

# THUNDER MAX

## Nitrous Assisted Dry System #109-214

This product is legal in California only for racing vehicles which may never be used upon a highway. Not legal for sale or use on pollution controlled vehicles.

This kit is designed to be installed on stock or modified Harley-Davidson® motorcycles. This kit is not designed as a plug-and-play system. Installation of this kit on any modified or larger displacement engine will require larger injectors and custom mapping. This product and its required service must be performed by an experienced high performance tuner familiar with ThunderMax. Oversize injectors should be sized for the proper fuel flow at peak torque while spraying the engine with Nitrous. You should not proceed with installation and use of this kit if you have limited skills using-altering-developing custom maps using a ThunderMax system.

If you are a professional tuner who methodically reviews his work with a dyno to assure you have stable Air/Fuel ratio while spraying the engine, there should be no reason why you cannot achieve success with this product. Depending on your set up and understanding of nitrous systems, damage to your engine may be a real possibility. Neither Zippers Performance Products nor Thunder Heart Performance Corporation is responsible for ANY consequential damage related to the use of this product. There is no warranty written or implied in any way when using this product.

Nitrous oxide designed for vehicle use should never be inhaled as it contains sulfur dioxide which can cause death. Contact with liquid nitrous may cause burns/frostbite. Never vent nitrous oxide in a confined space. Wear safety glasses and rubber gloves when handling.

This product is sold as a 2-part kit, the main component consisting of the air cleaner backplate with solenoid assembly, air filter and harness. The bottle/bottle mounting brackets are sold separately and are model specific. This kit

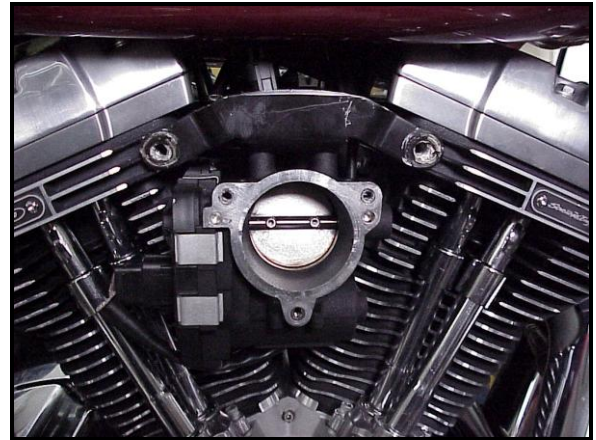
also requires a ThunderMax ECM with Auto-Tune system (sold separately). Please read through the instructions entirely before performing this installation.

### How a 'Dry' System Works

A 'dry' system introduces the required extra fuel nitrous demands through the EFI fuel injectors, rather than using a secondary fuel delivery system. The ThunderMax ECM has programming built in it that recognizes the nitrous system and increases the fuel 'pulse width' and retards engine timing when activated. Once additional fuel is introduced, it burns with the extra oxygen provided by the nitrous, providing additional power.

### Installation

1. Remove seat, air cleaner cover, element and backplate from the motorcycle. Retain the original cover screw, breather bolts and 'S' hoses for future use.

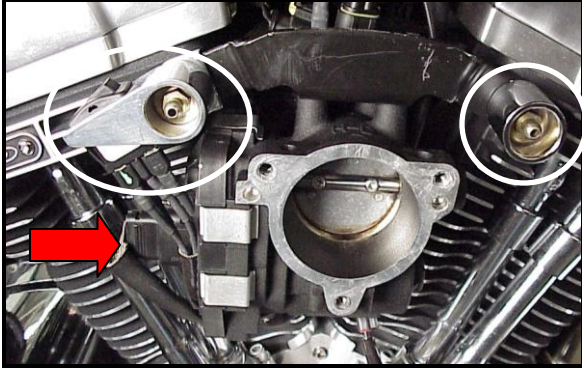


2. Locate the supplied NADS harness and arming switch. The female spade wire terminals are marked with color codes; male spades are numbered on the switch. Connect to switch in the following manner:

