

# Adding AutoTune To Your THUNDERMAX Equipped Motorcycle

Before you start the installation of the ThunderMax EFI AutoTune closed loop system, **you must first verify that you are using the latest version of the SmartLink software and the latest ThunderMax Firmware.** A software disc is included in this package for installation in your computer; firmware updates require an internet connection.

## SOFTWARE INSTALLATION

To install the software onto the computer system, take the following steps:

1. Exit any programs that are currently running.
2. Insert the SmartLink software disc into the CD-ROM drive.
3. SmartLink will automatically begin the installation process.

*If the software does not automatically begin to install, double-click on the “My Computer” icon. Then double-click on the CD-ROM drive. Finally, double-click on the file named “setup.exe.”*

4. The SmartLink Installation Wizard will now guide you through the rest of the installation.
5. Once the SmartLink software is loaded onto the computer, the authorization code will need to be entered before SmartLink will properly open. Enter the code **85MDN1ZJXXPF-4** and the SmartLink will be available for use. Entering the unlock code above only needs to be completed once, when SmartLink is first installed.

The install wizard **will not** install the Instructions Document or the included Base Map file; these must be manually viewed by accessing the CD-Rom and opening the CD.

To view the software version on your computer, select **[Help] [About SmartLink]** to read the current installed version. To read the firmware version in your module, perform the same task while linked to the module (as described in the manual). If your module firmware is not 4.2 or higher, proceed to the enclosed instruction page titled “Updating Your ECM Firmware”. Software, firmware and base map updates are accessible with a broadband internet connection from within your SmartLink program. It is suggested to check periodically and update whenever new programs are available.

To access updates while in SmartLink:

**Software** – Choose **[Configure] [SmartLink Update]** and follow the prompts.

**Firmware** – Choose **[Configure] [Firmware ► Check For Firmware Upgrade]**

**Map Definitions** – Choose **[EFI Maps] [EFI Map Listings / Definitions]**, then select **[Update Definition File]**. Note that this function only updates the available map definitions (descriptions), not the maps themselves. Maps are accessed from this window (requires internet connection for map downloads).

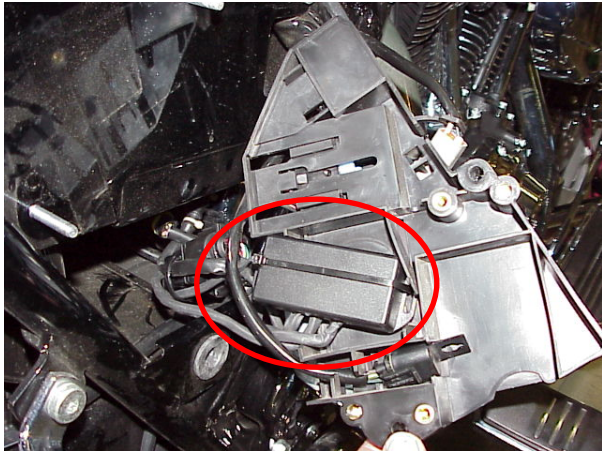
## INSTALLING HARDWARE

Install supplied wide band oxygen sensors in the front and rear exhaust pipes. If your bike is a 2006 FXD or 2007 (all) model, remove the factory narrow band sensors and install the wide band units in the stock location. If the exhaust system you are using is not equipped with oxygen sensor bungs, bungs will need to be added to the exhaust pipes. Bungs must be located within 4"-6" from the cylinder head. Route the sensor harness away from the engine.

On touring models, attach the closed loop module on the back side of the ECM mounting caddy. On FXD models, use the back side of the battery box. Softail® models, mount the module under the seat, in the forward pocket of the battery. To mount the closed loop module, secure with wires ties supplied.

Connect the sensors to the closed loop module. The sensor wiring harness for the rear cylinder sensor is shorter and can be easily identified by black tracers on all of its wires. It is very important to install this correctly or the engine will perform poorly!

Plug the closed loop module into the power source (Data Link) on the bike. It is through the data port that data from the AutoTune module is transferred to the ThunderMax. A 'Y' harness is available to keep an open data port if desired.



Typical Touring bike installation. Mount module to the back side of the ECM caddy using a wire tie or 2-sided tape.



Typical Softail® installation. Mount in the forward pocket on the top of the battery, secure with 2-sided foam tape.



## Upgrading Your ThunderMax ECM Firmware

A firmware upgrade is available for ThunderMax modules, version 3.2 and higher. To identify your version, simply look for the number located near the 36 pin harness connector. Version 1.3, 1.4, 2.1 and 3.1 modules will have to be returned to Zipper's to have the firmware upgraded. 3.2 or higher version modules can be updated with an internet connection through Smartlink software.

