

Carburetor Tuning for Kawasaki Triples

This manual can be downloaded in PDF format (4.8M) [here](#).

Proper carburetor tuning is essential to having a good, clean running Triple. Improper tuning can lead to engine damage. It is important to not only know what to do but why you need to do it. For that reason, it is strongly suggested that you read the entirety of this manual.

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Mikuni Carburetor Circuits

Mikuni VM carburetors are built with four distinct circuits for delivery of fuel/air mixture to the combustion chamber in proper ratios to provide smooth engine operation from start-up through wide-open-throttle position. All of these circuits are metered by throttle position. It is for this reason that throttle position is referenced throughout this manual rather than RPM. A lean condition at an throttle position can result in detonation or pinging which can cause severe engine damage.

Enrichment

The enrichment circuit, commonly referred to as "choke", provides extra fuel to the cylinders to aid in cold starting. Brass, spring loaded, plungers are connected via cables to a lever at the left hand twistgrip. The enrichment circuit will only work properly with a closed throttle.

Low Speed/Idle

The low speed circuit, pilot circuit, provides fuel/air mixture, at diminishing effectiveness, from zero to 3/8 throttle. The component in this circuit are the pilot jet, airscrew, and slide. The idle screws are used to set idle RPM.

Mid-Range

The mid-range circuit primarily affects mixtures at 1/4 to 3/4 throttle positions. It includes the needle jet, jet needle, and, to a lesser degree, the slide.

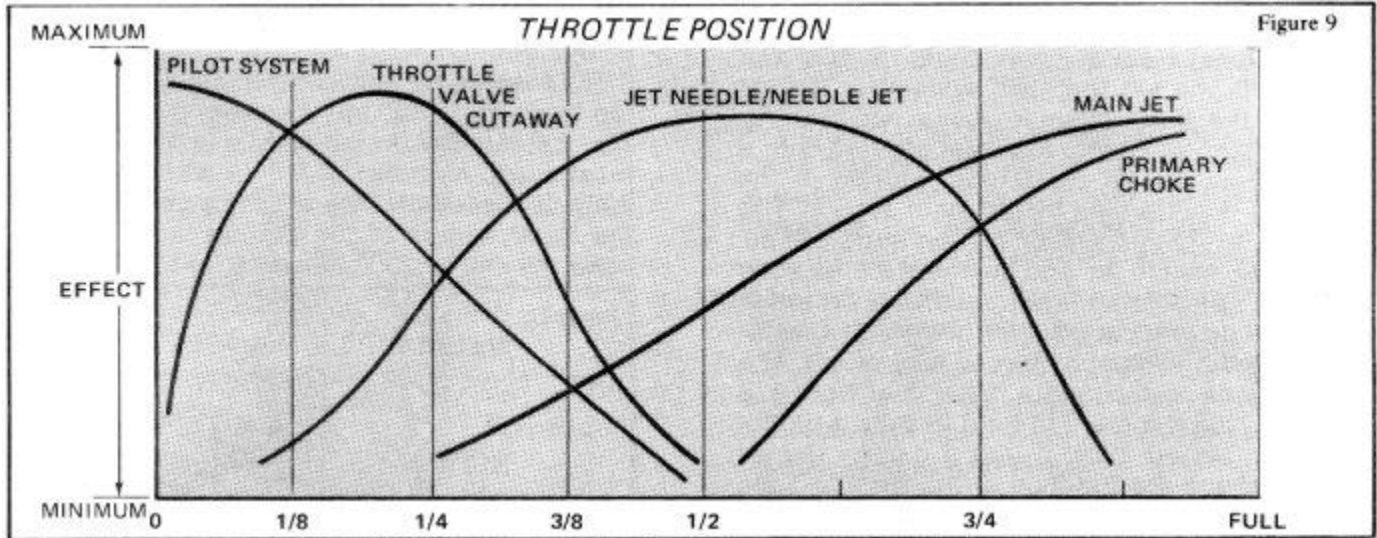
Hi-Speed

The hi-speed circuit mixture is effective at 3/4 to WOT. The mixture is, almost all, controlled by the main jet size. The primary choke height atop the needle jet is also a factor.

Effects of Jetting Variables

Chart

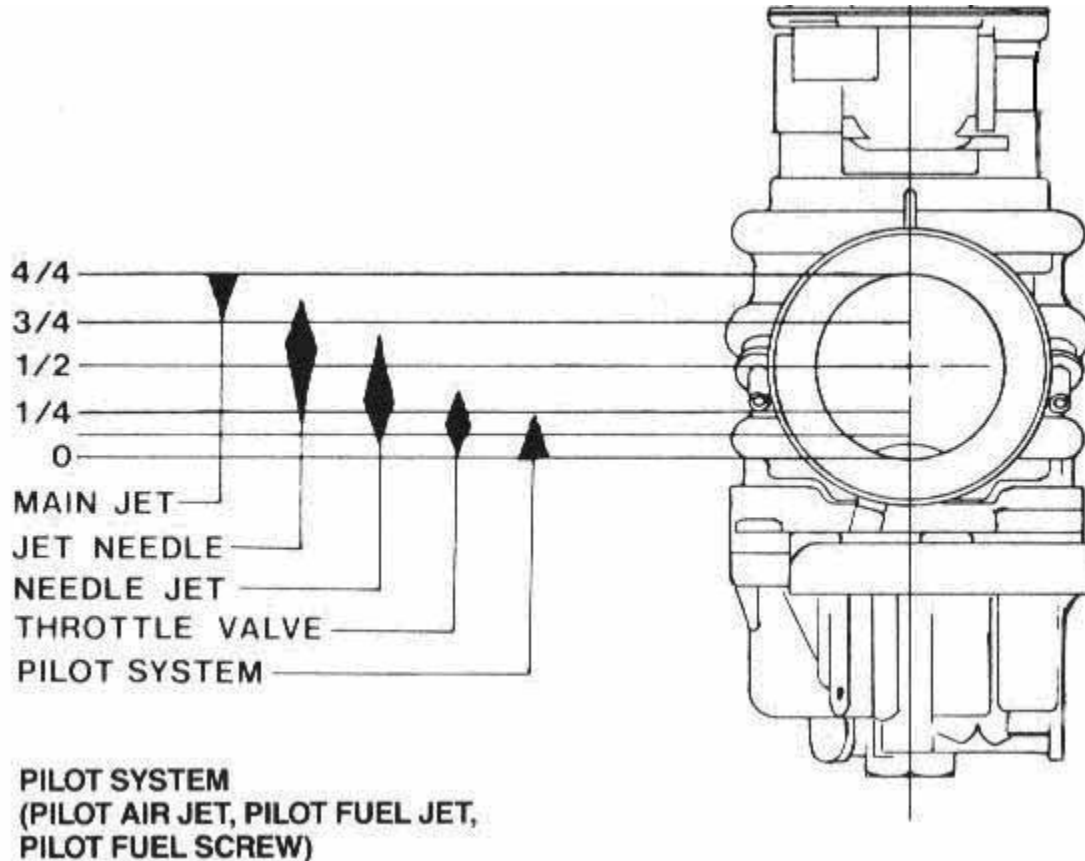
Throttle Position Circuit Adjustments



	Throttle Pos	Larger# =	Note:
Air Screw	0-1/4		CW rotation = richer Adjust for highest idle RPM.
Pilot Jet	0-1/4	Richer	If the best idle mixture screw setting is less than 1 turn out, the pilot jet is probably too lean. If the best idle adjusting screw setting is more than 2 turns out, the pilot jet is probably too rich.
Slide Cutaway	0-3/8	Leaner	Height of the cutaway notch. Each unit equals .0625", i.e., 2.0 = .125" cutaway.
Needle Jet	1/8-5/8	Richer	Use the largest number (richest) that will work successfully.
Needle	1/4-3/4	Richer	The numbers are stamped at the top of the needle. Reducing diameter richens mixture. Taper controls transition rate.
Clip Position	1/8-3/4	Richer	Clip position is counted from top down. If the motor runs best with the clip in the top notch, the needle taper is too sharp or the needle jet is too large. If the motor runs best with the clip in the bottom notch, the needle taper is too shallow or the needle jet is too small.
Primary Choke	3/4-4/4	Richer	Height is measured in mm.
Main Jet	3/4-4/4	Richer	Plug chop after full throttle operation is required to determine the best size for main jet. Too small a main can damage the motor. The motor should run up to 3/4 throttle with the main jet removed.

FUEL METERING CIRCUITS:

- **Closed Throttle: Choke/Starter System** Fuel mixture enrichment system for cold starting. Pull lever OUT for cold starting, push lever IN as engine warms up.
- **Closed Throttle to $\frac{1}{8}$ Throttle:** Idle circuit consisting of the *Pilot Jet*, *Pilot Fuel Screw* and *Pilot Air Jet*. *Idle Adjustment Screw* raises or lowers throttle slide height to control engine idle speed. *Pilot Fuel Screw* meters fuel with standard setting $\frac{1}{8}$ to $\frac{1}{2}$ turn out maximum.
- **$\frac{1}{8}$ to $\frac{3}{4}$ Throttle:** Fuel metering components in this range are the *Needle Jet* and the *Jet Needle*. Raising the circlip at the top of the needle lowers the needle into the needle jet, making the mixture leaner. Lowering the clip and raising the needle makes the mixture richer.
- **$\frac{3}{4}$ to Full Open Throttle:** *Main Jet*. The larger the jet number, the richer the jet.



Jetting Components

Note: Some components are offered for other type Mikuni carburetors that look similar and will fit but they will NOT function properly.

