# Part 1: Module Installation

**"DISCLAIMER: NOT LEGAL FOR SALE OR USE IN CALIFORNIA ON ANY POLLUTION CONTROLLED MOTOR VEHICLES"** *The user shall determine suitability of the product for his or her use. Installation and use on a pollution-controlled vehicle constitutes tampering under the U.S. EPA guidelines and can lead to substantial fines. Review your application and check your local laws before installing.*

* **CA Proposition 65 "known to the state of CA to cause [cancer] birth defects or other reproductive harm]"**
see www.p65warnings.ca.gov for details

## #309-363 11-'13 TBW Softail® Models includes '13 CVO Breakout®

***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_____***

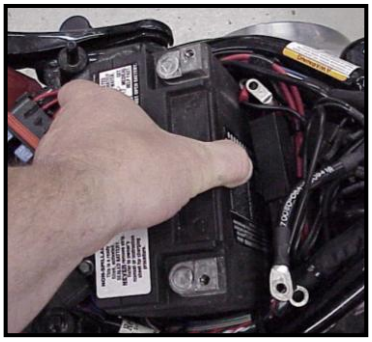
**309-363**

## Module Installation

**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.

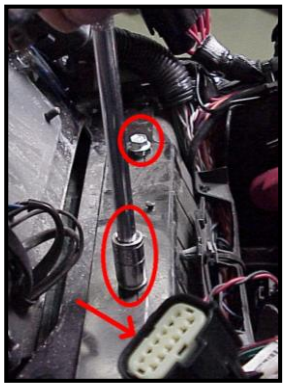
**B:** Remove the battery cables (negative first) and remove the battery from the motorcycle.

***Special Note – If you have previously installed another tuning device such as a Power Commander, be sure to remove the device and any "$O_2$ Sensor Eliminators" that may have been installed at the sensor harness plugs at that time!***



**C:** *Breakout skip to page 4* Remove the factory ECM by spreading the side tangs and lifting the ECM away from the ECM caddy. Once removed from caddy, release the red locking clip from the connector, depress button on socket housing of the connector; rotate locking bar until it reaches the full rearward position (the index pin [circle] on locking bar will engage the rear notch in the socket housing, and both red and orange slide bars [arrows] will protrude past the connector housing when fully released). Wiggle the ECM slightly as you remove it from the connector.

**D:** Unplug the taillight harness (arrow) at the connector. Remove the (2) bolts (circles) holding the steel fuse box mounting bracket from the frame. Cut the (2) wire ties holding the battery tray to right frame rail.



## 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; 2011 FLSTSE models equipped with 18mm sensors are in most cases are direct bolt-in replacements, while 2012 FLSTSE models came equipped with 12mm sensors and will require the addition of 18mm sensor bungs to the exhaust header pipes or pipes equipped with 18mm bungs. Installation of the wide band sensors into most 18mm 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 18mm 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 2011 Softail® 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***.

**E:** 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.

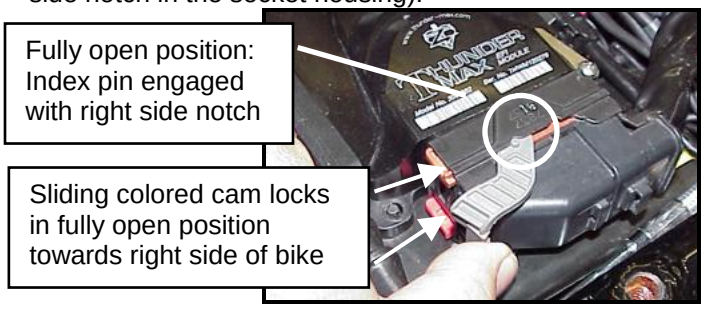
**F:** Unplug and r**e**move the factory oxygen sensors from the exhaust pipes. If you wish to cap off the bike side of the harness connector, protective caps are provided.

See Tips and General Information Section on page 6 for further details.

