



BoonDocker Nitrous System Installation Instructions for YFZ 450

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

Nitrous Kit Contents:

- | | |
|---|---|
| 1 – Nitrous Manifold with fittings installed | 1 – 1/8" NPT to 4AN adapter for solenoid |
| 1 – Nitrous Bottle with valve | 1 – pushbutton switch |
| 1 – 1/8" NPT male to 4AN fitting (for bottle) | 1 – mounting clamp for pushbutton switch (bolt style) |
| 1 – 1/8" NPT plug (for bottle) | 1 – rectifier |
| 2 – bottle clamps | 4 – female electrical connectors |
| 1 – high pressure braided hose (5.5') | 4 – electrical butt connectors |
| 1 – 12" length of 1/8" black nylon hose | 4 – orifice cup plugs (3/16") |
| 1 – solenoid | 1 – orifice cup plug (1/8") |
| 1 – solenoid holding bracket | 1 – 2' length of 3/16" tubing |
| 1 – self tapping screw for solenoid bracket | 2 – 3/16" x 3/16" x 3/16" barbed Tees |
| 1 – 1/8" NPT compression fitting for solenoid | |

Tools Required:

- Drill + bits (3/4", 1/4")
- Wire stripper / crimp tool
- Side cutters
- 5/32" and 7/32" Allen wrench
- Basic wrench and socket set
- Flat blade 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 565 deg. F, nitrous oxide (N_2O) 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 blowtorch inside your engine. When used properly, nitrous oxide provides the same benefits as turbo charging 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.

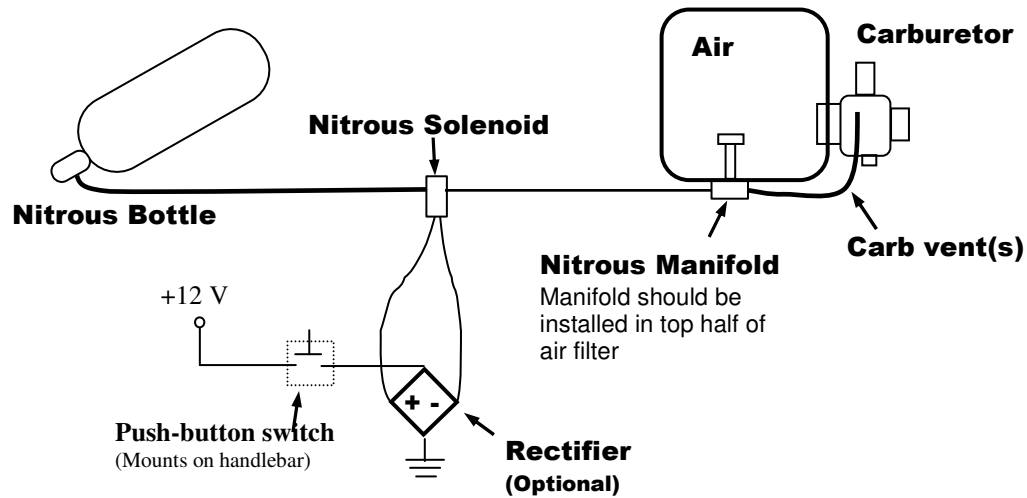
The part that makes the Boondocker nitrous system so unique is our patent pending Nitrous Manifold. This manifold simply mounts on the airbox or air filter where it sprays a fine mist of nitrous that is then drawn into the engine through the carburetor(s). This allows the nitrous to be naturally aspirated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



