

## Part 1: Module Installation



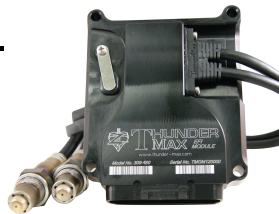
**WAVE TUNE**

**#309-460 for 2001-2010 Softail®,  
2002-2007 Touring®, & 2007-2009 XL®**

**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 # TMRM \_\_\_\_\_

309-460



### All Models - Oxygen Sensor Installation Tips

ThunderMax kit includes robust 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 first used on 2007-2010 bikes and in most cases are direct bolt-in replacements. 2001-2006 models will require the addition of 18mm sensor bungs to the exhaust header pipes if yours don't currently have them installed. 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 2007 factory location). Weld-in

**"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](http://www.p65warnings.ca.gov) for details

bungs are available in straight or angled style from many industry sources. 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 harness 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. **Remove any previously installed ancillary tuning device including oxygen sensor eliminators that may be plugged into the factory oxygen sensor harness.**

**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 help to maintain vital conductivity between the ThunderMax and the 36 pin connector.



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



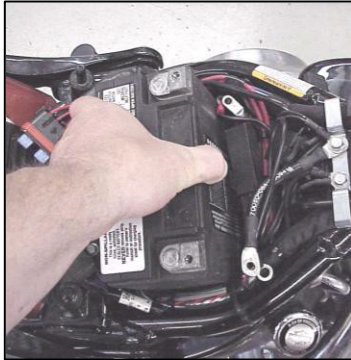
## Module Installation - Softail® Models

*(Skip ahead for other models)*

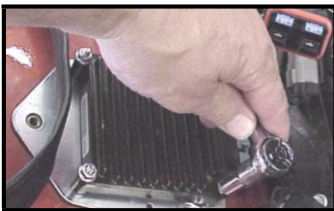
**FX/FLST-A:** Remove the seat to access the factory Electronic Control Module (ECM). Slide the fuse box to the left to release it from the plastic bracket. Open the fuse box and remove the main fuse.



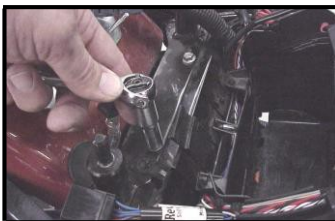
**FX/FLST-B:** Remove the battery cables (negative first) and remove battery from the motorcycle. **Remove any previously installed ancillary tuning device including oxygen sensor eliminators that may be plugged into the factory oxygen sensor harness.**



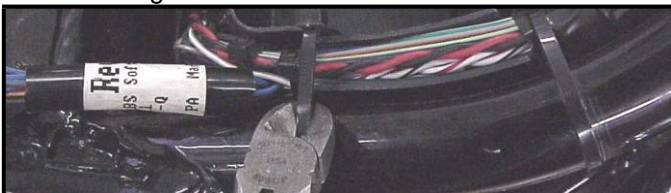
**FX/FLST-C:** Remove the (4) mounting nuts holding the factory ECM in place and lift the ECM from the mounting bracket. Depress the latch on the main connector and remove the factory ECM from the wiring harness.



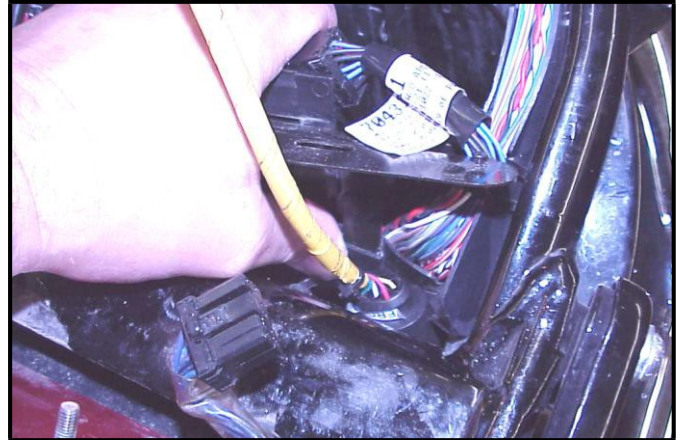
**FX/FLST-D:** Unplug the tail light harness connector plug. Remove the (2) bolts holding the steel fuse box mounting bracket (and seat support for FLSTSB models; temporarily remove the support bracket only).



