

Mikuni BS34 tuning

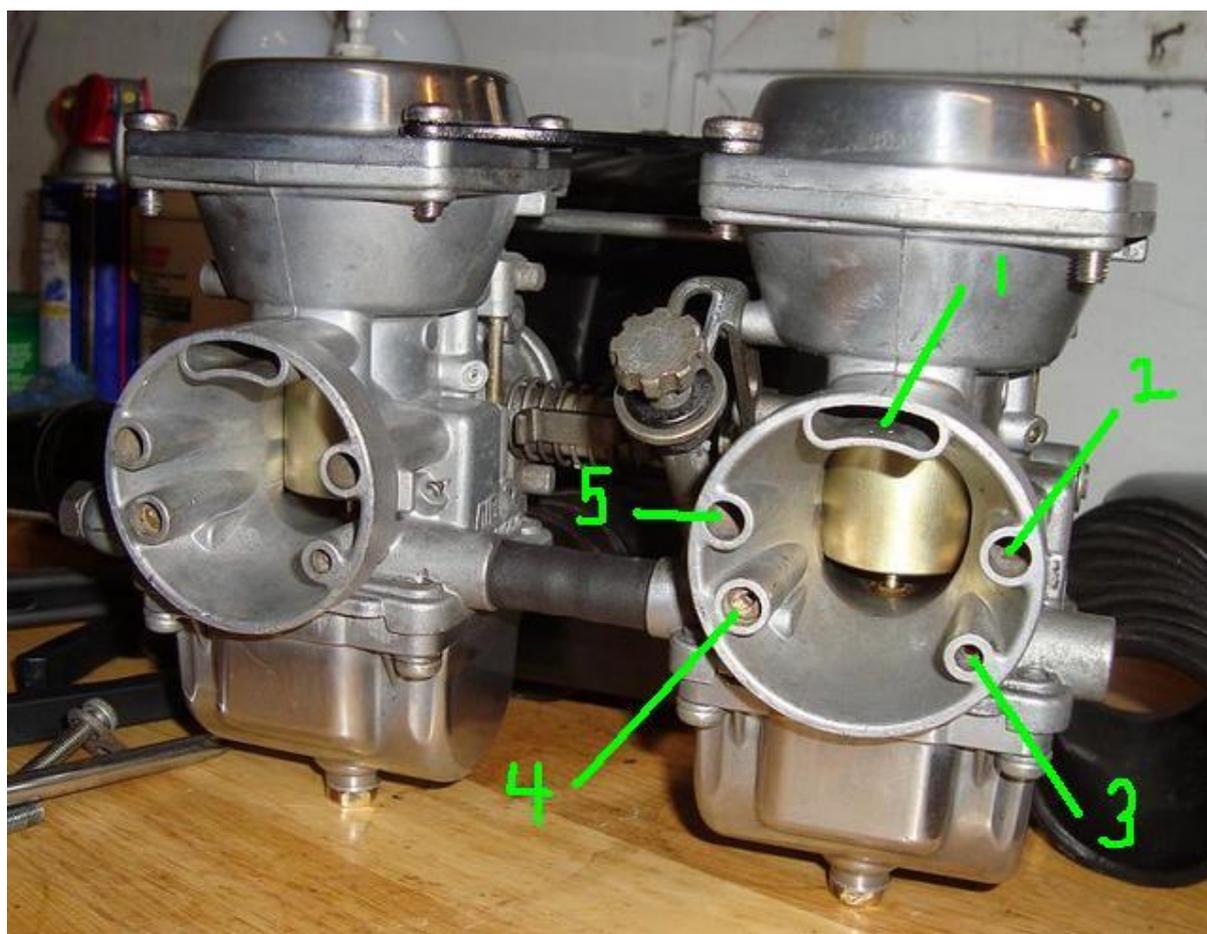
It is normal to have some climb in idle rpm as the bike warms. After I shut off the enrichener all the way (choke) and the bike is still cool having just run for a couple of minutes, it will idle around 1000rpm. After it warms up, it will vary from 1200-1400 rpm (give or take)- and there is nothing wrong with that.

An idle up around 3000 rpm if everything is adjusted indicates a lean condition from adjustment, air leak or idle circuit passages being dirty. I would turn the idle mixture out to 3.5 turns, make sure there is free play on the throttle cable, good plugs properly gapped, just let it idle to warm, then use the idle air screw to adjust to 1200 rpm. If the idle still climbs too high, then check for air leaks. If there are none, the carbs need cleaning.