To perform the upgrade, you will need **SmartLink IV** (available from [www.thunder-max.com](http://www.thunder-max.com)) software version **2006.16.3** or higher. To view your current computer software and module firmware, open SmartLink and link to the module. Go to the tool bar and select **Help** / **About SmartLink** to view the current firmware in the module and your current computer software version.

If your software needs upgrading, select **Configure** / **SmartLink Update** and follow the prompts to complete the upgrade. It will require broadband access to download the file. If you do not have access to broadband, call us and we will mail you a disc.

Once you have completed the software upgrade, you are ready to upgrade the firmware in the module. Select **Configure** / **Firmware** / **Check for Firmware Update** to view available firmware updates.

If more than one selection is available, pick the SmartLink IV version with the latest date. Double click on the file to "auto load" for future use on your SML IV.

With ignition key and handlebar switch power on, select **Configure** / **Firmware** / **Update Module Firmware Now**. Perform each step listed precisely as prompted on the screen to prevent corrupting the module during the upgrade process.

Once complete you should see a prompt to **Clear IAC Module Offsets**. **This step must be performed.** If this screen does not appear, select **Tools** / **Clear IAC Module Offsets** before you proceed. Turn the key switch off 5 seconds; then back on. Once this step is finished, you are ready to proceed with new firmware.

While you are still linked, select **Module Configuration** / **Basic Settings** under the **Tuning Maps** tab. New features in the firmware require resetting to the following values:

<b>INITIAL FUEL PULSE</b> set to <b>199</b>	<b>IAC STOPS TARGET</b> set to <b>10</b> 2006-up models
<b>IAC MIN. LEARNING</b> set to <b>-10</b>	set to <b>7</b> 2001-05 models
<b>IAC MAX LEARNING</b> set to <b>10</b>	

Reinitialize the IAC by cycling the switch 3 times (on 60 seconds, off 30 seconds, x3) and your firmware update is complete. You can run the IAC-AUTO function now to have SmartLink automatically set the IAC stops if desired (see instruction booklet).

# CONFIGURING THUNDERMAX FOR CLOSED LOOP OPERATION

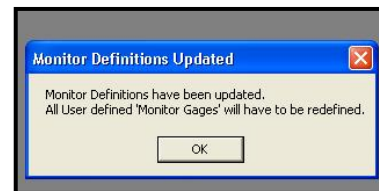
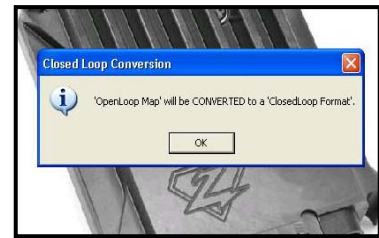
Once you have installed the ThunderMax AutoTune kit and verified that your software version is 2006.16.3 or higher and your module firmware is 4.2 or higher, you are ready to configure your ECM and base map for closed loop operation. Your new software and firmware will automatically convert an existing open loop map to run in closed loop. When you open the SmartLink icon a message will appear alerting you that any map you open will be converted to closed loop.

This is normal. Once you select **[OK]** the software will open in closed loop format. The next message you may see alerts you that any custom monitor gauge values you may have set during a previous session will need to be re-set due to the new default values installed with new Monitor Definitions during the software update. Click **[OK]** to continue.

To link to your ThunderMax module, you must first open the map currently installed in your ThunderMax from your map files. If you have not stored the original base map from your ThunderMax (included on your original software disc) on your hard drive, retrieve it from your original software disc. If you do not have access to the original base map (no disc), refer to the last page of this instruction booklet. Upon opening the map, you will be notified that SmartLink is automatically configuring the map for closed loop operation.

Connect the communication cable to the computer and module. With the ignition switch and handlebar switches in the 'run' position, click the red **[Link]** button (turns green when successfully linked). Confirm that the speedometer algorithm setting for the year/model of your motorcycle is correct (listed on the "Tips" page attached) in the tuning tree under **[Module Configuration] [Basic Settings]**. Select **[File] [Write Module Maps and Settings]** to upload your newly configured closed loop map to the module. After map is uploaded, select **[Tools] [Clear IAC Module Offsets]**. ***This Step is Very Important!***

Since you have loaded a newly configured closed loop map into the ThunderMax, you must 'Initialize' the module to establish 'home' settings for the IAC and TPS. With the handlebar switch in the 'ON' position, cycle the key switch on and off 3 times, leaving the ignition on for 1 minute, off for 30 seconds each cycle. DO NOT start the engine or move the throttle at this point. After 3 on/off cycles, start the bike 2 times, let it settle at idle for 10 seconds; the idle should be smooth and even. If so, shut down and proceed to running the IAC-AUTO function.

