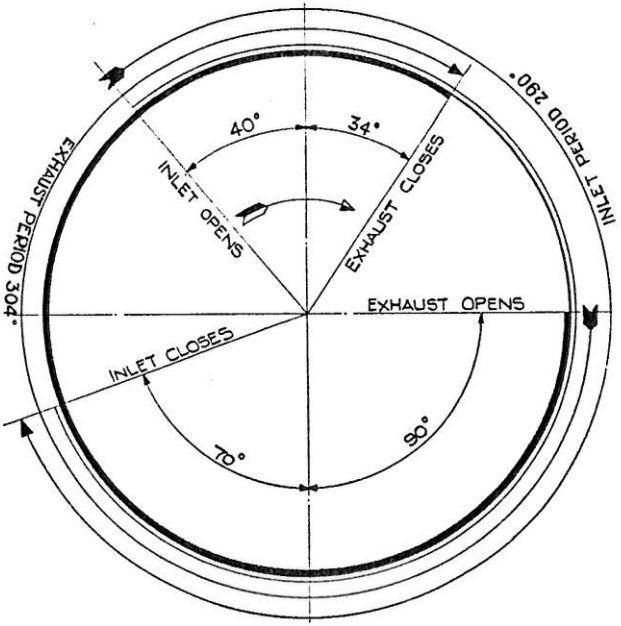


Clearances Cold { Inlet Valve ·004″ (~~·127~~ .10 m/m).
Exhaust Valve ·004″ (~~·127~~ .10 m/m).

Order of Firing : 1-3-4-2.

Magneto Advance : 30°.

Rotation. **L. H. Tractor.**

TIMING DIAGRAM
FOR
"CIRRUS MINOR."

APPROVED OILS

The Cirrus Minor engine used **Ragosine "Minix 90"** Oil to Air Ministry Specification D.T.D. 109 during its Type Tests by the British Air Ministry, and this brand of oil is therefore recommended.

The following oils are also approved for general purposes :—

Wakefield "Patent Castrol XXL."

Shell "Aeroshell Heavy."

Vacuum Aero Mobiloil "Red Band."

and

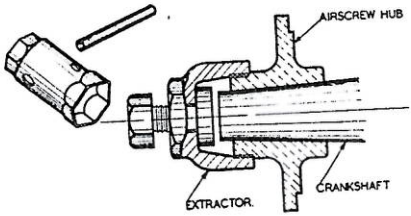
Other Oils to D.T.D. Specification 109.

FUEL

The fuel used for Type Test was **"Esso High Test"** petrol. Any good grade of No. 1 Motor Spirit or fuels with an octave value above 70 are suitable.

CIRRUS MINOR TOOLS
and their applications.

Description.	Used for
UNIVERSAL BOX SPANNER $\frac{3}{16}$". Part No. B.A. 801/1.	(1) Nuts attaching Induction Manifold to Heads. (2) Nuts attaching Exhaust Manifold to Heads.
TUBULAR BOX SPANNER $\frac{3}{8}$" × $\frac{9}{16}$" Whitworth. Part No. A.A. 802.	(1) Oil Filter Body Tube. (2) Centre Screw Airscrew Hub Extractor. (3) Nut Airscrew Hub Bolt.
MAGNETO SPANNER. Part No. B.A. 804.	General Magneto Adjustments.
FEELER GAUGES. Part No. A.A. 805.	General clearances for maintenance.
EXTRACTOR AIRSCREW HUB. Part No. C.F.B. 806.	Withdrawal of Airscrew Hub.



N.B.—When removing or re-fitting hub nut locking tab, care should be taken not to damage the thread provided on exterior of the hub for fitting of the extractor.

AIRSCREW LOCK NUT BOX SPANNER. Part No. C.F.B. 807. — Airscrew Hub retaining nut.

N.B.—The handle of this spanner is jointed for economy of space when not in use.

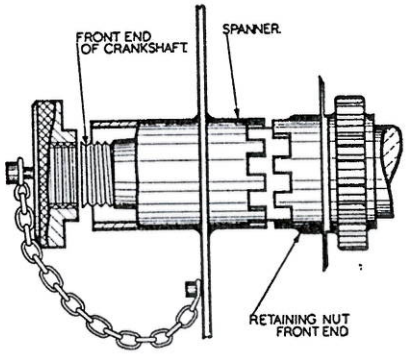
SCREWDRIVER. Part No. A.A. 808. — For general use **except** for Ball Sockets on rocker arms, for which a combination tool is supplied.

