VIRAGO FUEL SYSTEMS

The main points about fuel tanks are these: they need a way of letting fuel out to the carbs, and they need a way to let air in as the fuel goes out, to avoid a vacuum buildup in the tank. We will call this "venting" or "breathing".

The tank should have a "reserve" function that will allow you to access an additional supply of fuel when you start to "run out of gas" and thus allow you a few more miles of driving to find the nearest gas station.

And finally, there are safety considerations, mainly involving the situation where the bike falls over on its side. The concern is that we don't want fuel spilling out all over the place when this happens, so we need to block the fuel path and also the venting path, so that the fuel stays in the tank in a "down" situation.

EARLY YEARS -750's AND 920's

Viragos and RH, RJ chain drive models offered from '81 to '83 have a gravity feed system. The fuel runs down hill from the tank through fuel lines to the carbs. Some models have one petcock and some two, but the method is the same. One petcock just requires a splitter and two pipes to feed the carbs.

These petcocks are vacuum operated petcocks. This means that they have a little diaphragm and valve set-up in them which responds to engine vacuum and allows fuel to flow only when the engine is running and supplying vacuum. This is how things work when the petcock lever is set to the "on" or "run" setting. So we see that the "on" setting is actually the "off" setting when the engine is not running. Since the engine will likely quit shortly in a "down" situation, this petcock will automatically close and prevent the fuel from flowing out.

These petcocks also have two other lever settings:

The "prime" setting bypasses the vacuum function and allows fuel to flow at all times, even when the engine is stopped. The purpose of this setting is to allow the carb float bowls to be filled when the engine is not running. Note that if you run your petcock(s) on the prime setting all the time, you lose the safety feature provided by the vacuum petcock. Note also that on this setting, fuel is prevented from flowing out through the carbs only by the float valves in the carbs, which close when the carbs are full. Should one of these float valves stick open or leak, you then get flooding through the carb.

The "reserve" setting is used to access an additional amount of fuel when you start to run out. Here is how this works. These petcocks have inlet towers which stick up into the tank. In the "on" position, fuel flows down to the petcock through an opening high on the tower. So when you "run out of fuel" you actually have some more fuel sitting in the bottom of the tank which lies below this high inlet. When you turn the petcock lever to "reserve", a lower inlet near the bottom of the tower opens, so you can gain access to this last bit of fuel in your tank.

All the older tanks breath through venting passages in the gas cap. When the bike goes over, and a little ball bearing rolls along a little passage in there and blocks the flow of fuel through this vent.

LATER 700'S AND 750'S

Starting in 1984, things changed a little for all 700's ('84 to '87) and 750's ('88 to the end of the run).
First, a fuel sender and low fuel light were added to warn us of a low fuel condition and encourage us to switch the petcock to reserve. The sender (which resides in the fuel tank) is actually a switch designed to turn the warning light on when the supply of gas available through the high tower inlet is about to run out.

The second change relates to venting. These tanks no longer vent through the gas cap but have a venting pipe exiting to the rear. For many models (certainly California models) this pipe breathes through a charcoal canister, which is designed to collect fumes from the tank (and the carbs) when the bike is at rest, and return them into the engine to be burned when the engine runs. This breather hose also has a "rollover" valve in it, which performs the same function as the ball bearing in the earlier gas caps. When the bike goes over, it a floating ball rolls into a seat and prevents fuel from pouring out the vent.

**VIRAGO 1000′ s AND 1100′ s**

With these models almost everything changes big time.

Gone is the petcock, together with its prime and reserve functions. The fuel now flows all the time from the main tank to an added lower tank through a big fuel pipe. Main tank breathing is handled as in the 750′ s, but there is also a breather pipe between the main and lower tanks.

Added are:

- The second (lower) fuel tank of about .6 gallon capacity (noted above).
- A fuel pump
- A fuel pump controller (electrical black box)

Here’s how things work. All fuel flows from the main tank, through the lower tank, through a fuel filter, to the fuel pump. It is one continuous system. The fuel pump (a low pressure "on-demand" type pump) then pumps fuel to the carbs. There is no physical reserve fuel supply.

Running things is the fuel pump controller. This black box has several functions.

First, it tells the fuel pump to pump when the ignition is on, the engine is running, and you have adequate fuel.

Second, mainly as a safety device to prevent fuel escaping when the bike is "down", it stops the fuel pump about 5 seconds after the engine quits (or is not) running, even though the ignition switch is still on. You will notice this effect also when you first turn on the ignition. Before the engine starts, the pump will often give a few burps to fill partially empty float bowls.

