

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 1-866-464-6553 or for online help, refer to the Tech Service section of our website: www.holley.com.**

NOTICE: The 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 the 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.

NITROUS OXIDE INJECTION SYSTEM SAFETY TIPS

WARNINGS

IT IS NOT LEGAL TO ENGAGE NITROUS OXIDE INJECTION SYSTEMS ON PUBLIC ROADS OR HIGHWAYS. NITROUS OXIDE INJECTION SYSTEMS ARE ONLY TO BE ENGAGED DURING SANCTIONED COMPETITION OR RACING EVENTS.

Do not attempt to start the engine if the nitrous has been injected while the engine was not running. Disable the ignition and fuel systems (consult owner's manual) 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.

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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, producing 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 PTFE-based paste on pipe-style fittings.
- ❑ Make sure your engine and related components (ignition, carburetor, and driveline) are in proper working condition.
- ❑ **Do not attempt to start the engine if the nitrous has been injected while the engine was not running. Disable the ignition and fuel systems (consult owner's manual) 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.**
- ❑ **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. Severe engine damage can occur.
- ❑ Modify NOS nitrous systems (if you need a non-stock item, call NOS Technical Service for assistance)
- ❑ Overtighten AN type fittings.
- ❑ Use PTFE Tape on any pipe threads. Pieces of PTFE tape can break loose and become lodged in the 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

These instructions will cover the installation and use of NOS nitrous kit part numbers; 05162NOS 105mm cable throttle, 05163NOS 90mm cable throttle, 05164NOS 90mm DBW, 05173NOS 105mm DBW & 13437NOS 105mm plate only kits.

1.2 System Requirements

When used correctly, these kits are designed to work with stock internal engine and driveline components. The jet combinations in this kit generate 100HP, 125HP, & 150HP gains, depending on the kit chosen. Colder plugs (non-platinum, non-projected tip or fine wire gapped at .035 - .045) are recommended. Check **Table 2** in the back of the manual for recommended spark plug heat range selection. If the jetting is increased over 150 HP, it is important to ensure the fuel delivery system has enough capacity to supply the required amount of fuel to support the total power output of the engines base power plus the additional power added through the nitrous system.

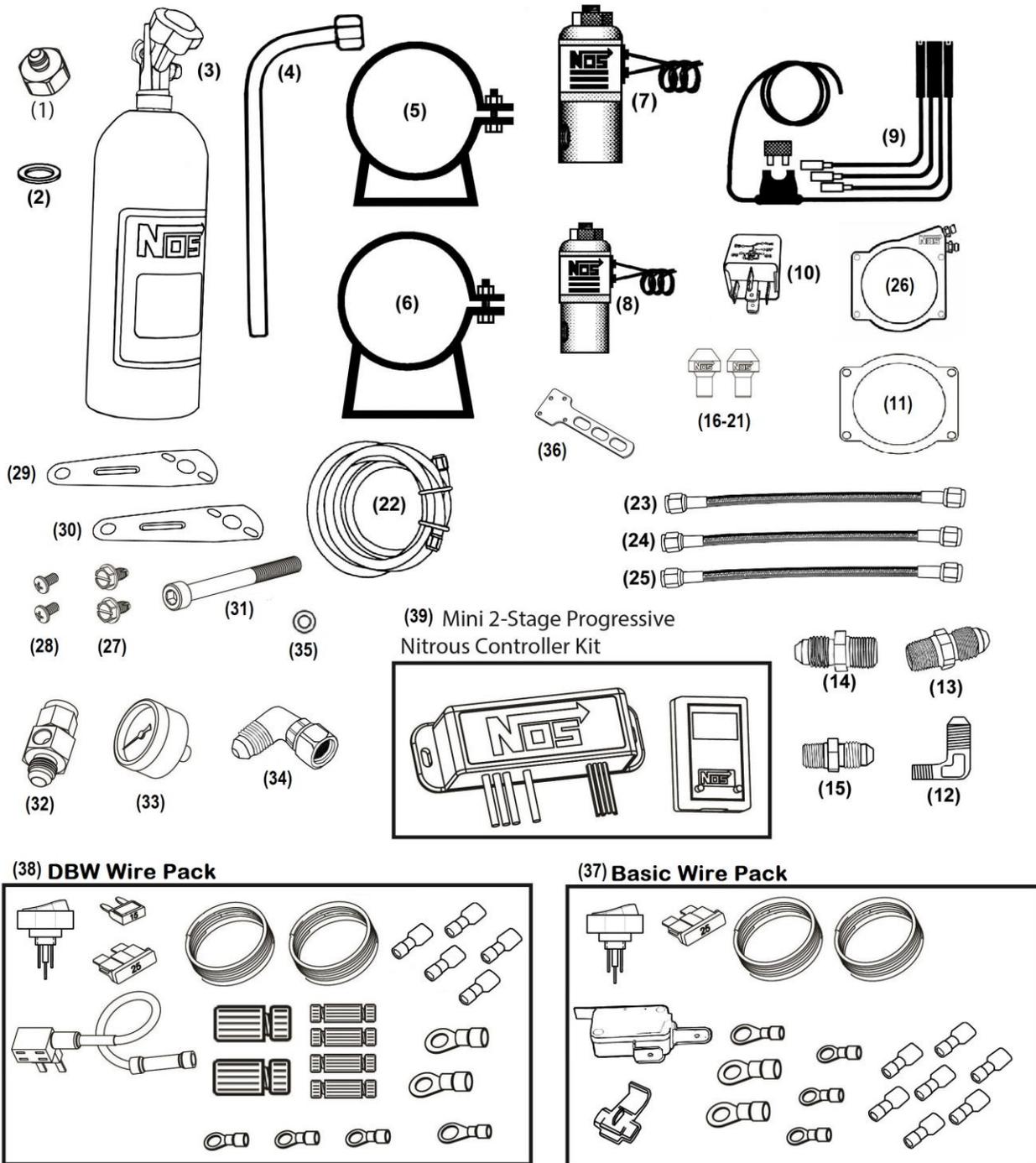
1.3 Kit Components

Before beginning the installation of your NOS kit, compare the components in your kit with those listed in Table 1. If any components are missing, please contact NOS Technical Support at 1-866-464-6553.

