SNIPER™ NITROUS SYSTEMS

P/N 07002NOS, 07003NOS, & 07007NOS

Part Number 07002NOS Shown

GENERAL INFORMATION

The Sniper™ System is intended for use on domestic V-6 and V-8 engines using a single 4V Holley or 4V "Rochester Quadrajet" carburetor. Horsepower and torque increases will vary with engine displacement and modification. Approximate power increase estimates can be made based on the mass flow of nitrous oxide into the engine. Three jetting kits are supplied with this system kit to allow you to vary your engine's power output. On a typical mildly modified 350 cubic inch engine, you can expect the following approximate power gains for each of the three jetting combinations:

Nitrous/Fuel Jetting	Approximate Power Gain	Approximate N_20 Consumption Rate
47/47	100 HP	1.00 lbs./10 sec.
55/55	125 HP	1.25 lbs./10 sec.
63/63	150 HP*	1.50 lbs./10 sec.
73/73	180 HP*	2.00 lbs./10 sec.
82/82	210HP*	2.5 lbs./10 sec.
93/93	250 HP*	3.0 lbs./10 sec.

*Jetting included in kit

SNIPER™ KIT REQUIREMENTS

When used correctly, nitrous oxide 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, the following are absolute musts:

Adequate Fuel Pressure and Delivery

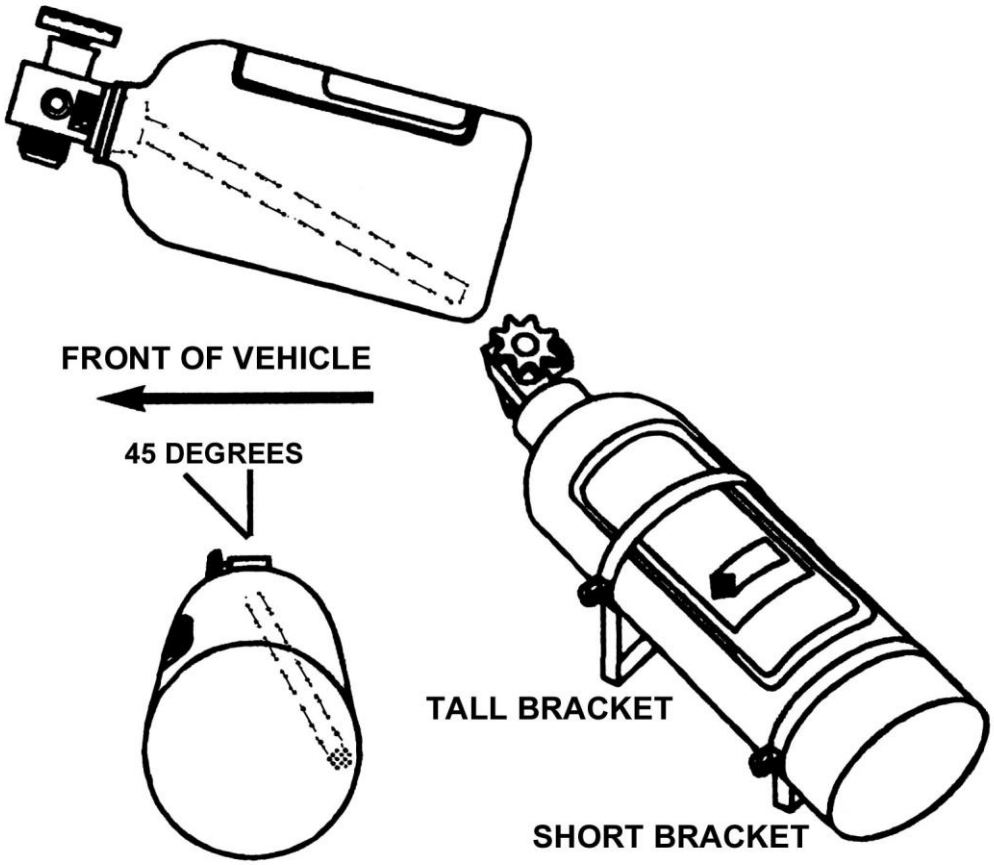
Most carburetor's are designed to operate at 5 psi to 10 psi. when purchasing your fuel system components, plan on your pumps and lines flowing at least 0.10 gallons per hour per horsepower at 5 psi.

NOTE: Most pumps are rated at free-flowing conditions - at 5 psi, their flow rates may be greatly reduced.

