

## Two Stroke TUNER'S HANDBOOK

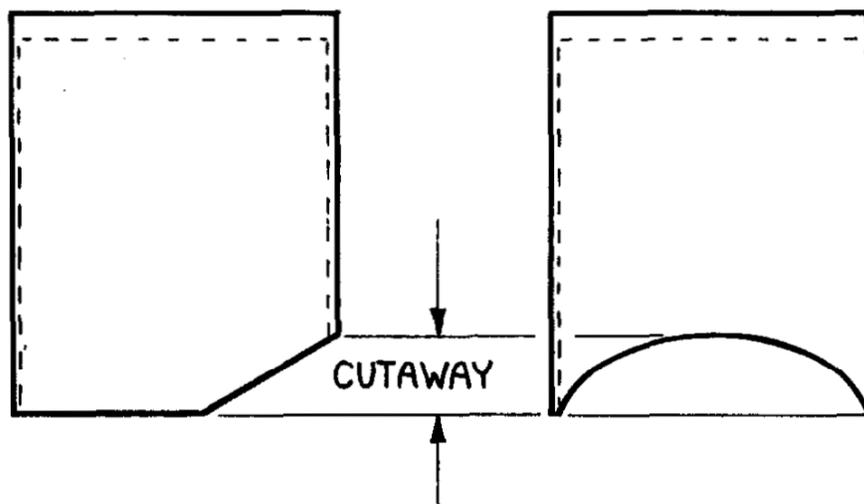
should then run, if none-too-well, on part-throttle, but flood as the throttle is opened fully. Should the engine be willing to run on full throttle, you may be sure that a larger needle jet is required.

After the selection of a jet-needle/needle-jet combination that will pass more fuel than the engine can digest, you then proceed to the problem of finding the correct main jet. Until you become really expert in the art of "reading" spark plugs, the right approach is to start with a huge main jet and then reduce the size until the engine will just barely run, on full throttle, without "four-stroking". Because of the benefits in cooling that are obtained with very rich mixtures, you will get very near the maximum power to be had from a high-output two-stroke engine with a mixture that verges on being so rich that misfiring occurs. The optimum usually will be found with a slightly leaner mixture than that bordering on four-stroking, but as the potential gain is rather small, and the risk of melting a piston is very large, leaner mixtures should be tried very cautiously.

While you are experimenting with main jets, the metering needle - which controls the mixture strength when the throttle is from about a quarter to three-quarters open - should be installed with its clip in the middle groove, or halfway through its adjustment range. You ultimately will probably change this setting, and perhaps switch to a different needle, but you'll need a starting point for the adjustments required to the throttle cutaway and the idle system. Start these adjustments by backing out the throttle-stop screw until the throttle is completely closed, and then turn it back in until the throttle is just barely cracked open. Having done that, you also close the idle mixture screw completely, and then open it two or three turns before starting the engine. The object, in juggling the two adjustments, is to keep working with the idle-mixture adjustment to increase the idle speed while dropping the idle by backing off on the throttle stop. Eventually you'll arrive at the lowest throttle setting at which the engine will idle satisfactorily, and the correct mixture at that throttle opening, unless, of course, the idle system is wrongly jetted. On carburetors with an "air" adjustment, and a fixed jet feeding fuel, you'll know that the fixed jet is too small if engine speed continues to rise (at a fixed throttle-stop setting) until the adjustment screw is turned all the way in to the closed position; at some point in this process the idle mixture should become over-rich, and if it does not the fuel jet is too small.

The opposite is, of course, true when engine speed continues to climb as the idle mixture adjustment screw is opened, without an optimum ever appearing. A similar, but opposite, rule applies for idle systems with fixed air jets and an adjustment for fuel flow. I cannot give you a listing of which manufacturers use what type of idle system, as this varies even between carburetors of a single make. To be certain, you'll have to take your carburetor apart (or check the maker's literature, if available) to see whether the mixture adjustment is for fuel or air.

