Universal Wet 4, 6 & 8 Cylinder Nitrous Oxide System

OWNER'S MANUAL

CONGRATULATIONS on purchasing your CFNS Cold Fusion Nitrous System! Your system is of the highest quality components available. It should provide many uses of trouble-free performance when used correctly. If you have any questions regarding the your system, call CFNS Technical Service at 1-713-849-4120.

NOTICE: Installation of Cold Fusion Nitrous System 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.

Cold Fusion Nitrous System 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.

Cold Fusion Nitrous System Inc. assumes no responsibility or liability for damages incurred by the use of products manufactured or sold by **Cold Fusion Nitrous System Inc**. on vehicles used for competition or racing. **Cold Fusion Nitrous System Inc**. neither recommends nor condones the use of products manufactured or sold by **Cold Fusion Nitrous System Inc.** on vehicles, which may be driven on public roads or highways, and assumes no responsibility for damages incurred by such use.

Cold Fusion Nitrous System Inc. is legal for use in most states when used in accordance with state and local traffic laws. **CFNS** does not recommend or condone the use of its products in illegal racing activities.

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

NOTICE: The CFNS Universal 4, 6 & 8 Cylinder CFNS System Kits are not intended for use on hatchback type vehicles without the use of External Aluminum Blow-Down Tube and a Racer Safety Pressure Relief Cap.

HAZARDS DEFINED

This manual presents step-by-step instructions that describe the process of installing your CFNS Nitrous Oxide System. These procedures provide a framework for installation and operation of this kit. 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.

NITROUS OXIDE 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 CFNS 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.

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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 CFNS nitrous system.

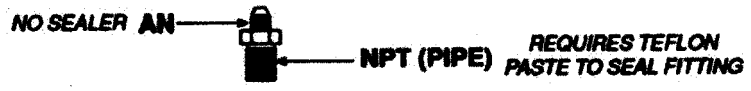
Make sure your fuel delivery system is adequate for the nitrous jetting you have chosen. Inadequate fuel pressure or flow will result in engine damage.

Use 14 gauge (minimum) wire when installing electrical system components.

Use high-quality connections at all electrical joints.
Use Teflon-based paste on 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 CFNS 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. Severe engine damage can occur.
Modify CFNS nitrous systems (if you need a non-stock item, call CFNS Technical Service for assistance).
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 CFNS Nitrous Oxide Kit

1.1 General Information

This Kit is intended for 4, 6, & 8 cylinder applications. This kit was designed to be used on late model multi-point fuel injection type engines with 43 psi ± 5 psi fuel pressure.

This nitrous oxide system injects a mixture of nitrous oxide and fuel into the air intake duct. If the instructions are not carefully followed, poor mixture distribution can occur, resulting in variations of air to fuel ratio from cylinder to cylinder. In extreme cases, intake manifold backfires can occur, if the instructions are not followed exactly. These kits have been designed for safety and smoothness of operation. Nitrous oxide is injected into the engine only when the following conditions are met:

Bottle valve is opened. System is armed. Engine is at wide-open throttle.

Horsepower and torque increases due to these kits will vary with engine displacement and modifications. Approximate power increase estimates can be made based upon the mass flow of nitrous oxide into the engine. The following table is provided to allow you to estimate the power increase you can expect for your application. CFNS **strongly** suggests that an upper limit of about 40% to 50% increase in power output from your stock engine. Exceeding this can result in premature engine failure.

THESE JET SETTINGS ARE FOR A SINGLE NOZZLE APPLICATION AND ONLY A STARTING POINT. FOR MAX POWER, TUNING IS REQUIRED.

Table 1 Jetting Combinations @ 44 PSI Fuel Pressure

Kits Nitrous/Fuel Jetting Approximate Power Increase

	N2O/FUEL
45HP	**.034/.020**
75HP	**.044/.024**
95HP	**.050/.027**
100HP	**.052/.029**

125HP .057/.031
150HP .063/.035
200HP .068/.038

If jets other than the ones recommended in the table are used, please refer to Chapter 3, “Baseline Tuning Suggestions” and Chapter 4, “Preparing for Operation”, for additional information on jet selection. Driveability, fuel economy, and exhaust emissions should not be affected under normal (part throttle) conditions.

1.2 System Requirements

When used correctly, these kits will work with stock internal engine components. **To ensure proper performance and engine life, the following is an absolute must:**

Manual Transmissions

If the vehicle is to be exposed to severe operating conditions, such as drag strip usage, the standard clutch should be replaced with a high performance unit.

