BoonDocker Nitrous System Universal Installation Instructions for ATV

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

Nitrous Kit Contents:

Quality and contents inspected by_____

1 – Nitrous Manifold with fittings installed
1 – Nitrous Bottle with 4AN fitting
2 – bottle clamps
1 – 48" high pressure braided hose
1 – 12" length of 1/8" black nylon hose
1 – solenoid
1 – solenoid holding bracket
1 – 1/8" NPT compression fitting for solenoid
1 – 1/8" NPT to 4AN adapter for solenoid
1 – pushbutton switch
2 – mounting clamps for pushbutton switch (1 bolt style, 1 crimp style)
1 – rectifier
4 – female electrical connectors
2 – electrical butt connectors
4 – orificed cup plugs (1/8" and 3/16")
1 – 3' length of ¼" tubing
2 – 3/16" x 3/16" x 3/16" barbed Tee

Tools Required:

Drill + bits (3/4", 1/4")
Wire stripper / crimper tool
Sidecutters
allen wrench set
Basic wrench set
Flatblade screwdriver
Teflon Tape

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 572 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.

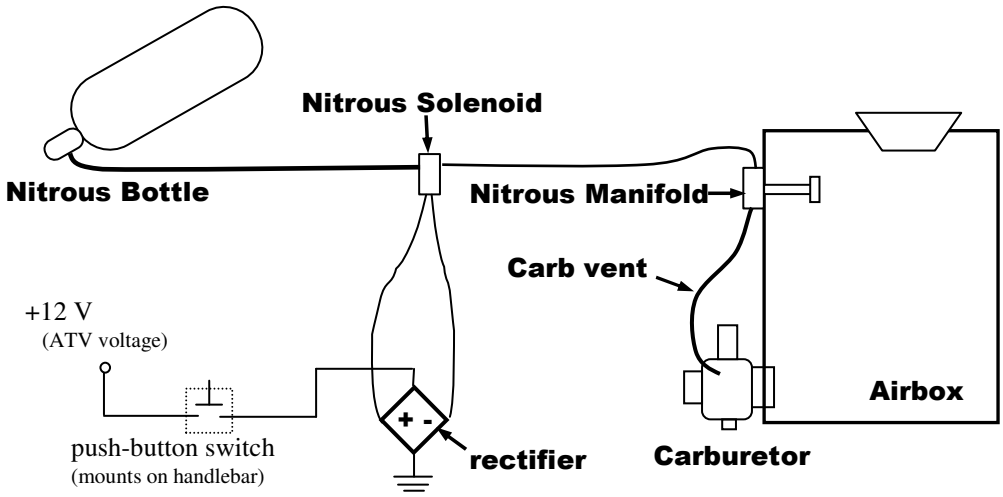
The part that makes the Boondocker nitrous system so unique is our patent pending Nitrous Manifold. This manifold simply mounts on the airbox or airfilter where it sprays a fine mist of nitrous that is then drawn into the engine through the carburetor(s). This allows the nitrous to be naturally aspirated 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.

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.

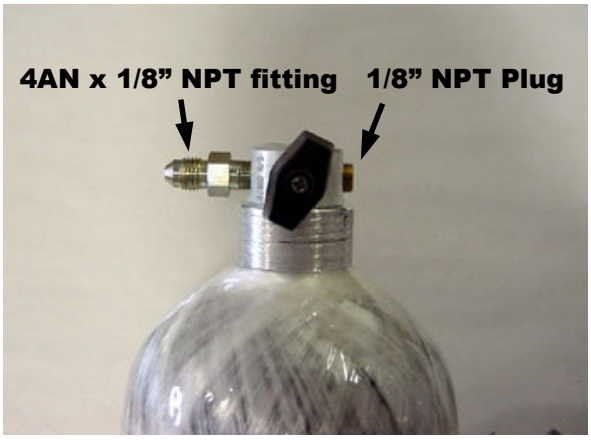
(continued on next page)

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.

Be sure to understand and follow the tuning instructions at the end of these instructions. Proper tuning is an important part of any performance-enhancing product.



