GM TBI
Nitrous Oxide Systems
#13045 & #13065

INSTALLATION AND TUNING INSTRUCTIONS

INTRODUCTION

Congratulations on your purchase. Now, that you're fully equipped with the latest technology from The NitrousWorks, the high-performance world of nitrous oxide awaits you.

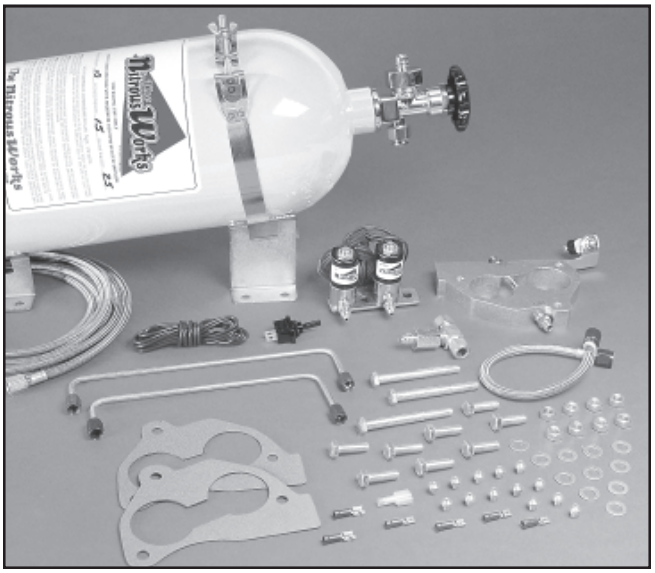
However, despite the natural impulse to have the kit installed in record time and an unbridled desire to go out and test it, please read the following information first. It's important you understand all aspects of these instructions, prior to the installation of your new system. Let's begin, by taking a brief look at the basics of nitrous.

Adding nitrous oxide to an internal-combustion engine is the most cost-effective way of increasing it's performance. Nitrous is rich in oxygen which is a vital component for making more power. And, by introducing nitrous oxide to the cylinder, more fuel can be burned as a result of the higher oxygen content, and the engine will produce more power.

This formula works without exception, providing the correct amount of fuel is added to the cylinder to match the nitrous charge. If fuel is not added to the nitrous, or if the amount of fuel is insufficient, the resulting incorrect mixture will bring about leanness. This is an undesirable condition that causes combustion temperatures to increase rapidly, and one that has the potential to inflict severe engine failure.

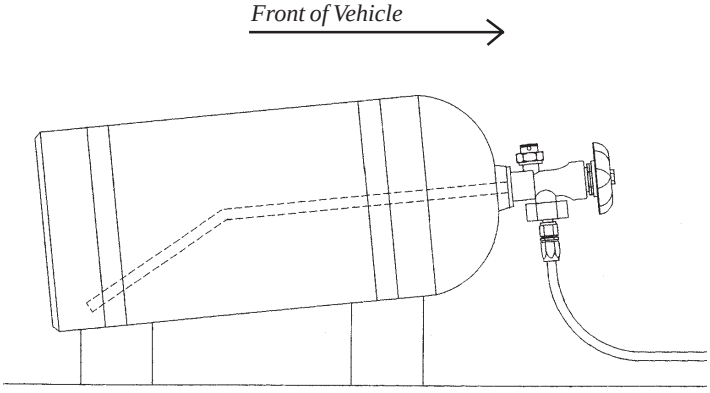
The TBI nitrous system comprises four main components: nitrous delivery system, fuel delivery system, system plate and electrical system. Let's look at each of these with regard to installing and tuning. Testing the system will be discussed, along with some general tips.

