

## The Grampsized Air Flow Control System

May 14, 2005

### Vulcan 800A/B/Drifter

**GRAMPSIZING INSTRUCTIONS FOR VULCAN 800:** Written by Russian Wolf (VROC #5268) with consultation and collaboration from Gramps (VROC #300).

**Note:** Procedure is best done with bike completely cooled down; this makes bolt/nut removal easier and prevents burns to modifier. *Read completely through these instructions prior to performing actual modification; this will enable modifier to best plot the course(s) of action, sequence of events, and specific parts to be used.*

**Note:** All directions given in relation to the bike (right, left, front, back) are as seen when sitting on the bike in a riding position.

**Note:** Read **MATERIALS LIST** and directions carefully to determine parts and procedures relevant to use of OEM or aftermarket needle in carburetor.

**WARNING!** *Do not attempt this, or any airbox modification, while retaining the OEM exhaust system! The OEM exhaust system is far too restrictive to properly scavenge the burnt exhaust gases from a motor that has been equipped with a modified or aftermarket airbox and rejetted carburetor. Attempting to use the OEM exhaust system will result in a loss of power, the motor choking out in short order, and quite possibly serious carbon buildup in the top end of the motor. Prior to attempting this, or any airbox modification, the OEM exhaust system should either have the rear baffles removed (detailed process available at <http://www.ipass.net/dmvinson/pipemods.html>), or replaced by an aftermarket performance exhaust system.*

*Individuals perform this modification, as well as any other modifications suggested in this document, at their own risk. The writer and editors/collaborators accept no responsibility or liability for any loss or damage to the modifier's person or personal property arising from use of this document.*

*This document is intended for the private use of the individual to whom it was provided. The writer and editors/collaborators ask that their intellectual property be respected, and that this Manual not be distributed to others in any way, nor posted to any other sites. Others desiring this, or other Manuals in the Illustrated series, should be directed to the source from which this copy was obtained.*

### **MATERIALS LIST:**

§ **K&N KA-8095** air filter (direct replacement for OEM air filter)

§ (Optional) Aftermarket needle, such as a **Dynojet**

**Note:** The decision to use the OEM throttle needle or an aftermarket needle should be based upon what the individual modifier seeks; power or fuel economy. The Grampsizing process will provide more power than the OEM airbox system; however, a bit more power is realized with the use of an aftermarket needle. The OEM needle has been shown historically to yield better fuel economy than the aftermarket, whereas the aftermarket needle gives smoother throttle response in addition to a bit more horsepower.

**Note:** Currently, the only way to obtain a new **Dynojet** needle for the 800 (**Dynojet** part number DNO106) is to purchase an entire **Dynojet** jet kit. Do **not** use the jets supplied in the jet kit; they are meant for use with a OEM airbox system and if used will cause the air/fuel mixture to be dangerously lean. In the past, many **Vulcan 1500** riders swapped the OEM needle in their carburetors for a **Dynojet** needle with poor results. The **Dynojet** needle from a 1500 (**Dynojet** part number DNO313) will work perfectly well in the 800; however, it is slightly longer than the needle meant for the 800, so the clip position is different. It is important to know which needle is to be installed so the clip can be placed in the appropriate groove. If a 1500 rider who has a **Dynojet** DNO313 needle and is willing to swap for a OEM needle can be located, many \$\$ can be saved.

**Note:** As of this writing, **Sherm's Cycle Products** (<http://shermcycleproducts.com/>) is selling **Factory Pro** adjustable needles for the 1500. Taper comparison to the **Dynojet** needle is unknown, however the length is identical; the **Factory Pro** needle is useable with the e-clip on the third notch from the top.

§ **165** Main jet (use with aftermarket needle)

§ **170** Main jet (use with OEM needle)

**Note:** **Kawasaki**-specific jets need not be used; most **Harley-Davidson** custom builders have the required size jets in stock. **HDs** use **Keihin** CV carburetors as well, so the jets will interchange with one exception. The Main jet on the **HDs** is slightly

larger in diameter than that used on **Kawasakis** and the thread pitch is coarser, so the jet will not work with the **Kawasaki** OEM emulsion tube. If **HD** jets are to be used, the **HD** emulsion tube for the Main jet must be purchased and used also.

§ **50** Pilot jet (use with aftermarket needle)

§ **52** Pilot jet (use with OEM needle)

**Note:** **Kawasaki**-specific jets need not be used; most **Harley-Davidson** custom builders have the required size jets in stock. **HDs** use **Keihin** CV carburetors as well, so the jets will interchange. The pilot jet has its emulsion tube built in, so there is no problem.

**Note:** If **HD** jets are to be used, ask for jets for a 40mm **Keihin** CV carb. If asked what bike it is for, explain that it makes no difference; so long as the jets are meant for a 40mm **Keihin** CV carb, they will fit the application. The 800 uses a 36mm **Keihin** carb, but the same jets as the 40mm.

An alternative source for **Keihin** jets is **Rage Performance**. Go to:

<http://www.rageperformance.com/carburetorparts.asp>

Scroll down to: “**Keihin Main Jets For most Honda VB, VD, and VE series carbs. Honda, Kawasaki, CV and CVK, CDKII Series carbs. Some Honda PD and PE Series carbs. Main Air Jet for FCR.**” Select “**165**” or “**170**” jet (as appropriate), input quantity in “**Quantity**” box, and press the “**Order**” button. Scroll down to: “**Keihin Slow Jets Fit most FCR, CV & CVK.**” Select “**50**” or “**52**” jet (as appropriate), input quantity in “**Quantity**” box, and press the “**Order**” button. Return to the top and select “**Click Here To View Order Or Check Out**”. Input salient information and proceed with payment options.

