BoonDocker Nitrous Manifold Installation Instructions

Before you begin, please read all the instructions below and check kit contents.

I. Kit Contents:

1 – Nitrous Manifold with fittings installed
1 – 5-hole nozzle
2 – 3/16" plastic Tees
1 – 12" black 1/8" poly line

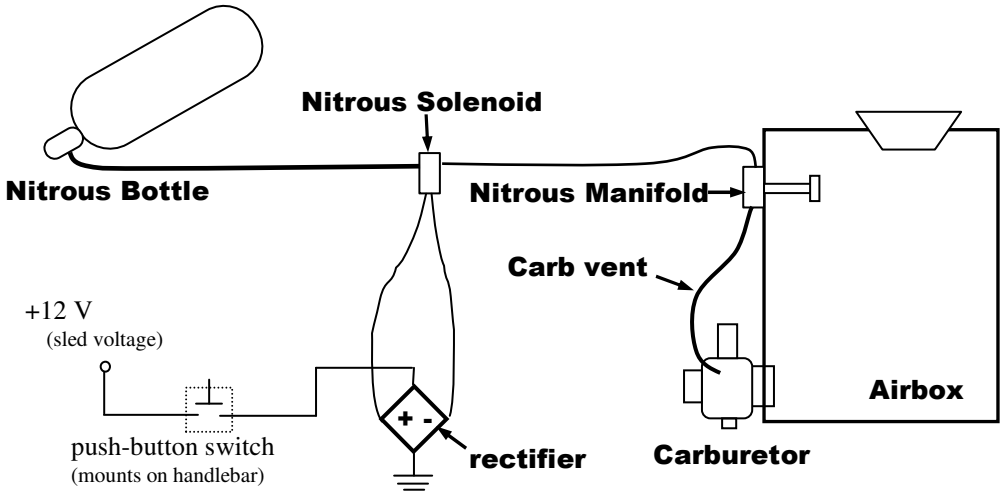
II. Tools Required:

Drill + bits (¾", ¼")
5/32"and 7/32" allen wrenches

III. Theory of Operation:

A common misconception about nitrous oxide is that it is explosive or flammable. Nitrous by itself does not burn, nor is it explosive. At 565 deg. F, nitrous oxide (N_20) breaks apart and forms two parts nitrogen and one part oxygen. Inside an engine, this added oxygen speeds up the combustion process (the nitrogen plays an important part in buffering the reaction). Whenever nitrous is used, additional fuel is necessary, otherwise the added oxygen will act as a blow-torch inside your engine. When used properly, nitrous oxide provides the same benefits as turbocharging or supercharging your engine (extra power is made by burning more fuel and oxygen), but without the added cost or complexities.

Below is a diagram of the major components of the Boondocker Liquid Nitrous System. The simplicity of this system makes it the most reliable, easy to tune, and easy to install nitrous system available. By using the existing fuel system (carburetor) to add the required extra fuel for nitrous, the complexity and unreliability of extra components is eliminated.



The part that makes the Boondocker nitrous system so unique is our patent pending Nitrous Manifold. This manifold simply mounts on the airbox or airfilter where it sprays a fine mist of nitrous that is then drawn into the engine through the carburetor(s). This allows the nitrous to be naturally aspirated into the cylinder instead of being forced, which is much friendlier to the motor and allows the nitrous to be used in a much wider range of throttle and rpm settings.

(continued on next page)

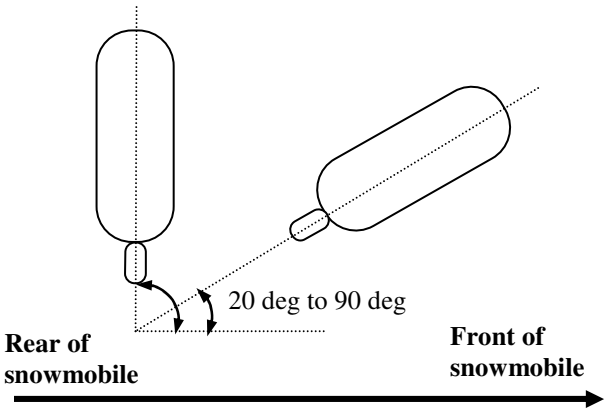
This nitrous manifold greatly simplifies the way extra fuel is delivered that is needed for nitrous use. The carburetor vents are connected to this manifold, allowing the carburetor(s) to breathe normally through the airbox when nitrous is not used. When nitrous is sprayed, the manifold produces a positive pressure that goes to the carburetor float bowl, which "pushes" more fuel through the main jet of the carburetor(s). This eliminates the need for an extra fuel pump, fuel solenoid, extra plumbing, and nozzle(s) that are necessary to inject the extra fuel in other systems.