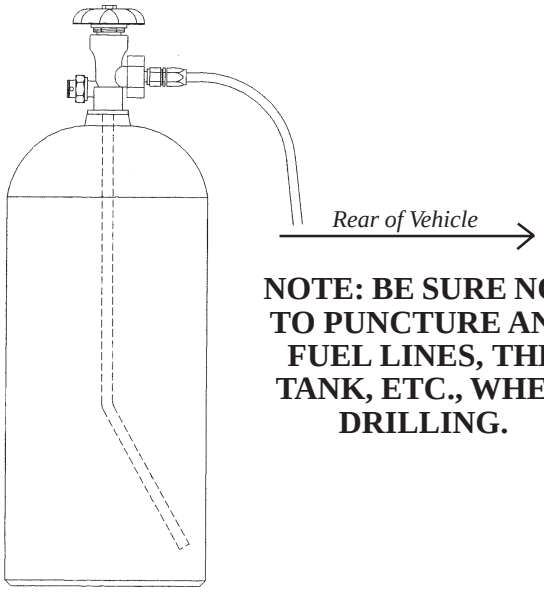
NOTE: BEFORE ANY WORK BEGINS, DISCONNECT THE POSITIVE BATTERY TERMINAL.



NITROUS DELIVERY SYSTEM

The nitrous-oxide cylinder should be mounted in the trunk, or similar area, but not in the drivers compartment. The positioning of the cylinder must be executed as shown in the diagrams below and on the following page to insure the siphon tube remains covered with liquid nitrous. Either installation is acceptable, use the layout that suits your vehicle best.





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

When mounting the cylinder/bottle in the horizontal position, the cylinder brackets should be assembled on the cylinder and used as templates for marking the eight, 5/16" clearance holes. In this position, the valve end will be higher than the bottom of the cylinder, the valve will be pointing forward and the valve outlet facing downwards.

The smaller fitting, opposite the valve outlet, is for pressure relief. Should the cylinder exceed 3000psi, the relief fitting will expel the contents of the cylinder IHRA regulations dictate that this relief fitting is vented to the outside of the car. To comply, The NitrousWorks offer an IHRA-legal relief valve, part number 16021. It's threaded to accept either an external vent tube or braided-steel hose with a -8AN hose end. The other end of the hose can be fixed to a -8 AN bulkhead fitting (part number 150887) to exit the car.

There are several ways in which the nitrous supply line can run to the engine compartment. Some suggestions include: under the carpet, under the kick-panel moldings, or under the floor panel. Anyone of these methods is acceptable. Insure the line is secure, that it cannot be tugged out of position, and it's protected from blows that could cause the line to rupture. Route the line into the engine compartment to the area where the throttle body is located and where the plate will be installed. Make sure the line has a small amount of slack to absorb any engine-to-chassis movement.

SYSTEM PLATE AND FUEL DELIVERY SYSTEM

To mount the system plate, it is necessary to remove the throttle body. Begin this operation by, first, removing the air cleaner, followed by the various morse cables that are attached to the throttle body. If the air cleaner is of the two-bolt type, remove both studs. Next, disconnect the inlet fuel line. Situated on the left hand (driver's) side of the engine bay, the fuel line is the larger of the two lines and is attached to the rear of the throttle body. It may be necessary to loosen the retaining bracket on the transmission for better access to the line. Carefully detach all other plugs and hoses from the throttle body, taking note of their various locations and orientations.

Complete the dismantling process by removing all three bolts that hold the throttle body to the intake manifold. One is located in the mid-front position, and the other two can be found around mid-point on each side of the throttle body.

In order to provide a source of fuel to the nitrous system, cut the existing fuel line near the throttle body, with a tubing cutter, leaving enough space to fit a ferrule for a compression fitting. Insure sure no metal shavings enter the line. Next, install the 'Tee' compression fitting, included in the kit, with the -4AN male outlet.

Fit the system plate and replace the throttle body. Using the new gaskets included, place the plate on the manifold with the N2O mark facing upward and towards the rear of the motor, i.e. next to the firewall. With the plate mounted in this way, the full-throttle switch that's attached to it, will be on the left (driver's) side, with the bracket angled upwards. Then place the throttle body in position.

Fit the two long studs (each of which have a tapped hole in the center of their hex head, for twin-bolt air cleaner retention) and the spacers, included in the kit, into the two mid-point positions, and the single bolt in the mid-front position. Tighten the throttle body/plate assembly to the manifold. Adjust the full-throttle switch, such that it's fully depressed when the throttle body is at wide-open throttle.