Automatic Transmissions

If the vehicle is to be exposed to severe operating conditions, such as drag strip usage, a reputable high-performance transmission shop should service the automatic transmission.

Chapter 2 Kit Installation

2.1 Bottle Mounting Instructions

NOTE: Disconnect the battery ground before beginning installation.

2.1.1 Street Vehicles

Accurate calibration of your CFNS nitrous system depends on the bottle remaining at a stable temperature. Mount the bottle away from heat sources, such as the engine compartment or exhaust system, and away from windows, where the bottle is exposed to direct sunlight. CFNS recommends that the bottle be environmentally separated from the driver’s compartment. Because hatchback-type vehicles generally do not have a firewall between the trunk area and the driver’s compartment, the safety pressure relief cap should be replaced with an aluminum blow-down tube
(a –8 neoprene-line braided hose can be substituted). The blow-down tube should be routed to the exterior of the vehicle (preferably under the vehicle). This procedure will prevent filling the driver’s compartment with nitrous oxide, if the safety pressure relief cap should happen to rupture for any reason.

2.1.2 Racing Vehicles

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 that the bottle be mounted within the confines of the safety roll cage with the safety pressure relief cap vented away from the driver’s compartment.

Figure 2 Nitrous Bottle Siphon Tube Orientation

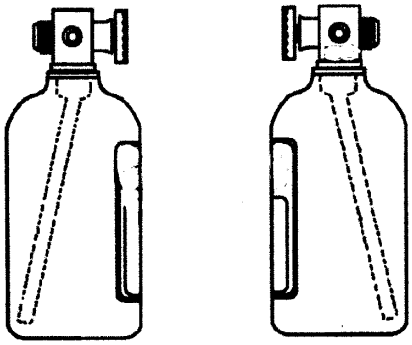
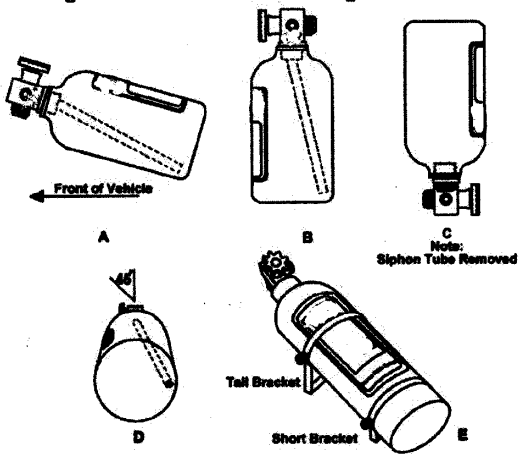


Figure 3 Nitrous Bottle Mounting Orientations



2.2 Bottle Orientation

Bottle placement is critical to the performance of your CFNS nitrous system. It is important to understand how the bottle valve and siphon tube are assembled to properly orient the bottle in your vehicle and ensure that it picks up liquid nitrous while undergoing acceleration. All CFNS nitrous bottles are assembled so that the bottom of the siphon tube is at the bottom of the
bottle and opposite the bottle label (Figure 2). 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. Failure to completely empty the bottle will result in an explosive condition causing injury or death.

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

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:

1. Install the bottle nut adapter (1) and Teflon washer (2) on the nitrous bottle (3). Tighten securely.
2. Loosely install the bottle mounting brackets (4) on the nitrous bottle
3. 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.
4. Use the assembled bottle/bracket unit as a pattern to mark and drill four 5/16” holes in the mounting surface.

CAUTION! When drilling or punching holes for these brackets, be aware what component, wires, or hoses are located or routed behind the general area to avoid vehicle or equipment malfunction.

5. Mount the brackets securely to the surface (recommended minimum of 5/16” bolts or No. 12 sheet metal screws).
6. Secure the nitrous bottle in the mounting brackets and tighten the bracket clamps.

2.4 PRO Nozzle Installation

The recommended mounting location for the PRO nozzle is in the air inlet duct, between the throttle body and the mass airflow sensor (in applications where a mass airflow sensor is used). In certain applications where the throttle body is an integrate part of the air cleaner housing, install the nozzle between the throttle body and the intake manifold. If possible, install the nozzle between 6 and 12 inches before the throttle body or any major turn in the air inlet duct

1. Before making any permanent modifications to the vehicle, layout the location of all the major components (solenoid, nozzle, fuel/nitrous supply lines, etc.).Select the desired mounting location for the PRO Nozzle taking into account the length of the nitrous and fuel supply hoses and the intended location of the solenoids. Make sure the nozzle and feed lines will not interfere with engine components or accessories and will not interfere with the hood when closed. The nozzle should not move from the perpendicular position in the air inlet duct due to strain induced by the nitrous and/or fuel supply hose. Remove the air inlet duct.

