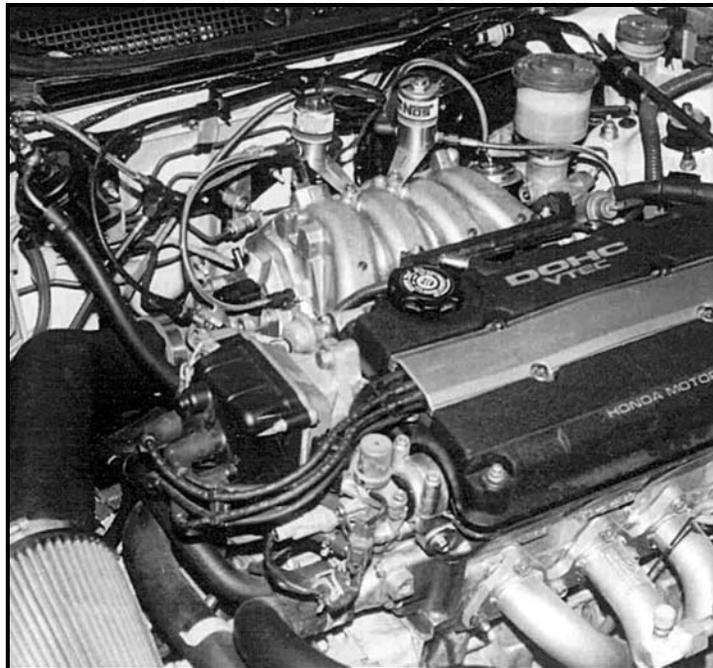


A Holley Performance Brand

P/N A5082-SNOS

COMPETITION CHEATER SYSTEM

**1.8L Honda VTEC (Acura Integra GSR with 2 Piece Intake Manifold)
Kit Number 02040NOS**



OWNER'S MANUAL

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

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

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

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

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

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

NOS has not pursued California Air Research Board (CARB) exemptions for these 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.

NOTICE: The NOS Competition Cheater System Kit is not intended for use on hatchback type vehicles without the use of NOS part numbers 16160 (External Aluminum Blow-Down Tube) and 16166 (Racer Safety Pressure Relief Cap).

HAZARDS DEFINED

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

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

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

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

HINT: These special instructions provide a handy work tip.

NITROUS OXIDE INJECTION SYSTEM SAFETY TIPS

WARNINGS

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

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

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

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

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

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

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

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

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

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

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

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

CONGRATULATIONS on purchasing your NOS Nitrous Oxide Injection System. Your system is composed of the highest quality components available. It should provide many miles of trouble-free performance when used correctly. If you have any questions regarding the performance of your system, call NOS Technical Service at 1-866-GOHOLLEY.

TABLE OF CONTENTS

What is Nitrous Oxide?.....	4
Do's and Don'ts of Nitrous Oxide.....	4
Chapter 1 Introduction to Your NOS Nitrous Oxide Kit.....	5
1.1 General Information.....	5
1.2 System Requirements.....	5
1.3 Kit Components.....	6
Chapter 2 Kit Installation.....	7
2.1 Bottle Mounting Instructions.....	7
2.1.1 Street Vehicles.....	7
2.1.2 Racing Vehicles.....	8
2.2 Bottle Orientation.....	8
2.3 Bottle Installation.....	8
2.4 Injector Plate Installation.....	9
2.5 Intake Manifold Support Modification & Reinstallation.....	11
2.6 Solenoid Mounting.....	13
2.6.1 Nitrous & Fuel Solenoid Installation.....	13
2.7 Solenoid/Injector Plate Hose Connection.....	14
2.8 Nitrous Feed Line Mounting.....	14
2.9 Fuel Supply Connection.....	14
2.10 Electrical System Wiring.....	15
Chapter 3 Baseline Tuning Suggestions.....	17
Chapter 4 Preparing for Operation.....	17
Chapter 5 Advanced Tuning for Maximum Power.....	18
5.1 Determining Optimum Nitrous/Fuel Jetting.....	18
5.2 Determining Optimum Ignition Timing.....	18
Chapter 6 Routine Maintenance.....	19
6.1 Nitrous Solenoid Filter.....	19
6.2 Nitrous Solenoid Plunger.....	19
6.2.1 General Information.....	19
6.2.2 Nitrous Solenoid Plunger Disassembly & Inspection.....	20
Appendix A Troubleshooting Guide.....	22
Nitrous Oxide Accessories.....	24

LIST OF FIGURES AND TABLES

Figure 1 Competition Cheater VTEC System Kit Components.....	7
Figure 2 Nitrous Bottle Siphon Tube Orientation.....	8
Figure 3 Nitrous Bottle Mounting Orientation.....	8
Figure 4 Competition Cheater VTEC System Assembly Drawing.....	9
Figure 5 Coolant Drain Plug Location.....	11
Figure 6 Intake Manifold Bolt Replacement.....	11
Figure 7 Intake Manifold Support Bracket Templates.....	12
Figure 8 Manifold Support Bracket and Crank Case Breather Support Relocators.....	12
Figure 9 Solenoid Assembly Mounting Location.....	14
Figure 10 Main Fuel Supply Source—Banjo Fitting Location.....	15
Figure 11 Wiring Schematic.....	15
Figure 12 Microswitch Mounting.....	16
Figure 13 Spark Plug Condition.....	18
Figure 14 Exploded View of Typical Solenoid.....	21
Table 1 Jetting Combinations.....	5
Table 2 Competition Cheater VTEC Parts List.....	6
Table 3 Competition Cheater VTEC Jetting Map.....	17

WHAT IS NITROUS OXIDE?

NITROUS OXIDE...

...Is a cryogenic gas composed of nitrogen and oxygen molecules

...Is 36% oxygen by weight

...Is non-flammable by itself

...Is stored as a compressed liquid

...Exists in two grades—U.S.P. and Nitrous Plus:

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

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

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

Do's and Don'ts of Nitrous Oxide

Do's

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

Don'ts

- ❑ Engage your nitrous system with the engine off. 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 Teflon Tape on any pipe threads. Pieces of Teflon tape can break loose and become lodged in nitrous or fuel solenoids or solenoid filters. Debris lodged in a nitrous or fuel solenoid can cause catastrophic engine failure.



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

Chapter 1 Introduction to your NOS Nitrous Oxide Kit

1.1 General Information

NOS Competition Cheater System Kits 02040NOS is designed for 1994-1997 Acura Integra featuring the 1.8L VTEC engine. Kit Number 02041NOS is designed for 1993-1997 Honda Preludes that use the 2.2L VTEC engine. These kits are engineered for use on mildly to heavily modified vehicles, intended for off-highway use only.

These nitrous oxide injection kits have been designed to produce dramatic gains in engine performance, while retaining acceptable durability. 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 slightly with the state of engine tune and extent of engine modifications. Approximate power increase estimates can be made based on 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 from your application. NOS strongly suggests an upper limit of about 40% to 50% increase in power output for vehicles featuring stock short blocks. Exceeding this can result in premature engine failure. Driveability, fuel economy, and exhaust emissions should not be affected under normal (part throttle) conditions.

