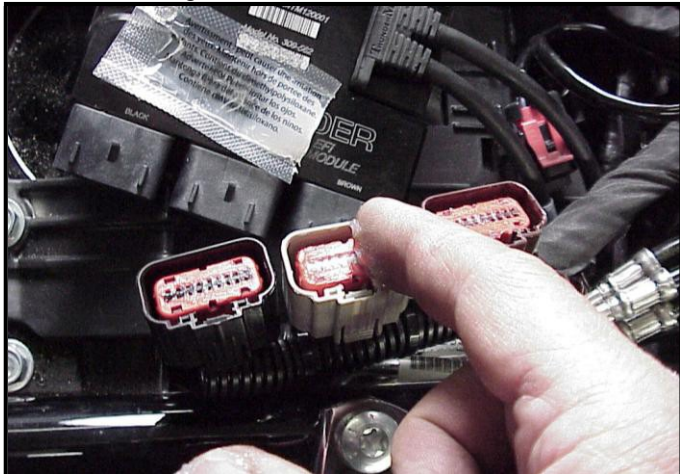
FL-G: With the factory ECM removed, route the AutoTune harness thru the opening on right side of the frame below the down tube for the seat, towards the ECM caddy.



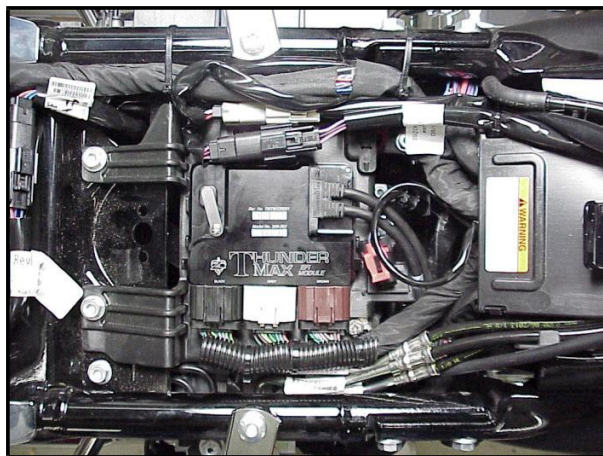
FL-H: Route the AutoTune harness plug under the brake lines to the ECM caddy area. Locate the package of dielectric grease included with communication cable. Spread a small amount of grease on the AutoTune harness plug end and inboard of the mounting flange to allow the plug to easily slide into the ThunderMax ECM. Install in case with the ThunderMax logo up and attach with the provided screws.



FL-I: Install main harness connectors to ThunderMax ECM. Before installing the connectors, lightly spread some dielectric grease on harness connector terminals.



FL-J: Once the three harness plugs are connected, place the ThunderMax ECM into the ECM caddy.



FL-K: Connect the oxygen sensor harnesses to the AutoTune harness, you will hear a click when they are connected properly. Carefully wire tie the leads to the motorcycle. Take extra care to ensure harness and sensor leads are safe from rubbing or chaffing on the motorcycle. Use all supplied wire ties; add extra ties if needed to properly secure wiring on your installation.

FL-L: Position the rear connector under the ABS caddy and attach with wire ties provided as shown.



FL-M: Position front connector above lower frame rail between engine and transmission. Attach to existing harness with provided wire ties. Inspect all wiring to make sure it is clear of moving parts and excessive heat.



FL-N: Re-install the 50A fuse, replace the side covers.

You are now ready to begin part 2 setup of your system.

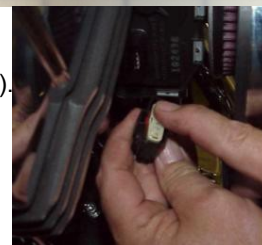
TIPS AND GENERAL INFORMATION

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.

Find the enclosed caps to block off the bike side of the stock oxygen sensor connector. There are 2 large caps for all motorcycles that come stock with the smaller 12mm oxygen sensors. Install per the picture to the left.



H-D® released a Tech Tip (#418) regarding improving conductivity at the throttle body wire connector (TCA). Carefully remove the harness plug from the throttle body, clean the male TCA pins with a swab and alcohol, apply dielectric grease to the female terminals and reassemble.



Nitrous - When adding a Nitrous system, plan to use a relay to control the activation of the system. This will keep from overloading the circuit and causing damage to the ECM.