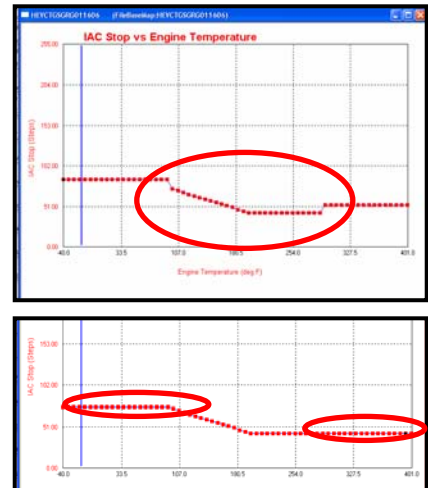


Because you cleared the learned 'IAC Offsets' within the module as part of this update process, it is advisable to run the IAC-AUTO function to adjust IAC stops settings for this particular engine. Set up Engine Head Temperature, Engine Speed, IAC Position, EGO Front and Rear (live AFR display) gauges as described on pages 19-24 of the SL manual.

Select the IAC Stops vs. Engine Temperature page. With the engine at ambient temperature, click the **[Monitor]** button while linked to the module; strike the spacebar to show the actual values of the tuning block. Make certain that the motorcycle is in Neutral and the engine is cold, then start the engine. If the engine idle is stable after 15- 20 seconds, select the **[IAC-AUTO]** button (Idle Air Control Auto Adjustment). Allow the 'IAC-Auto' function to run at idle until the engine head temperature reaches 289 degrees. Do not shut off the engine until the head temperature reaches 289 degrees.



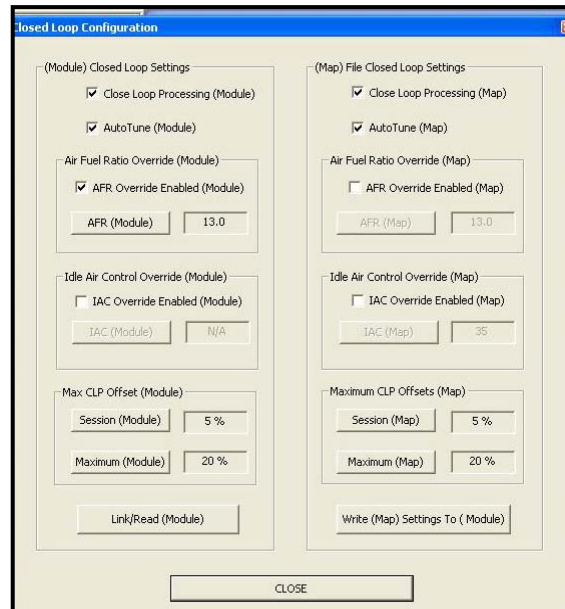
Once the head temperature has reached 289°, turn off the 'IAC-AUTO' function by selecting the button again, then shut the engine off by the handlebar switch. Turn the power back on, without starting the motorcycle. Align the remaining blocks above 289° and below the first corrected point. To do this, select one of the tuning boxes and use the Up ▲ and Down ▼ arrows on your keyboard to move the tuning block up or down. To move to the next adjustment block, use the Left ◀ and Right ▶ keys on the keyboard. "Aligning the blocks" simply refers to moving the points past the range that the IAC auto adjustment did not adjust. Notice the points above 289° and below the first corrected tuning block in the two pictures.



Click the **[Link]** button to unlink, then turn off the ignition switch and unplug the cable. It is important to unlink *before* turning off power and removing the cable. Save the current 'closed loop' map file to your hard drive for future module communications and tuning.

# CLOSED LOOP PROCESSING

Your SmartLink software will allow you to set Air/Fuel tuning parameters for your ThunderMax and its installed base map when the AutoTune module is installed and AutoTune program is enabled. To set Target AFR and AutoTune Limits, go to the toolbar and click **[Configure] [Closed Loop MODULE Settings]**. (Note: If **[Closed Loop MODULE Settings]** is not highlighted and can't be accessed, you have an 'open loop' map open. Go to **[File] [New]** and select **[Closed Loop]**. You will need to re-open your map once the conversion from open to closed loop takes place.) The Closed Loop Configuration dialog page opens; the right side shows the default MAP settings stored in the MAP file (settings are applied to the installed base map during the 'Closed Loop Format' conversion performed by SmartLink), while the left side shows what the module is currently set to (unadjusted, these settings will mirror MAP's settings).



