Part 1: Module Installation

THUNDER MAX WAVE TUNE

#309-466 2002-17 V-Rod® Models

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 # TMCM_____

309-466

Install Module

The ThunderMax ECM mounts in the same location as the factory ECM.

2002-2005 MODELS

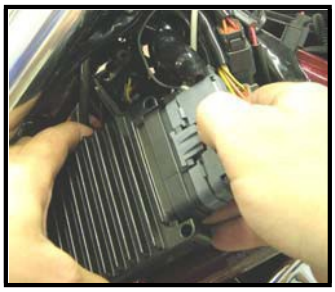
A: Remove the seat, air box cover and front frame side covers to expose the airbox and battery area. Remove the airbox lid with snorkel.

"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

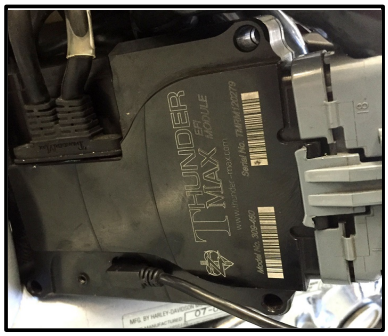
Locate fuse box just forward of the seat and remove fuse labeled "ECM POWER" (center fuse, right side).

Unplug and remove the factory ECM from the motorcycle (located just behind the steering stem).



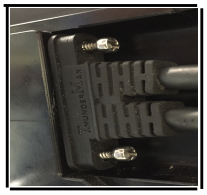
Due to the tight restrictions of the location of the ECM on 2002-2005 model bikes:

Option 1 or 2



The communciation cable can be installed intothe communication port of the ThunderMax attached to the ECM and stored on the motorcycle (how you store / route thecable is up to you, you can run it through the frame and along the airbox housing and store it under the seat or roll it up and store it under one of the side covers), or **Option 2 – (PREFERRED not required)** Install the ThunderMax Pigtail Communication Port Harness (included) and wire it to the ECM harness plug on the motorcycle for an alternate port location.

Once option 1 or 2 is performed, install the ThunderMax ECM to the motorcycle in the stock location. Use dielectric grease on the O2 harness, slip into the harness port in the side of the case and tighten the screws. Use dielectirc grease on the 36 pin connector and a light coat just inside the ECM housing opening for the connector. Plug the main harness into the ECM and reinstall the ECM fuse. Slide the ECM back into the mount carefully route the rear O2 harness up towards the air box, the front can go directly out the side to connect and attach to the front sensor later in the install. Now attach with the ECM to the mount with the original bolts.

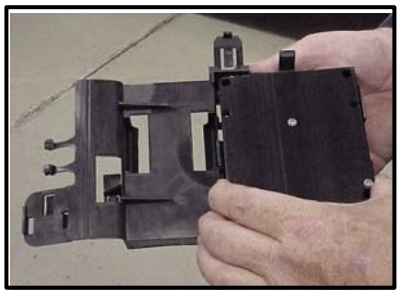



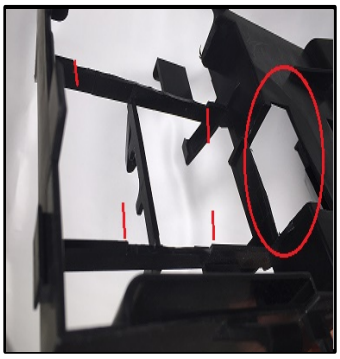

2006-UP MODELS

A: Remove the front and rear seat, air box cover and front frame side covers (2) to expose the airbox and battery area. Remove the airbox lid with snorkel.

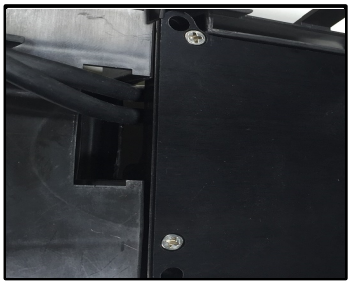
Locate and remove the ECM fuse. Unplug the ECM and remove the ECM with the plastic ECM caddy (unsnap the caddy from the fender). Separate the ECM from the caddy.

