

The following articles and instructions are provided as general information for working with AMAL and MIKUNI carbs on British Motorcycles, without the need for expensive tools or paying for expensive shop labour. Many British motorcycles are not properly enjoyed as the owners have neglected the basics of carb maintenance that they run so poorly and are frustrating to ride. A Norton Commando should idle evenly at 600rpm and be able to jump off the line at a traffic light with a fistful of throttle, without hesitation or stalling. Use this information with common sense and at your own risk.

## AMAL CONCENTRIC REBUILD

Remove carb(s) from your bike. Completely dismantle them to last screw and soak in carb cleaner. Use stiff bristle brush, bottle cleaners, probes etc. to completely remove all dirt and scale from all passages. Clean filters. Blow dry with compressed air. Bead blast if required.

Number one, make sure that your carbs have been checked out for factory settings and that all jets, slides, needles etc are set the same on each carb. Check the settings, do not assume anything.

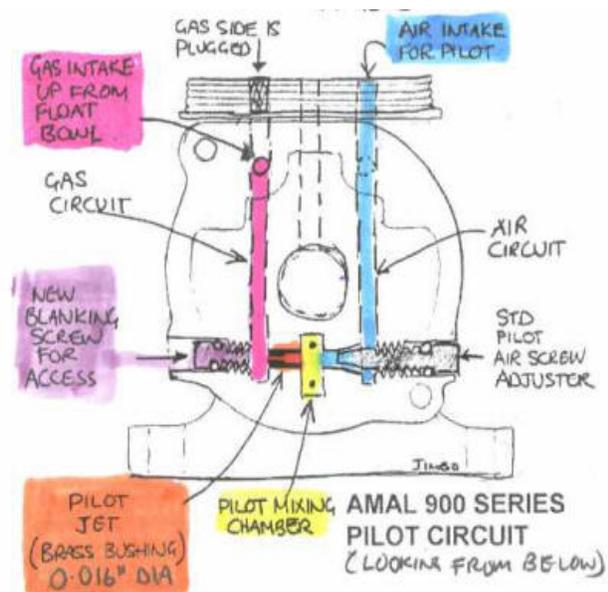
It is advisable to purchase and install new gasket sets. These are inexpensive and they come with gaskets, new rubber O-rings and washers. If you are restoring an older carburetor also consider a jet metering kit that replaces the needle jet and the needle and a VITON tipped float needle. Later style tickler conversion parts are also available as a kit.

## PILOT JETS EXPLAINED

The number one cause for **poor starting, erratic idle and poor low speed running** is the pilot gas jets are likely to be clogged.

The pilot (or the slow-speed, idle) circuit has two parts:

1. an air passage that is adjustable by the screw on the side
2. an internal gas passage with the fixed pilot jet. This jet is a small brass bushing with a tiny 0.016" (16 thou) orifice that is a press fit opposite the air adjusting screw. Gas is brought up from the the float bowl and travels toward the front and is metered before it mixes with the air in the pilot mixing chamber.



The pilot circuit provides a metered amount of gas and air for idle and low speed running. Think of the gas circuit as an artery - over time the gas passages slowly clog up with scale and varnish from dried gasoline and eventually clog right up. **The only remedy is to physically unclog the jet with a wire probe.**

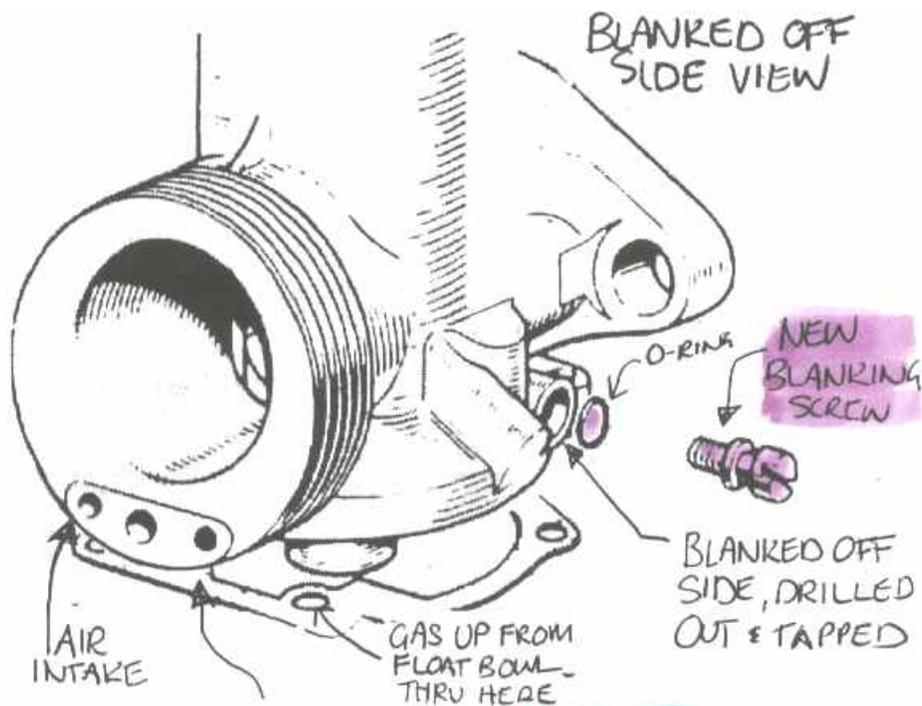
The pilot jet is drilled 16 thou dia. (0.016"), a very tiny orifice indeed. I use an old guitar string wire with a filed flat end to probe the jet from the air side, after the air adjuster screw is removed (use a flashlight to locate the orifice). Another useful tool is a #78 drill, mounted on an end of small brass or plastic tube, The drill will re-size the orifice, so be careful and make sure all swarf is blown out by compressed air.