Table 1 Kit Parts List

Item	Description	Quantity	NOS P/N
(1)	Bottle Nut Adapter	1	16230NOS
(2)	Bottle Valve Washer	1	16210NOS
(3)	10 lb. Bottle w/ racer safety	1	14745-TPINOS
(4)	Blow Down Tube	1	16160NOS
(5)	Bottle Mounting Bracket, Short	1	14126-SNOS
(6)	Bottle Mounting Bracket, Long	1	14127-SNOS
(7)	N ₂ O Cheater Solenoid	1	18000NOS
(8)	Cheater II Fuel Solenoid (small body)	1	18055NOS
(9)	Relay Wiring Harness	1	15604-SNOS
(10)	30 Amp Relay	1	15618NOS
(11)	Throttle Body / Plate Gasket	2	8R2311 (105mm) 8R2273 (90mm)
(12)	6AN – 1/4NPT Nitrous Filter	1	15564NOS
(13)	4AN – 1/8" NPT Fuel Filter (Red)	1	15571NOS
(14)	4AN – 1/8" NPT Adapter (Blue)	1	17960NOS
(15)	4AN – 1/8" NPT Adapter (Red)	1	17961NOS
(16)	0.031" Flare Jet	1	13760-31NOS
(17)	0.035" Flare Jet	1	13760-35NOS
(18)	0.044" Flare Jet	1	13760-44NOS
(19)	0.051" Flare Jet	1	13760-51NOS
(20)	0.055" Flare Jet	1	13760-55NOS
(21)	0.063" Flare Jet	1	13760-63NOS
(22)	6AN 14 ft. Hose (Blue)	1	15475NOS
(23)	4AN 18" Hose (Red)	1	15221NOS
(24)	4AN to 3AN 18" Hose (Red)	1	15346NOS
(25)	4AN to 3AN 18" Hose (Blue)	1	15345NOS
(26)	90mm or 105mm Plate Assembly	1	14R818A, 40R887A
(27)	Screws, Solenoid Mounting 10-32	2	16501-SNOS
(28)	Screws, Solenoid Mounting 8-32	2	16506-SNOS
(29)	Bracket, Nitrous Solenoid	1	16500-VSNOS
(30)	Bracket, Fuel Solenoid	1	16505-VSNOS
(31)	Throttle Body Bolts M6-1 x 40mm	4	5R2538
(32)	Gauge Adapter (Blue)	1	16104NOS
(33)	Nitrous Gauge	1	15910NOS
(34)	4AN Male – 4AN Female 90° Swivel	1	17535-SNOS
(35)	Throttle Body Bolt Washers M6 SS	4	46R1506
(36)	Microswitch Bracket	1	15645-VSNOS
(37)	Basic Wire Pack	1	15612-VSNOS
Cable kit	Rocker Switch	1	15602NOS
Cable kit	15 amp Fuse	1	208R2
Cable kit	Microswitch	1	15640NOS
Cable kit	4-40 x 1 SL PAN HD M Screw*	2	15647-SNOS
Cable kit	4-40 Hex Nut*	2	15648-SNOS
Cable kit	1/4" Ring Terminal	3	15882-SNOS
Cable kit	Blue Female Spade Terminal .25	7	15885B-SNOS
Cable kit	Blue Male Spade Terminal .25	1	15886B-SNOS
Cable kit	Scotch lock	1	15891-SNOS
(38)	Drive By Wire – Electrical Kit	1	85R9801
DBW kit	Rocker Switch	1	89R687
DBW kit	1/4" Ring Terminal – Red – 18-20 AWG	1	N/A
DBW kit	1/4" Female Spade – Red – 18-20 AWG	3	N/A
DBW kit	25 Amp Fuse ATC (large)	1	N/A
DBW kit	15 Amp Fuse ATM (mini)	1	N/A
DBW kit	Add-A-Fuse Tap for Mini ATM Fuses	1	N/A
DBW kit	Posi-Lock Splice Connector 22-20 AWG	4	N/A
DBW kit	5/16" Ring Terminal – Yellow – 10-12 AWG	2	N/A
DBW kit	5/16" Ring Terminal – Red – 18-20 AWG	1	N/A
DBW kit	Posi-Twist Connector 10-22 AWG	2	N/A
Cable/DBW	Wire – Red – 20AWG	8ft	N/A
Cable/DBW	Wire – Black – 20AWG	8ft	N/A
(39)	Mini 2-Stage Progressive Nitrous Controller	1	15974NOS

Figure 1 Component Identification



-Parts Shown are not to scale-

Chapter 2 Kit Installation

2.1 Bottle Mounting Instructions

Accurate calibration of your NOS 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.

2.2 Bottle Orientation

Bottle placement is critical to the performance of your NOS 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 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 N₂O will be during acceleration.

WARNING! DO NOT attempt to remove the siphon tube without completely emptying the bottle of all N₂O 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.

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.

Find a position in the rear of your vehicle that meets your personal preference. Make sure that it meets the guidelines show in Figure 3.

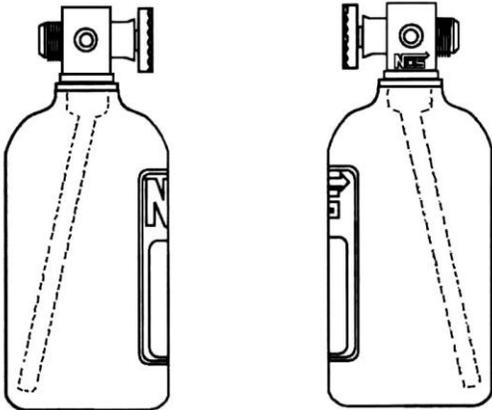


Figure 2 Nitrous Bottle Siphon Tube Orientation

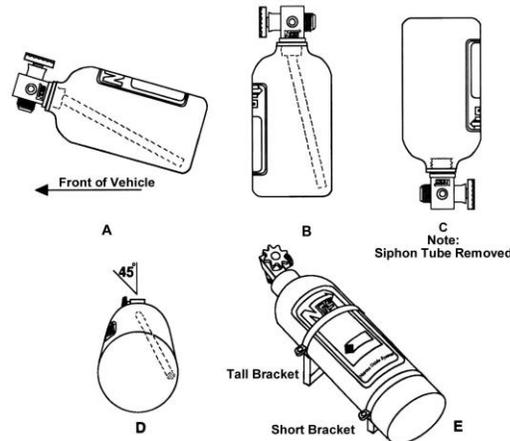


Figure 3 Nitrous Bottle Mounting Orientations

2.3 Bottle Installation

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 relief cap vented away from the driver's compartment.

1. Install the bottle nut adapter and washer on the nitrous bottle, and tighten securely.
2. Slip the bottle mounting brackets onto the nitrous bottle, as shown in Figure 3E.
3. Locate the bottle assembly in the desired mounting location, ensuring that the location will provide easy access to the bottle valve, hose connection, bracket clamp bolts to facilitate bottle changing and through hole of the blow-down tube.
4. Use the assembled bottle/bracket unit as a pattern to mark for hole drilling. Drill four 11/32" holes in the mounting surface for the bottle bracket bolts. **Make sure the holes are in a position that does not damage other components.**

CAUTION! When drilling or punching holes for these fasteners, be aware what components, wires, hoses or fluid reservoirs 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.
7. Route the blow-down tube through the hole in the trunk, install and fasten to the fitting on the bottle valve.

2.4 Nitrous Plate Installation

WARNING! Do not smoke, carry lighted tobacco, or allow an open flame of any type when working on or near any fuel-related components. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in personal injury.