Step 2c Trial fit the ThunderMax to the plastic ECM caddy. Note that some parts of the caddy will need to be modified for proper fit. This is easily accomplished with a saw blade.





Slot caddy approx 3/16" deep along the rails to add clearance for the modlue to set full with the bottom of the caddy when installed. Between the 2 ribs in the picture cut out .700 deep of the plastic. As pictured also remove the 1/8" x 1/8" rib at the top side. Cut caddy with a hacksaw blade or similar cutting tool.

Trial fit the ThunderMax ECM into the modified caddy; re- trim as necessary. Re- install the caddy with the ThunderMax ECM and Oxygen harness plugged in and tightened in place.

Plug the ECM main harness into the ThunderMax and reinstall the ECM fuse. At this point you have two options for linking to the ThunderMax with the supplied communication cable:

Option 1 - The communication cable can be installed into the communication port of the ThunderMax ECM and remain attached to the ECM and kept stored on the motorcycle under the seat, or

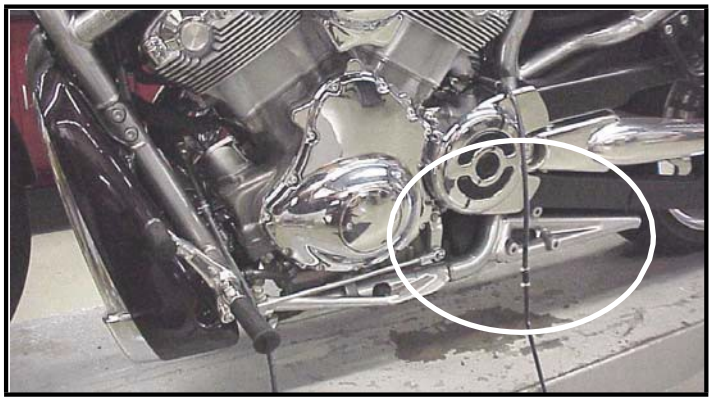
Option 2 – Install the ThunderMax Pigtail Communication Port Harness (included) and wire it to the ECM harness plug on the motorcycle for an alternate port location.

Either of these options will allow you to connect the commication cable to the ThunderMax without removing the passenger seat. Reinstall the passenger seat.

ALL MODELS

Step 2c Install the supplied wide band oxygen sensors into the exhaust pipes. If your exhaust system is not equipped with oxygen sensor bungs, they must be added to the exhaust pipes. The supplied wide band sensors are longer than the factory sensors. Installation of the wide band sensors into factory headpipes equipped with bungs should present no clearance problems, however, some aftermarket 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. Weld-in bungs are available for exhausts systems not equipped with bungs or if current bungs present clearance issues. Bungs should be located no more than 3-4" from the head/pipe connection (for ideal location, refer to the factory location on 2008-up models). Weld-in bungs are widely available from many after market shops. After installation, route the sensor harnesses through to the left side of the bike as shown. 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 7 for further detail.



Route the oxygen sensor harness from the front pipe along the left frame downtube, across to the right side of the frame in front of the cylinder head cover, away from the engine and along the frame when possible.

Plug the O2 sensor harness intotheAutoTune harness plug marked "FRONT".Avoid routing harnesses where engine movement or moving parts can contact and damage the harnesses or connector plugs.

Route the rear oxygen sensor harness between the engine and fuel tank under the seat. The AutoTune harness for the rear cylinder sensor is shorter and can be easily identified by black tracers on all of its wires; both plugs are clearly marked for front/rear use.