Part I – Bottle Installation



A. Bottle Valve Fittings

Insert the 4AN x 1/8" NPT fitting and the 1/8" NPT Plug into the bottle valve (these are attached to the lid of the box for the bottle). Use Teflon tape to seal the threads – be sure not to get tape inside the threads!

Siphon Tube Considerations

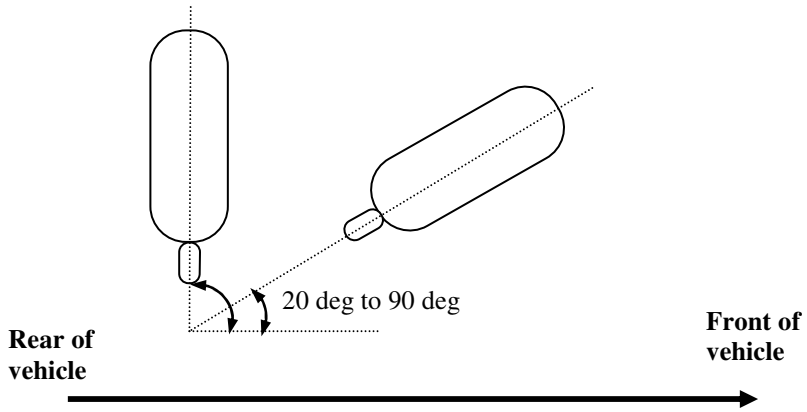
With nitrous in the bottle, both nitrous liquid and nitrous gas are present under high pressure (760psi at 70 deg F). Due to gravity and acceleration forces, the liquid portion of the nitrous will be at the bottom and rearward parts of the bottle. For this nitrous system to work properly, it is important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

A siphon tube can be used inside the bottle, much like a pickup tube inside an aerosol can. With the bottle in an upright position, this tube will allow liquid to be drawn from the bottom of the bottle. If the bottle can be mounted in an inverted position with the valve pointed down, the liquid can be picked up directly by the valve and a siphon tube is not required.

If a siphon tube is inside the bottle, it is attached to the bottom of the valve. This can be determined by looking for the word "siphoned" on the label or by tapping an empty bottle and listening for vibrations of the tube inside. If the siphon tube is not needed, remove valve and remove the tube.

B. Bottle Mounting Positions Without a Siphon Tube

The bottle must be mounted so the valve is pointed down and towards the back of the vehicle as shown below.

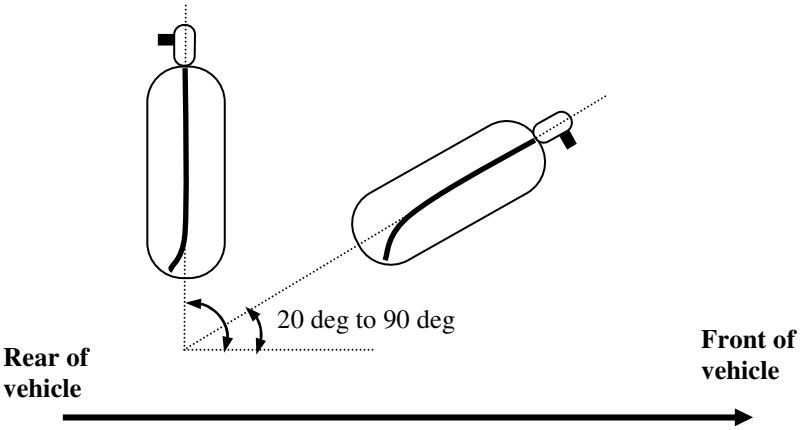


Example Pictures of bottles mounted <u>Without</u> a Siphon tube:

C. Bottle Mounting Positions With a Siphon Tube

The bottle must be mounted so the valve is pointed up and towards the front of the vehicle as shown below.

The siphon tube should be bent slightly so that it can pick up from the bottom rear portion of the bottle as shown in the drawings below. When bending the siphon tube it is best to orient the bend so it points towards the hose fitting on the valve.



Example Pictures of bottles mounted <u>With</u> a Siphon tube:

D. 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 Nytrous-Plus.

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.