**FX/FLST-E:** Clip the right rear wire tie holding the harness trough to the frame as shown.



**FX/FLST-F:** Lift the steel fuse box mounting bracket to expose the rear of the plastic battery tray / wiring caddy. Firmly push the caddy forward to create space needed to feed the "Front" ThunderMax oxygen sensor harness (shown in yellow) connector through the opening between the frame and the caddy, exiting behind the right wing of the oil tank.

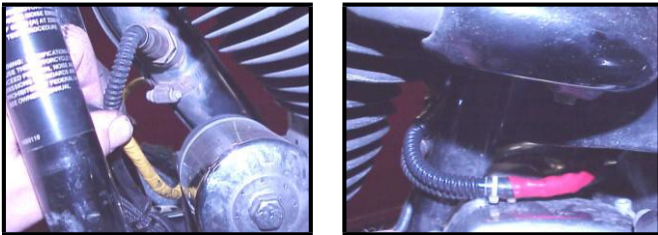


**FX/FLST-G:** Install the ThunderMax ECM onto the ECM caddy studs without nuts; insert the oxygen harness connector into the ECM with the imprinted "ThunderMax" logo facing up. Tighten the (2) Phillips connector screws. Lift ECM and install main 36-pin connector, ensuring it is fully seated and latched. Replace ECM onto studs.

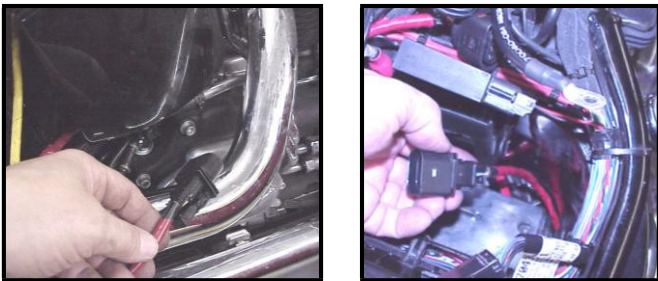


**FX/FLST-H:** Unplug and remove factory oxygen sensors from exhaust if equipped (rear sensor plug located under oil tank). If you wish to cap off the bike side of the harness connector, protective caps are provided.

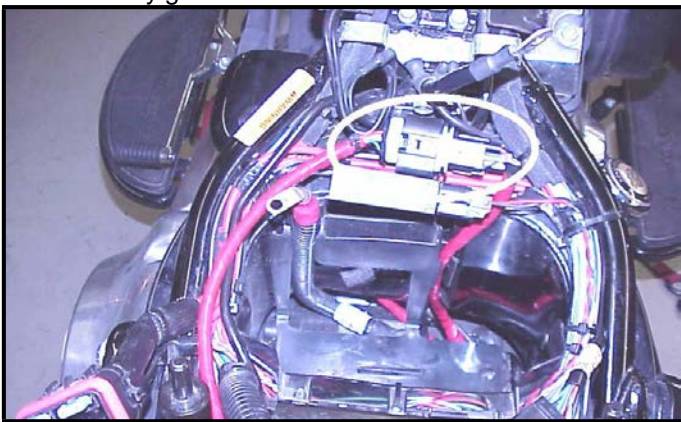
See Tips and General Information section on page 5 for further detail. Install both ThunderMax oxygen sensors into exhaust pipes and tighten.