You can see all the way into the jet on the far side and with liberal application of carb cleaner and compressed air the jet passage usually opens up. Best to do this on the bench with the float bowl removed so that any scale removed will exit the carb out the orifice on the underside. Make sure the fuel passage on the float bowl is also clear, crud and scale tend to collect on this at the bottom (there are two on each float bowls, one is not used)

Many people say they have soaked the carbs in carb cleaner and blown them out - BUT this will not usually unclog the pilot gas jet, it needs to be physically probed and the scale scraped out.

**MODIFICATIONS FOR BLANKING SCREW:**

A better method is to actually drill out the blank plug on the opposite side from the air screw and physically probe the jet so that you can see with your own eyes that the jet is clear. The drilled hole is tapped 10/32 (in real life it should be 2BA) and install a blanking plug (an old air adjuster screw cut to size) with Loctite. This is a machinist operation and should not be attempted without the proper tools. This process is a must if you plan to reuse old carbs on a new restoration.



**THROTTLE SLIDES:**

These are the round thingies that slide up and down and over time they wear in the carb body and let air past, particularly noticeable at idle.

One simple test to see if the slides are contributing to the rough running is to hold the throttle at idle and then take up the slack on the cable by slowly turning the throttle - if the idle speed drops, it indicates that the slides are a loose fit in the carb body and should be replaced. As a rule of thumb, slides can be replaced at least once; maybe twice in the life of a carb, they are expensive at around \$25US each, so most people don't think of changing them.

If new slides don't fix the running problem, new bodies can be purchased at a reduced cost rather than buying new carbs. However one should consider that other parts like needles, needle jets can be worn as well and that new carbs maybe the way to go.

Re-sleeving is a viable solution, especially for one off carbs that cannot be easily replaced (Monobloc 689's for instance). Remember, that just about ALL AMAL carbs are available newly manufactured nowadays, even the TT's and 276's.

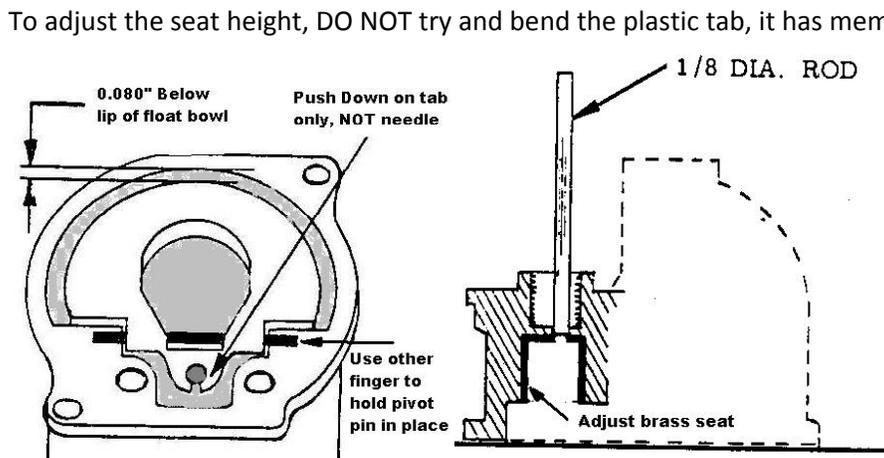
**CHECKING & SETTING FLOAT HEIGHT:**

Improper float level can be determined by several factors

- fuel leaking out from the gasket joint (too high)
- fuel spilling out the intake holes at the rear into the air cleaner (too high)
- rich running, erratic idle (too high)
- slow to tickle (too low)
- lean running (too low)

There is a very simple method to checking the float height, without special tools or risking the chance of spilling fuel and a fire. This is taken straight from the Triumph Factory Service bulletins. This is how they were set up in the factory and is good enough for general running, including Norton Commandos and BSA's. This setting is good for singles, twins and triples. For down-draught carbs that slope down (i.e. on Atlas), the setting will need to be adjusted to suit using other methods.

