199R-10175-1

IMPORT 4 CYLINDER / MAZDA 2 ROTOR PRO RACE FOGGER SYSTEM

Kit Numbers: 04430NOS—Soft Plume & 04431NOS—Annular Discharge

OWNER'S MANUAL

NOTICE: Installation of Nitrous Oxide Systems Inc. products signifies that you have read this document and have agreed to the terms stated within.

It is the purchaser's responsibility to follow all installation instruction guidelines and safety procedures supplied with the product as it is received by the purchaser to determine the compatibility of the product with the vehicle or the device the purchaser intends to install the product on.

Nitrous Oxide Systems Inc. assumes no responsibility for damages occurring from accident, misuse, abuse, improper installation, improper operation, lack of reasonable care, or all previously stated reasons resulting from incompatibility with other manufacturers' products.

Nitrous Oxide Systems Inc. assumes no responsibility or liability for damages incurred by the use of products manufactured or sold by Nitrous Oxide Systems Inc. on vehicles used for competition or racing.

Nitrous Oxide Systems Inc. neither recommends nor condones the use of products manufactured or sold by Nitrous Oxide Systems Inc. on vehicles, which may be driven on public roads or highways, and assumes no responsibility for damages incurred by such use.

NOS nitrous oxide is legal for use in most states when used in accordance with state and local traffic laws. NOS does not recommend or condone the use of its products in illegal racing activities.

NOS has not pursued California Air Research Board (CARB) exemptions for its kits, hence, they are not legal for use on pollution-controlled vehicles in California. A correctly installed NOS nitrous system should not alter the emission control performance of your vehicle under standard EPA test cycle conditions.

HAZARDS DEFINED
This manual presents step-by-step instructions that describe the process of installing your NOS Nitrous Oxide Injection System. These procedures provide a framework for installation and operation of this kit. Parts are referenced by name and number to avoid confusion. Within the instructions, you are advised of potential hazards, pitfalls, and problems to avoid. The following examples explain the various hazard levels:

WARNING! Failure to comply with instructions may result in injury or death.

CAUTION! Failure to comply with instructions may result in damage to equipment.

NOTE: This information is important, needs to be emphasized, and is set apart from the rest of the text.

HINT: These special instructions provide a handy work tip.

NOTICE: This kit is not intended for use on hatchback type vehicles without the use of NOS P/N 16160 (External Aluminum Blow-Down Tube) and 16166 (Racer Safety Pressure Relief Cap).

NITROUS OXIDE INJECTION SYSTEM SAFETY TIPS

WARNINGS

Do not attempt to start the engine if the nitrous has been injected while the engine was not running. Disconnect the coil wire and turn the engine over with the throttle wide open for several revolutions before attempting to start. Failure to do so can result in extreme engine damage.

Never permit oil, grease, or any other readily combustible substances to come in contact with cylinders, valves, solenoids, hoses, and fittings. Oil and certain gases (such as oxygen and nitrous oxide) may combine to produce a highly flammable condition.

Never interchange nitrous and fuel solenoids. Failure to follow these simple instructions can result in extreme engine damage and/or personal injury.

Never drop or violently strike the bottle. Doing so may result in an explosive bottle failure.

Never change pressure settings of safety relief valve on the nitrous bottle valve. Increasing the safety relief valve pressure settings may create an explosive bottle hazard.

Identify the gas content by the NOS label on the bottle before using. If the bottle is not identified to show the gas contained, return the bottle to the supplier.

Do not deface or remove any markings, which are on the nitrous bottle.

Nitrous bottle valves should always be closed when the system is not being used.

Notify the supplier of any condition, which might have permitted any foreign matter to enter the valve or bottle.

Keep the valves closed on all empty bottles to prevent accidental contamination.

After storage, open the nitrous bottle valve for an instant to clear the opening of any possible dust or dirt.

It is important that all threads on the valves and solenoids are properly mated. Never force connections that do not fit properly.

CONGRATULATIONS on purchasing your NOS Nitrous Oxide Injection System. Your system is composed of the highest quality components available. It should provide many miles of trouble-free performance when used correctly. If you have any questions regarding the performance of your system, call NOS Technical Service at 1-714-546-0592.

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WHAT IS NITROUS OXIDE?

NITROUS OXIDE…

…Is a cryogenic gas composed of nitrogen and oxygen molecules
…Is 36% oxygen by weight
…Is non-flammable by itself
…Is stored as a compressed liquid
…Exists in two grades—U.S.P. and Nitrous Plus:

- U.S.P. is medical grade nitrous oxide; its common use is dental and veterinary anesthesia. It is also commonly used as a propellant in canned whipped cream. U.S.P. is not available to the public.
- Nitrous Plus differs from U.S.P> in that it contains trace amounts of sulphur dioxide added to prevent substance abuse. Nitrous Plus is intended for automotive applications and is available for sale to the public

In automotive applications, Nitrous Plus and fuel are injected into the engine's intake manifold, which produces the following results:

- Lowers engine intake air temperature, producing a dense inlet charge.
- Increases the oxygen content of the inlet charge (air is only 22 percent oxygen by weight).
- Increases the rate at which combustion occurs in the engine's cylinders.

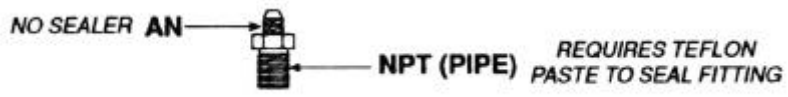
DO'S AND DON'TS OF NITROUS OXIDE

DO'S

- Read all instructions before attempting to install your NOS nitrous system.
- Make sure your fuel delivery system is adequate for the nitrous jetting you have chosen. Inadequate fuel pressure or flow will result in engine damage.
- Use 14 gauge (minimum) wire when installing electrical system components.
- Use high-quality connections at all electrical joints.
- Use Teflon-based paste on the pipe style fittings.
- Make sure your engine and related components (ignition, carburetor, and driveline) are in proper working condition.
- **If nitrous is accidentally injected into the engine when it is not running, remove the engine coil wire, open the throttle, and crank the engine 10 to 15 seconds before starting. Failure to do so can result in an explosive engine failure.**
- **Use your NOS nitrous system only at wide-open throttle and at engine speeds above 3000 RPM.**
- **Install a proper engine to chassis ground. Failure to do so may result in an explosive failure of the main nitrous supply line.**
- Use a high-quality fuel, as suggested in Chapter 3, Baseline Tuning Suggestions.

DON'TS

- Engage your nitrous system with the engine off. Sever engine damage can occur.
- Modify NOS nitrous systems (if you need a non-stock item, call NOS Technical Service for assistance; 1-714-546-0592)
- Overtighten AN type fittings.
- Use Teflon Tape on any pipe threads. Pieces of Teflon tape can break loose and become lodged in nitrous or fuel solenoids or solenoid filters. Debris lodged in a nitrous or fuel solenoid can cause catastrophic engine failure.



- Use sealant of any kind on AN type fittings.
- Allow nitrous pressure to exceed 1100 psi. Excessive pressure can cause swelling or in extreme cases failure of the nitrous solenoid plunger. Solenoid plungers are designed so that pressure-induced failures will prevent the valve from operating. No leakage should occur with this type of failure.
- **Inhale nitrous oxide. Death due to suffocation can occur.**
- **Allow nitrous oxide to come in contact with skin. Severe frostbite can occur.**
- Use octane boosters that contain methanol. Fuel solenoid failure may occur, producing severe engine damage.

Chapter 1 Introduction to your NOS Nitrous Oxide Kit

1.1 General Information

Direct port injection style kits are intended to provide maximum performance and tunability in a nitrous oxide injection system.

Horsepower increases from these kits will vary with engine displacement and configuration. However, approximate power increases can be estimated based upon the massflow of nitrous oxide into the engine. On a typical engine, the following power increases approximate what you can expect to see.

Table 1 Jetting and Power Levels

Configuration	Nitrous/Fuel Jetting	Approximate Power Increase (BHP)	Approximate Nitrous Consumption Rate
CARB applications @ 6-6.5 psi	24-24	120	1.4 lbs/10 secs
	26-26	160	1.9 lbs/10 secs
	30-30	200	2.3 lbs/10 secs
EFI applications @ 40-48 psi	24-18	120	1.4 lbs/10 secs
	26-22	160	1.9 lbs/10 secs
	30-24	200	2.3 lbs/10 secs

A full #10 bottle will weigh 25 pounds. For best performance, the bottle should be refilled when it weighs 17 to 18 pounds.

1.2 Pro Race Fogger System Requirements

NOS Pro Race Fogger Kits P/N 04430 & 04431 are single stage systems intended for maximum effort competition race engines only.

