Chapter 1

Know your carburettor: stripdown & inspection

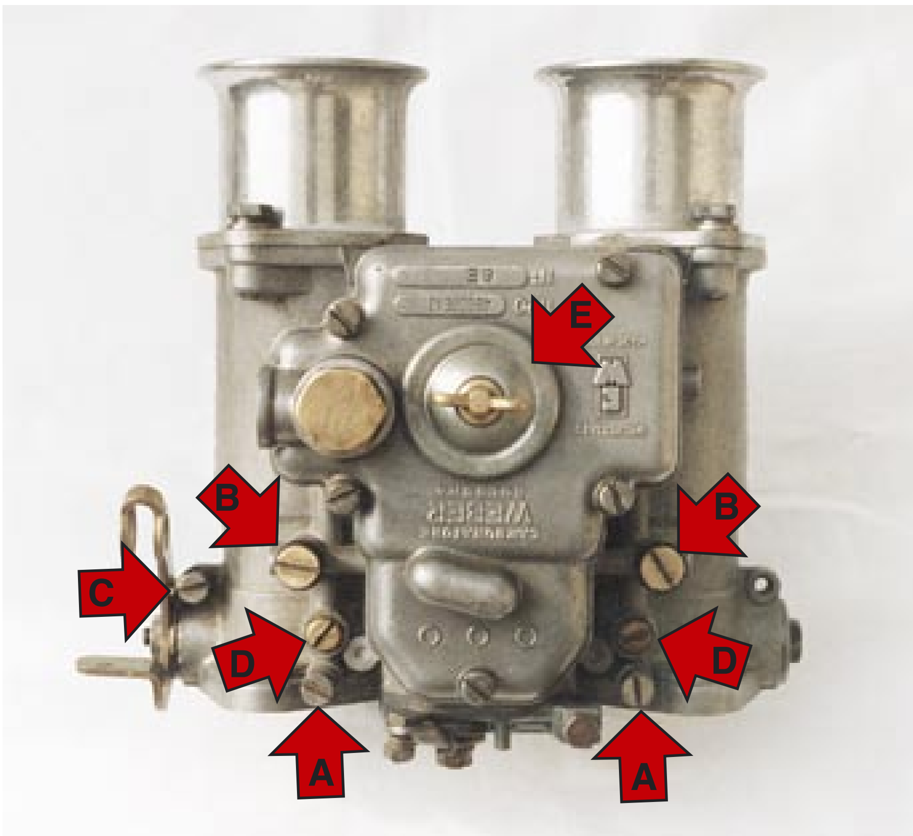
KNOW YOUR CARBURETTOR - MAJOR COMPONENTS

The overall layout is almost identical for Webers and Dellortos. The principles of operation are so close that carburettors of this type couldn't really be designed any differently.

Chokes and auxiliary venturis

On all carburettors the choke is fitted into the barrel bore first and then the auxiliary venturi.

Note: it is quite possible on the 45 and 48 DCOE to put the auxiliary venturi into the carburettor body the wrong way around. The engine will run quite satisfactorily at low rpm but will run lean as the revs rise. Always check to see that the auxiliary venturi is fitted the right way around.



View of a Weber showing the idle mixture adjustment screw at (A) the pump jet screw cover at (B) the throttle arm adjustment screw at (C) the progression hole screw cover at (D) the main jet and idle jet cover at (E).

Dellorto butterflies with the progression hole sweep slots and the numbers clearly visible.

to see. Hand file the butterfly hole for more clearance until the butterfly fits properly.

The fit is correct when both butterflies have as near as possible equal bands of light around their respective diameters (view this from the trumpet side of the throttle bore). **Note**: make sure that the throttle arm stop adjusting screw is wound back well out of the way so that it is not interfering with the shutting off of the throttle during the butterfly fitting and checking procedure.

Remove each screw in turn (only one at a time) and apply some proprietary thread locking compound to the thread. Refit the screw and tension it as tightly as possible within the confines of the strength of the screwdriver slot. **Caution**! The protruding screw threads should be crimped as well just to be absolutely sure that the screws don't come out and end up going into the engine. The spindle (screw heads actually) has to be supported or rested on a bar of aluminum which goes up into the throttle bore. An aluminum flat bar 35mm by 10mm (1 5in by 0.375in) clamped in a vice with about 50mm (2in) sticking above the jaws will provide a suitable rest for the spindle. With an assistant to hold the carburettor in position, use a long pin punch to get down the carburettor throttle bore from the trumpet side and peen over the top of each side of each screw sufficiently so that, even if a screw did come loose, there is no way it could wind out of the spindle.