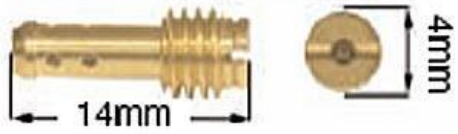
Example below:



The pilot jet on the left is NOT correct for any Triple. Be sure the jets used are exact type and style as shown below and have the Mikuni logo:



Pilot Jet - VM22/210 Series



Main Jet - Large Round - N100-604



Float Valve - VM26/26 - 2.5



Needle Jet - Various Series

(Note: Kaw OEM or Mi

om aftermarket sources)



Needles - Various

(Note: Kaw OEM needles are not commonly available from aftermarket sources)

[Needle Information](#)



Air Screw - VM20/214



Slide (Throttle Valve) - Various

(Note: Although replacement slides are available, guide slots may not be accurate for OEM carb bodies and they may need to be adapted for guide rods.)



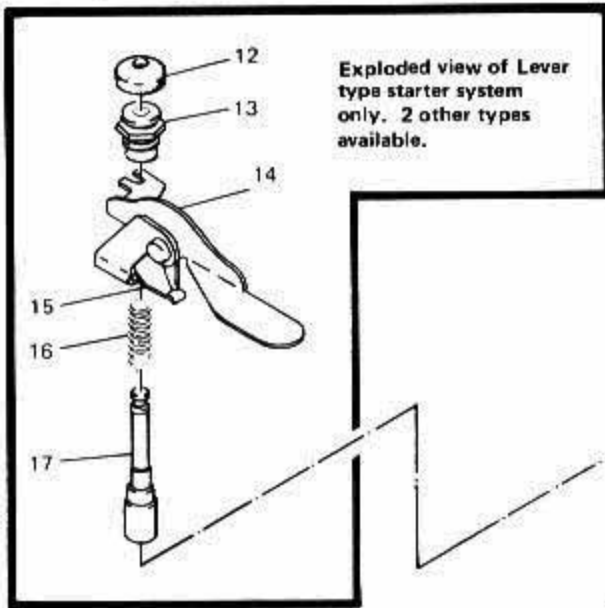
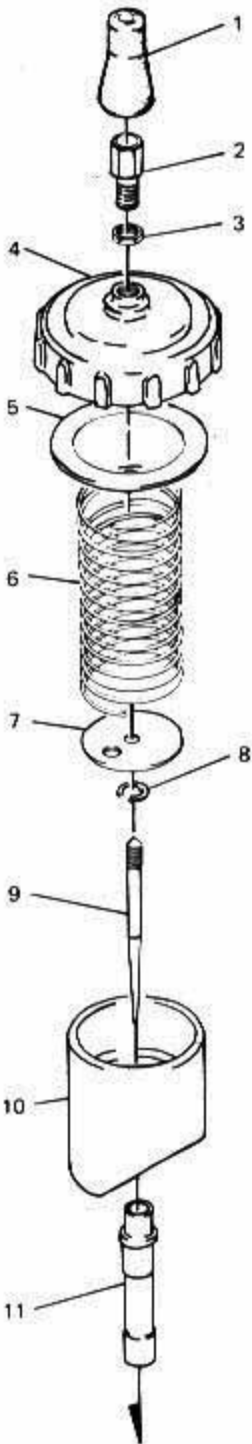
Typical Carb Kit Components

Be aware that jets and needles in most carb kits are not to Mikuni specs and can cause tuning problems. ([photo example](#))



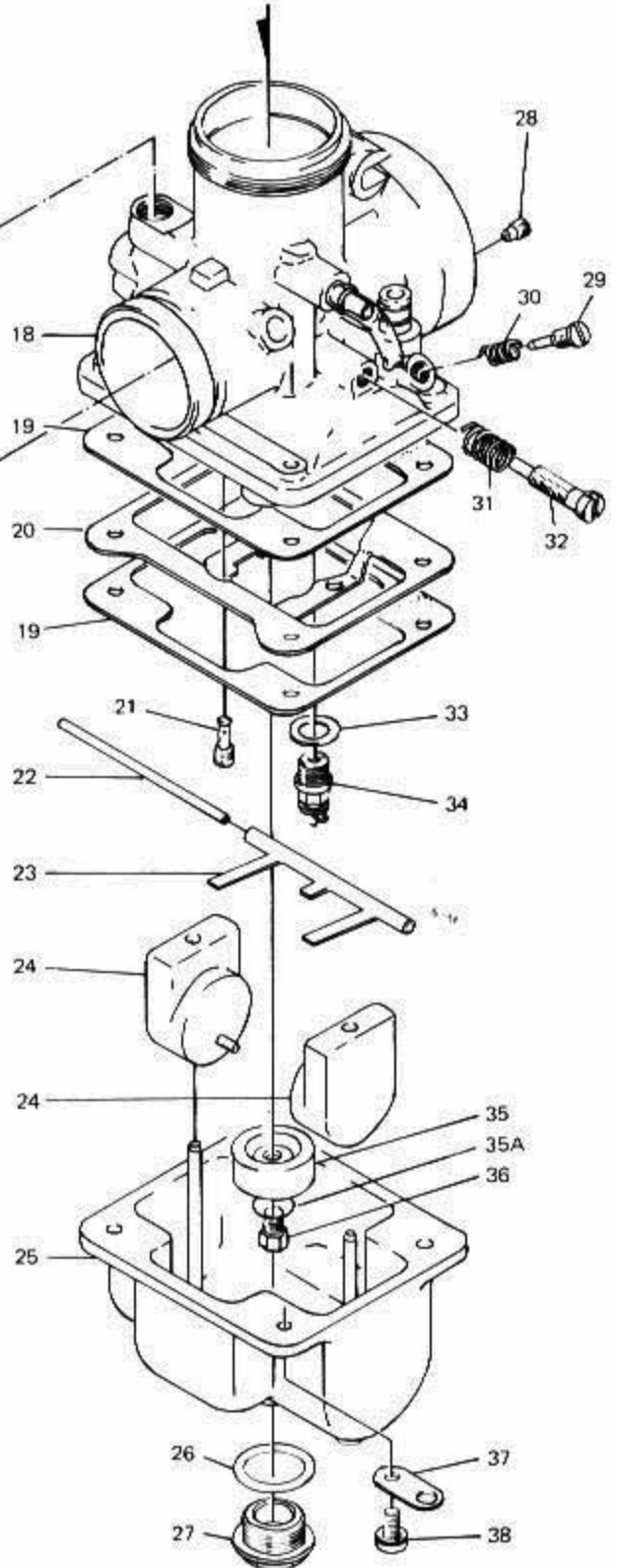
Exploded View

Note: This is a generic VM carb that may not be identical to Kawasaki OEM



Exploded view of Lever type starter system only. 2 other types available.

Exploded view of a SPIGOT MOUNT TYPE MIKUNI CARBURETOR



* ITEM NUMBER and DESCRIPTION

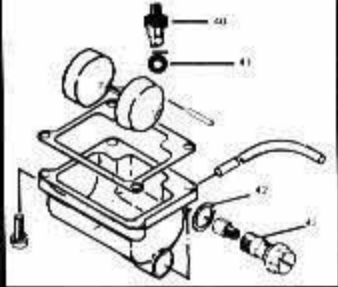
1. RUBBER CAP, throttle cable
2. CABLE ADJUSTER
3. LOCKNUT, cable adjuster
4. TOP, mixing chamber
5. GASKET, mixing chamber top
6. SPRING, throttle valve
7. PLATE, spring seat
8. CLIP, needle positioning
9. NEEDLE
10. THROTTLE VALVE (SLIDE)
11. NEEDLE JET
12. RUBBER CAP, starter plunger
13. FITTING, starter plunger
14. LEVER, starter
15. SPRING PLATE, starter lever
16. SPRING, starter plunger
17. PLUNGER, starter
18. BODY, mixing chamber
19. GASKET, float bowl
20. BAFFLE PLATE, float bowl
21. PILOT JET
22. PIN, float arm hinge
23. ARM, float
24. FLOAT
25. BOWL, float
26. WASHER, main jet plug
27. PLUG, main jet
28. AIR JET
29. AIR ADJUSTING SCREW
30. SPRING, air adjusting screw
31. SPRING, idle adjusting screw
32. IDLE ADJUSTING SCREW
33. WASHER, needle valve
34. NEEDLE VALVE & SEAT ASSY.
35. RING, main jet
- 35A. WASHER
36. MAIN JET
37. PLATE, vent tube anchor
38. SCREW, float bowl
39. GUIDE SCREW
40. NEEDLE JET SETTER
41. "O" RING, needle jet setter
42. WASHER, banjo bolt
43. BANJO BOLT
44. RUBBER FLANGE ADAPTER

GUIDE SCREW



DIAGRAM

Exploded view of the FLANGE MOUNT FLOAT BOWL



Carburetor Cleaning

Videos of disassembly are provided by John Aylor in the links below:

[Disassembly video Part 1](#)

[Disassembly video Part 2](#)

I - Disassembly

A - Remove float bowl

By slowly & carefully removing float bowl you may be able to save the gasket for reuse. Use a knife to peel the gasket as the bowl is being removed. Carefully examine the overflow tube for fracture or loose fit as this can be a source for leaks.

B - Remove the float

The float is fragile. Bulbs can easily be dented. If they have recently been submerged in fuel, shake them and listen for fuel inside. They are prone to leak with minute pinholes from corrosion/oxidation. Pinholes can be repaired with solder if done properly.

C - Remove float valve

Old float valve assemblies should normally be replaced as they are prone to leak with corrosion/wear.