TOMMY BAR (LARGE). Part No. A.A. 809. — For Box Spanners A.A. 802, C.F.A. 811, C.F.A. 833 and C.F.A. 836.

Description.	Used for
VALVE GRINDING TOOL. Part No. C.F.A. 810.	For " grinding in " valves.
BOX SPANNER $\frac{1}{2}$" × $\frac{7}{16}$" Whitworth. Part No. C.F.A. 811.	(1) Sparking Plugs. (2) Retaining Nut Tachometer Drive. (3) Nut Magneto Driving Shaft. (4) Bolt Idler Gear Spindle.
" C " SPANNER SPECIAL. Part No. C.F.A. 812.	Starter dog removal or re-fitting.
RING SPANNER. Part No. A.B. 807.	Nut for retaining gear on crankshaft rear end only.
BOX SPANNER $\frac{5}{16}$" × $\frac{3}{16}$" Whitworth. Part No. A.A. 814.	(1) Big End Nuts on connecting rods. (2) Nuts on lifting eyes in top cover. (3) Cap nuts on crankcase side. (4) Nuts securing timing cover to crankcase. (5) Nuts securing top cover to crankcase.
BOX SPANNER $\frac{3}{16}$" Whitworth. Part No. C.F.A. 816.	Nuts on crankshaft oil retainers.

N.B.—This is a special short spanner so as to pass between the crankshaft webs, and we recommend its use solely for this purpose.

SPECIAL THRUST NUT SPANNER. Retaining nut of thrust bearing.
Part No. C.F.B. 818.

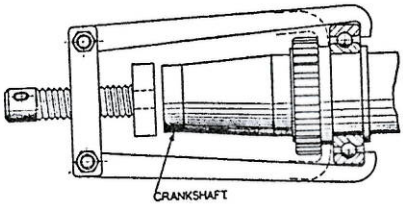


N.B.—Engines up to and including engine No. F.65 have R.H. threads. All engines thereafter are fitted with L.H. threads.

The screw should be kept in relative position to the sleeve when tightening or unscrewing, to keep spanner in mesh with castellated thrust nut.

DRIFT (Mild Steel). For fitting or removing valve guides.
Part No. C.F.A. 825.

Description.	Used for
EXTRACTOR. Part No. C.F.B. 829.	(1) Crankshaft thrust bearing. (2) ,, Gear front end. (3) ,, ,, rear ,,



N.B.—The extractor should be used to remove the timing gear on crankshaft before attempting to remove the thrust bearing, as the key in gear will prevent bearing being removed until gear is withdrawn.

SKIMMING TOOL.
Part No. C.F.B. 830.

For skimming up valve seats if pitted or pocketed. Also after fitting of new valve guides.

SPRING COMPRESSOR.
Part No. C.F.A. 831.

For compressing valve springs to release valve collets.

BOX SPANNER $\frac{3}{16}$" Whitworth.
Part No. C.F.A. 832.

(1) Nuts front camshaft bearing.
(2) Bolts for pulling up thrust bearing housing.

BOX SPANNER (Special).
Part No. C.F.A. 833.

Nut Idler spindle to crankcase.

TOMMY BAR (SMALL) AND CIRCLIP EXTRACTOR.
Part No. C.F.A. 834.

(1) Circlips on Gudgeon Pin.
(2) ,, ,, Valve rocker brackets.
(3) ,, ,, Magneto drive shaft.
(4) ,, ,, Idler spindle.
(5) Also used as tommy bar for small box spanners.

SPECIAL FLAT SPANNER.
Part No. C.F.A. 835.

Rearmost nuts holding down rear cylinder.
N.B.—The two rear nuts are not so accessible as the remainder, and this spanner is provided to meet the case.

DRIFT (Brass).
Part No. C.F.A. 837.

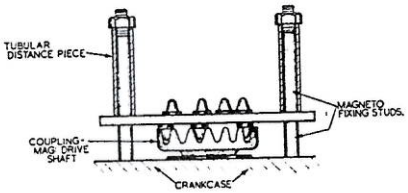
Magneto drive assembly.

COMBINATION TOOL.
Part No. E.A. 838/1.