1. Disconnect the negative battery cable.
2. Remove the air inlet tube or entire air cleaner assembly.

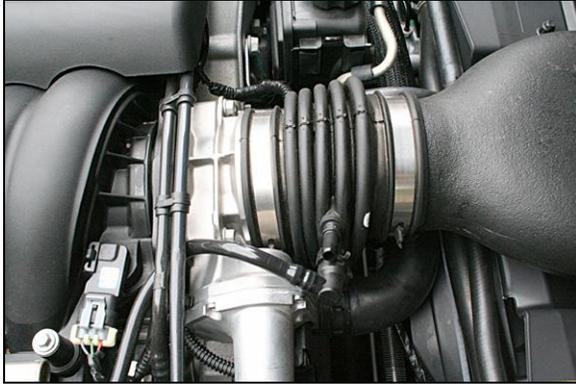


Figure 4



Figure 5

3. Remove the stock throttle body bolts.
4. Install the nitrous plate, with the side labeled "INTAKE SIDE" toward the intake, gasket, and throttle body to the intake using the supplied throttle body bolts. Torque to 106 in./lbs. (~8.8 ft./lbs.). See **Figure 5**.
5. Reinstall the air inlet tube or air cleaner assembly.

2.5 Solenoid Mounting

1. Apply a small amount of PTFE thread sealant to the NPT threads of the **nitrous filter fitting** (blue fitting with screen) and insert into the **IN** side of the blue nitrous solenoid. Use a bench vise to tighten the fitting at least 1-1/2 turns after finger tight. See **Figure 6**.
2. Apply a small amount of PTFE thread sealant to the NPT threads of the **blue nitrous outlet fitting** and insert into the **OUT** side of the blue nitrous solenoid. Use a bench vise to tighten the fitting at least 1-1/2 turns after finger tight. See **Figure 6**.



Figure 6



Figure 7

3. Apply a small amount of PTFE thread sealant to the NPT threads of the **fuel filter fitting** (red with screen) and insert into the **IN** side of the red fuel solenoid. Use a bench vise to tighten the fitting at least 1-1/2 turns after finger tight, see **Figure 7**.
4. Apply a small amount of PTFE thread sealant to the NPT threads of the **red fuel fitting** and insert into the **OUT** side of the fuel solenoid. Use a bench vise to tighten the fitting at least 1-1/2 turns after finger tight, see **Figure 7**.
5. Attach the bracket to the solenoids using the supplied 10-32 x 5/16" for the nitrous solenoid and the 8-32 x 5/16" screws for the fuel solenoid. The solenoids can be mounted in any convenient location within reach of the supplied hoses. Be sure to route hoses away from sharp edges and excessive heat sources.

6. Install desired nitrous and fuel jets into the corresponding jet fittings on the nitrous plate (see chapter 3, table 2 for recommended jetting). Attach the AN -3 end of each solenoid line to the jet fitting with the jets installed. Attach the other end to each corresponding solenoid outlet fitting.
 - NOTE: it is recommended to start with the smallest jetting combination to ensure proper operation of the nitrous system before moving to higher power level jetting.
 - NOTE: all nitrous fittings and lines are identified with blue color. All fuel fittings and lines are identified with red color.
7. Route the long AN -6 nitrous supply line from the bottle to the nitrous solenoid inlet fitting. Avoid sharp objects and excessive heat sources, like the exhaust system.

WARNING! Fuel in the fuel system remains under high pressure even after the engine is shut off. Before working on or disconnecting any of the fuel lines or fuel system components, the fuel pressure must be relieved. Failure to follow these instructions may result in personal injury.

8. Remove the internal valve from the Schrader type fitting (a tool for use on a tire valve stem can be used) in your fuel rail and plumb the fuel supply line to the **IN** side of your fuel solenoid.
 - NOTE: retain the internal valve for reinstallation at a later date.

2.6 Electrical System (Cable Throttle Kits P/N 05162NOS & 05163NOS)

Refer to **Figure 9** and 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).
2. Loosely mount the microswitch to the microswitch bracket. Mount the microswitch to the throttle body or a convent mount location that will allow the switch to contact the throttle lever at the WOT position. Adjust microswitch position on the bracket until a repeatable trigger is configured when the throttle lever reaches 90-100% throttle. Tighten microswitch to bracket. (**Figure 8**)

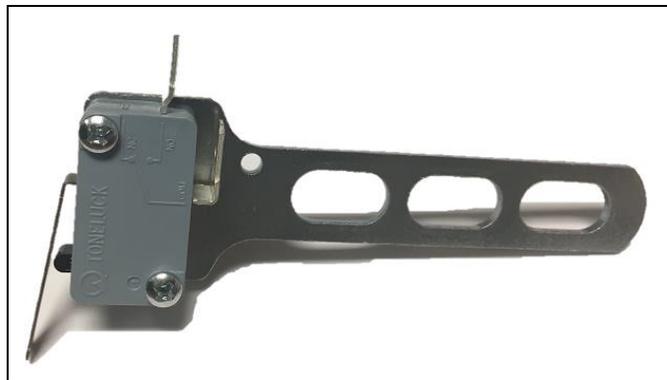


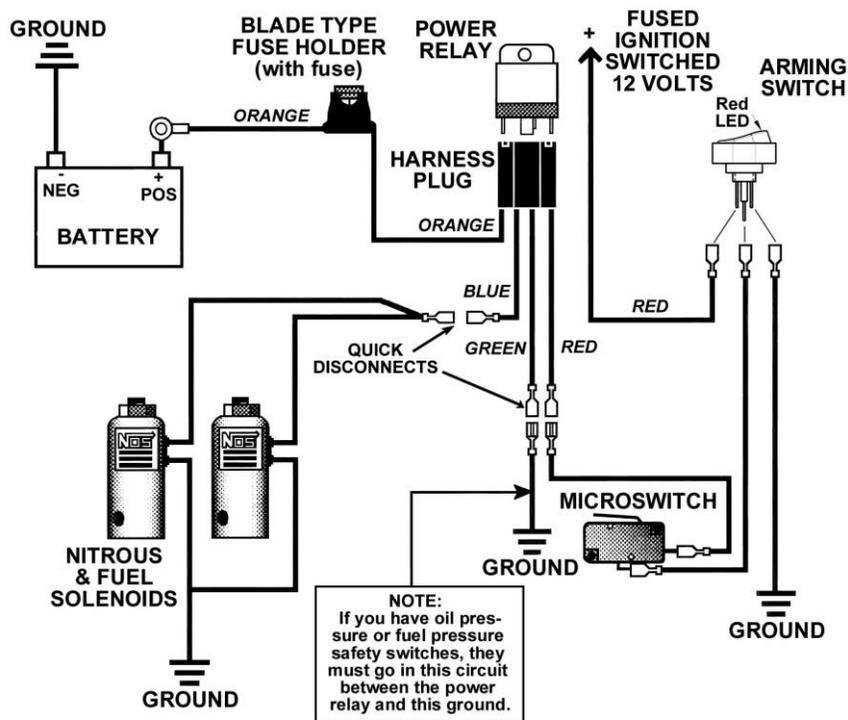
Figure 8

3. Install the NOS arming rocker switch in the vehicle interior within easy reach of the driver.
4. Install the wiring relay in the engine compartment near the battery. The relay's orange wire should reach the battery (+) terminal.
5. Connect the orange relay wire (with fuse) to the battery (+) terminal or a good power distribution source.
6. Connect one wire from each solenoid together. Join the solenoid wires to the blue relay wire.
7. Connect the green relay wire to a good chassis ground.
8. Connect the red relay wire to either terminal on the microswitch.
9. Connect the other terminal on the microswitch to the center terminal on the arming switch.
10. Connect the terminal (away from the LED) on the arming switch to a fused ignition switched +12 volt power source.

