

Part 1: Module Installation

THUNDER MAX WAVE-TUNE

#309-589 - 2018 Softail® Models (Mil 8®)

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.

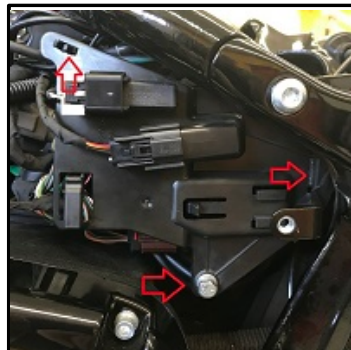
Serial # TM8M _____

Module Installation - Softail® Models

A: Remove both side covers under the left and right side of the seat, to access the factory Electronic Control Module (ECM). Remove the seat for additional space during the installation. Remove the main fuse.



B: Remove bolt, depress tab (upper left), disengage panel from hook at rear, move the small electrical panel towards the front of the bike out of the way.



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

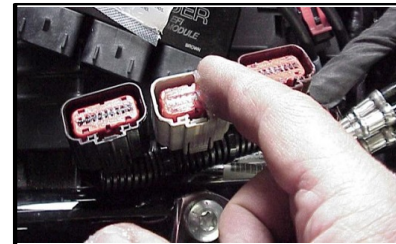
“DISCLAIMER: NOT LEGAL FOR SALE OR USE IN CALIFORNIA ON ANY POLLUTION CONTROLLED MOTOR VEHICLES” The user shall determine suitability of the product for his or her use. Installation and use on a pollution- controlled vehicle constitutes tampering under the U.S. EPA guidelines and can lead to substantial 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



C: Slide ECM towards the front of the bike to remove from the electrical caddy.

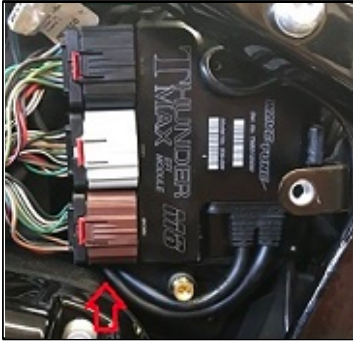
D: A packet of dielectric grease is included with your ThunderMax. When installing the ECM, apply the provided dielectric grease to the inside lip of the 3 ThunderMax ECM connectors to ensure the rubber seals do not bind upon installation, and across the pin casing on the 3 18 pin ECM connectors. Spread the grease across all of the female terminal openings, making sure the grease penetrates openings. This grease will help to maintain vital conductivity with ECM.



E: Apply dielectric grease to the ThunderMax oxygen harness connector female terminals to help maintain vital conductivity, and to the outer housing to prevent binding upon installation to the ECM.



F: Guide the O2 harness flat connector through from the right side of the bike, just ahead of the battery, toward the RCM caddy. Insert the oxygen harness connector into the ECM with the imprinted "ThunderMax" logo facing outward. Tighten the (2) Phillips connector screws. Place the 2 harness leads behind the connector prior to installing the ThunderMax ECM onto the ECM caddy. To install slide the ECM towards the rear of the bike. Install the 3 18-pin connectors, ensuring they are fully seated and latched, slide the red locks back into place.



G: Route the oxygen harness inward and forward towards the engine in front of the battery, protecting for pinching or any other form of damage. Route the harness and both connectors towards the right cowl opening.



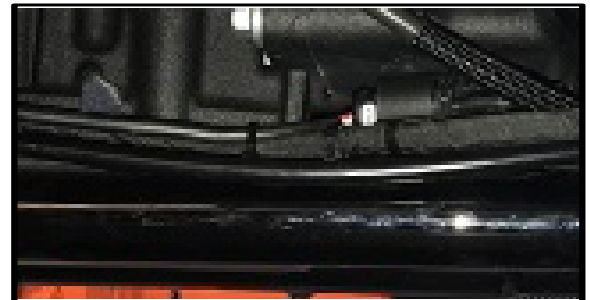
Ha: If not previously done install your new exhaust system or modify stock head pipe (with 18mm oxygen sensor ports). **If done skip Hb.**

Hb: Unplug and remove factory oxygen sensors from the exhaust pipes and factory 12mm plug ports. If retaining factory exhaust headpipes, 18mm bungs will need to be added to the headers 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.

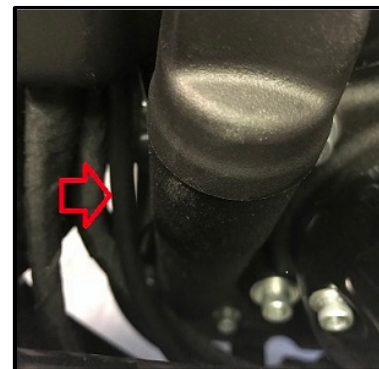
I: Install rear oxygen sensor into head pipe, route the oxygen sensor harness toward the right cowling area. Plug the oxygen sensor connector in to the harness connector, push until you hear a click. Secure the excess wiring and connectors in the cowling area. (pic top of column)



J: Install front oxygen sensor into head pipe, route the harness oxygen sensor to the right front down tube of the frame. Then route along the upper in side area of the lower frame rail.