BOTTLE ORIENTATION

Bottle placement is critical to the performance of your Sniper 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. Whenever the bottle is mounted in a laydown position, the valve handle must be towards the front of the vehicle with the label facing up. If the bottle is mounted vertically, the valve handle and label must face toward the front of the vehicle. This orientation will position the siphon tube at the back of the bottle where the liquid N_2O will be during acceleration. See Figure 1.

Figure 1 Nitrous Bottle Mounting Orientations

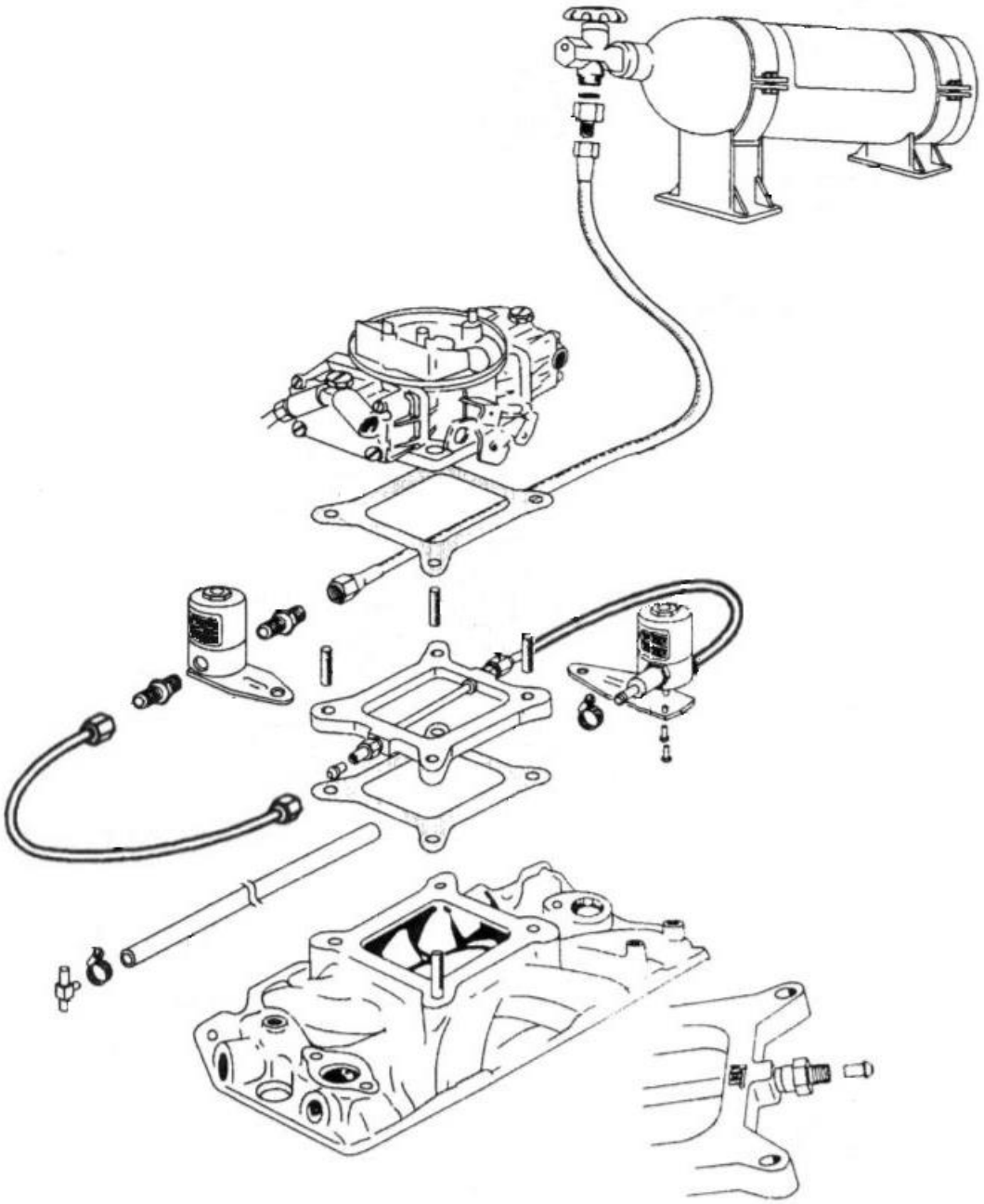


INJECTOR PLATE MOUNTING

Use the following procedure to install injector plate:

1. Remove the carburetor inlet ducting and air cleaner.
2. Disconnect the throttle linkage from the carburetor.
3. Disconnect the fuel line from the carburetor.
4. Remove the carburetor.
5. Remove the stock carburetor studs.
6. Install the extended carburetor studs.
7. Install the injector plate and gaskets on the intake manifold with the NOS label facing up. See the assembly drawing (Figure 2) for an illustration of the part installation.
8. Install the carburetor.
9. Connect the throttle linkage.