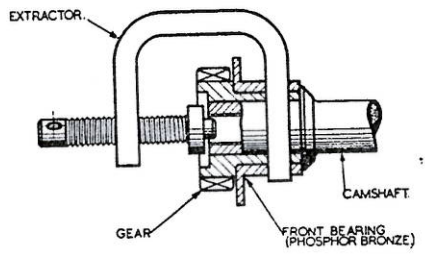
N.B.—This tool has three arms carrying a screwdriver point, a spanner and a half-round screwdriver end.

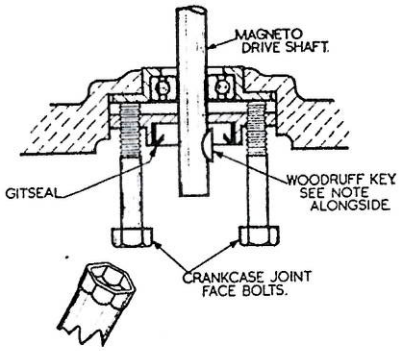
(1) Adjusting key ball sockets on valve rockers.
(2) 2 B.A. spanner for lock nuts of control rods.
(3) do. nuts ball end on controls.
(4) do. nuts securing air intake pipe.
(5) do. nuts securing baffle plate.
(6) Screwdriver for ball ends of control rods.

Description.	Used for
BOX SPANNER 1½" Whitworth. Part No C.F.A. 836.	Oil Filter Caps.
BOX SPANNER 2 B.A. Part No. C.F.A. 841.	(1) Intake pipe nuts. (2) Gitseal housing nuts. N.B.—This is provided for facilitating the removal of the rear nut on the air intake casting.
CLAMPING FIXTURE MAGNETO SHAFTS. Part No. C.F.B. 840.	(1) Nut securing magneto coupling. (2) Nut magneto armature shaft. N.B.—(1) This is provided to relieve the magneto drive shaft of twisting strain when removing or fitting the large nut securing the Simms Coupling to shaft. We do not recommend the shaft being held from turning by means of the driving gears and crankshaft. N.B.—(2) In the reversed position this fixture may be used for securing the armature shaft whilst removing or fitting the Simms coupling nut.



EXTRACTOR FOR CAMSHAFT GEAR AND BEARING. Part No. C.F.B. 842.	For removing camshaft gear wheel and front bearing (phosphor bronze). N.B.—Care should be taken when fitting the extractor to see that the plain portion of extractor screw end does not foul and so damage interior threads on camshaft. The extractor body should snugly fit the bearing recess to prevent movement of the extractor on the bearing so as to avoid any damage to same. A sharp blow on the extractor screw will assist in stubborn cases.





The method of extracting the gitseal housings on the magneto driving shaft is shown in the adjacent illustration. Two crankcase bolts are used for extracting the housing. Next remove Woodruff key. After extracting gitseal housing the magneto drive shaft can be lightly driven through bearing and bearing then removed with housing.

NOTE.— Extractor holes are not tapped in engines prior to Engine No. 75.

N.B.—The special tools for dismantling and assembling sparking plugs as referred to in Appendix H can be supplied on request.

In all other cases a fixed flat spanner or box spanner can be used, but we suggest that box spanners Part No. C.F.A. 832 and 816 be used solely for their specified purpose.

H. M. HOBSON (AIRCRAFT AND MOTOR) COMPONENTS, LTD.

Established 1903

47-55, THE VALE, ACTON, LONDON, W.3.

Telephone: SHEPHERDS BUSH 3321 (4 lines).

Telegrams: ASSEMBLAGE, PHONE, LONDON.

Claudel-Hobson Aero Carburetter.

SERIES TYPE A.I. 40.

These carburetters have been designed to operate on high efficiency aero engines. They are completely pressure balanced, and the available range of mixture control for altitude is enough to meet all requirements up to at least 30,000 ft., but for use in machines unlikely to attain great altitudes, the percentage of altitude control is cut down by decreasing the area of the slot in the altitude control plug.

This demand for a great range of altitude control calls for extreme care in design and a special altitude control system, in order to avoid any suddenness of action, and to ensure that equal increment of movement of the altitude control lever shall give equal and progressive weakening of the mixture.

Further, it is essential for convenience in flying, that for a given position of the altitude control lever, the mixture shall be weakened by the same percentage at all throttle positions. The pilot will then only have to alter the position of his altitude control lever with change of altitude, and not for different throttle positions at the same height.

