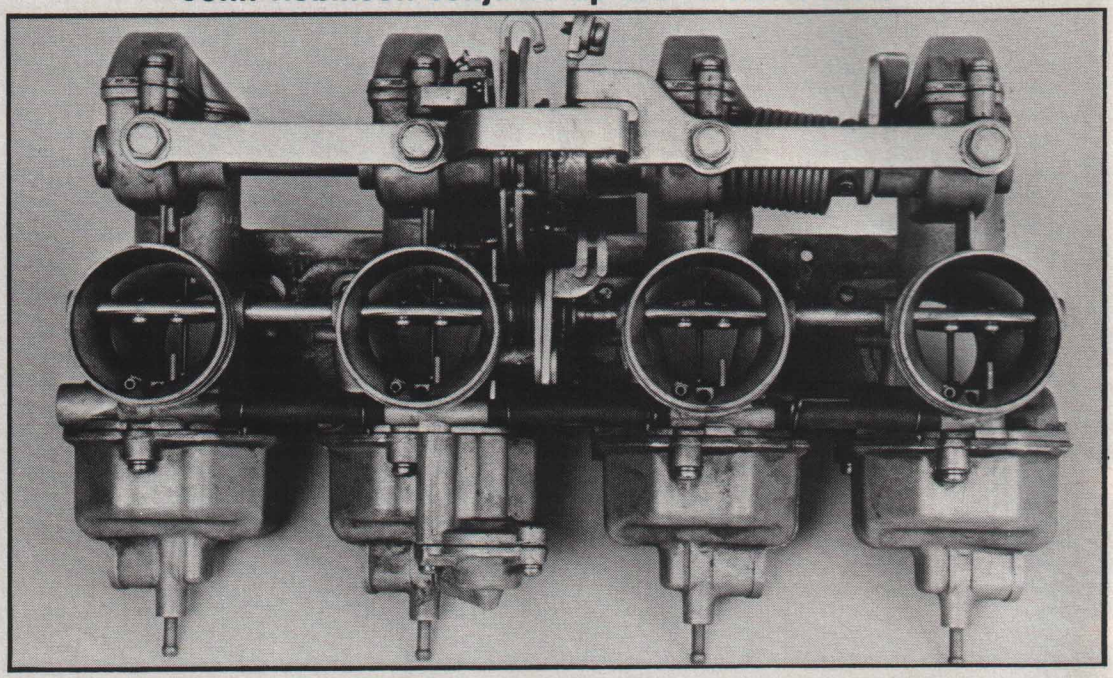
CARB TRICKS

John Robinson conjures up the relevant facts



Keihin slide-type carbs share one advantage with all Japanese units — the ready-made linkage.

RIDERS looking for more power will, sooner or later, come up against the fact that they need bigger (or better) carburettors.

This will only let the engine give more if it is already being restricted by its carbs; if the restriction is somewhere else, in the exhaust, for example, or in bad combustion, then changing the carbs will make no difference.

There are several pointers which can show up if the carbs are too small:

1. If you have to use relatively small main jets to get the correct mixture (compare jet sizes with other models using the same carb);
2. The engine is not sensitive to changes in the exhaust or intake lengths;
3. The power is low (or tuning does not give the expected increase in power) yet the fuel consumption is good;
4. The load or power drops rapidly after peaking, the engine will not rev on in the higher gears.

All of these are symptoms of intake restriction — which includes the air box and ports as well as the carb — but, of course, the individual symptoms can be caused by other failings, too.

Fitting a carburettor which is too large will not give more power. It may even reduce peak power and will certainly spoil low-speed performance and fuel efficiency.

It will probably be difficult to tune and will not respond clearly to small adjustments.

So, getting the right carb size can be crucial. Power depends on air flow and the carburettor governs this by the size of its bore and by its internal shape and design. Air is whistling through the carb at high speed and aerodynamics become important.