***note**: all weights are in fractions of pounds, not ounces*	**Bottle Size**								
	4.1lb CF	**4.0lb CF**	**2.9lb CF**	**3.0lb AL**	**2.5lb AL**	**20oz AL**	**16oz AL**	**12oz AL**	**9oz AL**
Weight of Cylinder & Gas	7.8 lb	7.4 lb	6.0 lb	6.1 lb	6.1 lb	3.0 lb	2.8 lb	2.1 lb	1.7 lb
Weight of Cylinder Empty	3.7 lb	3.4 lb	3.1 lb	3.1 lb	3.6 lb	1.7 lb	1.8 lb	1.3 lb	1.1 lb
Weight of Gas	4.1 lb	4.0 lb	2.9 lb	3.0 lb	2.5 lb	1.3 lb	1.0 lb	0.8 lb	0.6 lb

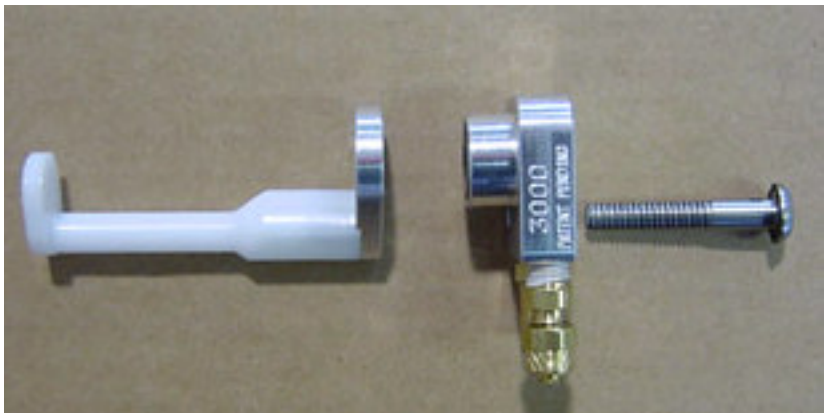
Part II – Nitrous Manifold Installation

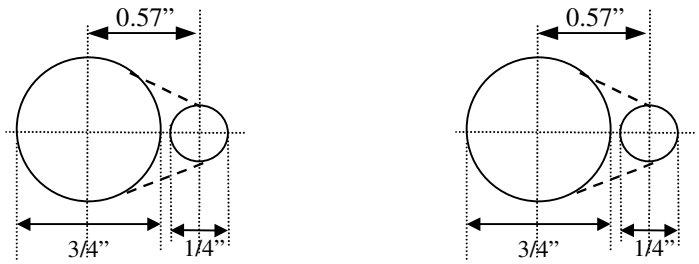
1. Locate a suitable place on the airbox or airfilter for the nitrous manifold. For best results the manifold should spray into the airflow that goes directly to the carburetor(s). Nitrous should not be sprayed through the filter.
   a. If a K&N filter is available for your application, install the nitrous manifold directly on the back of the filter.
   b. If enough room is available, the manifold can be installed on the airboot between the filter and the carburetor.

2. Using the template below as a guide, drill the holes shown. The dotted lines can be cut in order to allow the manifold to be installed without completely removing the stem (in case the filter/airbox/airboot is difficult to remove). This is done by unscrewing the bolt so the stem extends past the body by ¼" (the stem is still attached to the bolt). Feed the stem through the mounting hole, then align the stem to the body and tighted the bolt.

3. If the nitrous manifold is to be installed as two pieces, separate the stem from the nitrous manifold by completely unscrewing the bolt in the back, then install the manifold to the airboot with the stem half inside 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 airboot.