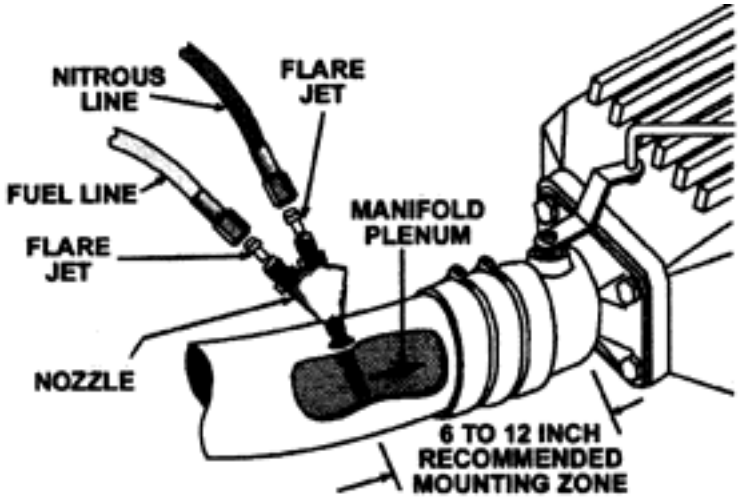
A. ***Metal Mounting Surface:*** Drill a 1/4” hole perpendicular to the centerline of the inlet duct. Tap the hole using a 1/16” NPT tap. Tap depth should be deep enough, so that the discharge orifice of the nozzle is completely submerged into the duct, but not so deep that the PRO nozzle bottoms out.

CAUTION! All debris **must** be removed from the air inlet duct. Use compressed air, if available. Failure to do so can result in severe engine damage.

B. ***Rubber/Hard Plastic Mounting Surface:*** Drill a 7/16” hole perpendicular to the inlet duct centerline through the inlet duct. **CAUTION!** Severe engine damage can occur if the nozzle / nozzle assembly works loose from the air inlet duct. Ensure that the PRO nozzle is securely tightened in the air duct.

5. Note the discharge side of the PRO nozzle. Install the PRO nozzle in the inlet duct with the discharge side pointed toward the engine (downstream or in the direction of the induced air stream). Use Teflon paste to ensure adequate sealing.
6. Install the air inlet duct.

Figure 5 PRO Nozzle Installation Cut-Away



2.5 Solenoid Mounting

CAUTION: Do not over tighten the vise in the following procedure, or the solenoid will be damaged.

1. Clamp the nitrous solenoid in a bench vise.
2. Thread the 1/8" NPT x 4AN nitrous fittings into the inlet/outlet port of the nitrous solenoid. Use Teflon paste to avoid leaks.
4. Clamp the fuel solenoid in a bench vise.
5. Thread the 1/8" NPT x 4AN Fuel Fitting into the outlet port of the fuel solenoid.
6. Thread the 1/8 NPT hose barb into the inlet port of the fuel solenoid. Use Teflon paste to avoid leaks.
9. Select the mounting location for the solenoid assembly. Ensure that the assembly and lines do not interfere with engine accessories or body parts, and that hoses reach the PRO nozzle inlet ports without being stretched or kinked.
10. Securely mount the solenoid assembly.

2.6 Solenoid / PRO Nozzle Hose Connection

1. Select the proper nitrous and fuel jets. Place the desired jets in the PRO nozzle, making sure that the jets are inserted into the correct locations, as marked on the nozzle. Red for fuel and Blue for Nitrous.
2. Connect and tighten the 1 foot braided lines to the PRO nozzle inlet port marked BLUE "nitrous". Hold the PRO nozzle in position with a wrench to ensure the nozzle doesn't rotate out of position when the line is tightened.
3. Connect and tighten the 1 foot braided lines to the PRO nozzle inlet port marked RED "FUEL". Hold the PRO nozzle in position with a wrench to ensure the nozzle doesn't rotate out of position when the line is tightened.

2.7 Nitrous Feed Line Mounting

Most late model vehicles have access plugs in the trunk floor, which are convenient for nitrous line routing. Following the fuel lines along the underbody, and entering the engine bay through the front fender well between the plastic inner fender panel and the body usually works well.

1. Determine the route for your nitrous feed line to follow. Ensure the path is clear of exhaust system, suspension, steering, wheels, electrical lines and components, and tires.
2. Feed the nitrous supply line (16) along the proposed route.
3. If it is necessary to support the nitrous supply line under the vehicle, use nylon tie-wraps to support the line securely.
4. Attach the nitrous supply line to the 4AN bottle nut adapter on the nitrous bottle.

