LS-1 Adjustable Nitrous Kit
Part Number 13075

INSTALLATION AND TUNING INSTRUCTIONS

INTRODUCTION

Congratulations on your purchase. Now, that you're fully equipped with the latest technology from 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 its performance. Nitrous is rich in oxygen which is a vital component for making more power. By introducing nitrous oxide to the combustion chamber, more fuel can be burned as a result of the higher oxygen content, and the engine will produce more power.

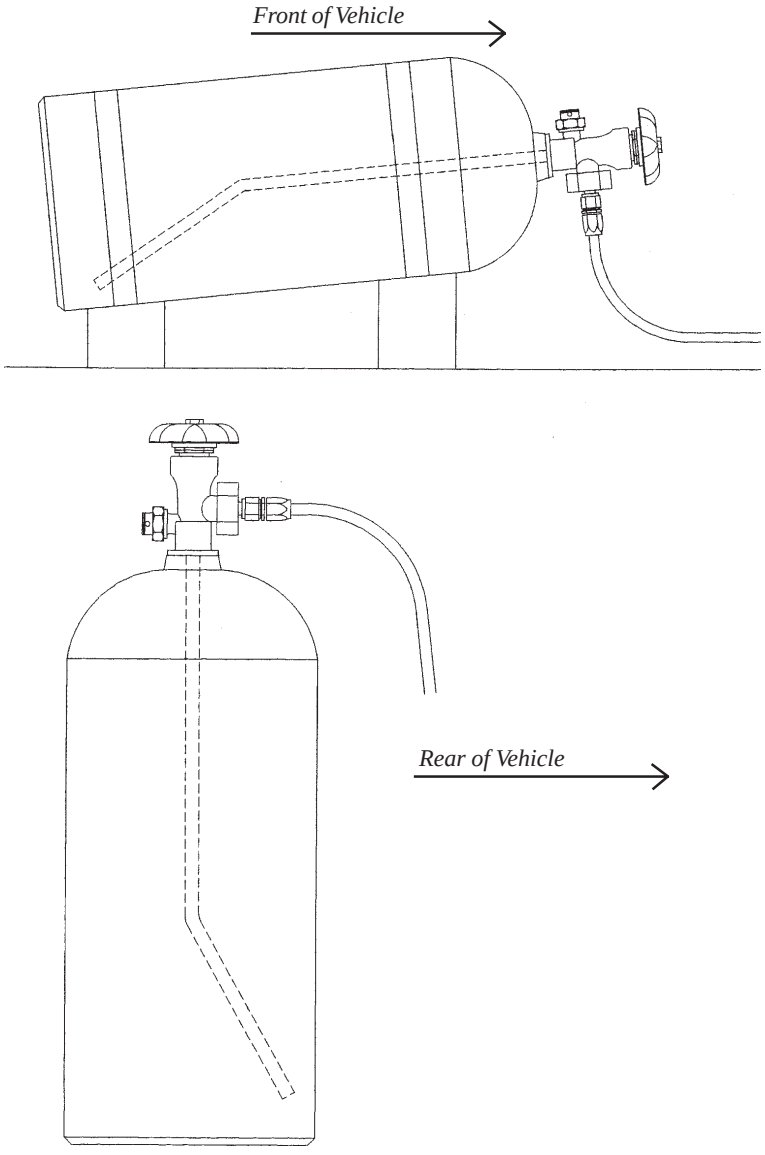
This formula works without exception, providing the correct amount of fuel is added to the combustion chamber to match the nitrous charge. If fuel is not added to the nitrous, or if the amount of fuel is insufficient, the resulting incorrect mixture will bring about leanness. This is an undesirable condition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

The nitrous system comprises four main components: nitrous delivery system, fuel delivery system, delivery nozzle, 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 driver's compartment. The positioning of the cylinder must be executed as shown in the diagrams below to ensure the siphon tube remains covered with



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liquid nitrous. Either installation is acceptable, use the layout that suits your vehicle best.

When mounting the cylinder/bottle in the horizontal position, assemble the brackets on the cylinder and use them as a template for marking the positions of the eight, 5/16" mounting 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.

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

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. Cars competing under IHRA regulations are required to have this relief fitting vented to the outside of the car. To comply, 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 be routed to the engine compartment. Some suggestions include running it under the carpet, under the kick-panel moldings, or under the floor panel. Anyone of these methods is acceptable. On some models of vehicles equipped with an LS-1 engine, you can use the OE brackets used to mount the fuel and brake lines under the car (see figure 1). In either case, ensure 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 towards the area where the solenoids will be mounted. Make sure the line has a small amount of slack to absorb any chassis flex.