Check to see that the butterflies are at 90 degrees when the throttle is fully opened. If they are over centre the stop on the throttle arm is not in the correct position. Fit a new one or put a run of braise on the stop and file it down until the butterflies are 90 degrees with the lever on the stop.

Removing damaged threaded components

When working on these carburettors it is important to use the right screwdriver head size for the particular slot size of the screw plug and a six-sided box end wrench (ring spanner) and not a twelve-point to avoid damaging components. Reasonably well-maintained carburettors handled with reasonable care never get into a poor state of repair.

Threaded jets and other threaded components can usually be easily removed. Some components, however, such as the idle adjustment screws found in the towers of some Dellorto carburettors, become well and truly jammed, or the screwdriver slot may no longer be usable. This is quite a common problem with those fine thread Dellorto idle adjustment screws in towers. The carburettor is useless in this condition, in terms of getting the idle mixture of that particular cylinder correctly set. The only solution is to remove the damaged screw.

The carburettor body will then have to be taken to a precision engineer to have the damaged part bored out. To do this, the carburettor body is mounted in a machine vice which is bolted to the table of a vertical milling machine (Bridgeport or similar), and the centre of the damaged part lined up perfectly with the spindle.

Dellorto carburettors with towers have very fine threaded idle mixture adjustment screws which frequently seize solid and the screwdriver slot gets damaged.

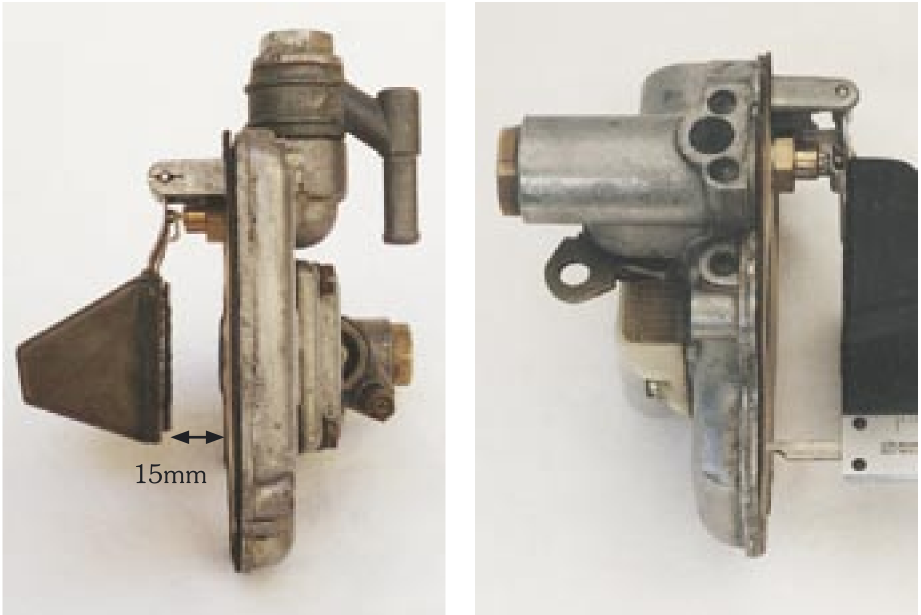
slackness should be removed. This is done by squeezing the floats' hinge loops using needle-nosed pliers. The aluminum can be squeezed in a progressive manner to fit the pin very closely but not too closely as this may cause the float to bind on the pin during operation, which could lead to flooding. The pin fit in some floats is very loose which is not conducive to accurate fuel metering by the floats.