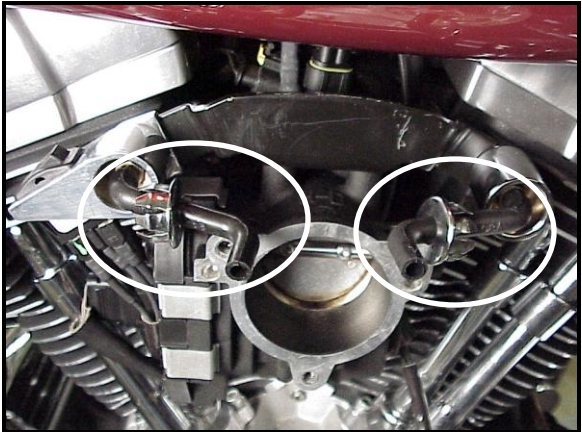
Switch #1 – Yellow  
Switch #2 – Green  
Switch #4 – Red  
Center spade – Black



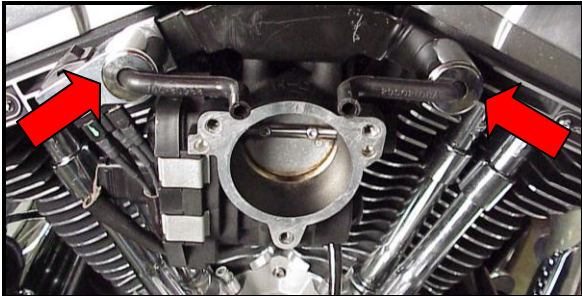
3. Unplug the throttle body harness and install the arming switch over the rear cylinder head throttle body support bracket using the original breather bolt. Install supplied breather spacer to the front head using the other original breather bolt. Re-install throttle body harness with NADS harness routed under T-Body harness plug.



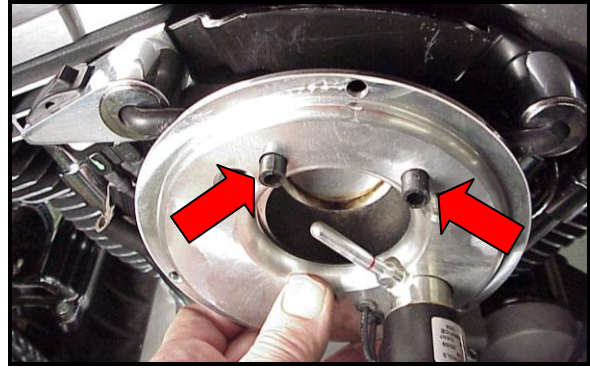
4. Install supplied breather spacer chrome caps onto the breather 'S' hoses and install the hoses to the breather bolts.



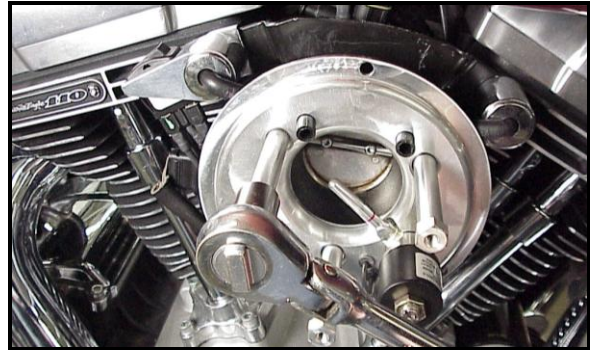
5. Slide the chrome breather caps along the breather hoses and push them into place on the breather spacers/arming switch housing.



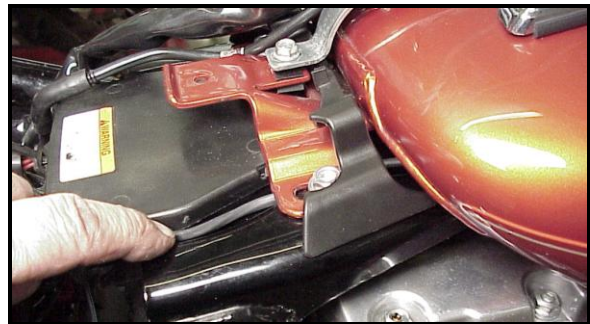
6. Position the NADS backing plate over the throttle body; insert the breather hoses through the two openings in the backing plate as shown.