In-Tank Fuel Filters should be inspected as a part of routine maintenance. The filter is small and one bad load of fuel can clog 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 service provider can quickly perform this simple test.

Oxygen Sensors: Included Bosch wide-band sensors are very robust and durable; under normal conditions should last 50K miles or more. Circumstances that can damage or shorten the life of your sensors include:

- Leaded fuel – Race fuel
 - Excessive (extreme) heat
 - Oil deposits from oil consumption
 - Excessive moisture exposure
- There is no warranty on sensors. Replacement P/N is 309-355.

Heat Management Strategy

ThunderMax ECM's do not support the EITMS® (rear cylinder shutdown) feature like the stock ecm on HD® Throttle by Wire motorcycles. The ThunderMax heat management strategy which is just as affective, benefits from using the wide band oxygen sensors that are used in our auto tuning system. For more details please visit our website or email tech support.

Part 2: Software Setup Guide



#309-XXX ThunderMax Tuner Software setup / map loading

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 setup properly for optimal results. If you have any problems or questions, please refer to the TMax Tuner.pdf Manual, in the software (under the Help Menu).

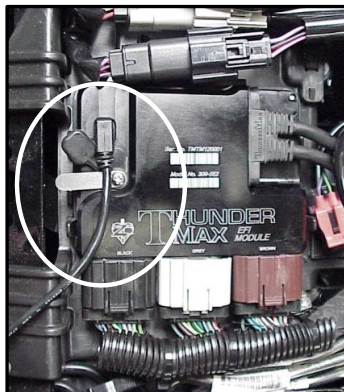
Step 1: Download Software and install software



Go to www.thunder-max.com, click on support tab, then software tab, now click TMax Tuner (yellow/top disc) Click save file and then ok, the file will start to download. When completed locate and open the file folder and double click on the setup (Application file or .exe file depends on Windows version). The Install Shield Wizard will automatically open and guide you through installing the software on your computer. After installing and opening the software the first time, you will be prompted to install the driver for the USB connection. The TMax Tuner software is designed to run on computers using Microsoft® Windows 2000™, XP™, Vista™ and 7, 8 & 10 operating systems. Your computer must have an adequate amount of free space on the hard drive for proper operation. TMax Tuner is approx. 140MB when installed. TMax Tuner is not compatible with any other operating systems.

Step 2: Linking and Installing a Map

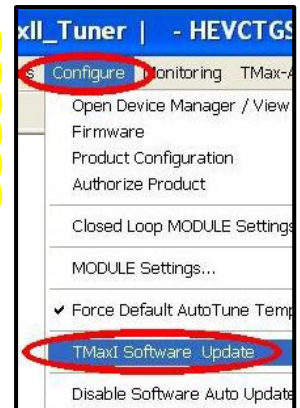
The TMax Tuner software for the ThunderMax EFI systems contains the correct drivers required for USB interface with the ECM. Connect the USB cable to the specific port on your PC that the driver will be configured to and the ThunderMax



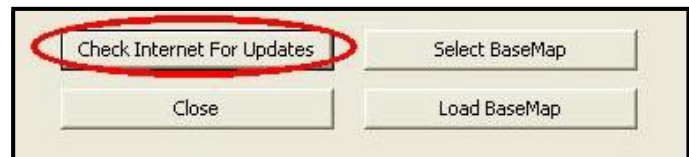
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ECM communication connection located under the retainer plate (loosen retainer screw, rotate retainer plate and open rubber weather seal). Open the TMax Tuner software and turn the bike’s ignition and handlebar switches to the on/run positions. Follow the prompt instructions for installing the driver. Turn off ignition when finished.

(There is no need to be linked to the module at this time). This section is only to ensure you are working with the latest version of TMax 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 [TMax Software Update] and follow prompts.

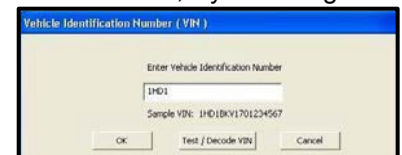


After uploading latest software (if found), next click [EFI Maps] [EFI Map Listings (Throttle By Wire)], double-click any map; when the Base Map Name Encoding window appears, click the [Check Internet For Updates] button and follow the prompts. Close window after updating.