Third, the controller now provides the "reserve" function. You still have a fuel level sender and a fuel light. When the fuel goes low in the main tank, the sender unit sends a signal to the low fuel warning light which goes on. But now it also sends a signal to the fuel pump controller. Shortly after the warning light goes on, the fuel pump controller partially shuts down the fuel pump, so that your engine does not completely quit, but does start to starve for fuel. The effect (to the rider) is that you are running out of gas. You then hit the "reserve" switch on your handlebar, and this tells the controller to turn your fuel pump back on full so that you can access the remaining fuel, which is, no doubt, mostly in that lower tank. So, my friends, that is how it works. It’s just a "running out of gas" trick played on you by Yamaha and the fuel pump controller.

**TROUBLE-SHOOTING THE SYSTEM**
NOTE THAT WE ARE DEALING WITH FUEL HERE. FUEL CAN GO BOOM! TAKE ADEQUATE PRECAUTIONS, OR HAVE AN EXPERIENCED MECHANIC DEAL WITH YOUR FUEL SYSTEM PROBLEMS. !!!

PETCOCKS
Sucking on the vacuum lines can tell you whether the vacuum function is working. Petcocks can also start to leak. You can try disassembling, cleaning and reassembling. If this doesn’t work rebuild kits are available from K&L Supply Co. (through your dealer, K&L does not sell direct.)

GAS CAPS/VENTING
A typical symptom is the bike that will run for a while then just quit. Then after a rest it will run again. The vacuum buildup prevents the fuel from dropping/flowing properly. You can try running on a back road with the gas cap ajar (at your own risk!!), and see if the problem goes away. Gas caps can be partially disassembled. Be very very careful if you try this, since there are little springs and balls in there that can get away from you easily, never to be found again. Then some carb cleaner sprayed here and there plus some air, may be able to clear out any blocked passages.

RUSTY TANKS
Several cleaning and coating products are available, Kreem being one of them. This is tedious, messy, smelly work, but your tank will be restored.

FLOODING CARBS
If your carbs flood on the "prime" setting, your float valves are sticking. Tap your carbs a little to see if the problem clears. Otherwise, replace your float valves.

VENTING PROBLEMS ON LATER MODELS
Check to see whether your "rollover valve" is stuck closed. Clean or replace if it is giving trouble. If you suspect that the problem is with your charcoal cannister, wait until the EPA inspector has hi head turned and just disconnect the breather hose from the cannister--and let it breath into the open air.

FUEL WARNING LIGHT/FUEL LEVEL SENDER PROBLEMS
Check the bulb, check the fuel sender as per instruction in the Factory Service Manual. (I don’t give specs in my articles).

FUEL PUMP
Drain your carbs. Find the hot wire to your fuel pump and give it 12 volts. The pump should operate until the float bowls are full and the float valves shut, at which time the pump should stop. If the pump isn’t working strong and continuously in this situation you are probably looking at a new pump. Pumps seldom fail in my experience.

FUEL PUMP CONTROLLER
Drain your carbs. Turn your ignition on and see if you get 5 seconds of action. Run tests given in factory service manual. If you decide the controller is bad, price one and see how badly you want to retain it. If you swoon at the price, here is a solution that I do not recommend to you because if you do it this way you will lose the engine cutoff safety feature, as well as your reserve function.

But anyway, here it is. Find the wire that supplies power to your TCI (ignition). This will be after the main switch AND the engine stop switch. Tap into this wire and run a wire to a horn type relay (Radio Shack sells a good 30 amp, 12 volts relay. Bosch also makes one with a nice connector set-up). Ground the other side of the
relay. Then run a wire with an in-line fuse, say 5 amp, directly from the battery through the relay to the hot side wire to the fuel pump.

If you do this here’s how it will work. With both ignition and the engine stop switch on, the fuel pump will be on at all times. Fuel flow will be checked by the float valves only. No five second shut offs if the engine quits (safety feature gone!!) If you know you are going over, try to hit the engine stop switch before you pass out or whatever, otherwise you pump will stay active, and fuel could be lost. You will now have to figure your gas stops on your odometer, and your warning light, which will probably still work. If you know your gas mileage this should be too hard. But there will be no "running out of gas" feeling to warn you and if you don’t fill up, your pump will keep pumping until the last drop is gone.

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