**Note:** Look carefully at the pictures of the jets in the **REJETTING INSTRUCTIONS** section; make *sure* the jets received appear like the ones pictured. In several instances, modifiers have purchased jets both online and through dealers and received tall, hexagonal jets that are meant for **Mikuni** carbs; they will in no way fit into the **Keihin** carb.

§ ½” vacuum cap (may not be needed)

§ Yellow 12-18 AWG wire connector (may not be needed)

§ 3 each ¼” vacuum caps (may not be needed)

**Note:** If vacuum caps are used, *do not* use the cheaper natural rubber type. These caps will, in time, deteriorate, crack and self-destruct. Use only the synthetic caps.

§ **Loctite** 242 (blue)

§ Gasket sealant (**Permatex** Blue)

§ Aftermarket crankcase vent filter, such as the **K&N** versions shown at <http://www.knpowersports.com/vent.htm>. This vent replaces the plastic bottle that hangs under the frame in front of the right front down tube, and is available through **Sherm’s Cycle Products** or possibly at your local auto parts outlet (**NAPA, Schucks, Pep Boys**, etc)

§ (Optional) 3’ of ¾” oil hose

§ (Optional) 1 each ¼” vacuum T-fitting

§ (Optional) 8” of ½” high-pressure, high-temperature heater hose

§ (Optional) Chrome automotive door edge trim

**BIKE TYPES:** There are 2 types of bikes manufactured; California models, which are emissions-legal in all 50 states, and 49-state models, whose emissions do not meet the California Air Regulatory Board’s standards. California models have a vacuum hose routing diagram on the inside of the right side cover, a charcoal vapor canister inside, and a fuel vapor recovery line on the left side of the fuel tank running from a nipple on the front to the charcoal vapor canister. Later year California models also have a fuel vapor recovery line on the right side of the fuel tank; do not confuse this line with the fuel tank vent line that is present on the right side of the fuel tank on **all** models. It is necessary to know *which* model the bike being modified is, as a few steps are different. The easiest and quickest way to tell the difference is to check the left underside of the fuel tank; if there is a nipple and a line on the left side, the bike is a California model. Note that some instructions are labeled **California Models**, some **All Models** and some **49 State Models**.

## **SEAT REMOVAL (OEM Seat)**

**Note:** If bike has aftermarket seat, consult seat manufacturer’s instructions.



Remove the 8mm bolt at the rear that holds the back of the seat onto the fender. Strike the back of the rider's section of the seat (the "step" where it comes up to become the passenger seat) solidly toward the rear of the bike to release the clips holding the seat onto the U-bracket on the rear fender. Lift the rear of the seat and pull backwards; the front tab will come out from underneath the rear bolt of the fuel tank. Set the seat aside someplace safe.

### **FUEL TANK REMOVAL**

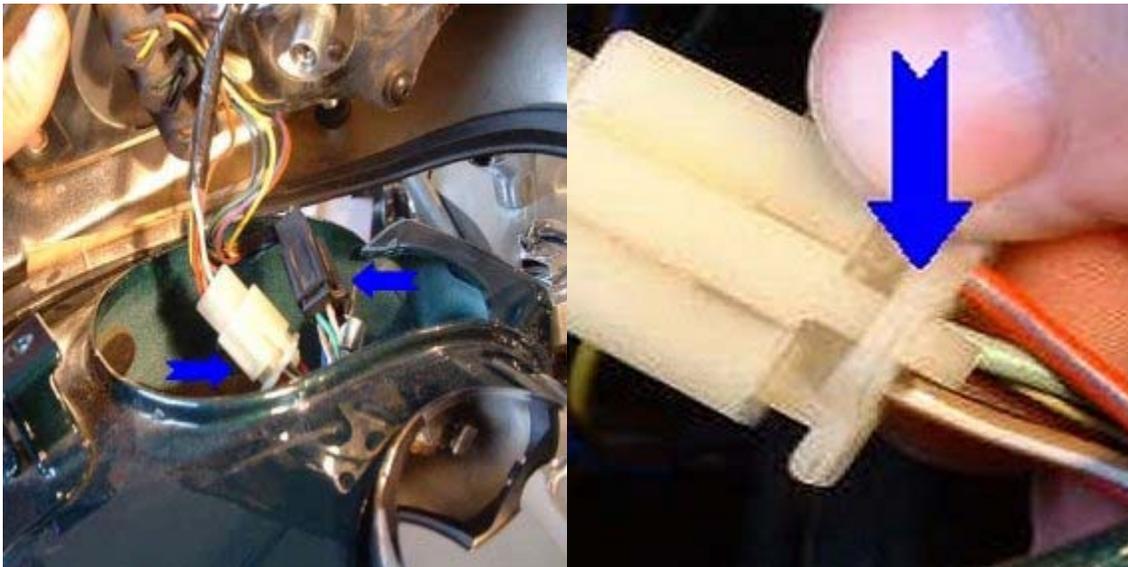
This is easiest if there is very little fuel in the tank; if it is full or partly full the tank will be heavier, and the fuel will slosh, making it more difficult to control.



a. Remove the 8mm bolt at the bottom of the instrument panel (the triangular panel that holds the 3 indicator lights) on the speedometer pod. Carefully lift the rear of the pod and push forward to release the clip holding the pod at the front of the tank. Tilt the pod to allow access underneath.



1. Unscrew the speedometer cable from the bottom of the speedometer.



2. Unhook the 2 wiring harness connectors. Each connector is locked together by a slot-tab arrangement at the junction; push down on the tab and carefully pull backwards on the other half of the connector. *Do not pull on the wiring.* Lift the pod clear of the tank and put it aside someplace safe.



