GM TPI
Nitrous Oxide System
13015

INSTALLATION AND TUNING INSTRUCTIONS

INTRODUCTION

Congratulations. You have just purchased an extremely high quality, high performance kit that introduces you into the world of nitrous oxide. It is imperative that you read and completely understand all aspects of these instructions prior to the installation of your new system. Now, let's start out with a brief look into the basics of nitrous.

Nitrous is the most cost-effective way to increase the performance of an internal combustion engine. The way that it works is to increase the amount of oxygen that can be introduced into the cylinder during the intake stroke. With more oxygen, more fuel can be burned, and thus, the engine produces more power. This equation works without exception as long as the proper amount of fuel is added to the cylinder to match the nitrous charge. If the fuel is not added, the engine is forced into a lean condition, which causes combustion temperatures to increase, along with the potential for massive engine failures.

The nitrous system consists of four main components: nitrous delivery system, fuel delivery system, system plate, and electrical system. We will look at each of these in terms of installation and tuning. Testing the system will then be discussed along with some general tips.

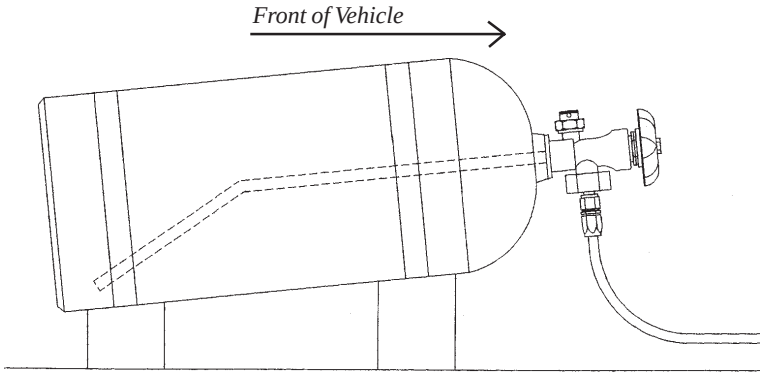
NOTE: BEFORE ANY WORK BEGINS, DISCONNECT THE POSITIVE BATTERY TERMINAL.

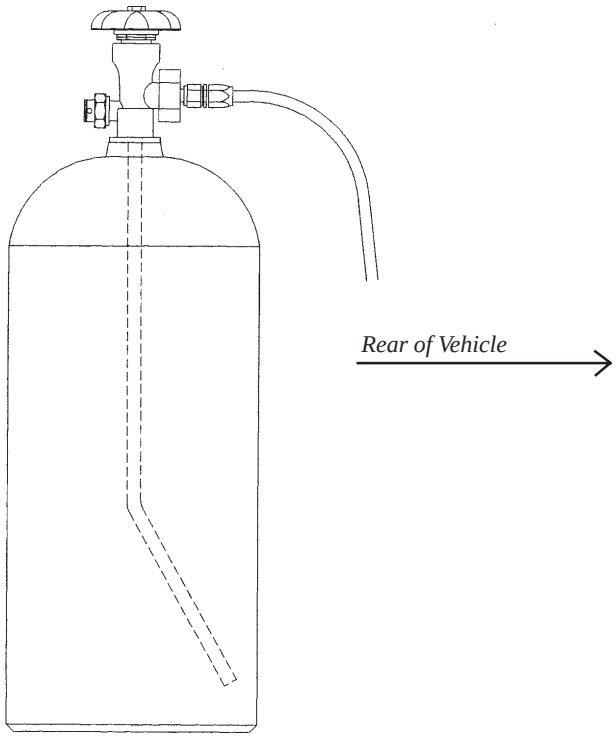
NITROUS DELIVERY SYSTEM

The nitrous oxide cylinder should be mounted in the trunk area or somewhere out of the driver's compartment. The positioning of the cylinder must be done as the cylinder diagrams show to insure that the siphon tube remains covered with liquid nitrous. Either installation is acceptable; which ever fits your vehicle better.

For further questions, please contact our technical department at (706) 864-8544.