If it is up against the head, in front of the slide valve, then it is an mixture screw. This will be **In Lean, Out Rich**. So these you have are the BS38 Mikunis on your twin? I'd say start about 2 turns out, with stock airbox and stock jets. With Pod's, you will need richer Pilot jets, and then still be around 2-3 turns out.

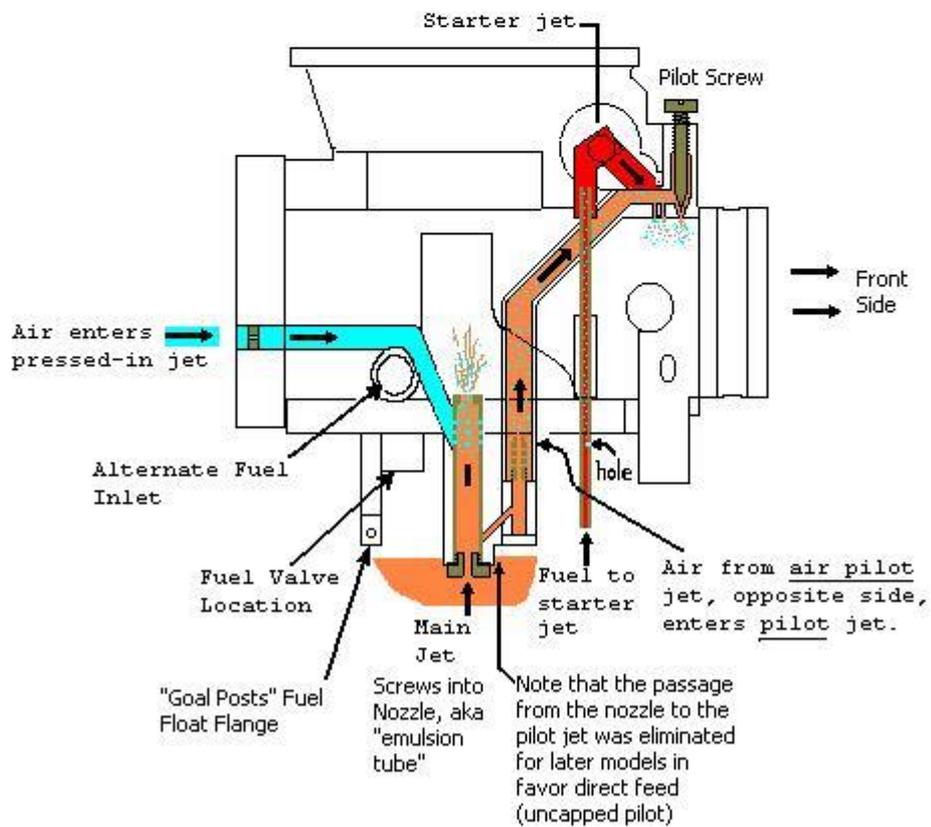
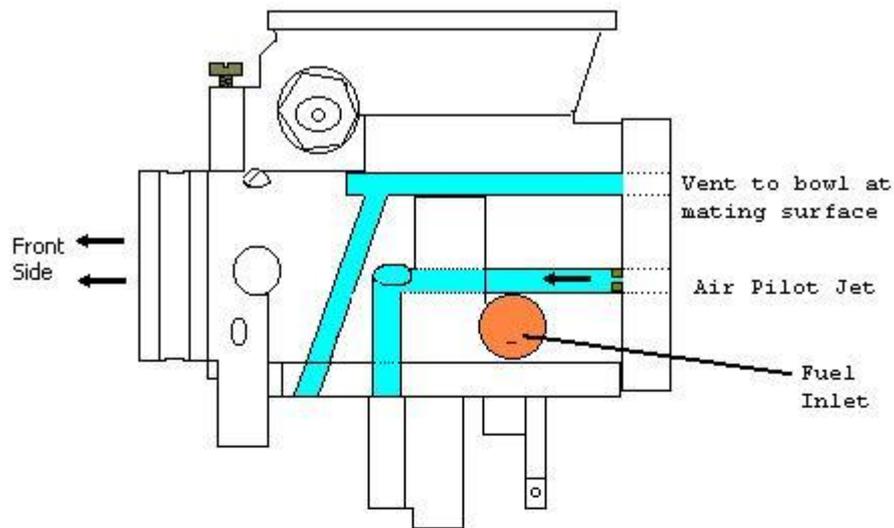
That's just the Pilot circuit.