7. Insert supplied gasket between backing plate and throttle body. Apply blue threadlocker to threads of (3) supplied air filter stanchions and install. Tighten stanchions to 120-140 in/lbs.



8. Plug two-wire harness connector into NADS solenoid attached to backing plate. Route remaining harness up to frame backbone, under fuel tank to ECM area under seat as shown.

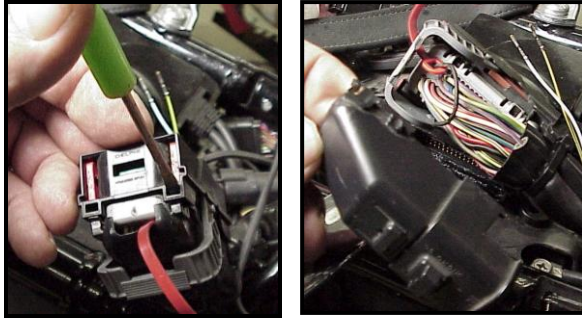


9. Electrical Harness Installation: Remove left side frame cover and remove the ECM fuse. Disconnect the negative battery cable. Carefully disconnect the wiring harness connector from the ThunderMax.

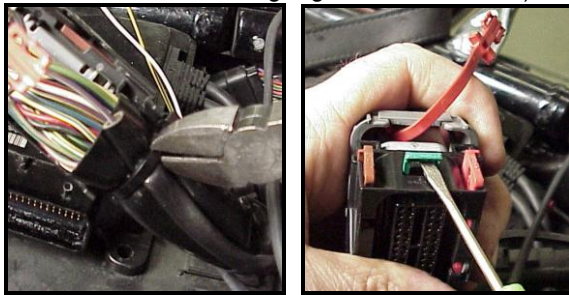




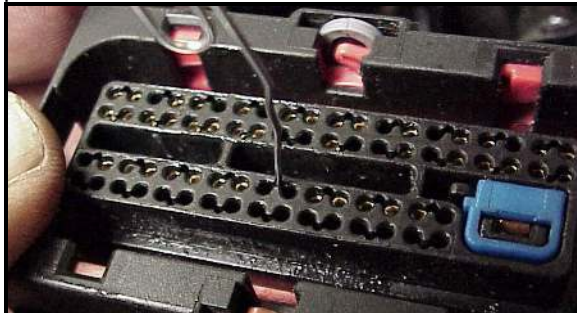
10. Carefully push the black housing cover locks of the ECM connector in to release the housing cover. Note there are (4) rows of terminal ports in the harness housing, (2) rows of 16 ports and (2) rows of 20 ports, each row has a starting number to identify the port number on the wire entry side (1<sup>st</sup> row [1-16] not used). You will be inserting (2) wires from the NADS harness into two unused ports that have sealing pins in them which must be removed before wires are added.



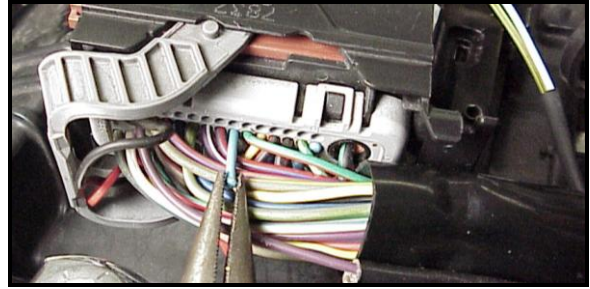
11. Snip wire tie holding harness to connector housing. Remove the green terminal lock pin from the housing using a small screwdriver (lock has one short, one long leg; note orientation).