If mounting the cylinder in the horizontal position, the cylinder brackets should be assembled on the cylinder and used as a template for marking the eight 5/16" mounting holes. The cylinder must be mounted with the valve outlet facing down, the valve towards the front of the car, and the valve end higher than the cylinder.
The fitting that is on the valve in the upright





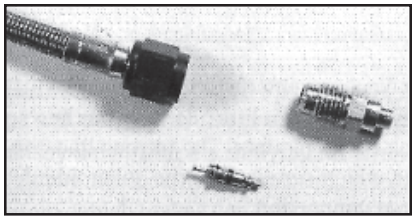
NOTE: BE SURE NOT TO PUNCTURE ANY FUEL LINES, THE TANK, ETC., WHEN DRILLING.

position is the pressure relief. Should the cylinder exceed 3000 psi, this relief fitting is where the cylinder will empty. If the vehicle is to be used in IHRA competition, the rules dictate this relief fitting be vented to the outside of the car. Part number 16021 is a relief valve with a threaded outside that accepts a -8 AN hose end. The other end of the hose can be fixed to a -8 AN bulkhead (part number 150887) to exit the car.

There are several ways that the nitrous supply line can be run to the engine compartment. Some suggestions are under the carpet, Under the kick panel moldings, or under the floor panel. Any method is fine, just be certain the line is secure, cannot be tugged out of position, and is protected from blows that could cause the line to rupture. Route the line into the engine compartment where the throttle body is located, and, where the plate will be installed. Make sure the line will still have a small amount of slack, to absorb any engine to chassis movement.

FUEL DELIVERY SYSTEM

The first step in the installation of the fuel delivery system is to locate the Schrader valve. It can be found on the fuel rail, on the passenger side. Once the valve has been found, remove the cap and the internals from the valve body. It's a good idea to have some rags handy at this point to soak up the leaking fuel.



Now, attach the #4 line with the red nuts to the fitting. Tighten it securely, but don't over tighten and rip the fitting off the rail. The other end of this line will be attached to the fuel solenoid later.

SYSTEM PLATE

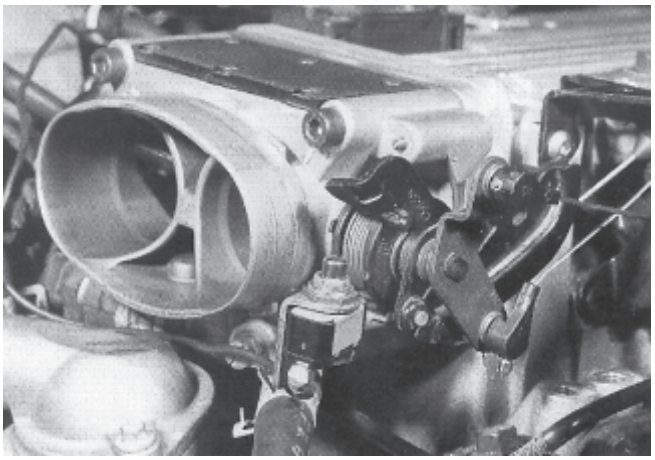
To install the plate, remove the portion of the air induction tract that mounts directly to the throttle body. Now, unhook the cables that attach to the throttle body linkage on the driver's side. With these removed, the four (4) bolts used to retain the throttle body can be seen. Remove these bolts and the throttle body will be free from the intake manifold. With the throttle body loose, slip the plate in between the throttle body and the intake manifold. Now, using the new gaskets and the four (4) Allen head screws, reinstall the throttle body.

The stock throttle linkage must be moved forward about 3/4" to maintain the proper relationship with the installation of the plate. With the linkage still detached from the throttle body, unbolt the cable bracket on the driver's side of the intake manifold. Now, mount the aluminum relocation bracket using the flat head screws used to mount the original bracket to the manifold, in the countersunk holes. Using the button head screws included in the kit, re-attach the original bracket to the relocation bracket. The linkage should now be re-installed to the throttle body.

The solenoids mount to the passenger's side of the manifold using the two (2) center runner bolts. Using the aluminum tubing and the four (4) inch socket head cap screws, mount the solenoids. When mounted, the nitrous solenoid should be above the fuel solenoid. Now, attach the fuel line, coming from the Schrader valve, to the inlet of the fuel solenoid. Attach the main nitrous line from the cylinder to the inlet of the nitrous solenoid.