- b. Ensure that the fuel petcock is in the “On” or “Res” position; *not* in the “Pri” position! Disconnect the main fuel line (large hose) from the bottom of the petcock on the left side of the tank.

**Note:** A small amount of fuel will spill from both the petcock and the line; have rags and a non-flammable container ready to catch the fuel (do *not* use a Styrofoam cup; gasoline will dissolve Styrofoam). Dispose of this fuel safely and immediately. Wipe up any fuel that spilled onto the bike and/or the floor; dispose of the rags safely and immediately. Do *not* store the rags for reuse; *rags soaked with gasoline are known to spontaneously combust.*

- c. Disconnect the vacuum line (small hose) from the rear of the petcock.



- d. **[California Models]** Look/feel for the fuel vapor recovery line on the left side of the tank towards the front; disconnect this line from the nipple on the fuel tank. Look/feel along this line for the tabs that secure the line along the inside of the seam at the bottom of the tank; free the line from these tabs and allow it to hang. Repeat for fuel vapor recovery line on the right side of the tank, if present; if so, label this line to differentiate it from the tank vent line.



**d. [All Models]** Look/feel for the tank vent line on the right side of the tank towards the front; disconnect this line from the nipple on the fuel tank. Look/feel along this line for the tabs that secure it to the inside of the seam of the tank; free the line from these tabs and allow it to hang.

**Note:** Later model 800s have two lines on the right side of the tank; if this is the case, disconnect the second line in a similar manner. Label each line to prevent confusion on reassembly.



**e.** Remove the 12mm bolts at the rear and front of the tank. Lift the tank free, being careful not to tangle the crossbrace with the speedometer cable or instrument wiring.



Set the tank aside someplace safe, placing it upright onto something that will keep the petcock off a solid surface.

#### **AIR CLEANER SYSTEM REMOVAL**



- a.** Remove the 2 10mm bolts securing the large black rectangular plastic box (surge box) to the spine of the upper frame (normally covered by the fuel tank). Lift the box free of the snorkel that comes up from the air cleaner backing plate. Put this box and its bolts in a spare parts bin; *they will **not** be reused.*



- b.** Remove the 10mm nut and washer from the center of the round chrome air filter cover. Set nut and washer aside someplace safe; *they **will** be reused.* Remove the air filter cover and set it aside someplace safe; *it **will** be reused.* Remove the OEM air filter and dispose of it or place it in a spare parts bin; *it will **not** be reused.*



c. Disconnect and label the crankcase vent line (small hose) and the air switch valve line (large hose) from the rear of the backing plate.



d. The idle RPM adjust is a black plastic knob hanging to the lower right of the backing plate; it is secured on a small clip to the rear of the backing plate. Pull the line clear of the clip and allow it to hang. Disconnect the small line just to the left of the RPM adjust. This is the line that goes to the “milk bottle” at the front of the frame. Remove this line and the bottle. Put both line and bottle in spare parts bin; *they will not be reused.*



e. Remove the 2 10mm bolts holding the backing plate to the securing bracket in front of the carburetor. Set these bolts aside someplace safe; *they will be reused.* Carefully ease the backing plate off the carburetor.



Note the position of the black rubber boot between the backing plate and the carb, and that the boot *is* rubber and *must not* be damaged. Set the backing plate aside someplace safe; *it will be reused*.

### CARBURETOR REMOVAL

Rejetting *can* be done without completely removing the carburetor from the bike; I (Russian Wolf) have done it many times. However, on the initial modification, drilling and a steady hand are necessary; removal of the carburetor to a workbench is often best. This is the only time removal of the carburetor from the motor is necessary; further adjustments can be made with the carburetor in place.

**(Paragraphs a, b, and c refer to rejetting whether the carburetor is removed to a workbench or not; paragraph d is applicable only if the carburetor is to be removed to a workbench)**



**a.** Drain fuel from carburetor float bowl by opening the 3mm Allen head bolt (carburetor drain plug) next to the small nipple on the bottom of the carburetor (carburetor drain). Catch this fuel in a non-flammable container (do *not* use a Styrofoam cup; gasoline will dissolve Styrofoam). Dispose of this fuel safely and immediately. Tighten drain plug.



**b.** Remove the 2 10mm bolts holding the airbox mounting bracket/carburetor stop in place. **Caution:** These bolts are harder than the

cylinders they are threaded into; be **very** careful not to strip the threads inside the cylinder. Set bolts aside someplace safe; *they will be reused*. Note the position of the rubber tab holding this bracket into place against the carburetor. Carefully remove bracket from carburetor and motor. Set bracket aside someplace safe; *it will be reused*.



c. A rubber boot connects the carburetor to the intake manifold, secured with 2 3mm Allen head, Phillips or slotted head hose-type clamps (clamp bolts differ depending on model year). Experience has shown that it is best to remove the carburetor from the boot, leaving the boot connected to the manifold; thus, loosen only the bolt for the clamp on the *carburetor side* of the boot. Ease the carburetor out of the manifold boot; note the position of the notch on the boot that aligns the carburetor into place.

**Note:** When using a standard 3mm Allen wrench or a small screwdriver, it is easier to reach the bolt from the left side of the bike, between the cylinders. However, this is very difficult to accomplish without previously removing the EPA equipment (see **EPA EQUIPMENT REMOVAL** section). When using a long 3mm Allen T-handle wrench (which speeds and eases the loosening) or a long, thin-shank screwdriver, it can be reached from above, beside the frame spine.