11. Connect the terminal (on the side of the LED) of the arming switch to the ground.
12. Reconnect the battery.

CAUTION: Make certain the nitrous bottle is closed. Failure to comply may result in the intake manifold being filled with nitrous creating a potential engine explosion on start up.

13. Temporarily ground the open lead of the nitrous solenoid.
14. Turn the ignition key to the ON position (DO NOT start engine).
15. Turn the arming switch on.
16. Hold the throttle wide open. You should hear a clicking noise if the nitrous solenoid is activated correctly. If no noise is heard, check all the wiring connections and the wiring schematic.
17. Disconnect the grounded wire of the nitrous solenoid and connect the open leads from the fuel and nitrous solenoids together and then to ground



WIRING COLOR KEY	
ORANGE	TO BATTERY POSITIVE (+) TERMINAL
BLUE	TO ONE WIRE FROM EACH SOLENOID
GREEN	TO GROUND
RED	TO IGNITION SWITCHED +12V THROUGH MICROSWITCH AND ARMING SWITCH

Figure 9 General Electric Wiring Diagram

2.7 Testing for Proper Operation without Nitrous Bottle Hook Up

1. Connect the battery and prime the fuel system by cycling the ignition switch from OFF to ON and back to OFF waiting 10 seconds for each interval. Start the engine and check for leaks in the main fuel and secondary system: i.e. fuel injector, fuel supply line to the fuel solenoid, fuel quick disconnect to the fuel rail, etc.
2. Check the WOT switch. These are tested under WOT condition and listening for the clicking sound when the solenoids are activated. WOT condition should be tested in a safe open road area and within legal driving limits. A small lamp can be used to indicate solenoid operation if the engine application does not allow listening for solenoid activation.
3. Make sure a filled nitrous bottle is **NOT open or connected** when performing all of these tests. If it is, engine damage might occur. The nitrous solenoid ground should be disconnected as well (would be a vacuum leak when activated with nothing attached to the supply side).
4. Start the engine and let it run until reaching normal operating temperature.

5. Once in a safe open road area (within legal driving limits) and with the arming switch turned “ON” (it should light up), move the gas pedal to the floor. As soon as WOT condition is reached you should hear the solenoid click on. At this time, fuel enrichment through the plate should be supplied the engine. This will make the engine very rich. This verifies proper functioning of the system. Do not run the vehicle like this for an excessive period of time. When you let the pedal back up, the solenoids should click off. If proper functioning does not occur, call the NOS technical service department and troubleshoot the system.

2.8 Preparing for Operation

1. Install a fully charged nitrous bottle. The pressure gauge should read 900-1000 psi at operating temperature/pressure.
2. Connect the nitrous solenoid ground.
3. Start the engine and open the nitrous bottle valve.

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

4. Inspect the nitrous lines and fittings for leaks.
5. When you want to activate the nitrous, turn on the arming switch and it should light up. When the throttle is pressed wide open, the nitrous will automatically activate. The nitrous pressure should always be between 900 and 1000 PSI. If it is lower than this, lesser performance can result.

WARNING! Never activate nitrous with the vehicle in “NEUTRAL” or “PARK”!

WARNING! Never activate nitrous at engine speeds below 3000 RPM, or engine damage may result!

WARNING! SEVERE ENGINE DAMAGE MAY OCCUR IF NITROUS IS ACTIVATED WHILE TRACTION CONTROL DEVICES ARE ENABLED. TRACTION CONTROL DE-ACTIVATION MUST BE CYCLED EVERY TIME THE IGNITION SWITCH IS CYCLED.

2.9 Electrical System (Drive-by-Wire Throttle Kits)

Refer to **Figure 11** 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 ground cable from the battery.
2. Install the NOS arming rocker switch in the vehicle’s interior, within easy reach of the driver, and route the provided red and black wires from the switch to a good power distribution location, such as the fuse box.
3. Install the relay assembly in the engine compartment so the relay connector’s orange wire will reach the battery (+) terminal or suitable power distribution location.
4. Install the NOS 2-stage mini progressive controller in the engine compartment near the battery or power distribution panel, route the white wire to the NOS arming rocker switch in the vehicle interior. This is also a good time to route the USB cable into the interior if desired.
 - a. The progressive controller can be mounted with Hook & Loop, or double sided tape to the fender well or fire wall.
5. Connect the orange relay wire (with fuse) to the battery (+) terminal or power distribution panel.
6. Connect one wire from each solenoid together with the large blue wire from the mini 2-stage progressive controller, using one of the provided Posi-Twist connectors (Figure 10).
7. Join the remaining two solenoid wires to the smaller blue wire coming from the relay harness using the other Posi-Twist connector (Figure 10).
8. Connect the green relay wire to a good power ground, such as the battery negative post or engine ground.
9. Connect the red relay wire to the white wire (same wire as described in step 4 above) between the master arming switch (“Load”) and the 2-stage mini controller using one of the provided Posi-Tap connectors (see assembly diagram below). This tap can be installed close to the Mini 2-Stage Controller in the engine bay.

10. Connect the "Supply" terminal (supplied red wire from step 2) on the NOS arming rocker switch to the blue crimp connector on the provided Add-A-Tap fuse holder. Find a suitable 15 amp fused circuit in the main fuse/relay box in the engine bay to plug into. Install both the supplied 15 amp mini fuse and the fuse removed from the fuse box into the Add-A-Tap fuse holder.
 - a. Ensure the chosen switched power supply 15 amp fuse location is powered only in the ON/RUN position of the ignition. This can be verified by using a test light before connecting the Add-A-Tap fuse holder.
 - b. If not using the Add-a-Tap, find a good 12 volt switched power source to connect the NOS arming rocker switch red wire to.
11. Connect the digital ground (small black) wire to a clean ground not shared with high voltage grounds. This is the same wire from step 2 above, the wire from the Earth terminal will be T-tapped into this wire using the Posi-Tap connector.
12. Connect the "Earth" terminal on the NOS arming rocker switch (supplied black wire from step 2) to the digital ground wire coming from the 2-stage mini controller (small black wire) using one of the provided Posi-Tap connectors (Figure 10).
13. Connect the 2-stage mini progressive ground (large black wire) to a good battery/engine ground using the supplied ring lug connector.
 - a. It is important to ensure that a good ground path to the battery is used. This is the high current ground used by the fuel and nitrous solenoids.
14. Using a supplied Posi-Tap connector, connect the green tach signal wire from the 2-stage mini progressive controller to the #2 or #4 coil driver signal wire (#2-Red, #4-Green). This will be one of the wires on the 4 wire connector located on the ignition coil.
 - a. NOTE: base on the year model of the engine control system wiring, the colors of the coil wires may differ from what is shown. Refer to a factory wiring diagram to determine the color code for your application.
15. Using a supplied Posi-Tap connector, connect the white with blue stripe TPS signal wire from the 2-stage mini progressive controller into the TPS signal wire on the throttle body. This must be the rising voltage signal from the throttle position sensor. All drive-by-wire throttles are equipped with one rising voltage wire and one falling voltage wire. Refer to a factory wiring diagram to determine the correct wire. On later model applications, the correct wire is violet/purple in color.
16. Install the relay into the relay connector and reconnect the battery.