Sniper™ Assembly Drawing



SOLENOID MOUNTING

Use the following procedures to install the nitrous solenoid (1) and the fuel solenoid (2). See the assembly drawing (Figure 2) for an illustration of the part installation.

NOTE: Remember to use PTFE paste only on pipe threads.

NITROUS SOLENOID INSTALLATION

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

1. Clamp the nitrous solenoid base in a bench vise.

2. Install the nitrous filter fitting (blue fitting with screen) in the inlet port of the nitrous solenoid and the remaining blue fitting into the outlet side of the solenoid. (NOTE: DO NOT USE THREAD SEALING TAPE ONLY PASTE.)

3. Install the proper nitrous jet into the blue fitting of the injector plate, with the beveled edge out.

4. Loosely install the 12” braided flex line with the blue ends to the jet fitting on the injector plate.

5. Loosely install the other end of the 12” braided flex line onto the nitrous solenoid “out” fitting.

6. Mount the solenoid to the desired location; typically on one of the carburetor studs.

7. Tighten the hose ends to the solenoid and injector plate fittings.

FUEL SOLENOID INSTALLATION

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

1. Clamp the fuel solenoid base in a bench vise.

2. Install the fuel filter assembly fittings (brass colored filter with a hose barb on one end and 1/8” NPT threads on the other. It must be used with the 1/8” to 1/8” extension fitting) in the inlet port of the fuel solenoid and the remaining red fitting into the outlet side of the solenoid. (NOTE; DO NOT USE THREAD SEALING TAPE ONLY PAST)

3. Install the proper fuel jet in the red end of the injector plate, with the beveled edge out.

4. Loosely install the 12” braided flex line with the red ends to the jet fitting on the injector plate.

5. Loosely install the other end of the 12” braided flex line onto the fuel solenoid “out” fitting.

6. Mount the solenoid to the desired location; typically on one of the carburetor studs.

7. Tighten the hose ends to the solenoid and injector plate fittings

NITROUS FEED LINE MOUNTING

HINT: Most vehicles have access plugs in the trunk floor that are convenient for 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 that the path is clear of exhaust system, suspension, steering, wheels, electrical lines and components, and tires.

2. Install the nitrous supply line along the proposed route.

3. If it is necessary to support the nitrous supply line under the vehicle, use nylon cable ties, or similar, to support the line securely.

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

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. Attach the nitrous supply line to the nitrous filter fitting installed in the nitrous solenoid inlet port

6. Purge the nitrous supply line:
   A. Ensure the supply line is properly connected and tightened to both the bottle valve and solenoid.
   B. Slowly open the bottle valve and listen for any nitrous leaks.
   C. If no leaks are present, slowly loosen the feed line fitting at the solenoid until nitrous starts to fog out of the fitting.
   D. Tighten supply line hose end and check for any leaks.

AUXILIARY FUEL LINE INSTALLATION

Under most operating conditions, it is suggested that a separate 3/8-inch fuel line and pump be dedicated to the nitrous system. If you choose to use a single-line fuel system to feed both the engine and the nitrous system, follow these instructions, but remember that at higher power levels, this fuel system may be inadequate.

1. Choose a location where the primary fuel line is to be tapped into.

2. Cut and deburr the primary fuel line.

3. Install the brass fuel-line T-fitting in the primary fuel line.

4. Connect the brass T-fitting to the fuel filter fitting installed in the inlet port of the fuel solenoid using the auxiliary fuel hose and fuel hose clamps.

5. Route the suppled, rubber fuel line from the brass T-fitting to the inlet side of the fuel filter (hose barb) and secure with supplied hose clamps

6. Turn on fuel pump or start vehicle and inspect for any fuel leaks before operating the vehicle.

ELECTRICAL SYSTEM INSTALLATION

Refer to the wiring schematic (Figure 4) for the electrical system installation.

