



BoonDocker Nitrous System Installation Instructions for Yamaha Banshee ATV

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

Nitrous Kit Contents:

- | | |
|--|---|
| 1 – Nitrous Manifold with 1/16” 90 deg
compression fitting and 3/16” barbed Tee | 1 – 1/8” NPT to 4AN adapter for solenoid |
| 1 – Nitrous Bottle with 4AN fitting | 1 – pushbutton switch |
| 1 – Bottle Bracket (for option 1 installation) | 1 – mounting clamp for pushbutton switch (1 bolt style, 1 crimp
style) |
| 1 – Bottle Clamp | 1 – rectifier |
| 1 – high pressure braided hose (3 feet) | 2 – ¼” x 1” mounting bolts with washers for Nitrous Manifold |
| 1 – 12” length of 1/8” black nylon hose | 4 – misc. electrical connectors |
| 1 – solenoid | 4 – orificed cup plugs for 3/16” tubing |
| 1 – solenoid holding bracket | 1 – 4’ length of 3/16” tubing |
| 1 – 1/8” NPT compression fitting for solenoid
with filter | |

Tools Required:

- Drill + bits (1/2”, 5/16”)
- Wire stripper / crimper tool
- Sidecutters
- 5/32” and 7/32” allen wrench
- Basic wrench and socket set
- Flatblade screwdriver

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 (N₂O) 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.

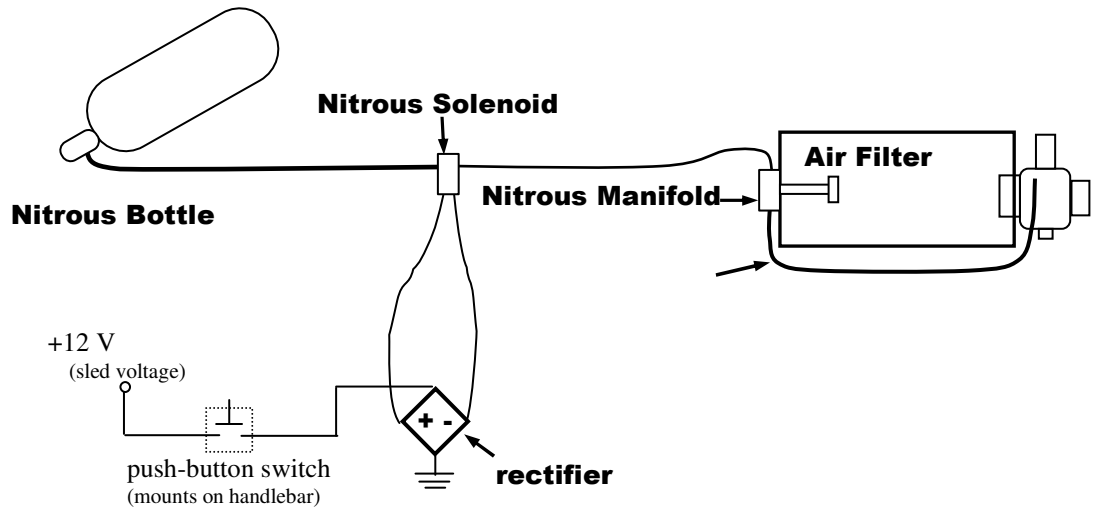
Below is a diagram of the major components of the BoonDocker Liquid Nitrous System. The simplicity of this system makes it the most reliable, easy to tune, and easy to install nitrous system available. By using the existing fuel system (carburetor) to add the required extra fuel for nitrous, the complexity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



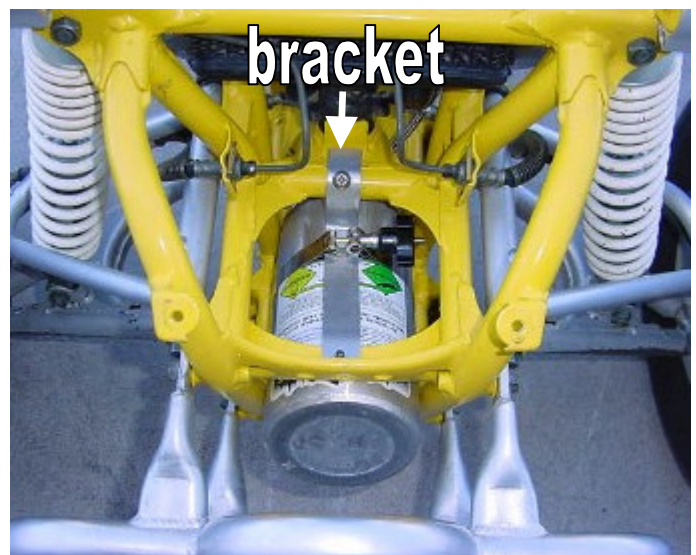
Part I – Bottle Installation

There are several options for mounting the bottle. The most common ways are shown below.