12. Note on the terminal side of the connector, that the terminal ports are grouped in pairs two with a small hole located between the pairs (think opera glasses). You must "unlock" the wire terminal/seal pin by inserting HD® tool #45928 (or a small paper clip) into the center hole between the paired set of terminals. Locate port numbers 25/26 and insert the appropriate tool in the opening between the ports as shown.



From the other side of the connector, remove the seal pin from port #26. Remove the unlocking clip or tool from the terminal side.



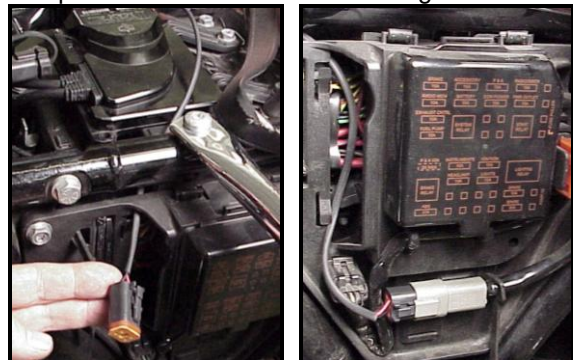
Install the **white wire with black tracer into port #26**. Bottom the terminal into the chamber then gently tug on the wire to verify that it has locked into place. Repeat this process for the **yellow wire with black tracer into port #47**.

13. Install new wire tie to hold harness to connector housing. Re-install connector housing cover and green secondary locking pin (correctly oriented) until it bottoms on connector housing.



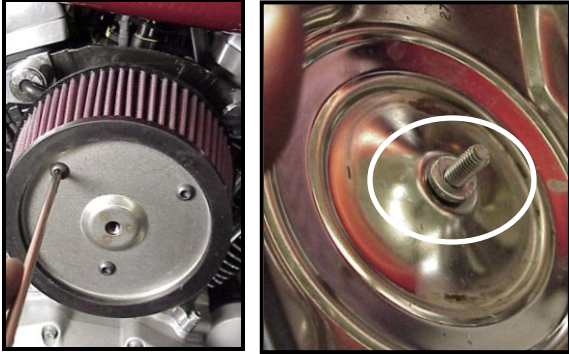
Re-install ECM connector to ThunderMax ECM. Replace ECM into ECM caddy.

14. Route the power harness under the left frame rail to the gray 4-pin diagnostic port located just below the fuse box area and plug it in. Re-install the battery negative cable, then the ECM fuse. With the handlebar switch in the 'RUN' position, cycle the ignition switch on for 20 seconds without starting the engine to initialize the ThunderMax ECM. Secure all harnesses with supplied wire ties away from sharp edges, components that move or create high heat.



12. Install the nitrous line to the solenoid fitting. Route line down towards front tappet block, forward of the front cylinder to the left frame down tube.

13. Apply blue threadlocker to threads of (3) supplied air filter element screws and install the air filter element.

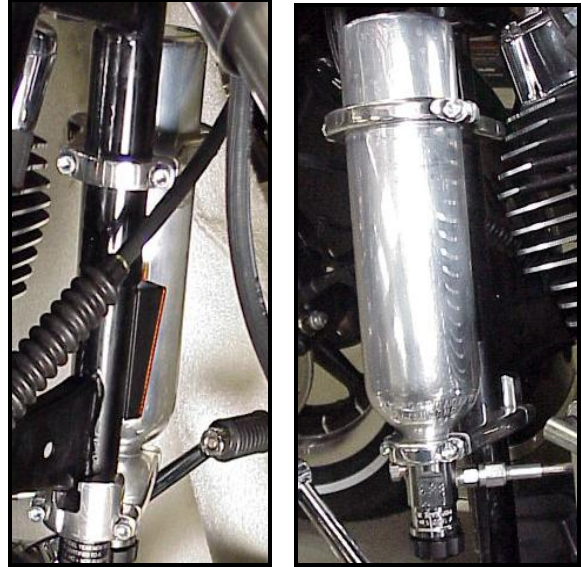


14. Locate the supplied A/C cover washer. From **inside** the cover, place the supplied washer over the cover bolt. Apply blue threadlocker on the threads of the bolt and install the cover assembly onto the air filter element.