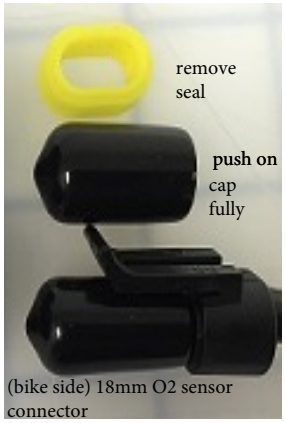
Route the harness along the upper left frame rail and plug the oxygen sensor harness into the AutoTune harness plug marked "REAR". It is very important to install these correctly or the engine will perform poorly! Tie the harnesses to the frame or existing component harnesses, taking care to avoid contact with any vibrating component that may chaff the sheathing or wires. Some disassembly of bike components may be required for best harness routing.

Some riders prefer to remove the airbox lid altogether for increased airflow to the intake. Another option if you chose to leave it on, the "snout" can be removed to increase air flow, with less air noise. With a hacksaw blade or similar cutting tool, cut the airbox snout off the airbox lid. Reinstall the airbox and frame louvered covers.

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

TIPS AND GENERAL INFORMATION

(bike side) 12mm O2 sensor connector



(bike side) 18mm O2 sensor connector

ATTENTION!

Please find the enclosed caps to block off the bike side of the stock oxygen sensor harness connector. There are 2 larger caps for all motorcycles that come stock with the smaller 12mm oxygen sensors. There are also 2 smaller caps for all motorcycles that come stock with the larger 18mm oxygen sensors. Install per the appropriate picture to the left. Disgard the other 2 caps they will not be needed.

Thank you for your purchase of ThunderMax products. For other information visit www.thunder-max.com

IMPORTANT STEP BEFORE STARTING THE FIRST TIME OR AFTER A BATTERY CHANGE

Next, **'Initialize'** the ThunderMax ECM. Initializing synchronizes 'home' positions for the TPS and IAC, and is a required step any time battery power has been interrupted or established to the ThunderMax ECM. **With the handlebar switch in the 'ON' position, cycle the key switch on and off 3 times, leaving the ignition on for 30 seconds, then off for 30 seconds, each cycle.** DO NOT start the engine or move the throttle during this process. After 3 on/off cycles, make certain that the motorcycle is in neutral and start the bike 2 times, letting it settle at idle for 10 seconds; the idle should be smooth and steady. Some engines may require several on/off engine starts to initialize properly. **This initialization process must be performed any time battery power is interrupted to the module (after battery servicing/winterization, etc)**.

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*.

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.

Oxygen Sensor Care - Items that can damage or shorten the life of your sensors: Leaded fuel-racing fuel, oil deposits from oil consumption problems, excessive moisture, Excessive (Extreme heat) heat. There is no warranty on sensors (part # 309-355).

Initializing Instructions

Auto Support Feature

Installing Exhaust Bungs

Part 2: Software Setup Guide

"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

#309-XXX ThunderMax Tuner Software setup / map loading

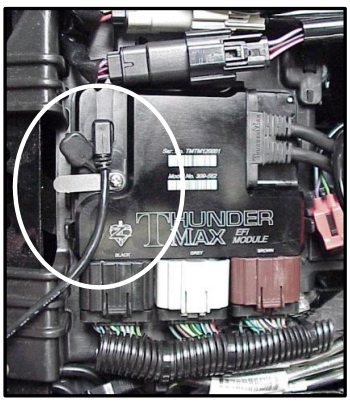
Thank you for purchasing a ThunderMax ECM! Please read through the following instructions before beginning the installation procedure*. Following these instructions will ensure that the ECM setup properly for optimal results. If you have any problems or questions, please refer to the TMax Tuner.pdf Manual, in the software (under the Help Menu).*

Step 1: Download Software and install software

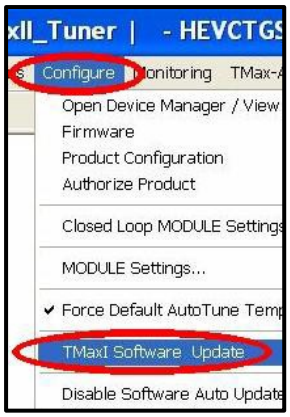
Go to www.thunder-max.com , click on support tab, then software tab, now click TMax Tuner (yellow/top disc) Click save file and then ok, the file will start to download. When completed locate and open the file folder and double click on the setup (Application file or .exe file depends on Windows version). 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 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.