This manifold is also designed to vary the float bowl pressure in relation to nitrous pressure, thus keeping the nitrous and fuel delivery in sync. Fluctuations in bottle temperature greatly affect nitrous pressure, which affects nitrous delivery. By automatically adjusting the fuel delivery as nitrous pressure varies, this manifold makes nitrous safe, reliable, and easy to use.

IV. Bottle Mounting Position

With nitrous in the bottle, both nitrous liquid and nitrous gas are present under high pressure (760psi at 70 deg F). Due to gravity and acceleration forces, the liquid portion of the nitrous will be at the bottom and rearward parts of the bottle. For this nitrous system to work properly, it is important that nitrous liquid be drawn from the bottle. Nitrous vapor will cause a significant decrease in performance.

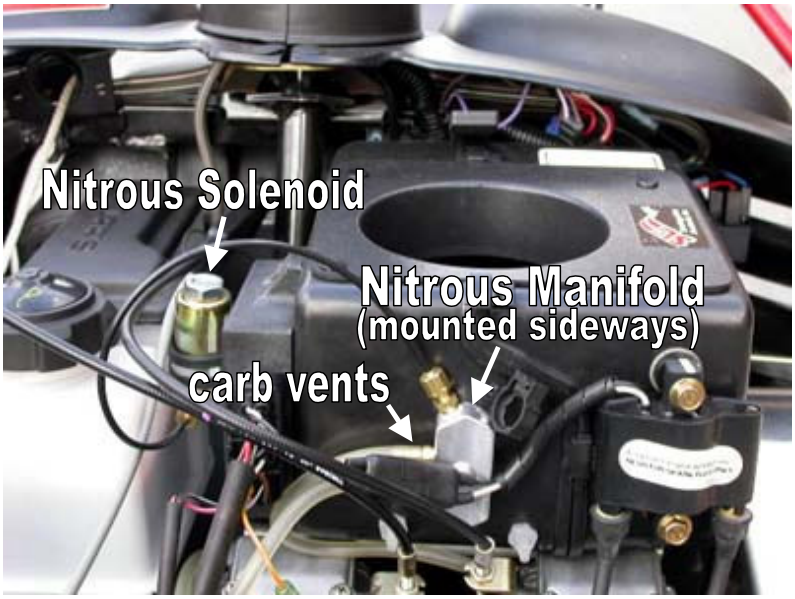
We prefer not to use a siphon tube inside the bottle since the tube can sometimes come loose and move around inside the bottle. Without a siphon tube, the bottle must be mounted so the valve is pointed down and towards the back of the sled as shown.



V. Nitrous Manifold Installation

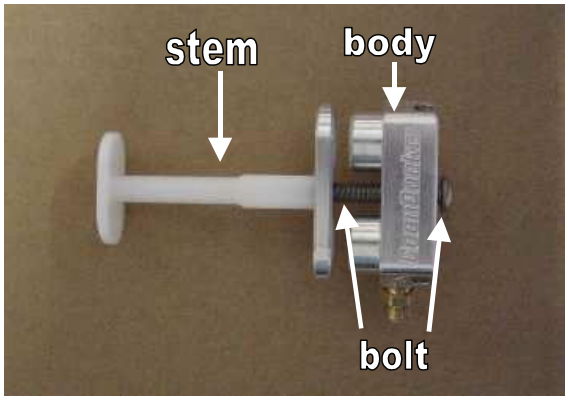
1. Locate a suitable place on the airbox for the nitrous manifold. Ideally this will be halfway between the two carburetors and pointed towards the incoming airflow so nitrous will be evenly mixed with the incoming air before entering the carburetors. If the shelf is left in the airbox, the manifold should be located above the shelf.

   Note: The manifold should be mounted sideways so the two ¾" barrels are positioned vertically (one above the other). This will allow a more even distribution if one barrel sprays more holes than the other.

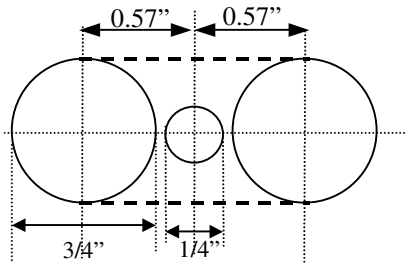


2. Using the template below as a guide, drill the three holes shown using 3/4" and 1/4" drill bits.

   Note: The dotted lines may be cut so the manifold can be installed with the stem still attached. This may be useful for locations where it is difficult to access the inside of the airbox. The manifold can be installed as one piece as follows:
   a. Loosen the bolt until the stem extends past the aluminum body by ¼".
   b. Rotate the stem 90deg. in relation to the body.
   c. Fit the stem through the oval-shaped hole in the airbox (the stem may need to be rotated as it goes through the hole),
   d. Realign the stem to the body and tighten the bolt. Be sure the two ¾" holes on the stem are properly aligned to the body of the manifold before tightening the bolt.