When used correctly, NOS nitrous oxide injection elevates cylinder pressures and temperatures while increasing the combustion rate. These characteristics make the engine more sensitive to detonation.

To ensure proper performance and engine life will all Sportsman Fogger kits, the following is an absolute must:

- ❑ **Adequate Fuel Pressure and Delivery**

When designing your fuel system, plan on your fuel pump(s) and lines flowing at least 0.10 gallons of gasoline per hour per horsepower at the fuel pressure your engine is designed to operate at.

- ***Carbureted Applications***
  Use a fuel pump(s) designed to operate between 5 and 10 psi with a flow rate of 0.1 gallons per hour (gph) per horsepower at 6 psi at WOT. Please note that most aftermarket pumps are rated under free-flowing conditions. At 6 psi, their flow rates may be greatly reduced. Check the manufacturer's specifications carefully or have the pump checked before you use it.

- ***Fuel Injected Applications***
  Use a fuel pump(s) that flows at least 0.1 gallons per horsepower (gph) per horsepower at system pressure. For example: at 42 psi flowing, a motor that makes 450 hp while the nitrous system is activated will require at least 45 gph at 42 psi flowing at WOT. Please note that most aftermarket pumps are rated under free-flowing conditions. At system pressure their flow rates may be greatly reduced. Check the manufacturer's specifications carefully or have the pump checked before you use it. EFI jetting is applicable to vehicles that operate at 40-45 psig at WOT.

If you intend to increase engine output by more than 40%-50%, the following modifications in engine configuration are suggested.

- ❑ **Forged Pistons**

Cast pistons are very prone to failure at elevated cylinder temperatures and pressures.

- ❑ **Connecting Rods**

Cast connecting rods tend to break under the high-compressive loads generated with large doses of nitrous oxide. For most applications, factory forged connecting rods are acceptable. For very high output applications, a steel billet or aluminum rod is suggested.

- ❑ **Cylinder Block**

Main support girdles/sleeves reduce the tendency for the block to flex under high output loading. Cylinder head studs decrease the chance of cylinder heads lifting or moving relative to the cylinder block deck surface.

- ❑ **High Output Ignition System**

Stock ignition systems are prone to producing misfires at high-RPM, when subjected to high cylinder pressures. A quality aftermarket racing ignition is suggested.

1.3 Kit Components

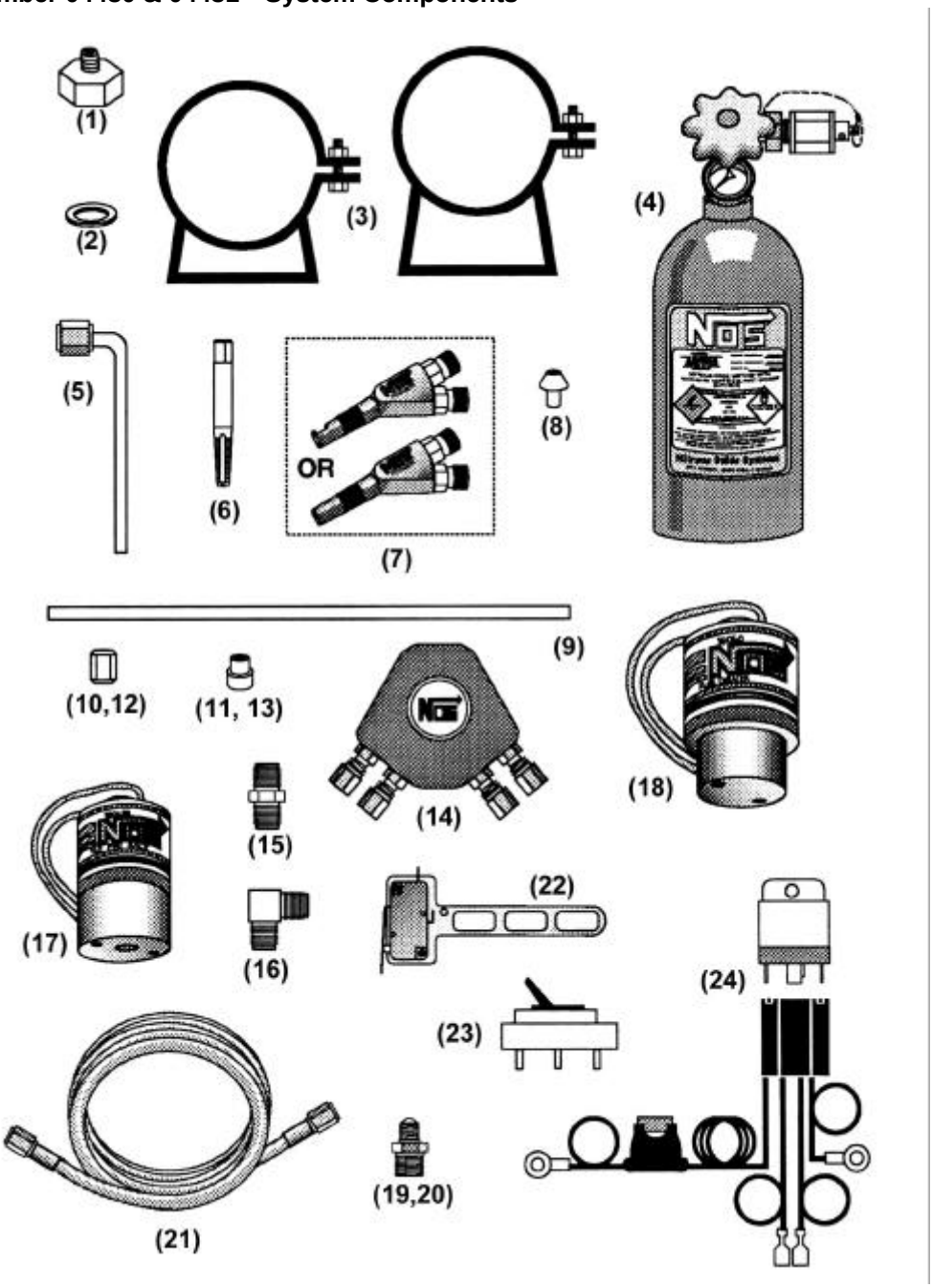
Before beginning the installation of your NOS kit, compare the some of the components in your kit with those shown in Figure 1, and listed in Table 2. If any components are missing, please contact NOS Technical Service at 1-714-546-0592.

Table 2 Kit Number 04430 & 04431 Parts List

Item	Description	Quantity	NOS P/N
(1)	Bottle Valve Adapter	1	16230
(2)	Bottle Washer	1	16210
(3)	Bottle Bracket Set	1	14125
(4)	Bottle 10lb. w/ Super High Flow Valve & N_20 Pressure Gauge	1	14745-SHF-G
(5)	Racer Safety Blow Down Tube	1	16160
(6)	1/16” NPT Tap	1	15990
(7)	Stainless Fogger Nozzle		
	Kit 04430	4	13716
	Kit 04431	4	13700R
(8)	Flare Jet	*	13750
(9)	3/16 x 12” S/S Tube	8	16365
(10)	3AN x 3/16” B-Nut (Blue)	4	17550
(11)	3/16” Sleeve (Blue)	4	17600
(12)	3AN x 3/16” B-Nut (Red)	4	17551
(13)	3/16” Sleeve (Red)	4	17601
(15)	1/8” NPT Male Nipple	1	17500
(16)	1/8” NPT 90° Male Nipple	1	17530
(17)	Pro Race N_20 Solenoid	1	16048R
(18)	Cheater Fuel Solenoid	1	16050
(19)	1/4” NPT x 6 AN N_20 Filter	1	15564
(20)	1/8” NPT x 6 AN Fitting (Red)	1	17986
(21)	12 ft. 6AN Hose (Main Supply)	1	15470
(22)	Microswitch and Bracket	1	15640
(23)	Toggle Arming Switch	1	15600
(24)	30 amp Electrical Relay & Harness*	1	15618

*Varies with application

Figure 1 Kit Number 04430 & 04431—System Components



Chapter 2 Kit Installation—Bottle Mounting

2.1 Bottle Mounting Instructions

Before mounting a nitrous bottle in a racing vehicle intended for use in sanctioned events,, check with the sanctioning association for any rules regarding this subject. Most associations require the bottle to be mounted within the confines of the safety roll cage with the safety pressure cap vented away from the driver's compartment. This kit includes a special safety pressure relief cap (P/N 16166) and an aluminum blow-down tube (P/N 16160) of this purpose.

2.2 Bottle Orientation

Bottle placement is critical to the performance of your NOS nitrous system. It is important to note the orientation of the bottle valve and siphon tube in the nitrous bottle (Figure 2). The bottle must be mounted so that the siphon tube is at the back of the bottle where the liquid (N_2O) nitrous oxide will be during vehicle acceleration.

