

Removing the Air Injection

Triumph Bonneville and Bonneville America:
Model Year 2001 & onwards.

by Peter J. Jenks and Chris Coleman

Introduction

Air injection is used to burn up any hydrocarbons in the exhaust. It will also convert some carbon monoxide to carbon dioxide and change the proportions of oxides of nitrogen. Without a catalytic exhaust the improvement is not optimal.

How does it work? The aluminum housing under the tank has 2 reed valves in it (one for each cylinder). They are normally closed. In the closed position, exhaust gas cannot travel very far up that chrome tube as the reeds stay closed and block the reverse flow.

During the engine exhaust cycle a pulse of exhaust gas rushes down the exhaust pipe toward the muffler. When the exhaust valve closes on the engine, this pulse of exhaust keeps moving down the pipe, but now creates a small vacuum behind it. The chrome tube on the cylinder head is placed right next to the exhaust valve and so gets a vacuum drawn in it.

Under the vacuum, the reed valves open, allowing air from the airbox into the exhaust pipe. When the vacuum goes away the reed valves close, ready for the next cycle.

Also in that housing is a kind of flow control valve that is partly open all the time. The small tube from the left intake manifold supplies vacuum to a little diaphragm on the front of the housing. When this gets a large enough vacuum signal from the inlet, it opens this flow valve fully, allowing more air into the exhaust pipe: the manifold vacuum is highest when the throttle is closed and the engine is turning over. The result is popping, as the unburnt hydrocarbons don't just burn, they explode!

As the Bonnie does not have fuel injection, engine management computer including lambda sensor and three way cats the effectiveness of the stock set up is not very good. There are also disadvantages; since the air is sucked into the exhaust port downstream of the exhaust valve the top end of the exhaust pipes gets very hot, at night it glows red. This temperature does nothing for the chrome, turning it dark blue and eventually making the chrome peel. The Bonnie America has secondary covers on the top end of the exhausts, so the blue effect is less obvious.

Removing the air injection will not affect performance at all - however it will reduce combustion in the exhaust port and pipe, thus significantly lowering the exhaust temperature and so help keep the exhaust pipes cooler (and less blue!) It will also reduce, if not eliminate, exhaust popping on the overrun, provided the carbs are properly set up.

Remember, removing the air injection will increase emissions of un-burnt hydrocarbons. There are, in many markets no emission tests for motorcycles, so other than in Germany and certain US States you break no laws. It is down to your "green" conscience! Remember also that there will be absolutely no difference in performance, but the bike will run better and in some people's experience, with a nicer engine noise: the air moving through the air valves makes a noticeable whistling sound.

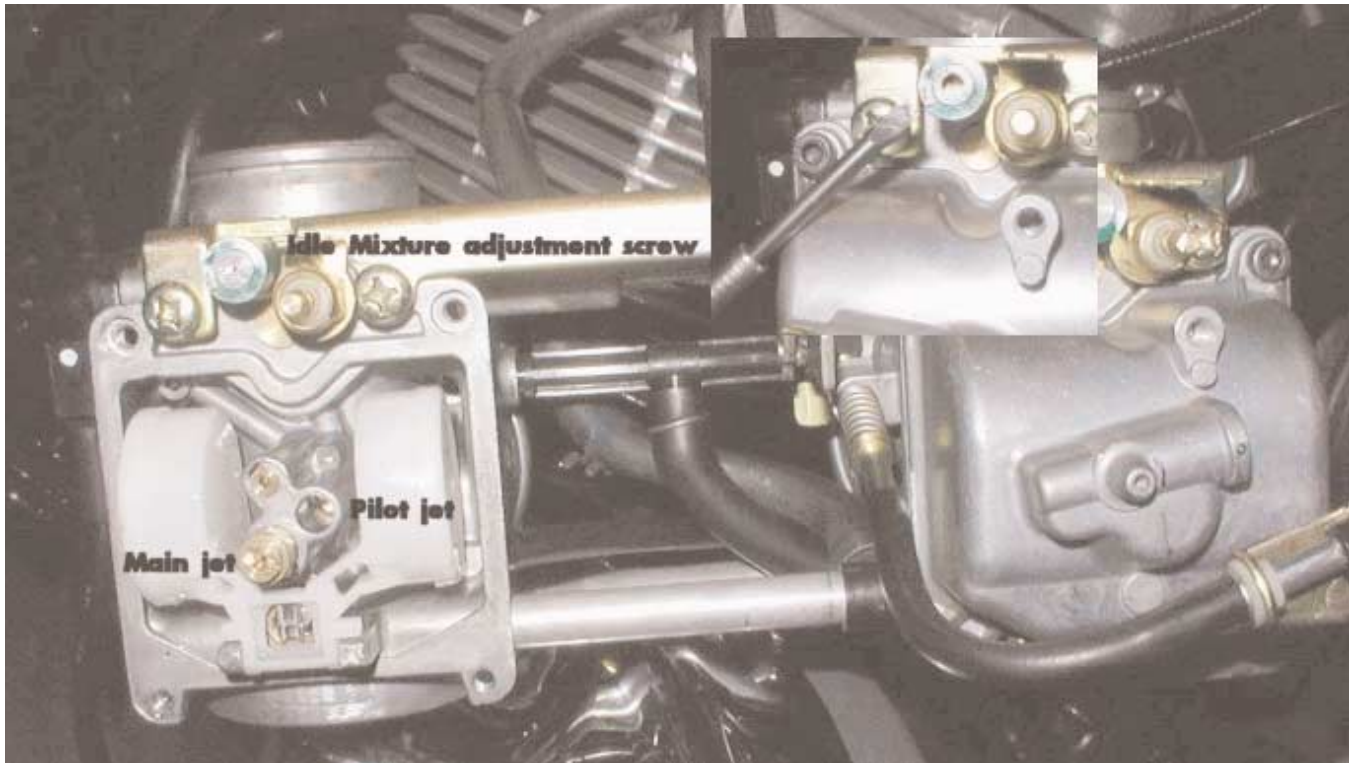
This work requires only basic mechanical skills, but if you are unsure please get help from a professional. This work is best done when the tank is reasonably empty and the motor cool. This information sheet is provided based on our experience, but is without guarantee or liability.