3. Install the manifold with the stem half inside the airbox and the aluminum half on the outside. Align the two halves together then thread the bolt in so the two halves are tight against the airbox.



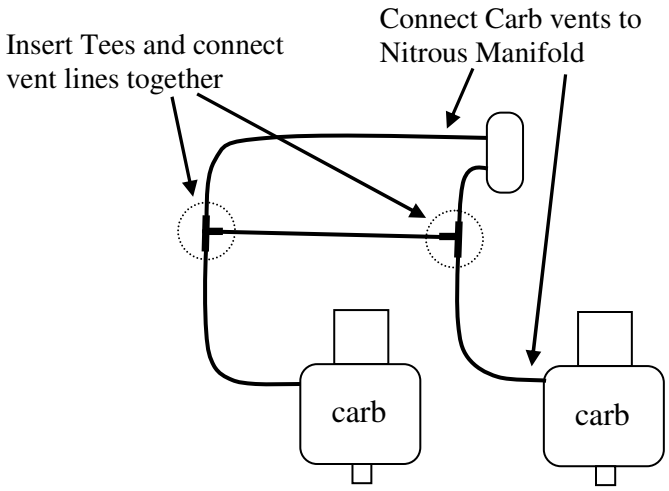
Manifold Cutout Template

VI. Hose Installation

Connect the 1/8" black nylon line from the solenoid brass fitting (side marked "OUT") to the nitrous manifold brass compression fitting. Keep this away from hot items. Note – do not overtighten these fittings! (if overtightened, the compression fitting may constrict the inside of the hose and limit nitrous flow).

VII. Carb Vent to Nitrous Manifold Installation

The nitrous manifold must be able to pressurize the carb float bowl. Connect the carb vent lines to the nitrous manifold as shown below. Insert a plastic Tee in each line and connect the two vent lines together as shown.



VIII. Startup and Tuning Procedures

A. Important Notes before using Nitrous:

1. We strongly recommend using high octane fuel (at least 94 for most stock motors, more for modified motors). We have found that race fuel or Boondocker race fuel concentrate mixed with premium gas can provide the necessary octane.

2. Be sure to use filtered nitrous – always use a filter when filling your bottle!

3. When tuning the system, do not use nitrous for more than 2 seconds at a time. Once the system is properly tuned (see steps below), we recommend not using nitrous for more than 8 seconds at a time. If nitrous is used for longer durations, it is critical that the system be carefully tuned and that no detonation problems are occurring.

B. Startup & Leak Test Procedure

The rider must do the following steps every time the bottle is turned on and before doing the fuel adjustment procedure.

1. With the engine off, open the bottle valve and check for leaks. Shut the bottle valve off. With the valve shut, the hose will still have pressure in it.

2. With pressure in the hose and the bottle valve closed, start the engine. Check to make sure the solenoid does not discharge hose pressure.

3. With the engine running (be ready to shut down engine if necessary), open the bottle valve. Push the nitrous button for about one second or less. Engine rpm should increase if the nitrous system is functioning properly.

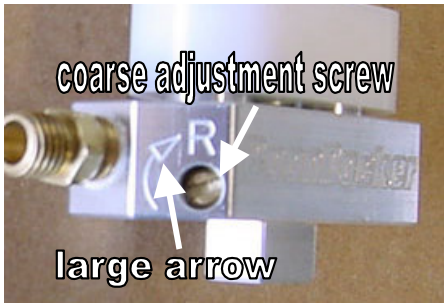
C. Nitrous Manifold Fuel Adjustment Procedure

The steps below should be done with a full nitrous bottle that is at the proper operating temperature (70-90deg F). Make sure the engine is at normal operating temperature. Do not exceed 2 seconds of nitrous use until the fuel adjustment is complete and correct.

This adjustment process should only be performed by an experienced tuner. If you are not an experienced tuner, find someone who is. Remember, safety first!

Warning: Only adjust the fuel mixture screws according to the steps below. The factory setting should provide a good starting baseline. If this setting accidentally gets changed, turn the screws in (clockwise) all the way and then back out 2.5 turns each, then proceed with the steps below.

There are two fuel adjustment screws on the nitrous manifold. These screws adjust the amount of fuel when nitrous is being used - they will not affect carburetor jetting off nitrous. All adjustments below should be done using the **fine adjustment screw** (small arrow, small "R") first. The coarse adjustment screw (large arrow, large "R") should only be used if correct results cannot be obtained using the fine adjustment screw (if fine screw is turned in all the way or turned out more than 6-8 turns). Two turns on the fine adjustment screw equal one turn on the coarse adjustment screw. "R" stands for "Rich" – turning the adjustment screws in will add more fuel when using nitrous.



1. Run the sled in an open area at full throttle and apply nitrous for 1 or 2 seconds. Note engine power and rpms when the button is pushed.