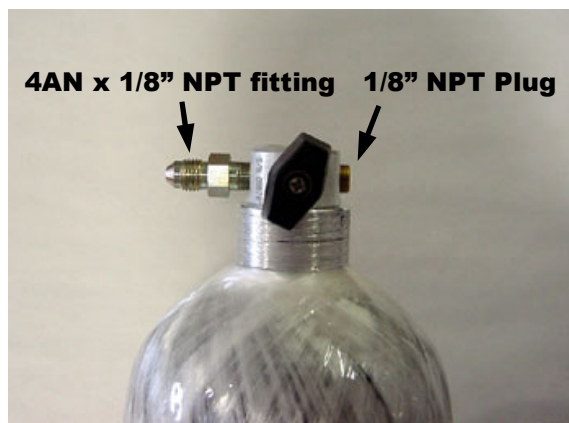
Part I – Bottle Installation

A. Bottle Valve Fittings

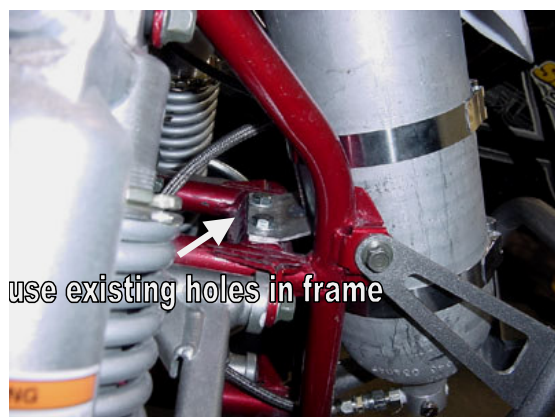
Insert the 4AN x 1/8" NPT fitting and the 1/8" NPT Plug into the bottle valve. Use Teflon tape to seal the threads – be sure not to get tape inside the threads!

B. 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. This means the bottle must be mounted so the valve is pointed down and towards the rear. The best location on the YFZ450 is behind the front bumper as shown in the picture. The bumper might need to be spread apart slightly to allow the bottle to slide in and out from the bottom; this model specific bracket is included in this kit.



C. Bottle Filling /Weights

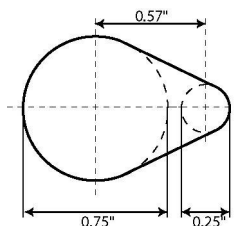
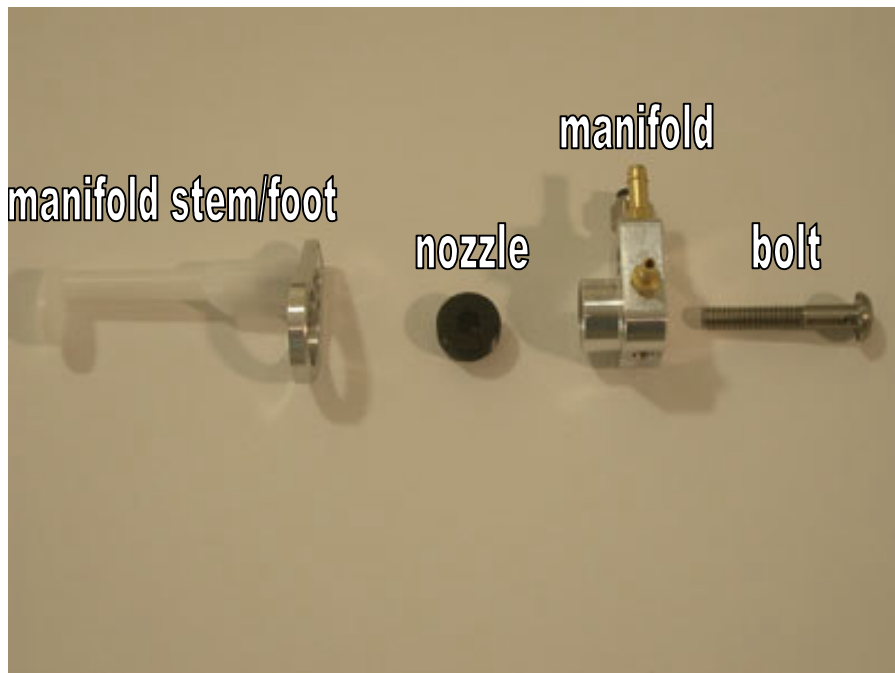
Automotive speed shops that sell nitrous kits can usually refill nitrous bottles. This bottle can be filled with non-medical grade nitrous oxide that contains a very small amount of sulfur dioxide (combines with water in your lungs and forms sulfuric acid if breathed too much). This is the same nitrous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

<i>Note: all weights are in fractions of pounds, not ounces</i>	Bottle Size							
	4.0lb CF	2.9lb CF	3.0lb AL	2.5lb AL	20oz AL	16oz AL	12oz AL	9oz AL
Weight of Cylinder & Gas	7.4 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	3.4 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	4.0 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 the nitrous manifold in the top part of the air boot that goes between the air filter and the carb as. Using the template below as a guide, drill the holes shown.
2. Install the manifold to the air boot with the stem half inside and the aluminum half on the outside so the air boot is sandwiched in between. Align the two halves together then thread the bolt in so the two halves are tight against the air boot (air boot is sandwiched in between).



