# *TUNING THE MIKUNI CARBURETOR*

The Mikuni carburetor is a very simple and effective device and, as a general rule, functions quite happily with very little attention. The purpose here is to outline the proper method of initially tuning the carburetor. Once set, it does not require frequent maintenance or adjustment. Due to the many variables which can effect carburetion (temperature, humidity, altitude, rider weight, terrain, etc.), it is impossible to set a carburetor (especially a racing engine carb) at the factory and have it perform perfectly in all field areas. It is, therefore, a must for any mechanic to be very familiar with the specifics involved in carburetion adjustment.

There are 4 basic areas that can be adjusted to effect the fuel/air mixture and, thus, the tune of the carburetor. The 4 adjustments are:

1. **The pilot jet air adjusting screw and pilot jet.** These 2 items control the fuel/air mixture at idle speed through the first 1/8 of throttle opening.

2. **The throttle slide cut-away.** The amount of cut-away will effect the tuning area between **1/8** and **1/4** throttle opening. The **larger** the throttle cut-away, the **leaner** the mixture will become at this range.

3. **The needle and needle jet.** These 2 items and their relationship to each other control the fuel/air mixture through the **mid-range** (*1/4 to 3/4 of the throttle operation*).

4. **The main jet.** Varying the orifice size of the main jet controls the fuel/air mixture from ***3/4 to full opening of the throttle.***

To tune the carburetor for your particular situation, follow these steps in this sequence, but first make sure the float level is correct, there are no leaks in the induction system, and the timing, point setting, spark plug, etc. are set properly.

**CHECK THE PROPER FLOAT LEVEL SETTING.** With float needle, float, etc., in place, turn carburetor upside down and allow float to rest on the spring-mounted float needle. With float bowl gasket removed, measure from the flat gasket surface to the edge of the float, for a **24 mm Mikuni**, the distance should be **one inch** (25 mm); for a **20 mm Mikuni**, it should be 7/8 inch (22.5 mm). Check owner's manual or local shop for your particular size. When adjusting float level, bend only the needle-actuating tab; *be careful not to bend or twist floats.*

**FIND THE PROPER MAIN JET.** To accomplish this, run machine at full throttle on level or slightly inclined roadway – if ***engine runs heavily and sputters or 4-cycles at full throttle, the main jet is too large.*** Insert the next size smaller and repeat this process until engine runs clean at full throttle. If ***engine runs crisp and clean at full throttle to begin with, BEWARE, mixture may be too lean.*** Insert 2 sizes larger jet and recheck, repeat until heavy running or 4-cycling is encountered at full throttle, then use the next lower main-jet size. Main jets are numbered from 0- up (usually in steps of ten, as: 100-, 110-, 120-). The *larger the number, the larger the jet orifice*, which in turn, provides a *richer fuel/air mixture.*

**PILOT AIR SCREW ADJUSTMENT.** With throttle slide resting against idle speed adjusting screw (slacken throttle cable adjustments at twist grip and carburetor top), turn the idle speed screw in until engine begins to idle faster, then back the screw out slowly until engine runs slower and begins to falter; now adjust pilot air screw in or out until engine runs smoothly. ***Turning the pilot air screw in richens the mixture; turning it out leans the mixture***. Slowly turn idle speed adjusting screw out again until engine slows and begins to falter; repeat pilot air screw adjustment. This procedure can be repeated until the proper engine idle speed is attained.

After you have attained the desired idle speed, gently turn the pilot air screw in and count the number of turns required to seat it (*use caution not to use force, damage to pilot seat may result).*

> The pilot air screw adjustment should range between 1/2 and 2 turns out from a fully-seated position. If it takes 1/2 turn or less, the pilot jet is too small and the next larger size should be used. If more than 2 turns are required, the pilot jet is too large and the next size smaller should be installed. The machine may idle smoothly without being in the 1/2- to 2-turn range of adjustment, but it will cause problems in smooth transition to the mid-range of throttle operation. Pilot jets are numbered 20-, 25-, 30-, etc. *The larger the number, the larger the jet orifice, which causes a richer mixture.*