The plate supply lines can now be installed. The #3 line with the red nuts should be run from the fuel solenoid to the fitting closest to the manifold on the plate. The #3 line with the blue nuts goes from the nitrous solenoid and the outside fitting on the plate. It should be noted that the tuning jets go into the plate fittings.

Protruding from the front of the plate on the driver's side is the full throttle switch bracket. Mount the push button switch to this bracket and make sure that it is engaged when the butterflies are wide open.



Now, reinstall the portion of induction tract removed during installation.

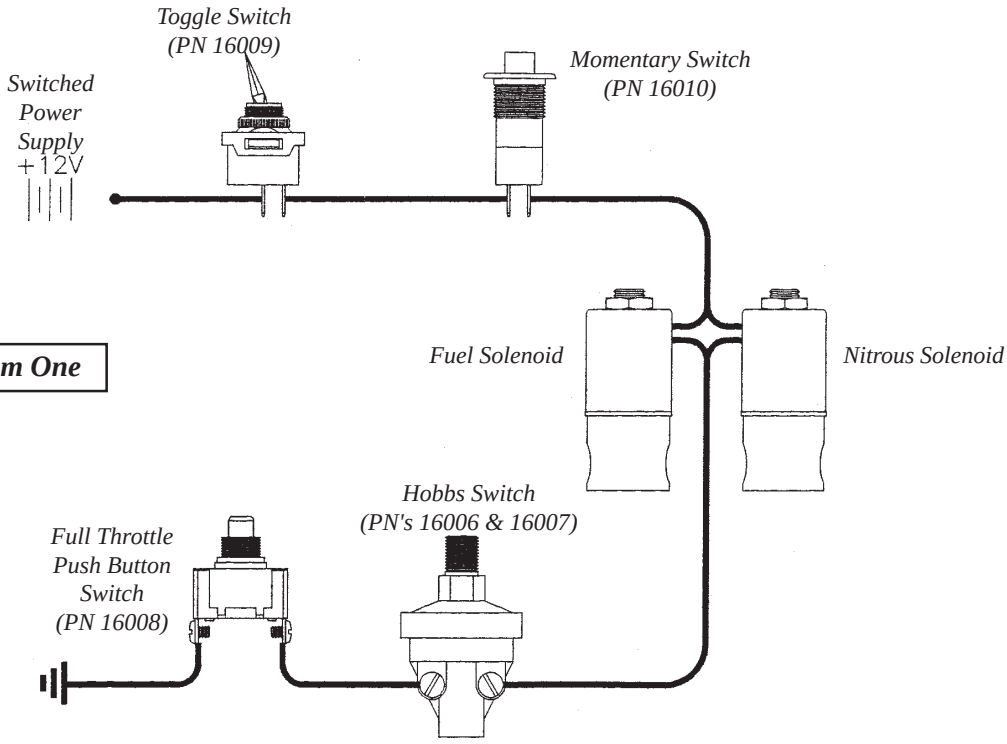


Diagram One

Diagram One – Suggested Wiring

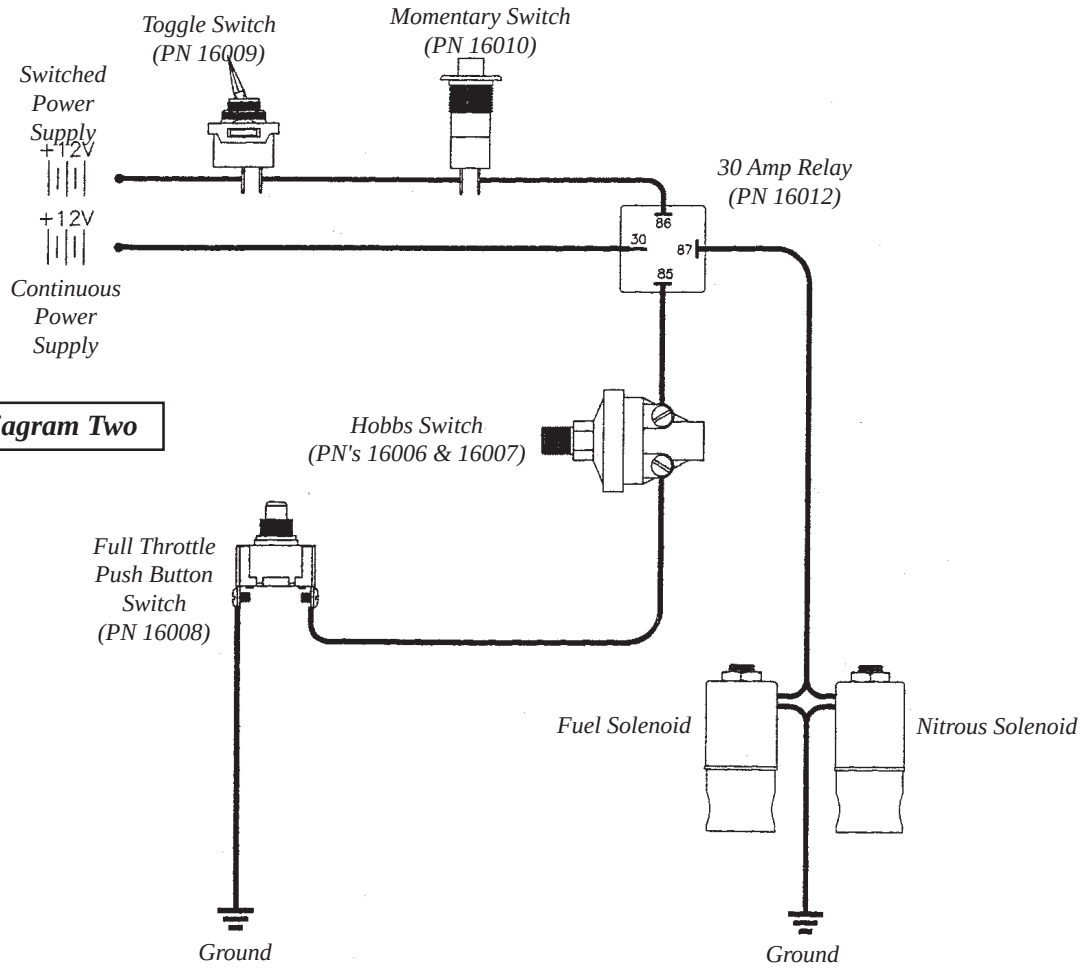


Diagram Two

Diagram Two – Preferred Wiring

ELECTRICAL SYSTEM

The proper and safe wiring of the nitrous system is also critical for consistent performance. Safety should ALWAYS be the primary consideration in the method of wiring. The NitrousWorks strongly recommends the use of electrical relays so the amperage draw from the solenoids does not damage activation switches and to assure proper solenoid function.

Diagrams One and Two (on the preceding page) show two proposed wiring diagrams. It should be noted that any wire used to deliver power to the solenoids should be a minimum of 16-14 gauge wire. The trigger wiring for the relay can be a 22-18 gauge wire.

