THUNDER TMAX
EFI made simple.

Part # 309-464 for *XR1200® Models*

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

Serial # TMRM_____

Oxygen Sensor Installation Tips

Your ThunderMax kit includes robust Bosch Wide-Band oxygen sensors that report data from every cylinder combustion event to the ThunderMax ECM for automatic air/fuel corrections. These sensors replace the factory supplied narrow-band sensors and in most cases are direct bolt-in replacements. Installation of the wide band sensors into most bung-equipped headpipes presents no clearance problems; however, some pipe brands 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 exhaust 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). Weld-in bungs are available in straight or angled style from many industry sources; see video installation link on page 8.   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. <mark>**Remove any previously installed ancillary tuning device including oxygen sensor eliminators that may be plugged into the factory oxygen sensor harness.**</mark>

Step 1 Insert the TMaxII CD into your computer. TMaxII will automatically open the InstallShield Wizard when the computer finds the CD-Rom. Follow the instructions and install the software on your computer.

All Models - A packet of dielectric grease is included with your ThunderMax. When installing the ECM, apply the provided dielectric grease to the inside lip of the ThunderMax ECM to ensure the rubber weather seal does not bind during installation and across the clear case on the 36 pin ECM connector. Spread the grease across all of the female terminal openings, making sure the grease penetrates openings. This grease will greatly improve vital conductivity between the ThunderMax and the 36 pin connector.

Also apply dielectric grease to the ThunderMax oxygen sensor harness connector terminals for improved conductivity, and to the outer housing to prevent binding upon installation to the ECM.

Step 2a Remove the seat and seat pan assembly. Remove the left side cover, exposing the main fuse panel. Remove the main fuse.

Step 2b Remove the (3) bolts that attach the steel frame bracket to the frame, exposing the factory ECM.


Step 2c Remove the lower inner fender bolt and allow the inner fender to rest on the rear tire. Unplug and remove the factory ECM from the inner fender.

Step 2d Install included ThunderMax Pigtail connector #309-424 to 36 pin ECM connector per instructions.

Step 2e Remove the inner fender and trim the plastic as shown to provide clearance for the ThunderMax oxygen sensor harness.
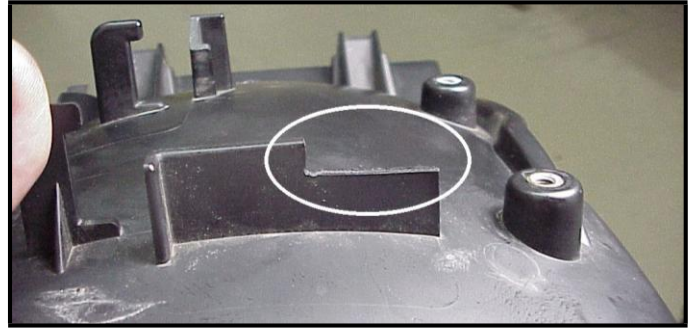

Step 2f Unplug and remove factory O_2 sensors; use supplied caps to cover factory bike O_2 harness connectors. Route ThunderMax front oxygen sensor harness through gap between swingarm and frame. It's a tight fit; turn connector so that locking tab boss faces forward and open plug area faces to left side of bike and it will slide through. Feed connector under transmission.


Step 2g Route front O_2 sensor from under transmission through gap between lower frame rail and primary cover, along frame rail to front exhaust pipe. Carefully wind O_2 sensor harness 3-4 turns counterclockwise before installing into exhaust pipe; turn clockwise while installing to unwind harness. Connect harness plug under transmission.