Fit the air-cleaner studs, attach the fuel line, throttle cable and other lines disturbed during the removal of the throttle body. The air cleaner should be put in place after the system is tested.

Select a horsepower setting, and install the jets in the appropriate fittings in the system plate. Refer to the Tuning Tips and the Jet Card for help in making this selection. Now, install the hard line with the blue ends to the rear fitting in the system plate and the hard line with the red ends to the front fitting. Fit them in such a way, that the open ends are located over the left (driver's) side valve cover. To these open ends, attach the solenoids. The nitrous solenoid should mount to the blue line, and the fuel solenoid to the red line. In both cases, the lines should attach to the fitting near the 'out' marking on the solenoids. Using the -4 braided-steel line, connect the 'Tee' to the inlet side of the fuel solenoid (marked 'IN'). Connect the nitrous feed line to the inlet of the nitrous solenoid by routing the line along the right (passenger) side of the throttle body and looping it around to the solenoid.

ELECTRICAL SYSTEM

For consistent performance, it's very important to have the nitrous system wired properly. Safety should always be the primary consideration when wiring. The NitrousWorks strongly recommends the use of electrical relays. Relays prevent the amperage draw of the solenoids from damaging the activation switches. They also contribute to the proper functioning of the solenoids.

Diagrams three and four (see insert) illustrate two alternative wiring arrangements. It should be noted that any wire used to deliver power to the soleniods should be a minimum of 16-14 gauge wire.

Diagram three exemplifies the minimum requirement. Though this diagram may appear simpler in design than diagram four, it can be more cumbersome to install. To assure proper solenoid operation, the 12volt switched power supply must be capable of handling 25 - 30 amps. From the power supply, run the cable to the toggle 'arming' switch. From the toggle switch, run to the solenoids, either directly or via an optional momentary switch (Pt. Number 16010).

It should be noted at this point that each solenoid has two wires coming from it. Either wire can be positive or ground - the choice is yours.

From the remaining two wires, either run to the optional Hobbs switch or directly to the full-throttle switch. The Hobbs switch is a pressure-sensing device that will close the circuit, as long as it's exposed to its minimum-rated pressure. They are available in two different settings, 5psi and 30psi. It is recommended to include one of these switches (5 psi Pt. Number 16006) to monitor the pre-regulated fuel pressure and immobilize the setup, should the fuel system fail. This is a wise precaution that could save your engine. From the throttle switch run to a good ground.

Diagram four shows the preferred wiring layout. This design has four main legs. The switched power supply in this system does not need to provide high amperage to the toggle switch. A switched auxiliary port on the fuse panel is an excellent choice. Run from the toggle switch, through the optional momentary switch to the #86 connection on the relay. From the relay (connection #85), 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 of the battery to the #30 connection on the relay. From relay connection #87, run to the solenoids and from the solenoids to a good ground.

TESTING THE SYSTEM

NOTE: AT THIS POINT, RECONNECT THE POSITIVE BATTERY TERMINAL.

The first thing to check is the wiring. If a Hobbs switch is included in the wiring layout, it will be necessary to build a small jumper, or remove it from the system temporarily. Unless exposed to pressure, a Hobbs switch will not close the circuit. These tests need to be performed with the engine switched off.

With the ignition key in the 'on' position, the engine not 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 switch in the 'on' position. This time the solenoids should click. If they do, the wiring is correct. This test applies to either wiring scheme.

To check for fuel leaks, start the car and inspect the fuel fittings and the solenoid inlet fitting. If the fuel system is leak-free, switch off the engine.

CAUTION: NITROUS IS EXTREMELY COLD AND CAN CAUSE BURNS SIMILAR TO FROSTBITE. USE CAUTION WHEN HANDLING NITROUS.