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

1. Disconnect the car battery.

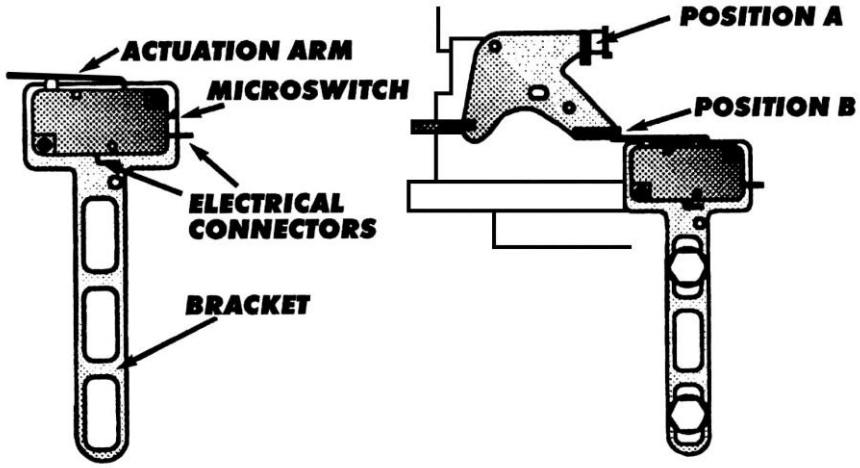
WARNING! Binding or dragging of the throttle linkage will create a potentially dangerous stuck-throttle condition. Ensure that the microswitch does not interfere with normal throttle linkage operation.

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

2. Install the throttle microswitch as follows:

   A. Mount the microswitch on the carburetor, so that the microswitch is triggered by throttle linkage movement.
   B. Adjust the microswitch to trigger at wide-open throttle by adjusting the microswitch's position to ensure that the actuation arm of the microswitch "clicks" at the same point your throttle linkage reaches wide-open against the throttle stop, (position A).
   C. Ensure that the microswitch is activated by the accelerator pedal. Slowly press the throttle to the floor, while you listen for the "click" of the microswitch, (position B).

Throttle Microswitch Installation



3. Install the arming switch within easy reach of the driver.

4. Connect terminal #3 on the arming switch to an ignition switched +12V source, using the fused red wire provided.

NOTE: When selecting an ignition switched +12V source, ensure that your source is capable of handling the amperage of the fuse provided.

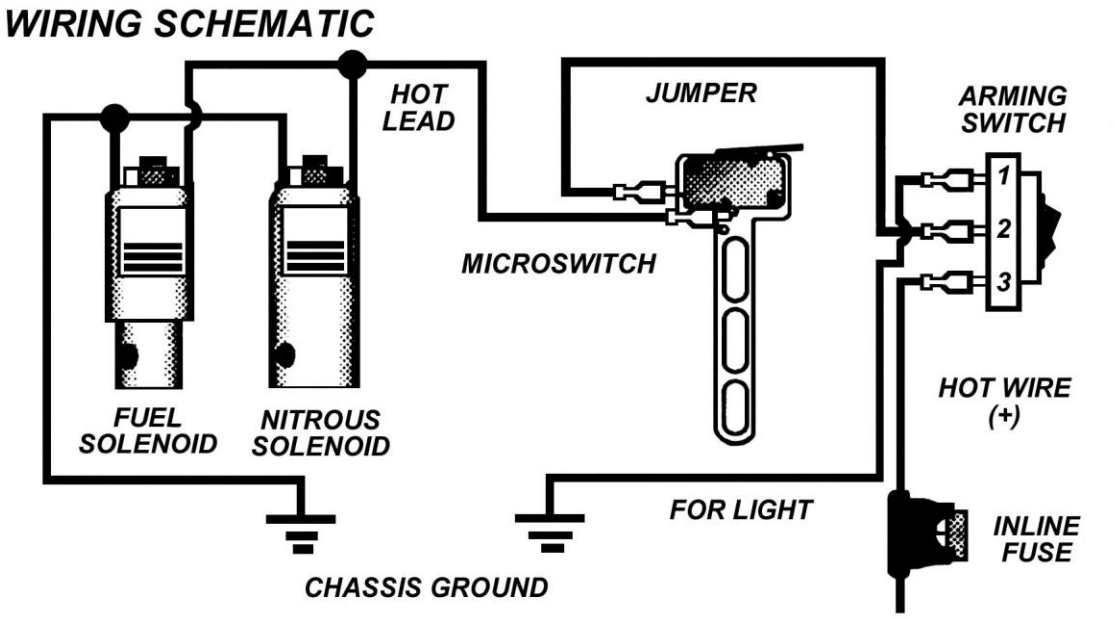
5. Connect terminal #2 of the arming switch to one post of the throttle microswitch (either post will do), with the blue wire provided.