Option 1 – bottle laid down in front

The bottle is mounted in the front between the two A-arms with the valve pointed towards the rear. In this position the bottle does not require a siphon tube. The front bumper will need to be tilted down in order to access the bottle.

1. Two holes will need to be drilled into the frame for the bracket. Secure the bracket with a self-tapping bolt in the rear and a rivet or small-headed bolt in the front (the bolt head will be against the bottle).
2. Mount the bottle and secure with the bottle clamp as shown.

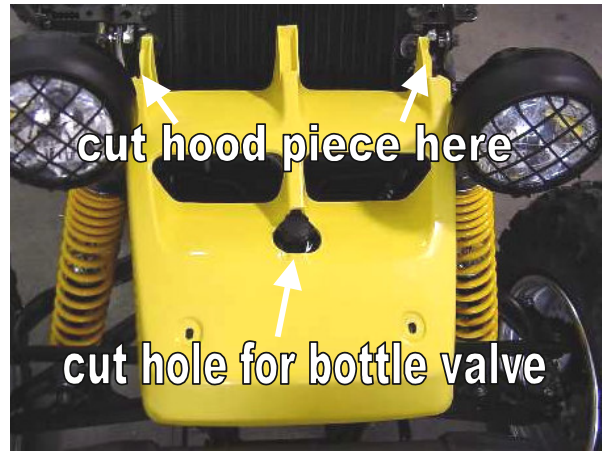
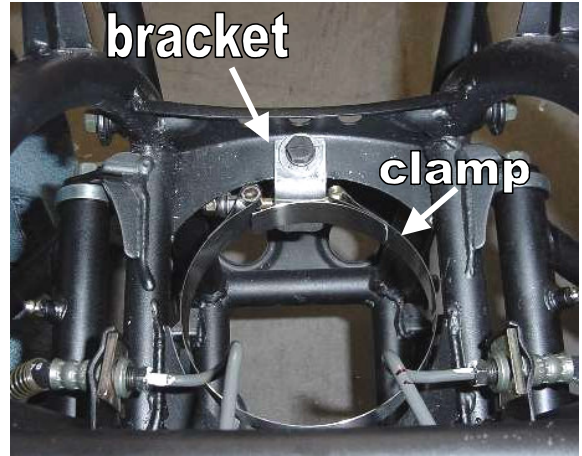


(Part I – Bottle Installation - Cont.)

Option 2 – bottle upright in front

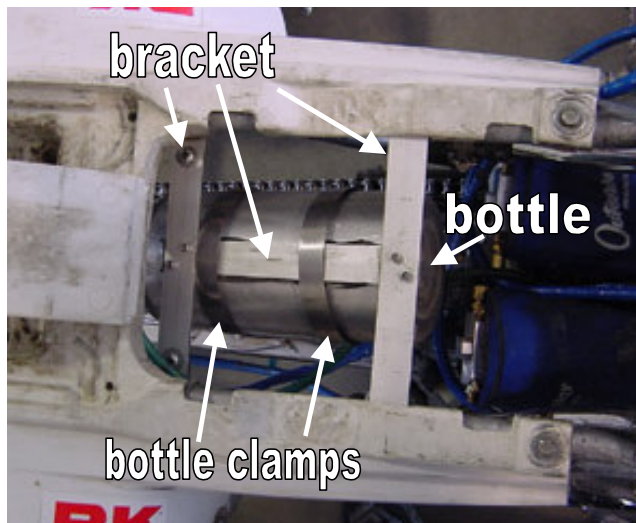
Note: With the bottle in an upright position, the bottle must contain a siphon tube so the nitrous liquid can be picked from the bottom of the bottle. If your bottle does not contain a siphon tube and you wish to install the bottle in this position, please contact BoonDocker.