Step 2h Route ThunderMax rear O_2 sensor between left frame rail and oil tank. Install O_2 sensor into rear exhaust pipe and connect plug.
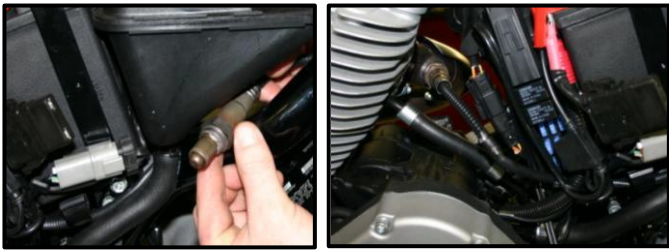
Step 2i Position ThunderMax O2 harness plug to approximate ECM location. After applying dielectric grease to connector, install harness to ECM with imprinted "ThunderMax" logo facing up. Tighten the (2) Phillips connector screws.
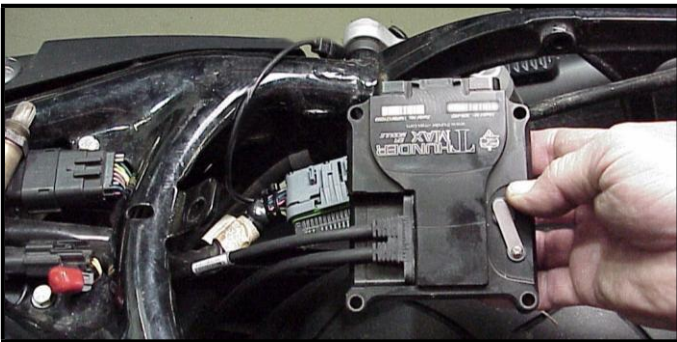
Step 2j After applying dielectric grease, carefully connect ThunderMax ECM to the 36 pin harness plug, ensuring that the harness plug weather seal does not roll out or get pinched during assembly; firmly press the plug and ECM together until latched completely. Install the ThunderMax ECM to the inner fender; tie oxygen sensor harnesses to the frame or existing component harnesses, taking care to avoid contact with any vibrating component that may chaff the sheathing or wires. Route the pigtail connector plug to gap just forward of the right shock absorber for access to the communication cable. Re-install the steel frame bracket. Re-install main fuse, seat and seat pan/fender assembly.


Map Loading & Set-Up

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

Step 3 - Programming the ThunderMax ECM

Now it's time to turn your attention back to your computer. Open your TMaxII Tuner software. There is no need to link to the module at this time. To ensure you are working with the latest version of TMaxII Tuner software and have the most up-to-date selection of base maps, it is suggested that you establish an Internet connection and click **[Configure]** on the tool bar, then **[TMaxII Tuner Update]** and follow the prompts.
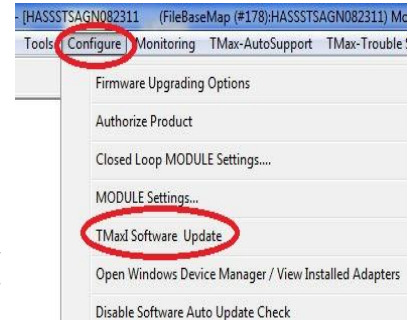
After uploading new software (if found), next click **[EFI Maps] [EFI Map Listings (Throttle Cable)]**, double-click any map; when Base Map Name Encoding window appears, click the **[Check Internet For Updates]** button and follow the prompts. Close window after updating.

Loading Interface Drivers and VIN Number

Next, the TMaxII Tuner software for the ThunderMax EFI systems contains the correct Windows® drivers required for USB interface with the ECM. Connect the USB cable **to the specific port on your PC that the driver will be configured to**, and to the ThunderMax ECM pigtail connection port located just forward of the rear shock absorber. Open the TMaxII Tuner software and turn the bike's ignition and handlebar switches to the on/run positions. Follow the prompt instructions for installing the driver. Next, go to the menu bar and select **[Tuning Maps] [Module Configuration] [Module Service Data]**. Under the Module Information tab, click **[Edit VIN/SRN]** and enter your motorcycle's serial number in **CAPITAL LETTERS**, click **[OK]** then **[Close]**. Turn off ignition; once your software, map databases and USB driver are verified as up-to-date, move to selecting your base map.

Selecting A Base Map File from the Database

*Note: The map selection process for this ThunderMax is the same as the original ThunderMax system; if you are familiar with the map selection process, select your map and proceed to Initializing (step 7, page 5). **If you***

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

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

Available base maps will be shown (if the **[Show All Maps]** button at the lower left of the screen is highlighted, click it to clear any filtered maps so all maps will be shown).
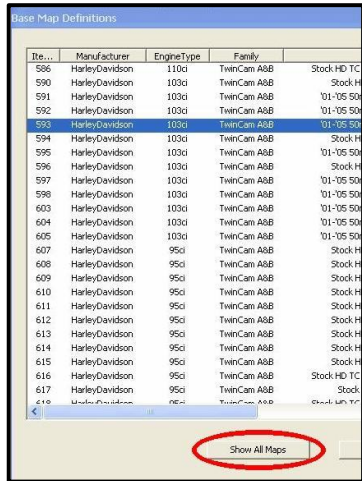
You will now be able to select the closest Base Map for your engine combination. Please read the following section on Key Elements before proceeding; this will help you quickly narrow down the selection of available Base Maps and find the right one for your application.

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

Engine Size. A correct match to the engine's stroke is more important than an exact match of engine displacement. Stroke and cam timing influence engine pumping pressures. The correct shape of spark curves in the base map will be best matched by engine stroke.