The un-highlighted left 'MODULE' side of the page allows editing of those settings within the module for tuning purposes. To edit module settings, click the **[Link/Read (Module)]** button (left side highlights/active). You can now edit these settings within the module should you want to change any of the settings from the MAP default settings.

**Closed Loop Processing (Module)** – Check **[ON]** to enable closed loop processing. During closed loop processing, the ThunderMax module processes feedback from the oxygen sensors to adjust the fuel volume at all points by creating "offset" points from the installed 'base map' fuel points. The 'static' base map is dynamically used by the ThunderMax module and the AutoTune's active (closed loop) feedback system. This system optimizes the fuel points to fit the target air/fuel ratio through 'learned offset points'. These 'learned offset points' are stored within the ThunderMax and are used in conjunction with the base map. The 'base map' fuel points are not being adjusted by either the AutoTune or ThunderMax modules.

**AutoTune (Module)** – Check **[ON]** to allow the AutoTune module to provide data used for AFR adjustments via map point offsets mentioned above. Un-checked, fuel points will be adjusted to the last learned offset points, or if no learning has occurred, to the original base map points.

**Air Fuel Ratio Override (Module)** – The default Target AFR setting is 13.0, which provides a good balance of power and economy. Clicking this box and changing this number overrides ALL 'Air/Fuel Ratio vs. TPS' pages at all RPM's. To target *specific* Air/Fuel Ratio RPM ranges and throttle positions, leave this box unchecked and edit the individual 'Air/Fuel-TPS @ rpm' map pages located under the 'Tuning Maps' tree.

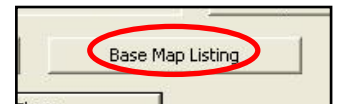
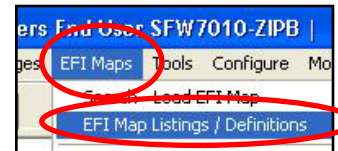


# THUNDERMAX

## LINKING TO THE MODULE WITHOUT THE ORIGINAL BASE MAP

If you do not have the original base map or disc, follow these steps to attempt to match the installed map to a database map included on the current software disc or from the internet:

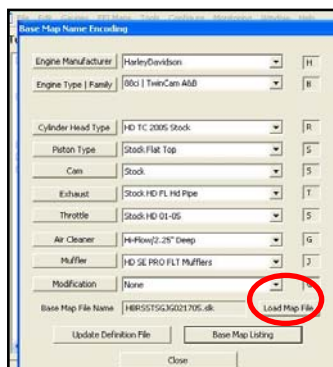
From the toolbar, choose [EFI Maps] [EFI Map Listings / Definitions] [Base Map Listing]. Available base maps will be shown (if the [Clear Filters] button at the lower left of the screen is highlighted, click it to clear filtered maps so all maps will be shown). Filter the maps to locate a base map that best matches your application by placing your cursor **first** over any 'Engine Type' that matches your engine and right-click it. All maps that do not match your selection will be filtered from the screen. **Second**, place your cursor over the 'Throttle' column and right click your match. **Third**, right-click the 'Exhaust' type that closest matches your application. **Fourth**, right click the 'Muffler' column if further definition of the exhaust system is required (depends on exhaust application). Keep right-clicking the application columns until you have located the best map match. Highlight the map (left-click; blue bar indicates selected map) and click the [Close] button.



EngineType	Family
88ci	TwinCam A&B
80ci	TwinCam A&B
95ci	TwinCam A&B
88ci	TwinCam A&B

Stock HD 01-05	St
Stock HD 01-05	St
Stock HD 01-05	St
Stock HD 01-05	St

CylinderHead
HD TC 99-04 Stock
HD TC 2005 Stock



This brings you to the 'Base Map Name Encoding' page, from which you can review the map parameters. From this page you can load the base map into the software by clicking the [Load Base Map] button. [Close] this page to return to the open map page.

With the ThunderMax cable connected to your computer and module, key switch and handlebar switch in the 'run' position, click the red [Link] button (turns green when linked). Select [File], [Read Module Maps and Settings]. If the map selected from the database matches the map in the module, the map upload from the module will start.

If the maps do not match, SmartLink will display a mismatch has occurred, show the module map name and attempt to locate the map from within the database, or if not found in the database, from the internet if the computer is connected.

If this fails to produce a match, email us at [productsupport@zipperperformance.com](mailto:productsupport@zipperperformance.com) and we will email the map to you.