To find the best setting is trail and err. you need to turn the screw in till the Idle speed drops, then back out about 1/4 to 1/2 turns and then run it. It might be farther out, end up at 2-1/2 turns or 3 turns, maybe 3-1/2. If any farther I would suspect vacuum leak, or still to lean a Pilot jet, with Pod's

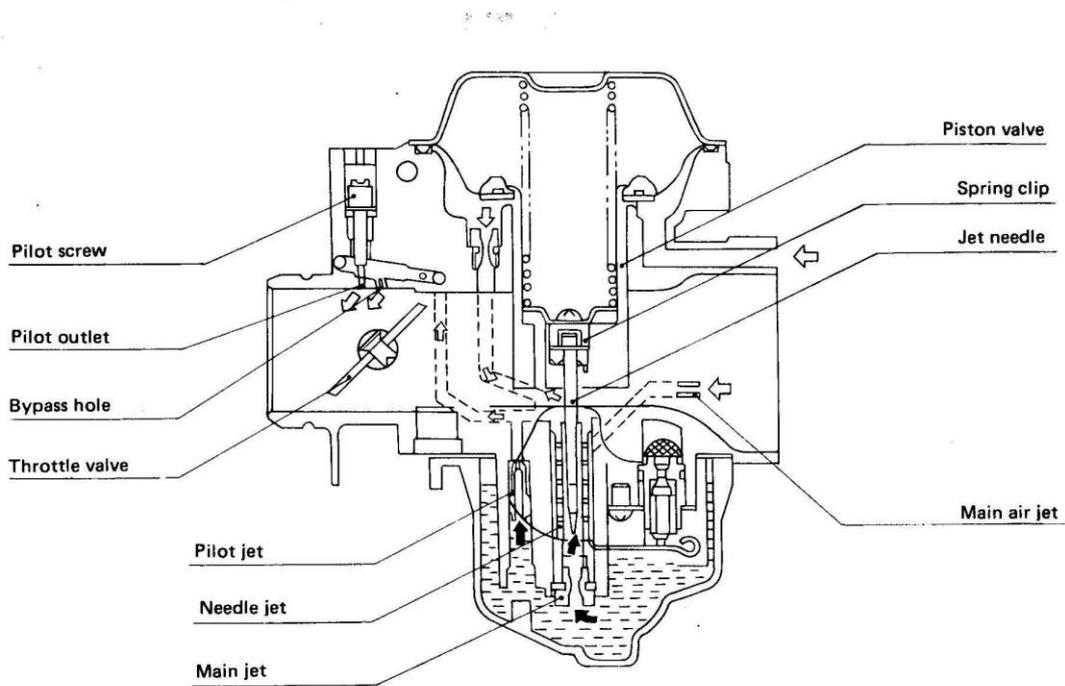


May visualize from this BS34 diagram how turning the pilot screw in clockwise reduces the volume of mixture through the orifice into the carb bore (which produces a leaner mixture into the combustion chamber), and how turning the pilot screw out counter-clockwise increases the volume of mixture through the orifice into the carb bore (which produces a richer mixture into the combustion chamber).

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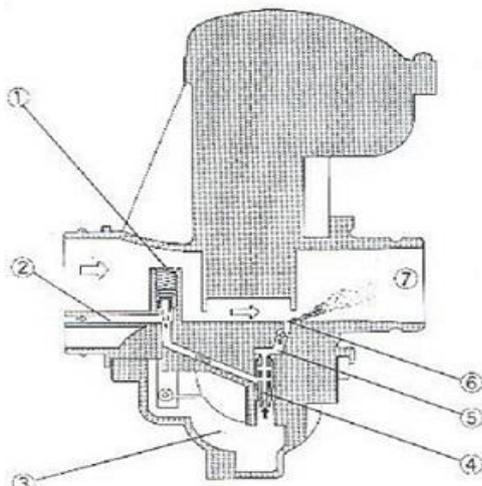


I concur with your preferred terminology, that the adjustment screws at hand are indeed pilot mixture screws, and not pilot air screws which are typically located on the air box side of carbs.

A pilot air screw governs the amount of air being allowed to reach the pilot jet, whereby screwing in clockwise reduces air and thereby enriches the pilot circuit; and screwing out counter-clockwise increases air and thereby leans the pilot circuit.

The following illustration compares the different pilot circuits in manual slide carbs, being side-located air screw on air box side of carb, and bottom located mixture screw on engine side of carb.