Procedure

- I. Remove the seat.
- II. Disconnect the battery.
- III. Turn off the fuel and then release the fuel pipe from the tap, there should be a spring clip that needs pliers to remove it. I prefer to replace the spring clip with a "Jubilee" (worm drive) Clip.
- IV. Release the tank breather pipe from under the right (when sitting on the bike) side of the tank, just behind the fuel filler.
- V. If you are in California there is additional anti smog gear that needs to go, contact CC for details of this.
- VI. Remove the rubber hoses between the chrome air injection tubes and the reed valve. Again, there are spring clips that need pliers to remove them.
- VII. Remove the large rubber hose that runs from the top of the airbox to the reed valve and plug the hole in the air box with a stopper. Bicycle bar end plugs are a good bet. The stopper needs to be sealed in place with adhesive or silicone.
- VIII. Remove thin the vacuum line that runs from the reed valve to one of the carburetor manifold vacuum points. There are 4 of these vacuum ports, two on each site. The other three are closed with black rubber caps, so you will need a new one. You can get these caps from Triumph: they need to fit tightly. An even better way is to use the open port to drive a Scott Oilier!
- IX. Now remove the vacuum operated reed valve, it is mounted with 2 x10mm bolts to a frame bracket directly above the cam cover.

- X. To remove the air injection tubes from the head the first try is a 13mm open-ended wrench. If the bike is new you should be able to move the tube enough to free them. When the tube is loose it can be undone using soft nose pliers. Save the copper washer on each tube.
- XI. On older bikes the tube may be "glued in" with carbon. Then you need to take off the metal band that holds the elbow to the tube. To do this release the bent metal tab on the clip and spring the clip undone. Note that the clip cannot be re-used without a special clamping tool, so you need to source the right sized jubilee clips in case there is ever a need to replace the air injection
- XII. As you remove the elbow take care not to damage the graphite based heat insulator; you may have to ease the fingers that form the end of the elbow slightly.
- XIII. Finally, use a long reach 13mm box spanner to undo the air tube, save the copper compression washers.
- XIV. To plug the holes for the air injection tubes there are two options.
 - A. I am preparing two 316 stainless steel blanking plugs, the aim is to sell for £17.50 / \$25.50. Details soon on the forum.
 - B. Purchase two oil pan drain plugs from a Nissan Bluebird, part number 11128-01M05 is supposed to be the part number.
- XV. Fit the saved copper compression washer to the blanking plug of your choice, or use new spark plug washers. DO NOT use the fibre washers supplied with the oil pan plugs! Tighten the plugs hand tight, then a quarter turn more, so they are as tight as the spark plugs, 20Nm.
- XVI. Box up all the removed parts: you never know when you might need them again....
- XVII. Re-connect the battery, positive lead first.
- XVIII. Replace the fuel tank, making sure the various hoses are properly in place.
- XIX. Replace the seat, using a pair of the Jenks Thumb Wheel Screws for preference.
- XX. Adjust the slow running screws on the carbs. These are located on the bottom, at the side, close to the connectors for the heaters. If you are in the USA these adjusters are covered with a "security cover" which you have to remove. To do this you have to remove the carbs..... (see the photo for a view of the underside of the carbs.)
- XXI. Once you can get at the screws warm the bike up. Then, with a short flat blade screwdriver close one slow running screw and then open up to 3 turns. The correct setting is between 2? and 3? turns, the ideal is the best, most even idle. Repeat with the other screw. You will probably have to slow the idle speed once everything is set. The exhausts should not pop when you pen the throttle and "blip" it.

XXII. That's it: ride.



Edited by P J Jenks from Forum posts by CC Rider and others: Thanks Guys for sharing the knowledge!

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