Whenever the bottle is mounted in a lay-down position, the valve handle must be towards the front of the vehicle with the label facing up (Figure 3A).

If the bottle is mounted vertically, the valve handle and label must face toward the front of the vehicle (Figure 3B). This orientation will position the siphon tube at the back of the bottle where the liquid N_2O will be during acceleration.

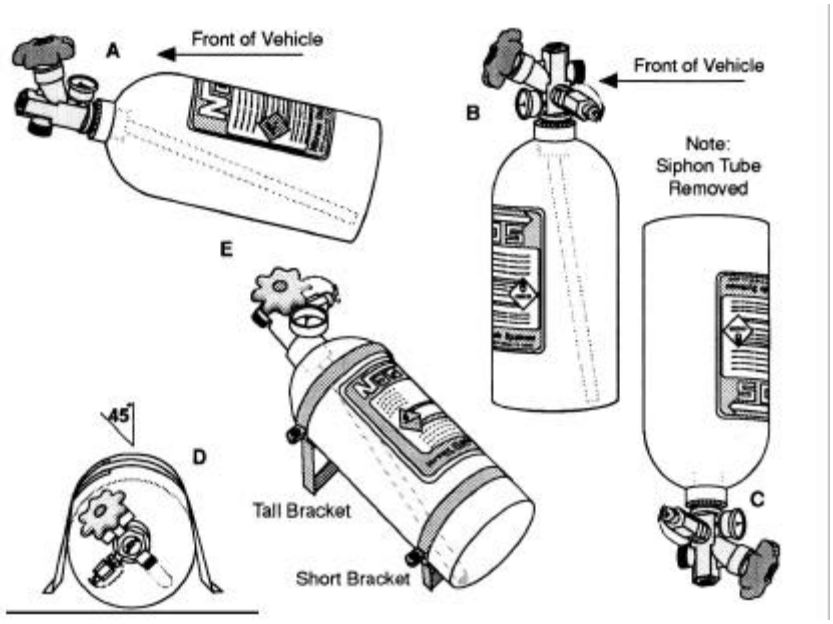
WARNING! DO NOT attempt to remove the siphon tube without completely emptying the bottle of all nitrous and pressure.

A bottle mounted upside-down must have the siphon tube removed before use (Figure 3C). Non-siphon bottles can be specially ordered from NOS.

If the bottle must be mounted parallel to the axles of the vehicle (sideways), the valve handle and label must be angled at approximately 45° toward the front of the vehicle (Figure 3D). This orientation will position the siphon tube toward the rear of the bottle.

Figure 2
Nitrous Bottle Siphon Tube Orientation

Figure 3
Nitrous Bottle Mounting Orientations



NOTE: When using a bottle with a siphon tube, the tall bracket should be at the valve end of the bottle and the short bracket at the bottom (Figure 3E).

The most efficient mounting is the lay-down position (Figure 3A) with the valve handle toward the front of the vehicle. This position allows the greatest amount of liquid to be used before the siphon tube begins to pick up gaseous nitrous oxide.

2.3 Bottle Installation

After you have determined the location and orientation of the nitrous bottle, use the following procedure to install the bottle:

NOTE: Numbers in parentheses ( ) refer to the parts list (Table 2) and component identification drawing (Figure 1). Refer to Figure 4, the exploded view of all parts to be installed, while performing the following instructions.

All standard nitrous oxide cylinders are equipped with safety burst discs in the bottle valve assembly. If the bottle pressure is raised to approximately 3000 psig, the safety disc will burst and empty will burst and empty the contents of the cylinder through the diffuser nozzle cap.

In some applications, the nitrous oxide cylinder is installed in a vehicle location that would result in nitrous oxide being vented to the interior of the vehicle if the safety cap were to burst. In these installations, the safety diffuser cap should be replaced with NOS Racer Safety P/N 16166 for internally threaded safety valve and P/N 16170 for externally threaded safety valve. The outlet from the Racer Safety should be vented outside the vehicle either with NOS Blow-down Tube P/N 16160 or via a 8AN braided steel hose.

1. Connect the open port of the Racer safety to the NOS Blow-Down Tube or 8AN vent hose. Install the Racer Safety Blow-Down Tube (5) onto the special safety adapter on the bottle valve.

IMPORTANT! Whenever the NOS Blow-Down Tube or 8AN vent hose is unhooked from the nitrous oxide cylinder, install and finger tighten the Racer Safety's Diffuser Nozzle Cap. Failure to do so can result in the nitrous oxide cylinder "taking off" and injuring someone or causing property damage if the safety disc were to burst when the bottle was not secured in place.

2. Install the bottle nut adapter (1) and washer (2) on the nitrous bottle (4), and tighten securely.

3. Slip the bottle mounting brackets (3) onto the nitrous bottle, as shown in Figure 3E.

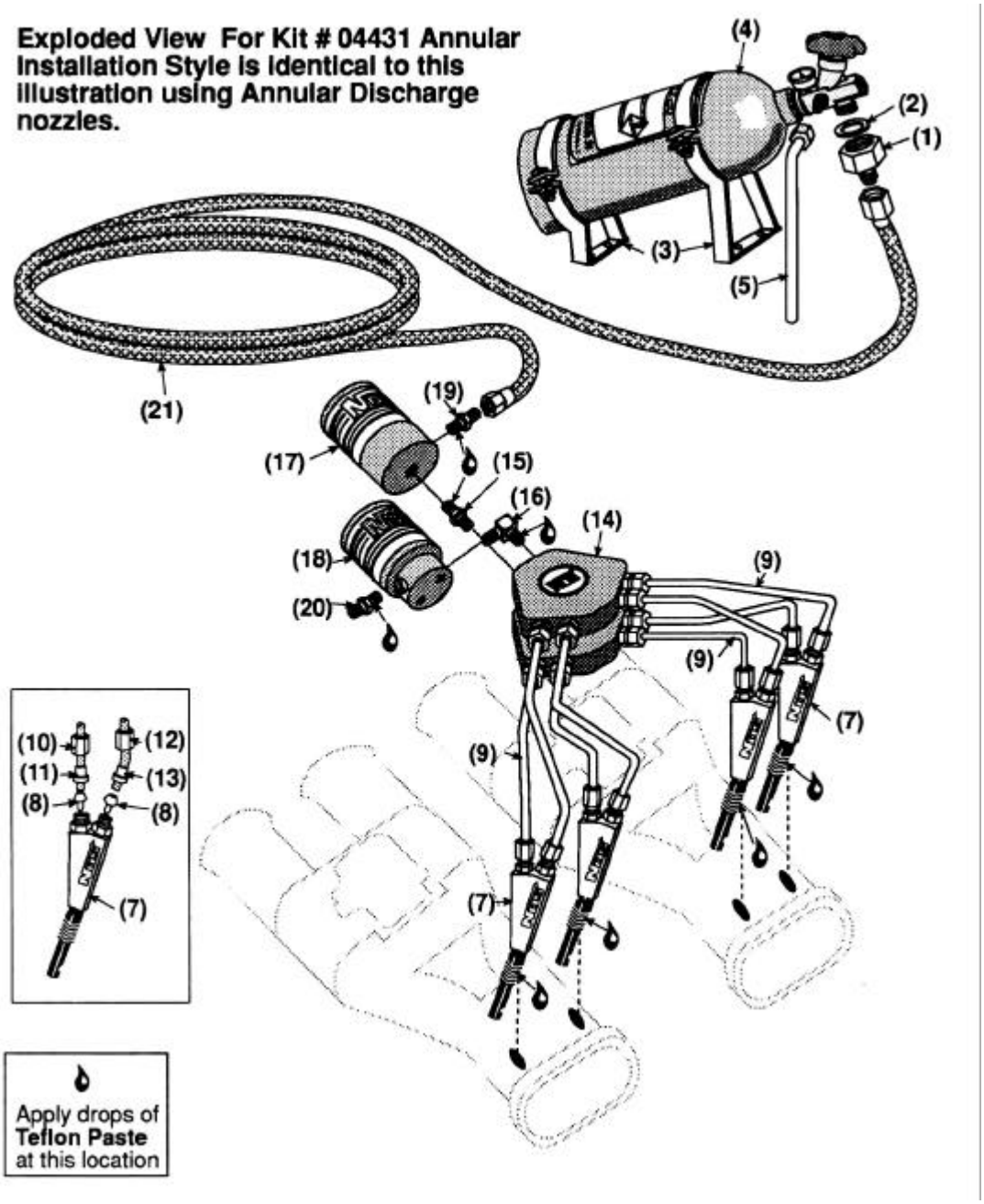
4. Locate the bottle/bracket assembly in the desired mounting location, ensuring that the location will provide easy access to the bottle valve, hose connection, and bracket clamp bolts to facilitate bottle changing.