Because of the amount of altitude control required at great heights, it is imperative that there shall be an interlocking gear, which will shut the altitude control valve when the throttle is closed for a dive, to ensure that the engine will open up again. On engines which are likely to cruise at altitudes at part throttle for long periods, it is necessary for fuel economy that the interlocking gear does not begin to close the altitude control before the half throttle position. In most cases the interlocking gear is arranged on the engine or machine instead of on the carburetter.

It should be clearly understood that this control in no way affects the automaticity of the carburetter, which remains constant—whatever the amount of control given—within the limits of mixture strength on which it is possible to run the engine.

In designing the carburetter, we have employed the years of experience gained with our well-known diffuser type of carburetter, and have in many respects extended and developed the functional principles, in addition to making constructional alterations to simplify the design and promote accessibility.

We were the first to employ a diffuser using a progressively emptied well, with air bleed, and that feature is retained. Its excellence is well exemplified by the many imitations placed on the market. The power jet principle of which we were pioneers and which fulfils as no other can, the fundamental requirement of maximum power at full throttle, with economical running at part throttle, is incorporated in this carburetter.

The butterfly throttle now used is quite novel in principle, and is not only the throttle, but is definitely part of the slow running system.

A form of float gear to give great capacity with a given size of float chamber is used.

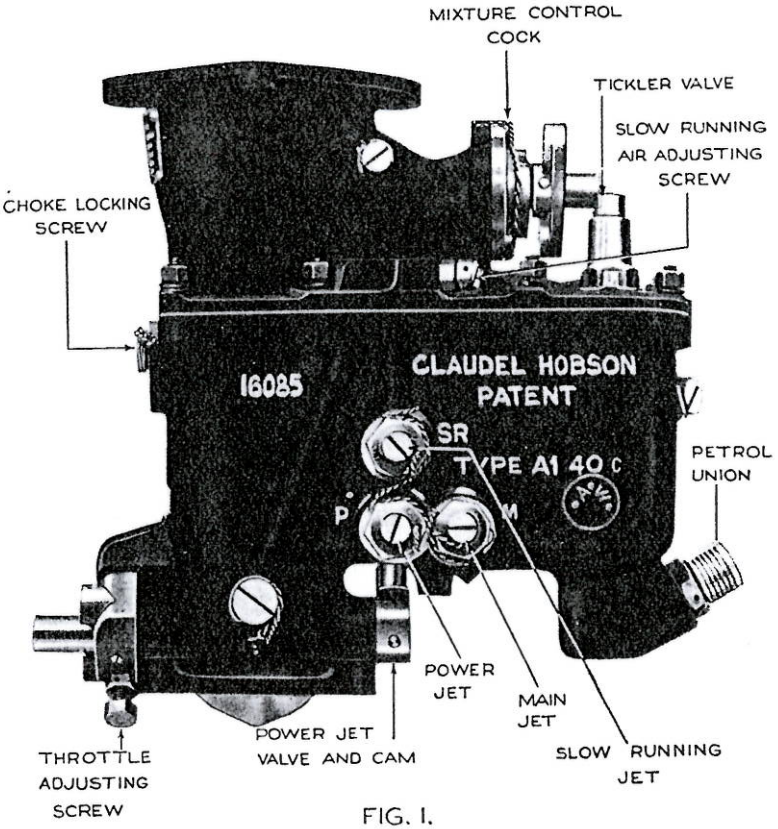

MIXTURE CONTROL COCK
TICKLER VALVE
SLOW RUNNING AIR ADJUSTING SCREW
CHOKE LOCKING SCREW
16085
CLAUDEL HOBSON PATENT
SR
TYPE A1 40 C
P
M
PETROL UNION
POWER JET
MAIN JET
SLOW RUNNING JET
POWER JET VALVE AND CAM
THROTTLE ADJUSTING SCREW

FIG. 1.