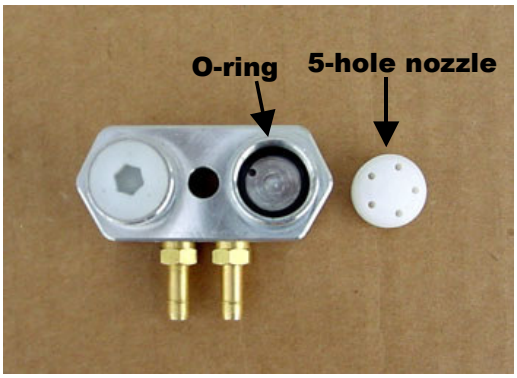
2. Enrichen the mixture by turning the nitrous manifold adjustment screw in (clockwise) 1/2 turn. Run nitrous for 1 or 2 seconds again and note power and rpm difference. If no power loss is noted, repeat step 2 until a loss is noted. A power loss indicates you are rich enough (be sure!) - go to step 3.

3. To find where the mixture starts to become too lean, turn the nitrous manifold adjustment screw out (counterclockwise) 1/2 turn and note power. A power increase should be noted. Turn nitrous manifold adjustment out 1/2 turn and compare to previous run. If no power increase is noted, go to step 4. If power increase is noted, repeat step 3 until no power increase is noted. Use extreme caution - you can go too lean!

4. For the final setting, turn the nitrous manifold adjustment screw back in (clockwise) 1/2 turn.

5. After this adjustment is made, <u>if the engine does not run perfectly smooth when using nitrous, do not use it!</u> If the exhaust note does not sound clean, the cause is likely detonation which can quickly destroy the engine. Either use higher octane fuel or reduce the engine's compression before using nitrous again.

IX. Changing Nitrous Manifold Nozzles



It is possible to increase/decrease the amount of nitrous the nitrous manifold sprays by replacing the white ¾" nozzles with nozzles with more/less orifice holes. In general, each orifice hole that is sprayed is equivalent to a 5hp increase.

Read this before you increase nitrous!

Be sure your engine is working good before you decide to increase the amount of nitrous. If you are not getting the power increase you are expecting with the original setup, something is likely wrong. Review the manifold tuning procedure and verify that you can tune the manifold so you know there is too much fuel. From there, if leaning the manifold mixture screw does not produce an increase in power, one of the following problems may exist:

1. Be sure your bottle is full, at the correct temperature (70-90 deg), and positioned correctly so the valve picks up liquid nitrous. The system will not work properly if nitrous vapor is being picked up or if the bottle is too cold.

2. Your engine could be detonating. Detonation can occur if your compression ratio is high, your timing has been advanced, or you are not using good octane fuel. Listen carefully to the motor - if it does not sound clean and you are not too rich, you are likely detonating.

3. A bad power source or faulty electrical connection may cause the nitrous system to malfunction intermittently. Carefully check all connections. If necessary, solder all connections.

   Important Note: A known problem exists on Polaris snowmobiles when the lighting system has been disconnected (often when the hood has been removed). The voltage will be fine at an idle, but when revved up, the voltage regulator will become overloaded and the voltage will drop to a very low voltage, causing the nitrous solenoid to no longer work. Either reconnect the headlight so there is enough load on it, or remove the old voltage regulator an replace it with two new regulators wired in parallel (connect both yellow wires together). Both regulators must in good working order and be the exact same type so they both regulate to the same voltage.

4. Dirty nitrous can quickly plug the nitrous filter and obstruct the nitrous delivery. Remove and clean the sintered bronze filter element by blowing compressed air through it backwards. Always fill your bottle from a filtered source.

Installing / Removing Nozzles

1. Remove the nitrous manifold from the airbox.
2. Use a 7/32" hex wrench to carefully remove/install a nozzle. Be sure the o-ring is still in place before threading in a new nozzle. Be very careful not to overtighten the plastic nozzle – it needs to be just snug.
3. If you want to increase nitrous delivery, increase the total number of nozzle holes by one! (ie. go from 7 holes to 8 holes)
4. Retune the nitrous manifold according to the instructions above. Anytime the orifices are changed, the nitrous manifold pressure will change so retuning is necessary.

X. Warranty, Terms & Conditions

Returned Goods – No merchandise will be accepted without prior approval. A RMA number (Return Merchandise Authorization) provided by Boondocker is required before a return will be accepted. A 20% handling and restocking charge will be applied to returned merchandise. No unauthorized returns will be accepted.

Limited Warranty – Boondocker warrants its product to the original purchaser against workmanship defects for a period of 90 days, commencing from the date of product delivery to the Consumer.

Maximum Liability – The maximum liability of Boondocker in connection with this warranty shall not under any circumstances exceed the price of the product claimed to be defective.