To check for nitrous leaks, open the cylinder/ bottle valve to examine both the connection at the valve and the connection at the solenoid inlet fitting. If leak-free, open the throttle blades, look into the intake tract and examine the spray bars. Any signs of weeping in this area would indicate a leaking solenoid. If no leaks are found, close the cylinder valve and bleed the lines. This can be can be accomplished by loosening the line nut at the cylinder valve. If any leaks are found at the fittings, tighten the line nut. If leaking persists, close the cylinder valve and remove the line for inspection. Alternatively, if a leak is detected at the spray bars, close the cylinder valve immediately. Remove the coil wire and crank the engine with the throttle blades in the wide-open position for about 5 seconds. At this point, contact The NitrousWorks Tech Staff at (706) 864-7009.

Replace the air cleaner.

TUNING TIPS

All NitrousWorks systems are calibrated to operate with a cylinder/bottle pressure of 1000psi. Running with a pressure lower than this will cause the system to operate in a rich condition, and make the vehicle seem sluggish - producing power 'in waves'. If the cylinder pressure exceeds the 1000 psi mark, the kit may go lean which, as discussed earlier, can cause severe engine damage. The best way to monitor cylinder pressure is to install a gauge and in-line adaptor (Pt. Number 16005).

Along with cylinder pressure, specified jetting changes can be made to affect the richness or the leannes of the kit. The larger the fuel jet, the richer the system and, conversely, smaller jets create leanness. The kits are designed to function with a fuel system operating at between 10 - 14 psi. You may need to adjust the jetting based on the fuel pressure (experiment by going up or down a size, or even two sizes). A tell-tale sign of richness is a black exhaust.

One can also look at the sparkplugs. 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, in order to get a good sparkplug 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 ERR ON THE RICH SIDE THAN THE LEAN. A RICH CONDITION MAY LACK IN PERFORMANCE BUT, UNLIKE A LEAN CONDITION, IT'S LESS LIKELY TO DAMAGE ENGINE PARTS.

Finally, timing can also play a key role in nitrous tuning, and retarding it by 2 - 4 degrees is a good rule of thumb. Further retardation may be necessary on larger kits to prevent detonation.