1. The bottle is mounted upright in the front between the two A-arms. Remove the front plastic and drill a hole for the bracket (not included) into the frame gusset as shown. The bottle clamp will fit around this bracket and hold the bottle in place.
2. For easy access, the hood can be cut so it can be detached from the rest of the front plastic. Cut the hood piece in the two corners as shown. If desired, cut a hole in the middle of the hood so the bottle valve can be accessed.
3. Mount the bottle and route the hose as shown.



Option 3 – Bottle under the seat (airbox must be removed)

With the airbox removed, a simple bracket (not included) can be made to install the bottle as shown below. The bottle shown does not contain a siphon tube so it is mounted with the valve towards the rear and tipped down.



Bottle Filling /Weights

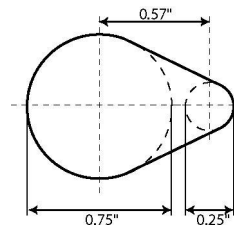
Automotive speed shops that sell nitrous kits can usually refill nitrous bottles. This bottle can be filled with non-medical grade nitrous oxide that contains a very small amount of sulfur dioxide (combines with water in your lungs and forms sulfuric acid if breathed too much). This is the same nitrous that is used for all nitrous oxide systems, usually with the name “Ny-trous+”.

Fill the bottle according to the weights below. We do not recommend overfilling the bottle – when the bottle gets hot, it will rupture the blow-off disk.

<i>note: all weights are in fractions of pounds, not ounces</i>	Bottle Size		
	2.5 lb AL Bottle	2.9 lb CF Bottle	4.1 lb CF Bottle
Weight of Cylinder & Gas	6.3 lb	6.0 lb	7.8 lb
Weight of Cylinder Empty	3.8 lb	3.1 lb	3.7 lb
Weight of Gas	2.5 lb	2.9 lb	4.1 lb

Part II – Nitrous Manifold Installation

1. A K&N filter for the Banshee must be installed (part # YA-3502 for stock airbox).
2. The Nitrous Manifold will be installed on the back of the airfilter. Use the template below as a guide to drill the three holes using 1/2” and 5/16” drill bits.
3. Disassemble the nitrous manifold by first unscrewing the aluminum bolt. Carefully separate the plastic half from the aluminum body as show in the picture. Be careful not to allow debris inside the plastic piece or the aluminum body while the manifold is disassembled.
4. Install the manifold with the plastic half inside the filter and the aluminum half on the outside. Push the two halves together then thread the aluminum bolt in so the two halves are tight against the filter (be sure the o-rings are pushed on the aluminum body before tightening the bolt). Tighten to 80-90 in-lbs.
5. Be sure the manifold body seals against the back of the filter and that there are no air leaks. Use silicon or thick grease if necessary.