**THROTTLE SLIDE CUT-AWAY.** The amount of throttle slide cut-away effects the fuel/air mixture in the 1/8 to 1/4 range of throttle operation. If, as you take off from the idling position, there is spit back or the engine hesitates, a possible leanness (too large a throttle slide cut-away) is indicated. On the other hand, if the engine runs heavily, 4-strokes and bogs down in the same range, a richness is indicated. If adjusting the pilot air screw slightly does not correct the situation, a different throttle slide should be tried. Slides are stamped with a number such as 1.5, 2.0, 2.5, etc. *The larger the number indicates a greater amount of slide cut-away, which provides a leaner fuel/air mixture.*

**NEEDLE AND NEEDLE JET.** These 2 parts and their relation to each other control a wide range of the throttle operation (1/4 to 3/4 open). The needle can be set in one of 5 different positions by moving the needle clip to one of the different grooves on the needle end. For turning purposes, the grooves are numbered from the TOP down as:

> 1, 2, 3, 4, & 5 with the **#1** groove being the **leanest** needle setting and the **#5** being the **richest.** If proper mixture is obtainable only by using the #1 or #5 groove, other adjustments to the main jet are indicated.
>
> The needle is stamped with a number/letter series such as 4E3, 4E1, etc. The first number, in this case a 4, designates the overall length of the needle. A 3 would be shorter and a 5 would be longer.
>
> The letter indicates a scale of richness and needle taper, i.e., an "E" needle will have more taper and, thus, provide a richer mid-range fuel/air mixture than a "D" needle will, and so on up the alphabetical scale.
>
> The last number indicates materials and finish used.

The needle jet works in direct conjunction with the jet needle in controlling the mid-range fuel/air mixture. Needle jets come in various orifice sizes, the orifices are the same diameter the entire length of the jet and do not taper as the needle does. A change in the needle jet will have a far greater effect on the mid-range mixture than a step change in the jet needle.

The needle jets are stamped with a letter followed by a number, such as N8, O1, P3, etc. Each letter has a ten-digit increment (i.e., N0, N1, N2, N3, N4, N5, N6, N7, N8, N9, 00, 01, 02, etc.) The letter designates orifice size and a "0" needle jet will provide a richer mixture than an "N" needle jet. *The number also relates to the orifice size, only in finer calibrations, the larger the number, the richer the jet.*

The method for tuning the mid-range is similar to that used for the main jet, i.e., use richer needle positions, needles, and/or needle jets until "4-stroking," running heavily, etc., indicates a too-rich mixture, then back up to the next leaner setting to provide correct fuel/air mixture.

All of these adjustments will over-ride into the next range to some degree, to provide smooth acceleration, the pilot jet, slide cut-away, jet needle, and main jet must overlap to make the proper transition. A rule of thumb is that a major change (such as a different size main jet) will have a 10% effect on the mid-range operation. One notch jet needle change will effect the main jet by 10%. It is apparent at this point that several different combinations of pilot jet, slide, needle, needle jet, and main jet can be used to produce the same end result. The text here is to relate the various parts, the sizes, and the effect that can be experienced to one or the other of the carburetor tuning ranges.

## NEEDLE JET AND JET NEEDLE CHART

### *Orifice Size of Needle Jet in Millimeters*

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| **A** | .000 | .005 | .010 | .015 | .020 | .025 | .030 | .035 | .040 | .045 |
| **B** | .050 | .055 | .060 | .065 | .070 | .075 | .080 | .085 | .090 | .095 |
| **C** | .100 | | | | | | | | | |
| **D** | .150 | | | | | | | | | |
| **E** | .200 | | | | | | | | | |
| **N** | .650 | .655 | .660 | .665 | .670 | .675 | .680 | .685 | .690 | .695 |
| **O** | .700 | .705 | .710 | .715 | .720 | .725 | .730 | .735 | .740 | .745 |
| **P** | .750 | .755 | .760 | .765 | .770 | .775 | .780 | .785 | .790 | .795 |
| **Z** | 1.250 | | | | | | | | | |

Example: N5 = .675 mm

*Jet Needle Code:*

Example: 4D3 – 1st digit indicates overall length from shortest (2) thru 3, 4, 5, 6, 7, 8, 9, to longest (1).

*Letter indicates amount of taper:*

A: Smallest amount of taper
Z: Largest amount of taper

*Second digit indicates various materials and finish used.*