Install both ThunderMax oxygen sensors into exhaust pipes and tighten.

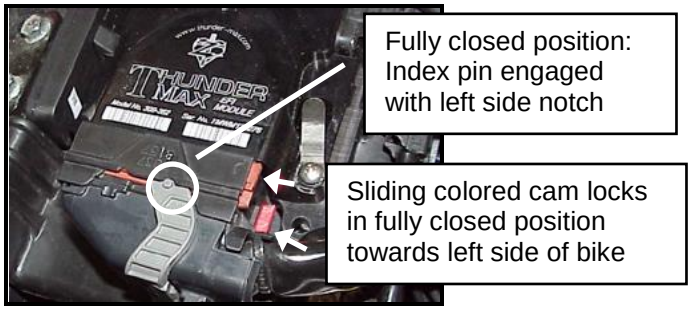
**G:** Route rear sensor harness under oil tank, feeding connector plug up though opening in the right front bottom of the battery cavity in the oil tank.

**H:** Insert the ThunderMax oxygen harness connector into the ThunderMax ECM with the imprinted "ThunderMax" logo facing up. Tighten the (2) Phillips connector screws. Apply a dab of dielectric grease to the locating pins on the ThunderMax housing. With the ThunderMax oxygen sensor harness positioned below the ECM plug, connect the greased 72-pin ECM connector to the ThunderMax ECM. Before connecting, verify that the locking bar is in the fully open, rightmost position (locking bar index pin is fully engaged with right side notch in the socket housing).



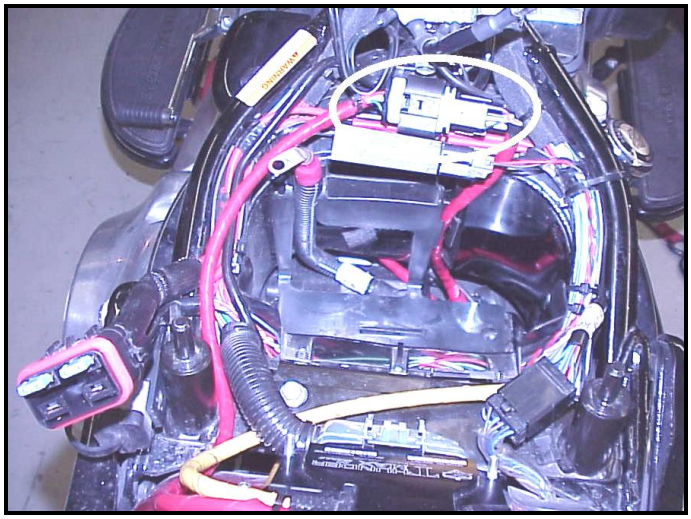

Rotate the locking bar towards the left side of the bike to engage the connector. Observe that the colored cam locks are moving with the locking bar; proper execution will show both colored cam locks visible in equal amounts on the left-facing side of the connector when the locking bar is in its fully 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.

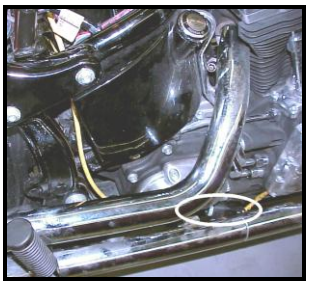



***Important Note:*** Pin and socket housing of the connector must be fully engaged before you rotate the locking bar to the forward position. Forcing the locking bar forward before the connector is fully engaged will damage the connector and/or the ECM

**I:** Place the ThunderMax ECM into the ECM caddy. Position and connect rear oxygen sensor harness to sensor connector on top of oil tank, just forward of the battery under battery ground cable as shown.