NOTE: When connecting the battery, be aware of any excessive arcing or sparks from the battery to the negative cable. This could be an indication of a wire that has been shorted to ground.

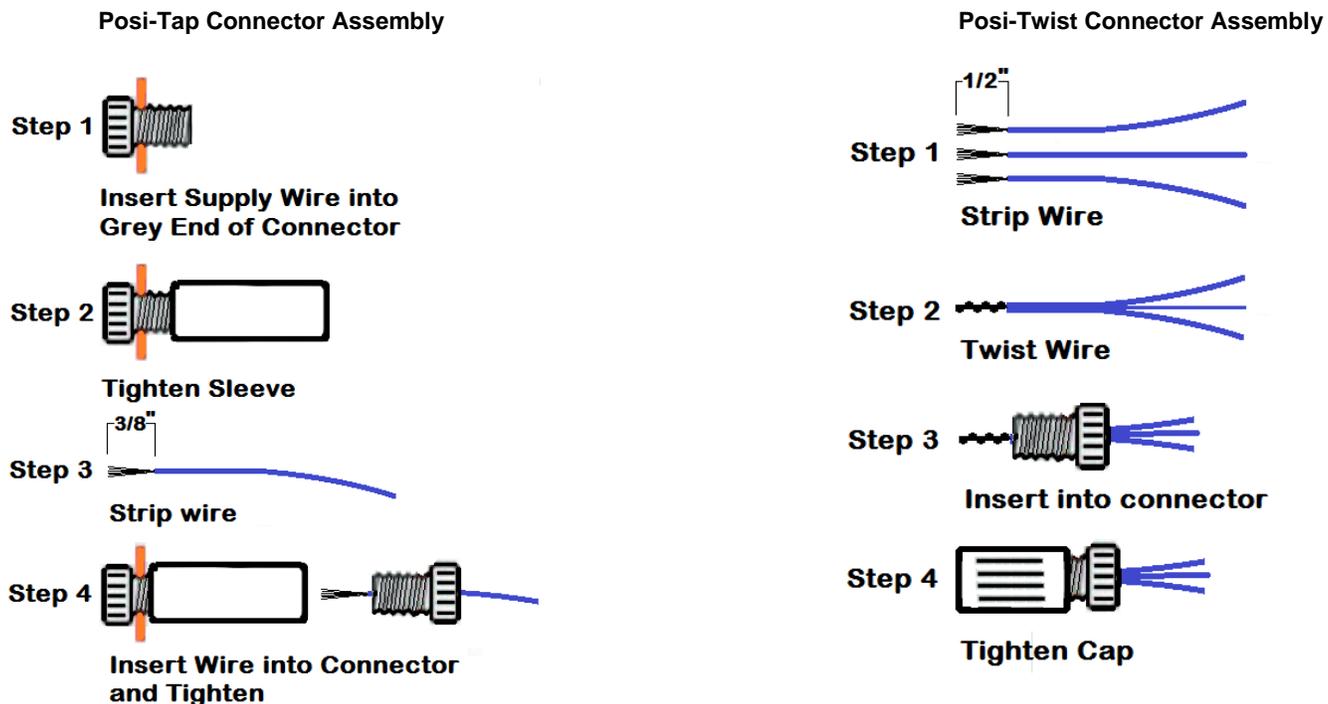
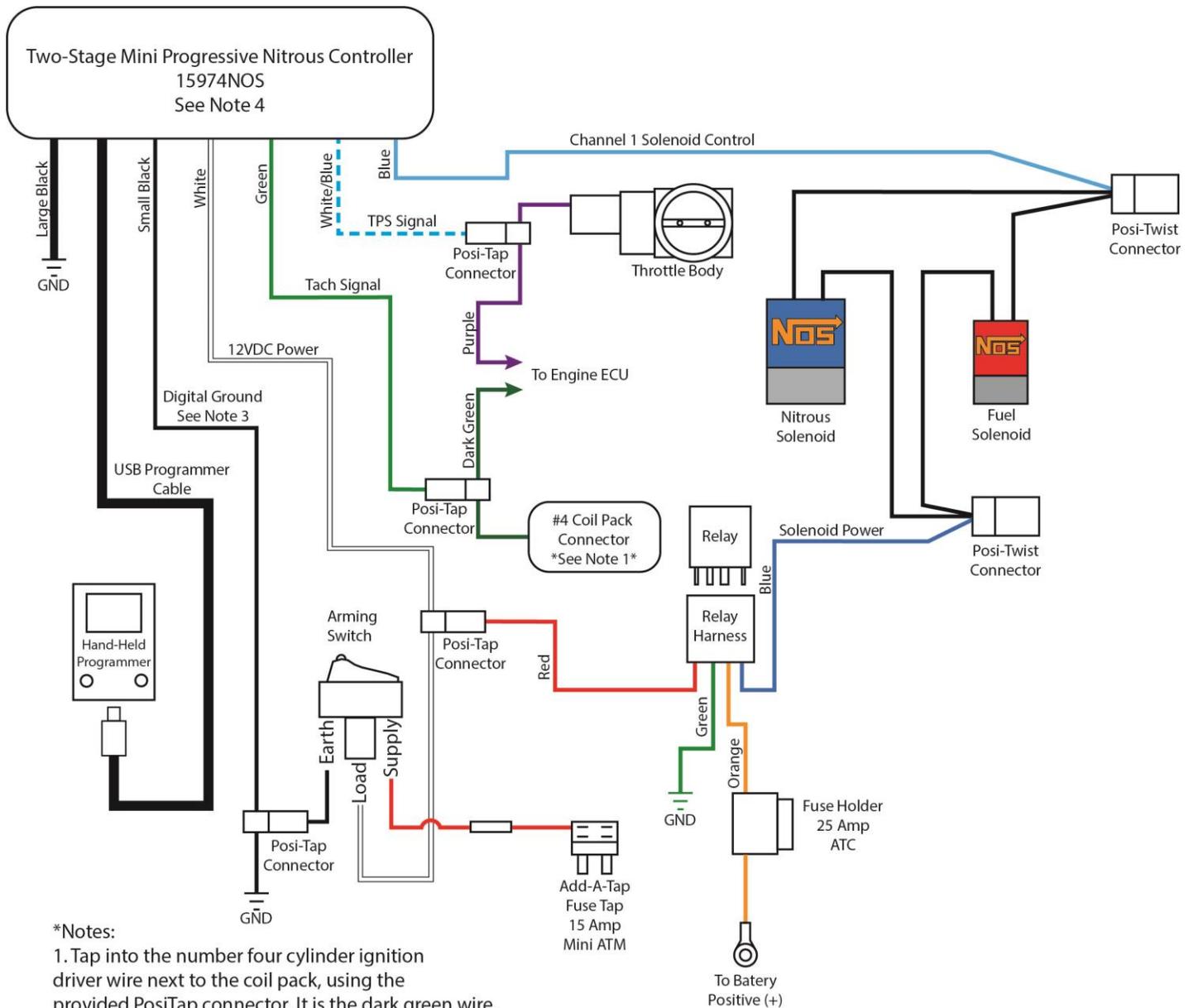