Diagram One exemplifies the minimum requirement. Though this diagram may look simpler in design than Diagram Four, you may find it more cumbersome to install. It is mandatory for the 12V switched power supply to be able to handle 25-30 amps to assure proper solenoid operation.

From the power supply, run to the toggle “arming” switch. From the toggle switch, either run to the solenoids or to an optional momentary switch (PN 16010) and then to the solenoids.

It should be noted at this point that each solenoid has two wires coming out of it. Either wire can be positive or ground. You choose!

From the other two wires, run to the optional Hobbs switch or directly to the full throttle switch. The Hobbs switch is a pressure-sensing switch that will close the circuit as long as it is exposed to its minimum rated pressure. They come in two settings, 5 psi and 30 psi. It is recommended to include one of these switches (5 psi, PN 16006) to monitor the pre-regulator fuel pressure and shut the system down if your fuel system fails. This can really save your engine.

From the full throttle switch, run to a good ground.

Diagram Two is the preferred wiring diagram. This design has four main legs. The switched power supply in this system does not need to supply high amps to the toggle switch. A switched auxiliary port on your fuse panel is an excellent choice. Run from the toggle through the optional momentary switch to the #86 connection on the relay. Coming out of the relay (connection #85), you can wire through an optional Hobbs switch or directly to the full throttle switch and then to ground.