Leon Moss ran a series of carburettors on the LEDAR air flow rig and the chart shows the results. The amount of air passed by each carburettor is shown as a percentage of the highest one. The increase in air flow as the pressure is increased is also shown.

This gives an instant comparison between different makes and sizes. The progression from the 24 mm Mikuni through to the 28 mm versions (which have roughly the same shape and design) shows the effect of using larger carbs. The influence of shape and design can be seen by a comparison with the 34mm CV Mikuni. On this carb the flow drops off at low pressures, but improves more than the others when the pressure is raised.

The flow rate shown here is proportional to power. If 24mm Mikunis could give 55 to 60 bhp, then the 26mm versions could make 60 to 65 bhp (as long as the engine could pump and burn that quantity of gas and the overall state of tune wasn't changed).

Choosing the best size and type is only one aspect. There are plenty of other problems connected with carburettors.

First there is the physical size — will the new carb fit within the boundaries of the frame, tank and air box?

Then there is all the trivia of fitting, the rubbers, the air box, the throttle linkage and cables. Often this is the most difficult part of all. Cost and availability also play a fairly strong part. Finally there is the matter of tuning the carb to the engine.

As a rough starting point, if you multiply the choke size by five you will get a number which corresponds to the main jet size (all in mm). That's without air cleaners. If air cleaners are fitted or if you run without them and plan to use smaller air jets, multiply the choke size by four.

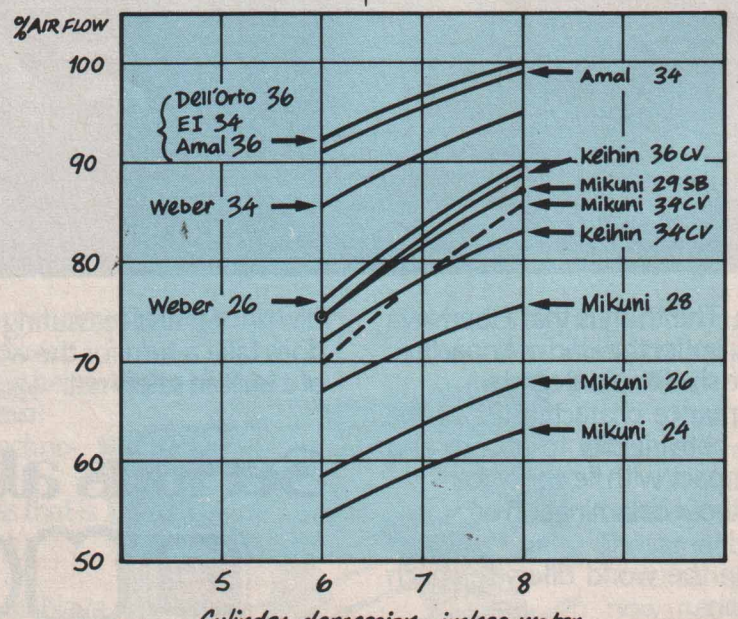
Thus a 30mm carb would need 150 mains or 120 mains and smaller-than-stock air jets. If a full air cleaner was to be used, 120 mains would be the place to start. All of these are millimetre sizes, i.e. 120 is a hole of 1.20 mm diameter. Unlike the other manufacturers, Amal calibrate their jets according to how much fuel they flow and their sizes are in cc/min.

Leon measured a couple of Amal jets and found that a 320 cc/min had a 1.52 mm bore, while a 230cc/min came out at 1.25 mm.