K: Route the longer Oxygen sensor harness (front) lead behind the plastic cover to the rear of the oil filler tube. Then route along the upper in side area of the lower frame rail towards the front of the bike. Plug the oxygen sensor connector in to the harness connector, push until you hear a click. Secure the harness to the upper side of the lower frame rail. (Make sure to protect from any type of damage (i.e. dragging, hanging, heat etc.)



If you wish to cap off the bike side of the harness connector, protective caps are provided. See Tips and General Information section for further detail.

L: 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 hang, crush and/or cut into the harnesses or connector plugs. Be aware that swingarm movement at full suspension compression reduces the clearance opening at the rear.

M: Re-install the main fuse, side covers and seat.

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.

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. Bungs should be located no more than 3-4" from the head/pipe connection. Weld-in bungs are available in straight or angled style from many industry sources. 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 so.**

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.

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
 - Oil deposits from oil consumption
 - Excessive moisture exposure
 - Excessive (extreme) heat
- 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.

You are ready to proceed to part 2 setup of your system.

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).

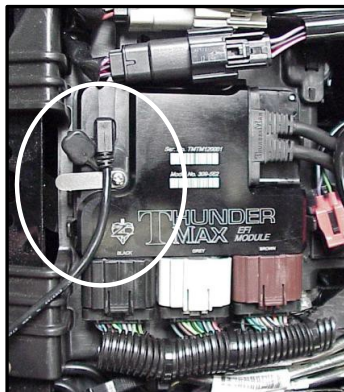
Step 1: Download Software and install software



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

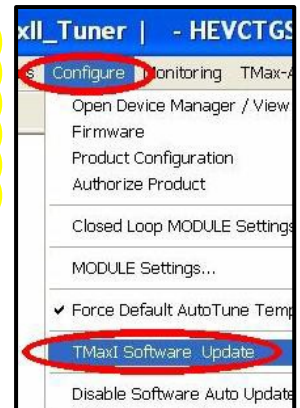
The TMax Tuner software for the ThunderMax EFI systems contains the correct drivers required for USB interface with the ECM. Connect the USB cable to the specific port on your PC that the driver will be configured to and the ThunderMax



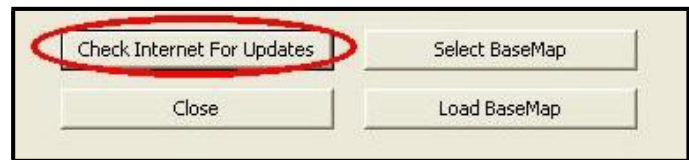
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ECM communication connection located under the retainer plate (loosen retainer screw, rotate retainer plate and open rubber weather seal). Open the TMax Tuner software and turn the bike’s ignition and handlebar switches to the on/run positions. Follow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

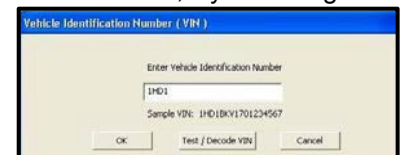


After uploading latest software (if found), next click [EFI Maps] [EFI Map Listings (Throttle By Wire)], double-click any map; when the Base Map Name Encoding window appears, click the [Check Internet For Updates] button and follow the prompts. Close window after updating.



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	EngineT...	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.

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).

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.

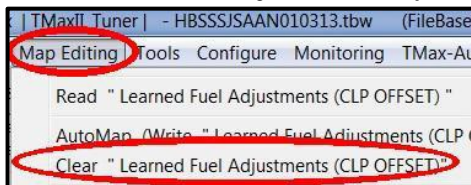


a prompt that the chosen map has settings applied for either an air or liquid cooled engine; only if the system does not recognize your model through the VIN, the following window will appear: Choose the correct application and click **[OK]**.



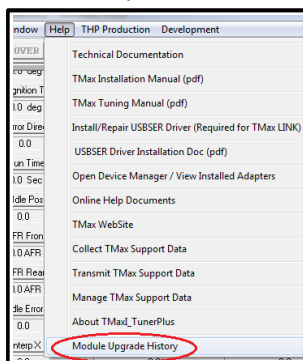
The transfer bar then appears during the map load. Once the Base Map has been written to the module, clear any active Diagnostic Code readings and Learned Fuel Adjustments that may have been created during the live module testing session that each ThunderMax module must pass. While linked, from the Tuning 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.

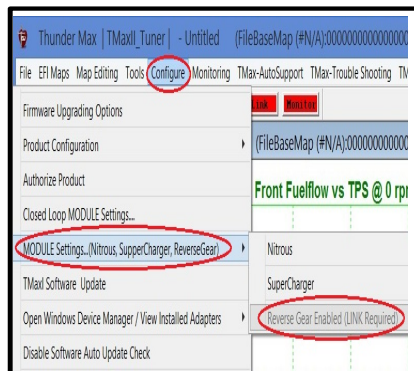


Step 6a: Skip if not a trike or Freewheeler or if your Firmware is version 5.12 or higher (Reverse is controlled by the VIN with newer firmware).

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

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.

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.