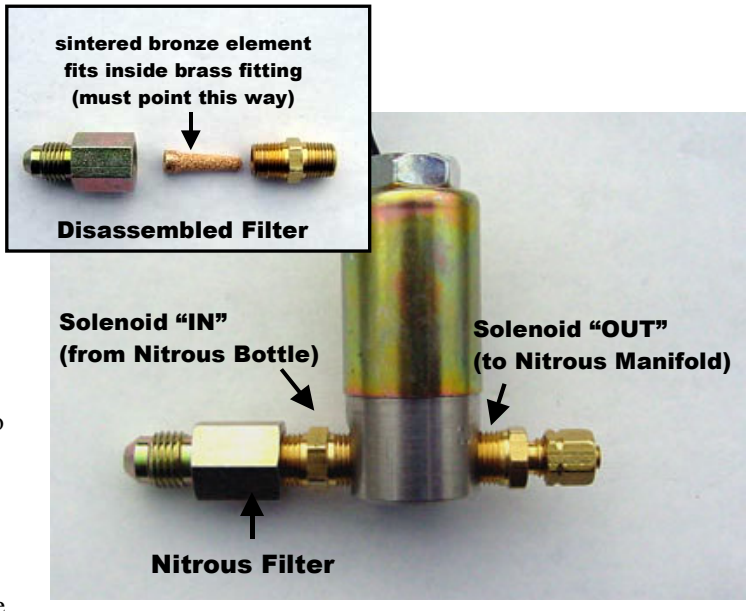
4. Use silicone to seal any airleaks.





Manifold Cutout Template (copied 2x's)

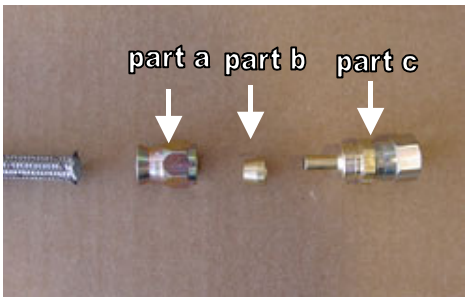
Part III – Solenoid / Hose Installation



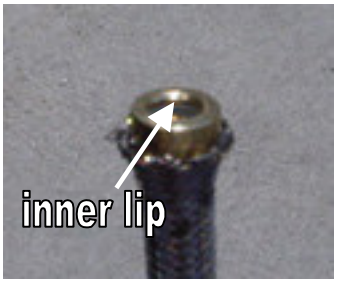
1. Before installing the following fittings, apply a thread sealant or teflon tape to the threads – be careful not to contaminate the insides of these fittings.
    a. Connect the Nitrous Filter to the side of the solenoid marked "IN".
    b. Connect the brass compression fitting to the side of the solenoid marked "OUT".
2. Locate the solenoid in or near the airbox. Use the padded strap to secure the solenoid. 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. Connect the 1/8" black nylon line from the solenoid brass fitting to the brass fitting on the nitrous manifold. Keep this away from hot items. Note – do not overtighten the compression fittings!
4. Connect the high-pressure braided hose from the bottle to the solenoid. If a universal hose end is included, see the directions below. Do not use Teflon tape on the hose fittings - these 4AN fittings are designed to seal themselves as they are compressed together.

Universal Hose End Installation

Some kits come with a hose with one end crimped on and a universal end that is not installed. This allows the hose to be cut to length (a hacksaw can be used). Install the end as follows.



1. Cut hose to length.
2. Clean the hose using compressed air. Make sure there is no debris left inside the hose.
3. Install part **a** on the hose.
4. Install part **b** so it fits over the inner plastic hose. Press part **b** on far enough so the plastic hose stops at the inner lip.
5. Push part **c** onto the hose end.
6. Tighted part **a** and part **c** together using wrenches.



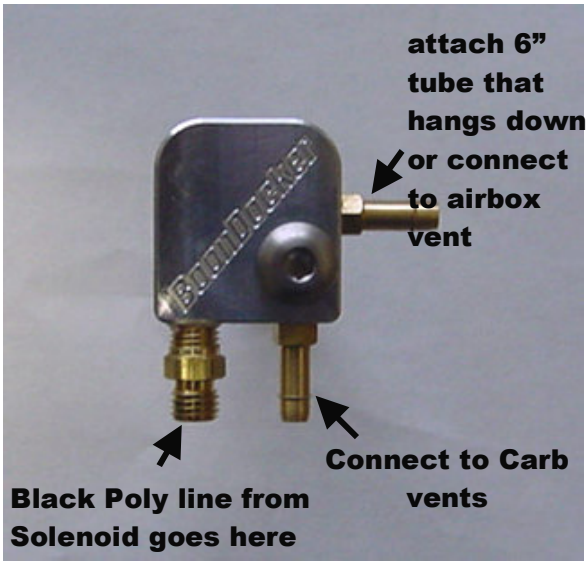
Part IV - Carb Vent to Nitrous Manifold Installation

1. The nitrous manifold must be able to pressurize each carburetor's float bowl. All vents lines that go to each carburetor's float bowl must be connected into this system. If there are additional vents per carburetor, tee each carburetor's vents together, then tee this into the system (as shown in the diagrams below).