6. Connect terminal #1 of the arming switch to ground. (You may elect to skip this step. If you do so, the light in the arming switch will not illuminate when the system is armed).

7. Connect the open post of the microswitch to one wire from each solenoid (either wire will do, the solenoids are not polarized), using the blue wire provided.

8. Connect the open wire from each solenoid to ground.

Figure 4 Wiring Schematic



Baseline Tuning Suggestions

Your Sniper 250 System Kit comes with four sets of nitrous and fuel jets. These are conservative jetting combinations, based upon 900 psi nitrous oxide bottle pressure and 5 to 6 psi 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 if your carburetor is 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 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.

Suggested Baseline Tuning Combinations

EXTRA HP	JETTING N_2O/FUEL	Baseline Pressures N_2O/Fuel	FUEL OCTANE (R+M/2)	IGNITION TIMING	NGK Spark Plug or Equivalent
100 HP	.047/.047	950PSI/6PSI	93+ Octane	*	Stock
125 HP	.055/.055	950PSI/6PSI	100+ pump gas w/octane booster or 100+ racing gas	*	Stock or -7
150 HP	.063/.063	950PSI/6PSI	100+ pump gas w/octane booster or 100+ racing gas	*	-8
180 HP	.073/.073	950PSI/6PSI	110+ octane, .74 or higher specific gravity, racing gas	*	-9
210 HP	.082/.082	950PSI/6PSI	110+ octane, .74 or higher specific gravity, racing gas	*	-9
250 HP	.093/..093	950PSI/6PSI	112+ octane, .74 or higher specific gravity, racing gas	*	-10

At stage IV jetting level (93/93 jetting), the nitrous solenoid is flowing at maximum capability. Increasing jetting levels beyond this point will not provide a performance increase. If you need performance greater than Stage IV delivers, contact NOS Technical Support for information on higher flow rate solenoids and other related parts.

Preparing for Operation

After you have completed the installation of your nitrous system, 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. Start the engine.

4. Turn the arming switch on. Set the engine speed at 2000 RPM. Briefly depress the activation arm on the microswitch. Engine speed should decrease if the fuel delivery system is performing properly; if not, refer to Appendix A, Troubleshooting Guide.

5. 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.

6. Inspect the nitrous lines and fittings for leaks.

Advanced Tuning for Maximum Power

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 5.1.1 before attempting to optimize the ignition timing (Section 5.1.2). Improper nitrous/fuel jetting combinations can mislead you when attempting to optimize the ignition timing.

Determining Optimum Nitrous/Fuel Jetting

The jetting combinations included in your kit are compromises, intended to provide you with a safe starting point. They are intended to be used with 900 psi nitrous bottle pressure and 5-6 psi flowing fuel pressure. In many 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 fuel jet size. Optimum jetting can be determined using the following scheme.

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 spark plugs for the indication of lean or rich nitrous/fuel conditions (refer to Figure 7 for tips on reading the spark plugs).

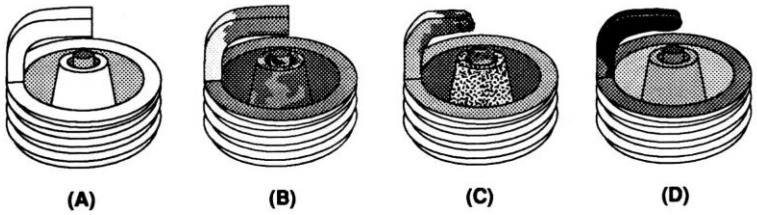
   2A. If spark plugs appear to be excessively rich, decrease the fuel jet size 2 steps (ex. 93 to 91, 102 to 100, etc;).

   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.

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.

Determining Optimum Ignition Timing

Determining the correct ignition timing for an engine using nitrous oxide is not cut and dry as it is dependent on many variables. Variables such as piston design, combustion chamber size and design, valve angle, fuel type, nitrous system design, and other factors all play a critical role as to what timing a specific engine/vehicle combination needs. When running larger amounts of nitrous, it is critical that the proper ignition timing be run as well as the proper spark plug heat range.

There is one specific timing that is most ideal for a specific engine and nitrous tune-up. In the end the best and correct method to determine timing in a car is to read the spark plugs.