Figure 10



***Notes:**

1. Tap into the number four cylinder ignition driver wire next to the coil pack, using the provided PosiTap connector. It is the dark green wire.
2. Tap into the TPS signal wire next to the throttle body connector using the provided PosiTap connector. It is the purple wire.
3. Digital ground must be a clean ground. Do not share with high voltage grounds.
4. This schematic represents a single stage of nitrous. There will be 4 additional wires coming from the controller that are not used. To wire a second stage, see schematic included with 15974NOS.

Figure 11 Electric Wiring Diagram

2.10 Preparing for Operation (Drive-by-Wire Kits)

6. Install a fully charged nitrous bottle. The pressure gauge should read 900-1000 psi at operating temperature/pressure.
7. Slowly open the nitrous bottle valve while listening and looking for any leaks at the bottle fittings as well as the fittings on the solenoids in the engine compartment.
8. If no leaks are found, slightly loosen the -6 AN supply line fitting at the blue nitrous solenoid. Allow the air to leak from the fitting until nitrous starts to fog out, then retighten the fitting. **NOTE: Nitrous is very cold and can cause burning and irritation to the skin, we recommend wearing gloves during this procedure.**

9. Turn the ignition power to the ON position, but do not start the car.
10. Turn the Master Enable switch to the ON position. The red LED should be on now.
11. Connect the hand held programmer to the USB cable and program the unit to the recommended base settings shown in section 2.7.1. Additional instructions are included with the 2-stage mini progressive controller for creating custom settings.
12. Once programming is complete, turn the ignition switch off for 10 seconds, then back to the ON position; do not start the engine yet.
13. Verify the programmer display shows an “r r”. If display show any other values than “r r”, refer to page 2 of the Mini 2-Stage controller instructions for more information.
14. You are now ready to drive the car and test the operation of the nitrous system.

WARNING! It is VERY important to use caution and good safety practices when testing and using any nitrous oxide system. We do not recommend the use of nitrous on any public streets or highways. It is recommended to only test and use nitrous in a controlled, closed course location, such as a race track.

WARNING! Never activate nitrous with the vehicle in “NEUTRAL” or “PARK”!

WARNING! Never activate nitrous at engine speeds below 3000 RPM, or engine damage may result!

WARNING! SEVERE ENGINE DAMAGE MAY OCCUR IF NITROUS IS ACTIVATED WHILE TRACTION CONTROL DEVICES ARE ENABLED. TRACTION CONTROL DE-ACTIVATION MUST BE CYCLED EVERY TIME THE IGNITION SWITCH IS CYCLED.

2.11 Programming the Mini 2-Stage Progressive Controller

The following settings are a good baseline from which to start. Additional or Custom settings can be programmed by following the User Guide supplied with the Mini 2-Stage controller.

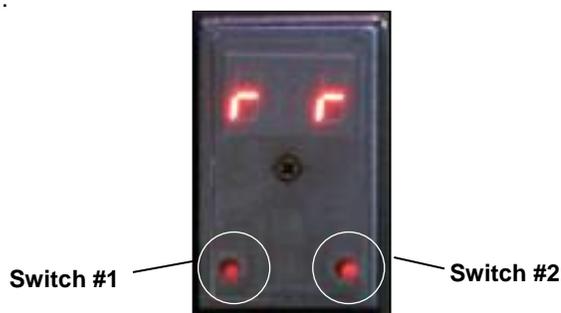
Switch #1 - toggles through the configuration menu. As you toggle through the configuration menu, the stored value will be displayed. Use this switch to toggle to the next step in programming mode (Press switch #1, 2 times).

Switch #2 - increments the flashing value that was selected by switch #1.

LED A.B.C - displays the configuration step number and its setting

A = this is the step being programmed

B & C = value for the current configuration step



To enter the programming mode:

Press and hold both switches until “Pro” is displayed. Now release the switches and the unit will automatically go to the first configuration step.

STEP F. SOLENOID FREQUENCY (Hz) = 20 Display reads; F.20

STEP C.RPM SIGNAL SET-UP = 00 Display reads; C.00

STEP P. RAMP PAUSE MODE = 00 Display reads; P.00

1. **ACTIVATION RPM = 40 (4000rpm)**

NOTE: This setting can range from a minimum of any RPM greater than 0 rpm (3000 rpm recommended) up to a maximum of 9900 rpm. Display reads; 1.40

2. **DEACTIVATION RPM = 65 (6500rpm)** Display reads; 2.65

NOTE: This setting should be set to 200 RPM below engine rev limiter (maximum of 9900 rpm).

3. **DELAY TIME = 00 (zero seconds)** Display reads; 3.0.0

- 4. **START % = 20 (20%)** Display reads; 4.20
- 5. **RAMP TIME = 20 (2.0 seconds)** Display reads; 5.2.0
- 6. **END % = 99 (99%)** Display reads 6.99
NOTE: (99% = 100 %)
- 7. **CONTROL OUTPUT DELAY TIME = 00** Display reads 7.0.0
- 8. **TPAS MODE = 02 (90% of WOT voltage)** Display reads; 8.02
- 9. **TPS SETTING = see below to calibrate this setting**

Press switch #2 to read and display the TPS signal. Momentarily press the accelerator pedal completely to the floor and release, to reach 100% throttle – the unit only needs to see WOT for a fraction of a second. Now press switch #1 to save the displayed value. (You do not have to be at WOT when you press switch #1 to save.) **Engine should not be running, but ignition must be ON!**

- 15. After completing channel #1 set-up, you will now be prompted to set up channel #2. Channel 2 is not used for this installation, but can be programmed for a second stage, if all required hardware is added. **(Repeat steps 1-7 for channel #2)** or toggle through the channel #2 setup until you see **End** which indicates that the programming is complete. If at any point you see **Err**, a programming error has occurred. Turn the power off, back on, and try again.

NOTE: The user must continue through the setup for stage 1 and stage 2 until they see END. If the power is shut off, or the system reset in any way, the changes will not be saved.

Chapter 3 Tuning

Table 2 Tuning Suggestions

Configuration	N ₂ O Jetting	Fuel Jetting	Configuration	N ₂ O Jetting	Fuel Jetting
75 HP	41	26	175 HP	67	47
100 HP*	51	31	200 HP	73	51
125 HP*	55	35	225 HP	78	55
150 HP*	63	44	250 HP	83	59

*Included in kit

NOTE: It is recommended to install one to two steps colder, non-projected tip, non-Iridium or other fine wire spark plugs when using Nitrous Oxide. The jetting shown in Table 2 is intended as a starting point only, each engine combination may require a slight variation on the jetting to obtain the correct Air/Fuel Ratio and power level.