Table 1 Jetting Combinations

Nitrous/Fuel Jetting	Approximate Power Gain	Approximate N₂O Consumption Rate
34/22	75 HP	0.85 lbs./10 sec.
38/24	100 HP	1.25 lbs./10 sec.
42/26	125 HP	1.50 lbs./10 sec.

1.2 System Requirements

When used according to instructions, these kits will work with stock internal engine components at power levels up to an additional 100 HP over stock. **To ensure proper performance and drive line longevity, the following is suggested:**

Clutch / Drive Line

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.

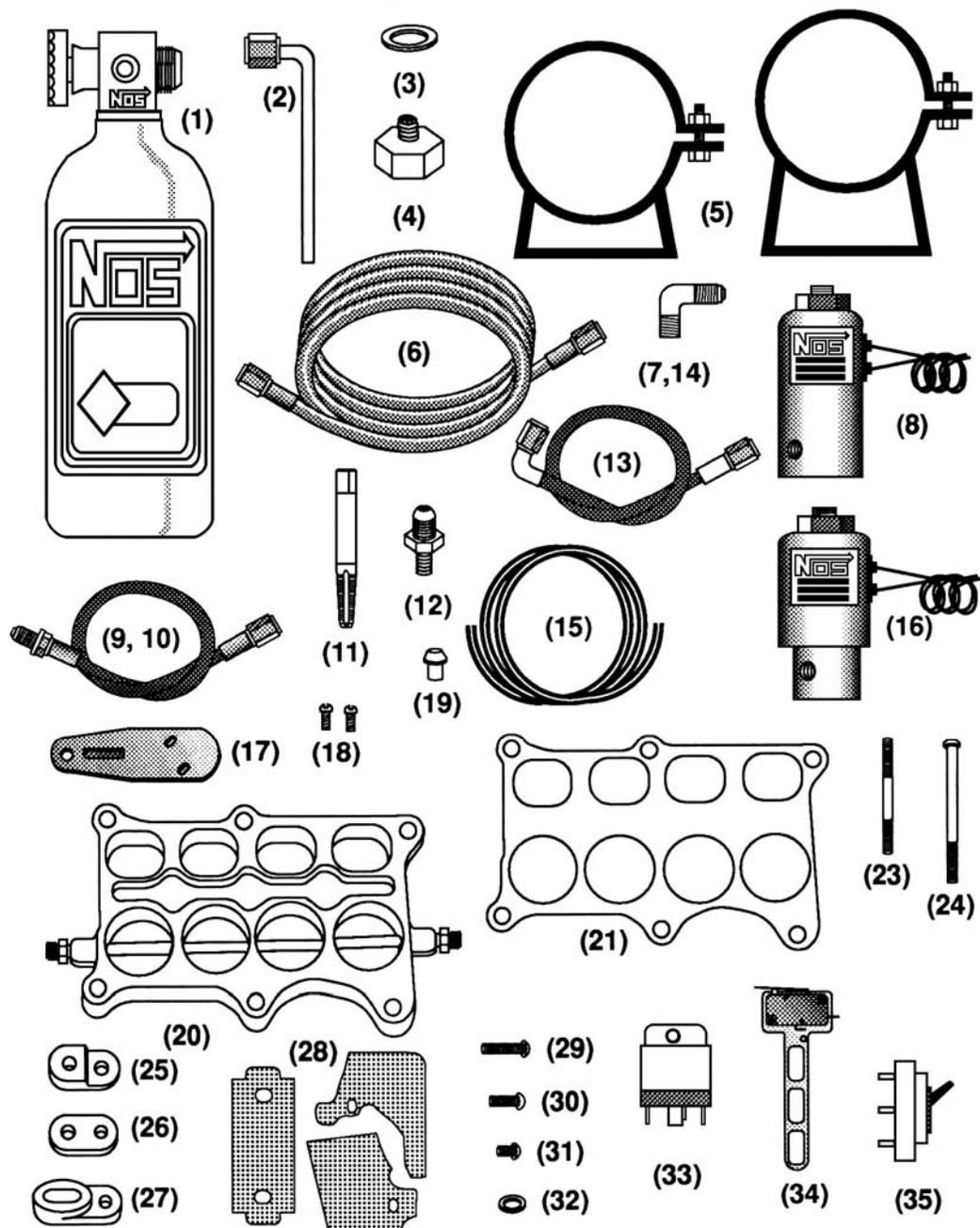
1.3 Kit Components

Before beginning the installation of your NOS kit, compare the components in your kit with those shown in Figure 1, and listed in Table 2. If any components are missing, please contact NOS Technical Support at 1-866-GOHOLLEY.

Table 2 Competition Cheater 1.8L Honda VTEC Kit #02040NOS Parts List

Item	Description	Quantity	NOS P/N
(1)	#10 N ₂ O Bottle with Racer Safety	1	14750 TPI
(2)	Racer Safety Blow-Down Tube	1	16160
(3)	Teflon Bottle Nut Washer	1	16210
(4)	4AN Bottle Nut	1	16220
(5)	#10 Bottle Bracket Set (Metal)	1	14125
(6)	12 ft. 4AN N ₂ O Supply Hose	1	15290
(7)	4AN N ₂ O Filter 90°	1	15562
(8)	Cheater N ₂ O Solenoid	1	16000
(9)	1 ft. 3AN x 1/8 NPT Hose (Blue)	1	15030-1-S
(10)	1 ft. 3AN x 1/8 NPT Hose (Red)	1	15030-2-S
(11)	1/16 NPT Tap	1	15990
(12)	1/16 NPT x 4AN Fitting	1	17945
(13)	16" x 4AN Hose with one 90° Hose End	1	15215-S
(14)	1/8 NPT x 4AN 90° Fitting (Red)	1	17671
(15)	2 ft. x 5/16" Hose	1	15000-S
(16)	Cheater Fuel Solenoid	1	16050
(17)	Cheater Solenoid Bracket	2	16500
(18)	Cheater Solenoid Bracket Screws	4	16501
(19)	Sapphire Flare Jet	1	13740-20
			13740-24
			13740-26
			13740-34
			13740-38
			13740-42
(20)	1.8L VTEC Injector Plate	1	13410
(21)	1.8 L VTEC Plenum Gasket	3	13413
(22)	1.8L VTEC Bolt Kit including:		
(23)	Intake Plenum Studs M8—1.25 x 100	2	18100-S
(24)	Intake Plenum Bolts M8—1.25 x 90	4	18109-S
(25)	Crankcase Breather Res. Relocator	1	18200-S
(26)	Int. Man. Support Brkt. Relocator (Lower)	1	18201-S
(27)	Int. Man. Support Brkt. Relocator (Upper)	1	18202-S
(28)	Int. Man. Support Brkt. Template	1	19240-S
(29)	M8—1.25 x 30mm Bolt	2	18108-S
(30)	M8—1.25 x 20mm Bolt	1	18107-S
(31)	M8—1.25 x 10mm Bolt	1	18106-S
(32)	M8 Washer	4	18132-S
(33)	30 Amp Electrical Relay	1	15618
(34)	WOT Microswitch, Bracket, & Screws	1	15640
(35)	Arming Toggle Switch	1	15600-S

Figure 1 Competition Cheater VTEC System Kit Components



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 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. In vehicles such as the Acura Integra, it is impractical to mount the bottle away from direct sunlight. In these cases, the bottle should be covered and insulated with an NOS bottle blanket (P/N 14160NOS).