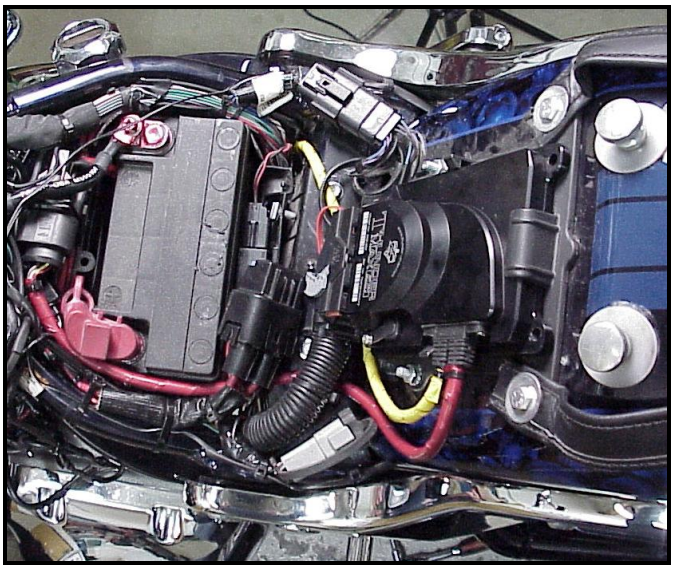
**J:** Route front oxygen sensor harness behind and under transmission with connector plug just under the engine/transmission mounting boss; connect to front oxygen sensor.



**K:** 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).

**L:** Install steel fuse box mounting bracket bolts. Plug in the tail light harness plug, re-install the battery (positive cable first). Re-install the main fuse and replace the fuse box cap. Replace harness trough ties and verify oxygen sensor harnesses are routed so they will not be pinched when seat is replaced.

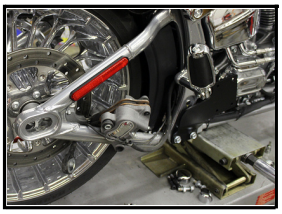


***You are ready to proceed to part 2 setup of your system.***

## Breakout Module Installation

*** Obtain your models HD® service manual for procedures& specifications required in the following steps.*

**C**: Jack up the bike to remove the rear wheel / tire.

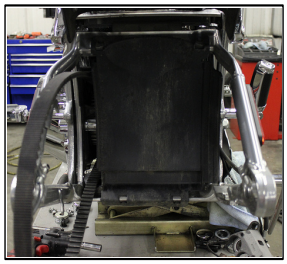


**D**: Remove the caliper bolts, remove the caliper and set to the side (as per picture above). Remove the axle nut.

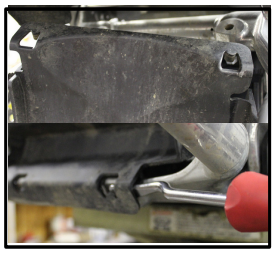
**E**: Remove the belt guard.

**F**: Slide the rear axle out, be careful with the wheel speed sensor and watch for the proper location of spacers.

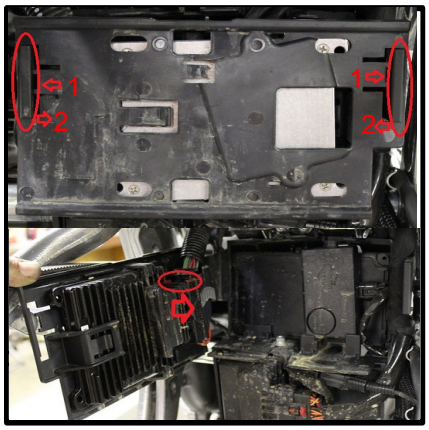
**G**: Remove belt from pulley and remove rear wheel / tire.



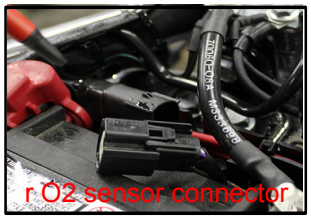
**H**: Remove splash guard, the plastic pins snap it into place.