WARNING! Nitrous oxide can cause death if inhaled. Severe frostbite can occur, if allowed to contact the skin. Always point the nitrous line opening away from people when purging the line.

5. Purge the nitrous supply line.

A. Wrap the end of the nitrous line with a rag and hold securely.
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

The fuel supply can be achieved by connecting into any component of the original equipment high-pressure fuel supply system.

Some examples are as follows:

• Connecting to the fuel pressure test port installed in the fuel rail (if available) most American made auto's have one. BE SURE TO REMOVE THE VALVE STEM BEFORE INSTALLING YOUR BRAIDED HOSE TO THE SCHRADER VALVE!

• Connecting to the fuel rail by tapping into the end caps of the rail

• Connecting to the banjo fitting on the fuel filter (most of the European applications)

• Connecting to the fuel supply hose of the original fuel system (easiest access for Imports)

Fuel Supply Connection by using Fuel line.

Supplemental fuel for the CFNS nitrous oxide injection system is taken directly from the fuel line, which feeds the engine's fuel injectors. If you cannot locate the fuel line on your engine, consult a repair manual for your vehicle.

1. Identify the location of the fuel line

2.Find a good location to introduce the fuel tee.

CAUTION! When cutting the fuel line use caution. Fuel in the line is under high pressure. Never cut the fuel line when the engine is hot.

3. Connect the fuel supply line to the fuel tee. Be sure to tighten the hose clamps.

Some vehicles equipped with a fuel rail test port have threads on the test port that are compatible with a 4AN supply line. If your vehicle is so equipped, you may purchase a 4AN x 4AN braided steel line from our Tech. Dept. for a cleaner install.

Fuel Supply Connection by Tapping Fuel Rail

If your vehicle's fuel rail is not equipped with a test port, the fuel rail will need to be removed and tapped for the 1/16"NPT x 4AN fitting (22) using steps A through F on the following page.

CAUTION! Before attempting any modifications to the fuel rail, make sure that enough wall thickness is available to achieve 3 to 4 threads of engagement during the tapping operation. This would be equivalent to 0.120" (3.00mm) to 0.150" (4.00mm) wall thickness.

Figure 6 Typical Fuel Rail

A. Select a location for the 1/16" NPT x 4AN fitting on the fuel rail. Make sure that the fitting and line are clear of all engine components.

B. Remove the fuel rail from the engine. Remove the fuel injectors and regulator (if applicable) from the fuel rail. Drill a 1/4" hole in the fuel rail, making sure that the hole is perpendicular to the mounting surface, and that the hole penetrates into the fuel rail reservoir.

C. Tap the 1/4" hole with the 1/16" NPT tap. De-burr entry and exit hole edges.

CAUTION! All debris must be removed from the fuel rail. Failure to do so will result in an engine failure.

D. Remove all debris from the fuel rail.

E. Install a 1/16" NPT x 4AN fitting or hose barb end in the tapped hole. Use Teflon paste to avoid fuel leaks.

F. Re-install the fuel injectors and regulator. Use clean engine oil to lubricate the o-rings.

G. Install the fuel rail on the engine.

Fuel Supply Connection by Tapping into Main Fuel Supply Fitting

Some engines utilize a fuel rail or distribution block system that does not have test ports and does not allow drilling and tapping to install the 4AN fitting. Supplemental fuel for the CFNS nitrous oxide kit must be acquired from the fuel injectors high pressure supply line.

1. Locate the main fuel supply line. The main fuel supply line feeds pressurized fuel from the fuel pump (in-line or in-tank fuel pump) to the fuel filter and from the fuel filter to the fuel rail or distribution block. The most desired location to "tap" into the fuel line is after the fuel filter.

2. Examine the outlet port of the fuel filter or the inlet to the central distribution block for a "banjo" bolt fitting. Remove the fitting and examine the diameter of the shank of the fitting. To use this fitting for the supplemental fuel supply,
the diameter must be sufficient for a 1/4" hole to be drilled through the centerline of the fitting.

3. Drill a 1/4" hole through the centerline of the banjo fitting.

4. Tap the 1/4" hole with the 1/16" NPT tap.

CAUTION! All debris MUST be removed from the inlet fitting. Failure to do so can result in severe engine damage.

5. Thread a brass 1/16" NPT to 4AN or hose barb fitting into the modified banjo fitting. Use Teflon paste to avoid fuel leaks.

