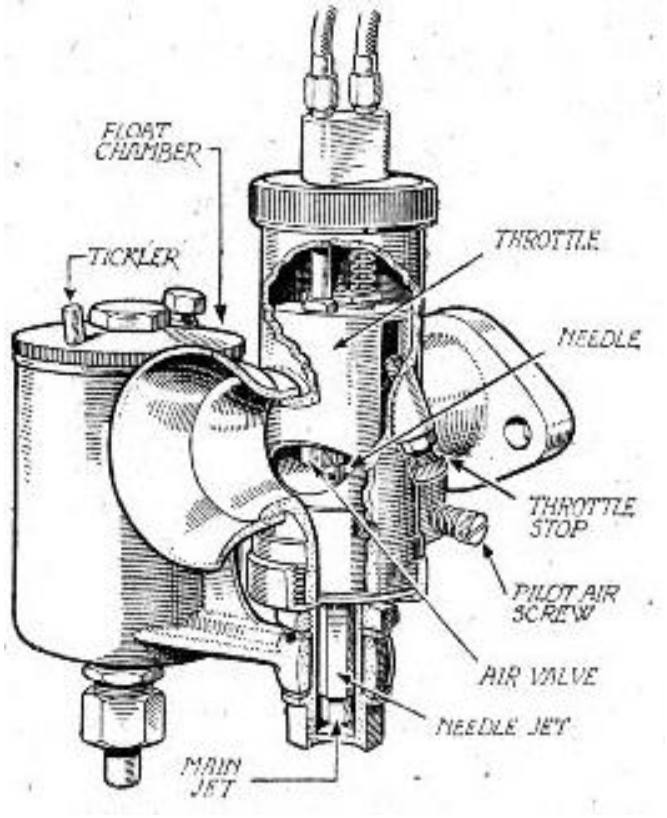
AMAL PRE MONOBLOC CARBURETTERS

There are several types of Amal carburetters – Fig 1 depicts a typical one.

Fig 1. The Amal needle-type control carburetter standard on the majority of British motor-cycles.



It will be seen that the mixing chamber forms an extension of the inlet pipe and a cross tube carries the cylindrical throttle valve, the rise and fall of which opens or closes the choke tube above the jet.

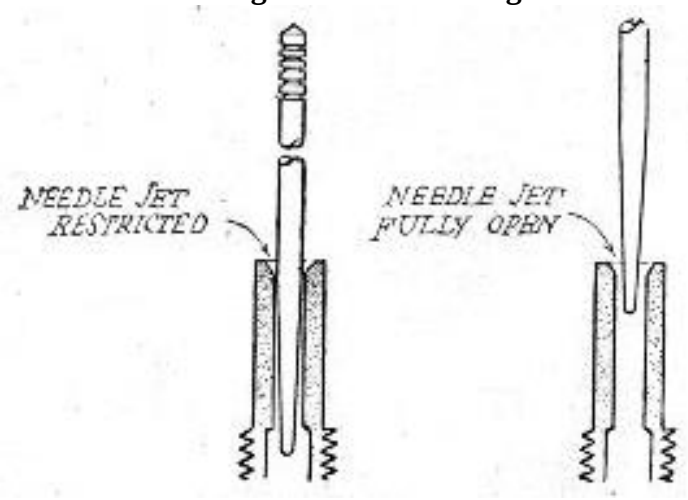
The feed from the float chamber to the main jet can be seen, the latter jet limiting the total amount of fuel that can pass under full throttle opening and full suction.

Unfortunately, the amount of fuel that can be passed by a plain jet does not vary as does the amount of air passing over it so the Amal design incorporates a tapering needle, fixed to the throttle valve, rising and falling with it. Opening the throttle increases the needle jet aperture by bringing a narrower part of the needle into action and thus more petrol can pass.

Subsidiary control of the mixture strength is afforded by an air "bleed" or leak which enters the carburettor either at the main air intake or else in the base of the mixing chamber, according to type. This air "bleed" starts the process of mixing the petrol mist and the air which is completed in the choke tube.

Unfortunately, even this rather complicated arrangement does not completely satisfy the varying needs of the engine, and to provide an ultra-rich mixture a shutter, or air control, is provided; this is mainly used when the engine has to be started from cold when less air in proportion to petrol is needed.

Fig 2. The principle of needle-control is clearly shown in these diagrammatic drawings.