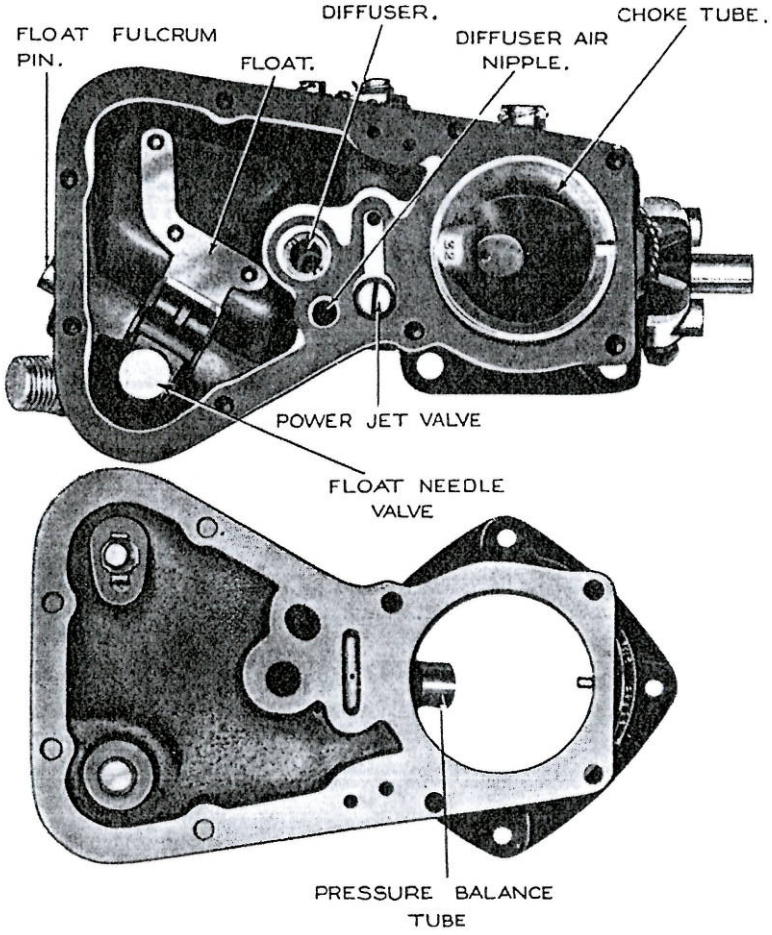

FLOAT FULCRUM PIN.
DIFFUSER.
FLOAT.
DIFFUSER AIR NIPPLE.
CHOKE TUBE.
POWER JET VALVE
FLOAT NEEDLE VALVE
PRESSURE BALANCE TUBE

FIG. 2.

ADJUSTMENT INSTRUCTIONS.

The idling or slow running jet (*Fig.* 1) feeds the slow running mixture to a hole situated in the side of the carburetter body adjacent to the edge of the butterfly throttle. The feature of the slow running in this carburetter is the use of a passage situated in the throttle, which registers in the closed position with one slow running hole. It will be seen that the mixture is drawn not only past the edge of the throttle when the latter is a little way open, but is also drawn through the passage in the throttle, or as we style it, the "transverse hole," and a portion of the mixture emerges from the throttle adjacent to the other side of the carburetter bore. There is a further small hole in the centre of the throttle through which emerges another portion of the slow running mixture, and it will be seen that by this means, the mixture is not fed entirely to one side of the induction system, but more or less evenly throughout the whole area. Also due to the fact that the depression increases on the transverse hole throughout the early part of the throttle movement, the "flat spot"—which is so prevalent on other types of butterfly throttle carburetters—is obviated.

The adjustment of the slow running mixture is carried out by means of a change of jet (*Fig.* 1), final adjustment being carried out by the slow running air adjusting screw (*Fig.* 1). This screw admits more or less air to the slow running system, thereby altering its richness or quality. Turning the screw in a clockwise direction shuts off the air, and gives a richer mixture.

Note.

At no time should it be necessary to adjust the slow running screw to the richest possible position, as such a setting indicates (1) air leaks in the induction system, either at joints or valve guides; (2) slow running jet too small or partially choked. On a new or re-conditioned engine, the screw should always be at least a few turns from the "full rich" position when correctly set for good "tick-over," so as to allow a margin for future adjustment as the engine wears.

Action of Diffuser and Choke Tube.
Small Throttle Opening.

Mixture is drawn through the emulsion passage in the body of the carburetter and into the choke tube (*Fig.* 2), via the choke delivery tube.

The control of the quality of the main mixture supplied is carried out by means of a change of the main jet (*Fig.* 1). This latter adjustment can be made by simply removing the main jet, *which is integral with the external plug*, from the side of the carburetter; no other dismantling of parts being necessary.