**Note:** If rejetting is to be accomplished with the carburetor *in place*, put a clean, lint-free cloth in the open intake manifold to prevent foreign object intrusion; go to **REJETTING INSTRUCTIONS**.



d. Disconnect the choke knob from the mounting bracket on the left side of the bike; leave the cable connected to the carburetor. Leave the idle adjustment cable and the fuel line connected to the carburetor. Label and disconnect the remaining 2 lines on the back of the carburetor. One is the carburetor vent line going to the evaporative canister (**California Model**) or exiting just forward of the rear swing arm or inside the right side cover (**49-state Models**); the other is the vacuum source for the fuel petcock and the air switch valve (**All Models**). Label each of the two throttle cables and its position on the carburetor; disconnect the cables. The carburetor is now free and can be taken to a clean workbench. Put a clean, lint-free cloth in the open intake manifold to prevent foreign object intrusion.

### REJETTING INSTRUCTIONS

All procedures involving the carburetor should be approached carefully; bolt heads can be stripped out or valve seats ruined if too much force is used. If the carburetor has been *removed*, turn it over and examine the bottom; if the carburetor is *still attached*, tilt carburetor carefully to examine the bottom.



**a.** The small hole with a factory-installed aluminum plug is in the center of the bottom, close to the manifold boot. *Do not drill the brass-colored plug.* The aluminum plug covers the fuel/air mixture screw, and must be removed to adjust the mixture. Use a center punch to make a slight indent in the center of the plug to prevent the drill bit from wandering. If the carburetor is still attached, put a rag on the engine case under the carburetor to catch the metal shavings. With a 5/32" drill bit and drill motor, begin drilling this plug.

**\*\*\* EXERCISE EXTREME CAUTION DURING THIS PROCEDURE \*\*\***

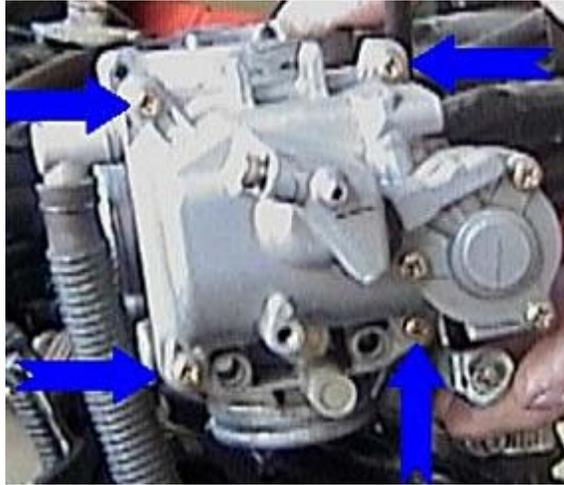
The plug is soft and thin, and the drill bit could punch through and ruin the brass mixture screw beneath. Use a low RPM on the drill motor, light pressure, and pull back frequently to check progress. Stop *immediately* when the drill bit breaks through the plug. The plug may come out while attached to the drill bit; if not, screw in a sheet metal screw until it is seated.

**\*\*\* EXERCISE EXTREME CAUTION DURING THIS PROCEDURE \*\*\***

There is not much space between the plug and the brass mixture screw; seating the sheet metal screw too deeply will ruin the mixture screw head. Once the sheet metal screw is seated, grip its head with a pair of pliers and gently pull on the screw with a rocking motion. The plug will come out fairly easily. Discard the plug; *it cannot be reused.*



**b.** Examine the inside of the hole and find the brass flat-head slotted screw. This is the fuel/air mixture screw. Turn this screw *clockwise* until it stops, counting the turns as it goes. *Do not seat this screw forcefully* or the valve seat will be ruined. Write down the number of turns noted in case the settings should ever need to be returned to factory original. Turn screw back *counter-clockwise* 2½ (if using aftermarket needle) or 1½ turns (if using OEM needle) out. This is a starting point only; most bikes with the Grampsized modification are running with these settings  $\pm$  ¼ turn. However, all motors and all carburetors are different, so observation of subsequent performance (or a dyno run on a machine with an exhaust gas analyzer) is essential to dial in the correct setting for any individual bike. Clean up all metal shavings and fragments before proceeding.



c. Remove the 4 Phillips head bolts securing the bottom of the carburetor. Set these screws aside someplace safe. Remove the bottom from the carburetor body; be careful not to touch the floats or damage the rubber O-ring gasket in the groove inside this plate. Set the bottom aside someplace safe.



**CAUTION!** Do not allow the bottom of the carb to face down while the Main jet is removed! If the bottom is down, there is a chance that the needle seat above the Main jet will fall out; this is a small part that will be difficult to locate and reinstall if it does. Should the needle seat fall out, *very carefully* reinstall it with the thick side facing the Main jet.

d. Remove the Main jet. Be careful not to hit the floats. The emulsion tube the Main jet is installed inside may come out; if so, remove the Main jet from the emulsion tube. Put the OEM Main jet (**135**) in a spare parts bin; *it will not be reused*, but may be necessary to reinstall should the bike ever need to be returned to factory original settings. Install the **165** (used with aftermarket needle) or **170** (used with OEM needle) Main jet; tighten down only until seated firmly. If the emulsion tube came out of the carburetor, install the Main jet into the emulsion tube, then reinstall the emulsion tube into the carburetor.

**Note:** If **Harley-Davidson** jets are being used, the **Kawasaki** OEM emulsion tube must be removed and replaced by the **HD** emulsion tube prior to installing the Main jet. In this case, put the **Kawasaki** OEM emulsion tube along with the OEM Main jet into the spare parts bin.



e. Remove the Pilot jet. Be careful not to hit the floats. Put the OEM Pilot jet (**48**) in a spare parts bin; *it will **not** be reused*, but may be necessary to reinstall should the bike ever need to be returned to factory original settings. Install the **50** (used with aftermarket needle) or **52** (used with OEM needle) Pilot jet. Tighten down only until seated firmly.

f. Reinstall the bottom cover onto the carburetor, being careful that the O-ring gasket is properly seated. Reinstall the 4 Phillips head bolts into place. Tighten screws only until seated firmly. A light coat of **Loc-Tite 242** on the threads prior to installation is recommended.