D - Remove pilot jet

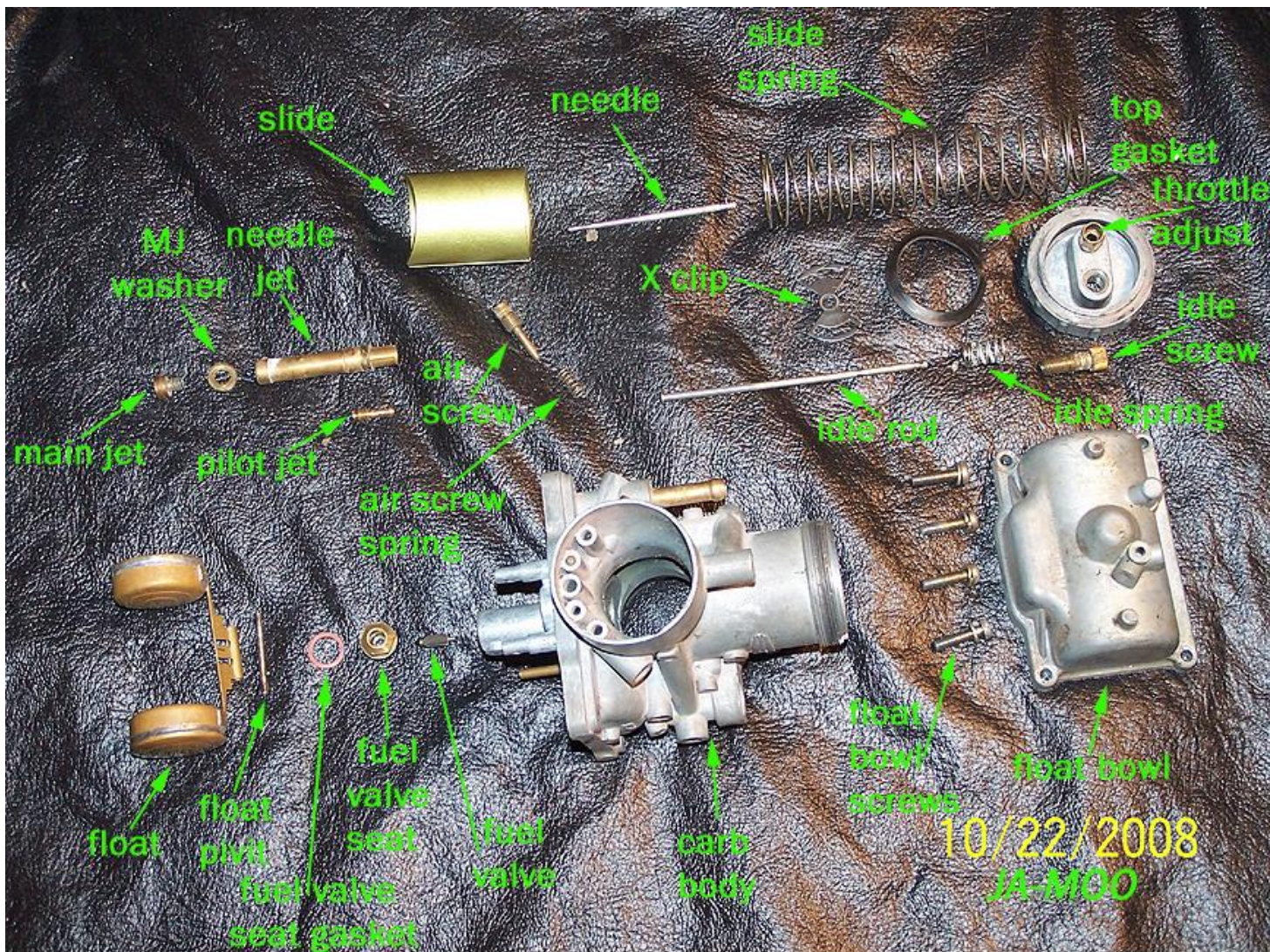
Always use a screwdriver that has a good square tip as a rounded tip will easily deform the pilot slot and make removal a serious problem. Note the pilot size stamped.

E - Remove the main jet

Note the size stamped. Do not lose the metal washer.

F - Remove the needle jet

The needle jet can be removed by reinserting the main jet for a couple threads and then tap lightly. This will unseat the needle jet and allow easy removal. Do NOT pull on the jet at the primary choke shield as it is easily distorted.



H1 500 carb exploded view

these are all the parts that have to be removed to properly clean the carbs.

II - Cleaning

A - It is best to soak all parts overnight in a good carb cleaner. Berryman's or Gunk is available at Autozone, etc. and comes with a dip basket inside a gallon container. It will not harm phenolic inserts in the carb body. Observe safety precautions and use in well ventilated area. It stinks!

- If carb cap is being cleaned, remove the gasket to prevent damage.
- If the float is weighted so it will be submerged it can later be checked for leaks by shaking.
- After soak, blow out ALL orifices with compressed air.

B - An alternative to soaking is to use brake cleaner to clean/blow out all orifices.

Note: There are several techniques used to restore the original finish to carb bodies. These should not be confused with cleaning agents designed to dissolve varnish/gum of fuel residue.

III - Inspection

A - All orifices in carb body (including those at air intake) should be clear.

B - Pilot jet should have clear holes at each end and through the body. A fine wire (guitar string) can be used to clear holes. It is very important to not distort or enlarge holes during cleaning.

C - The needle jet has an orifice at the side that is prone to clogging.

D - Insure that no fluid is present inside floats.

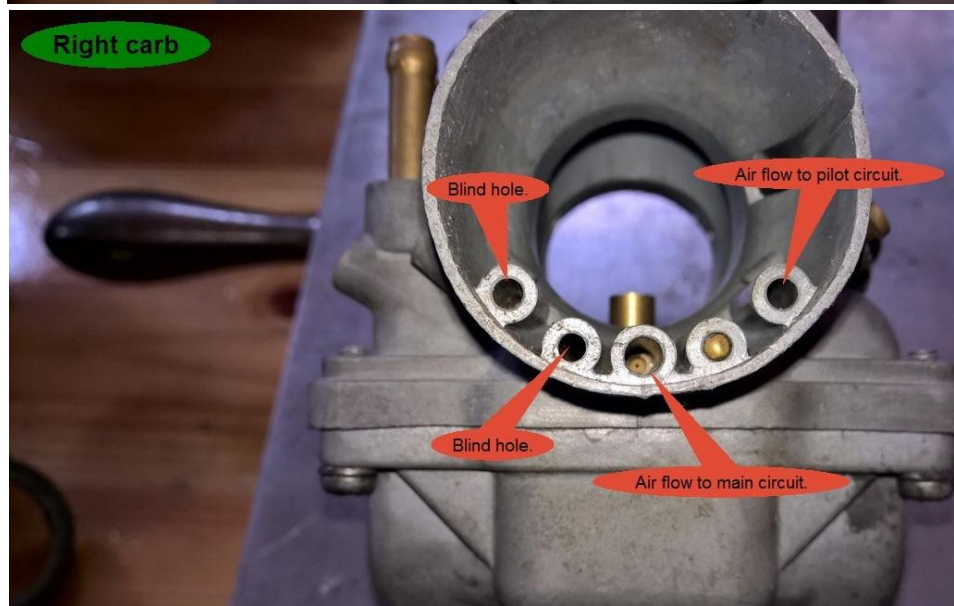
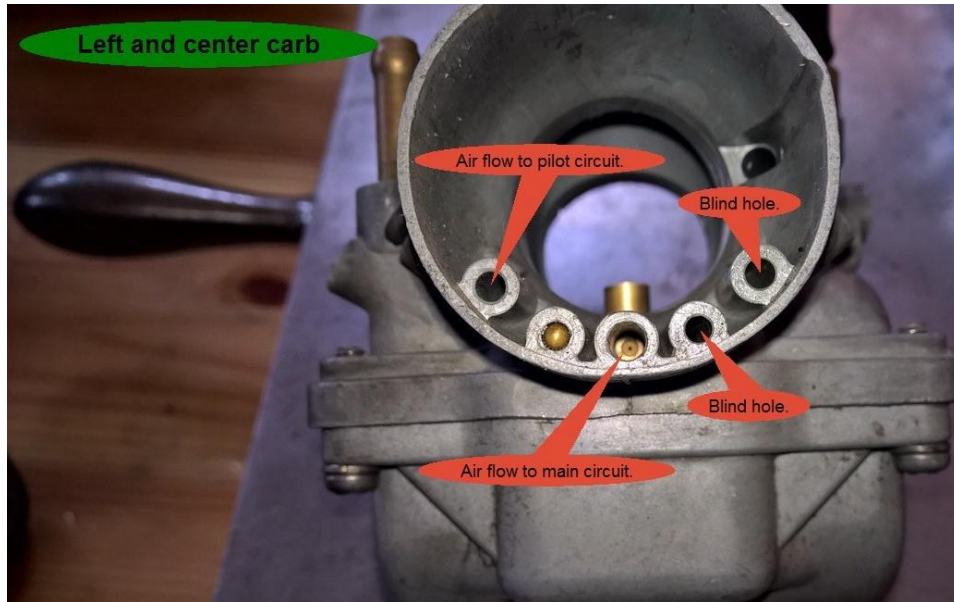
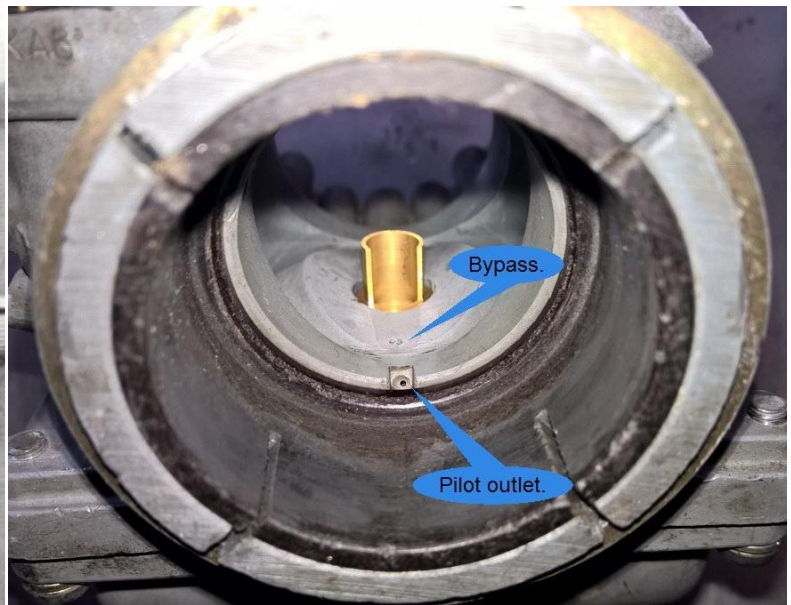
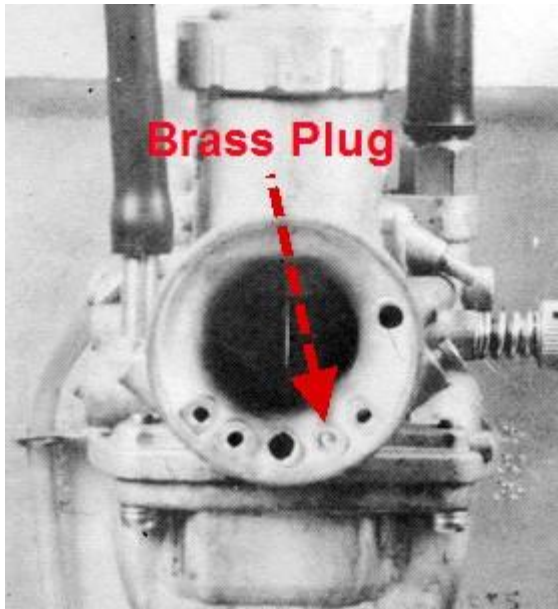
E - Insure that a brass plug resides in one of the ports at the intake bell of the carb body.