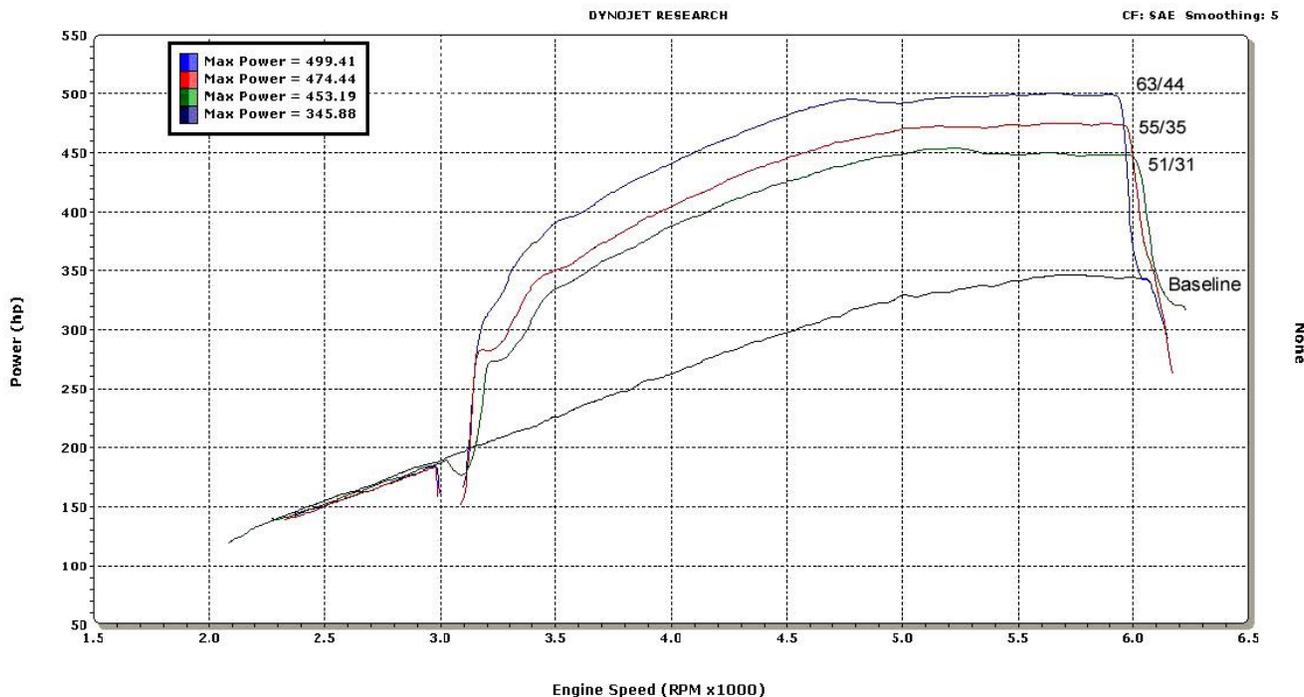


Figure 12

Chapter 4 Determining Optimum System Performance

The jetting combinations included in your 05169NOS kit are intended to generate power gains of 100-150 HP. These combinations are designed to be used with 950 psi of nitrous bottle pressure and 60 psi of flowing fuel pressure. Spark plug inspection and/or the use of a wide-band O₂ sensor can determine optimum system performance. Inspection of the spark plugs should be done on a consistent basis.

1. 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 an indication of lean or rich nitrous/fuel conditions (refer to Figure 13 for tips on reading the spark plugs). For this application, the air/fuel mixtures at WOT tend to be very rich in stock form. You may wish to examine a plug after a NO-nitrous pass or dyno pull for comparison purposes.

CAUTION! Terminate test immediately if pinging, knocking, detonation is noticed during the test. If engine does not pull hard (expected HP or torque gains are not observed), terminate test and investigate before continuing.

- 1A. If spark plugs appear to be excessively rich, decrease the fuel jet size 1 step (ex. 28 to 26 or 26 to 24).
 - 1B. If spark plugs appear to be excessively lean, increase the fuel jet size 1 step.
 - 1C. If spark plugs have a "like new" appearance on the porcelain and electrode, do not make a fuel jetting change.
2. Repeat these steps until the desired mixture is obtained.

How to Read Spark Plugs from a Nitrous Oxide Injected Engine

A. Correct Timing, Mixture, and Spark Plug Heat Range

The ground strap retains a "like new" appearance. The edges are crisp, with no signs of discoloration. The porcelain retains a clear white appearance with no "peppering" or spotting.

B. Excessively Rich Mixture

The porcelain may be fuel stained, appearing brown or black. In extreme cases, the ground strap, electrode, and porcelain may be damp with gasoline, or smell of fuel.

C. Detonation

The edges of the ground strap may become rounded. The 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 phenomenon can result from excessive ignition timing, too high a heat range spark plug, inadequate fuel octane, or excessively lean mixture.

D. Excessively Lean Mixture

The 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.

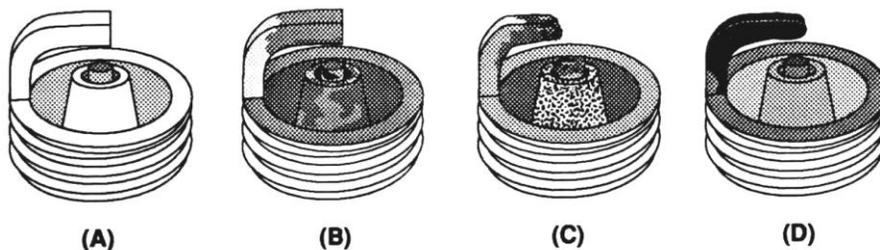


Figure 13 Spark Plug Condition

Chapter 5 Alternate Sensor, Actuator, and Switch Components

1. In some racing applications, "pushbutton solenoid" activation is preferred. In such instances, the solenoid is connected to ground via a pushbutton momentary switch P/N 15610NOS. For information on wiring options, please call **NOS Technical Support at 1-866-464-6553**.
2. Almost all multi-point fuel injection systems are provided with throttle position sensors. NOS has throttle position sensor controllers that activate the solenoids, according to the sensor voltage output. This form of solenoid activation procedure is commonly referred as "TPS activation". Such devices are more accurate than the microswitch. For P/Ns on TPS switches and information on wiring options, please call **NOS Technical Support at 1-866-464-6553**.