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. Assemble the Nitrous Filter with the filter element pointed in the direction as shown. Connect the Nitrous Filter to the side of the solenoid marked “IN”.
 - b. Install the push to connect fitting to the side of the solenoid marked “OUT”.



2. Install the solenoid near the nitrous manifold using the padded strap. 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 manifold brass fitting. Keep this away from hot items and make sure there are no tight bends in the line. Note – do not over tighten these fittings! (If over tightened, the compression fitting may constrict the inside of the hose and limit nitrous flow)
4. Connect the high-pressure braided hose from the bottle to the solenoid. Do not use Teflon tape on the hose fittings - these 4AN fittings are designed to seal themselves as they are compressed together.

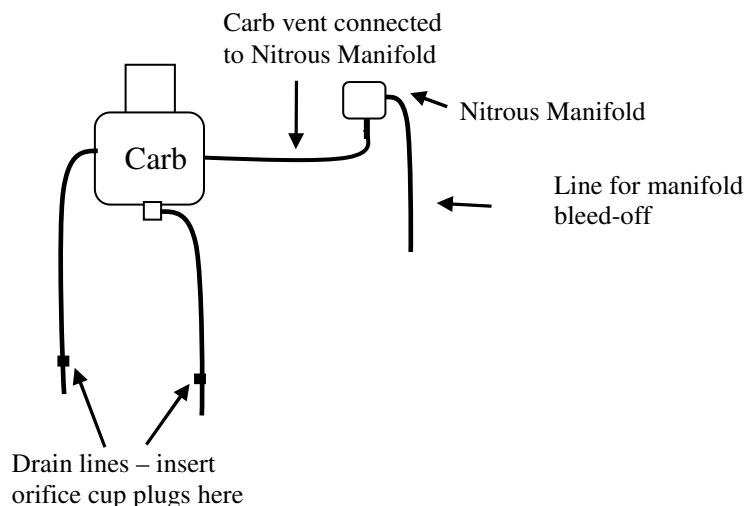
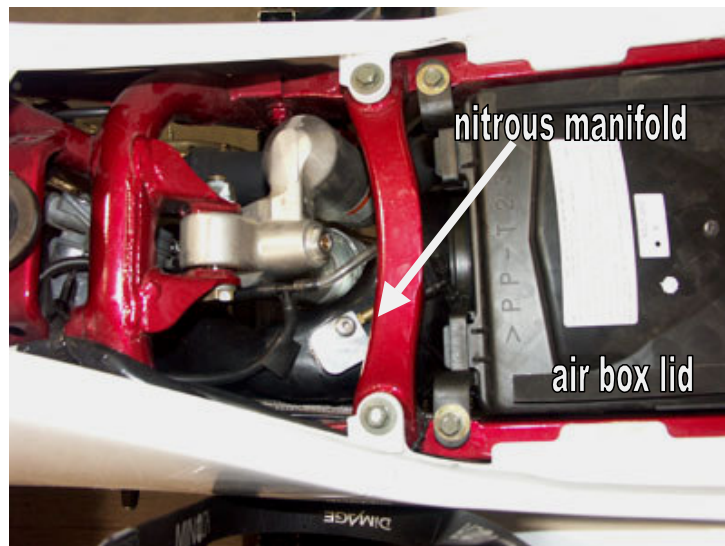
Part IV - Carb Vent to Nitrous Manifold Installation

Be sure to connect to the manifold pressure line, the line coming from the nitrous manifold, to the vent on the right hand side of the carb. The vent on the left side is for the accelerator pump and will not work correctly

1. The nitrous manifold must be able to pressurize the carburetor's float bowl. All vents lines that go to the carburetor's float bowl must be connected into the Nitrous Manifold or have an orifice cup plug inserted into the line.
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 orifice cup plugs in the bottom of all vent lines that drain outside – the .025" orifice will allow fuel to drain, but retain pressure to the float bowl when nitrous is used.

Note: Normally a drain exists at the bottom of the float bowl which is likely connected to the float bowl area through a stand-up pipe and must have an orifice cup plug installed (as shown in diagram).

3. The barbed fitting on the side of the manifold is where the excess pressure is bled off. Connect about a 6" length of line to this fitting that just hangs down. This will help prevent debris from entering the nitrous manifold



Part V – Push-Button Installation

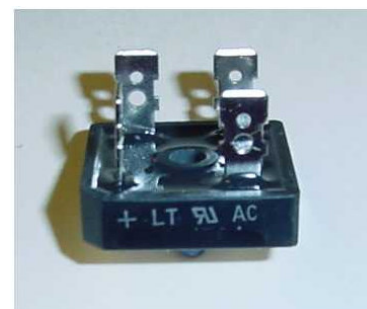
Attach the pushbutton switch to the left handlebar with the clamp provided as shown. The controls may need to be moved slightly in order to provide enough room for the button.