To enable the engine to "tick-over" properly a small amount of fuel is taken directly to the engine side of the throttle valve. When the throttle is almost or entirely shut, suction on this by-pass is high and petrol is drawn in for slow-running purposes. When the throttle is opened the suction is lessened and the pilot jet fades almost completely out of action.

An air leak, controlled by an external screw, is provided in the by-pass so that the pilot jet mixture may be adjusted to suit the needs of each individual engine.

On aspect of the carburation has not yet been discussed. It will be noted that the cylindrical throttle valve is situated astride the main jet: the engine side of it, therefore, simply acts as a slide to permit or restrict the flow of mixture into the engine – it cannot primarily affect the mixture strength but only the volume passed.

The other side, on the other hand, limits the amount of air passing over the jet and it is consequently cut away slightly so that a reasonable amount may pass. It is known as the throttle "cut-away"; decreasing the amount of cut-away increases the mixture strength and vice versa, from one eighth to a quarter throttle

opening. Opening the throttle more than about a quarter brings the cut-away into a position in which it is masked by the throttle chamber, and its effect is therefore nullified.

Fig 3. The Amal design allows of quick adjustment. The illustration shows the adjustable taper needle and throttle cut-away. By varying these two factors correct mixture can be obtained.

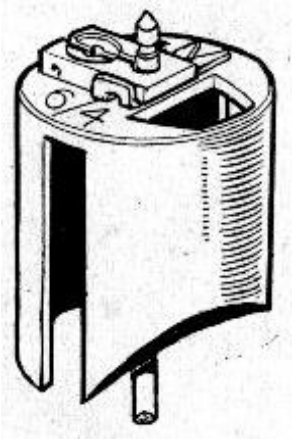
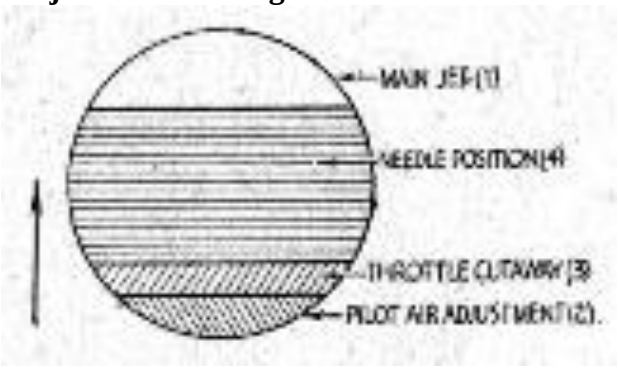


Fig 4. This drawing shows in graph form the range of control of the adjustable features in the Amal needle-type carburetter. It should be studied in conjunction with Fig 1.



As Fig 4 shows, the pilot jet controls the mixture strength up to a one-eighth throttle opening, the throttle cut-away then takes command until a quarter open. The position of the needle relative to the throttle (to which it can be fixed in one of several positions by a spring clip) then takes affect up to three-quarters throttle, after which the size of the main jet is the controlling factor. These phases are not, of course absolutely rigid; they blend and overlap so as to give a suitable mixture strength at all points.

Amal Carburetter Tuning Hints

The handbooks issued by individual motorcycle manufacturers usually contain tuning instructions for the Amal needle-jet type carburetter which is fitted to the majority of British machines, and the makers - Amal Ltd., of Holford Works, Perry Barr, Birmingham – are most helpful in dealing with queries through their very excellent service department. Should the required information not be available, however, the following hints will prove of assistance:-

Remember that the main jet is the only controlling factor from three-quarter throttle to the full open position; that the taper needle attached to the throttle slide is in control from quarter throttle to three-quarter throttle; and that the "cut-out" on the throttle slide controls the situation from the "shut to quarter open position". Correct carburation is achieved when it is impossible to detect any one phase of control merging into the next.