3. NOS offers fuel pressure safety switches. These switches only allow the nitrous and fuel solenoid to be activated, if a safe fuel pressure is existent in the enrichment fuel supply system. For information on pressure safety switches and information on wiring options, please call **NOS Technical Support at 1-866-464-6553**.
4. Activation of nitrous at low RPM levels can be detrimental to the engine performance and engine life. The RPM window activation switch only allows the nitrous and fuel solenoid to be activated if a safe RPM value has been reached. Some factory engine control units cut off the ignition if a maximum RPM level is reached. Although the engine is still at WOT and the solenoids are activated no nitrous and fuel is combusted. When the engine reaches safe RPM levels ignition is restored but excess fuel and nitrous are present in the manifold. Some applications may even cut the fuel injector to limit engine RPM. Because the engine is at WOT, the nitrous solenoid is still open thus generating an extreme lean condition. Under both conditions engine damage might occur. The RPM window activation switch cuts off the supply of fuel and nitrous until safe RPM levels are reached. The low and high RPM values can be trimmed according to the application. For information on pressure safety switches and wiring options, please call **NOS Technical Support at 1-866-464-6553**.

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 adequate filtration in his transfer pump mechanism. Contaminants in the bottle will eventually become lodged in the nitrous solenoid filter fitting. **Call 1-800-99-REFILL (1-800-997-3345) for bottle refill location information.**

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** PTFE 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, if necessary.
7. Apply fresh PTFE 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 NOS nitrous solenoid plungers are constructed from materials which 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 NOS nitrous solenoid plungers 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 seal in the plunger swelling or in extreme cases disintegrating.

NOTE: The seals are designed so that if they fail due to over pressurization, 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).

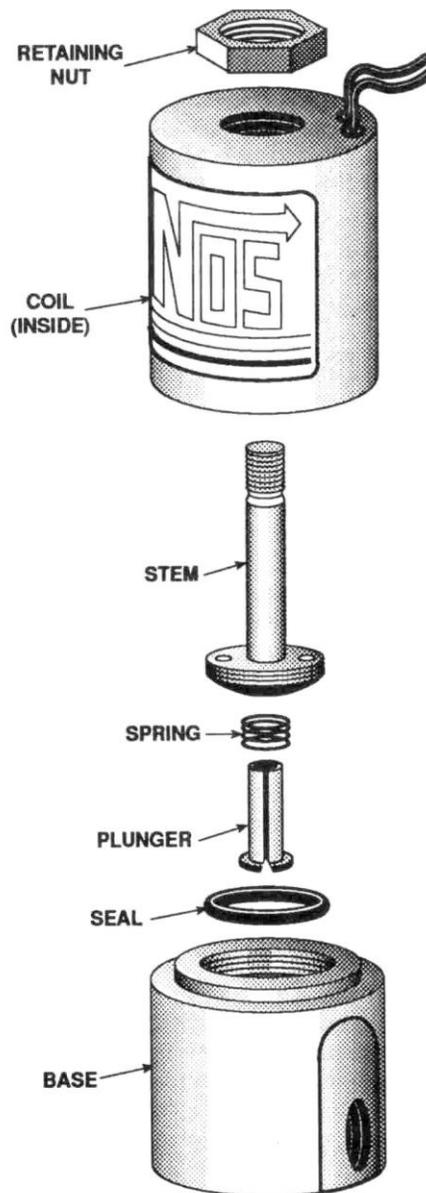
6.2.2 Nitrous Solenoid Plunger Disassembly and Inspection

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 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.



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 NOS Technical Support Department at 1-866-464-6553.

PROBLEM	POSSIBLE CAUSES	DIAGNOSTIC PROCEDURE	CORRECTIVE ACTION
No change in engine speed when the system is activated.	System 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.	Remove and inspect solenoid.	Repair/replace solenoid.
	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. 1-800-997-3345 for refills nearest you.
	Mismatched N ₂ O/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 solenoid outlet port. Disconnect the solenoid (+) lead. Open the nitrous bottle valve. Briefly connect the +12V to the solenoid. Solenoid should discharge N ₂ O at a high rate.	Repair/replace solenoid.	
No change in performance when system is activated.	System wired incorrectly.	Compare nitrous wiring to schematic.	Wire system per instr.
	Loose ground wire(s).	Connect 12V test light to battery (+) terminal. Check for continuity at grounds noted in schematic.	Tighten/repair loose ground(s).
	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.
	Damaged fuse in switched power (15 amp)	Remove and inspect 15 amp fuse	Replace Fuse
	Damaged fuse in solenoid relay battery power (30 amp)	Remove and inspect fuse	Replace Fuse
	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.
	Malfunctioning Progressive Controller	Refer to the installation instructions for the NOS Mini 2-Stage Controller, part number 15974NOS	

Engine detonates mildly when system is activated.	Overly rich fuel condition.	Check for black smoke or backfiring through exhaust with system activated.	Install smaller fuel jet or check for restriction in fuel supply.
	Inadequate octane fuel.		Use higher octane fuel; up to 116VPC-16.
	Incorrect spark plug type or heat range.	Do not use "fine wire" or iridium type spark plugs. Reduce spark plug heat range by 1 or 2 steps.	Replace spark plugs with correct type and heat range.
Engine detonates heavily when system is activated.	Too much nitrous flow.		Reduce nitrous jetting.
	Inadequate fuel delivery due to restricted fuel filter.	Inspect fuel filter.	Clean or replace filter.
	Crimped fuel line.	Inspect fuel line.	Replace crimped line.
High rpm misfire when system is activated.	Weak fuel pump.	Install fuel pressure gauge. Run engine under load at wide-open throttle, with system activated.	Repair/replace fuel pump.
	Excessive spark plug gap.	Inspect spark plugs.	Set spark plug gap at 0.030" to 0.035".
Surges under acceleration when system is activated.	Weak ignition/ignition component failure.	Inspect components (plug wires, coils, etc.)	Replace worn components.
	Inadequate supply of nitrous.	Check bottle weight.	Replace with full bottle.

Nitrous Oxide Accessories

NOS systems are calibrated for optimum performance with a bottle pressure of 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 Heater (P/N 14164NOS)** is available for 10 & 15 lb. bottles. **Bottle Heater, P/N 14169NOS**, is pressure-controlled to keep your bottle at 950 psi.

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 blankets are made of a rugged, easily cleaned Nylon outer shell with insulation. It's also an excellent "dress up" accessory and perfect for "covering" battle-scarred bottles. **Bottle Blanket (P/N 14165NOS)** is a 7" diameter blanket for the 10 lb. bottle.

#10 Bottle Heater P/N 14169 NOS



#10 Bottle Blanket P/N 14165NOS



The **Nitrous Pressure Gauges, P/N 15910NOS (-4AN lines) or P/N 15912NOS (-6AN lines)** [0-1500 PSIG] are designed to provide accurate ($\pm 2\%$ of full scale) readings of fuel pressure in carbureted applications.

The **Fuel Pressure Gauges, P/N 15906NOS** [0-120 PSIG] and **P/N 15900NOS** [0-15 PSIG] are engineered to provide accurate ($\pm 2\%$ of full scale) readings for high and low fuel pressure applications.

Nitrous & Fuel Pressure Gauges



NOS Technical Support
Toll-Free Phone: 1-866-464-6553
Phone: 1-270-781-9741

**For online help, please check the Tech
Service section of our website:
www.holley.com**

**For refill information:
1-800-99-REFILL (1-800-997-3345)**

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Date: 3-9-17