NOS recommends that the bottle be environmentally separated from the driver's compartment. Vehicles, such as the Acura Integra, do not have separate trunk compartments, so this kit includes an external blow-down tube. The safety 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 a cloud of nitrous oxide if the safety pressure relief cap should 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 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.

Figure 2 Nitrous Bottle Siphon Tube Orientation

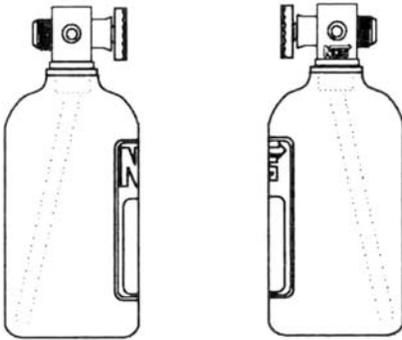
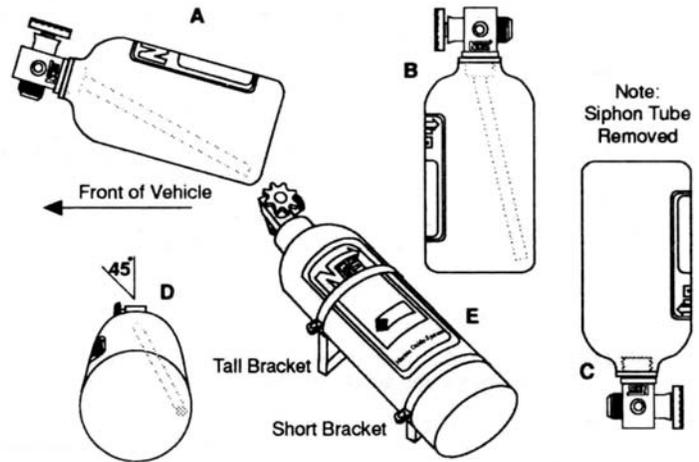


Figure 3 Nitrous Bottle Mounting Orientations



2.2 Bottle Orientation

Bottle placement is critical to the performance of your 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 NOS 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 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 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.

2.3 Bottle Installation

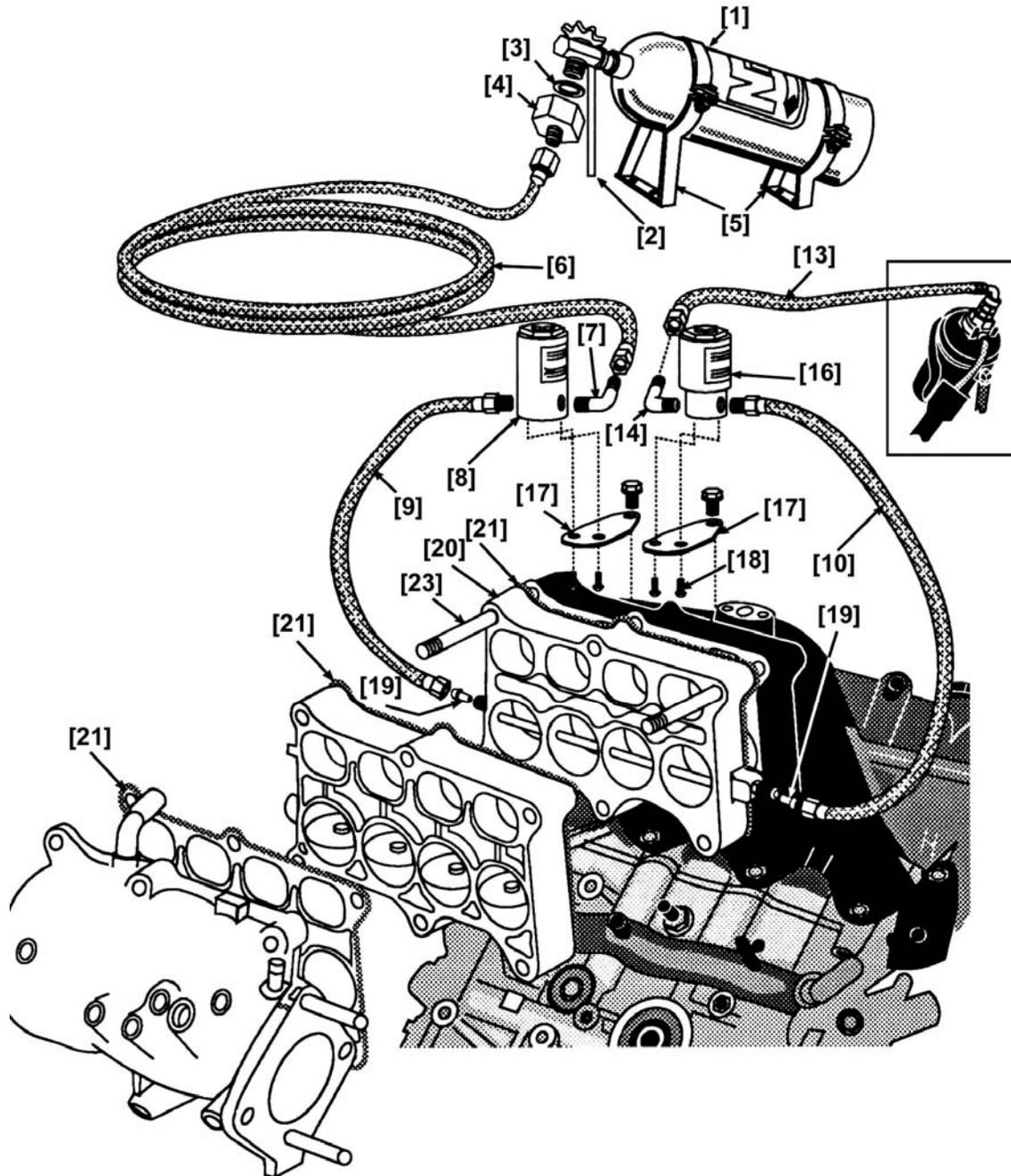
After you have determined the location and orientation of the nitrous bottle, use the following procedure to install the bottle:

NOTE: Numbers in parentheses () refer to the parts list /assembly drawing number for the component (Figure 1). Figure 4 shows the installation assembly for the Competition Cheater System.