2. The carb vent lines must be able to either drain back to the carbs or drain outside if fuel gets trapped in the lines. Put orificed cup plugs in the bottom of all vent lines that drain outside – the .030" orifice will allow fuel to drain, but retain pressure to the float bowl when nitrous is used.

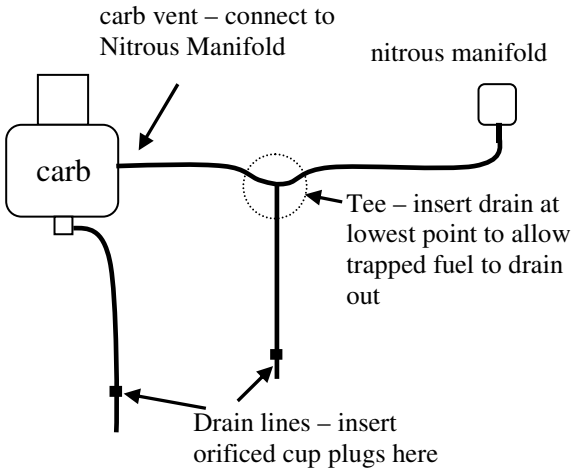
   Note: If a drain exists at the bottom of the float bowl, this is likely connected to the float bowl area through a stand-up pipe and must have an orificed cup plug installed (as shown in diagrams).

3. The barbed fitting on the side of the manifold is where the excess pressure is bled off.
   a. If an airbox is used that still has fittings for the original carb vents, connect a line from this fitting to the airbox fittings.
   b. If an airbox is not used or the carbs were not vented to the airbox, connect about a 6" length of line to this fitting that just hangs down. This will help prevent debris from entering the nitrous manifold.

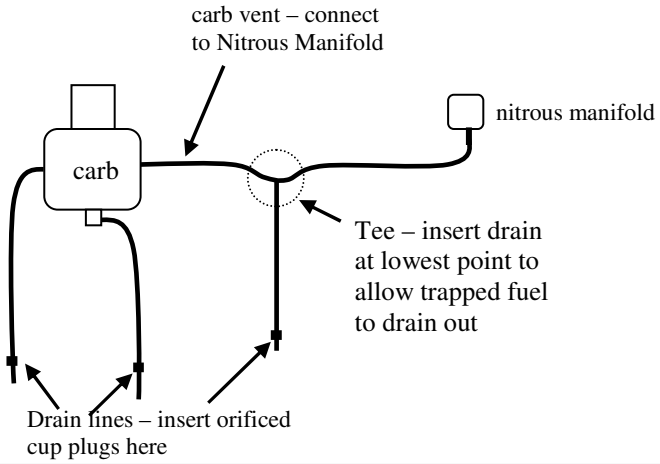


Refer to the diagrams below for venting ideas.