F - Inspect overflow tube in float bowl for hairline splits and tight fit.

G - Replace float valve

Worn float needle vs. new kit needle



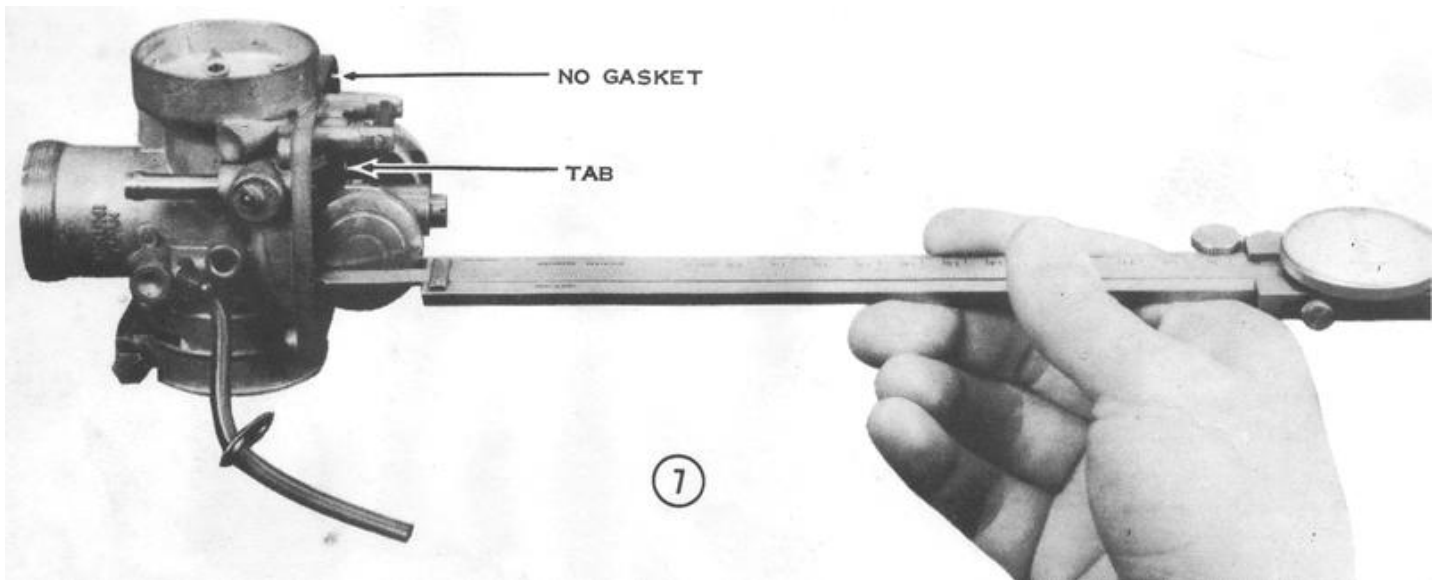


IV - Reassembly

- A - Reassemble in reverse order of disassembly.
- B - Be sure metal washer is under main jet and fiber washer is under float valve.
- C - Do not over tighten pilot jet.
- D - Insure that slides move freely within carb body.
- E - Insure that gasket is present and properly seated in cap.
- F - Insure that float needle moves freely.
- G - Reset float height. Simple gauge: <http://kawtriple.com/mraxl/tips/floatgage.htm>

Setting Float Height

Set float level per spec: <http://kawtriple.com/mraxl/carbspec.html> This is usually done by inverting the carb and measuring the "float height" in the "at rest" position in reference to the gasket surface with gasket removed. Precise setting is made when the float tang just touches the needle plunger. <http://kawtriple.com/mraxl/tips/floatgage.htm> "Fuel Level" can be used when using a special float bowl... don't confuse the two terms. If any carb is leaking from the overflow after assembly, this problem must be addressed before continuing with adjustments.



Mounting Carburetors

Mount carbs and assure there are no air leaks from missing cap gaskets, loose fit, etc. Set all needle clips to the same position. ref: <http://kawtriple.com/mraxl/carbspec.html> Be aware that some carbs (S series) will allow slides to be fitted backwards and the clamp space may need to be cut wider to allow tight clamping.

Some models have a phenolic heat insulator sandwiched between two gaskets at the base of the intake manifold to prevent excessive heat transfer from the cylinders to the carburetors.

Gaskets should be present on all carb caps. A drop of super-glue will insure they stay in proper position.

Carb Sync

It is important to understand, no matter what method is used, that carb sync is the act of attempting to get the slides positioned so that they all pass the same airflow at ANY given throttle position. That cannot be done if any slide is resting on an idle stop screw or bottomed out. Idle screw adjustment will NOT sync carbs. Sync can only be achieved through cable adjustment.

Once cables are adjusted for proper sync, the settings should not change except for cable stretch over a longer period.

Be sure to check oil pump adjustment after carb sync is completed.

Sync Method 1:

- 1) First back off the idle screws until they don't touch the slides.
- 2) Carefully screw each one in until the screw just barely touches the slide.
- 3) Turn in each screw the exact same amount, until you get your target idle number. If you don't do this first, the little variance you get when setting the idle screws will affect slide height and the sync will not be "spot on".
- 4) Make sure you have slack in the cables.
- 5) Put your middle finger of your left hand on the center slide, and your thumb (left hand) on the right slide. Turn the throttle very slowly and feel if the slides lift at the same time. If not, adjust one or the other cable so they do.
- 6) Snap the throttle a couple of times to make sure the slides are setting in well, and tighten the cable lock nut and recheck.
- 7) Move your thumb to the center slide and your middle finger to the left carb. Adjust the LEFT carb till it lifts exactly with the center.
- 8) Snap the throttle again and make sure the lock nut is tight (tightening the lock nut will change the slide height).
- 9) Open throttle until slide is even with top of carb throat. Feel that all slides are at the same position.
- 10) Take out any extra slack in the cable, AND check the oil pump for correct setting.

The finger method can tell movement in thousands of an inch (just say very accurate). Set the sync from idle, because that is where it is most important.

Sync Method 2:

- 1) Find a smooth round pin about 3/8" or 10mm dia. (I use the shank of drill bit)
- 2) Remove air box/filters.
- 3) Back out slide stop (idle adj) screws.
- 4) Set throttle lock or set throttle adjuster at the grip so the pin will just lightly drag as it is inserted in the carb throat under the slide cutaway of one carb.
- 5) Set the other carbs so they offer the same resistance when the pin is inserted by setting the cable adjuster at top of each carb.
- 6) Release throttle lock or reset throttle adjuster at grip insuring that slides on all carbs will fully bottom out and throttle grip has 2-3mm play.
- 7) Set air & idle adj screws per topics following for best idle.

As a final check to insure all idle adj screws are set the same, insert a nail, spoon, or long toothpick under each slide without altering slide position. As the grip is turned the ends of all three should tip at the same time. Readjust idle screws as required.

[Carb sync video by Darth](#)

Meters

A manometer or Uni-Syn can also be used and may obtain better results IF used properly.

When using a meter for carb sync the sequence of procedures must be altered to achieve desired results.