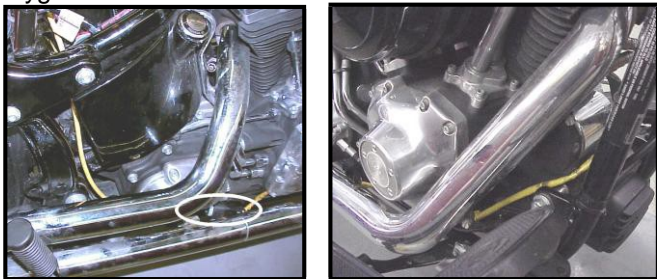
**FX/FLST-I:** Route rear sensor harness under oil tank, feeding connector plug up through opening in the right front bottom of the battery cavity in the oil tank.



**FX/FLST-J:** Position rear oxygen sensor harness connector on top of oil tank, just forward of the battery under battery ground cable as shown.

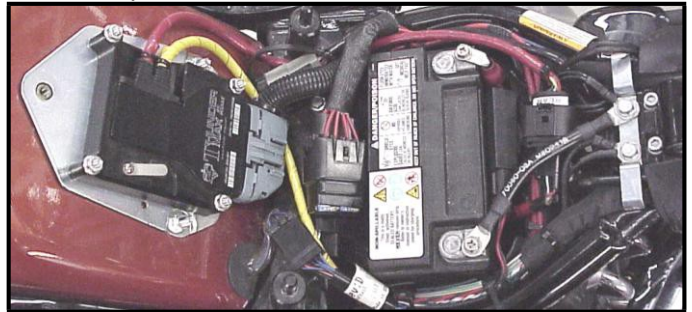


**FX/FLST-K:** Route front oxygen sensor harness behind and under transmission with connector plug just under the engine/transmission mounting boss; connect to front oxygen sensor.



**FX/FLST-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 contact and cut into the harnesses or connector plugs. Be aware that swingarm movement at full suspension compression reduces the clearance opening at the rear of the oil tank where the front oxygen sensor harness is routed (tie harness inboard of swingarm).

**FX/FLST-M:** Install steel fuse box mounting bracket (with seat support for FLSTSB models). Install the (4) ECM mounting nuts, plug in the tail light harness plug, re-install the battery (positive cable first). **Re-install the main fuse.** Replace the fuse box cap and attach the fuse box to the plastic fuse box bracket.



### Module Installation - Touring Models

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

**FL-A** Remove the factory oxygen sensors (if equipped) and install supplied Wide-Band sensors into exhaust pipes. Rubber caps are included to cap off the factory oxygen harness connectors on 2007 models (see page 5).



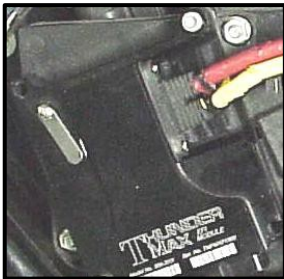
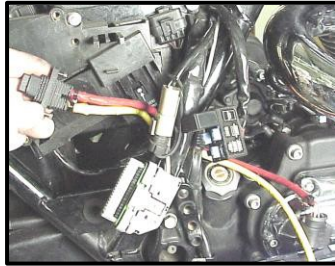
**FL-B:** Remove the right saddlebag and side cover from the bike. Locate the fuse box that contains the ECM fuse, remove fuse labeled "ECM POWER". Depress tab on main ECM harness plug and unplug the ECM wiring harness from the factory ECM.



**FL-C:** Remove the factory ECM from the motorcycle, the ECM is held to the electrical caddy by socket head cap screws. The screws have a locking agent on them and can be difficult to remove.

Work the screws back and forth slowly to break them loose. If the screw and brass threaded insert turn together in the plastic, use a socket on an electric or air impact driver to spin them as a unit; the heat generated will release the thread glue.

**FL-D:** Route the AutoTune harnesses through the frame opening behind the transmission before positioning the ECM for installation.

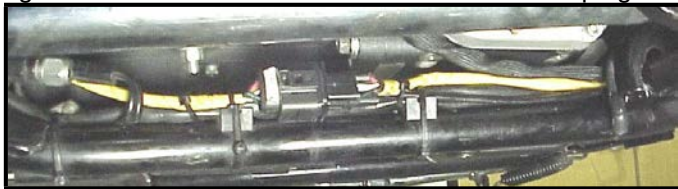


**FL-E:** Insert the greased oxygen harness connector into the ECM with the imprinted "ThunderMax" logo facing up. Tighten the (2) Phillips connector screws. Install the ThunderMax ECM to the ECM caddy using original screws.