1. Install the 4AN bottle nut (4) and Teflon bottle nut washer (3) on the nitrous bottle (1), and tighten securely.
2. Loosely install the bottle mounting brackets (5) and Racer safety blow-down tube (2) 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/blow-down tube unit as a pattern to mark for hole drilling. Drill four 5/16" holes for the bottle bracket bolts, a 1/2" hole for the blow-down tube, and a 11/16" hole for the nitrous supply tube.
5. Mount the brackets securely to the surface (recommended minimum of 5/16" bolts or No. 12 sheet metal screws).
6. Tighten the bracket clamps on the bottle.

Figure 4 Competition Cheater 1.8L Honda VTEC—Kit #02040NOS Assembly Drawing



2.4 Injector Plate Installation

NOTE: Procedures outlined in this section require the vehicle to be raised several feet off the ground to allow for access from underneath. The use of a vehicle hoist is recommended, if available.

1. Disconnect the negative battery terminal.
2. Allow the engine to cool completely, then drain the engine coolant from the cylinder block. Refer to Figure 5 for the drain bolt location. Reinstall the drain plug once the cooling system is empty.
3. Remove the air filter and engine air intake hose assembly.

4. Remove the two electrical connectors that are routed to the throttle body –1) Throttle Angle Sensor (TAS) and –2) Engine Air Control Valve (EACV).
5. Remove the two coolant hoses that are attached to the throttle body.
6. Unbolt the throttle body from the intake manifold. Remove the throttle body from the intake manifold (with throttle linkage still attached), being careful so as not to damage the gasket. Disconnect the breather hose that connects the crankcase breather tank to the throttle body. Temporarily relocate the throttle body out of the way.
7. Disconnect the electrical connector at the back of the intake manifold (Engine Air Temperature Sensor). Remove the sensor from the intake.
8. Remove the power brake booster vent hose from the intake manifold and temporarily relocate out of the way.
9. Remove the two bolts that hold the air conditioner hose mounting bracket to the bottom of the intake manifold plenum. Temporarily relocate the bracket and hose out of the way.
10. Cut the nylon tie wraps that hold the branch of the engine harness that is connected to the intake manifold support bracket.
11. Remove the intake manifold support bracket. The bracket is connected to the intake manifold with two bolts and connected to the cylinder block with three bolts.

NOTE: Once unbolted, the bracket can be removed from underneath the vehicle.

12. Disconnect the hose from the secondary butterfly plate actuating mechanism.
13. Remove the intake manifold retaining bolts and nuts.
14. Remove the intake manifold plenum and secondary butterfly plate.
15. Remove the two 8mm studs that held the intake plenum and secondary butterfly plate in place.

NOTE: Double nut the studs using the factory 8mm nuts to loosen.

16. Remove all old gasket material from the intake manifold, secondary butterfly plate, and intake manifold plenum.
17. Remove the 5/16" hose from the vent port of the crankcase breather tank.
18. Cut a 5 3/4" long section of the 5/16" rubber hose (15). Install on the vent port of the crankcase breather tank.
19. Install a M8—1.25 x 100mm stud (23) in each of the upper two outside threaded holes in the intake manifold. Refer to Figure 6.
20. Install an intake manifold gasket (21) on the intake manifold studs.
21. Install the NOS injector plate (20) on the intake manifold studs.
22. Install the second intake manifold gasket on the intake manifold studs.
23. Install the secondary butterfly plate on the intake manifold studs.
24. Install the third manifold gasket on the intake manifold studs.
25. Install the intake manifold plenum on the intake manifold studs.
26. Install and finger tighten the factory M8—1.25 x 90mm bolts (24) and washers (23) in the intake manifold plenum retaining bolt holes.
27. Install and loosely tighten the four M8—1.25 x 90 mm bolts to 17 ft./lbs. starting at the center and working outward in a criss-cross fashion.

Figure 5 Coolant Drain Plug Location

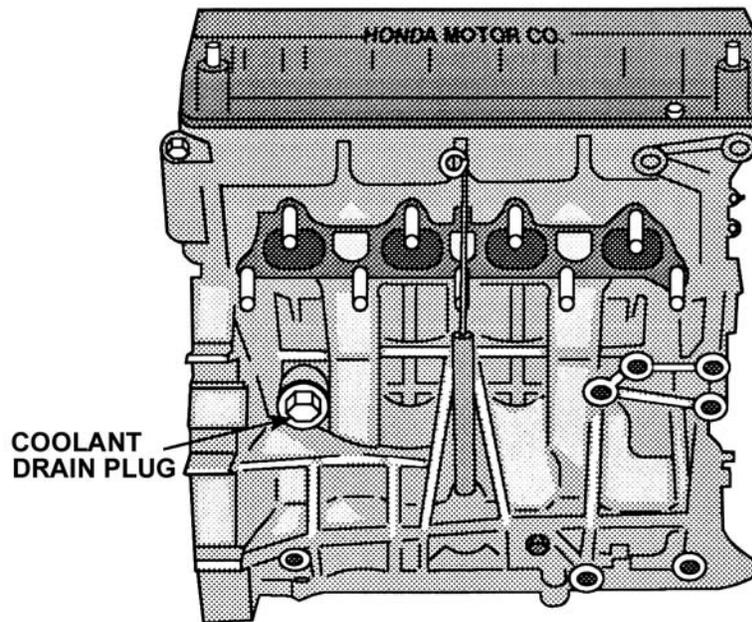
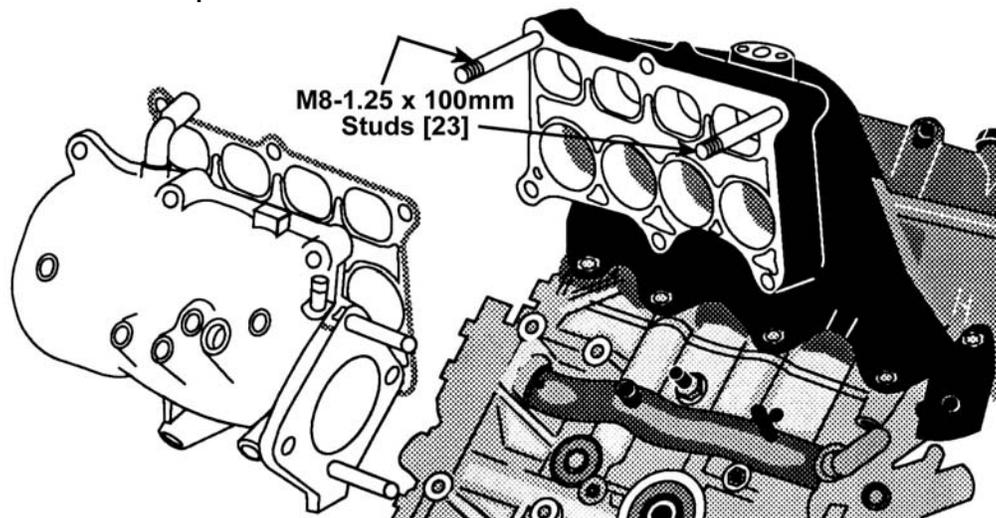


Figure 6 Intake Manifold Bolt Replacement



2.5 Intake Manifold Support Modification and Reinstallation.

1. Apply stick-on templates (28) to the intake manifold support bracket, as shown in Figure 7.
2. Using a die grinder and a carbide bit, grind the exterior profile and elongate the bolt holes in the manifold support bracket.
3. Install and lightly tighten the manifold support bracket mounting relocators (26 & 27) and the crankcase breather support relocator (25) using the M8—1.25 x 30mm bolts (29) provided. Refer to Figure 8.
4. Rotate the upper right side manifold support mounting relocator clockwise, so that it rests against the engine mount. Secure in place.
5. Rotate the upper wiring clip on the intake manifold support bracket 180° from its original position.
6. From underneath the vehicle, insert into position the manifold support bracket. Note that the branch of the engine wiring harness that used to be attached to the intake manifold support bracket, needs to be routed between the bracket and the engine. Be careful not to crush this harness when installing the bracket.
7. Connect the intake manifold support bracket to the upper right manifold support mounting relocator using the M8—1.25 x 20mm bolt (30).