## CARBURETION, IGNITION

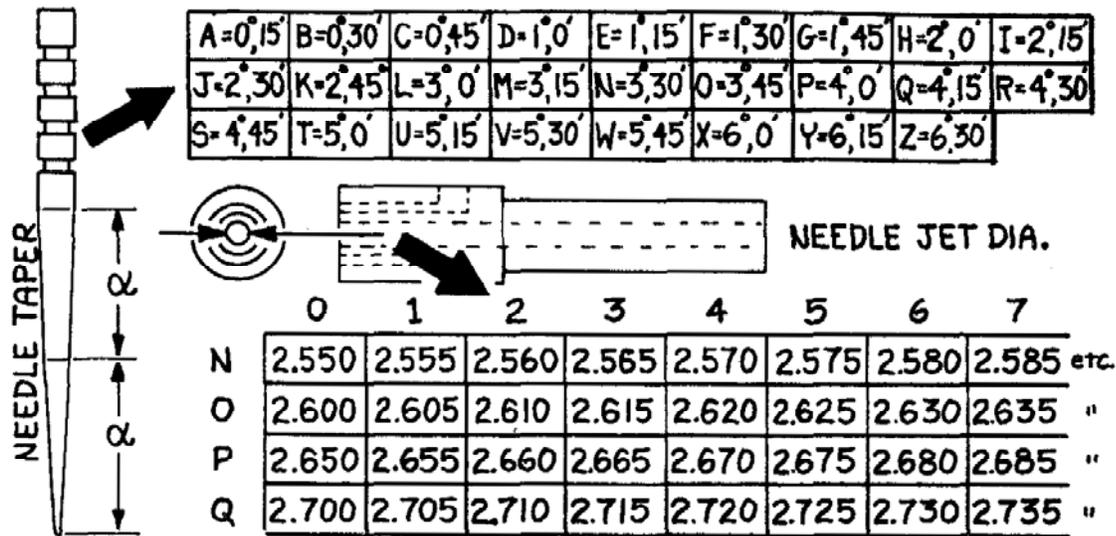


Throttle slides are numbered according to cutaway height, with the higher numbers indicating greater cutaways.

Throttle cutaway will be the next matter for your attention, and this factor almost exclusively concerns what happens during the first eighth of throttle opening. It is possible to have a too-low cutaway on the front edge of the throttle slide, but a carburetor intended for some big engine will almost always have too much cutaway for one with a smaller cylinder displacement. The too-high cutaway problem will be manifested in a tendency for the engine to cough and die when the throttle is opened, and the cure simply is a new throttle slide with less cut-away. When dealing with a single-cylinder engine, you can buy a replacement slide with the lowest cutaway offered, and file the bevel higher until off-idle running is clean. The same approach may also be taken with multiple cylinders, but it is very difficult to get the cutaways modified exactly the same and if finances permit you should just buy a selection of slides. Incidentally, a too-low cutaway will make the engine surge and burble at one-eighth throttle or less - and if you are forced to make a very large change in cutaway, you'll have to start the idle-system tuning process over from the beginning. Probably the best sequence in overall carburetor tuning is to begin with the main jet, then rough-adjust the needle and needle jet, after which the cutaway and idle jetting are managed more or less simultaneously as it is almost impossible to separate them completely.

Factories devote months to finding precisely the right metering needle - because a touring motorcycle spends most of its life being run somewhere between one- and three-quarter throttle. Fortunately, considerations of fuel economy are strictly secondary in racing, so you need not spend months switching needles and needle jets, but a racing

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Mikuni needles are double tapered, and the two letters in their identification numbers are a code for the upper and lower tapers, respectively. Needle jets have a letter and number identification indicating their inside diameter, as shown in the lower of the charts presented.

motorcycle is much easier to ride when it at least runs cleanly on part throttle and you will have to make some effort in this direction. If there is surging and stuttering at steady throttle within the range controlled by the needle, then the mixture is too rich and the needle should be lowered. An engine that runs fairly cleanly at steady throttle but stumbles and hesitates as the throttle is opened farther is suffering from mid-range leanness and the carburetor's needle should be raised. Sometimes you will get both symptoms with the same needle, with an over-lean condition at one-quarter throttle changing to become over-rich as you approach three-quarters throttle. That should tell you the needle's taper is wrong, being too steep, which means that a needle with a more shallow taper will be required. Obviously, the opposite may also be encountered. Unhappily, these needles are expensive, but there is no satisfactory alternative to buying a selection and trying them until the right one is found.

At one time a remote-mounted float chamber was the *sine qua non* of racing carburetors. Commonly, carburetors were bolted rigidly to the engines they fed and float chambers were mounted in rubber to isolate them from the worst effects of engine vibration - which can cause such extreme frothing of the fuel that accurate metering is impossible. But while remote mounting may have solved one problem, it introduced another: Acceleration and braking caused a surging in the long fuel lines linking the carburetor and float chamber which also upset metering. The answer, all along, was to incorporate everything in one casting and mount the whole carburetor/float chamber