5. Use the assembled bottle/bracket/blow-down tube unit as a pattern to mark for hole drilling. Drill four 5/16" holes for the bottle bracket bolts, a 1/2" hole for the blow-down tube, and an 11/16" hole for the nitrous supply tube.

6. Mount the brackets securely to the surface (recommended minimum of 5/16" bolts or No. 12 sheet metal screws).

7. Secure the nitrous bottle in the mounting brackets and tighten the bracket clamps.

Figure 4 Kit #04430 & #04430 FI—System Exploded View—depicting Soft Plume Installation Style



2.4 Fogger Nozzle Installation

NOTE: When mounting Fogger nozzles, ensure nozzles and feed lines do not interfere with engine components. Intake manifold must be removed from the engine during drilling and tapping operations.

1. Mark the desired Fogger nozzle mounting locations on the intake manifold.

2. Remove the intake manifold from the engine.

3. Drill a 1/4” diameter hole into the intake manifold at each Fogger nozzle mounting location. For aesthetic purposes, all holes on each cylinder bank should be drilled to line up straight.

NOTE: Holes should be tapped just deep enough for discharge orifice of Fogger nozzle head to protrude through. Be careful not to tap holes too deep, as the Fogger nozzle may not adequately seal.

4. Tap each 1/4” hole with the 1/16” NPT tap (6).

5. Remove all debris from the intake manifold.

HINT: Apply Teflon paste to the threads of each Fogger nozzle before installing them in the manifold. This will help prevent vacuum leaks into the intake manifold.

6. Install a Fogger nozzle (7) into each 1/4” hole, orienting nozzles so the discharge orifices are pointed down the intake manifold port toward the intake valve.

7. Examine Chapter 3—Baseline Tuning Suggestions—for proper nitrous and fuel jet selection for your application. Install the desired flare jets (8) in the Fogger nozzles.

Figure 5 Annular and Soft Plume Pro Race Fogger Nozzles

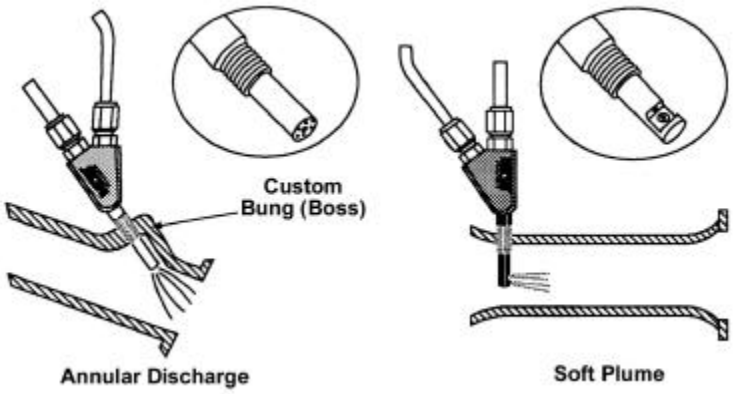
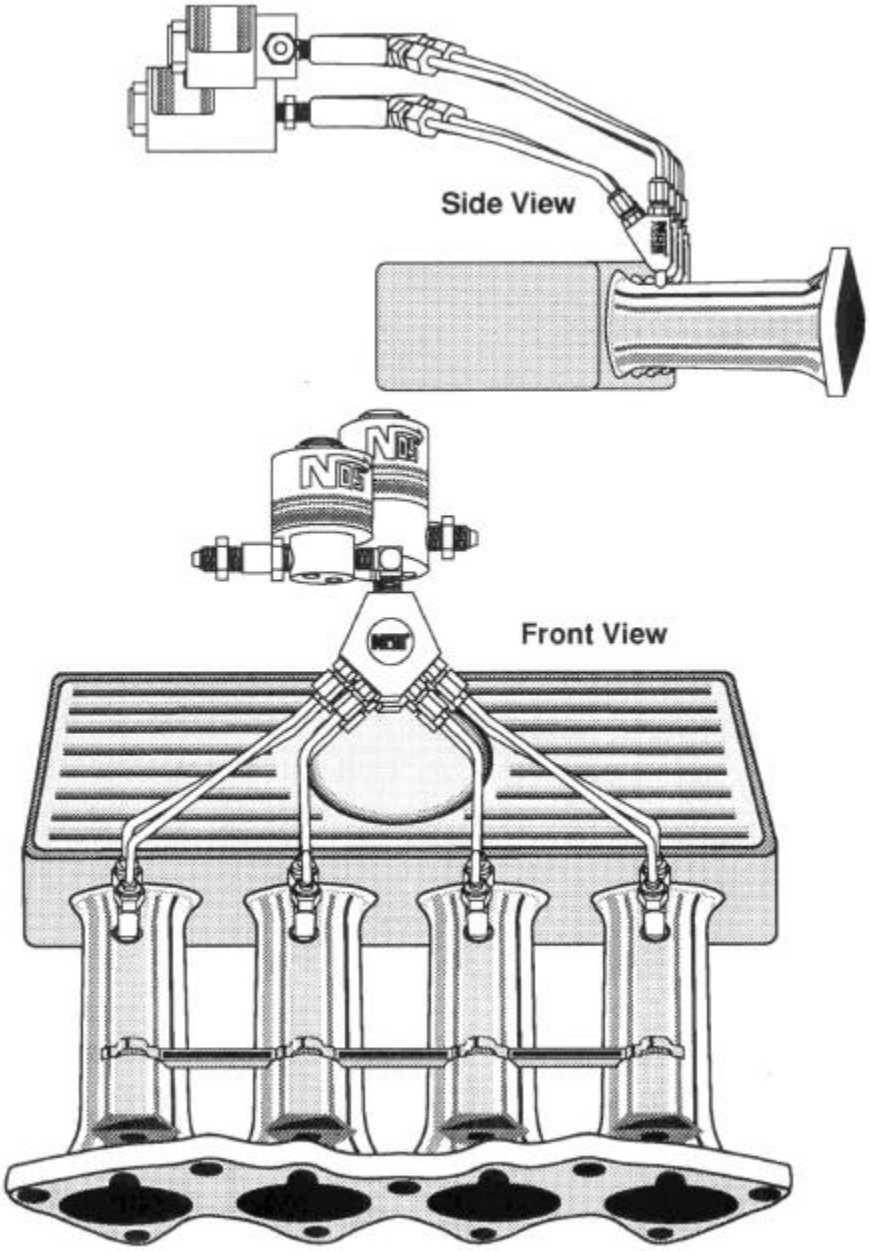


Figure 6 Fogger Nozzle Mounting Position

Figure 7 Kit #04431—Typical Installation depicting Annular Style Discharge Nozzles



2.5 Fogger Nozzle Feed Tube Mounting

2.5.1 Fuel Feed Tube Installation

NOTE: For professional looking results, the following steps need to be performed with a quality tube-bending tool. NOS sells a tool for this purpose under P/N 15991.

NOTE: If you are not experienced in tube bending, it is advisable that before you bend each solenoid extension tube, you make a sample tube using either a piece of brake line or a coat hanger. This "practice" will help you minimize errors and help you to produce an aesthetically pleasing plumbing job.

1. Select two of the 12" solenoid extension tubes (9). Install a Red sleeve (13) and a Red B-Nut (12) on each tube.

2. Install two bent solenoid extension tubes, sleeves, and B-nut assemblies on the fuel inlet ports of the center two Fogger nozzles, with the lone legs of tubes crossing. Measure between the insides of the tubes and place a center mark across both tubes.

3. Remove the two solenoid extension tubes. Cut off the tubes at the inside end marks. Deburr and ream the cut ends.

NOTE: Be sure to remove any debris left from cutting and deburring from the inside of the tube before assembly.

4. Install the compression fitting nuts and ferrules on “smoothed” ends of the solenoid extension tubes.

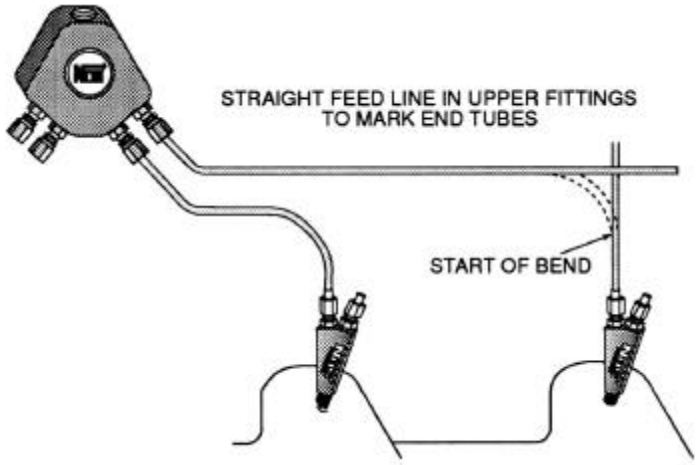
5. Insert the solenoid extension tubes into the compression fitting bodies, which are located in the lower ports of the distribution block. Rotate the distribution block so that it is positioned vertically (relative to the intake manifold runners). Lightly tighten the compression fittings. Lightly tighten the Red B-nuts onto the Fogger nozzle fuel port inlet fittings.