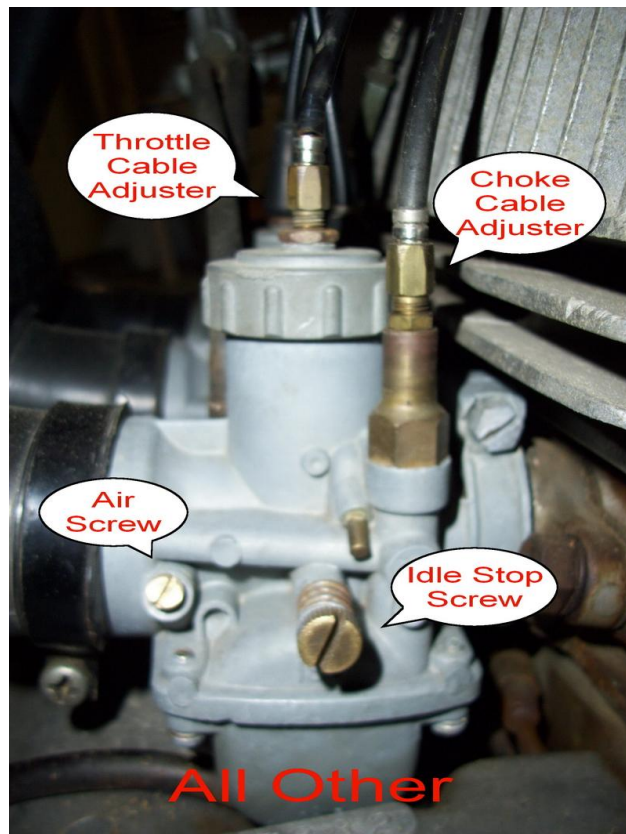
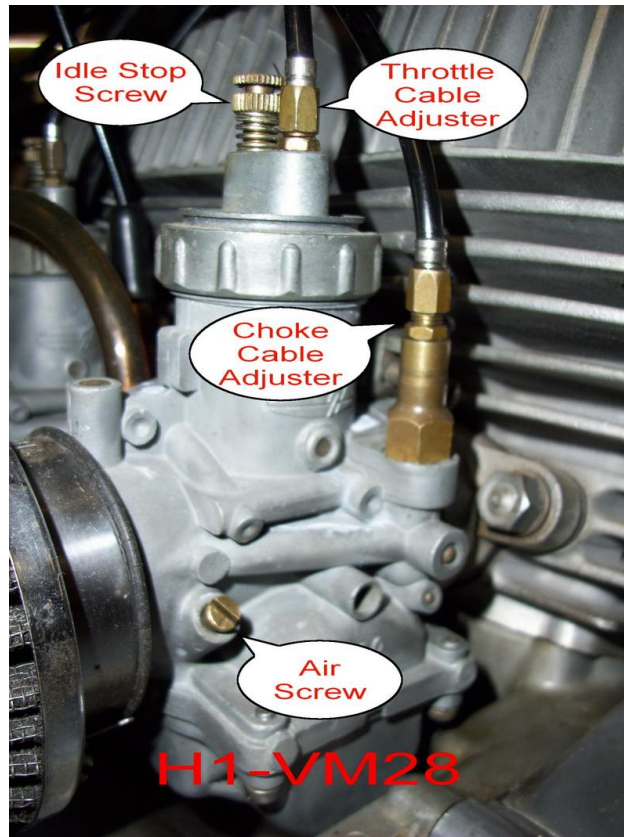
- Air screw adjustment for highest reading with meter must be done first.
- Slide sync adjustment may then be done with slides positioned off idle screws.
- Idle screw adjustment may then be done.

Tuning

Tuning Prerequisites

- **Timing** can affect performance. Know where your timing is set before making carb adjustments. A couple of degrees can make a big difference in acceleration characteristics. Properly setting timing may cure ills without getting into carbs.
- **Gearing** can also be a significant factor. Too tall gearing can cause bogging on takeoff when tuning is spot on.
- Exhaust pipes/baffles **MUST** be clean. **Clogged pipes** can kill top end.
- **Excess carbon** on pistons can cloud tuning issues.
- **Air leaks** and/or bad crank seals can affect tuning. A leakdown test is strongly recommended. <http://kawtriple.com/mraxl/cranksealtest/cranksealtest.htm>
- **Float Height** must be properly set.
- **Enrichment (choke) cables** must be set with approx 1/8" free play at carb.
- **Low compression** can't be compensated for with tuning. Compression specs vary between models but anything less than 140 psi requires attention.
- Change in **fuel grades** or blends can make tuning requirements change. It is best to use premium fuel.
- If **premix** is used, it can alter tuning characteristics, as can ratio changes.
- Before making any adjustments be sure the **carbs and jets are clean**. That means ALL jets... pilot, needle jet, and main, are removed and inspected/cleaned. Carb body passageways should be blown out with brake cleaner or soaked in carb cleaner for several hours and blown out with compressed air. There is a very small air passage in the bell of the carb that clogs very easily and is a major cause of jetting problems. Disassembly video Part 1 [Disassembly video Part 2](#)
- **Sparkplugs** should be NGK B9HS (or B8HS) or equivalent, properly gapped. Extended reach plugs are an absolute no, no, and resistor plugs are discouraged as being problematic, as are resistor caps and wires.
- Unless **ALL** these prerequisites are met, tuning can prove to be fruitless and frustrating.
- Mikuni VM carbs are designed with three main circuits..... idle, mid-range, full open. Tuning and diagnostics of these circuits is based on **throttle position, not RPM**. It is a good idea to mark the throttle with tape at various positions when diagnosing problem areas to make it easier to know which circuit requires attention.
- Adjustments should be made with air filters intact as you intent to run. Changes to pipes or air intake may require rejetting. Be aware that pod filters with metal backing can reduce performance and made tuning more difficult.

Adjustment Screw Location



(Note: VM24 used on S1 & KH250 models are as shown in H1-VM28)

Enrichment (Choke)

Check the choke cable slack by tugging on the cable sheath at the choke lever. There must be 1/16" to 1/8" slack in the cable with the lever released. If there is no slack in the cable, the enrichment plunger may be held off its seat, causing rich fuel mixtures and increased exhaust emissions, especially at low throttle openings. If the cable slack is excessive, the cold-start system will not work properly, causing difficult starting with a cold engine.

To adjust the choke cables, loosen the adjuster locknut at the handlebar lever, and then shorten the adjuster till the cable sheath has at least 1/4" free play. Pull up the rubber boots from the carburetors and loosen the adjuster locknuts. Turn out the cable adjuster if cable slack is excessive; turn it in if there is no slack. Tighten the locknuts and replace the rubber boots. Now lengthen the adjuster at the handlebar lever until the cable sheath has 1/16" to 1/8" free play. Tighten the locknut.

Tuning Sequence

Because of the overlapping of carb circuits it is highly recommended to perform tuning in the sequence shown here... LoSpeed, MidRange, then HiSpeed.

Low Speed

Adjust air screws (one carb at a time) for highest idle RPM with a warm engine. It will require that idle screw is turned to increase RPM for the cylinder to be adjusted. Air screw adjustment should be made at >2000 rpm. Adjustment should be made in slow, small increments. If air screw is out more than 1 3/4 turns for highest RPM, a smaller pilot jet should be fitted. If air screw is out less than 1 1/4 turns, a larger pilot jet should be fitted. Return idle to normal and repeat for next cylinder. Idle RPM should be 1250-1400 RPM.

The airscrew is a fine-tuning adjustment designed to allow the carburetor to be slightly adjusted for variances in atmospheric conditions. The air screw works with the pilot jet, mainly affecting the engines initial starting, idling and initial power delivery. Proper adjustment of the airscrew can offer direct feed back on pilot jet sizing. When adjusting the air screw, tightening the screw is richer and loosening it is leaner.

If you get no RPM fluctuation when adjusting the air screw there is a good chance that there is something clogging the pilot system or the wrong size pilot jet is installed. In most cases, the pilot jet should be the same as original stock, ref: <http://kawtriple.com/mraxl/carbspec.html> Clean the system thoroughly with carb cleaner and blow out with compressed air.

A lean setting will cause your engine to surge at very low RPM's, bog or cut-out when the throttle is opened quickly and have trouble idling down.

A rich pilot setting will result in hard starting, plug fouling at low RPM's, sputtering as the throttle is cracked opened.

- Note: Kaw specs for air screw setting is just a starting point. Adjustment is required for best performance.

Each carb must be ADJUSTED for optimum idle. That is done via AIR SCREW adjustment.... seeking the point where idle rpm for that cyl is highest. That is the point where the fuel/air mixture is optimum at idle rpm. Starting from scratch, unless you're extremely lucky, there is no "balance" between cyls or carbs.... one cyl will be pulling the other two. When this condition exists ONLY the carb on the pulling cyl will respond to adjustment. Setting the idle stop to insure that the "pulling" cyl carb is in control of idle rpm will then allow adjustment of that carb to be seen in rpm changes. An alternative is to pull the plugs of the cyls not being adjusted so it would be apparent which cyl is "pulling". If, using this method, an air screw has no effect on idle speed, something is wrong. On a new stock bike setting air screws X number of turns is "close". Changes in altitude, humidity, pipes, or filters and all bets are off.

- Note: Once each carb is adjusted they then need to be SYNCed to deliver power equally at the same time. This is done in two steps... slide position and idle stop screw setting.

SLIDE POSITION must be adjusted so at any given throttle position the slide opening is the same on all carbs. It is accomplished with the cable adjusters on the carbs and should never change once set. It is a static adjustment.

The other SYNC adjustment is BALANCING the carbs at idle so each cyl has equal "pull". That is done by setting the IDLE STOP screws so that any clockwise rotation of any stop screw increases rpm.

Use of a mercury indicator is another way to setup carbs, but the same principles are applicable.

- The aforementioned settings will primarily affect idle and performance thru 1/4 throttle position.

Idle

Idle screw balance should be set so that any clockwise movement of the idle screw from any carb increases RPM.

- Back out all except one idle screw.
- Set desired idle RPM with this screw.
- Screw in each of the remaining idle screws until rpm just starts to increase.

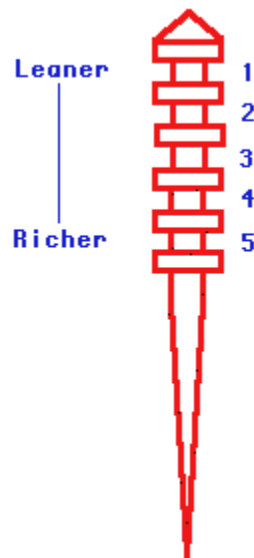
Mid-Range

Adjust the needle clip position to affect performance in the 1/4 to 3/4 throttle position. Raising the clip will lean out the mixture. Lowering the clip will richen the mixture.

When the clip setting is lean the bike will be very zingy sounding . Lean in the midrange will rob power and cause the machine to run hot and seize easily or even hole a piston.