### Bottle / Bracket / Line Kit Assembly

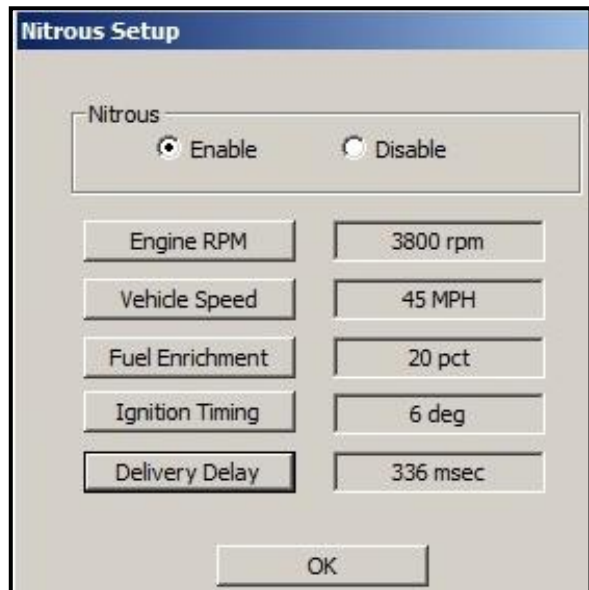
After filling bottle, install the nitrous bottle using supplied model-specific brackets. The bottle mounts with the outlet at the bottom. Install the brackets to the left frame down tube; leave the clamp screws slightly loose. Place the bottle in the bracket cradle and install the clamps loosely. Attach the nitrous line and orient the bottle so that the hose is routed without interfering with the shift linkage or any other component (clamp provided for attachment to tappet cover screw). Tighten all clamp screws securely.



### Software Setup

You should always check to see if you are running the latest available version of ThunderMax software and your module's firmware is up to date. Software and firmware updates are available with a high-speed Internet connection through your TMax software. Please verify you have the latest version before you proceed.

Open the TMAX software. Link to the module and select **[CONFIGURE]**, scroll down to **[MODULE Settings] [NITROUS]** and the following dialog page appears:





## DEFINITIONS:

**1. Nitrous Enable/Disable** - Enables (turns on) or disables (turns off) all nitrous functions, regardless of other settings or switch positions.

**2. [Engine RPM]** - Sets minimum rpm for nitrous activation (maximum rpm remains located in [BASIC SETTINGS] under [REV LIMIT]).

**3. [Vehicle Speed]** - Minimum vehicle speed for nitrous activation regardless of other settings.

**4. [Fuel Enrichment]** – Percentage of additional fuel (global override) that is applied to the installed base map fuel delivery during nitrous activation. AFR's for nitrous activation in the low to mid 11's are safe. More power may be available with a leaner mixture.

**5. [Ignition Timing]** - A flat value of spark retard (global override) on nitrous activation.

**6. [Delivery Delay]** – Fuel and timing. Sets a time delay due to solenoid opening and purging of air in the system. Fuel enrichment and timing adjustment are delayed by this number in milliseconds after all other conditions are met.

## Summary of Operation

The NADS system has only has 2 states, "Active" or "Not Active". In order to go into the active state all of the following conditions must be met:

**1.** System must be "enabled" from nitrous menu in TMax software. From the toolbar **[Configure] [MODULE Settings] [Nitrous]** (requires module link).

**2.** The arming switch, located on the rear cylinder breather port, must be cycled from the "disarmed" (switch light off) to the "armed" position (switch light on) after the engine is started. If the switch was left in the "on" position when ignition was cycled off, arming switch must be cycled off / on before system will activate. This prevents accidentally causing an inadvertent charge of Nitrous or activation on the following ride.

**Note** - On some models, the check engine and battery lamp will be lit together when the system is armed to provide another visual reminder that the system is in an active mode. This is normal and intended.