**Note:** Some have recommended replacing these screws with stainless steel Allen head capscrews; this is left to the discretion of the individual modifier.

## NEEDLE REPLACEMENT

**Note:** If retaining OEM needle, go to **OPTIONAL THROTTLE SLIDE MODIFICATION**. If this modification is desired, perform modification, then reinstall OEM needle. If this modification is not desired, proceed to **CARBURETOR REINSTALLATION**.

If the carburetor is on a workbench, turn it right side up; if the carburetor is still attached to the motor, it will hang without support.



a. Loosen but *do not remove* the 4 Phillips head bolts holding the domed plastic cover (top of the carburetor) in place - there is a spring under this cover that *may* launch the cover and bolts away from the work area if the bolts are completely removed. Holding the cover down, remove the bolts. Set the bolts aside someplace safe. Carefully remove the top cover and the spring pushing it up; set them aside someplace safe. Examine the black rubber diaphragm inside the carburetor attached to the slide. Be **EXTREMELY** careful with this diaphragm; *if it is pierced, torn, or twisted out of shape, the entire slide assembly must be replaced.*



b. The needle can be seen by looking down the center of the diaphragm where the diaphragm attaches to the slide assembly. The head of the needle is the steel circle in the middle of the white plastic needle retainer. Carefully note the position and orientation of the needle retainer. Using long tweezers, hemostats, or a suitable thin, long tool, grasp the needle retainer and lift it out. Set this retainer aside someplace safe. Grasp the head of the needle and lift it out. If the diaphragm moves, release the needle; the tool has grasped the head of the tube the needle rides in, inside the slide. Try again, grasping only the *circular* section of the needle top. If the OEM needle is to be **replaced** by an aftermarket needle, put the OEM needle in a spare parts bin; *it will not be reused*, but may be necessary to reinstall should the bike ever need to be returned to factory original settings.

**Note:** Before proceeding further, determine if the following optional modification to the throttle slide is to be done. If so, proceed with this modification at this point. If not, go to **c. Replacement Needle**.

#### **OPTIONAL THROTTLE SLIDE MODIFICATION.**

The slide assembly has an air hole that allows air to pass through it as it moves up and down. This hole can be drilled out larger ( $1/8''$ ), which *theoretically* allows the slide to move up and down more rapidly, thus decreasing throttle response time.

The diaphragm is sealed well onto the edges of the carburetor body. Using a blunt instrument, *carefully* pry loose the edges of the diaphragm. Once the diaphragm is free, *carefully* lift it and the slide assembly out of the carburetor, noting its orientation, and take it to a clean workbench. Examine the top of the slide. The hole in the center is where the needle rides. The second, offset from center toward the motor side of the slide, is the air hole.



Note the position of the drill bit; *do not drill the center hole!* Using a  $1/8''$  drill bit and drill motor, *carefully* drill through this hole, thus enlarging it. It is *essential* that the bit follow the vertical alignment of the original hole.



Clean any burrs off the hole and clean out any metal pieces. The end product should appear as pictured.

Reinstall the slide assembly into the carburetor, ensuring that the slide is positioned correctly (I [Russian Wolf] am told it is not possible to install the slide backwards; however, care should still be exercised) and that the diaphragm will seat properly. One method widely used is to place the slide assembly and diaphragm in a freezer for approximately 30 minutes; this will shrink the rubber of the diaphragm and make it easier to install. Also, a small amount of silicone lubricant gel (not silicone caulk!) in the groove will assist the diaphragm to seal properly. If this is done, install the slide assembly and diaphragm while it is still cold.

**Note:** Test the slide movement; if it moves up and down smoothly, the diaphragm is seated correctly. If there is resistance, reexamine the diaphragm to ensure it is installed properly and seated well.



c. Replacement Needle. Carefully study the manufacturer's instructions for placement of the e-clip on the replacement needle. As an example, the **Dynojet** needle for the **Vulcan 1500** (DJO313) when used in the 800 uses an initial setting of the **third** notch *from the top* of the needle. The **Dynojet** needle for the **Vulcan 800** (DJO106) uses an initial setting of the **second** notch *from the top* of the needle. The **Factory Pro** needle for the **Vulcan 1500** also uses the **third** notch *from the top* of the needle. **Pro One** needles are also available; however, they are different, and no field data is currently available on their settings. In case of doubt, contact an 800 rider who has performed this modification and is using the same needle. Once the clip is in the proper place on the needle, use tweezers/hemostats, or a suitable thin, long tool to reinstall the new needle into the slide tube. Reinstall the needle retainer back into the carburetor in the *same position and orientation* it was originally.

**Note:** There should be no movement of the needle with the retainer installed. The OEM needle has a large head which the retainer engages perfectly, and prevents "needle bounce"; aftermarket needles do not have this head. Thus the aftermarket needle may move fractionally within the slide, and under conditions of hard acceleration or certain crosswind conditions, cause the engine to cough, sputter, or hesitate momentarily before reacting to throttle input. Should this happen (or as a precaution to prevent it) two needle shims should be installed on *top* of the e-clip. A 1mm thick stainless steel #4 washer (available at any hardware store) can be substituted for these shims, and may fit better within the retainer. Be aware that adding shims or a washer on top of the e-clip also adds weight to the slide, possibly slowing throttle response fractionally, or negating any benefit derived from drilling the slide.

d. Reinstall the spring into the carburetor, ensuring that it fits over the needle retainer. Carefully reinstall the domed top onto the carburetor, ensuring that the spring fits over the tab on the inside of the cover. Reinstall the 4 Phillips bolts into place. Tighten down only until seated firmly. A light coat of **Loc-Tite 242** on the threads prior to installation is recommended.