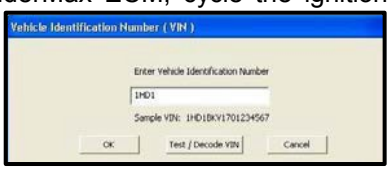
(There is no need to be linked to the module at this time). This section is only to ensure you are working with the latest version of TMax Tuner software and have the most up-to-date selection of base maps. It is suggested that you establish an Internet connection and click **[Configure]** on the tool bar, then **[TMaxI 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]**.

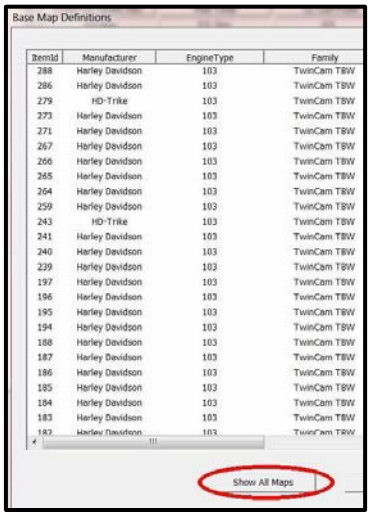
Now click **[Yes]** when the product registration prompt appears. When the product registration window opens, fill in the requested fields then click **[Close]**. Unlink (click green **[Link]** button) and turn off ignition when finished. Once your software and map databases are verified as up-to-date 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).



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.

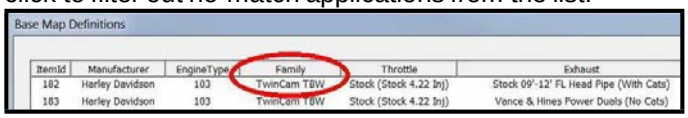
(True) Dual Exhaust: 100% separate exhaust pipes.

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

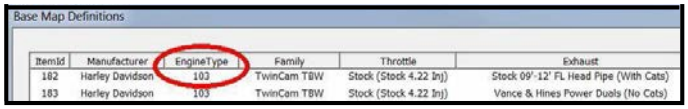
With your Base Map Definitions window open, you may begin narrowing down the list of maps for your application. To sort the map files by a particular key element, left-click on the column heading to arrange the column in alpha/numeric order. All of the columns can be sorted in this manner for filtering 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 curser 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.

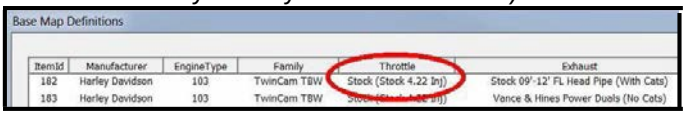


Tip **-** After any filtering, notice that the **[Show All Maps]** button at the bottom left is now selectable. At any time if you want to return to the complete library listing, left-click the **[Show All Maps]** button and you will start over with all Base Map Files in the library displayed.

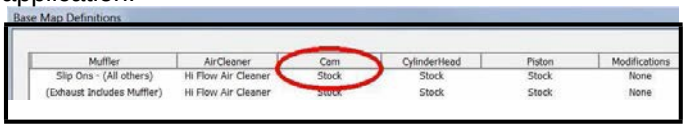
Second, right-click the engine size under **'Engine Type'** that matches your engine. All maps that do not match your selection will be filtered from the screen.