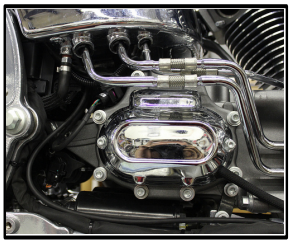
**I**: Unlatch ECM caddy by gently prying lock tabs (1) outward to allow long outer clips (2) to press inward to release caddy, pivot to hold in place while you disconnect harness connector (notice slides extend fully outside of connector housing). Unlatch and remove connector from the ECM, then remove caddy lid with ECM in place.

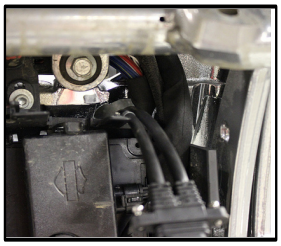



**J**: Disconnect the stock narrow band oxygen sensors the left picture shows the front connector location (just behind voltage regulator) and the right picture shows the rear connector location (in front of battery). Rubber caps are included to protect the harness end connector. If you have 18mm and 12 mm ports remove the 12mm sensors and block off the ports then skip to L.

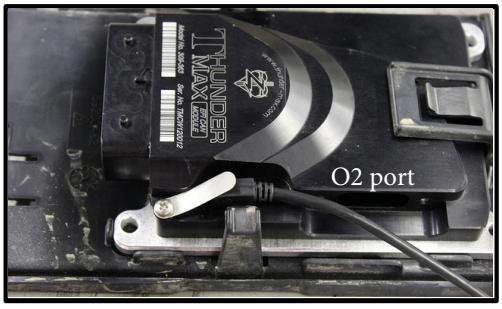

**K**: If you do not have 18mm oxygen ports and plan to add them mark the locations prior to removing.





**L**: While exhaust is removed, route O2 harness just below the oil tank up into the opening into the ECM caddy area. Route the front O2 wire along the lower frame rail as shown in the left picture. Leave the rear O2 wire on the transmission under the oil tank. These will be connected and secured later.

**M**: Remove stock ECM and install ThunderMax by sliding onto caddy lid. Due to the ECM location the communication port isn't accessible after final assy. To communicate with the module you have 2 options: Silicone the cable into the port and lock in place with the tab, Or you can order a 309-454 for 2013 or a 309-456 for 2014-2015 models. This communication device plugs into the data port under the seat allowing an alternative way of communicating with the ECM.



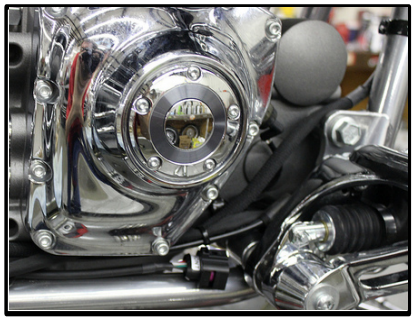
**N**: Use the supplied dielectric grease and put a light coat on the O2 harness terminal end and on the seal area just below the flange. Insert the O2 harness into the port on the side of the housing and tighten. Also put a light coat of dielectric grease on the bike harness connector(s) and a light coat on the inside edge of the ECM connector housing.

**O**: Position the caddy lid with ECM slightly into the tray and reconnect the factory harness to the ThunderMax ECM housing. 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 bottom image in section I above (do not force the locking bar).

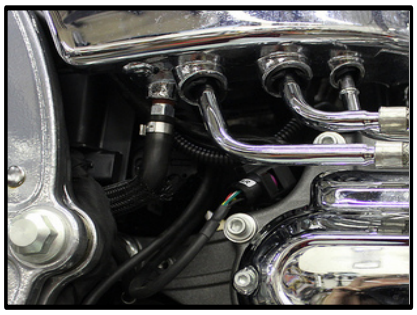
**P**: Align caddy lid/ECM assy with the housing while guiding the O2 harness up into the caddy housing opening and snap the lid back into place. Ensure the 2 inner locking tabs (1) return in place as not to allow the longer outer tabs (2) to spring inward allowing the caddy lid to disengage (refer to section I).