When the clip setting is rich the bike will have a lazy feeling in the midrange. Exhaust note will be a little flat sounding. In more extreme cases of richness the engine will sputter or kind of crap out in the midrange.

Clip position is called out from the top groove down. Clip in the topmost groove is in position #1, the leanest setting. You raise the needle by lowering the clip.



The safest way to set the clip position is to richen up the clip position setting until the machine loses a little power (feels lazy/unresponsive) then lean it back one position. Ideally you like to run the needle setting in either the 3rd or 4th clip position, if possible. The needle clip jetting is especially critical to your bike's reliability because on average more time is spent in the midrange than any other part of the throttle. Most triples pull very hard in the midrange, putting quite a load on the engine. This makes a lean condition very detrimental to your reliability.

Difference in clip position will be most noticeable at 1/2 throttle.

Hi-Speed

Main jet size affects 3/4 to full throttle performance. Plug chops can help determine correct jetting.

The main jet does not effect the jetting for starting and idling. It plays no part on low RPM or mid RPM jetting either. The main jet is very important to your bike's overall tuning, but should never be over emphasized at the expense of needle tuning or other facets of your carburetion tuning.

When the main jet is lean the engine will experience detonation or "pinging". Exhaust note will be of a higher, tinier type note. Engine will over heat easy and can be down on horsepower. A moderately lean main jet can cause engine seizures. A severely lean main jet can cause the engine to burn a piston (hole in top).

When the main jet is rich the engine will be a bit flat or lazy at ¾ to full throttle, giving off a flat, dead sounding exhaust note. When the main jet is severely rich the engine will sputter in the high RPM's and have a lot of trouble making power up top.

The safest way to get the main jet setting as near correct as possible is to richen the main jet setting up until the engine begins to lose power and sputters at WOT. Then reduce jet size in increments of two sizes until sputtering disappears and WOT is clean and crisp. Then go back up one size.

Alternatively, [Ivan's Performance Products](#) provide custom jet kits that perform well and eliminate surging. These kits are also a good alternative to the unobtainable needles and needle jets for stock carbs.

Surging

Surging is a common problem with H2's. Surging is a symptom of a lean condition. Lots of folks try to cure it with oversized pilot jets but the best fix is to use 2.0 cutaway slides and careful slide sync.

Slide cutaway- changing slides one size can lean/richen mixtures at 1/8 - 1/2 throttle settings. The smaller the number, the richer the mixture, i.e. 2.0 is richer than 2.5. Slides can be built up to reduce cutaway with JB Weld to richen mixture or by removing 0.020" from the bottom of the slide.

Plug Chops

Plug Chops are a good way to test the jetting accuracy of your carb setup. Simply pulling a plug and looking at the color after running through a variety of throttle positions can be misleading and possibly lead to disaster if jetting is too lean.

The procedure outlined below is intended to test main jet sizing at WOT. It is strongly suggested to begin with overly rich jetting and work your way down in two size increments to avoid seizure. The same procedure can be used at marked mid throttle position to test needle jet position. The distance covered should be at least 1/2 mi, the farther, the better. It may be best to perform the test in a lower gear to avoid excessive speed. Throttle position is the critical item. Variation of throttle position should be avoided and can taint results.

It is possible to examine plugs by using a good light and magnifying glass rather than cutting the threads away. A single cylinder can be used to hone in on the right jetting to save the expense of new plug consumption, assuming all carbs are jetted and setup the same.

Be aware that changes in fuel type/grade and timing can change results.

- 1. GET NEW SPARK PLUG(S), BUT DON'T PUT THEM IN YET.**
- 2. WARM UP MOTOR TO OPERATING TEMP ON OLD PLUGS.**
- 3. INSTALL NEW PLUGS.**
- 4. ACCELERATE THROUGH ALL GEARS TO TOP GEAR WITH THROTTLE PINNED.**
- 5. WHEN YOU HIT THE TOP OF THE TOP GEAR, HIT THE KILL SWITCH AND PULL IN THE CLUTCH.**
- 6. REMOVE THE SPARK PLUG(S) AND RIDE HOME ON THE OLD PLUG(S).**
- 7. HOLD THE NEW PLUG IN A VISE AND USE A HACKSAW TO CUT THE THREADS AWAY FROM THE CENTER ELECTRODE.**
- 8. YOU SHOULD SEE A BROWN 2MM "SMOKE RING" AT THE BASE OF THE WHITE CENTER ELECTRODE IF THE MAIN JETS ARE DIALED IN PERFECT.**
- 9. IF THE SMOKE RING IS DARKER THAN CHOCOLATE BROWN OR TALLER THAN 2MM, YOU'RE RICH ON THE MAINS, BUT IF IT REVS CLEAN TO FULL THROTTLE, YOU CAN LEAVE IT THERE AND BE ON THE RICH SIDE.**
- 10. IF THE SMOKE RING IS SMALLER THAN 2MM OR LIGHTER THAN CHOCOLATE BROWN, YOU'RE LEAN ON THE MAINS, GO UP A SIZE AND TRY AGAIN.**

CHOPPED PLUG ILLUSTRATION:



BELOW IS A SERIES OF PLUG CHOPS RANGING FROM EXTREMELY RICH TO SLIGHTLY LEAN.



Leaking Carbs

Fuel dripping or leaking from bottom of carbs (overflow) can be caused from only a few things:

- Defective/contaminated float valve
- Improper float height setting
- Leaking float
- Defective/improper seating of brass overflow tube in bowl
- Split/cracked overflow tube
- Float binding on side of float bowl

Defective gaskets are NOT the cause of leaking carbs, nor is a leaking petcock. When the bike is upright fuel level should be below the gasket.

Leaking at side of carb (as when on sidestand) can be defective gasket and/or warped float bowl.

Tuning Notes

- Needles can have washers added beneath the clip to raise the needle less than one full clip length. Sudco carries special washers for this purpose.
- Sparkplug gap can be varied to optimize power output.
- Air intake to carb body can influence tuning. Short air filters with blocked ends may cause tuning problems. Foam UNI Filters have been known to cure some flat spot tuning ills. Stock inlet tubes smooth air flow and are sometimes better than aftermarket pods.
- UFO's have reportedly improved tuning performance. It will drastically affect pilot jet size.
- Polishing intake ports is NOT a good thing to do.
- Machining intake adapter ID to match cylinder intake port IS a good thing to do.
- Giving a little "choke" at various throttle positions can help determine if you need to be richer at that throttle position.
- Altitude, humidity, type fuel, premix, filters and pipes can alter jetting requirements.
- Note that use of "kits" will many times cause problems. Usually, gaskets and float valves are the only parts worthwhile in the "kits". Jets may or may not be what you need and needle taper is not stock. Retain stock needles as they are not readily available from any source.
- The float controls fuel level in the float bowl at the bottom of the carburetor. It has no effect on jetting but can cause some symptoms that can be easily confused with a jetting problem. If the fuel level is too low for example, it can cause a bog similar to a lean condition.
- Make sure engine has passed a pressure test. It can be virtually impossible to tune an engine with an air leak. It is imperative that you establish a solid baseline with proper assembly and an air leak free engine. *Note: On a 2-Stroke engine there is absolutely no way to be sure your engine DOES NOT have an air leak without properly performing a pressure test.
- Establish that the engines compression is not weakened. Any loss of compression for whatever reason will give off signs that engines jetting is rich. Any loss of compression on a 2-stroke engine should be followed by a top end disassembly and inspection of piston, rings, cylinder liner etc.
- Compression Test How To: Always use a quality name brand gauge (SNAP-ON Best Choice). Note length of threaded probe in relation to spark plug length. Perform test with engine cold, throttle wide open. Kick machine over until needle quits moving (10-15 kicks normal). Perform 3 separate tests, record results. It is always a wise idea to perform a compression test on a fresh engine right after break-in to use for future reference.
- Spark Plug: To properly tune a 2 Stroke engine it is imperative to have a good quality spark plug that is functioning properly. This means that the plug cannot be too old or partially fouled. Spark plug gap is essential; an improperly gapped plug (or partially fouled one) can cause the engine to run poorly, sometimes appearing to be a jetting problem when in reality

the problem originates at the spark plug. Also make sure you are using the correct heat range. Use of resistor plugs is discouraged!

- Weak Spark: Weak spark is not only detrimental to your engines performance but can make tuning your engine a nightmare. Weak spark will make the engine run rich. When an engine is running rich due to weak or poor spark the machines performance will slowly continue to deteriorate. Some common causes of weak or poor spark can be a failing or faulty coil winding, faulty plug cap or plug wire, failing coil, improper ground etc.

- Plug Color: Ideal plug color is a chocolate brown. A rich plug will be a darkish brown or black. May be oily and sooty. A lean plug can be a light brown, or gray (some severe cases can be white). Plug color must be checked after a plug check has been run. To perform plug check run engine at specific RPM that reading is desired for at least 5 seconds, then turn off engine without letting RPM's fall. This test is very difficult to perform at any RPM other than wide-open throttle.

It can take years to learn how to accurately and precisely read spark plugs. For amateurs, plug color should not be the only piece of evidence used to adjust jetting. Plug reading should be evaluated with other jetting evidence to achieve a proper conclusion on tuning.

- Fuel: The fuel used in your triple is very influential in tuning your engine. Premium grade fuel is recommended. Various grades, brands, and ethanol levels can cause inconsistent jetting feedback and make your engine run hotter than normal.

- Baffles: 2 Stroke baffles must be functioning properly. A clogged, poorly maintained, baffle can cause the engine to run funny making tuning difficult. An excessively packed baffle can also cause a tuning difficulty, making the engine lose power and run rich.

- Exhaust Pipe: Check your pipe for severe dents in head pipe section or end cone area, dents in these areas may affect tuning. Also check for carbon build up inside pipe. Any carbon build up at all is not desirable. Heavy build up will hamper engine tuning and rob power. Pipes with these problems should be replaced. Pipes must be used that are designed for the engine. Just because they fit does not mean they are "tuned" for your displacement, etc.