Floats & pin - fitting

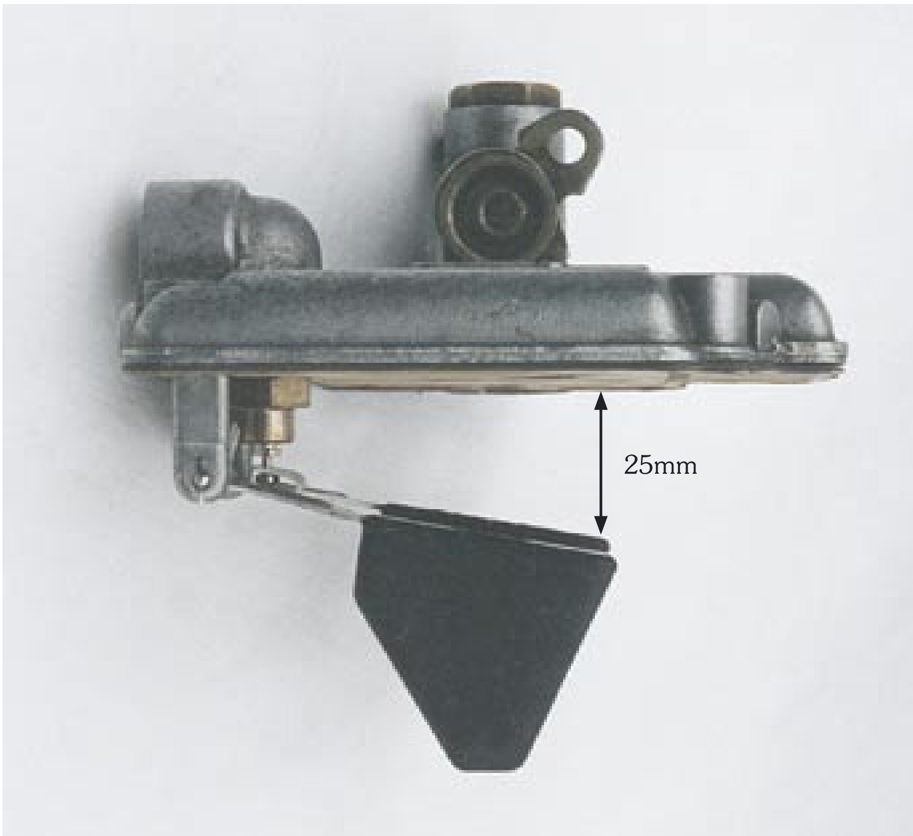
The needle is fitted into the seat body first, then the floats assembly is lined up with the posts and the spring-loaded head of the needle and moved across so that the two small tabs fit under the head of the needle and seat. Fit the fulcrum pin into the post (without the split in it) and push it through to the second post (the one with the split). When the pin is close to the split post, line it up exactly with the hole and carefully tap it in. The pin should be tight when fitted. If the pin goes in very easily the post may not be putting any tension on the pin. If so, place the pin between the posts so that the ends of the pin protrude an equal amount from each post and, using pliers, squeeze the split post slightly. It doesn't take much to 'tighten' the hole so that it exerts sufficient clamp to retain the pin.

FLOAT LEVEL - SETTING (DELLORTO)

There are three floats for DHLA carburettors, numbered 7298.1, 7298.2 and 7298.3. Over 95% of DHLAs use the 7298.1 floats (which are 8.5 grams) and have the 15mm/0.590 inch fuel shut off height. The 7298.2 has a 17mm/0.670 inch fuel shut off height and is 8.5 grams in weight. The 7298.3 has the same shut off height as the 7298.1 but is 7.0 grams in weight. Contact a main agent



Dellorto floats being set at 15mm when the needle is just seating.



Dellorto floats being set to 25mm droop.

Dellorto chokes, 40mm version on the left, 45mm centre and 48mm right.

Weber chokes to suit a 45mm carburettor.

be the smallest size for 45s and 36mm chokes the smallest size for 48s. The range of choke sizes which are readily available for the most widely used carburettor bodies goes up in 2mm increments as follows.

40s: 28, 30, 32 or 34mm chokes.
45s: 34, 36, 38 or 40mm chokes.
48s: 36, 38, 40 or 42mm chokes.

The choke size range for each model of carburettor is quite large as they go up in small increments, this means the choke size can be closely matched to the needs of the engine. Most of the sizes are listed here including those of the 38mm version of the DCOE -

38s: 26, 27, 28, 29, 30, 31, 32mm chokes.
40s: 28, 29, 30, 31, 32, 33, 34mm chokes.
45s: 34, 35, 36, 37, 38, 39, 40, 41mm chokes.
48S: 36, 37, 38, 39, 40, 41, 42, 43mm chokes.

CHOKE SIZE - SELECTING

In the first instance it is essential to know what each carburettor will take with regard to choke sizes and that is all listed in the previous section. The next stage is to decide on the choke size required for your particular engine and this is done on the basis of the individual cylinder capacity and the rpm range that you are likely to use.

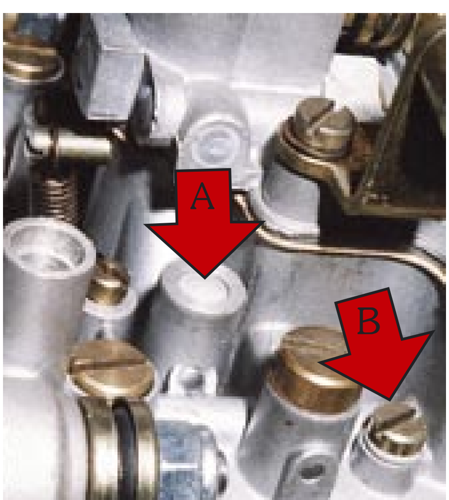
As an overall recommendation you are advised to FIT THE SMALLEST CHOKE THAT WILL GIVE FULL POWER.