A. one carb two vents

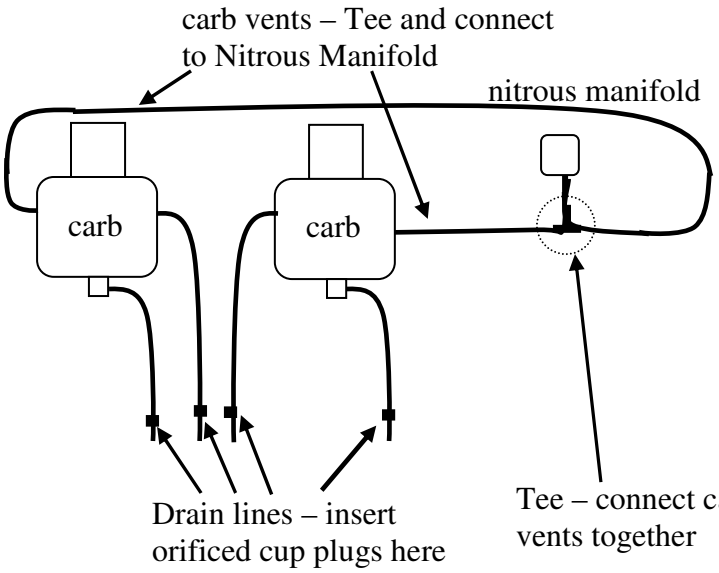


B. one carb three vents

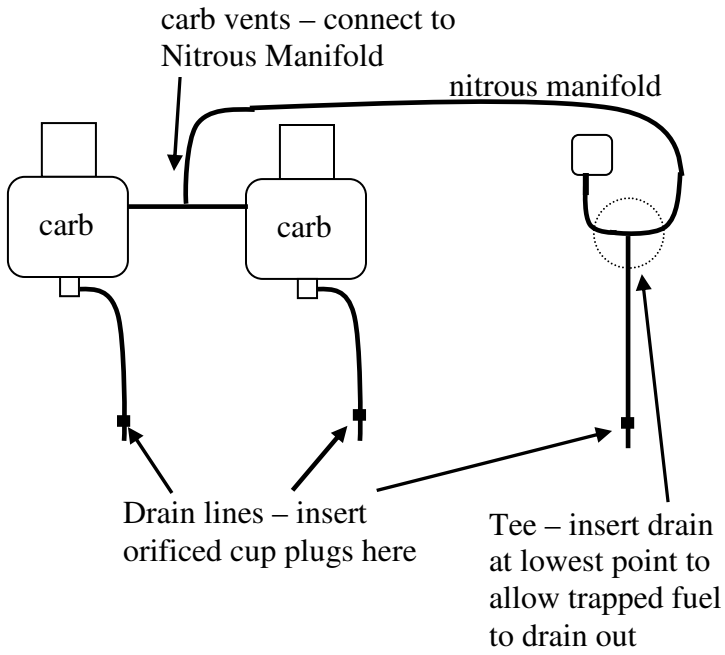


C. two carbs, one manifold (2 variations)

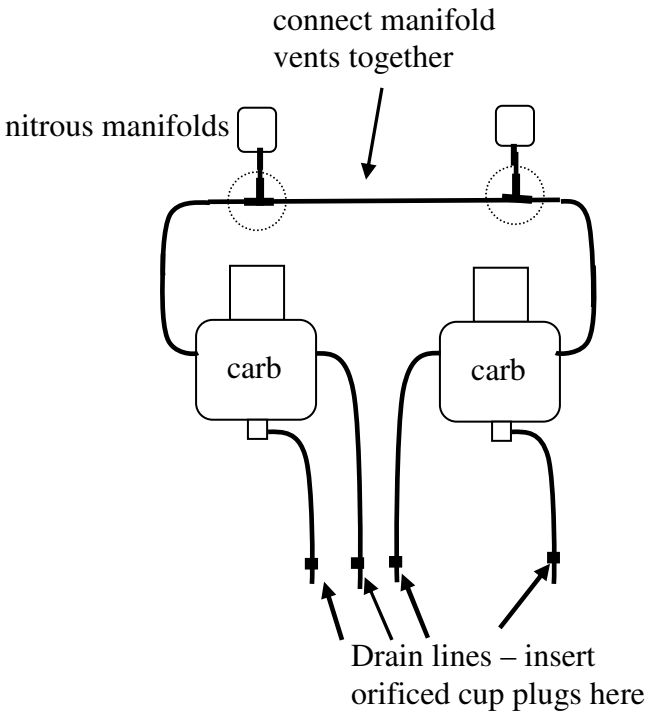
(for Yamaha Banshee, etc)



(for Yamaha Raptor, etc)