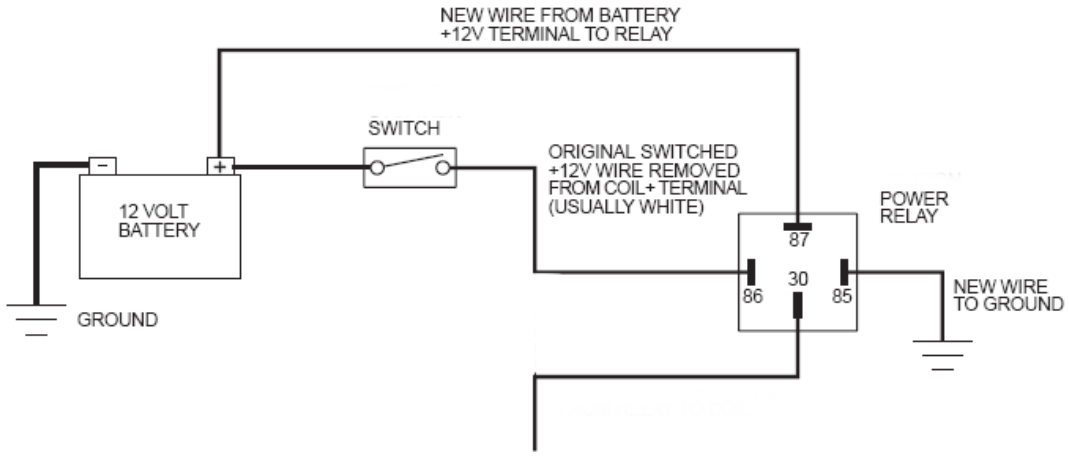
6. Install the modified banjo fitting into the fuel filter.

Fuel Supply Connection by Tapping into Main Fuel Supply Hose (Rubber Hose Only)

1. Locate the main fuel supply line. The main fuel supply line feeds pressurized fuel from the fuel pump (in-line or in-tank fuel pump) to the fuel filter and from the fuel filter to the fuel rail or distribution block. The most desired location to "tap" into the fuel line is after the fuel filter.

WARNING! Leaking fuel lines may cause engine damage, injury, or death. Call the CFNS technical department for potential suggestions or options.
2. Locate a section of the rubber main fuel supply line where the 5/16" hose barb fitting can be easily installed and the fuel enrichment supply line can be easily connected without interfering with engine and ancillaries.
3. Slide hose clamps on both ends of the main fuel supply tee.
4. Install both ends of the main fuel supply line to the ends of the 5/16" hose barb tee fitting.
5. Tighten the hose clamps.
6. Connect fuel supply line to the fuel solenoid fitting.

Figure 9 Electric Wiring Schematic



SOLENOID WIRING: The wire from the battery to the arming switch can also have a push button style thumb switch for the activation or you can use the switch as the arming switch and then use a micro switch for wide open throttle activation.

2.9 Electrical System Installation

Refer to Figure 9 and the procedures in this section for electrical system installation.

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

1. Disconnect the car battery at the ground cable (if not already done).

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

2. Install the throttle micro switch as follows:

The micro switch 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 micro switch on the throttle body so that the throttle linkage movement triggers the micro switch.

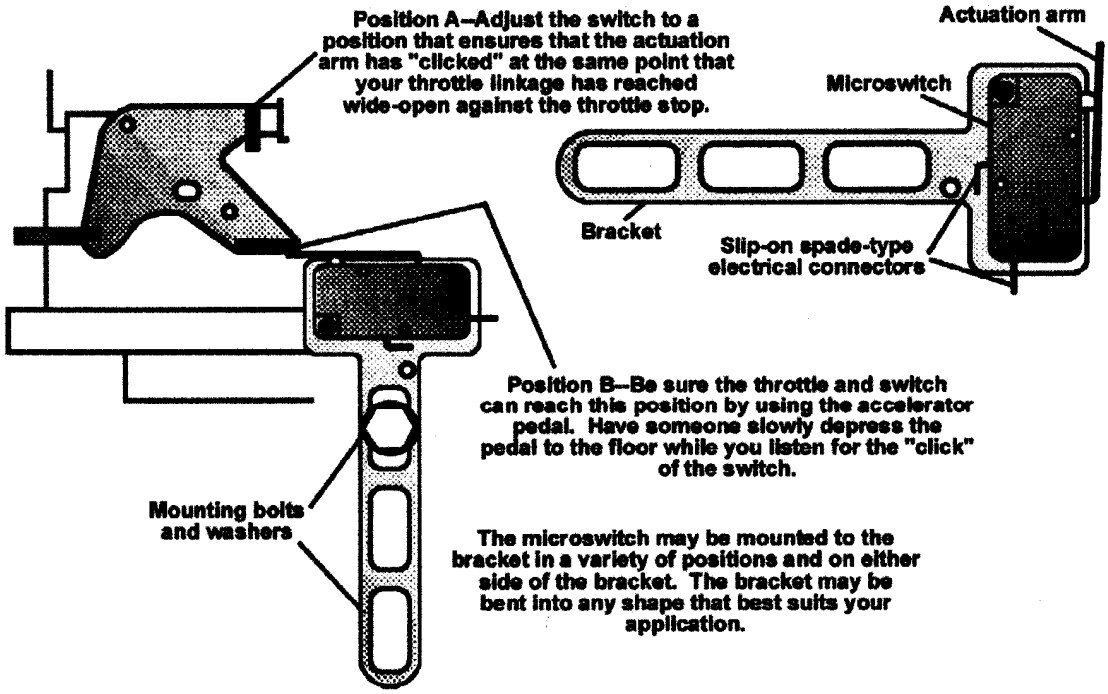
B. Adjust the micro switch to trigger at wide-open throttle by adjusting the microswitch's position to ensure the actuation arm of the micro switch "clicks" at the same point your throttle linkage reaches wide-open throttle against the throttle stop (Figure 10, Position A).