Step 3: Enter VIN Number and Product Registration

With the communication cable connected to your computer and the ThunderMax ECM, cycle the ignition switch to the 'on' Position (be sure kill switch is in the run position) and linking to the ThunderMax



will occur automatically. (Red **[Link]** button turns green).

You will be prompted to enter the bike serial number (VIN); answer **[OK]** and enter your motorcycle's serial number (CAPITAL LETTERS ONLY), click **[OK]** then **[Close]**.



Now click **[Yes]** when the product registration prompt appears. When the product registration window opens, fill in the requested fields then click **[Close]**. Unlink (click green



[Link] button) and turn off ignition when finished. Once your software and map databases are verified as up-to-date and your module is registered, move to selecting and loading your base map.

Selecting A Base Map File from the Database

If you purchased a pre-mapped system, you may skip the map installation process.

The TMax 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]** then your application (**Throttle by Wire**), (**Throttle Cable**) or (**VRod**).



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).

ItemID	Manufacturer	EngineType	Family
288	Harley Davidson	103	TwinCam TBW
286	Harley Davidson	103	TwinCam TBW
279	HD-Trike	103	TwinCam TBW
273	Harley Davidson	103	TwinCam TBW
271	Harley Davidson	103	TwinCam TBW
267	Harley Davidson	103	TwinCam TBW
266	Harley Davidson	103	TwinCam TBW
265	Harley Davidson	103	TwinCam TBW
264	Harley Davidson	103	TwinCam TBW
259	Harley Davidson	103	TwinCam TBW
243	HD-Trike	103	TwinCam TBW
241	Harley Davidson	103	TwinCam TBW
240	Harley Davidson	103	TwinCam TBW
239	Harley Davidson	103	TwinCam TBW
197	Harley Davidson	103	TwinCam TBW
196	Harley Davidson	103	TwinCam TBW
195	Harley Davidson	103	TwinCam TBW
194	Harley Davidson	103	TwinCam TBW
188	Harley Davidson	103	TwinCam TBW
187	Harley Davidson	103	TwinCam TBW
186	Harley Davidson	103	TwinCam TBW
185	Harley Davidson	103	TwinCam TBW
184	Harley Davidson	103	TwinCam TBW
183	Harley Davidson	103	TwinCam TBW
182	Harley Davidson	103	TwinCam TBW

You will now be able to select the closest Base Map for your engine combination. Please read the following section on Key Elements, 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 (includes 'X' pipes). Typically used with accessory slip-on mufflers. **Bikes with catalyst-equipped mufflers or headpipes require maps designed for use with catalyst-equipped systems or damage to the catalyst can result.** ThunderMax maps for use with 96, 103 and 110” 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 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 Auto Tuned 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 column in 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 easy steps:

First (in order of importance) place your cursor over the **'Family'** heading and left-click to change the sort order of that column. Scroll down the list and place your mouse pointer over you bike's family match and right-click to filter out no-match applications from the list.

Itemid	Manufacturer	EngineType	Family	Throttle	Exhaust
182	Harley Davidson	103	TwinCam TBW	Stock (Stock 4.22 Inj)	Stock 09'-12' FL Head Pipe (With Cats)
183	Harley Davidson	103	TwinCam TBW	Stock (Stock 4.22 Inj)	Vance & Hines Power Duals (No Cats)

Tip - After any filtering, notice that the **[Show All Maps]** button at the bottom left is now selectable. At any time if you want to return to the complete library listing, left-click the **[Show All Maps]** button and you will start over with all Base Map Files in the library displayed.

Second, right-click the engine size under **'Engine Type'** that matches your engine. All maps that do not match your selection will be filtered from the screen.

Itemid	Manufacturer	EngineType	Family	Throttle	Exhaust
182	Harley Davidson	103	TwinCam TBW	Stock (Stock 4.22 Inj)	Stock 09'-12' FL Head Pipe (With Cats)
183	Harley Davidson	103	TwinCam TBW	Stock (Stock 4.22 Inj)	Vance & Hines Power Duals (No Cats)

Third, place your cursor over the **'Throttle'** column and right click your match (injector size is more important than throttle body size if you have to choose).

Itemid	Manufacturer	EngineType	Family	Throttle	Exhaust
182	Harley Davidson	103	TwinCam TBW	Stock (Stock 4.22 Inj)	Stock 09'-12' FL Head Pipe (With Cats)
183	Harley Davidson	103	TwinCam TBW	Stock (Stock 4.22 Inj)	Vance & Hines Power Duals (No Cats)

Fourth, right-click the **'Cam'** that closest matches your application.