**3.** Rpm must be above the target nitrous menu rpm setting and below the prescribed rev limit.

**4.** Vehicle speed must be above the nitrous menu vehicle speed setting.

## Suggestions and Recommendations

The bottle is equipped with a valve that can be opened or closed. We suggest closing the valve when not in use. Extra bottles are available for purchase to quickly replenish exhausted nitrous.

Change and vent bottles only in a well ventilated area. When changing the bottle, close the bottle valve before disconnecting the line. Slowly loosen the line until a hissing sound is heard; let the line pressure escape slowly. Do not inhale nitrous as continued exposure can cause death. Do not allow liquid nitrous to touch your skin as it will burn like dry ice. Carefully check for leaks any time a connection has been broken. Do not use Teflon® tape on the tapered line fittings.

With a 12oz bottle, you can expect 3-4 full throttle pulls per bottle. Degree of engine modification and engine size will affect this estimation.

When the available nitrous is used up and the system remains enabled, The additional fuel dictated by the active system will cause the engine to run in a rich condition absent the presence of available nitrous. Turn off the arming switch to avoid overfueling the engine when the nitrous runs out.

## Conservative Settings

Nitrous Setup	
Nitrous	
<input checked="" type="radio"/> Enable	<input type="radio"/> Disable
Engine RPM	3800 rpm
Vehicle Speed	45 MPH
Fuel Enrichment	20 pct
Ignition Timing	6 deg
Delivery Delay	336 msec
OK	

Lower fuel enrichment settings will increase performance but will lean out the air/fuel ratio

Target air/fuel ratio while system is activated is between 11.25 and 11.75

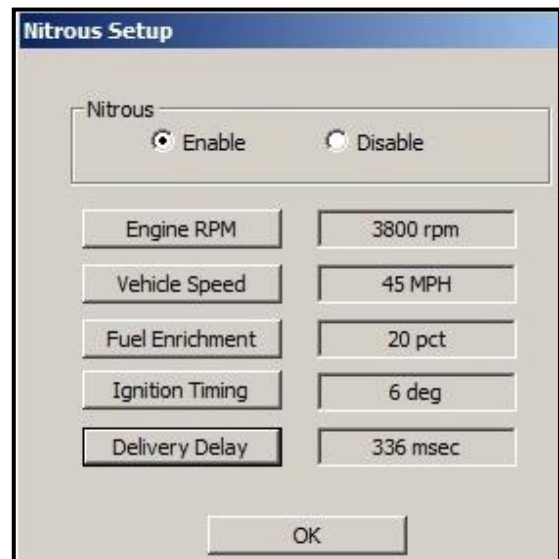
## Tuning Strategies and Suggestions for Modified Engines

Your first objective is to make sure you have large enough injectors selected for your application. Your injectors must be able to supply the proper amount of fuel required with nitrous so engine damage does not occur when nitrous is activated. The factory injectors have only enough capacity to operate safely on stock 96 or 103" applications with nitrous; larger injectors will be required for modified 96 or 103" engines, and any engine larger than 103". Select an oversize injector and first develop a map for proper engine operation with the new injectors without nitrous activation.

- 1) Select and install the proper sized injector for the engine. You need enough capacity to cover the engine at peak torque (max cylinder fill) plus enough capacity for an additional 15-25% fuel override when spraying. Once you have determined the size of the oversize injector required for your application, install the injectors then develop the map for proper operation on gasoline only.
- 2) Make sure the fuel system is equipped with a new fuel filter, fuel line and fuel pressure is proper (58-62psi) before you start the mapping operation.
- 3) Update your software, make sure you are using the TunerPlus (advanced) version of the software (dark blue screen with right click functions).