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

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

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

results. Group your exhaust system in one of the following three categories:

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

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

True Dual Exhaust: 100% separate exhaust pipes.

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

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

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 to **'XR'**® and right-click to filter out non-XR® applications from the list. **_Tip -_** 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, select the **[Show All Maps]** button and you will start over with all Base Map Files displayed.
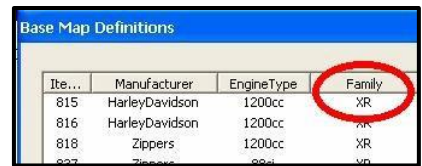
Second, right-click the engine size under **'Engine Type'** that matches your engine. All maps that do not match your selection will be filtered from the screen.

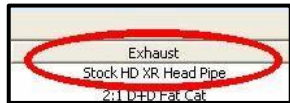**Third**, place your curser over the **'Throttle'** column and right click your match (injector size is more important than throttle body size if you have to choose).

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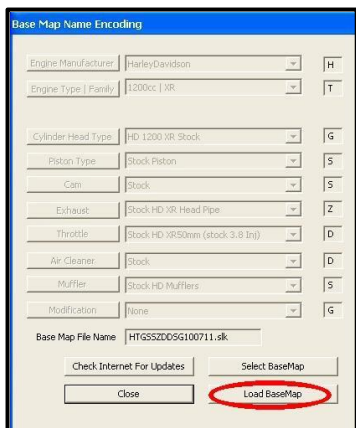
Note - If you're still unsure of which Base Map to select, please email the specifications of your Key Elements to Support@Thunder-Max.com. Please title the email "Base Map Selection" for a faster response.

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

Verify that the Speedometer Calibration is set for your year motorcycle based on the chart below. If it is, click **[Cancel]**; if it is not, enter the correct value and click **[OK]**, then **[Close]** the Basic Settings window.

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With the communication cable connected, linking to the module is now automatically performed with the TMaxII Tuner software when the handle bar and key switch are in the on/run positions. The red **[Link]** button turns green to indicate a successful link.

Once linked, from the toolbar, click **[File] [Write Module Maps and Settings]**, answer **[OK]** to the message that informs you that you are about to overwrite the current map in the module; the transfer bar 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.

IMPORTANT STEP BEFORE STARTING

Step 7 - Initialization Procedure

This procedure allows the ThunderMax to "learn" the "home" position for the Idle Air Control (IAC) motor. This is the only setting within the system that is not retained during 12 volt power interruption. Required for new module installation, or when interruption of 12v power takes place. Example: battery change, removal of maxi fuse, etc. Turn the ignition switch on and the handlebar rocker switch to run (without starting the engine) for 30 seconds, uninterrupted. Cycle the ignition switch off for 30 seconds **(time it)** and then back on for 30 seconds. **Repeat the 30 on / 30 off cycles three times;** after the 3rd off cycle, start the engine. Let the motorcycle idle on its own for 15 seconds. Cycle the ignition off, then restart the motorcycle; normal idle speed should be attained depending on engine temperature. Warm-up cycle will have slightly elevated idle speed (approximately 1200 rpm) until engine reaches operating temperature. To disconnect from the PC, click the Unlink button (turns to red), remove the USB cable and install the supplied rubber weather seal plug over the pigtail cable port. Position the retainer plate over the weather seal and tighten the retainer plate screw.
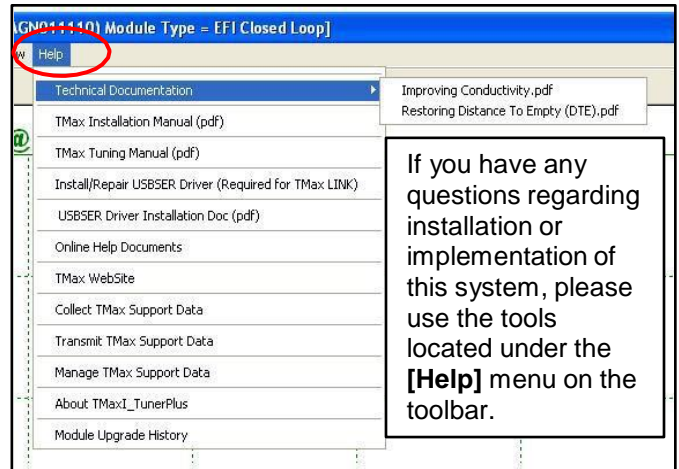
*If during this process you encounter wandering or unstable idle, the map selected may not be the best match for your application, or a mechanical problem may be present on your motorcycle. Please contact Product Support (from your toolbar, select **[TMax AutoSupport] [Collect TMax Support Data]** and follow the prompts*

(Internet connection required). This process copies your map and adjustments and automatically transmits the data to Product Support for evaluation.