Control of the amount of air supplied to the diffuser is carried out by means of the diffuser air nipple (*Fig.* 2). This can be varied in size to give a richer or weaker mixture at the larger throttle openings. In some cases no nipple is used, the control being left to the diffuser depression holes, but in most cases the carburetter is supplied with a suitable nipple, and only in exceptional circumstances will it be necessary for the size of this to be altered. If this is found necessary, a larger nipple should be used to weaken the mixture at full throttle whereas a smaller one should be used to enrich the mixture at full throttle.

Full Throttle.
Power Jet.

The Claudel-Hobson power jet supplies a small amount of petrol at full throttle only. By this means the mixture strength throughout the cruising range can be maintained at an economical proportion, whilst maximum power is obtained at full throttle where it is desired.

The power jet is situated in the side of the carburetter adjacent to the main jet (*Fig.* 1), and is removed in a precisely similar manner to the latter. The control of the supply is carried out by means of a small valve situated in the bottom half of the carburetter and operated by a cam on the end of the throttle spindle (*Fig.* 1).

Throughout all the range of these carburetters, the jets are flow calibrated, and the numbers represent the cubic centimetres of petrol which they pass on a recognised standard measuring instrument, and it is advisable not to interfere with these in any way, but to replace with others which give the required flow. The jets are grouped on the side of the float chamber directly below the slow running air adjusting screw, and the body is marked to indicate each jet, *i.e.*, S.R. slow running, M. main, P. power.

Float Mechanism.

The conventional type of needle valve is adopted, but the use of a float (*Fig.* 1) with a very much increased leverage gives greater power of resistance to the petrol head than with other types and flooding is not likely to occur under normal circumstances. Petrol lever is set 23-25 m/m. from top of float chamber when tested at a pressure of ½-lb.

ADJUSTMENTS AND MAINTENANCE.

It may be taken as a definite rule that carburetters supplied by engine makers with, or for their engines have jets, diffusers, etc., the sizes of which have been decided upon after exhaustive experiments. It is highly desirable that no alteration shall be made except on their explicit instructions, although for use in the tropics one or two sizes smaller main jets are sometimes permissible.

Maintenance.

Care must be taken when dismantling for cleaning that the joint washer between the two halves of the carburetter is not broken, as any leak into the float chamber alters the function of the carburetter.

When re-building, the studs should be tightened in centre of top half first to prevent distortion of the flanges.

If it is found necessary to adjust the petrol level, the lock washer under the needle seat may be altered in thickness. Increasing the thickness lowers the level.

Care must be taken when removing the float not to damage the varnish, as this coating prevents the float from getting petrol logged.

The float must be assembled the correct way up, that is, with the T. which is cast on float lever uppermost.

When the needle valve is badly worn, it must not be ground in, but should be replaced complete with a new seat.

The diffuser should be removed occasionally for cleaning. This is done by removing the top half of the carburetter, and with a screwdriver with a blade $\frac{3}{8}$" wide, the diffuser tube may be unscrewed out of the body (*Fig.* 2). Care should be taken that the size of the holes remain unaltered when cleaning and that the top face will make a good seat in the body, as any leak here is liable to cause a flat spot and weak consumption.

A check should be made that the choke is held tightly in the bottom half and that the locking screw (*Fig.* 1) is locating in the hole in the choke and is tight.

Power Jet Valve.

This can be tested for leakage by removing the top half of carburetter, when the valve head will be found in a recess (*Fig.* 2). This recess may be filled with petrol which will not leak away if the valve is sound.

Mixture Control Cock.

This should be taken out after a long storage to remove any possible traces of corrosion and must be, when fitted again, air-tight. Smear with castor oil before assembling.

This should be tested by removing the top half and holding with its joint face uppermost and pouring petrol in the inlet hole to the cock, which should hold. Any leak at the valve will cause the mixture to be weak through the whole throttle range.

It is permissible to lap this cock in with a very fine abrasive, such as metal polish paste. Anything coarser than this spoils the seat.

The pressure balance tube (*Fig.* 2), gauze should be blown out occasionally.

Care should be taken when replacing the jets that the fibre washer is in place on the spiggot of the jet, otherwise a part of the washer may be sheared off when the jet is screwed in and cause obstruction.

It should be remembered that many things, such as defective plugs, faulty ignition timing, leaky valves, etc., can all cause symptoms that appear to point to a carburetter defect, yet obviously no amount of carburetter readjustment can be more than at the most a temporary palliative.

One further point should be emphasised. Even a minor alteration from the air intake, as designed by the engine makers, can cause quite disproportionate alterations in carburation.