6. Attach and lightly tighten an unbent 12” solenoid extension tube, B-nut, and sleeve on the fuel ports of the two outboard Fogger nozzles.

7. Insert and hold in place the two unbent 12” solenoid extension tubes in the two upper ports of the distribution block, so that they intersect each of the two solenoid extension tubes which are attached to the outboard Fogger nozzles at 90° angles.

8. Place a mark on the two-installed solenoid extension tubes at the inside edge of the two exposed compression fitting body thread sections.

Figure 8 End Fogger Nozzle Feed Tubes



9. Remove the two fuel solenoid extension tubes. Cut-off the tubes at the inside end of the marks. Deburr and ream the cut ends.

NOTE: Be sure to remove any debris left from cutting and deburring from the inside of the tube before assembly.

10. Install the compression fitting nuts and ferrules on “smoothed” ends of the solenoid extension tubes.

11. Insert the solenoid extension tubes into the compression fitting bodies. Lightly tighten the compression nuts.

12. Connect and tighten the solenoid extension tubes to the Fogger nozzles.

13. Tighten all the fuel feed tube fittings.

2.5.2 Nitrous Feed Tube Installation

1. Clamp the distribution block to the side of the fuel distribution block.

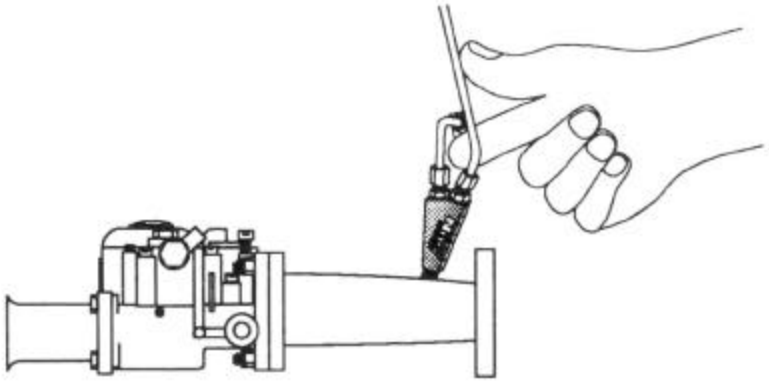
2. Install a Blue B-Nut and sleeve on each of the two 12” solenoid extension tubes.

3. Install two solenoid extension tubes on the center two nozzles.

4. With your thumb and forefinger, bend the two tubes inward so they are aligned with the compression fittings in the distribution block. Refer to Figure 9.

5. Install and loosely tighten the two bent nitrous solenoid extension tubes

Figure 9 Solenoid Extension Tube Installation



6. Place a mark on the two installed nitrous solenoid extension tubes at the inside edge of the two exposed compression fitting body thread sections.

7. Remove the two solenoid extension tubes. Cut off the tubes at the inside end marks. Deburr and ream the cut ends.

NOTE: Be sure to remove any debris left from cutting and deburring from the inside of the tube before assembly.

8. Install the compression fitting nuts and ferrules on the “smoothed” ends of the solenoid extension tubes.

9. Insert the solenoid extension tubes into the compression fitting bodies. Lightly tighten the compression fittings. Lightly tighten the Blue B-nuts onto the Fogger nozzle nitrous port inlet fittings.

10. Attach and lightly tighten an unbent 12” solenoid extension tube, B-nut, and sleeve on the nitrous ports of the two outboard Fogger nozzles.

11. Remove the two end nitrous feed tubes. Bend the tubes 90°. The tube should be placed in the tubing bender such that the marks align with the “finished” bend mark on the tube bender. The bend should proceed away from the nozzle end.

12. Place a mark on the two installed nitrous solenoid extension tubes at the inside edge of the two exposed compression fitting body thread sections.

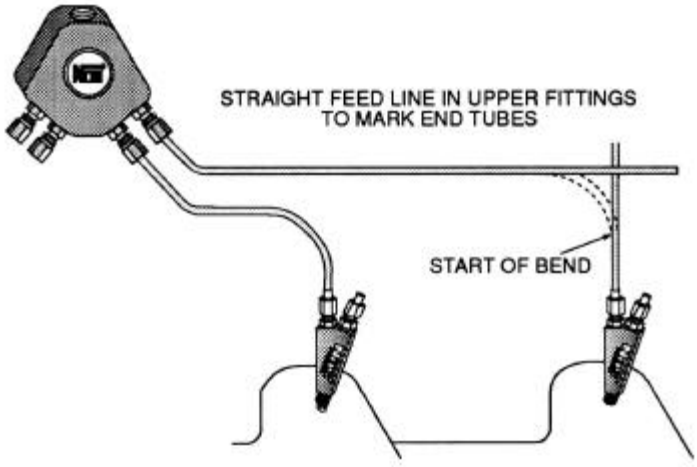
13. Remove the two nitrous solenoid extension tubes. Cut-off the tubes at the inside end of the marks. Deburr and ream the cut ends.

NOTE: Be sure to remove any debris left from cutting and deburring from the inside of the tube before assembly.

14. Install the compression fitting nuts and ferrules on the “smoothed” ends of the solenoid extension tubes.

15. Insert the solenoid extension tubes into the compression fitting bodies. Lightly tighten the compression nuts.

Figure 10 End Fogger Nozzle Feed Tubes



16. Connect and tighten the solenoid extension tubes to the Fogger nozzles.

17. Tighten all the nitrous feed tube fittings.

2.6 Nitrous and Fuel Solenoid Installation

CAUTION! Do not overtighten the vise in the following procedure, or the solenoid will be damaged.

NOTE: Apply Teflon based paste to all pipe fittings before assembling the solenoids.

2.6.1 Nitrous Solenoid Installation

1. Loosely install a 1/8" x 1/8" NPT Male Nipple (15) into the outlet port of the nitrous solenoid.

2. Loosely install the 1/4"NPT x 6AN Nitrous Filter (19) into the inlet port of the nitrous solenoid.

3. Trial fit the solenoid, nitrous filter, and the 1/8" x 1/8" nipple in the Nitrous Distribution Block (14). Note the orientation of the fitting and the solenoid. Disassemble the 1/8" x 1/8" nipple, nitrous filter, solenoid, and the distribution block.

4. Reassemble the solenoid, 90° fitting, 1/8" x 1/8" nipple, nitrous filter, and the distribution block using Teflon paste. Tighten the connections to attain the desired mounting location.

2.6.2 Fuel Solenoid Installation

1. Loosely install a 1/8" x 1/8" NPT 90° fitting (16) into the outlet port of the fuel solenoid.

2. Loosely install a 1/8" NPT x 4AN fitting (20) into the inlet port of the fuel solenoid.

3. Trial fit the solenoid, fuel inlet fitting, and the 90° fitting in the fuel distribution block. Note the orientation of the fitting and the solenoid. Disassemble the 90° fitting, fuel inlet fitting, solenoid, and the distribution block.

4. Reassemble the solenoid, 90° fitting, fuel inlet fitting, and distribution block using Teflon paste. Tighten the connections to attain the desired mounting location.

2.7 Main Nitrous Feed Line Mounting

1. Determine the route for your nitrous feed line to follow. Ensure the path is clear of the exhaust system, suspension, steering, wheels, electrical lines and components, and tires.

2. Feed the 12 ft. x 6AN nitrous supply line (21) along the proposed route.

3. If it is necessary to support the nitrous supply line under the vehicle, use 1/2" Tinnerman clamps or nylon tie-wraps to support the line securely.

4. Attach the nitrous supply line to the nitrous bottle valve adapter.

WARNING! Nitrous oxide is dangerous to humans if inhaled or if it comes in contact with the skin. Always point the nitrous line opening away from people when purging the line.

5. Purge the nitrous supply line:
   A. Wrap the ends of the nitrous line with a rag.
   B. Point the opening away from people.
   C. Briefly open the bottle valve.