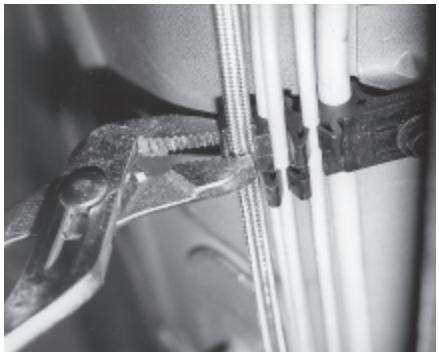


Figure 1

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 drivers side, at about the middle of the engine. Once the valve has been found, remove the cap and the internals from the valve body.

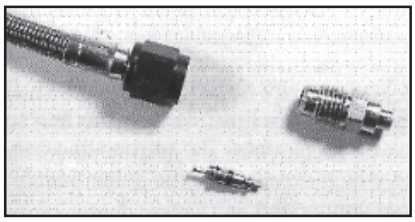


Figure 2

(See figure 2). It's a good idea to have some rags handy at this point to soak up the leaking fuel. Now, attach the 24" #4 line with the red nuts to the fitting. Tighten securely, but don't over tighten and rip the fitting off the rail. Route the fuel line to the area where the solenoids will be mounted.

DELIVERY NOZZLE

The best location for the nozzle is on the air intake side of the butterfly on the throttle body. Ensure that the location of the nozzle, and the lines that run to it, do not adversely affect other nitrous or existing engine components and that there is sufficient hood clearance.

Begin the installation process by removing the plastic/rubber air intake duct that attaches to the front of the throttle body. Place a rag in the mouth of the throttle body to prevent shavings from entering the intake and re-install the air duct.

NOTE: DRILL SHAVINGS CAN CAUSE SEVERE DAMAGE TO THE ENGINE. PLEASE TAKE CARE TO PREVENT DEBRIS FROM ENTERING THE INTAKE.

Using the Letter 'T' drill bit (.358" diameter), drill through the duct mounting clamp, the air intake duct, and the throttle body. Drill the hole normal to the throttle body along its centerline. Remove the air intake track and clamp. Using a 1/8" NPT tap thread the hole in the throttle body. The depth of the tappered tap can be used to position the nozzle. It is necessary for the nozzle to be installed with its 'exit' side aimed directly into the intake.

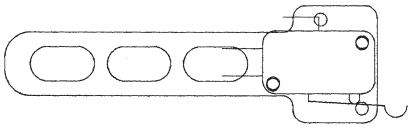
For checking purposes, install the nozzle in the throttle body to ensure its correct positioning. Remove it, together with the rag and all the drilling debris.

For ease of assembly, enlarging the hole in the throttle body clamp/air intake duct (to .375" diameter) is recommended. Re-install the duct and clamp to the throttle body. Mark the 'exit' side of the nozzle and re-install it in the throttle body. Use the mark to verify the installation. A second method of nozzle installation is to use the nozzle duct bushing. See the included sheet for full instructions on this method of nozzle mounting.

Mount the solenoids to a secure place. Their orientation is unimportant; they will function upside down or sideways as well as upright. Make sure the mounting location is within the range of the 18" #3 / #4 lines that run between the nozzle and the solenoids. Once mounted, connect the nitrous feed line from the cylinder to the nitrous solenoid inlet (marked 'IN'). Complete the routing of the fuel line from the Schrader valve to the fuel solenoid. The fuel line should be connected to the fuel solenoid inlet (marked "IN").

Mount the Full Throttle Switch and Bracket such that the switch is engaged with the lever depressed when the car is at full throttle. Mount the switch securely as required for your installation. It's wise to verify that the switch is engaged when the pedal is depressed. **(See Diagram One)**

Diagram One



Selecting the proper jets for the desired horsepower with your system can be done using the following chart. A discussion covering the use of jets can be found under the 'Tuning Tips' section.

HP LEVEL	NITROUS JET	FUEL JET	TUNING JET(S)
75	46	28	26,29
100	52	29	28,31
125	55	31	29,32

With the nozzle installed properly, the fuel jet will be the one closest to the engine; the other will be the nitrous jet. **(See insert - Diagram Two)**

After inserting the proper jets, install the delivery lines from the solenoids to the nozzle. Use the #3 / #4 line with the red nuts between the fuel solenoid and the fuel jet (closest to the engine) and the line with the blue nuts between the nitrous solenoid and the nitrous jet.