Muffler	AirCleaner	Cam	CylinderHead	Piston	Modifications
Slip Ons - (All others)	Hi Flow Air Cleaner	Stock	Stock	Stock	None
(Exhaust Includes Muffler)	Hi Flow Air Cleaner	Stock	Stock	Stock	None

Fifth, right click the **'Exhaust'** that closest matches your application.

Itemid	Manufacturer	EngineType	Family	Throttle	Exhaust	Muffler
182	Harley Davidson	103	TwinCam TBW	Stock (Stock 4.22 Inj)	Stock 09'-12' FL Head Pipe (With Cats)	Slip Ons - (All other
183	Harley Davidson	103	TwinCam TBW	Stock (Stock 4.22 Inj)	Vance & Hines Power Duals (No Cats)	(Exhaust Includes Muff

Keep right-clicking the application columns until you have located the best map match (in the case of identical maps, choose the latest date). Highlight the map you've chosen (left-click; blue bar indicates selected map) and click the **[Close]** button.

Step 4: This brings you to the 'Base Map Name Encoding' page, from which you can review the map parameters. Once verified, click the **[Load BaseMap]** button to load the map into the software.

Base Map Name Encoding

Engine Manufacturer: Harley Davidson
 Engine Type / Family: 103 | TwinCam TBW

Cylinder Head Type: Stock
 Piston Type: Stock
 Cam: Stock
 Exhaust: 2-1 D&D FatCat (No Cats)
 Throttle: Stock (Stock 4.22 Inj)
 Air Cleaner: Hi Flow Air Cleaner
 Muffler: (Exhaust Includes Muffler)
 Modification: None

Base Map File: HBS5535AAN010313.tbw

Buttons: Check Internet For Updates, Select BaseMap, Close, Load BaseMap (circled in red)

Note - If you're still unsure of which Base Map to select, please email the specifications of your Key Elements to Support@Thunder-Max.com. Please title the email "Base Map Selection" for a faster response.

Step 5: Next, go to the **[Tuning Maps]** Tree and click the **[+]** sign next to **[Module Configuration]** to reveal the **[Basic Settings]** tab. Open the Basic Settings window and click the **[Speedo Cal]** button (list window appears).

Thunder Max | TMax|Tuner | -Untitled (FileBaseMap (#N/A):0000000000)

File | EFI Maps | Map Editing | Tools | Configure | Monitoring | TMax-AutoSupport | TMax-Trouble Shooting | TMax-ModuleControlCenter | Window | Help

Tuning Maps Tree: Front Cylinder Fuel, Rear Cylinder Fuel, Idle Curves, Air/Fuel Ratio Curves, Ignition Timing VS TPS, Module Configuration, Basic Settings, Diagnostic Codes

Basic Settings

Rev Limit: 8144 rpm
 Cranking Fuel: 0.0 msec
 Comp Release Delay: 2.0 revs

Accel Fuel: 10.0 msec
 Decel Fuel Cut: 0 on/off
 EGO Sensor Type: 1 Narrow Band

Speedo Cal: 40960
 Decel Fuel Cut Rpm Low: 2048 rpm
 Injector Timing: auto close

Idle Rpm: 1024 rpm
 Decel Fuel Cut Rpm High: 2400 rpm
 Comp Release Control: 1 Activated

TAC Home Position: 70 steps
 Decel Post Fuel Enrichment: 16.08 % fuel
 Kick Start Enable: 0 on/off

Final Drive Ratio: 0 units
 Engine temp alarm threshold: 375.09 deg F

Gear 5 Min Tps: 0 tps
 *AutoTune Low Temp: 200 deg F

Initial Fuel Pulse: 199 %
 *AutoTune High Temp: 300 deg F

Buttons: Read Module Settings, Write Module Settings, Close

Verify that the Speedometer Calibration is set for your year motorcycle based on the chart. If it is, click **[Cancel]**; if it is not, enter the correct value and click **[OK]**, then **[Close]** the Basic Settings window. **If your bike doesn't have Automatic Compression Releases (ACR'S) toggle the Compression Release Control to 0 to Deactivate. If this isn't toggled you will get a "1655 ACR low code". Unless it is a CVO model, most bikes prior to 2011 models do not have "ACR's". (Normally on 103" & up)**