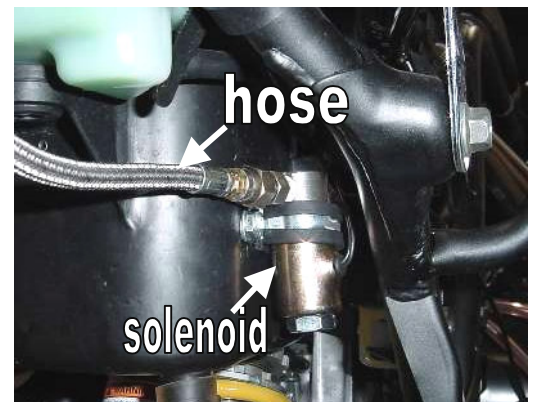
Manifold Cutout Template

Part III – Solenoid / Hose Installation

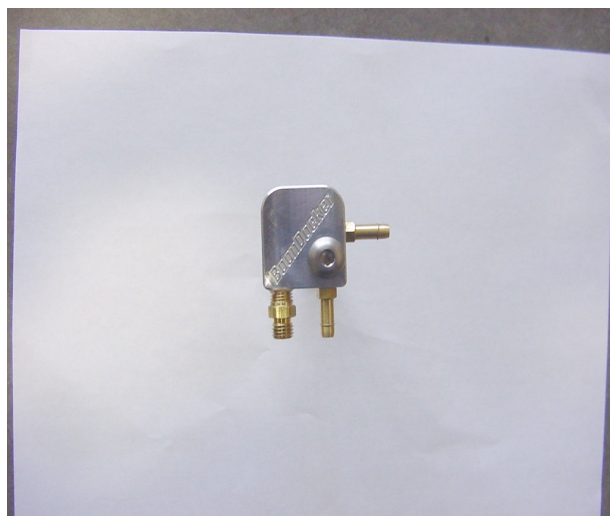
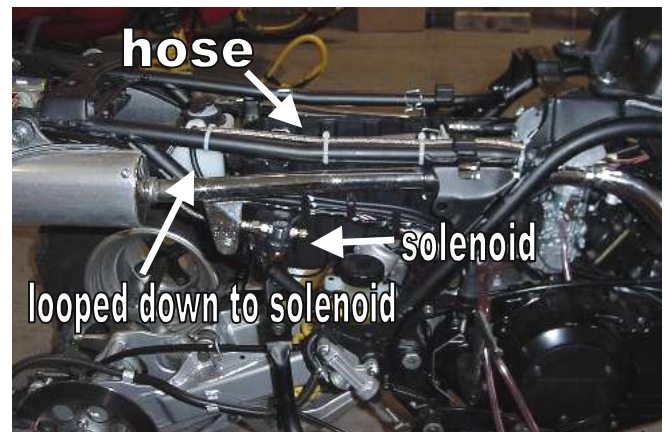
1. Before installing the following fittings, apply a thread sealant or teflon tape to the threads – be careful not to contaminate the insides of these fittings.
 - a. Connect the 1/8 NPT - 4AN fitting to the side of the solenoid marked “IN”.
 - b. Connect the brass compression fitting to the side of the solenoid marked “OUT”.



2. Locate the solenoid on or near the airbox as shown in the picture. The 1/8” black nylon hose going to the manifold and the high-pressure hose from the bottle needs to easily reach the solenoid with no sharp bends.
3. Use the padded strap to secure the solenoid near the airbox.
4. Connect the 1/8” black nylon line from the brass compression fitting on the solenoid to the brass compression fitting on the nitrous manifold by routing it through a 1/8” hole in the airbox. Keep this away from hot items. Note – do not over tighten the compression fittings!



5. Connect the high-pressure braided hose from the bottle to the solenoid. If the bottle is mounted in the front, run the hose next to the frame, then loop it down to the middle of the airbox where the solenoid is mounted, keeping it away from the exhaust, and secure it with zip-ties.



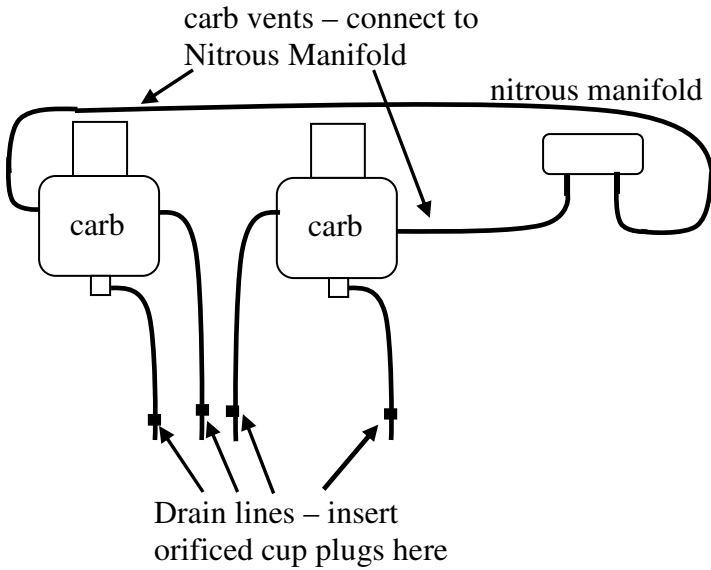
Part IV - Carb Vent to Nitrous Manifold Installation

The nitrous manifold must be able to pressurize the carb float bowl and the carb vent lines must be able to drain if fuel gets trapped in the lines.