C. Ensure that the throttle and switch can reach the activation position, as shown in Figure 10, 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 micro switch.

3. Install the CFNS arming toggle switch in the vehicle interior, within easy reach of the driver. This switch is to be used to activate the nitrous system once safe engine RPM levels are reached.

CAUTION! Never activate your nitrous system below 3000 engine RPM.

Figure 10 Microswitch Mounting



1. Connect the bottom terminal of the micro switch to the middle of the arming switch.
3. Connect the open terminal on the micro switch to the positive side of the solenoids.
4. Connect the #1 terminal on the arming switch to a switched 12 volt power source.
5. Connect the #3 terminal of the arming switch to a ground.
6. Reconnect the battery.
7. Turn the arming switch on.
8. 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 the wiring schematic in Figure 9.

Chapter 3 Baseline Tuning Suggestions

If you are unsure of your EFI system fuel pressure, you need to refer to Chapter 4, steps 2A through 2C before selecting a baseline tuning combination. Your CFNS System comes preset with nitrous and fuel jetting based upon engine displacement. The jetting combinations are conservative and are intended to work with stock ignition and +92 octane unleaded pump gasoline. Nitrous and fuel jetting combinations are derived based upon 950 psi (85° F) nitrous bottle pressure and fuel pressures as depicted in Table 3. Using the listed jetting and suggested fuel and nitrous pressure levels should yield safe and reliable power increase.

Table 3 EFI System Jetting Map

Fuel Jet at PSI

N_2O Jet	20psi	30psi	40psi	50psi	60psi
24	19-21	18-20	17-19	16-17	16-17
26	19-21	18-20	18-20	17-18	16-17
28	20-22	19-21	18-20	17-18	17-18
30	21-23	19-21	19-21	18-19	17-18
32	22-24	20-22	19-21	19-20	18-19
34	22-25	21-23	20-22	19-20	18-19
36	24-26	22-24	21-23	20-22	19-21

Using theses 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). If you experience any of these conditions, or you desire to maximize the power output from your system, you should refer to Chapter 5, “Advanced Tuning for Maximum Power”.

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

Chapter 4 Preparing for Operation

If jets for higher HP gains are being considered, you need to perform steps 2A through 2C before selecting a baseline tuning combination.

1. Turn on the ignition switch. Check for fuel leaks. Shut the vehicle off.
2. A. Connect a fuel pressure gauge to the fuel pressure test port

B. Turn on the ignition switch. Check for fuel leaks. Record the fuel pressure. Shut the vehicle off.
C. Examine the jetting chart in Table 3. Locate the nitrous jet you are intending to use in column #1. Go across the top row to the fuel pressure your vehicle operates at. Find the box that corresponds to your fuel pressure and nitrous jet. If the recommended fuel jet was not included in your kit, phone the CFNS technical department for assistance.
3. Install the correct fuel jet in the PRO nozzle. Close the nitrous bottle. Turn the arming switch on. Set the engine speed at 2000 RPM. Briefly activate the micro switch. Engine speed should decrease, if the fuel delivery system is performing properly. If not, refer to Appendix A, Troubleshooting Guide.
If jets for higher HP gains are being considered, care must be taken to ensure that the fuel delivery system of your vehicle is adequate. Before opening the nitrous bottle valve, repeat step 2B with the vehicle under wide-open throttle acceleration. Fuel pressure should not deviate more than 4-5psi when the fuel side of the nitrous system is activated. If the fuel pressure drop is greater than this, a supplemental fuel pump will be required. Contact the CFNS technical department for recommendations.
4. Open the nitrous bottle valve.
5. Inspect the nitrous lines and fittings for leaks.
6. Have Fun!