The setting is **080" (80thou) or approx. 2mm BELOW the back edge of the float bowl.** This is the measurement of the TOP edge of the plastic float to BELOW the top edge of the float bowl. Make a scribe mark on the metal float bowl and eye sight the plastic float when the float needle is seated by gently pushing down on the two pronged tab, using a spare finger to hold the brass pivot pin in place..



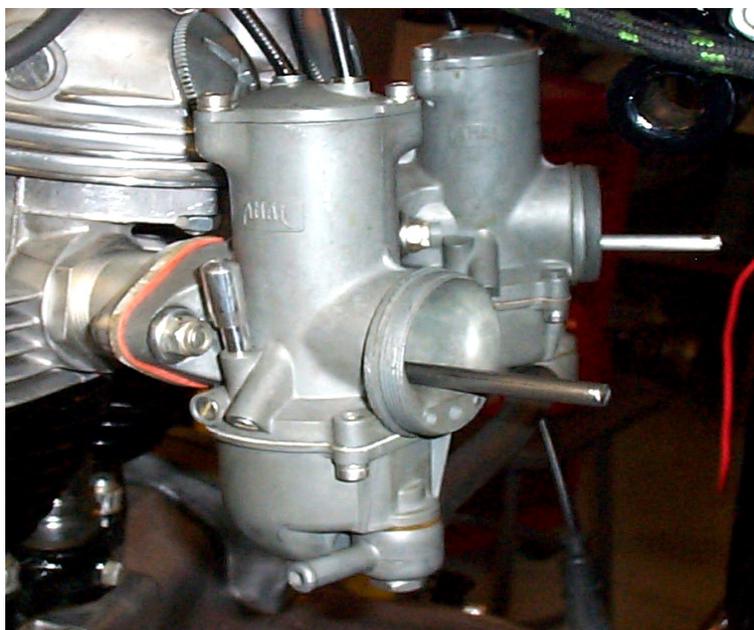
bowl on hot water then use a 1/8" drift to move the brass seat in the float bowl itself. It is a tight fit, but can be moved with gentle tapping. Adjust from underside to lower float height, from top side to raise the float level. The Factory suggested heating with a propane torch, but as a measure of safety, I do not recommend this due to gasoline fumes and possibility of explosion.

### SYNCHRONIZING TWIN CARBS FOR IDLE AND SLOW SPEED RUNNING:

This is one area where there is a lot of misinformation on the process, even in workshop manuals. This will outline the simple methodical professional shop steps to synchronize your twin (or triple) carbs, once all the prep and rebuild work above is completed.

1. Adjust pilot screw to 1 ½ turns out (turn all the way IN till stops then count **1 ½ turns OUT**). This assumes that the pilot gas jet has been cleaned as above)
2. Open the throttle to full open and check that each throttle slide is up the maximum amount (i.e. disappears up into the carb body). Adjust the cable adjusters until an equal amount of throttle slide is seen, just peaking through on each carb. It is surprising the number of bikes I have seen with a major difference in the full open position.
3. Once cables are adjusted for full open, fully turn out the throttle adjusting screws (to past were it touches the throttle slide)
4. Insert two 3/16" dia drill bits (or 4" long peice of round bar) into each carb (diameter size should be adjusted to suit the throttle cut away), seating the drill bit under the throttle slide, so that they stick out the end of the carb evenly. Screw in each throttle stop screw until the drill bit "dips" a little, find the happy spot, where the screw just touches the slide. Repeat for the other carb. With a felt pen mark the screw head flat-slot position for reference on each carb body..
5. With the drill bits still in place, perform the fine cable adjustment - by gently opening the throttle and seeing that each drill bit moves at precisely the same moment. Adjust the cable adjusters on the carb or on each cable so that movement is even (should be only ¼ - ½ turn each).
6. Start the bike, it will likely idle too high, wait for engine to warm up, then adjust each throttle stop screw down (out) by EXACTLY the same amount, i.e a ¼ turn at a time on each, using the felt pen reference mark to make sure the adjustments are same. The idle should be even and by blipping the throttle the pick-up should also be even.

