Part 1: Module Installation

Video Instructions Available on You Tube



#309-362 2008-13 TBW Touring 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 # TMWM



309-362

Module Installation - Touring Models

A: Install the ThunderMax ECM. Remove seat and both side covers. Push up on the bottom of the fuse box cover to remove the cover (located on the left side of the bike), then remove the ECM fuse from the fuse box.



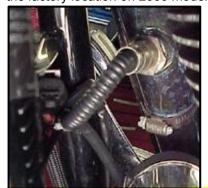
"DISCLAIMER: NOT LEGAL FOR SALE OR USE IN CALIFORNIA ON ANY POLLUTION CONTROLLED

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

B: Remove the stock narrow band sensors from the exhaust pipe. 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!

2008-2009 models: 18mm sensors are located at the top of the head pipe; supplied 18mm wide-band sensors will replace the stock narrow band sensors. Some stock 2008 model rear bung location may cause interference with the transmission lid when using the longer ThunderMax oxygen sensor. If this is the case, crease the pipe next to the bung to change the angle of the sensor for clearance, or relocate the bung for proper clearance. DO NOT pull or pry on the sensor to gain clearance—the sensor will be damaged if you do! 2010-13 models: If retaining factory catalyst-equipped headpipes, 18mm bungs will need to be added to 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

Stock 2010-2013
12mm O2 sensors
are located
downstream on the
factory header pipes,
between the engine

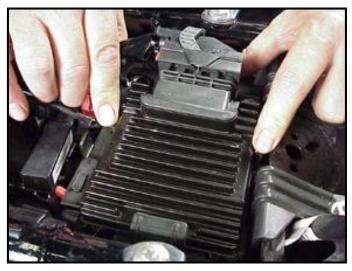
and transmission; unplug and/or remove them as they can affect you ThunderMax systems performance if left plugged in. Stock sensor connectors are located under the bike's right side cover (black and gray plugs). 12mm O2 pipe bung caps are available from many sources. If you wish to cap off the bike side of the harness connector, protective caps are provided. See Tips and General Information section on page 4 for further detail.

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.

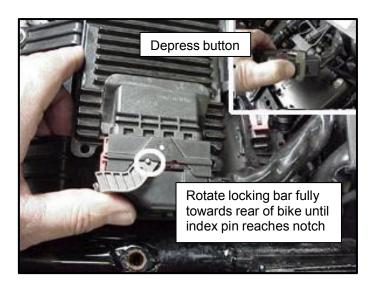
D: Route the rear sensor lead between transmission top cover and the starter, then towards the ABS caddy located under the right side cover. Place the sensor connector under the ABS caddy.



E: Remove factory ECM 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.



F: Disconnect the ECM from the connector as per the following procedure: Depress button on socket housing of the connector; rotate locking bar until it reaches the full rearward position (the index pin on locking bar will engage the rear notch in the socket housing).



The connector internal latches are not fully disengaged until the locking bar on the connector is seated to the full rearward position to complete removal of the connector. If you force the socket housing with latches partially engaged, it will result in damaging the connector. Once index pin is fully seated, with steady yet careful attention, pull apart the connector from the factory ECM and remove it from the motorcycle.

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.



H: If equipped with factory alarm, detach alarm antenna from ECM caddy clip by lifting slightly and sliding to the right of bike (do not disconnect).



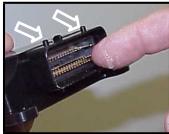
I: Locate the package of dielectric grease included with communication cable. Spread a small amount of grease on the AutoTune harness plug inboard of the mounting flange to allow the plug to easily slide into the ThunderMax ECM, with ThunderMax logo on harness plug facing up. Attach with screws provided.

J: Install main harness connector to ThunderMax

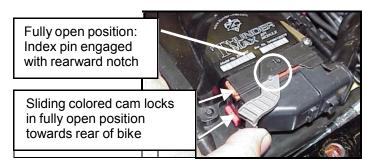


ECM. Before installing connector, lightly spread some dielectric grease on harness connector terminals, and on the inside lip of the connector port opening of the ECM to allow the rubber weather seal in the connector plug to slide into place without binding. Apply a dab of grease to the (2) upper and lower locating pins on the ThunderMax housing as well (arrows). See 'Tips' on page 7 for additional dielectric grease instructions.





Before connecting, verify that the locking bar is in the fully open, rearward position (locking bar index pin is fully engaged with rear notch in the socket housing).



Important Note: If socket housing with grounding pin are not properly aligned during connector installation damage to the grounding pin will likely occur, which will require you to return the ThunderMax ECM for repair to the damaged pin.

Rotate the locking bar forward to engage the connector. Observe that the colored cam locks are moving with the locking bar; proper execution will show both colored cam locks visible in equal amounts on the forward-facing side of the connector when the locking bar is in its fully seated position with the button lock engaged, as in the image below (do not force the locking bar). Index pin will engage front notch in socket housing.