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

Need Help?

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

If you have any questions regarding installation or implementation of this system, please use the tools located under the **[Help]** menu on the toolbar.

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

TIPS AND GENERAL INFORMATION

- **Several support features** are located under the [**Help**] menu:
    - A comprehensive tuning manual
    - Links to allow transmission of module and map data via E-mail directly to ThunderMax support
    - Links to allow transmission of monitor logs (recorded riding sessions) via E-mail directly to ThunderMax support (see video link page 8)
    - Links to Thunder-Max.com web site for support documents and videos

- **Enter your VIN (motorcycle serial number)** into your module as described in Step 3 to allow your ThunderMax to be compatible with H-D®'s Digital Tech as well as certain H-D® add-ons such as accessory speedometers.

- **System Updates are available** through TmaxII with an internet connection. Software, Firmware and Map updates can be downloaded; dealers, tuners and end users should check frequently for updates.

- **TMax-ModuleControlCenter** provides a snapshot of AutoTuned fuel flow adjustments, RPM time logs in increments of 100 RPM's, engine temperature logs and diagnostic codes. Valuable information about the condition of your tune and how you ride. **AutoMap**, located within the **[TMax-ModuleControlCenter]**, creates a custom base map based on AutoTuned fuel flow adjustments. Create a custom base map with just a few clicks!

- **International (non-US) model notes –** ThunderMax does not support active intake/exhaust functions or Jiffy stand safety switch.

- **When the TmaxII program is opened,** it will automatically retrieve and open the last map that was open.

- **Any time you link to your motorcycle:** *Read* the map that is installed in the ThunderMax ECM by selecting **[File]** then **[Read Module Maps and Settings]** on the TmaxII toolbar. This will synchronize the map file loaded into the ThunderMax ECM with the TmaxII software.

- **AFR Correction vs. Engine Temperature** page is used to adjust warm-up AFR's. If the engine requires more fuel during warm-up (start to 200°), use this function to adjust. See TmaxII Tuning Manual for procedures.

- **AFR vs. Engine Temperature** - During warm-up, the AFR on both cylinders will show richer than the target AFR at operating temperatures; this is a normal part of the warm-up map. No permanent changes to AFR targets and adjustments are made below 200 degrees. See TmaxII Tuning Manual for applications and procedures.

- **Air/Fuel-TPS @ RPM** These pages reflect desired targets of AFR to throttle position at every 256 RPM. Example: if you desire a leaner mixture for added fuel economy then you can easily enhance multi-tiered AFR targets at specific throttle positions and RPM's that will be learned during closed loop processing. When these pages are open, you can view the target AFR by clicking on a dot and tapping the space bar to view the target at a specific throttle position for that RPM. Use arrow keys to raise/lower targets.

- **Interrupting 12v power** to the module (battery service/replacement) requires system to be re-initialized **(Step 7).** Check battery terminal tightness as part of routine service (like during oil changes); avoid stacking accessory power leads onto main battery cables. If equipped with dual battery post ports, connect accessories separately.

- **When a new map is installed** any existing learned fuel adjustments need to be cleared **[Map Editing] [Clear Learned Fuel Adjustments]**. Linking or editing an existing map within the module does <u>not</u> require above steps.

- **System Updates are available** through your software with an internet connection **[Configure] [TmaxII Software Update]**. Software, Firmware and Map updates can be downloaded; check frequently for updates.

- **In-Tank Fuel Filters** should be inspected as a part of routine maintenance. The filter is small and one bad load of fuel can compromise it. The factory recommended service interval is 25K miles.

- **Fuel Pressure Should Be Checked** during periodic service; this is also the first thing to check should you experience sudden or gradual decreasing performance. For any EFI system to operate properly, your fuel system should build and maintain 55-62 PSI of fuel pressure; your dealer can perform this simple test quickly.

- **Save your edited maps** to your hard drive using the **[Save As]** command. Document the changes in **[Map Notes]** located under **[EFI Maps]** on the toolbar. These notes are stored with the saved map; remember to edit them when making changes for future reference.

- **Oxygen Sensor Care:** Items that can damage or shorten the life of your sensors:
  - Leaded fuel – Race fuel   Oil deposits from oil consumption problems
  - Excessive moisture exposure   Excessive (extreme) heat
  - There is no warranty on sensors. Replacement P/N is 309-355.

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

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

Auto Support   How T-Max Works   Installing Exhaust Bungs