CAUTION! Never activate your nitrous system below 3000 engine RPM.

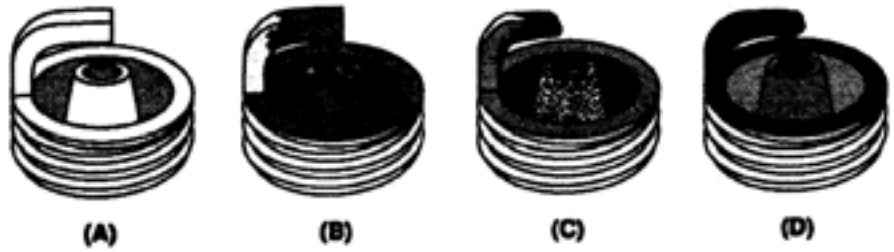
Chapter 5 Advanced Tuning for Maximum Power

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 ratio modifications listed in Section 5.1 before attempting to optimize the ignition timing (Section 5.2). Improper nitrous/fuel ratio combinations can mislead you when attempting to optimize the ignition timing.

5.1 Determining Optimum Nitrous/Fuel Jetting

The factory calibrated nitrous / fuel ratio included provide you with a safe starting point. It is intended to be used with 950psi nitrous bottle pressure and fuel pressures as stated in Table 3. In some instances, slight changes in fuel pressure may produce performance gains.
1. Stabilize the nitrous bottle pressure at 950psi.
2. Perform a dynamometer pull or a full throttle pass down the racetrack. Note the power reading or vehicle mph (not e.t.). Examine spark plugs for the indication of lean or rich nitrous/fuel conditions (refer to Figure 11 for tips on reading the spark plugs).
2A. If spark plugs appear to be excessively rich, decrease the fuel jet size 2 steps (ex. 26 to 24, 24 to 22, etc;).
2B. If spark plugs appear to be excessively lean, increase the fuel jet size 2 steps (ex. 24 to 26, 22 to 24, etc;).
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.

Figure 11 Spark Plug Condition



How to Read Spark Plugs form 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.

5.2 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:

Total Ignition Timing with Nitrous---------- 38°
100 HP Increase from Nitrous-------2°/50HP---------- 4° Retard
Initial Safety Margin---------- 2° Retard
Initial Timing with Nitrous---------- 32°

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 950psi.
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 11 for tips on reading spark plugs).

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

6B. If power increase or vehicle mph increase **and** 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 power decreases or 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 their 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. Empty the main nitrous feed line.
2. Disconnect the main nitrous feed line from the nitrous solenoid. Remove the nitrous filter fitting from the nitrous solenoid.
3. Remove **all** Teflon paste debris from the solenoid inlet port threads and from the nitrous solenoid filter pipe threads.
4. Examine the mesh in the nitrous filter fitting for contaminants. Blow out debris with compressed air, if necessary.
5. Apply fresh Teflon paste to the nitrous filter pipe threads. Reinstall the filter in the nitrous solenoid.
6. Reconnect the main nitrous supply line to the nitrous solenoid.

6.2 Nitrous Solenoid Plunger

General Information

The seals used in CFNS nitrous solenoid plungers are constructed from materials that are designed to be used with nitrous oxide. When kept free from fuel contaminants or from over pressurization, they should provide trouble free performance. You should periodically (after every 20-30 pounds of nitrous usage) examine the seal in the nitrous solenoid plunger. The seals used in CFNS nitrous solenoid plungers are designed to work at pressures up to 1100psi. Exposing the plunger to excessive pressure (whether the vehicle is sitting or in-use) can result in the seal in the plunger seal swelling or in extreme cases, plunger seal disintegration.