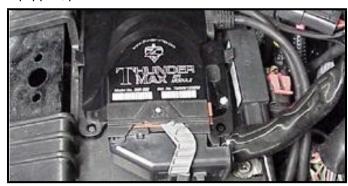


Fully closed position: Index pin engaged with forward notch

Sliding colored cam locks in fully closed position towards front of bike

<u>Important Note:</u> Pin and socket housing of the connector must be fully engaged before you rotate the locking bar to the forward position. Forcing the locking bar forward before the connector is fully engaged will damage the connector and/or the ECM

K: Place the ThunderMax ECM into the ECM caddy. If equipped, position alarm antenna as shown.



L: Connect the oxygen sensor harnesses to the AutoTune harness. 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.

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



N: 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.



O: Re-install the ECM fuse and replace the side covers.

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

TIPS AND GENERAL INFORMATION





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

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.

Below is a brief summary of how we use the ThunderMax system to aid in managing the heat build up in your air cooled and liquid cooled HD® engine.

- 1. We run at a slightly lower engine idle and generate less heat. This also gives you back that true HD® sound.
- 2. As the bike starts to heat up (setting in traffic etc.) prior to an imediate need the check engine light will illmuniate telling you its not urgent, but you need air flow or to shut the bike off soon for it to cool down.
- As the heat starts to build we reduce the engine idle slightly more, once again to generate less heat.
- 4. Utilizing the wide band oxygen sensors, we have the capabilitity to add fuel to help cool the engine.
- With all of the data points available within our system, we can shift into a different area of the timing tables (timing vs temp)

to reduce the timing. Once again will generating less heat.

We are just effecient as the stock bikes with this strategy, but remember it is an air cooled engine, so with no air flow they are all going to get hot.

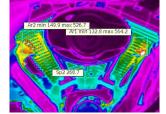
Built in support features

- [TMax-Auto Support tab] Includes <u>links</u> to collect and transmit module information, map data and/or monitor logs (recorded riding sessions) via E-mail directly to TMax support
- [TMax-Auto Support tab] Includes <u>links</u> to TMaxtroubleshooting steps to aid in diagnosing issues, as bikes age and issues with them start to appear.
- [Help tab] Includes comprehensive tuning manual
- [Help tab] Has <u>link</u> directly to Thunder-Max.com website for other support documents and videos

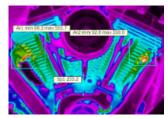
System Updates are available through TMax Tuner with an internet connection. Software, Firmware and Map updates can be downloaded; check frequently for updates.

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.

Interrupting 12v power to the module (battery service/ replacement) requires system to be re- initialized (Setup Sheet 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.



Pic 1: Shows the excessive, high-heat environment in which a typical air cooled H-D[®] engine normally operates - Very uncomfortable for the rider!



Pic2: Shows a ThunderMax[®]AT equipped engine; Note the cooler operating temperature resulting from a properly balanced fuel curve - Much more comfortable for both rider and passenger!

<u>In-Tank Fuel Filters</u> 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.

<u>Fuel pressure should be checked</u> 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.

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 problems
- Excessive moisture exposure
- Excessive (extreme) heat
 There is no warranty on sensors.
 Replacement P/N is 309-355.

H-D® released a Tech Tip (#418) regarding improving conductivity at the throttle body wire connector (TCA) plug. 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.



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 drivers correct required **USB** for with interface 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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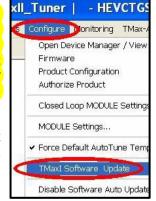
MOTOR VEHICLES" The user shall determine suitability of the product for his or her use. Installation and use on a pollutioncontrolled vehicle constitutes tampering under the U.S. EPA guidelines and can lead to substantial fines. Review your application and check your local laws before installing.

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

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 upto-date selection of base maps. It is suggested that you establish an Internet connection and click [Configure] on the tool bar, then [TMaxl 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 [Check Internet the 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

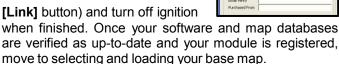
switch to the 'on' Position (be sure kill switch is in the run position) and linking to the ThunderMax



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

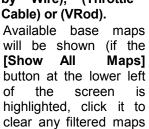
You will be prompted to enter the bike serial number (VIN); answer [OK] and enter your motorcycle's serial number (CAPITAL LETTERS ONLY), click [OK] then [Close].

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



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



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 Key on Elements, this will help narrow quickly

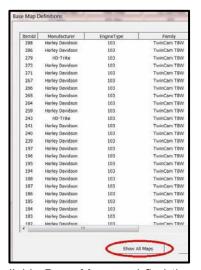


Module Registration

Address1

Module is not registered. Please complete the registation information

Yes No



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, <u>left</u>-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 <u>left</u>-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 <u>right</u>-click to filter out no-match applications from the list.



<u>Tip</u> - 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)

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)"]. | | TMaxIL Tuner | - HBSSSJSAAN010313.tbw (FileBase

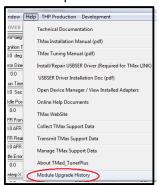
These steps ensure you will be starting with a "clean slate" Base Map. | TMaxIL Tuner | - HBSSSJSAAN010313.tbw (FileBase Map Editing) Tools Configure Monitoring TMax-Au Read " Learned Fuel Adjustments (CLP OFFSET) "

AutoMap (Write " Learned Fuel Adjustments (CLP OFFSET)"

Clear " Learned Fuel Adjustments (CLP OFFSET)"

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.

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.