8. Install the factory M8—1.25 x 8mm bolts in the lower two manifold support mounting relocater brackets.

Figure 7 Intake Manifold Support Bracket Templates

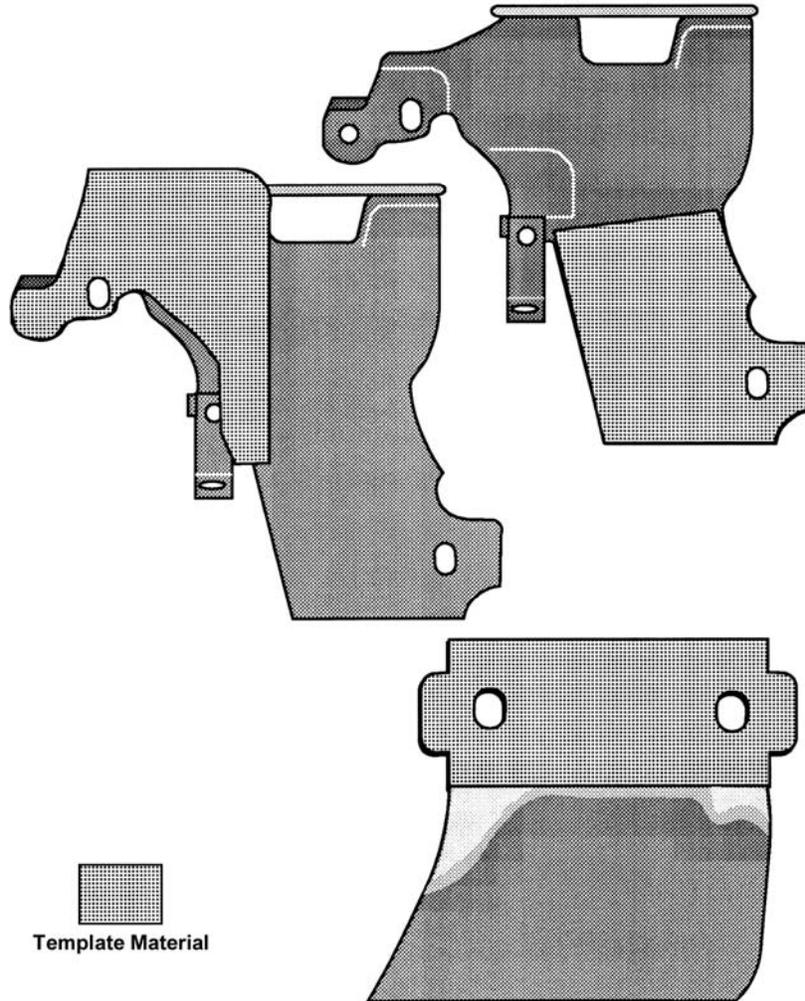
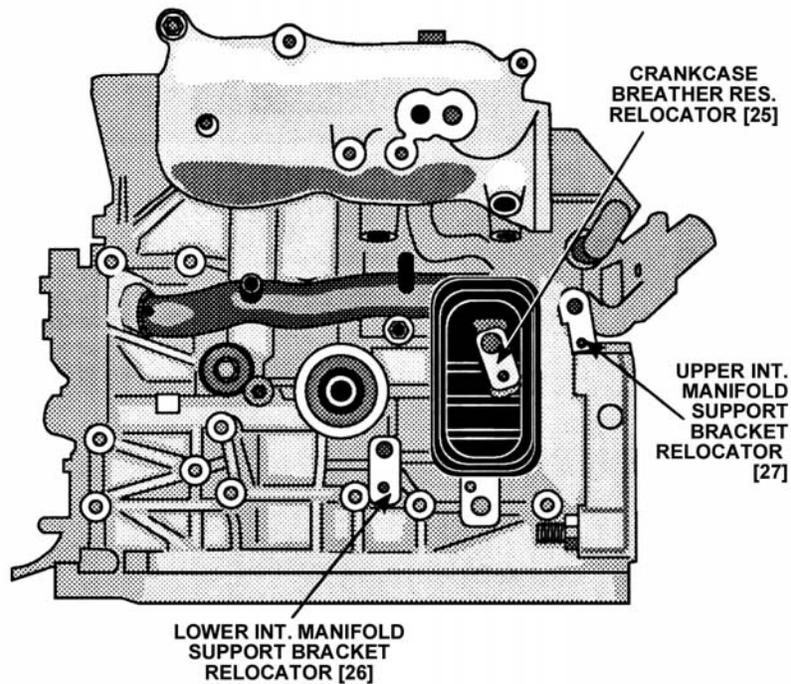


Figure 8 Manifold Support Bracket and Crankcase Breather Support Relocators



9. Install the factory 8mm bolts in the upper horizontal flange of the intake manifold support bracket (bolt the intake manifold support bracket to the intake manifold).

NOTE: This procedure may require a lot of finessing (prying/leverage) to get the clearance holes in the support bracket to align with the intake manifold bolt holes, if you have not enlarged the clearance holes adequately.

10. Install the bolt that holds the crankcase ventilation breather assembly to the intake manifold support bracket.
11. Securely tighten all the manifold support bracket bolts.
12. Reconnect the air conditioner hose mounting bracket to the bottom of the intake manifold plenum.
13. Reinstall the MAP sensor on top of the intake manifold plenum.
14. Reconnect the two electrical connectors at the back of the intake manifold plenum.
15. Reinstall the throttle body onto the intake manifold.
16. Connect the TAS and EACV electrical connectors to the throttle body.
17. Replace the coolant hose that connects to the upper radiator hose with the remaining piece of the 5/16" rubber hose (15).
18. Connect and tighten the two coolant hoses and the crankcase ventilation hose to the throttle body.
19. Refill the engine with coolant.