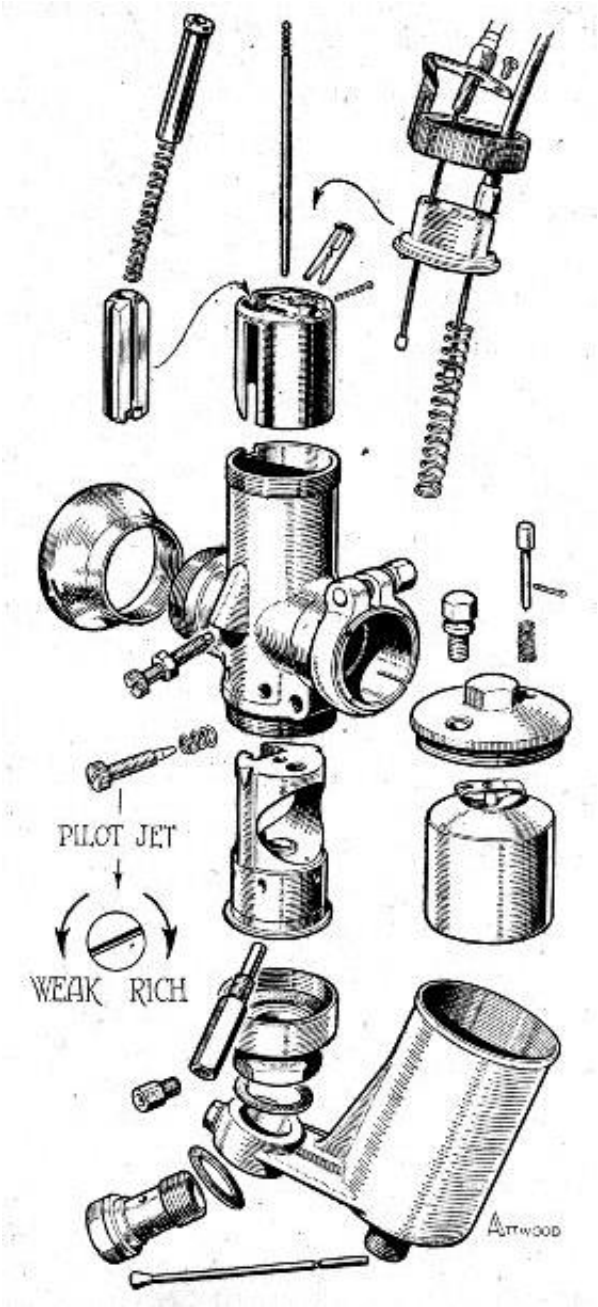
The first thing to get right is the main jet. This should be such that, with a warm engine, the carburetter will just take full air, e.g., with the air control lever pushed fully open. To test, find a good straight stretch of road free from side turnings. First, warm engine. Then, in third or top gear, open full out. Close air lever one third. If road speed increases, the jet is too small. If road speed drops, or the engine tends to miss a beat occasionally, the jet is too large. If this slight closing of the air lever makes no appreciable difference, the jet is approximately correct.

Next check the taper needle setting by running the engine on the stand at about half throttle with the air lever fully open. The engine note should sound crisp and healthy. If there is "spitting-back" or popping in the carburetter when the throttle is moved up or down, shut the air lever until the air slide is slightly lower than the "cut-away" on the throttle slide. If this effects a cure, raise the taper needle one notch and try again with air fully open. If still not quite right, raise needle another notch. If, on the other hand, closing down of the air lever causes the engine to run in a heavy thumping manner, or, in extreme cases, black smoke is visible from the exhaust, then lower the needle one or two notches as required.

It remains to check the "cut-away" on the slide and the pilot jet setting, both of which are inter-dependent to a certain extent. First, screw pilot jet right home, then unscrew approximately one and a half turns. Start up, warm engine. Then set "tick-over" to desired speed by adjustment of throttle stop and re-adjustment of pilot jet if necessary. Then open throttle smartly to one-third open position. If there is a coughing hesitancy in the engine's response, this can be cured by richening the pilot jet somewhat; but if this then upsets the "tick-over" it must be left as it was and a throttle slide with less cut-away should be fitted. If no alternative slide is available, a probable cure a probable cure can be effected by raising the taper needle one notch. Remember, however, that, invariably, each alteration of "cut-away" or needle will necessitate a slight re-setting of the pilot jet to suit.

For maximum economy the ideals to aim at are the largest "cut-away" and lowest taper needle position which will give a clean response to rapid opening of the throttle, and a main jet of such a size that the air lever must be closed a quarter to give maximum speed. Such a setting is, however, sensitive, and, in the hands of a careless or unskilled rider, can lead to undue heating-up of the power unit due to the use of a weak mixture, so, in case of doubt, it is better to adopt the standard policy of a setting which will take full air at all times save for starting up from cold.

Fig.5. With the aid of this "Exploded" drawing even the complete novice should experience no difficulty in dismantling and re-assembling the Amal carburetter. Note how the pilot jet setting is adjusted.



CARBURETTER PARTS