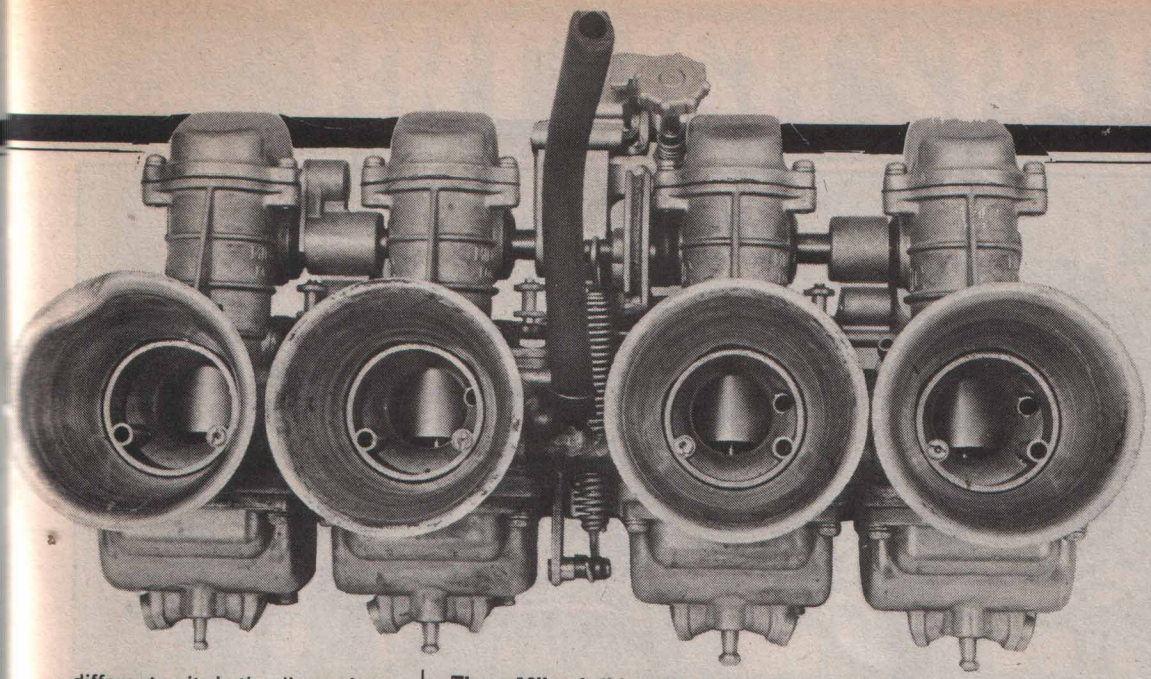
In this series of tests we've looked at all of these aspects of carburettors and tried to list the features of each make and type. In this issue we'll deal with the Japanese units, leaving the Amal, Weber, Dell'Orto and EI until the next issue.

Mikuni and Keihin make both CV and slide-type carburettors and all types have one big advantage. This is that they are available in banks of two, three and four, already hooked-up to suit Japanese engines.

There is, fortunately, a fair amount of compatibility between



Results of the tests on the LEDAR flow rig. The amount of air flow is shown on the vertical scale, against increasing pressure on the horizontal scale.



These Mikuni slide carbs have bellmouths added to "tune" the intake length. Having the air jet intakes inside or outside the bellmouth can make a big difference to carburation.

different units in the dimensions and spacing of the intake stubs and it is not usually difficult to make carbs from one engine fit another. The mounting rubbers and cable linkages are also easy to get.

Finally, for all but the biggest engines, it is usually easy to get bigger carbs from the next larger model, e.g. from 750 to 650, or 400 to 250. This is accompanied by a widespread disadvantage that non-stock jets, etc., are not easy to find. You can usually get jets which are listed for another model by looking through the parts lists but different needles, etc., are harder to trace as you will only have a part number and no indication of whether it is richer or weaker than the one you've already got.

Mikuni slide types

A very wide range is available because these carbs are used as OE on so many different models. These have a pear-shaped venturi and it's usually difficult to find any portion which actually measures the nominal size!

We guess that when they say 24mm, etc., they mean that the carb flows the same as a particular 24mm pipe on the factory flow meter. This means that it isn't necessarily valid to compare size-for-size with other makes.

The flow chart solves this problem by showing how much air the different carbs can flow.

The 29mm is the "smooth bore" competition version which does, in fact flow a lot more than its size would suggest.