- Air Filter: It is highly recommended to do your initial engine tuning/jetting with a new air filter. A used filter will never quite work as perfect as new one. Old, dirty, improperly serviced filters will severely hamper proper engine performance and tuning. Some aftermarket clamp-on filters can make tuning difficult. When performance is critical use a new filter.

- One Change at a time: When tuning a carburetor, only make one adjustment at a time. This is a good rule to follow so the tuner will not get confused or mislead from false information. Keeping to one adjustment at a time will help ensure that you will always know what effect each adjustment had on the engine.

- Unresponsive?: If during the jetting/tuning process you have made a number of adjustments (especially main jet or needle clip) to the carburetor and the engine has not changed. There is a strong possibility that something other than carburetion jetting is causing your engine to perform incorrectly. Jetting is a constant. When adjustments are made to a machine with all components working properly the engine will respond in some way. Depending on the adjustment made the bike will either run better or worse, but there is almost always some form of change. When changes are made without any response it is a sign of other problems. Things to check out would include; low compression, weak spark, fouled plug, failing reeds,

air leak, clogged air filter, clogged or over packed baffle, etc.

- Proper Slide Throw: It is always a good idea to confirm that the carburetor slide opens and closes all the way. This should be done with carburetor hooked up but not attached, as to physically see slide travel thru its complete stroke.

- Flat spots often result from the type air filter used. Many times, a chamber or channel type intake (similar to stock boots) can resolve these problems. Stock intakes can work quite well if not restricted.

Carburetor Specs

Note: Carburetor I.D. marks are on the front (Facing engine) of the channel for the choke mechanism.

Model	I.D. Mark	Make	Float Level	Fuel Level	Main Jet Size/Type	Needle/Jet/Primary choke height	Jet Needle/Clip Position	Pilot Jet	Throttle Valve Cutaway
H1 w/o CDI		Mikuni VM28SC	23.0-25.0mm	29.0-31.0mm	#90 Reverse	194 #O-2	#5EH7-3rd	#30	#2.5
H1 w/CDI	KA1	Mikuni VM28SC	23.0-25.0mm	29.0-31.0mm	#100 Reverse	194 #O-2	#5GL3-3rd	#30	#3.0
H1A	KAE-1	Mikuni VM28SC	23.0-25.0mm	29.0-31.0mm	#100 Reverse	194 #O-2	#5GL3-3rd	#30	#3.0
H1B	KA4	Mikuni VM28SC	23.0-25.0mm	29.0-31.0mm	#95 Reverse	194 #O-4/8mm 194 #O-4 -Euro	#5DJ19-4th	#30	#2.0 #2.5 -Euro
H1C	KA5	Mikuni VM28SC	23.0-25.0mm	29.0-31.0mm	#100 Reverse	194 #O-2	#5GL3-3rd	#30	#3.0
H1D/E	KA6	Mikuni VM28SC	23.0-25.0mm	29.0-31.0mm	#92.5 Reverse	172 #O-4/8mm	#5DJ19-4th	#30	#2.0
H1F	KA6	Mikuni VM28SC	23.0-25.0mm	29.0-31.0mm	#90 Reverse	172 #O-4/8mm	#5DJ19-3rd	#30	#2.0
KH500	KH5	Mikuni VM28SC	23.0-25.0mm	29.0-31.0mm	#75 Reverse	172 #O-4/8mm	#5DJ19-3rd	#25	#2.0
H2	H2	Mikuni VM30SC	23.0-25.0mm	29.0-31.0mm	#105 Reverse	171 #O-6/2mm	#5FL14-2nd	#35	#2.5
H2/A	H2-1 H2-2 H2-4	Mikuni VM30SC	23.0-25.0mm	29.0-31.0mm	#97.5 Reverse	171 #O-6/8mm	#5EJ15-3rd	#35	#2.5
H2B/C	H2-5	Mikuni VM30SC	23.0-25.0mm	29.0-31.0mm	#102.5 Reverse	171 #O-6/8mm	#5EJ15-4th	#40	#2.5
S3/A	S3	Mikuni VM26SC	24.5-26.5mm	26.0-28.0mm	#85 Reverse	220 #O-2/4mm	#4EJ4-3rd	#22.5	#2.0
KH400	KH4	Mikuni VM26SC	24.5-26.5mm	26.0-28.0mm	#77.5 Reverse	220 #O-6/4mm	#4EJ4-3rd	#20	#2.5
S2	S2J1	Mikuni VM24SC	25.5-27.5mm	27.0-29.0mm	#85 Reverse	220 #O-2/4mm	#4EJ4-3rd	#25	#2.0
S2A	S2U-0	Mikuni VM24SC	24.5-26.5mm	26.0-28.0mm	#85 Reverse	220 #O-2/4mm	#4EJ4-3rd	#25	#2.0
S1	S1-1	Mikuni VM22SC	24.0-26.0mm	27.0-29.0mm	#75 Reverse	220 #O-0/4mm	#4EJ8-3rd	#20	#2.0
S1A/B	S1-U	Mikuni VM22SC	24.0-26.0mm	27.0-29.0mm	#75 Reverse	220 #O-2/4mm	#4EJ9-3rd	#17.5	#2.5
S1C, KH-A5	S1U-1	Mikuni VM22SC	24.0-26.0mm	27.0-29.0mm	#75 Reverse	220 #O-2/4mm	#4EJ9-3rd	#20	#2.5
KH-B1	S1E-1	Mikuni VM22SC	24.0-26.0mm	27.0-29.0mm	#75 Reverse	220 #O-2/4mm	#4EJ9-3rd	#20	#2.5

Needle Information

NEEDLE TAPER DIAMETER DIMENSION CHART (C)

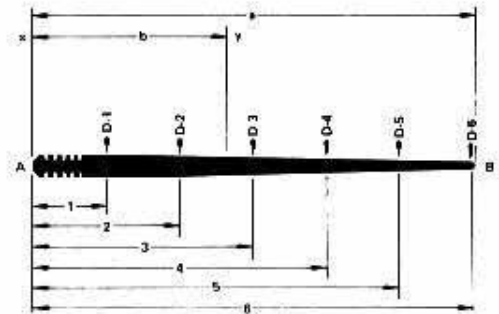
6 SERIES NEEDLES

D-1 through D-6 indicates diameter (mm) at each point.

	a	b	D-1	D-2	D-3	D-4	D-5	D-6
6H1	62.3	37.5	2.510	2.510	2.510	2.412	2.041	1.696
6DH2	62.3	28.0	2.511	2.511	2.466	2.295	2.000	1.660
6F9	62.3	28.9	2.516	2.516	2.475	2.210	1.949	1.678
6CF1	61.5	29.5	2.512	2.512	2.429	2.240	1.974	1.710
6FJ6	62.3	35.2	2.505	2.505	2.505	2.376	2.040	1.606
6DH3	62.3	22.0	2.512	2.512	2.458	2.286	1.948	1.607
6J3	62.3	36.7	2.515	2.515	2.515	2.359	1.912	1.456
6L1	62.3	37.0	2.512	2.512	2.512	2.335	1.826	1.313
6DP5	62.3	32.1	2.518	2.518	2.518	2.372	1.834	1.141
6N1	62.3	37.0	2.514	2.514	2.514	2.278	1.672	1.058
6DP1	62.3	28.9	2.511	2.511	2.476	2.312	1.748	1.075
6F3	60.5	34.2	2.512	2.512	2.512	2.313	2.050	
6DH4	62.3	25.5	2.520	2.520	2.440	2.258	1.915	1.575
6J1	64.0	36.2	2.517	2.517	2.517	2.339	1.919	1.495
6DH7	62.2	28.5	2.516	2.516	2.505	2.316	2.009	1.688
6DH8	62.3	22.7	2.522	2.522	2.395	2.160	1.828	1.505

(a) = Needle Length (mm)
 (b) = Length between point (x) and the taper point (y)

1 = 10mm D-1, -2, -3, -4,
 2 = 20mm -5, -6 are the
 3 = 30mm actual taper
 4 = 40mm diameters at those
 5 = 50mm given points in
 6 = 60mm millimeters



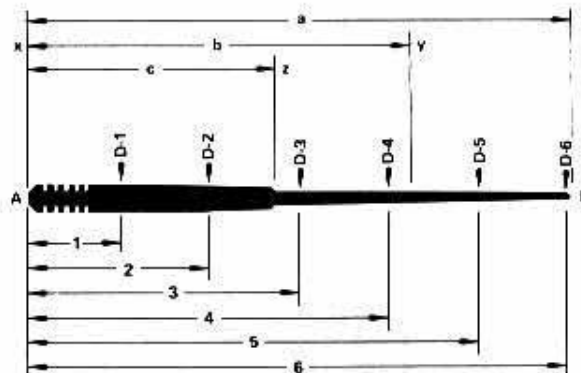
NEEDLE TAPER DIAMETER DIMENSION CHART (D)

D-1 through D-6 indicates diameter (mm) at each point.

	a	b	c	D-1	D-2	D-3	D-4	D-5	D-6
6F5	62.3	38.1	19.0	2.515	2.456	2.454	2.364	2.098	1.840
6F4	62.3	32.0	19.4	2.515	2.442	2.436	2.206	1.939	1.678
6F8	62.3	34.0	21.5	2.512	2.512	2.386	2.214	1.945	1.688
6FJ11	62.3	36.0	18.7	2.519	2.481	2.481	2.367	2.030	1.610
5F16	59.1	36.7	18.5	2.519	2.489	2.489	2.372	2.104	
5DH21	52.3	30.1	16.5	2.515	2.470	2.465	2.328	2.024	
6F16	64.6	31.2	18.4	2.520	2.404	2.400	2.201	1.941	1.679