**Q**: Install the modified or new exhaust with 18mm O2 ports. Be sure to prefit the oxygen sensors prior to completely installing the exhaust. Sometimes it is easier to install the oxygen sensors prior to bolting the exhaust back on the bike. This is usually the case when the clearances are tight, not having enough clearance in length for the sensor to go into the port.

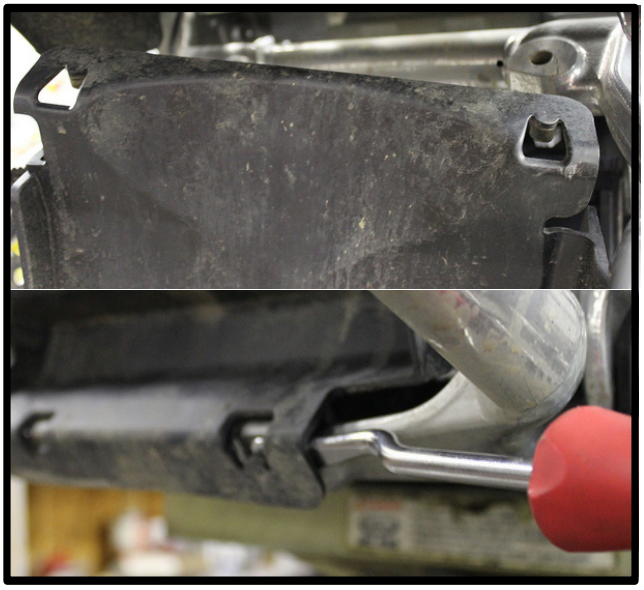
**R**: Loop the front oxygen sensor lead back over to the right frame rail, tuck inside the frame rail run down to the O2 harness front lead and push the connectors together until you hear a solid click. Use included wire ties to secure the wires in place, protecting from heat and abrasion. Do not allow the wiring to hang below the frame rail.



**S**: Loop the rear oxygen sensor lead back over to the right side under the oil tank. Push the connectors together until you hear a click.Use the included wire ties to secure the wiring away from heat and abrasion under the oil tank.



**T**: Install the splash shield over the ECM caddy lid. Finish reassembling the components per the factory service manual.

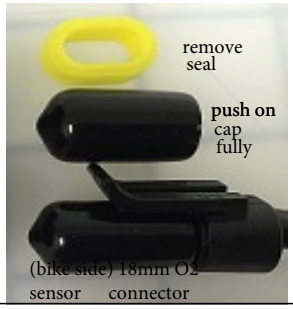


**U**: Re-install the battery, connecting the negative cable last. Put the fuse back in.

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

# TIPS AND GENERAL INFORMATION

(bike side) 12mm O2 sensor connector



(bike side) 18mm O2 sensor connector

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

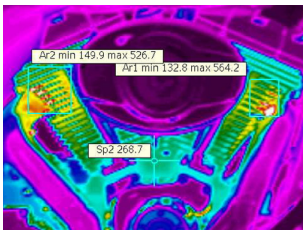
## Heat Management Strategy

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.

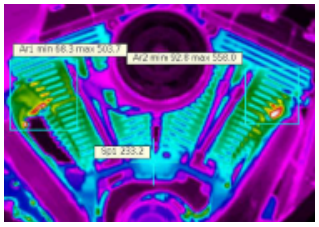
1. We run at a slightly lower engine idle and generate less heat. This also gives you back that true HD® sound.
2. As the bike starts to heat up (setting in traffic etc.) prior to an imediate need the check engine light will illmuniate telling you its not urgent, but you need air flow or to shut the bike off soon for it to cool down.
3. 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.
5. 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.



**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!

**Built in support features**

- [TMax-Auto Support tab] Includes *links* 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 *links* to TMax-troubleshooting 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 *link* 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.

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

**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 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.