When a slight choke size reduction is necessary to achieve better low end performance (eg: out of a corner pulling power) then FIT A CHOKE SIZE THAT PROVES BEST FOR THE OVERALL APPLICATION. As an example, an engine may well produce most maximum rpm power with 38mm chokes but, because in reality the engine is usually used over a wide rev range, 36mm chokes will prove better all round, offering superior mid-range with only a slight loss at the top end. Testing and (golden rule number one) changing one thing at a time is the only way to find out which is the best overall solution for you.

Most engines that Webers or Dellortos are fitted to are modified in some way and the degree of modification will have some bearing on the choke size that will work best. The situation is not as bad as it sounds, and choke choices can be narrowed down. Be realistic on how good your engine actually is and how fast you actually are going to turn your engine on a regular basis. Road cars should be fitted with the smallest chokes possible which are conducive to good all round engine performance. Jetting should be set with good emissions in mind without being excessively lean. Webers and Dellortos can give very good economy coupled with good performance but it is also fair to say that generally they will use more fuel than the original carburettor. For a start, in most applications, there's an accelerator pump for every cylinder.

A well modified four-cylinder 2000cc or 2100cc engine fitted with twin sidedraughts will usually run best using 38mm chokes with 40mm chokes being too large. On the other side of the scale, if mid-range

On this Dellorto carburettor the progression hole plug (A) has a Philips head, and the idle by-pass adjustment screw is in a tower (B).



On this Dellorto, the idle by-pass tower is plugged (A), and the choke location screw is shown at B.

Adjust the idle speed down if the engine turns over too fast, and then check that each cylinder is flowing the exact same amount of air. It doesn't take too much effort to do this and the idle will be as good as it's possible to get it, and the CO and the HC the lowest possible.

Many mechanics don't bother to go to this trouble for racing engines as they claim it's unnecessary. However, racing engines do foul spark plugs from time to time, but not if the idle mixture has been adjusted correctly as suggested. If the carburettors are equipped with 'idle by-pass' circuitry, it's advisable to use it for this purpose. Not only will the idle air be equal, but the butterflies can be set in the near shut off position for near maximum butterfly sweep past the progression holes.

The limit to the adjustment of the 'idle by-pass' system is when the butterflies are in the near shut off position; the individual chokes have equal air going through them, the idle speed of the engine is as required and the engine is able to accelerate from the off idle position as well as it did when the 'idle by-pass' system was in-operative. Too much 'idle by-pass' adjustment air going into the engine can upset progression phase.

It's normal to end up with a very small amount of main throttle butterfly opening and an amount of 'idle by-pass' and a very low idle mixture reading such as 0.95-0.92 Lambda, 14.0:1-13.5:1 air/fuel or 1.6-2.5% CO and have the same acceleration phase performance that you had before.

CO readings and air'fuel ratio readings

These two factors are quite easy to co-relate on an approximate basis and a level of understanding is required. Most rolling roads use Lambda or % CO exhaust gas analysis equipment which uses a probe fitted into the exhaust system to give a digital reading for % CO or a printout for Lambda. While air/fuel ratios are what are effectively being discussed, they are seldom used as meters these days. They were used on earlier times but they were slow reacting. Lambda, on the other hand, is instant.

The chemically correct air/fuel for optimum and best possible burning (clean burning and low emissions) is 14.7:1 or Lambda 1.00 or 0.5% CO (carbon monoxide). All cars made today have to comply with USA and EU emissions standards and the fuel injection systems used are now 'focused' to run the engine constantly at 14.7:1 air/fuel or Lambda 1.00 or 0.5% CO on a constant basis. The approximate equivalent Lambda to % CO to air/fuel ratios are listed in the accompanying chart.

Consider a suitable idle mixture to be 0.95-0.93 Lambda, 14.0:1 to 13.7:1 air/fuel or 1.6-2.0% CO for engines fitted with carburettors with 'idle by-pass' circuitry. All other engines, including racing engines, should be able to idle with a Lambda of 0.93-0.90, 13.7-13.2 air/fuel ratio or 2.0-3.3% CO idle mixture. Expect a full power mixture to be dependant on the engine design, but expect this to be between 0.82-0.88 Lambda, 13.0:1 to 12.2:1 air/fuel ratio or 3.8-5.9% CO.

Note that the 'California Air Resource Board' has been driving the world's auto manufacturers along the path of cleaner burning engines since about 1970. While working within the realms of the technology of the day they have never the less been relentlessly getting the various engine manufacturers to reduce emissions.

ACCELERATOR PUMP JETS - FINAL SELECTION

The fixed jetting of the carburettor cannot respond quickly when the throttle is opened rapidly. The