Due to all these variables, it is difficult to recommend a generic timing for a given amount of nitrous. However the information below is intended to provide a starting point. After this, it is best to use the spark plugs as an indicator as to what timing a specific engine requires. The spark plugs also will help with nitrous and fuel jetting as well as fuel pressure needs.

One large variable that drives the ideal ignition timing is the “combustion efficiency”. This is a combination of the cylinder head valve angle, combustion chamber size and burn characteristics, and piston dome design among other things. The more efficient the overall combustion efficiency is, the less timing is needed with nitrous. Note that when running large amount of nitrous, the old school rule of “take out two degrees per 50 HP of nitrous” is not ideal or wise.

The following timing recommendations below are based on nitrous HP amounts and a factor called “Combustion Efficiency”. Combustion Efficiency takes into account the piston dome, chamber size, valve angle, and other factors. It is split up into three categories, “High”, “Medium”, and “Low”. The following reviews these:

“High” – An engine with an exceptionally efficient and quick burn rate when running nitrous. Typically this would have a piston with a dish, flattop, or very small, flat dome design. Combustion chambers are small and valve angles are greatly reduced from the “factory” valve angle. Generic examples are engines with current high end race heads that have valve angles reduced 7-11 from stock, very small combustion chambers, and flat top piston that still maintain 13-14:1 compression ratios.

“Medium” – An engine with a small and efficient chamber. An example could be a SBC with an 18 degree head with a moderate piston dome.

“Low” – Older engines with factory valve angles. Pistons may have large domes to maintain high compression ratios - Large, open combustion chambers. An example would be a BBC engine with a 119cc open chamber and large dome piston.

The following are some initial recommendations for timing. Be conservative and read your plugs. Run an 1/8th mile hit rather than a ¼ mile pass to start to see initial plug strap readings. The "Plug" recommendation is based on NGK heat ranges. An equivalent Autolite or other brand can be used.

Note: These are for V8's. For a 4 cylinder, cut these numbers in half.

Table 4 Suggested Baseline Timing Combinations

Nitrous HP	Combustion Efficiency	Timing	NGK Spark Plug or Equiv.	Fuel/Octane
100	Low	32	Stock	93+
100	Medium	30	Stock	93+
100	High	28	Stock	93+
125	Low	31	Stock/-7	100+
125	Medium	29	Stock/-7	100+
125	High	27	Stock/-7	100+
150	Low	29	-8	100+
150	Medium	27	-8	100+
150	High	25	-8	100+
175	Low	27	-9	110+
175	Medium	25	-9	110+
175	High	23	-9	110+
200	Low	24	-9	110+
200	Medium	22	-9	110+
200	High	20	-9	110+
250	Low	22	-10	112+
250	Medium	20	-10	112+
250	High	18	-10	112+

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 1-866-464-6553.

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 (Figure 6).	Wire per instructions.
	Restricted fuel line.	Inspect fuel line for restrictions (crimped or plugged).	Remove restrictions.
	Malfunctioning fuel solenoid.	Turn arming switch ON. Activate 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 80° to 85°F.
	Inadequate nitrous supply.	Weigh bottle.	Fill bottle. 1-800-99-REFILL
	Mismatched N_2O/fuel jetting.	Compare jetting to recommended values.	Install correct jets.

	Excessive fuel pressure.	Install fuel pressure gauge 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 bottle valve. Disconnect the nitrous solenoid outlet port. Disconnect the solenoid (+) lead. Open the nitrous bottle valve. Briefly 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.	Wire system per instructions.
	Loose ground wire(s).	Connect 12V test light to battery (+) terminal. Check for continuity at grounds noted in schematic.	Tighten/repair loose grounds.
	No power to arming switch.	With vehicle ignition ON, turn arming switch 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.
	Overly rich fuel condition.	Check for black smoke or backfiring through exhaust with system activated.	Install smaller fuel jet or decrease fuel pressure.
	Malfunctioning throttle microswitch.	Turn arming switch OFF. Close throttle microswitch. Check for continuity between microswitch wiring terminals.	Replace throttle microswitch.
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 (max. 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 fuel filter.
	Crimped fuel line.	Inspect fuel line.	Replace crimped line.
	Weak fuel pump.	Install fuel pressure gauge. Run engine under load at wide-open throttle, 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"
	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 bottle.
	Bottle mounted incorrectly.	Compare bottle position and orientation to instructions.	Mount or orient bottle correctly.