6. Attach the nitrous supply line to the nitrous solenoid inlet port.

2.8 Fuel Supply Connection

CAUTION! NOS recommends that the primary fuel line for your nitrous system should be a separate line dedicated solely to the nitrous system. At the lowest power setting included with this kit, you **may** get away with tapping into your standard fuel delivery system, but we do not recommend it. **In all cases, your fuel pump, lines, and regulator must be capable of handling the fuel delivery requirements of your system or engine and system where applicable. Inadequate fuel delivery will result in catastrophic failure.**

2.9 Electrical System

2.9.1 Electrical System Installation for Kit P/N 04430 & 04431 for 5-7 psi Fuel Pressure

Refer to the Figures 11 and 12 for electrical system installation.

WARNING! Death or injury may occur from working on a charged electrical system

1. Disconnect the car battery.

WARNING! Binding or dragging of the throttle linkage will create a potentially dangerous stuck-throttle condition. Ensure that the microswitch does not interfere with the normal throttle linkage operation.

2. Install the throttle microswitch (22) as follows:

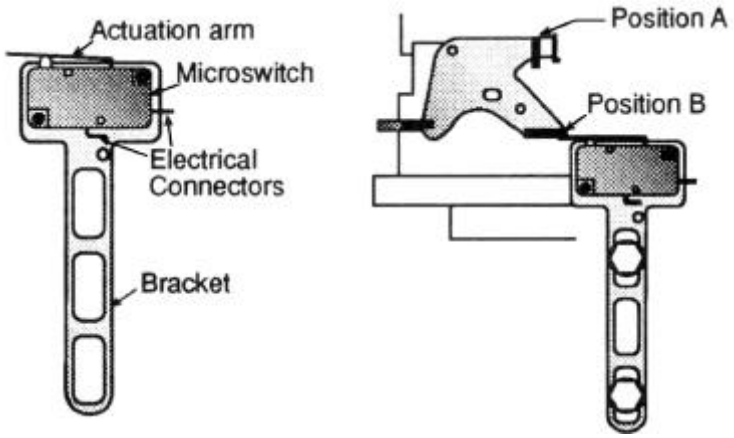
HINT: The microswitch may be mounted to the bracket in a variety of positions and on either side of the bracket. The bracket may be bent to suit the application.

A. Mount the throttle microswitch on the throttle body, so the microswitch is triggered by the throttle linkage movement.

B. Adjust the microswitch to trigger at wide-open throttle by adjusting the microswitch's position to ensure the actuation arm of the microswitch "clicks" at the same point your throttle linkage reaches wide-open throttle against the throttle stop (Figure 11, Position A).

C. Ensure that the throttle and switch can reach the activation position shown in Figure 11, position B, by using the accelerator pedal. Have an assistant slowly press the pedal to the floor while you listen for the "click" of the microswitch (Position B).

Figure 11 Throttle Microswitch Installation



3. Install the NOS arming toggle switch (23) in the vehicle interior, within easy reach of the driver.

4. Install the wiring relay and relay harness (24) in the engine compartment near the battery. The relay's orange wire should reach the battery (+) terminal.

5. Connect the orange relay wire to the battery (+) terminal. Install a 15 amp fuse into the fuse socket.

6. Connect one wire from each solenoid together. Join the solenoid wires to the blue relay wire.

7. Join the remaining solenoid wires together. Connect to a good chassis ground.

8. Connect the green relay wire to a good chassis ground.

9. Connect the red relay wire to either terminal on the microswitch.

10. Connect the open terminal on the microswitch to the middle (#2) terminal on the arming toggle switch.

11. Connect the #1 terminal on the arming switch to a switched 12 volt power source.

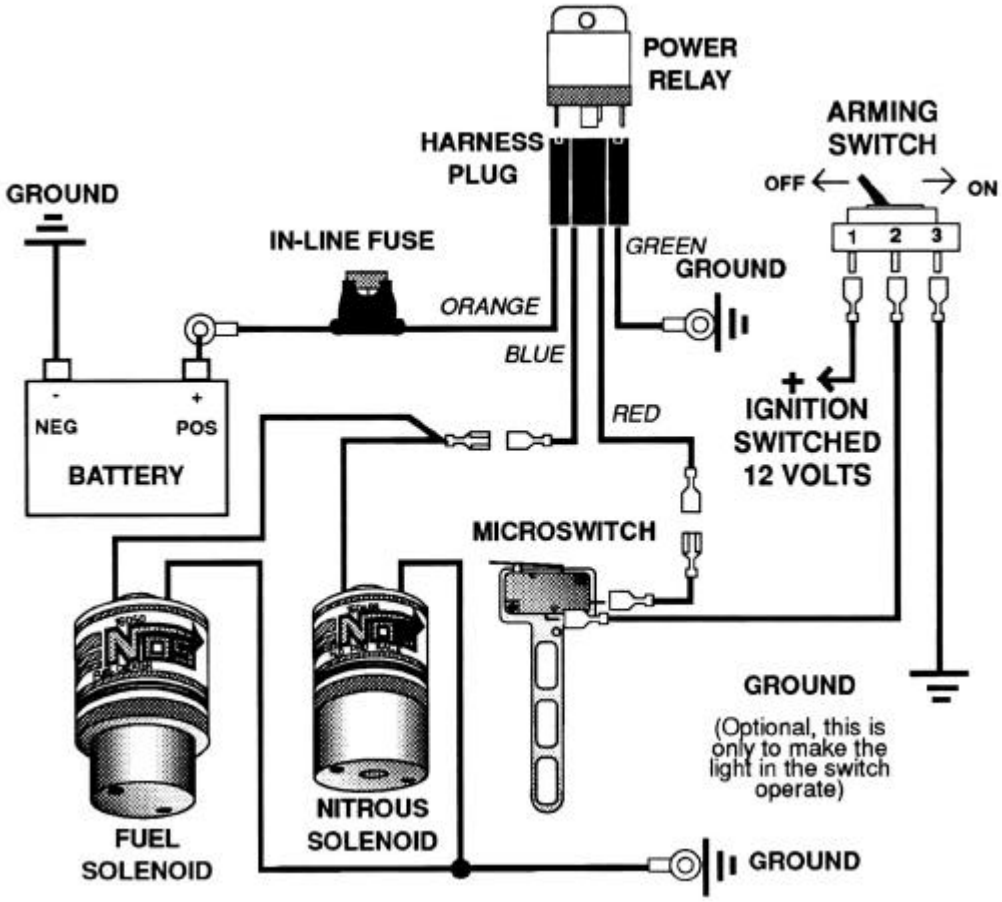
12. Connect the #3 terminal of the arming switch to a ground.

13. Reconnect the battery.

14. Turn the arming switch ON.

15. Push the throttle wide open while the engine is OFF. Each solenoid should make a clicking noise if it is cycling correctly. If no noise is heard, check all the wiring connections and wiring schematic in Figure 12.

Figure 12 Wiring Schematic—Kit Numbers 04430 and 04431



Chapter 3 Baseline Tuning Suggestions

Your NOS 4 Cylinder / Mazda Rotary Pro Race Fogger injection kit comes with three sets of nitrous and fuel jets. These are conservative jetting combinations, based upon 900 psi nitrous oxide bottle pressure and 6-6.5 psi or 40-45 psi (EFI) flowing fuel pressure. Operating with these pressure levels should yield safe and reliable power increases.

Using these jetting combinations with lower bottle pressure and/or higher fuel pressure may produce an excessively rich condition. This can result in a loss of power, excessive exhaust smoke (black), or misfiring (backfiring through the exhaust). This condition may also arise in the carbureted applications that are jetted excessively rich.

If you experience any of these conditions, or you desire to maximize the power output from your system, refer to Chapter 5 “Advanced Tuning Suggestions”.

CAUTION! Use of excessive bottle pressure and/or inadequate fuel pressure can result in an excessively lean condition. In extreme cases, this will produce a catastrophic engine failure.

Table 3 Suggested Baseline Tuning Combinations for the NOS 4 Cylinder Pro Race Fogger System

Stage #	Jetting N_2O/Fuel	Fuel Quality	Ignition Timing	Spark Plug Heat Range	Approx. Power Inc. (BHP)	Approx. Nitrous Consumption Rate
I	24/24 24/18**	100+ Octane	-2° to –4°	Stock to –1 Heat Range	120	1.4 lb./10 sec.
II	26/26 26/22**	105+ Octane	-4° to –6°	Reduce 1 to 2 Heat Ranges	160	1.9 lb./10 sec.
III	30/30 30/24**	110+ Octane or highest available	-8° to –10°	Reduce 2 to 3 Heat Ranges	200	2.3 lb./10 sec.

** These jetting combinations are for EFI systems

NOTE: Carburetor applications @ 6-6.5 psi and EFI applications @ 40-45 psi.