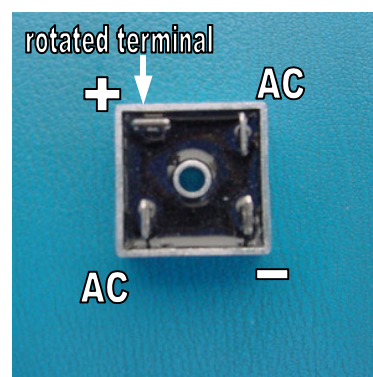
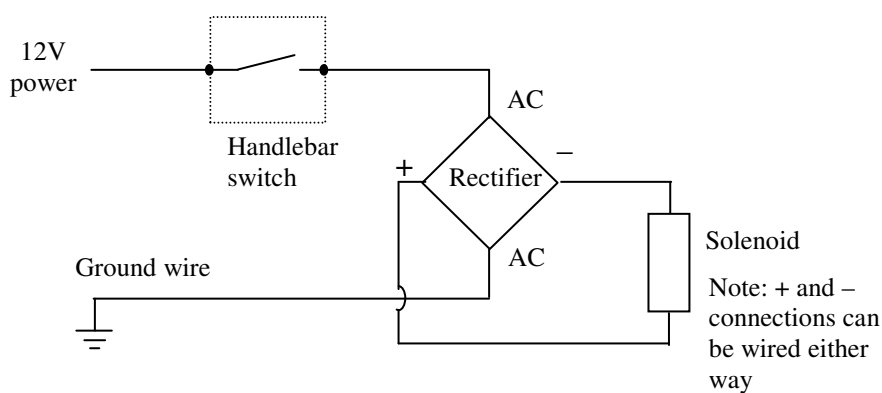
Part VI – Electrical Installation

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 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.



Rectifier markings on the side



Rectifier terminals

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.

A. Carb Jetting:

If your carburetors were originally vented to atmosphere instead of 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 bike and note performance.
2. Temporarily disconnect the vent lines from the manifold so the carburetors are vented back to atmosphere.
3. Run the bike 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" (to around .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.

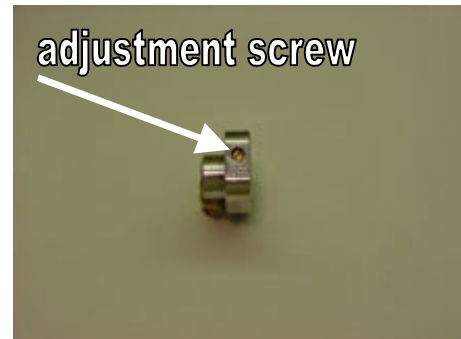
1. With the engine off, open the bottle valve and check for leaks. Shut the bottle valve off. With the valve shut, the hose will still have pressure in it.
2. With pressure in the hose and the bottle valve closed, start the engine. Check to make sure the solenoid does not discharge hose pressure.
3. 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. In most cases the engine rpm should increase if the nitrous system is functioning properly. Some carburetors may get too much fuel if the nitrous is sprayed at an idle – this will cause the engine to begin to flood and rpms may drop in this case. If the solenoid is not functioning, recheck the electrical connections and voltages and repeat this procedure.

D. Nitrous Manifold Fuel Adjustment Procedure

There is a fuel adjustment screw on the nitrous manifold. This screw adjusts the amount of fuel when nitrous is being used - it does not add fuel off nitrous. The "R" marking stands for "Rich" – turning the adjustment screw **in** (clockwise) will add more fuel when using nitrous.

Warning: Only adjust the fuel mixture screw on the Nitrous Manifold according to the steps below.

The factory setting for the adjustment screw fully closed. Begin adjustments with screw turned out two full turns.



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.

An experienced tuner should only perform this adjustment process. If you are not an experienced tuner, find someone who is. Remember, safety first!

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. Richen 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. 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 – Adjusting Amount of Nitrous

It is possible to increase/decrease the amount of nitrous the nitrous manifold sprays by replacing the 3/4" 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 well 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.
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 air box/air filter.
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 over tighten 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!
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.