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

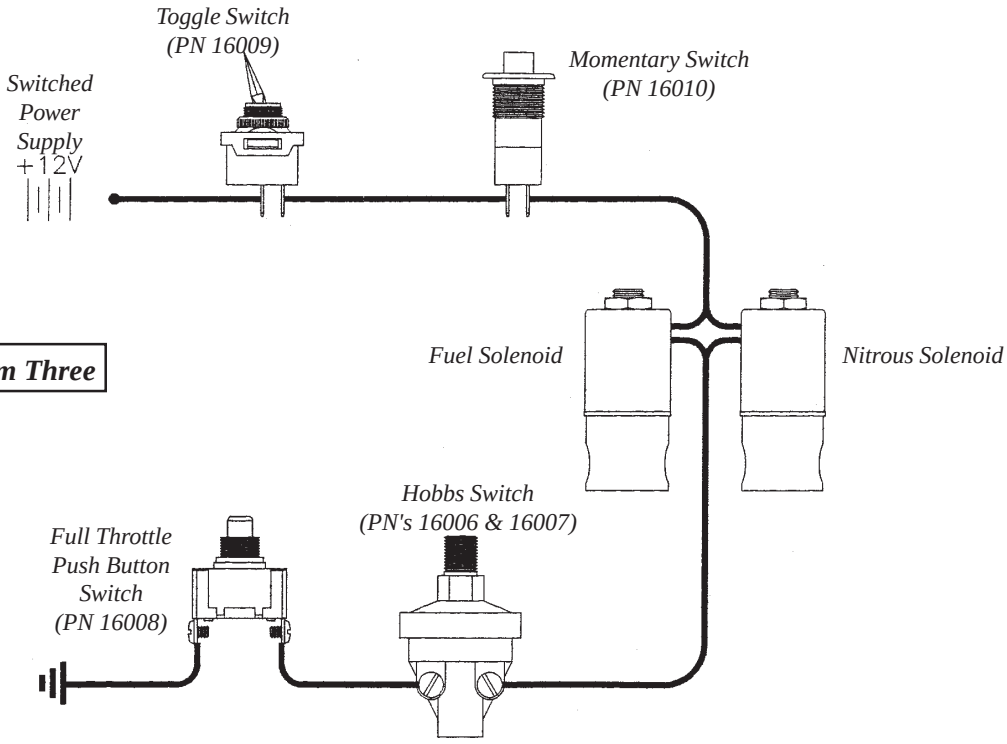


Diagram Three

Diagram Three – Suggested Wiring

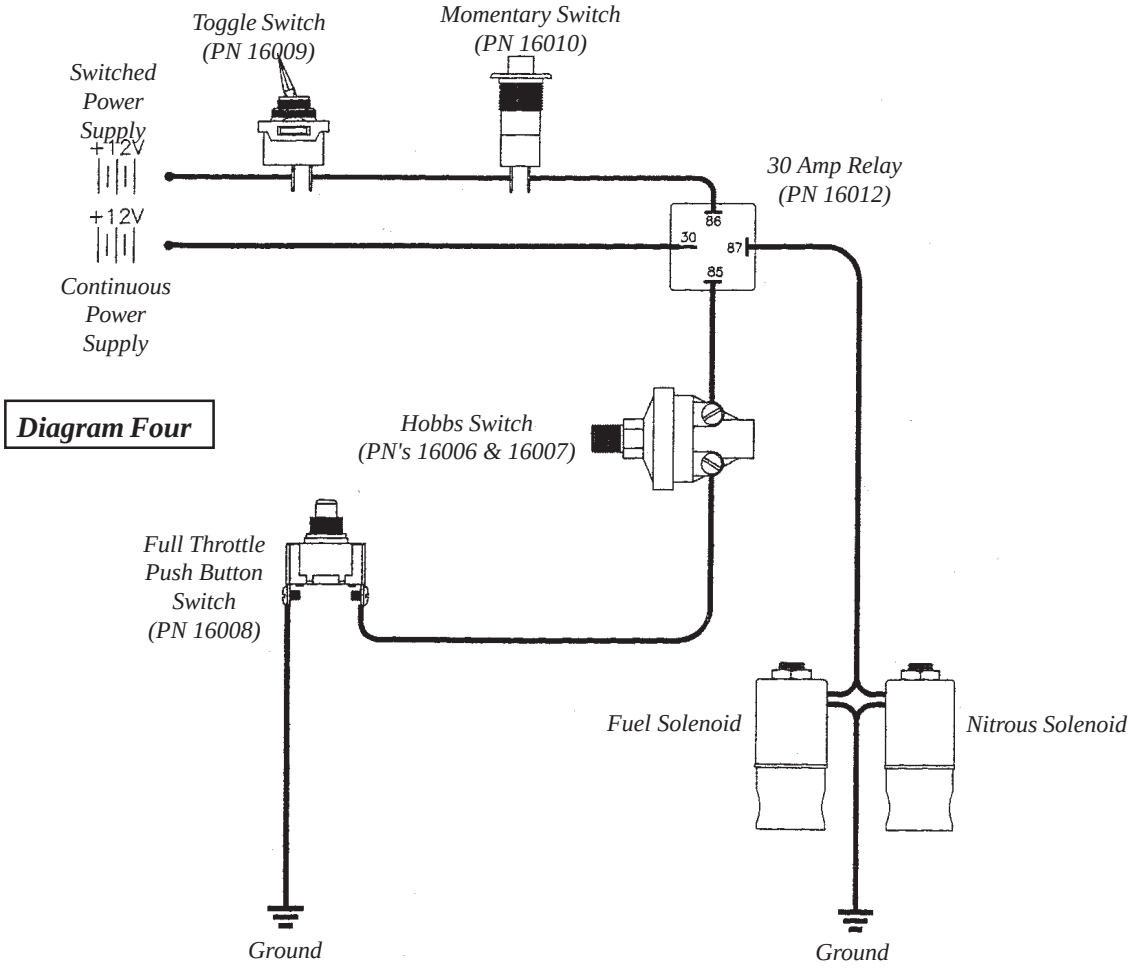


Diagram Four

Diagram Four – Preferred Wiring