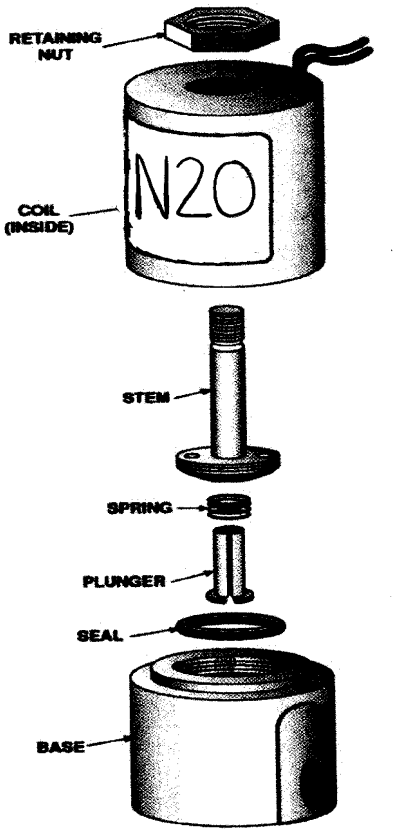
NOTE: fail to flow nitrous oxide. Swelling of the nitrous solenoid plunger seal will reduce nitrous flow (causing an excessively rich nitrous/fuel condition and a loss of power).

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 stem from the nitrous solenoid base. Do this by double nutting the stem, or by using a solenoid stem removal tool **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 over pressurized, 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.

Figure 12 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 CFNS system. If you still need assistance determining or fixing problems, call the CFNS Technical Support at 1-713-849-4120

PROBLEM	POSSIBLE CAUSES	DIAGNOSTIC PROCEDURE	CORRECTIVE ACTION
No change in engine speed when the fuel solenoid is activated (Preparing for Operation—Chapter 4).	System wired incorrectly.	Compare wiring to schematic in Fig. 9.	Wire per instructions.
	Restricted fuel line.	Inspect fuel line for restrictions (crimped or plugged).	Remove restrictions.
	Malfunctioning fuel solenoid.	Turn arming switch ON. Cycle the microswitch. Solenoid should make "clicking" noise.	Repair/replace solenoid.
Change in engine speed when nitrous bottle valve is opened (Preparing for Operation—Chapter 4).	Malfunctioning nitrous solenoid.	Remove and inspect 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 75° 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	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 bottle valve. Disconnect the nitrous solenoid outlet port. Disconnect the solenoid (+) lead. Open the nitrous bottle valve. Connect the +12V to the solenoid. Solenoid should discharge N_2O at a high rate.	Rebuild solenoid.
No change in performance when system is activated.	System wired incorrectly.	Compare nitrous wiring to schematic (Fig. 9).	Wire system per instructions.
	Loose ground wire(s).	Connect 12V test light to battery (+) terminal. Check for continuity at grounds noted in Fig. 9.	Tighten/repair loose grounds.
	Malfunctioning arming switch.	Turn arming switch on. Connect 12V test light to battery (-) terminal. Check for power at pole #2.	Replace pushbutton
	No power to arming switch.	Connect 12V test light to battery (-) terminal. Check for power at pole #1 on arming switch.	Repair wiring.
	Malfunctioning throttle microswitch.	Temporarily disconnect power relay red wire from microswitch. Connect 12V test light to battery (-) terminal. Manually set microswitch ON. Check for continuity at microswitch positive terminal (Fig. 9).	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.
	Inadequate octane fuel.		Use higher octane fuel.
	Spark plug heat range too high.		Reduce spark plug heat range (maximum 2 steps).
	Too much nitrous flow.		Reduce nitrous jetting.

Engine detonates heavily 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	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".
	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 (Figures 2 & 3).	Mount or orient bottle correctly.

Nitrous Oxide Accessories

CFNS systems are calibrated for optimum performance with a bottle pressure of 900-950 psi. The pressure will change with temperature. Heater kits are thermostatically controlled to keep the bottle near 85° F to provide correct pressure. ***Bottle Heaters*** are available for 10 & 15 lb. bottles. Insulating the bottle helps maintain pressure by keeping heat in the bottle when it's cold, or heat out when it's hot outside.

The ***Automatic Bottle Valve*** is the perfect convenience accessory it electronically turns the nitrous bottle on and off a switch no more trips to the trunk. It is also great as a safety shut-off valve. It operates on 12V DC.

The purpose of a ***Purge Valve kit*** is to release trapped air or gaseous nitrous from the feed line(s). This helps to ensure consistent performances. And, purging looks cool too!

Nitrous Pressure Gauges measure from 0-2000psi (although recommended level is 900-950 psi) and are essential in monitoring the bottle. It's a great safety feature and allows better tuning of your nitrous kit.

The ***Quick Release Aluminum Bracket*** is available for 10 lb. and 15 lb. bottles

CFNS Technical Support
6830 N. Eldridge Suite 101
Houston, TX 77041
Phone: 1-713-849-4120
Fax: 1-713-849-2297
Email:sales@coldfusionnitrous.com