ELECTRICAL SYSTEM

The proper and safe wiring of the nitrous system is also critical for consistent performance. Safety should always be the primary consideration when wiring. NitrousWorks strongly recommends the use of electrical relays, which prevent the amperage draw of the solenoids from damaging the activation switches. Relays 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 solenoids should be a minimum of 16-14 gauge wire. The trigger wiring for the relay can be 22 - 18 gauge wire. **(See insert - Diagrams 3 and 4)**

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 ensure 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, 5-psi and 30-psi. It is recommended to include one of these switches (5-psi Part 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. The switch is to be wired using the 'NO' (normally open) terminal and the 'COM' (common) terminal as shown in the diagram.

To supply power to the solenoids, it is recommended to run from the positive terminal of the battery to the #30 connection. 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. Remove the nitrous supply line at the nozzle and check for nitrous in the line (caution: very cold). Any sign 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. Contact the NitrousWorks technical staff at (706) 864-7009.

TUNING TIPS

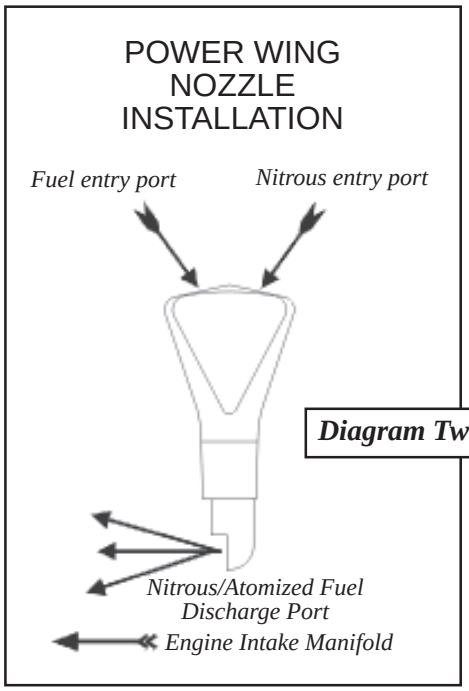
NOTE: TO OVERCOME THE INCREASED COMBUSTION PRESSURES CUSTOMARY WITH NITROUS USE, IT MAY BE NECESSARY TO DECREASE THE PLUG GAPS, OR INSTALL AN IGNITION PERFORMANCE ENHANCER SUCH AS AN *MSD-6AL*, OR SIMILAR, TO REDUCE THE PROSPECT OF BACKFIRE OR OTHER DETRIMENTAL EFFECTS.

All NitrousWorks systems are calibrated to operate with a cylinder/bottle pressure of 1000-psi. 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 system may become 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 adapter (Part. Number 16005 [-4] or Part Number 16013 [-6]).

Along with cylinder pressure, specified jetting changes can be made to affect the richness or the leanness 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 40-psi. You may need to adjust the jetting based on the fuel pressure (go up or down a size or two). A telltale sign of richness is a black exhaust. One can also look at 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, 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 PERFORMANCE BUT, UNLIKE A LEAN CONDITION, IT'S LESS LIKELY TO DAMAGE ENGINE PARTS.

Finally, ignition 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.