To supply power to the solenoids, it is recommended to run from the positive terminal on the battery to the #30 connection. From connection #87 on the relay, run to the solenoids and then from the solenoids to a good ground.

TESTING THE SYSTEM

NOTE: AT THIS POINT, RE-CONNECT THE POSITIVE BATTERY TERMINAL!

The first thing to check is the wiring. If a Hobbs switch is in the system, it will be necessary to build a small jumper connection or remove it from the system completely. A Hobbs' switch will not close the circuit unless it is exposed to pressure. These tests will be conducted without the engine running.

With the key in the on position, without the engine running, and the toggle switch in the 'off' position, depress the full throttle switch and any optional momentary switches. Nothing should happen. Now perform the same test with the toggle in the 'on' position. This time the solenoids should click. If they do, the wiring is correct. This test applies to either wiring design.

To check for fuel leaks, start the car and look to the fuel rail fitting and the solenoid inlet fitting. Also open the throttle blade and look to see that no fuel is dripping from the spray bar. This would indicate a leaking solenoid. If no leaks are present, turn the engine off.

CAUTION: NITROUS IS EXTREMELY COLD AND CAN CAUSE BURNS SIMILAR TO FROSTBITE. USE CAUTION TO PREVENT EXPOSURE TO NITROUS.

To check for nitrous leaks, open the bottle valve and examine both the connection at the bottle valve and the connection at the solenoid inlet fitting. If no leaks are found, open the throttle blade and look into the intake for any leaks coming out of the spray bars. This, again, would indicate a leaking solenoid. If no leaks are found, close the bottle valve and bleed the lines. This can be done by loosening the line nut at the bottle valve.

If any leaks are found at the fittings, tighten the line nut. If leaking persists, close the bottle valve and remove the line for inspection. Contact The NitrousWorks with any questions. If a leak is detected at the spray bars, close the bottle valve immediately. Remove the coil wire and crank the engine with the throttle blade in the wide open position for about 5 seconds. At this point, contact The NitrousWorks Tech Support Staff at (706) 864-7009.

NOTE: YOU MAY NOW REPLACE THE AIR DUCT HOSE BETWEEN THE THROTTLE BODY AND THE AIR BOX.

TUNING TIPS

All Nitrous Works systems are calibrated to operate with a bottle pressure of 1000 psi. Pressure lower than this will cause the system to run rich, which will make the vehicle seem "sluggish" and produce power "in waves". If the bottle pressure exceeds the 1000 psi mark, the kit may go lean. A lean kit produces extremely high combustion temperatures and can lead to severe engine damage. The best way to keep an eye on bottle pressure is to install a gauge adapter and gauge (PN 16005 (-4) or PN 16013 (-6)).

NOTE: NEVER USE A PROPANE TORCH OR OTHER DIRECT FLAME TO HEAT THE BOTTLE TO A DESIRED PRESSURE!

Along with bottle pressure, specified jetting changes can be made to affect the richness or leanness of the kit. The larger the fuel jet, the richer the system will be. Smaller jets will lean the system out. The kits are set up to run with a fuel system operating at 40 psi (Except for PN 13000 Adjustable Supercharger Kit, which is set up for 45 psi due to the boost referenced regulator). You may need to adjust your jetting based on your actual fuel pressure (go up or down a size or two). A tell-tale sign of a rich system is black exhaust. One can also look to the spark plugs. If the plug is black and wet, the system is rich. If the plug is white or has a semi-burned tip, the system is lean. Remember, to get a good spark plug reading one must check the plugs immediately after a run, not after a drive back to the pits.

NOTE: WHEN TUNING A NITROUS KIT FOR PEAK PERFORMANCE, IT IS ALWAYS BETTER TO ERROR TO THE RICH SIDE THAN THE LEAN SIDE. A RICH SYSTEM MAY LACK IN PERFORMANCE BUT IS NOT LIKELY TO HURT PARTS LIKE A LEAN SYSTEM WILL!

Timing can also play a key role in nitrous tuning. Retarding the timing 2-4 degrees is a good rule of thumb. Further retardation may be necessary on larger or dual stage kits to prevent detonation.

For further questions, please contact our technical department at (706) 864-8544.