**Note:** Some have recommended replacing these screws with stainless steel Allen head capscrews; this is left to the discretion of the individual modifier.

## CARBURETOR REINSTALLATION

**Note:** In earlier versions of this Manual, relocating the crankcase vent (eliminating the small plastic bottle in favor of an aftermarket crankcase vent filter) was considered optional. However, field data has come in that indicates it should be

standard procedure. This is because when the crankcase vent releases overpressure in the crankcase, it is venting a mixture of air and oil mist. In the OEM system, the vent line runs to the backplate of the airbox, and the vented air/oil mist is drawn through the filter into the carb. Most of the mist is deposited on the filter, which necessitates either rotating the filter periodically to prevent the same spot from becoming saturated or early replacement of the filter. With the Scooterizing system, the nipple where the vent line enters the backplate is inside the filter; thus the air/oil mist will be drawn directly into the carb. Oil mist will be deposited on the rubber diaphragm of the slider; and oil has been shown to stiffen and/or deteriorate this rubber, necessitating replacement of the slider assembly. Relocating the crankcase vent will prevent this deterioration.

Prior to reinstallation of the carburetor is a good point to disconnect the crankcase vent hose from the rear cylinder head, just behind the carburetor, and install the three foot (3')  $\frac{3}{8}$ " hose in its place. It is highly recommended to use a zip-tie to secure this hose to the crankcase vent nipple; in most cases, a hose clamp will not fit. Completing the crankcase vent relocation will be covered in **EPA EQUIPMENT REMOVAL** (paragraph d).

- a. Remove the rag from the intake manifold. Inspect inside the manifold for and clean away any debris.
- b. If the carburetor was completely removed, reroute the choke cable and fuel line through to the left side of the bike. Reconnect the vacuum line, vent line, and throttle cables. **CAUTION: Ensure that each of the 2 throttle cables are connected to their proper points, or the throttle will work backwards (or not at all).** Reconnect the choke knob to the left side frame of the bike. Realign the carburetor with the notch in the boot and carefully slide it into place; saliva makes an effective lubricant, if necessary. Ensure that the carburetor is securely mounted *inside* the boot, with no boot edges rolled over or under, and the edges completely against the back of the carburetor. Tighten the boot clamp. **CAUTION: Do not overtighten the boot clamp; this can result in the boot edges flaring, which will create an air leak.** The best method of insuring proper tightening is to match the paint marks of the clamp and clamp screw, or to align the edges of the clamp opening with the (undisturbed) edges of the manifold clamp.
- c. Place a clean, lint-free cloth in the carburetor opening.

## **EPA EQUIPMENT REMOVAL**

**Note:** This procedure is optional; removal or retention of the EPA equipment will have little if any direct effect on performance. However, removal of the system will cause lower exhaust temperatures, resulting in less bluing of the exhaust pipes, and cooler temperatures of the air flowing over the pipes and onto the rider's legs. Also, retention of the system has been known to cause "popping" and, in some cases, backfiring in the exhausts during deceleration; thus removal is highly recommended.

The air switch valve is a gold-colored valve located just below the spine of the frame, between the two cylinders. It is held in place by the lines connecting it to the reed valve line (T-shaped hose between the cylinders) and the hose to the back of the air cleaner backing plate.



**a.** Release the clamp holding the reed valve line to the switch valve and the clamp holding the vacuum line from the carburetor to the switch valve. Pull the switch valve free of both lines; the third line going to, and previously removed from the airbox backing plate will come free with the switch valve. Put the switch valve, line, and clamps in a spare parts bin; *they will not be reused*, but may be needed should the bike ever need to be returned to factory original configuration.