Step 6: Now that the Base Map is loaded into the TMax Tuner software; you must **'Write'** (transfer) the Base Map to your ThunderMax ECM. With the communication cable connected, linking to the module is now automatically performed with the TMax Tuner software when the handle bar and key switch are in the on/run positions. Turn the ignition switch on; the red **[Link]** button will turn green to indicate a successful link. Once linked, from the toolbar click **[File] [Write Module Maps and Settings]**, answer **[OK]** to the 'To Running Position' command in the 'Module Configuration Write Options' window that opens. When the system recognizes your motorcycle model through the VIN number entered earlier, you will receive

Step 7: Initialization Procedure

IMPORTANT STEP BEFORE STARTING

This step is required for new module installation, or when interruption of 12v power to the ECM takes place. Example: battery change, removal of battery, ECM or maxi fuse, etc. Turn the ignition switch on with the handlebar rocker switch to the run position for 20 seconds, uninterrupted. After 20 seconds, cycle the ignition switch off, repeat 3 times. Then turn ignition on and start the engine. Let the motorcycle idle on its own for 15 seconds. Cycle the ignition off and 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.



Congratulations!

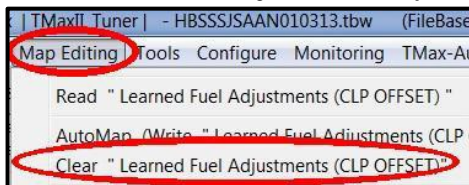
You have successfully installed and set up your ThunderMax ECM. Now it's time to ride the bike and let ThunderMax optimize your EFI system! Several riding sessions that allow the engine to reach normal operating temperature should be completed with as much variation in terrain and RPM as possible. Your ThunderMax customizes your map based on your engine, ambient conditions and your riding habits. For an automatic evaluation of your systems tuning, after several sessions have been logged, you can link to your ThunderMax and select **[TMax Module Control Center]** for a complete analysis of the ***Air Fuel Ratio*** adjustments that have been made. If more optimization is suggested just follow prompts to complete the process.

a prompt that the chosen map has settings applied for either an air or liquid cooled engine; only if the system does not recognize your model through the VIN, the following window will appear: Choose the correct application and click **[OK]**.



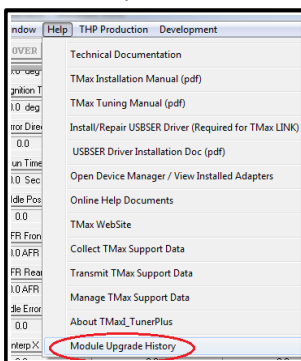
The transfer bar then appears during the map load. Once the Base Map has been written to the module, clear any active Diagnostic Code readings and Learned Fuel Adjustments that may have been created during the live module testing session that each ThunderMax module must pass. While linked, from the Tuning Tree select **[Module Configuration] [Diagnostic Codes]**. When the Diagnostic Codes window appears, select **[Clear Diagnostic Codes]**. After completing this step, proceed to **[Map Editing]** menu on the tool bar and select **[Clear "Learned Fuel Adjustments (CLP OFFSET)"]**.

These steps ensure you will be starting with a "clean slate" Base Map.

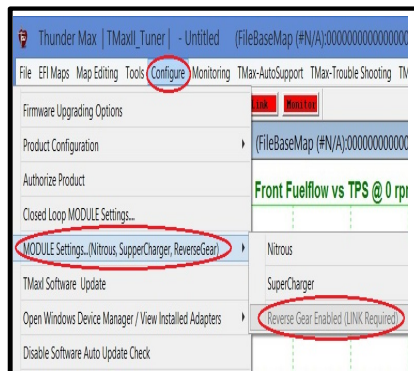


Step 6a: Skip if not a trike or Freewheeler or if your Firmware is version 5.12 or higher (Reverse is controlled by the VIN with newer firmware).

Link to verify firmware version click Help then Module Upgrade History. For reverse; go to the **[Configure]** Tree and then click **[Module Settings, Nitrous, Super Charger, Reverse Gear]** tab to reveal the listed options to choose. While linked (Link button is green) click Reverse Gear enabled option.



Verify firmware version



Toggle on reverse

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. In the future to assist with tech support help, please follow the instructions on performing a data collection to send to our tech support staff via email. This information is valuable to help diagnose any issue.