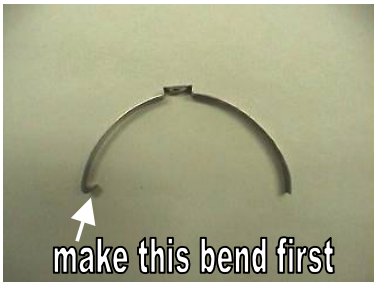


D. two carbs, two manifolds



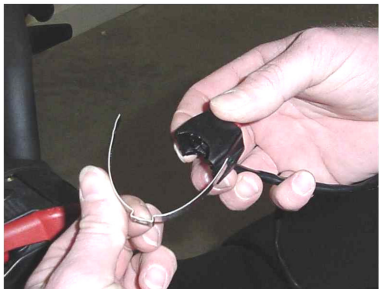
Part V – Push-Button Installation

The pushbutton switch can be installed on the left or right handgrip. Shown are directions for installing the button on the left so the button can be pressed with the thumb. An alternative position is to install the button on the right side, rotated so it can be pressed with the index finger.

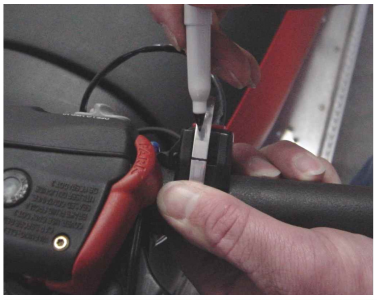


There are two clamps in the kit. The one with the screw is only useful if the button needs to be mounted directly to the handlebar. The crimp-on clamp allows the button to be mounted to a larger diameter surface. Directions for mounting the button directly to the handgrip using the crimp-on clamp are shown below:

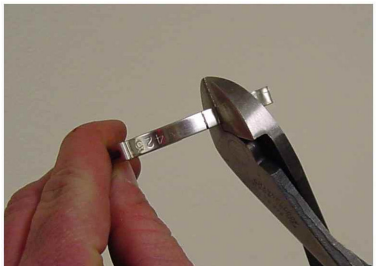
1. Using pliers, bend a hook into one end of the clamp.



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.

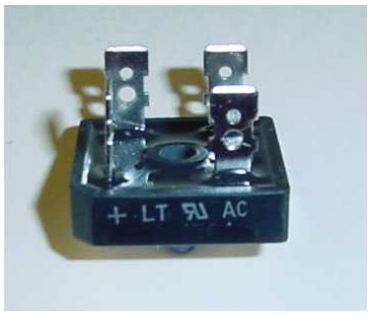


4. Remove the clamp and cut it approximately ¼" to 3/8" away from the mark. Bend this end with pliers so it is similar to the other hooked end.

5. Put the button and clamp back on the handlebar. Tighten the clamp with sidecutters so it is just snug. Do not overtighten.

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

Part VI – Electrical Installation



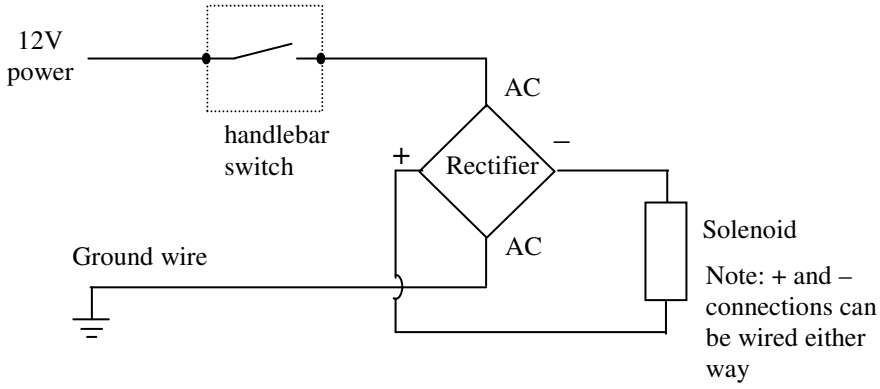
Most ATVs have a lighting coil that can supply the necessary regulated 12 volt AC or DC (if a battery is used) supply.

Note: If for some reason the voltage regulator has been removed, it must be re-installed so the voltage does not get too high and burn out the nitrous solenoid.

Wire the connections according to the diagram below. It is best to 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 the large 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.