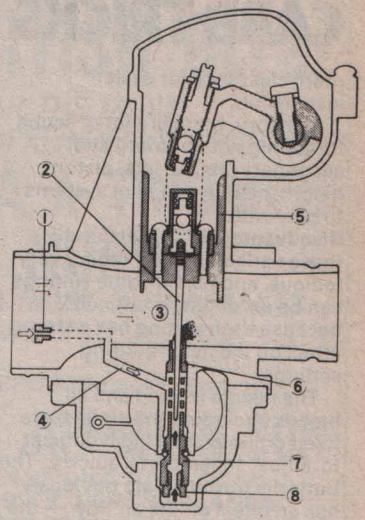
Advantages: Tuning should be straightforward because the intermediate settings are made on separate systems (pilot, air slide, needle, main).

Air jets are either in threaded holes, or there is room to tap a thread to round off the complete range of adjustment. LEDAR supply air jet kits which include a suitable tap.

A wide range of sizes is available in multi-carb form, with neat, compact linkages and adjusters.

Disadvantages: May be difficult to obtain alternative parts (other than jets) and the standard carbs do not go up to such large sizes as Amal, etc.

Also the theoretical ease of tuning isn't always borne out. Although the Mikuni should be the same as the Amal, the carburettor isn't as responsive and doesn't show such clear changes. We can only assume that this is produced by small differences in the size and proportions of the jet block, spray tube, and so on.



Operation of the slide-type carb.

Vacuum Piston Diaphragm

1. **Main Air Jet**
2. **Jet Needle**
3. **Carburettor Bore**
4. **Main Air Passage**
5. **Throttle Valve**
6. **Needle Jet**
7. **Bleed Pipe**
8. **Main Jet**

Keihin slide type

Essentially the same as the Mikuni, except there are not so many models fitted with them as OE and consequently there is a smaller range of choice. There is also the extra difficulty of changing the air jets which are pressed into the passageways. LEDAR also supply air jet kits for these, allowing screw-in jets to be fitted.

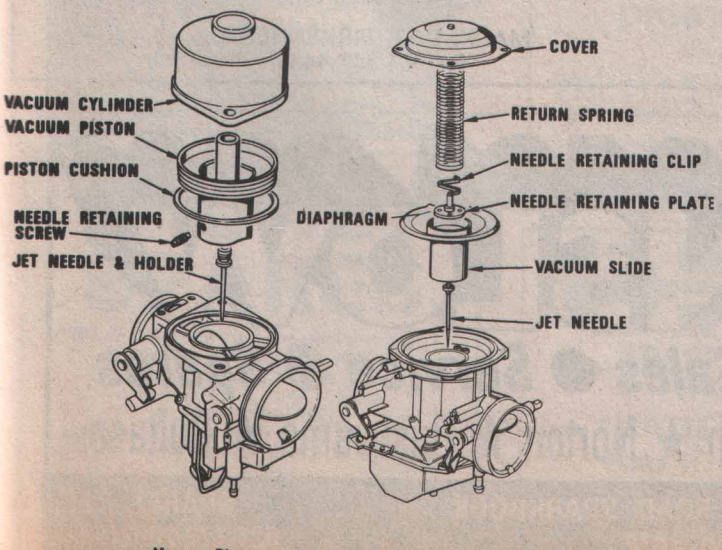
Later types have accelerator pumps which act as high-speed jets. Otherwise the pros and cons are as for Mikuni.

The competition 31CR is the largest Japanese carburettor available and has good air flow properties. Although LEDAR didn't test one in the same conditions as the others, previous tests showed that it gave about 10 per cent better flow than the 36mm CV Keihin.

Keihin CV

The operation of CV carbs should give better low-speed response and better SFC compared to slide-type units.

Advantages: Carbs come in compact sets to suit multi-cylinder engines. Using a butterfly choke gives an advantage over slide carbs in that the throttle linkage isn't added to the height of the carb, leaving ▷



A close up of the air intake shows the air jet passageway. Kits are available to fit threaded jets for tuning.