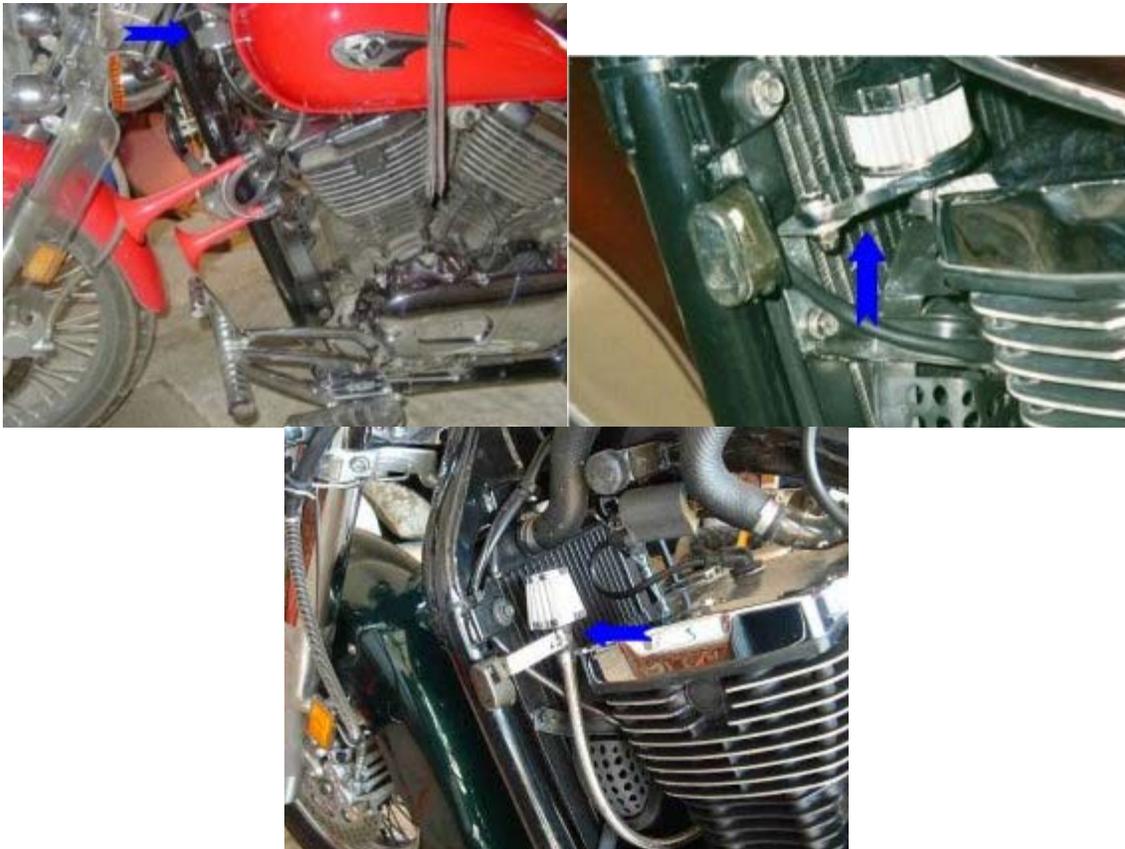


**b.** The reed valve line is a T-shaped hose that connects the two reed valves (in the cylinder heads) and the switch valve. Either plug the hole in the line to the switch valve (a large marble or internal line plug works well), remove the line and install vacuum caps over the nipples (better solution), or remove the line and replace it with a single length of high-temperature, high-pressure radiator line (best solution). This blocks the operation of the reed valves.

**Note:** In the case of replacing the OEM line with a single length of line, some members advocate the insertion of a ball bearing to block the line, preventing the possibility of gases passing back and forth between the front and rear cylinder reed valves. I (Russian Wolf) have had a single length of line, unblocked, on my bike for 3 years, and have not noted any problems. However, if the modifier wishes to block the line, use a stainless steel ball bearing of sufficient size to block the line without moving. Insert this ball deeply into the line; approximately to the halfway point of its length. At one time the use of a glass marble was accepted; however, at least one member noted during disassembly for another purpose that the marble had shattered, depositing glass fragments in the reed valves. Thus this method is now considered obsolete.



c. Remove the vacuum line to the switch valve from the tee in the vacuum line between the carburetor and the fuel petcock. Either plug the empty stub of this tee with a vacuum cap, remove the tee and replace it with an inline splice (better solution), or remove the line entirely and replace it with a single length of vacuum line from the carburetor to the fuel petcock (best solution).



d. Install the aftermarket crankcase vent filter on the bike. Some have removed the helmet lock on the forward left side and installed the vent filter in its place. Others have fabricated a mounting bracket and attached it to the left side of the gooseneck holding the front forks. Sarge fabricated a mounting bracket that attaches to the upper left radiator mounting bolt behind the helmet lock. Whatever location is used, the nipple on the vent filter should be pointing *down* so the vent line is routed in an upward direction when attached to the filter. The proper positioning of the vent filter *and* hose direction will reduce or eliminate oil mist escaping the filter which will foul chrome plating and the rider's clothing.

**Note:** Oil misting can be virtually eliminated by installing an “absorption filter” within the line. Purchase a pair of  $\frac{3}{8}$ ” to  $\frac{3}{4}$ ” line adaptors, and a 2” section of  $\frac{3}{4}$ ” oil line. Cut the crankcase vent line at approximately the midpoint. Install one of the adaptors into the  $\frac{3}{4}$ ” line. Cut a 1 $\frac{3}{4}$ ” strip of Scotchbrite™ pad; roll this pad into a cylinder that will fit tightly into the  $\frac{3}{4}$ ” oil line, then slide the cylinder into the line. Install the other adaptor into the remaining end of the line. Install the  $\frac{3}{8}$ ” ends of both adaptors into the cut ends of the crankcase vent line. The Scotchbrite™ material will absorb the majority of any mist traveling through the line and prevent it from blowing out the crankcase vent filter. This material will have to be replaced periodically, whenever increased misting is observed from the vent filter.

e. Route the new hose along the frame spine toward the front of the bike in such a way that it will not be pinched when the fuel tank is reinstalled. Loop the hose down below the level of the vent filter's nipple, then back up. On Sarge's installation, the vent hose was run from the rear cylinder down the lower right side of engine, to the forward engine mount, across the frame under the engine mount, then up the left down tube to the vent filter. **CAUTION: Do not to kink the hose at any point along the route.** Cut off the excess hose and mount the hose to the vent filter. Depending on the aftermarket vent filter purchased, the 1/4" line may not fit over the nipple. Judicious application of heat from heat gun or hair dryer will soften the line sufficiently to allow it to slide over. This completes the EPA equipment removal for **49-state models**; go to **AIRBOX [BACKPLATE] MODIFICATION**.

f. **ADDITIONAL: FOR CALIFORNIA MODELS.** California models have a charcoal evaporative fuel canister and vapor lines. Removal of this equipment is strictly optional; there is no effect on performance whether it is removed or retained. If the equipment is to be retained, go to **AIRBOX [BACKPLATE] MODIFICATION**.

1. Cap the fuel vapor recovery line nipple on left side of the fuel tank with a 1/4" vacuum cap; secure the cap with a small hose clamp or zip-tie.

1a. If a second fuel vapor recovery line is present on the right side of the fuel tank, remove the line from the charcoal canister and either route it to vent underneath the bike, alongside the tank vent line, or install a T-fitting into the tank vent line and attach the fuel vapor recovery line to the T-fitting (better solution). Do *not* remove this line and cap the nipple; this will cause overpressurization of the fuel tank, which creates other problems.