The following are the tuning steps required to develop a custom map for a ThunderMax-equipped nitrous system engine (these steps are for creation and stabilization of a map without nitrous activation, in preparation for use with nitrous activation):

- 1) Select a map with closest match to the injector flow rate and key engine parts like cam timing and compression (pumping pressures) of the engine.
- 2) Review the map's air/fuel target pages to make sure they are compatible with the desired target you want for your engine. Revise the targets as required for your application. Displayed air/fuel targets are for normal engine operation on gasoline. Nitrous override percentage will richen these targets (20% is usually a good amount of enrichment from a 13:1 AFR target at WFO under normal engine operation without nitrous).
- 3) We have found ideal target air/fuel ratio while spraying nitrous is between 11:1 to 11.75:1, which is achieved by the Fuel Enrichment value entered in the Nitrous Setup window. This fuel override is activated when the system is armed and the motorcycle has met the additional presets of **[Engine RPM]** and **[Vehicle Speed]** - once roughly 70% throttle is reached (this setting is not adjustable). **Note-** Fuel and spark overrides are not active unless system is armed and presets have been reached, therefore the same map for general engine operation is used with and without spraying nitrous.
- 4) Once injectors and map have been selected, if the engine is unstable with the first start up (rich or lean) you can globally adjust the map fuel flow either way to obtain stability. In the TunerPlus tool bar labeled **[Tools]**, use **[Injector Size Compensation]** to adjust fuel flow (we suggest entering a value of no more than +/- 10% at a time, check results).



- 5) Change the setting in **[Configure] [Closed Loop Module Settings] [Max Session (Map)]** to 10% to allow larger fuel adjustments per session, then click **[Write (Map) Settings To (Module)]**.
- 6) Start the engine, adjust the warm up fuel pages to obtain a stable warm up and idle for both front and rear cylinders. Air/fuel should track in the range of the air/fuel targets.
- 7) Ride the motorcycle for about for about 30 to 40 miles. During this ride, try to ride through different rpm ranges at different throttle positions, example hold at 3/8, 1/2, 3/4, and full throttle. During this ride, stop and cycle switched power about every 10 miles to re-set session adjustment limits. You should start to notice the engine running better after the third ignition cycle. This same procedure can also be performed on a dyno with a 10 to 15 percent load applied.
- 8) Link to the ThunderMax and from the toolbar, chose **[TMax-ModuleControlCenter] [AutoTune Analyzer]** and review the AutoTune Checkup notes. If suggested, perform the AutoMap function **[Run AutoMap]**. This feature creates a new, modified base map with the adjusted fuel flow values smoothed and now established as the baseline. If a large change has been made in the injector size it may be necessary to repeat the above process again.
- 9) Once you and the ThunderMax AutoTune Analyzer are satisfied with the non-nitrous activated map with the larger injectors, move to dyno to verify nitrous settings and operation.
- 10) Many tuners will complete their base map development then activate the Nitrous setting on their dyno without filling the bottle so they can verify enrichment and timing adjustments while running the engine on gasoline. This provides a level of comfort before you actually spray the engine with Nitrous. Once spraying, if you desire a richer mixture than what you observe on the dyno increase the Fuel Override percentage in the **[Nitrous Setup]** window.

This product was developed for professional tuners. Neither Zippers Performance Products or Thunder Heart Performance Corporation provides ThunderMax nitrous map calibrations for custom engine applications.

**If you do not understand these instructions or the strategies explained within you should not attempt to install or use this product.**

**Adding nitrous oxide to your engine and properly managing it can significantly increase its output. Used improperly, it can also shorten its lifespan. The purchaser of this system assumes all responsibility in regards to its usage and compatibility. Zipper's Performance Products and/or Thunder Heart Performance Corporation are not responsible for your engine, and/or the safety of others or yourself.....YOU ARE. There should be no reason why a seasoned tuner cannot achieve success with this product. This conservative kit should not damage your engine, but it is certainly possible. Depending on your riding habits and quality of installation, damage to your engine may be a real possibility. Neither Zipper's or Thunder Heart Performance is responsible for any consequential damage related to the use of this product. Nitrous oxide designed for vehicle use should never be inhaled as it contains sulfur dioxide which can cause death. Contact with liquid may cause burns/frostbite. Never vent nitrous oxide in a confined space. Wear safety glasses and rubber gloves when handling.**

**Thanks for your purchase of our product!**



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