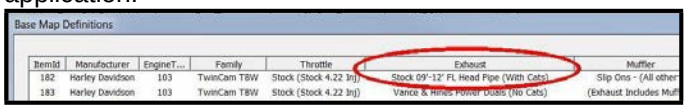
Third, place your curser over the **'Throttle'** column and right click your match (injector size is more important than throttle body size if you have to choose).



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

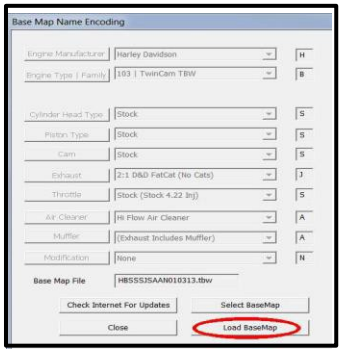


Fifth, right click the **'Exhaust'** that closest matches your application.



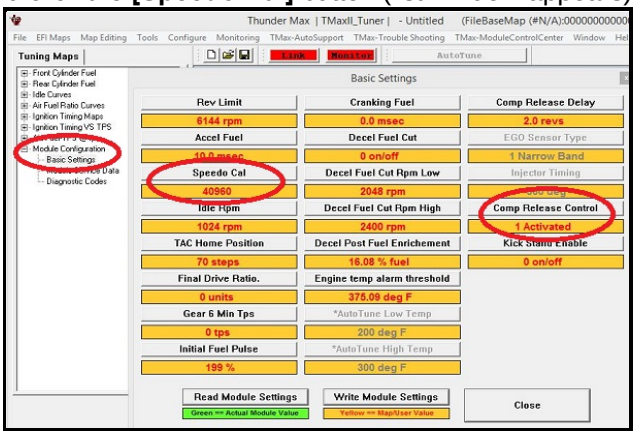
Keep right-clicking the application columns until you have located the best map match (in the case of identical maps, choose the latest date). Highlight the map you've chosen (left-click; blue bar indicates selected map) and click the **[Close]** button.

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).

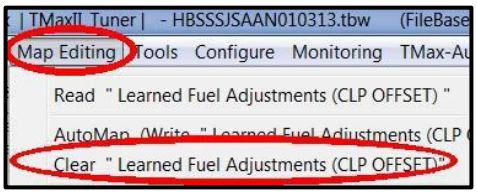


Verify that the Speedometer Calibration is set for your year motorcycle based on the chart. If it is, click **[Cancel]**; if it is not, enter the correct value and click **[OK]**, then **[Close]** the Basic Settings window. ***If your bike doesn't have Automatic Compression Releases (ACR'S) toggle the 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

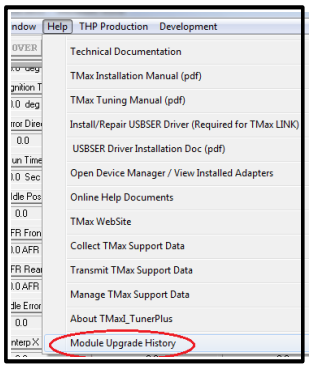
a prompt that the chosen map has settings applied for either an air or liquid cooled engine; only if the system does not recognize your model through the VIN, the following window will appear: Choose the correct application and click **[OK]**.

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.

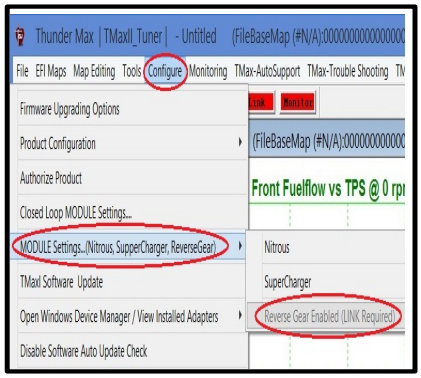


Step 6a: **Skip if not a trike or Freewheeler or if your Firmware is version 5.12 or higher (Reverse is controlled by the VIN with newer firmware).**

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

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 termperature. 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.

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.