Below: moving parts of the CV carbs — note two methods of sealing the piston, with and without diaphragm. The height of the piston cushion affects low-speed carburation.

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more clearance for easier installation.

In theory, there is a lot of scope for tuning with primary and secondary jets, air jets, piston height, needle and pilot systems to play with.

Disadvantages: In practice all these variables make tuning very tedious, and part-throttle settings can be exceedingly difficult because each setting has a strong effect on the neighbouring settings.

The needle is fixed and all bleeds (including the air jets) are fixed drillings, making it difficult to adjust these parts quickly. The butterfly throttle plate obviously has an effect on the air flow — the 34 mm CV flows roughly the same as the 28 mm slide types.

Mikuni CV

Essentially the same as the Keihin CV, the Mikuni shares more or less the same advantages and disadvantages except that more work has gone into the finish of the internals, and on the whole it is a better carburettor for both air flow and tuning.

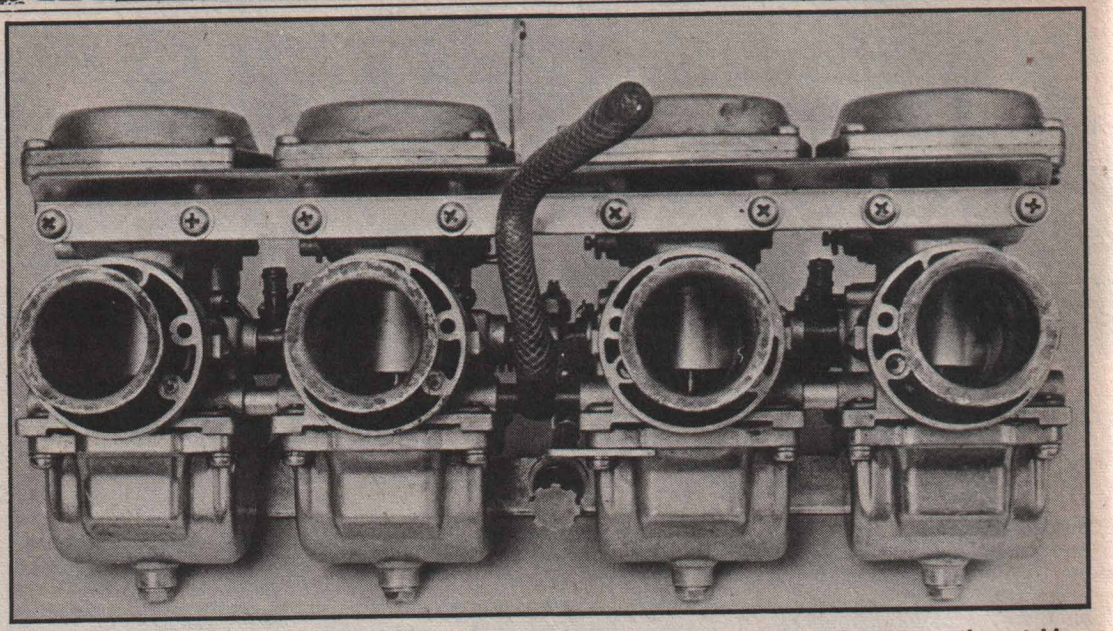
Advantages: That it is less restrictive can be seen from the flow readings. The 34mm Mikuni gives less flow than the 34 mm Keihin at low pressures, perhaps because the "34" is not the same in both cases. Or possibly the air flow allowed the piston to drop slightly.

Whatever the reason, the performance at lower pressures is not so important. As the pressure is stepped up, the flow increases until it is greater than the Keihin and still going up.

It is easier to tune because the primary, secondary and pilot systems are all fed from the main jet.

Disadvantages: This common fuel feed makes WOT tuning easier but it also means that these settings affect the part-throttle running which can, at best, be confusing.

Once again the 34 mm CV is only slightly better than a 28mm slide carb and these Mikunis are not available in very large sizes. □



These Mikuni CV carbs have also had tailored trumpets made, this time with the air jet entry on the outside.