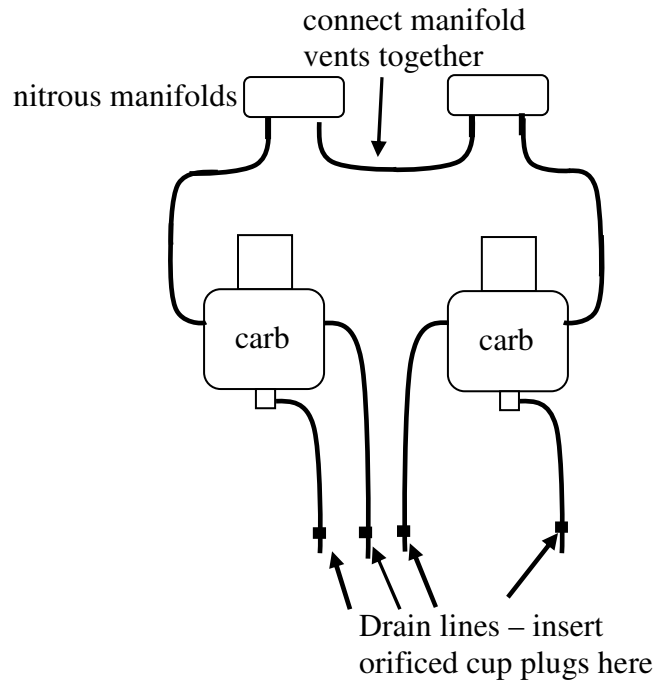
Connect the carb vent lines to the nitrous manifold as shown in one of the diagrams below. Orificed cup plugs are required to be installed in the bottom of all vent lines – the .030" orifice will allow fuel to drain, but retain pressure to the float bowl. Refer to the diagrams below for ideas.

A. two carbs, one manifold

****MOST INSTALLATIONS USE THIS SETUP****



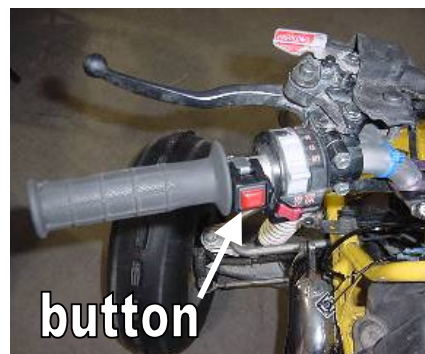
B. two carbs, two manifolds



Part V – Push-Button Installation

A. Button mounted on Handlebar

The pushbutton switch can be installed on the handlebar or directly on the left or right handgrip. The picture to the right shows the button mounted on the handlebar with the controls shifted over slightly to allow room.



B. Button mounted on Hand-grip

Shown below are directions for installing the button directly on the left handgrip.

1. Using pliers, bend a hook into one end of the clamp.
2. Connect the clamp to the button as shown. Fit the hooked part of the clamp to the button so the straight part of the clamp is not connected.
3. Put the button on the left handlebar. With a pen, mark on the clamp where the mounting hole on the button and the clamp meet.
4. Remove the clamp and cut it approximately 1/4" to 3/8" away from the mark. Bend this end with pliers so it is similar to the other hooked end.
5. Put the button and clamp back on the handlebar. Tighten the clamp with sidecutters so it is just snug. Do not over tighten.



6. The button should appear as shown in the picture.

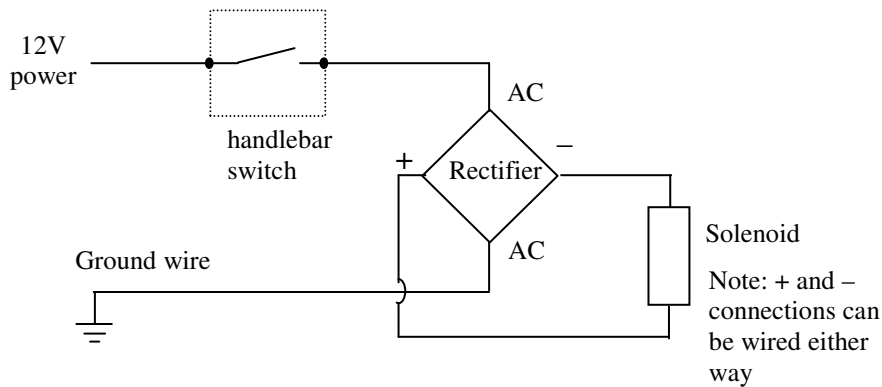


Part VI – Electrical Installation

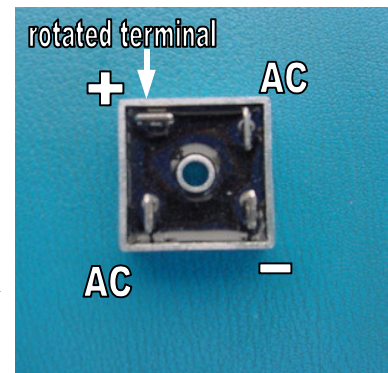
Wire the connections according to the diagram below. Use a 12V supply that is only on when the ignition key is turned on and the kill switch is in the “run” position.