(a) = Needle Length (mm)
 (b) = Length between point (x) and the taper point (y)
 (c) = Length between point (x) and the pronounced taper point (z)

1 = 10mm D-1, -2, -3, -4,
 2 = 20mm -5, -6 are the
 3 = 30mm actual taper
 4 = 40mm diameters at those
 5 = 50mm given points in
 6 = 60mm Millimeters



Needle Jet Sizes				Needle Jet Application Chart				
Size	Dia (mm)	Size	Dia (mm)	Series No	Type	Main Jet	Size	Carb Type
N-0	2.550	Q-2	2.710	159	P	Hex	O-0 R-8	30-36mm spigot
N-2	2.560	Q-4	2.720	166	P	Hex	O-0 R-8	38mm spigot
N-4	2.570	Q-5	2.725	169	P		N-0 Q-8	28-38mm small
N-5	2.575	Q-6	2.730	171	P	Hex	O-0 Q-8	30mm flange
N-6	2.580	Q-8	2.740	172	P		N-0 Q-8	28mm flange
N-8	2.590	R-0	2.750	175	B		N-0 Q-8	28mm spigot
O-0	2.600	R-2	2.760	176	B	Hex	N-0 Q-8	30-36mm spigot
O-2	2.610	R-4	2.770	182	P		N-0 Q-8	26mm spigot
O-4	2.620	R-5	2.775	183	B	Hex	N-0 Q-8	38mm spigot
O-5	2.625	R-6	2.780	188	P	Hex	O-0 Q-8	32mm flange
O-6	2.630	R-8	2.790	192	P		N-0 Q-8	26mm flange
O-8	2.640	Z-0	3.150	193	P	Hex	N-0 Q-8	24mm flange
P-0	2.650	Z-5	3.175	196	P	Round	O-0 Q-8	30-36mm spigot
P-2	2.660	AA-0	3.200	205	P	Hex	O-0 Q-8	34mm flange
P-4	2.670	AA-5	3.225	211	P	Hex	N-0 Q-8	Kaw KR250 350 750
P-5	2.675	BB-0	3.250	224	P	Hex	Z-0 CC-5	40-44mm spigot
P-6	2.680	BB-5	3.275	235	P		O-0 Q-8	30mm flange
P-8	2.690	CC-0	3.300	247	P		P&Q	Yam250 YZ400 IT400
Q-0	2.700	CC-5	3.325	249	P	Hex	N-0 Q-8	24-28mm spigot
				258	B		O&P	Yam Kaw Suz
				261	B		N-0 Q-8	VM29 VM33
				389	P		O-0 R-8	TM32 34 36 38 41
				499	B		P-2 Q-4	TM33
				P=Primary, mainly used in 2-S piston inlet engine				
				B=Bleed, mainly used in 4-S & 2-S rotary and reed valve engines				

Needle Tapers			
Letter	Taper	Letter	Taper
A	0° 15'	N	3° 30'
B	0° 30'	O	3° 45'
C	0° 45'	P	4° 00'
D	1° 00'	Q	4° 15'
E	1° 15'	R	4° 30'
F	1° 30'	S	4° 45'
G	1° 45'	T	5° 00'
H	2° 00'	U	5° 15'
I	2° 15'	V	5° 30'
J	2° 30'	W	5° 45'
K	2° 45'	X	6° 00'
L	3° 00'	Y	6° 15'
M	3° 15'	Z	6° 30'

Needle Dimensions

X = The total length of the needle

Y = The measurement from the top of the needle to where the taper starts

Z= The dimension in mm from the top of the needle to the pronounced taper point.

10-20 etc= The diameter of the needle measured from the top at 10 - 20 etc mm

4 Series Needles 26 spigot, and 22 & 24 flange carburetors										
<i>Needle</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>10</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>50</i>	<i>60</i>	<i>70</i>
4D3	50.3	25.3		2.511	2.511	2.421	2.253	2.100		
4D8	50.3	22.8		2.519	2.519	2.381	2.211	2.000		
4DG6	50.3	24.0		2.518	2.518	2.405	2.119	1.850		
4DG8	50.3	24.0		2.518	2.518	2.405	2.118	1.850		
4DH7	50.3	23.0		2.518	2.518	2.386	2.098	1.790		
4E1	50.3	28.0		2.515	2.515	2.345	2.127	1.924		
4F6	50.5	25.3		2.514	2.514	2.406	2.145	1.876		
4F10	50.2	24.5		2.513	2.513	2.385	2.135	1.877		
4F15	50.3	26.5		2.512	2.512	2.400	2.120	1.881		
4J6	50.3	24.2		2.513	2.513	2.233	1.827	1.472		
4J11	41.5	21.3		2.512	2.506	2.188	1.776			
4J13	50.2	24.0		2.513	2.513	2.230	1.800	1.400		
4L6	50.3	24.5		2.515	2.515	2.178	1.660	1.190		
4L13	45.1	25.0		2.518	2.516	2.339	1.842			
4P3	50.5	25.0		2.510	2.506	2.436	2.284	2.122		

5 Series Needles 26-32 spigot, and 28-34 flange carburetors										
<i>Needle</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>10</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>50</i>	<i>60</i>	<i>70</i>
5C4	55.1	24.0		2.516	2.516	2.448	2.310	2.179		
5D5	57.6	30.0		2.513	2.513	2.510	2.366	2.205		
5D6	59.3	27.5		2.515	2.515	2.460	2.290	2.120		
5DH21	52.3	30.1		2.515	2.470	2.465	2.328	2.024		
5D120	59.1	28.2		2.520	2.520	2.479	2.311	2.311	1.980	
5D120	53.5	27.6		2.510	2.510	2.496	2.338	2.169		
5DL13	60.2	32.0		2.515	2.515	2.515	2.362	1.922	1.463	
5DP2	60.3	32.4		2.515	2.514	2.513	2.418	2.067	1.418	
5DP7	57.6	26.4		2.512	2.512	2.440	2.259	1.580		
5E13	57.5	29.5		2.515	2.515	2.484	2.197	1.803		
5EH7	57.6	28.5		2.517	2.517	2.473	2.210	1.848		
5EJ11	60.3	28.5		2.515	2.515	2.515	2.241	1.839	1.420	
5EJ13	57.8	26.5		2.519	2.519	2.431	2.210	1.766		
5EJ15				2.52	2.52	2.50	2.28	1.90	1.66	
5EL9	60.3	27.0		2.517	2.517	2.441	2.221	1.780	1.248	
5EP8	60.2	33.0		2.513	2.513	2.513	2.245	1.780	1.120	
5F3	58.0	27.4		2.519	2.519	2.419	2.135	1.863		
5F12	51.5	23.3		2.021	2.021	1.882	1.631	1.375		
5F16	59.1	36.7		2.519	2.489	2.489	2.372	2.104		
5F18	58.0	27.0		2.521	2.521	2.515	2.257	2.006		
5FJ9	59.2	35.0		2.517	2.517	2.517	2.364	2.021		

5FL7	58.0	28.0		2.518	2.518	2.440	2.170	1.735		
5FL11	60.3	28.2		2.518	2.518	2.438	2.175	1.740	1.256	
5FL14	58.0	28.0		2.520	2.520	2.440	2.170	1.735		
5I4	60.0	27.0		2.514	2.509	2.442	2.071	1.690	1.332	
5J6	58.0	27.5		2.518	2.518	2.340	1.890	1.450		
5J9	58.0	27.0		2.522	2.520	1.432	1.1006	1.505		
5L1	58.0	27.0		2.518	2.518	2.330	1.811	1.297		
5L14				2.52	2.52	2.45	2.19	1.78	1.38	

6 Series Needles 30-38 spigot carburetors

<i>Needle</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>10</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>50</i>	<i>60</i>	<i>70</i>
6CF1	61.5	29.5		2.512	2.512	2.429	2.240	1.974	1.710	
6DH2	62.3	28.0		2.511	2.511	2.466	2.295	2.000	1.660	
6DH3	62.3	22.0		2.512	2.512	2.458	2.286	1.948	1.607	
6DH4	62.3	25.5		2.520	2.520	2.440	2.258	1.915	1.575	
6DH7	62.2	28.5		2.516	2.516	2.505	2.316	2.009	1.688	
6DH21	52.3	30.1	16.5	2.515	2.470	2.465	2.328	2.024		
6DP1	62.3	28.9		2.511	2.511	2.476	2.312	1.748	1.075	
6DP5	62.3	32.1		2.518	2.518	2.518	2.372	1.834	1.141	
6F3	60.5	34.2		2.512	2.512	2.512	2.313	2.000		
6F4	62.3	32.0	19.4	2.515	2.442	2.436	2.206	1.939	1.678	
6F5	62.3	38.1	19.0	2.515	2.456	2.454	2.364	2.098	1.840	
6F8	62.3	34.0	21.5	2.512	2.512	2.386	2.214	1.945	1.688	
6F9	62.3	28.9		2.516	2.516	2.475	2.210	1.949	1.678	
6F16	59.1	36.7	18.5	2.519	2.489	2.489	2.372	2.104		
6FJ6	62.3	35.2		2.505	2.505	2.505	2.376	2.040	1.606	
6FJ11	62.3	36.0	18.7	2.519	2.481	2.481	2.367	2.030	1.610	
6H1	62.3	37.5		2.510	2.510	2.510	2.412	2.041	1.696	
6J1	64.0	36.2		2.517	2.517	2.517	2.339	1.919	1.495	
6J3	62.3	36.7		2.515	2.515	2.515	2.359	1.912	1.456	
6L1	62.3	37.0		2.512	2.512	2.512	2.335	1.826	1.313	
6N1	62.3	37.0		2.514	2.514	2.514	2.278	1.672	1.058	
6F16	64.6	31.2	18.4	2.520	2.404	2.400	2.201	1.941	1.679	

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