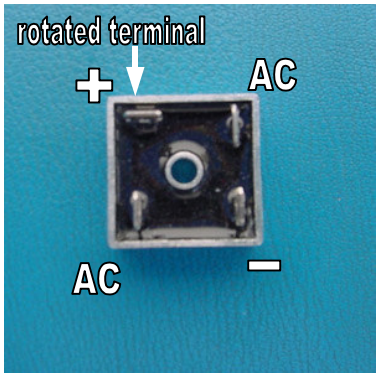
Most rectifiers are labeled on the side "+", "AC", "-", "AC" (see picture). If the rectifier is not labeled, see the picture below.

Note: A common mistake is to connect the "-" (negative) terminal to ground – this is not correct! Make sure the connections are according to the diagram.



Note: + and – connections can be wired either way

rectifier markings on the side



rectifier terminals

Part VII - Startup and Tuning Procedures

A. Carb Jetting:

If your carburetors were originally vented to atmosphere instead of the airbox/airfilter, the main jet size may need to be increased. When a large volume of air flows through the airbox/airfilter, a negative pressure may develop inside depending on how restrictive the airbox/airfilter 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 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. Replace the main jets with a larger 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. 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. We also recommend using one size colder spark plug (higher number = colder). In some cases decreasing the spark plug gap an additional .003"-.005" (total gap around .018"-.020") achieves best results.
3. Be sure to use filtered nitrous – always use a filter when filling your bottle!
4. 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.

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

There is a fuel adjustment screw on each nitrous manifold. These screws adjust the amount of fuel when nitrous is being used - they will not affect carburetor jetting off nitrous. "R" stands for "Rich" – turning the adjustment screws **in** will increase fuel when using nitrous.

Warning: Only adjust the fuel mixture screws on the Nitrous Manifold(s) according to the steps below.

The factory setting should provide a starting baseline. Each nitrous manifold requires a different number of turns on the fuel adjustment screws to make a given pressure to the float bowls (each nitrous manifold is calibrated before it is shipped). We recommend you first count the number of turns in each screw is set at before making adjustments. This will provide a baseline you can return to if necessary. If this setting accidentally gets changed and the initial setting is unknown, turn both screws in (clockwise) all the way and then back out 1.5 turns each, then proceed with the steps below.

(continued on next page)

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!

1. Run the ATV 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 each nitrous manifold adjustment screw in (clockwise) 1/2 turn. Turn each screw on each nitrous manifold the same amount. 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, add more ignition retard, reduce the engine's compression, or reduce the amount of nitrous (see next section) before using nitrous again.

Part VIII – Changing Nitrous Manifold Nozzles

It is possible to increase/decrease the amount of nitrous the nitrous manifold sprays by replacing the ¾" nozzles with nozzles with more/less orifice holes. In general, each orifice hole that is sprayed is equivalent to a 3-5hp 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! You can reduce your nitrous, increase your octane, retard your timing, and/or reduce your compression.

3. A bad power source or faulty electrical connection may cause the nitrous system to malfunction intermittently. This may be very difficult to diagnose – you may need to use a voltmeter and run the engine at full rpms. Carefully check all connections. If necessary, solder all connections. Sometimes a faulty voltage regulator be fine at idle but the voltage will drop as rpms increase.

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.

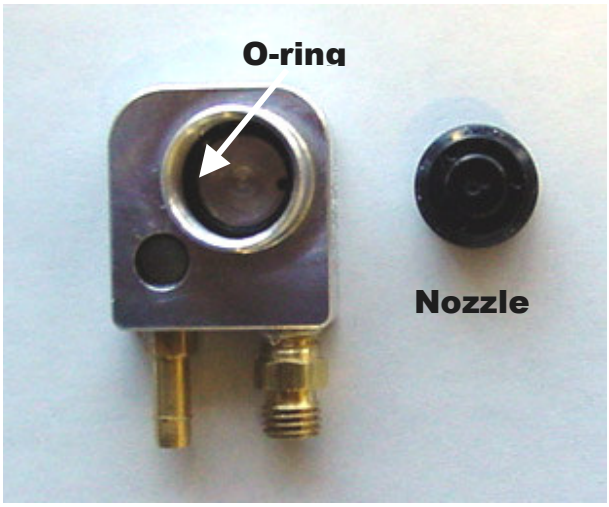
Installing / Removing Nozzles

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 number of nozzle holes by one for each manifold!

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.



Part IX – 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