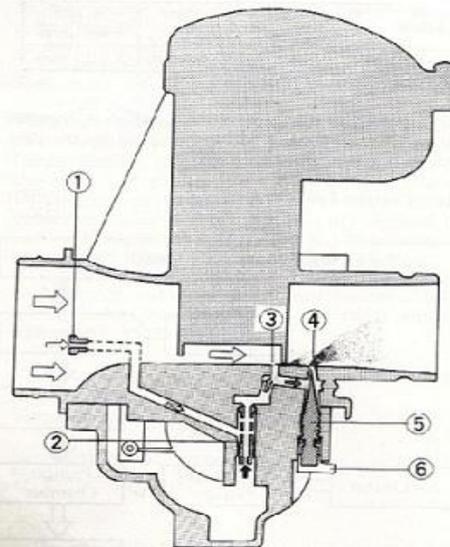
Pilot System



- 1. Air Screw
- 2. Pilot Air Passage
- 3. Float Chamber
- 4. Pilot Jet
- 5. Pilot Passage
- 6. Pilot Outlet
- 7. Carburetor Bore



Carb with side-located pilot "air" adjustment screw



- 1. Pilot Air Jet
- 2. Pilot Jet
- 3. Bypass Outlet
- 4. Pilot Outlet
- 5. Pilot Screw
- 6. Extender



Carb with bottom-located pilot "mixture" adjustment screw

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Lean and Rich Symptoms in Motorcycle Carburetors

In your post you indicate that some of the symptoms you have read are contradictory. I will try and clarify between the two conditions and attempt to give you guidelines in troubleshooting between the two.

Background

Motorcycle carbs have a few circuits that effect different throttle positions.

- Idle Circuit - for idle and off idle
- Pilot Circuit - small effect on idle. Higher effect at lower RPM's with decreasing effect to full throttle
- Needle jet/jet needle - Mid range circuit
- Main Jet - Wide open. Fuel is metered through the main by the jet needle at different throttle positions.
- Choke circuit - Initiated by a valve or butterfly that increases the vacuum and opens the circuit up. Cold starting and warm up.

Symptoms of Lean and Rich

Here are some basic symptoms, some duplicate

Lean

- **Reduced Power** - Sluggish at certain RPM's. Wide open throttle yields no power. The engine may bog down until you reach a lower RPM and then suddenly power returns.
- **Difficulty Starting**
- **Spark plugs are clean** - No residue. Insulator may be white.
- **Runs better at higher altitudes** - AFR becomes normalized due to reduced atmospheric pressure allowing fuel into the venturi easier.
- **Backfires** - Popping on deceleration for a lean idle circuit or backfires in general.
- **Runs on choke** - The vehicle may run on choke when it's warm but stalls if the choke is turned off.
- **Idles poorly** - Fluctuations in idle RPM, stalling
- **Engine runs hot** - Due to more oxygen than fuel combustion temperatures are hotter reflecting on a temp gauge.
- **Hanging idle** - The engine idles high and then drops and stalls. Typically a lean condition caused by an air leak between the butterfly and the head or a vacuum line that is not attached.
- **Sharp Odour** - The exhaust smell may be sharp and burn your nose. This is NOx or Nitrogen Oxide. It's created by high temperatures in the combustion process between nitrogen and oxygen. Although NOx is present in all exhaust it can be more

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pronounced in higher combustion temperatures associated with lean conditions with more oxygen. More oxygen=higher burn temp

Rich

- **Reduced Power** - It has less power but seems to be OK and runs.
- **Reduced Fuel Mileage** - You're using more fuel per cycle so your mileage becomes worse.
- **Rough Idle** - Combustion takes a just a bit longer with more fuel and at lower RPM's the engine can idle rough. Unlike a miss-fire on a spark plug this idle seems fine if the idle is turned up just a bit.
- **Spark Plugs Black** - Carbon buildup on insulator and electrodes of plug. Wipes off your finger as sooty and black. Carbon is a conductor of electricity and getting considerable carbon buildup from a rich condition with ground the inner electrode down the positive insulator. When this condition occurs there will be no spark. You can clean the sparkplug with carburettor cleaner and re-use.
- **Exhaust Exit is Black and Sooty** - Excessive carbon buildup in the exhaust is thick and overly grimy. A properly jetted carburettor will leave a nice grey scale colour in the end of the exhaust pipe.
- **Odour of unburned fuel** - In cases of a very, very rich mixture you may smell some unburned fuel coming out of your exhaust. This could be due to a grounded out sparkplug from too much carbon buildup preventing the combustion process in a cylinder or so much fuel that combustion is not occurring.
- **Runs better with more air** - If you remove your air filter and the engine begins to run a bit better with more oxygen in the mix it is likely you have a rich condition.
- **Runs worse at altitude** - If the bike starts to run worse at higher altitude with reduced oxygen, it's likely a rich condition.
- **Black Smoke** - If you have black exhaust when you rev it, it's rich. You can get a light colored rag and place it over the exhaust lightly and rev it to see if you get carbon/black residue on the rag.