We still recommend using the rectifier even if the system has a battery – the diodes in the rectifier absorb a current spike produced by the solenoid when the button breaks the connection (this prevents a spark). Even if a DC voltage is used, you must still connect the voltage supply to the two “AC” terminals on the rectifier.

To identify the terminals on the rectifier, look for the markings on the side: “+”, “AC”, “-”, “AC” (see picture). If the rectifier is not labeled, locate the beveled corner and identify the terminals according to the picture below.

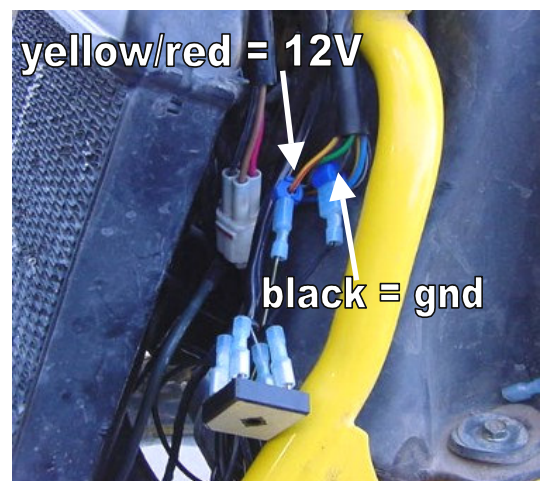


rectifier markings on the side



rectifier terminals

For most Banshees, power can be found on the 6-prong connector (located near the front) that comes off the ignition switch. The yellow/red wire is 12V and the black wire is ground (see picture).



Part VII – Tuning Instructions

A. Carb Jetting:

Because the nitrous manifold changes the carb venting from atmosphere to inside the airbox, the main jet size may need to be increased. When a large volume of air flows through the airbox, a negative pressure may develop inside depending on how restrictive the airbox is. This negative pressure can cause the engine to run too lean unless the main jet size is increased. Make sure the carb jetting is correct before proceeding with the tuning instructions.

Note: A quick check may be performed as follows:

1. With the nitrous manifold installed, run the ATV and note performance.
2. Temporarily disconnect one of the vent lines from the manifold so the carburetors are vented back to atmosphere.
3. Run the ATV again and note if performance improves.
4. If performance has improved, you will need to increase the main jet size. Increase the main jet size, reconnect the vent line to the nitrous manifold and retest. Continue increasing the main jet size until performance is the same as when the vent was disconnected from the nitrous manifold.

B. Important Notes before using Nitrous:

1. High-octane fuel is strongly recommended. We have found that race fuel or race fuel concentrate mixed with premium gas can provide the necessary octane.
2. We also recommend using one size colder spark plug (higher number = colder). In some cases decreasing the spark plug gap to around .020” achieves best results.
3. Be sure to use filtered nitrous – always use a filter when filling your bottle! Debris can quickly plug the small blue filter that is behind the brass compression fitting on the nitrous manifold.

C. 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.

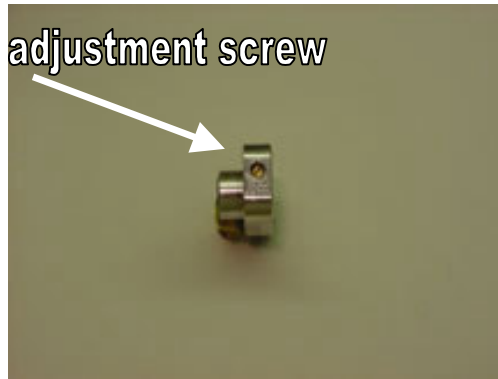
1. With the engine off, open the bottle valve and check for leaks. Shut the bottle valve off. With the valve shut, the hose will still have pressure in it.
2. With pressure in the hose and the bottle valve closed, start the engine. Check to make sure the solenoid does not discharge hose pressure.
3. 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.

D. 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 is fully closed. Begin by turning the adjustment screw out two full turns.



1. Run the vehicle 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, if the engine does not run perfectly smooth when using nitrous, do not use it! 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.

Part VIII – 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.