7. The pilot jet air screw may be adjusted at this time, but by very little, no more than ½ to ¾ turn in either direction. The effective range of adjustment for the pilot jet is 1 turn to 2 1/2 turns. This is where a bit of skill & experience comes into play. By turning one screw a little at a time with the engine running (on both cylinders) you can gauge any difference in running and find the sweet spot. When you hear the engine revs race, you want to turn it back a 1/8 to ¼ turn - the sweet spot is not at the extreme. The idle may need to be dropped equally again. If you have to screw it in all the way or out all the way, then the pilot circuit is still clogged, maybe not completely, but enough to affect the running. Go back and clean the jet.



**MIKUNI CARBS FOR BRITISH MOTORCYCLES:**

Mikuni VM series carbs are a popular modern replacement for the old AMALS. The advantages of VM Mikuni's over Amal's are:

- fully tunable in fine increments
- made of lighter aluminum, not zinc pot metal
- have a lever cold start circuit (choke)
- pilot fuel jets are replaceable
- have long lasting anodized slides
- throttle slides come in smaller increments for fine tuning (i.e. .019" compared to 0.03125")
- air jets are replaceable
- float height is fully adjustable
- assortment of needles with varying tapers available for 4 stroke engines
- assortment of replaceable needle jets
- larger sizes up to 38mm

Setting up the VM Mikuni's for a British twin is not difficult. The following list is a starting point, make adjustments as required by road testing.

On a 650/750 Twin (Triumph &/or Norton) for a PAIR of Mikuni VM's 32mm dia, use pilot 20-25, throttle slide 2.5, needle jet type 159, needle jet size P-2, P-4, needle 6DH2, 3, or 4, Main 220-230, air jet 1.0.

On a 850 Norton for a SINGLE Mikuni VM 34mm dia, use pilot 30-35, throttle slide 3, needle jet type 159, needle jet size P-4, P-6, needle 6DH3 or 4, Main 260, air jet 1.0.

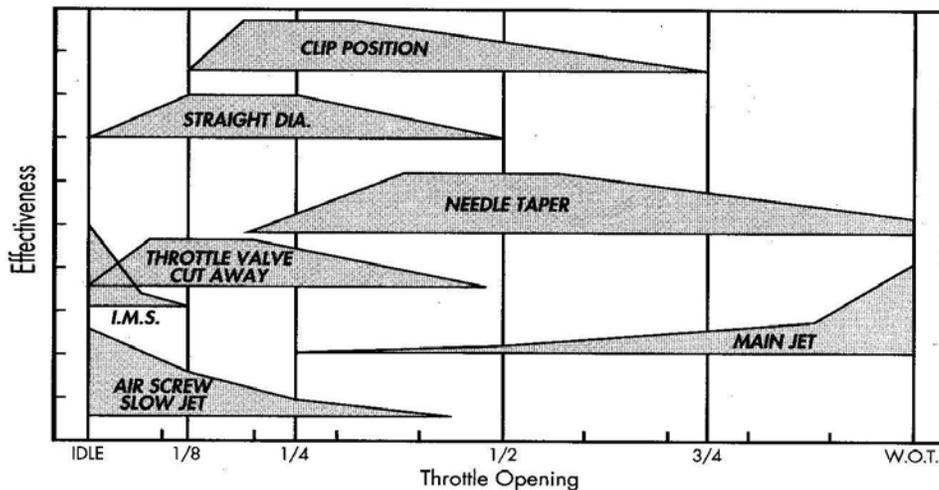
*These settings were provided by the Victory Library "Mikuni Tuning for British Twins" author Jeffery Diamond [www.victorylibrary.com](http://www.victorylibrary.com)*

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**TUNING & JETTING CHART:**

The following chart shows how the carb components interact and the effective range of adjustments.

**Jetting Chart**



### **TUNING BY ROAD TEST**

I have spent most of the summer test tuning ATV's in the sand dunes of Oregon including fitting the popular Dyno-jet Kits, modifying exhaust, airboxes etc.. These kits offer new main jets and a needle to replace the stock items. The jets are claimed to have venturi action and the needle have a custom taper, fine tuned by Dyno-testing. The claims are more mid range and top end. Combining a jet kit with a free flow air filter (K&N) can add an easy 5hp to most 4 stroke singles. The process of road testing and fine tuning is simple. Firstly get it running. Do the wide open throttle (WOT) test in say 3rd-4th gear and plug chop - change main jets to get desired plug colour (light tan, not chocolate brown) and performance.

The pilot circuit (IMS, idle mixture screw and the air screw) is next - make adjustments so that there is no hesitation when the throttle is blipped or blubbering when at low speed. Adjustments can also be made to needle clip position to fine tune mid range. Changing throttle slide should not be necessary.

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