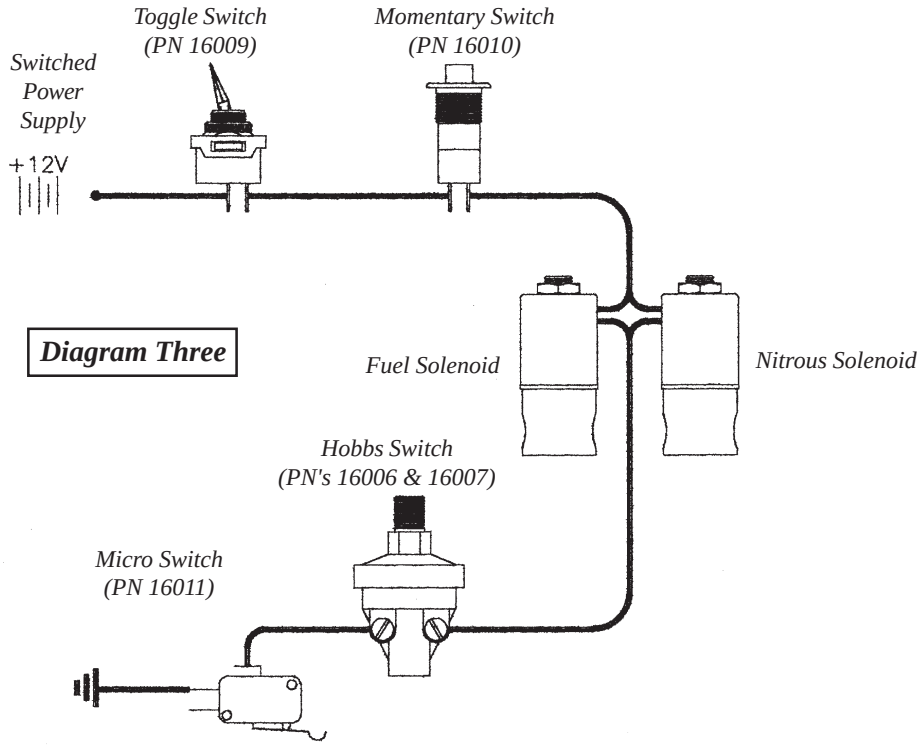


Diagram Three – Suggested Wiring

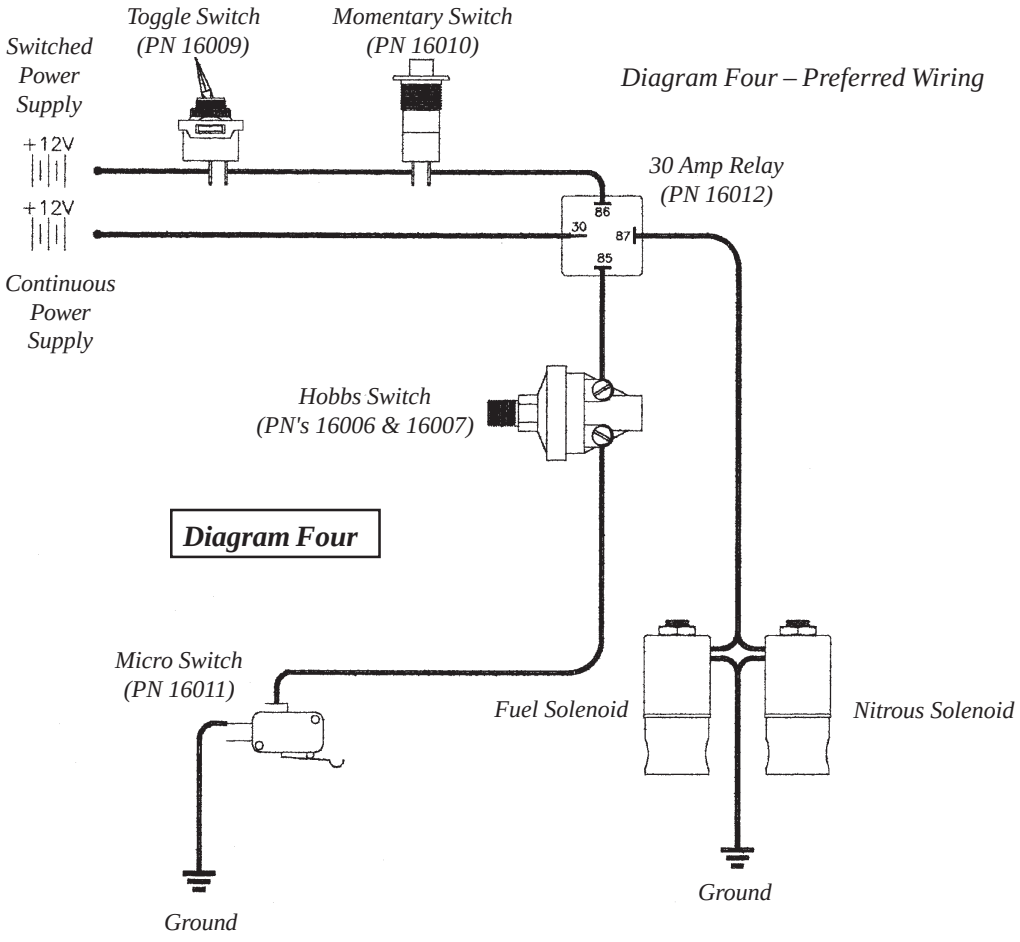


Diagram Four – Preferred Wiring

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