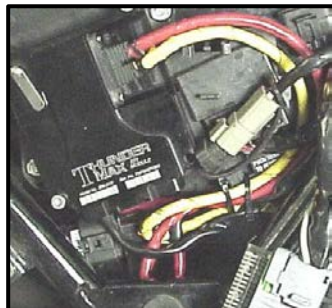
**FL-F:** Route oxygen sensor lead from rear pipe under starter and through frame opening behind transmission; connect to 'rear' ECM O<sub>2</sub> harness plug. Route front harness through frame opening and behind oil filler spout. Position connector along lower frame rail between engine and transmission.



**FL-G:** Route oxygen sensor lead from front pipe along right frame rail and connect to 'front' O<sub>2</sub> harness plug.

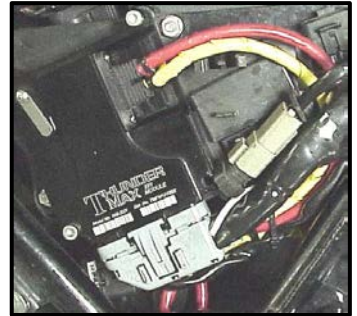


Securely tie all harnesses to the frame and/or other harnesses with supplied wire ties. Avoid sharp turns while routing harnesses and avoid areas where engine movement, sharp edges, exhaust systems or hot engine components can contact and cut into the harnesses or connector plugs. Bundle excess



harness together and tie to ECM caddy where it will be unaffected by swingarm movement and other moving components.

**FL-H:** Connect the greased 36-pin ECM connector to the ThunderMax ECM. **Re-install the ECM fuse** and secure the fuse box back into position on the ECM caddy. Move to Part 2: Software Setup.



### Module Installation – 07-09XL Models

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

**XL-A** Remove the factory oxygen sensors and install supplied Wide-Band sensors into exhaust pipes. Rubber caps are included to cap off the factory O<sub>2</sub> harness connectors (see page 5).



**XL-B** Remove the left side cover, locate and remove the ECM Power fuse. Remove the seat, unplug and remove the factory ECM. Feed the ThunderMax oxygen

sensor harness and 12-pin ECM connector between the battery and frame as shown.

**XL-C** Insert the greased oxygen harness connector into the ECM with the imprinted "ThunderMax" logo facing up; tighten the (2) Phillips connector screws. Connect the greased 36-pin ECM connector to the ThunderMax ECM and install the ThunderMax to the ECM caddy. **Re-install the ECM fuse.**



**XL-D** Route the front oxygen sensor lead along the left front frame tube to under the fuel tank as shown. Route the front ECM O2 harness from



the battery area along the frame backbone under the left side of the fuel tank and connect to the sensor. Connect the rear sensor lead to the rear ECM O2 harness and carefully bundle the excess harness and attach to the frame backbone above the starter. Securely tie all harnesses to the frame and/or other harnesses with supplied wire ties. Avoid sharp turns while routing harnesses and avoid areas where engine movement, sharp edges, exhaust systems or hot engine components can contact and cut into the harnesses or connector plugs.

### IMPORTANT STEP BEFORE STARTING

#### 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. It is required only 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 3<sup>rd</sup> 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. Use provided rubber dust cap to protect the open end of the mini USB Pigtail while not in use.

## 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.*

Please 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.



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

**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 (see setup part 2 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.

**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.

**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).

**02-07 FL with stock (Y) head pipe:** These head pipes are bad about allowing reversion of fresh air being pulled in and affecting the O2 readings. A simple adjustment for this issue is to take a 1 5/8 freeze plug (Dorman 555-030) and drill a 5/8" hole in the center. Remove your left muffler install the modified freeze plug flush with the end of the left head pipe. When you reinstall your muffler insure the clamp is over the freeze plug area to clamp it into place.

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