Chapter 4 Preparing for Operation

After you have completed the installation of your NOS 4 Cylinder PRO RACE FOGGER system kit, perform the following checkout procedure before operating your vehicle.

NOTE: Before performing steps 1-4, make sure that the nitrous bottle valve is closed and the main nitrous supply line is empty.

1. Turn on the fuel pump.
2. Check all the fuel lines and fittings for leaks.
3. Set the flowing fuel pressure
4. Start the engine.
5. Turn the arming toggle switch on. Set the engine speed at 2000 RPM. Briefly depress the activation arm on the microswitch. The engine speed should decrease if the fuel delivery system is performing properly; if not, refer to Appendix A, Troubleshooting Guide.
6. Open the nitrous bottle valve.

NOTE: There should be no change in the engine idle speed. If idle speed changes, refer to Appendix A, Troubleshooting Guide.

7. Inspect the nitrous lines and fittings for leaks.
8. ENJOY!

Chapter 5 Advanced Tuning for Maximum Power

5.1 Optimum Nitrous/Fuel Jetting

After performing the Baseline Tuning Suggestion—Chapter 3, if you desire to maximize the performance of your system, perform the following:

NOTE: Always perform the nitrous/fuel jetting modifications listed in Section 5.1 before attempting to optimize the ignition timing (Section 5.2). Improper nitrous/fuel jetting can mislead you when attempting to optimize the ignition timing.

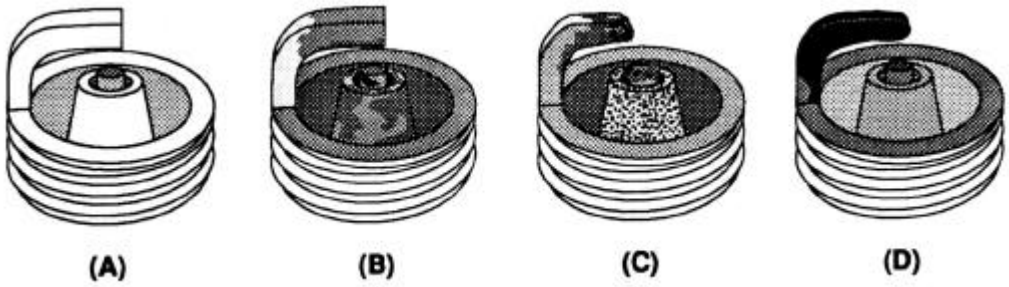
5.1.1 Determining Optimum Nitrous/Fuel Jetting

NOTE: The procedure outlined in this section is not recommended for Kit 04430 and 04431 unless you are operating at fuel pressures outside the design envelope (35-45 psi) of the system.

The jetting combinations included in Kit 04430 and 04431 are intended to provide you with a safe, reliable power increase. They are intended to be used with 5.5 to 6 psi flowing fuel pressure or 35-45 psi flowing fuel pressure at 900–950 psi nitrous bottle pressure. In some instances, installing slightly smaller fuel jets than the units provided in your kit will provide a more optimum nitrous/fuel ratio and increase power.

Always run the baseline jetting included in your kit before attempting to decrease the fuel jet size. Optimum jetting can be determined using the following scheme.

Figure 13 Spark Plug Condition



How to Read Spark Plugs from a Nitrous Oxide Injected Engine

A. Correct Timing, Mixture, and Spark Plug Heat Range
Ground strap retains a "like new" appearance. Edges are crisp, with no signs of discoloration. Porcelain retains clear white appearance with no "peppering" or spotting.

B. Excessively Rich Mixture
Porcelain may be fuel stained, appearing brown or black. In extreme cases, ground strap, electrode, and porcelain may be damp with gasoline, or smell of fuel.

C. Detonation
Edges of the ground strap may become rounded. Porcelain has the appearance of being sprinkled with pepper, or may have aluminum speckles. During heavy detonation, the ground strap tip may burn off. This phenomena can result from excessive ignition timing, too high a heat range spark plug, or inadequate fuel octane.

D. Excessively Lean Mixture
Edges of the ground strap may become rounded. Under moderate overheating, the tip of the ground strap can discolor, usually turning purple, or the entire ground strap can become discolored.

1. Stabilize the nitrous bottle pressure at 900 psi.

2. Perform a dynamometer pull or a full throttle pass down the racetrack. Note the power reading or vehicle mph (not e.t.). Examine the spark plugs for the indication of lean or rich nitrous/fuel conditions (refer to Figure 13 for tips on reading the spark plugs).

   2A. If spark plugs appear to be excessively rich, decrease the fuel jet size 2 steps (ex. 22 to 20, 20 to 18, etc;).

   2B. If spark plugs appear to be excessively lean, increase the fuel jet size 2 steps.

   2C. If spark plugs have a "like new" appearance on the porcelain and electrode, do not make a fuel jetting change.

3. Repeat steps 1 and 2 until the desired mixture is obtained.

5.1.2 Determining Optimum Ignition Timing

IMPORTANT! Ignition timing should be retarded approximately 2 degrees per 50 HP increase due to nitrous oxide injection. Start with the engine's best total timing and reduce from there. Use the initial settings, which are 2-3 degrees more retarded than you expect to be optimum.

Example: Ignition Timing with Nitrous---------- 38°
75 HP Increase from N_2O-------2° / 50 HP---------- 3° Retard
Initial Safety Margin---------- 2° Retard

Initial Timing with Nitrous---------- 33°

The following scheme for determining ignition timing should allow you to determine the optimum setting for your vehicle, without incurring engine damage during the tuning phase.

1. Estimate the reduced ignition timing that you think will produce the best power, based upon the 2 degree retard per 50 horsepower increase rule.

2. Set the ignition timing 2 to 3 degrees retarded from your best power estimate setting.

3. Stabilize the nitrous bottle pressure at 900 psi.

4. Perform a dynamometer pull or a full throttle pass down the racetrack. Note the power reading or vehicle mph.

5. Increase the ignition timing 2 degrees.

6. Perform a dynamometer pull or a full throttle pass down the racetrack. Note the power reading or vehicle mph. Examine the spark plugs for signs of detonation (refer to Figure 13 for tips on reading spark plugs).

   6A. If the power increases or the vehicle mph increases **and** the spark plugs show no sign of overheating or detonation, increase the ignition timing 2 degrees.

   6B. If the power increases or the vehicle mph increases **and** the spark plugs begin to show slight signs of detonation—STOP. Do not advance the timing further. You may choose to reduce the timing 2 degrees at this point for an extra margin of safety.

6C. If the power decreases or the vehicle mph decreases, reduce the ignition timing 2 degrees.

7. Repeat step 6 until optimum ignition timing is obtained.

Chapter 6 Routine Maintenance

6.1 Nitrous Solenoid Filter

When nitrous bottles are refilled they can become contaminated with debris, if the refiller does not have an adequate filter in his transfer pump mechanism. Contaminants in the bottle will eventually become lodged in the nitrous solenoid filter fitting.

You should periodically (after every 20-30 pounds of nitrous usage) examine the mesh in the nitrous filter for debris.

To clean the filter, follow the following steps:

1. Close the valve on the nitrous bottle.
2. Empty the main nitrous feed line.
3. Disconnect the main nitrous feed line from the nitrous solenoid.
4. Remove the nitrous filter fitting from the nitrous solenoid.
5. Remove **all** Teflon paste debris from the solenoid inlet port threads and from the nitrous solenoid filter pipe threads.
6. Examine the mesh in the nitrous filter fitting for contaminants. Blow out debris with compressed air is necessary.
7. Apply fresh Teflon paste to the nitrous filter pipe threads. Reinstall the filter in the nitrous solenoid.
8. Reconnect the main nitrous supply line to the nitrous solenoid.

6.2 Nitrous Solenoid Plunger

6.2.1 General Information

The seals used in the nitrous solenoid of the Pro Race Fogger System is designed and constructed to provide trouble free performance when kept free from fuel contaminants and overpressurization.

The seal provides excellent resilience from the cycling of a progressive nitrous controller and withstands fuel contamination associated with wet manifold style systems.

Due to the resilient nature of the plunger material, it is important to keep the bottle closed and the line purged until the system is ready to use, as small quantities of nitrous may seep through, especially at lower pressures.

The seals used in NOS nitrous solenoid plunger are designed to work at pressures up to 1100 psi. Exposing the plunger to excessive pressure (whether the vehicle is sitting or in-use) can result in the plunger swelling or in extreme cases disintegrating.

NOTE: The seals are designed so that if they fail due to overpressurization, they will not leak, the valve will just fail to flow nitrous oxide.

Swelling of the nitrous solenoid plunger seal will reduce nitrous flow (causing an excessively rich nitrous/fuel condition and a loss of power).