Troubleshooting Lean Conditions

There are a few common issues that pop up with motorcycles that have carbs.

1. Rubber Intake Manifolds - Most modern motorcycles (Mid 1970's on) have rubber manifolds attached to the cylinder head. The carburettors fit into these manifolds and are clamped. Over time they become hard, brittle and cracked and suffer from dry rot due to excessive heat at an accelerated rate.

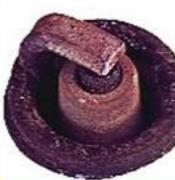
- **Cracking** can create air leaks which create lean conditions.
- **Poor assembly** accounts for another large portion of air leak created issues. Make sure the carbs are seated in the manifolds properly. When inserting a bank of 4 carbs into a 4 cylinder it can be very difficult to get them to seat right. Use a bit of oil in the inside diameter of the manifold to help them slip in easier. Tighten the outer two clamps initially in stages before starting on 2 and 3.
- **Vacuum Lines Not Attached** is very common. Leaving a petcock vacuum line off can create a lean condition on 1 cylinder but normal on the rest. You can get odd

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idle symptoms and a lazy idle condition where the engine RPM's drop slowly and it 'hangs'

You can test for air leaks by running the motorcycle and squirting carb cleaner at suspected cracks. The idle will reduce a bit if you hit a winner. As well, you smell a sharp odor from the exhaust as it is pulled through the motor and undergoes combustion. Don't breath much of that in and use fans while doing this. If you don't feel comfortable with carb cleaner you can use an oily thicker spray like WD40 that will clog the crack better temporarily and reduce the idle. I'm typically looking for the odor though, it's sharp and pronounced and unmistakable as opposed to, "did that idle just drop a bit, let's do it again..."

- **Sparkplugs** Give you great breadcrumbs at to what is happening inside the combustion chamber. Lean conditions can create pre-ignition that melts electrodes or leaves the electrodes in a dusty white condition or simply white with no deposits.

					
Oil Fouled	Oil Fouled	Carbon Fouled	Too Cold	Too Cold	Cold or Rich
					
Cold or Rich	Cold or Rich	OK	OK	OK	OK
					
Better	Best	Better	Good	Good	Good
					
OK	OK	Slightly Hot	Hot or Lean	Hot or Lean	Hot or Lean
					
Really Hot or Lean	Really Hot or Lean				

Common Rich Condition Causes

Rich conditions are considerably less frequent than lean. Much of the issues lay in the fact the people are typically creating lean conditions upon reassembly of carburetors. Rich conditions can be created by people too but the condition is usually caused by:

- **Installing a jet** that is too large
- **Setting a float** level that is too high.
- **A Choke** that is stuck or not turned off. Ensuring proper cable routing so that you can turn the handlebars all the way to the left and all the way to right without opening the choke when doing so is an essential test after installing the carbs and after reconnecting the choke cable. Ensure it doesn't bind up and pull the choke open.
- **A stuck float** in the float bowl will allow fuel to overfill and then spill out the main jet into the venturi. If you have fuel in your airbox that's a good sign you have a stuck float and bad vacuum petcock
- **A stuck float with a standard petcock** can create issues as the fuel will do what is stated above but when the bike is sitting. This fuel can also fill the cylinder and create hydrolock and destroy your engine when you start it. The piston cannot get to top dead center on the compression stroke and it bends your connecting rod. This is real. I've seen the results...AND of course if your petcock is stuck open it's overfilling all of your carbs and creating rich condition.

Sparkplugs Are Your Breadcrumbs

Again, refer to the sparkplugs. Look at the chart. See what you can see. If you have a multicylinder bike and multiple carburetors you will NEED to check ALL of your plugs. Each carburetor can have an individual issue.

Thoughts

In doing two stroke tuning we would change settings, start the bike and run it at a particular throttle position as long as we could safely ride it that way then abruptly cut the ignition and hope we could coast back to where the tools were. Doing this allowed us to look at the plug at a particular throttle position and adjust accordingly.

I have not put any real information on how to resolve the various conditions and how to set a float consistently or when to use a different size main jet or raising and lowering your jet needle. The post would just turn into a short novel. I'm already going to get some deserved tldr on this one.