2.6 Solenoid Mounting

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

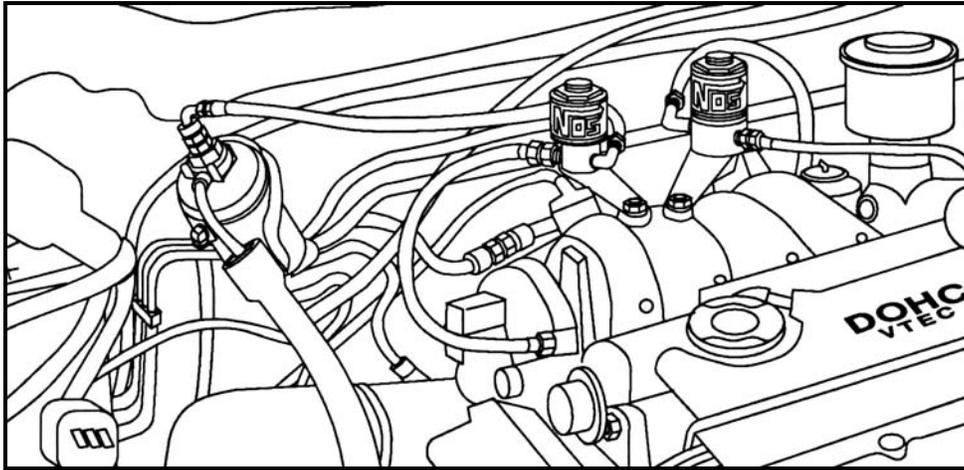
1. Clamp the nitrous solenoid (8) in a bench vise.

2.6.1 Nitrous and Fuel Solenoid Installation

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

1. Clamp the nitrous solenoid (8) in a bench vise.
2. Apply Teflon paste to the pipe threads of the nitrous filter fitting (7).
3. Thread the nitrous filter fitting (7) into the inlet port of the nitrous solenoid.
4. Apply Teflon paste to the 1/8 NPT male threads on the blue 1 ft. 3AN hose (9).
5. Thread the 1/8 NPT male end of the blue 1 ft. 3AN hose (9) into the outlet port of the nitrous solenoid. Remove from the vise.
6. Clamp the fuel solenoid (16) in a bench vise.
7. Apply Teflon paste to the pipe threads of the red 90° 4AN x 1/4 NPT inlet fitting (14).
8. Install the red 1/8 NPT inlet fitting in the inlet port of the fuel solenoid.
9. Thread the 1/8 NPT male end of the red 1 ft. 3AN hose (10) into the outlet port of the fuel solenoid. Remove from the vise.
10. Attach the nitrous solenoid to the solenoid mounting bracket.
11. Attach the fuel solenoid to the solenoid mounting bracket.
12. Select the mounting location for the solenoid assembly. Ensure that the assembly and lines do not interfere with the engine accessories or body parts, and that hoses reach the injector plate inlet ports without being stretched or kinked. Refer to Figure 9 for the suggested mounting location.
13. Securely mount the solenoid assembly.

Figure 9 Solenoid Assembly Mounting Location



2.7 Solenoid/Injector Plate Hose Connection

NOTE: The nitrous and fuel jets, included with this kit, feature high-precision sapphire orifices. Do not attempt to use standard (brass) flare jets with this system.

1. Select the proper nitrous and fuel jets (19). Place the desired jets in the injector plate fittings, being sure that the jets are inserted into the correct locations.
2. Connect and tighten the open end of the blue 1 ft. 3AN hose to the blue injector plate fitting.
3. Connect and tighten the open end of the red 1 ft. 3AN hose to the red injector plate fitting.

2.8 Nitrous Feed Line Mounting

HINT: The nitrous feed line can be routed following the fuel/brake 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. Feed the nitrous supply line (6) along the proposed route.
3. If it is necessary to support the nitrous supply line under the vehicle, use 1/2" Tinnerman clamps or nylon tie-wraps to support the line securely.
4. Attach the nitrous supply line to the nitrous bottle valve adapter.

WARNING: Nitrous oxide 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 filter installed in the nitrous solenoid inlet port.

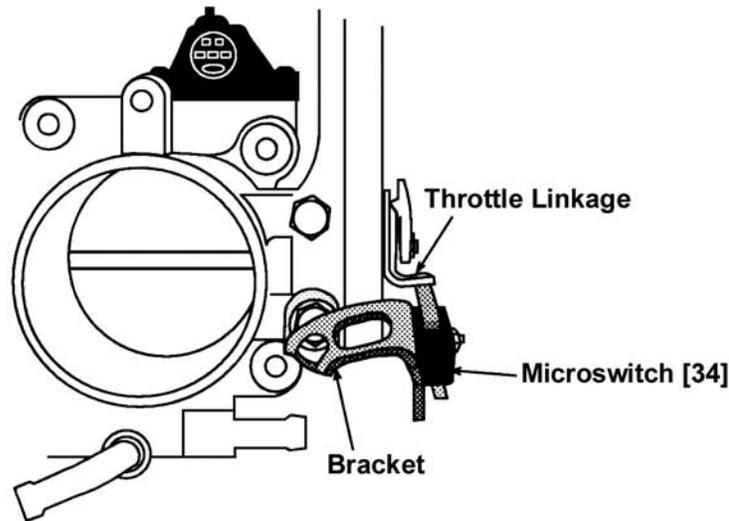
2.9 Fuel Supply Connection

1. Remove the Banjo fitting from the inlet of the main fuel supply line. Refer to Figure 10.
2. Drill a 1/4" hole through the centerline of the Banjo fitting.
3. Tap the 1/4" hole with the 1/16" NPT tap (11).
4. Thread the Brass 1/16" NPT to 4AN fitting (12) into the tapped hole. Apply Teflon paste to the pipe threads on the brass 1/16" NPT x 4AN fitting (12). Thread the fitting into the tapped hole.

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

- A. Mount the throttle microswitch on the throttle body so that the throttle linkage movement triggers the microswitch.
 - B. Adjust the microswitch to trigger at wide-open throttle by adjusting the microswitch's position to ensure the actuation arm of the microswitch "clicks" at the same point your throttle linkage reaches wide-open throttle against the throttle stop (Position 5A).
 - C. Ensure that the throttle and switch can reach the activation position by reaching the accelerator pedal. Have an assistant slowly press the pedal to the floor while you listen for the "click" of the microswitch.
3. Install the NOS arming toggle switch (35) in the vehicle's interior, within easy reach of the driver.
 4. Install the wiring relay (33) and the relay harness in the engine compartment near the battery. The relay's orange wire should reach the battery (+) terminal.
 5. Connect the orange relay wire to the battery (+) terminal. Install the 15 AMP fuse into the fuse socket.
 6. Connect one wire from each solenoid together. Join the solenoid wires to the blue relay wire.

Figure 12 Throttle Microswitch Installation



7. Join the remaining solenoid wires together. Connect to a good chassis ground.
8. Connect the green relay wire to a good chassis ground.
9. Connect the red relay wire to either terminal on the microswitch.
10. Connect the open terminal on the microswitch to the middle (#2) terminal on the arming toggle switch.
11. Connect the #1 terminal on the arming switch to a switched 12 volt power source.
12. Connect the #3 terminal of the arming switch to a ground.
13. Reconnect the battery.
14. Turn the arming switch ON.
15. Push the throttle wide open while the engine is off. Each solenoid should make a clicking noise if it is cycling correctly. If no noise is heard, check all the wiring connections and the wiring schematic in Figure 11.