2. Remove the right side cover. Remove the 4 8mm bolts holding the back of the box in place; it may be necessary to remove the rear exhaust pipe to get to the last bolt at the bottom of the box, though I (Russian Wolf) have had good success removing this last bolt without removing the exhaust by using a thin 8mm open-end wrench or a thin 8mm ratcheting box-end wrench. Pull the back free of the bike; the charcoal canister is riveted to this back plate. Remove the fuel vapor recovery hose along with the backplate/charcoal canister. Take the assembly to a workbench. Drill out the rivets holding the charcoal canister to the back plate; the canister and hose will drop free. Put the canister and hose in a spare parts bin; *they will not be reused*, but may be needed should the bike ever need to be returned to factory original configuration. Plug the rivet holes in the back plate with silicone caulk or rubber plugs to prevent water intrusion if desired. Reinstall the back plate into its original position and reinstall the rear exhaust pipe, if removed. Reinstall the right side cover.

#### **AIRBOX [BACKPLATE] MODIFICATION**



a. Remove the 8 Phillips head screws holding the back of the snorkel to the backing plate. Dispose of this snorkel half and the screws; *once the backplate has been modified, they cannot be reused.*



b. Using a **Dremel** rotary tool with a cutoff wheel is best for the next step, but a sharp razor or **X-acto** knife will work. *Eye protection is a necessity when using power tools; ear protection is also recommended.* Cut the external part of the snorkel off the upper leading edge of the plate. Do *not* cut into the edge of the plate. Once the snorkel half is removed, the ridges on the back of the plate that formed the rest of the snorkel can be cut off and smoothed down. Do *not* cut into anything but these snorkel ridges.



c. With the snorkel ridges cut down, cut the *entire* section containing the deflector vanes away. Smooth down the cut surfaces.



Outside and inside view of completed backplate modification.



Block the large nipple from the air switch valve hose with a 1/2" vacuum cap, if EPA equipment has been removed; if EPA equipment has been retained, the appropriate hose from the switching valve will be reattached when installing the completed assembly. Block the smaller nipple for the crankcase vent with a 1/4" vacuum cap.



Alternate (updated) method to plug the large nipple; spread some RTV gasket sealant (**Permatex Blue**) over a yellow 12-18 AWG wire connector and insert it small-end down into the nipple. In picture; on left, installed plug. Center, original vacuum cap which had deteriorated and cracked, necessitating replacement. Right, exemplar wire connector.

- d.** Remove the rag from the carburetor throat. Reinstall the securing bracket onto the carburetor; ensure rubber tab is properly aligned with carburetor. Reinstall the 2 10mm bolts into the securing bracket; *do not* use excessive force to tighten. A light coat of **Loc-Tite 242** on the threads prior to installation is recommended.
- e.** Reinstall the backing plate on the securing bracket by *carefully* easing the boot back over the carburetor throat; saliva makes a suitable lubricant if necessary. Ensure that the carburetor is securely mounted *inside* the boot, with no boot edges rolled over or under, and the edges completely against the carburetor. Line up the holes in the backing plate with the securing bracket; reinstall the 2 10mm bolts that hold the backing plate in place. *Do not* use excessive force to tighten. A light coat of **Loc-Tite 242** on the threads prior to installation is recommended.



**f.** Reinstall completed backplate on carb.



g. Install new **K&N** air filter onto backplate.



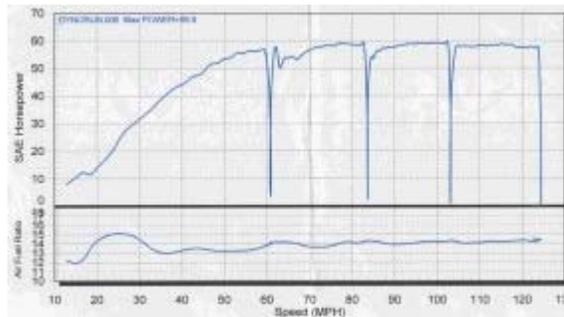
h. Install chrome cover. Note the large opening now available for air to flow into the air cleaner. There will now be plenty of air available for the engine.

### FINALIZING GRAMPSIZING™

Reinstall the fuel tank, instrument pod (ensure that the speedometer cable is screwed in *tightly*; problems with the speedometer cable backing off have been noted. Tighten the collar nut as tightly as possible with fingers, then an additional  $\frac{1}{8}$  turn with pliers), and seat. Wipe up any spilled fluids, put away all tools, and take the newly Grampsized bike outside. As the carburetor was drained of fuel, put the fuel petcock in the “Prime” position until the motor is started the first time. Once the motor is running, return the petcock to the “On” position.

Typically after Grampsizing, the bike does not need the choke to start except in temperatures below 40°F. Start the motor and allow it a few minutes to warm up.

**Note:** More power will be evident immediately, so make allowances for and expect this before releasing the clutch. Now the machine is ready for a test ride and final dialing in of the jets, needle and/or air/fuel mixture as needed for optimum performance. Typically the idle mixture screw will need adjustment; use of a tool such as the one pictured at <http://www.jcwhitney.com/autoparts/ProductDisplay/s-10101/p-3026/c-10101> makes this much easier. The tool may be used from the left side of the engine; no parts removal is required, and adjustments may even be made with the engine running.



A scan of Anthony Leo's 800 Classic after Scooterizing. That "Max POWER" figure reads "59.9". Similar results may be expected from the Grampsized Air Flow Control System.

Photographic credits:

Anthony Leo (VROC #8995)

Tony D (VROC #8927)

Gramps (VROC #300)

Sarge (VROC #5357)

Cat-In-The-Hat (VROC #6139)

PW (VROC #6285)