6.2.2 Nitrous Solenoid Plunger Disassembly and Inspection

1. Close the valve on the nitrous bottle.
2. Empty the main nitrous supply line.
3. Remove the retaining nut from the nitrous solenoid.
4. Remove the coil and housing from the nitrous solenoid base.
5. Unscrew the stern from the nitrous solenoid base. Do this by double nutting the stem, or by using a solenoid stem removal tool (NOS P/N 16665-S). **Do not use pliers on the solenoid stem. Damage to the stem will result.**

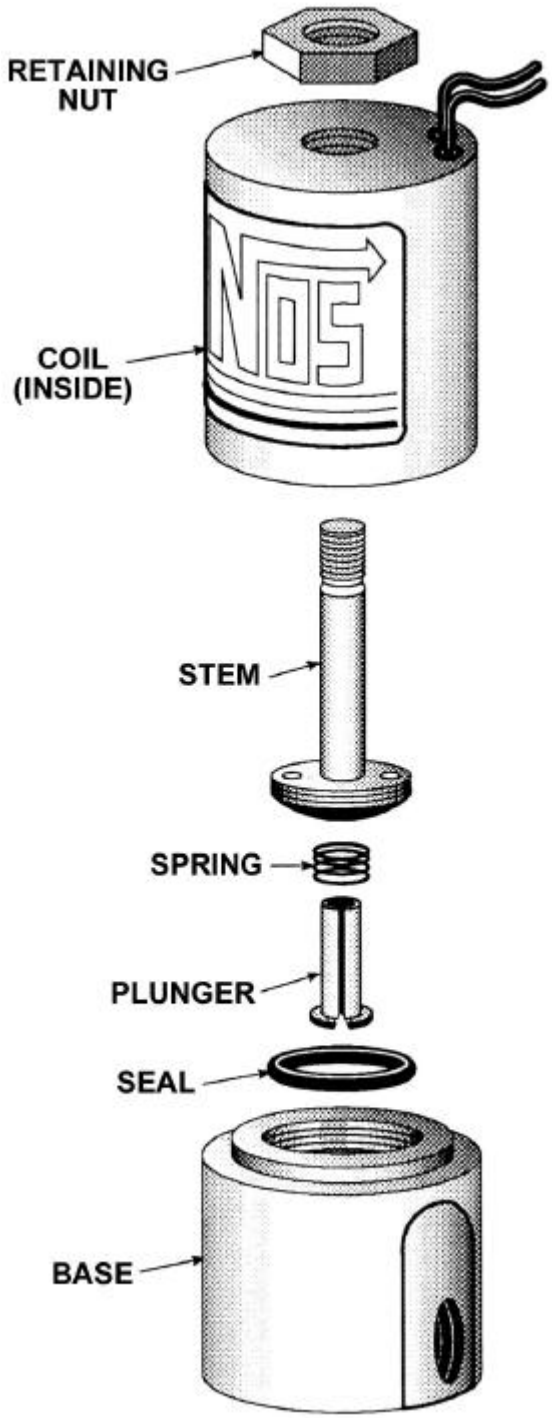
6. Remove the stem, spring, and plunger from the solenoid base.

7. Examine the plunger seal for swelling. The seal surface should be flat, except for a small circular indentation in the center of the seal;

   A fuel-contaminated seal will protrude from the plunger and be dome-shaped. A fuel-contaminated seal may return to its original shape if left out in the fresh air for several days. It may then be returned to service.

   A seal, which has been overpressurized, may be dome-shaped, or the sealing surface may be flat with the seal protruding out of the plunger. A dome-shaped seal may return to its original shape if left out in the fresh air for several days. It may then be returned to service. A seal, which is flat, but protrudes from the plunger body has probably failed internally and should be replaced. NOS P/N 16049 can be used to accomplish this.

Figure 14 Exploded View of a Typical Solenoid



Appendix A Troubleshooting Guide

The troubleshooting chart on the following pages should help determine and rectify most problems with your installed NOS system. If you still need assistance determining or fixing problems, call the NOS Technical Support at 1-714-546-0592, fax at 1-714-545-8319, or email at www.nos@support.holley.com.

PROBLEM	POSSIBLE CAUSES	DIAGNOSTIC PROCEDURE	CORRECTIVE ACTION
No change in the engine speed when the fuel solenoid is activated (Preparing for Operation—Chapter 4).	System is wired incorrectly.	Compare wiring to schematic.	Wire per instructions
	Restricted fuel line.	Inspect fuel line for restrictions (crimped or plugged).	Remove restrictions.
	Malfunctioning fuel solenoid.	Turn arming switch ON. Activate the microswitch. Solenoid should make “clicking” noise.	Repair/replace solenoid.
Change in the engine speed when the nitrous bottle valve is opened (Preparing for Operation—Chapter 4).	Malfunctioning nitrous solenoid.	Remove and inspect the solenoid.	Repair/replace solenoid.
Engine runs rich when system is activated.	Bottle valve not fully opened.	Check bottle valve.	Open valve fully.
	Bottle mounted improperly.	Check bottle orientation.	Mount bottle properly.
	Plugged nitrous filter.	Inspect filter.	Clean/replace filter.
	Low bottle pressure.	Check bottle temperature.	Set bottle temperature to 80° to 85°F.
	Inadequate nitrous supply.	Weigh bottle.	Fill bottle.
	Mismatched N_2O/fuel jetting.	Compare jetting to recommended values.	Install correct jets.
	Excessive fuel pressure.	Install fuel pressure gauge, such as NOS P/N 15931, in the fuel line. Measure the pressure during acceleration, with the system activated.	Regulate pressure down, or install smaller fuel jetting.
	Loose nitrous solenoid wiring.	Inspect the solenoid wiring.	Repair wiring.
	Malfunctioning nitrous solenoid.	**WARNING! Solenoid discharges nitrous at a high rate. Don’t inhale nitrous; death may occur. Skin contact may cause frostbite.** Close the bottle valve. Disconnect nitrous solenoid outlet port. Disconnect solenoid (+) lead. Open nitrous bottle valve. Briefly connect +12V to solenoid. Solenoid should discharge N_2O at high rate.	Rebuild solenoid.
No change in performance when system is activated.	System wired incorrectly.	Compare nitrous wiring to schematic.	Wire system per instructions.
	Loose ground wire(s).	Connect 12V test light to battery (+) terminal. Check for continuity at grounds noted in wiring schematic.	Tighten/repair loose ground(s).
	Malfunctioning pushbutton.	Turn bottle valve OFF. Turn arming switch ON. Connect 12V test light to battery (-). Turn pushbutton switch ON. Check for continuity at pushbutton output pole.	Replace pushbutton.
	No power to arming switch.	With vehicle ignition ON, connect 12V test light to battery (-) terminal. Check for power at pole #1 on arming switch.	Repair wiring.
	Malfunctioning arming switch.	With vehicle ignition ON, turn arming switch ON. Connect 12V test light to battery (-) terminal. Check for power at red wire on arming switch.	Replace arming switch.

	Malfunctioning throttle microswitch.	Temporarily disconnect power relay green wire from microswitch. Connect 12V test light to battery (+) terminal. Manually set microswitch ON. Check for continuity at microswitch positive terminal (see wiring schematic).	Replace throttle microswitch.
	Overly rich fuel condition.	Check for black smoke or backfiring through exhaust with system activated.	Install smaller fuel jet or decrease fuel pressure.
Engine detonates mildly when system is activated.	Excessive ignition timing.	Check ignition timing.	Reduce timing in 2° increments, up to 8° from non-nitrous conditions.
	Inadequate octane fuel.		Use higher octane fuel; up to 116VPC-16.
	Spark plug heat range too high.		Reduce spark plug heat range (maximum two steps).
	Too much nitrous flow.		Reduce nitrous jetting.
Engine detonates mildly when system is activated.	Inadequate fuel delivery due to: Plugged fuel filter	Inspect fuel filter.	Clean or replace filter.
	Crimped fuel line.	Inspect fuel line.	Replace crimped line.
	Weak fuel pump.	Install fuel pressure gauge, such as NOS P/N 15931. Run engine under load at WOT, with system activated.	Repair/replace fuel pump.
High RPM misfire when system is activated.	Excessive spark plug gap.	Inspect spark plugs.	Set spark plug gap at 0.030 to 0.035 inches.
	Weak ignition/ignition component failure.	Inspect components (plug wires, distributor cap, etc.)	Replace worn components.
Surges under acceleration when system is activated.	Inadequate supply of nitrous.	Check bottle weight.	Replace with full bottle.
	Bottle mounted incorrectly.	Compare bottle position and orientation to instructions.	Mount or orient bottle correctly.

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