Chapter 3 Baseline Tuning Suggestions

Your NOS Competition Cheater System comes preset with nitrous and fuel jetting based upon engine displacement. The jetting combinations furnished 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 900 psi (85° F) nitrous bottle pressure and stock fuel pressures as depicted in Table 3. Using the listed jetting and suggested fuel and nitrous 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.

Table 3 Competition Cheater 1.8L & 2.2L Honda VTEC Kit #02040NOS & 02041NOS Jetting Map

Jetting N ₂ O/Fuel	Approximate Power Increases	Spark Timing	Spark Plug Heat Range
34/22	75	Standard	Stock
38/24	100	2-4° Retard	Stock
42/26	125	4-6° Retard	Reduce Heat Range 1 Step from Stock

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).

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.

Chapter 4 Preparing for Operation

After you have completed the installation of your NOS Competition Cheater System kit, perform the following checkout procedure before operating your vehicle.

1. Refill the engine with coolant.
2. Reattach the battery ground cable.

NOTE: Before performing steps 3-7, make sure that the nitrous bottle valve is closed and the main nitrous supply line is empty.

3. Turn on the fuel pump.
4. Check all the fuel lines and fittings for leaks.
5. Start the engine.
6. Turn the arming toggle switch ON. Set the engine speed at 2000 RPM. Briefly depress the activation arm on the microswitch. The engine speed should decrease if the fuel delivery system is performing properly; if not, refer to Appendix A, Troubleshooting Guide.
7. 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.

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

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:

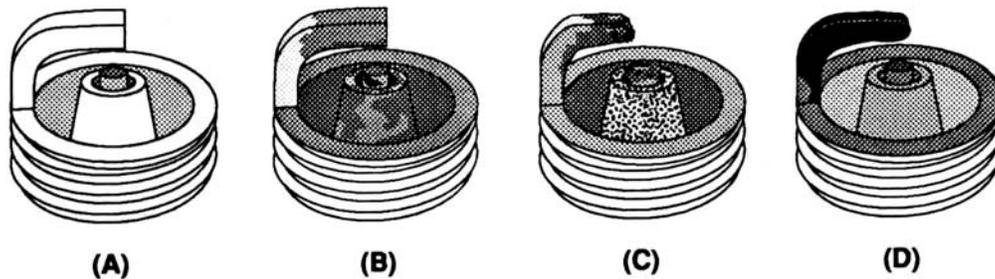
NOTE: Always perform the nitrous/fuel ratio modifications listed in Section 5.1 before attempting to optimize the ignition timing (Section 5.2). Improper nitrous/fuel ratio combinations can mislead you when attempting to optimize the ignition timing.

5.1 Determining Optimum Nitrous/Fuel Ratio

The factory-calibrated nitrous/fuel ratio included in your kit is intended to provide you with a safe starting point. It is intended to be used with 900 psi 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 900 psi.
2. Perform a dynamometer pull or a full throttle pass down the racetrack. Note the power reading or vehicle mph (not e.t.). Examine the spark plugs for the indication of lean or rich nitrous/fuel conditions (refer to Figure 13 for tips on reading the spark plugs).
 - 2A. If spark plugs appear to be excessively rich, decrease the fuel jet size 2 steps (ex. 26 to 24, 24 to 22, 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 jet change.
3. Repeat steps 1 and 2 until the desired mixture is obtained.

Figure 13 Spark Plug Condition



How to Read Spark Plugs from a Nitrous Oxide Injected Engine

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

The 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

The 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

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 phenomena can result from excessive ignition timing, too high a heat range spark plug, or inadequate fuel octane.

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.

5.2 Determining Optimum Ignition Timing

IMPORTANT! Ignition timing for **mildly** modified engines should be retarded approximately 2° per 50 HP increase for maximum performance. Start with the factory settings and retard from there. Use the initial settings, which are 2-3° more retarded than you expect to be optimum.

Example:	Ignition Timing without Nitrous-----	38°
	100 HP Increase from Nitrous-----2°/50HP-----	4° Retard
	Initial Safety Margin-----	<u>2° Retard</u>
	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° retard per 50 horsepower increase rule.
2. Set the ignition timing 2 to 3° retarded from your best power estimate setting.
3. Stabilize the nitrous bottle pressure at 900 psi.
4. Perform a dynamometer pull or a full throttle pass down the racetrack. Note the power reading or vehicle mph.
5. Increase the ignition timing 2°.
6. Perform a dynamometer pull or a full throttle pass down the racetrack. Note the power reading or vehicle mph. Examine the spark plugs for signs of detonation (refer to Figure 13 for tips on reading spark plugs).
 - 6A. If the power increases or the vehicle mph increases **and** the spark plugs show no sign of overheating or detonation, increase the ignition timing 2°.
 - 6B. If the power increases or the vehicle mph increases **and** the spark plugs begin to show slight signs of detonation—**STOP**. Do not advance the timing further. You may choose to reduce the timing 2° at this point for an extra margin of safety.
 - 6C. If the power decreases or the vehicle mph decreases, reduce the ignition timing 2°.
7. Repeat step 6, until the optimum ignition timing is obtained.

Chapter 6 Routine Maintenance

6.1 Nitrous Solenoid Filter

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

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

To clean the filter, follow the following steps:

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

6.2 Nitrous Solenoid Plunger

6.2.1 General Information

The seals used in NOS nitrous solenoid plungers are constructed from materials that are designed to be used with nitrous oxide. When kept free from fuel contaminants or from overpressurization, 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.

Due to the Competition Cheater System being a wet manifold style nitrous kit, the nitrous solenoid plunger will get exposed to fuel vapors. This is unavoidable. Fluctuations in the intake manifold pressure due to opening and closing of the throttle induce flow into the out of the NOS injector plate spray bars (fuel and nitrous), when the NOS system is not in use. Long term exposure of the nitrous solenoid plunger seal to the fuel vapors will result in swelling of the plunger seal. This will reduce the nitrous flow (causing an excessively rich nitrous/fuel condition and a loss of power).

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 overpressurization, they will not leak, the valve will just fail to flow nitrous oxide.

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

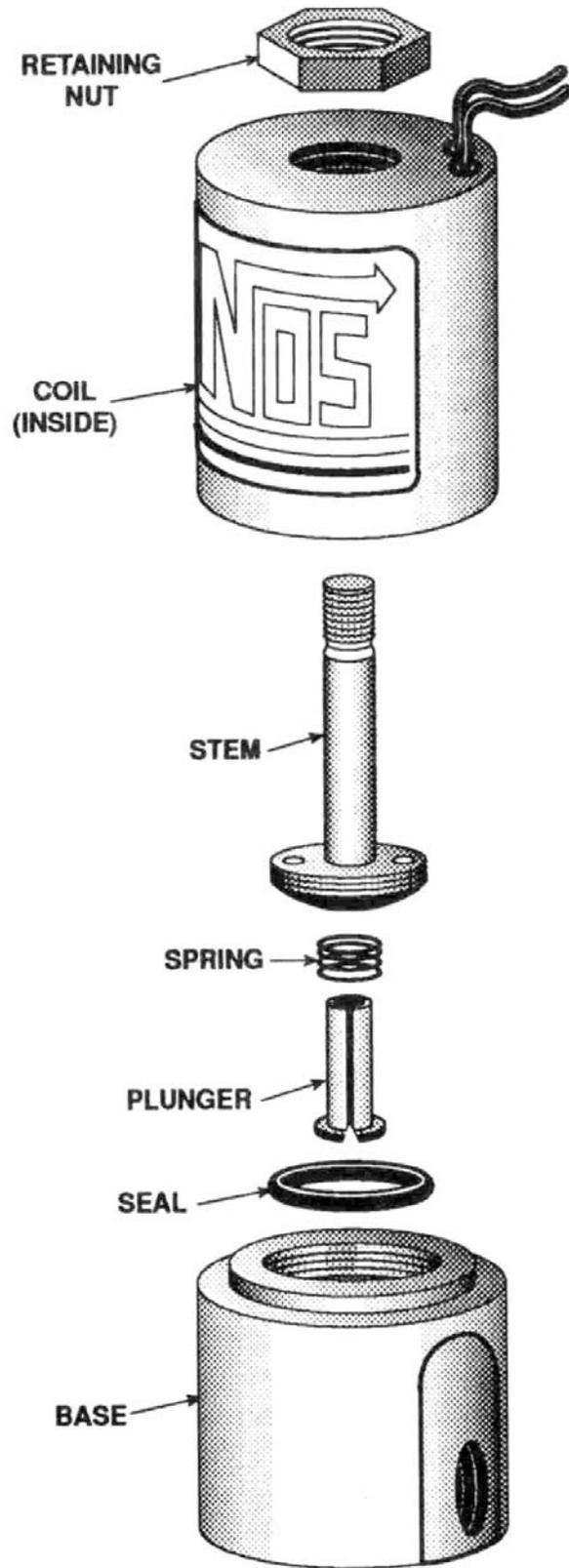
6.2.2 Nitrous Solenoid Plunger Disassembly and Inspection

1. Close the valve on the nitrous bottle.
2. Empty the main nitrous supply line.
3. Remove the retaining nut from the nitrous solenoid.
4. Remove the coil and housing from the nitrous solenoid base.
5. Unscrew the stem from the nitrous solenoid base. Do this by double nutting the stem, or by using a solenoid stem removal tool (NOS P/N 16666-S). **Do not use pliers on the solenoid stem. Damage to the stem will result.**
6. Remove the stem, spring, and plunger from the solenoid base.
7. Examine the plunger seal for swelling. The seal surface should be flat, except for a small circular indentation in the center of the seal;

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

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

Figure 14 Exploded View of a Typical Solenoid



Appendix A Troubleshooting Guide

The troubleshooting chart on the following pages should help determine and rectify most problems with your installed NOS system. If you still need assistance determining or fixing problems, call the NOS Technical Support at 1-866-GOHOLLEY.

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.	Wire per instructions.
	Restricted fuel line.	Inspect fuel line for restrictions (crimped or plugged).	Remove restrictions.
	Malfunctioning fuel solenoid.	Turn arming switch ON. Cycle 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 ₂ O/fuel jetting.	Compare jetting to recommended values.	Install correct jets.
	Excessive fuel pressure.	Install fuel pressure gauge, such as NOS P/N 15906NOS, 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: <i>Solenoid discharges nitrous at a high rate. Don't inhale nitrous; death may occur. Skin contact may cause frostbite.</i> 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. The solenoid should discharge N ₂ O at a high rate.	Rebuild solenoid.	
No change in performance when system is activated.	System wired incorrectly.	Compare nitrous wiring to wiring 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.	Connect 12V test light to battery (-) terminal. Check for power at pole #1 on the arming switch.	Repair wiring.
	Malfunctioning arming switch.	Turn arming switch ON. Connect 12V test light to battery (-) terminal. Check for power at pole #2.	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.	Temporarily disconnect power relay red wire from the microswitch. Connect 12V test light to battery (-) terminal. Manually set the microswitch ON. Check for continuity at microswitch positive terminal. See wiring schematic.	Replace throttle microswitch.

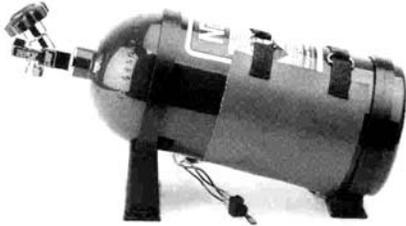
Engine detonates mildly when system is activated.	Excessive ignition timing.	Check ignition timing.	Reduce timing in 2° increments, up to 8° from non-nitrous conditions.
	Inadequate octane fuel.		Use higher octane fuel; up to 116VPC-16
	Spark plug heat range too high.		Reduce spark plug heat range (max. 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, such as NOS P/N 15931NOS. 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.

Nitrous Oxide Accessories

To maintain optimum system performance on cold days, a **Bottle Heater (P/N 14164)** is a must.

To maximize the efficiency of the system, a **Bottle Blanket (P/N 14165)** is also suggested.

#10 Bottle Heater P/N 14164NOS



#10 Bottle Blanket P/N 14165NOS



Throttle/RPM-Activated Switch P/N 15879NOS



Remote Bottle Valve P/N 16058NOS



The **Throttle/RPM-Activated Switch, P/N 15879**, allows hands-free nitrous operation and prevents nitrous from being injected at speeds above or below operator-set levels. Greatly reduces chance of accidental engine damage. ON/OFF levels adjust from 2000 to 9000 RPM.

The **Remote Bottle Valve, P/N 16058** is the perfect convenience accessory—electronically turns nitrous bottle on and off with the flick of a switch—no more trips to the trunk. It is also great as a safety shut-off valve. It operates on 12V DC. The complete kit includes hardware and installation instructions.

The **Custom Wiring Harness for Cheater/Super Powershot and Powershot kits, P/N 15836**, is engineered to provide high-quality, trouble-free wiring for your vehicle. These wiring harnesses come complete with all installation hardware. This is a must if you want maximum performance and appearance from your NOS nitrous oxide injection kit.

The **Nitrous Pressure Gauge, P/N 15910** (-4AN lines) and **P/N 15912** (-6AN lines), are designed to provide accurate ($\pm 2\%$ of full scale) readings of your NOS bottle pressure.

The **Fuel Pressure Gauge, P/N 15900**, is engineered to provide accurate ($\pm 2\%$ of full scale) readings of fuel pressure in carburetor applications.

To order, contact your local dealer.

NOS Technical Support

Phone: 1-866-GOHOLLEY

Fax: 1-270-781-9772

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

Bottle Refill Information: 1-800-99-REFILL

A5082-SNOS
Date: 10-25-01