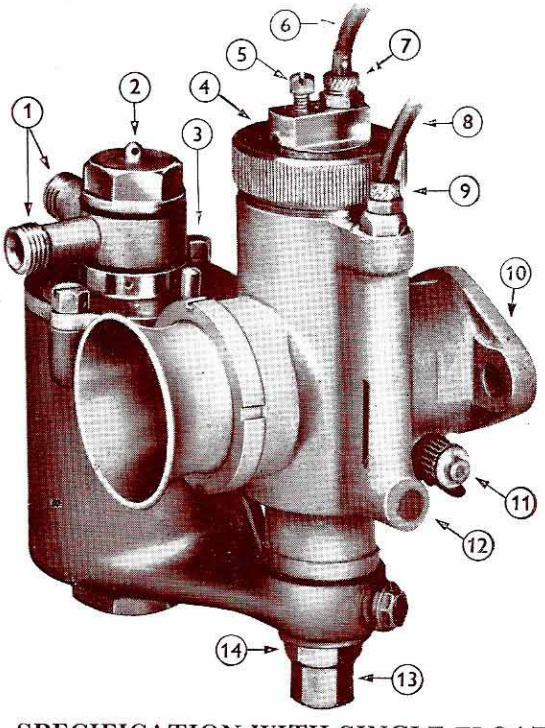
LIST No. A374
(January 1st, 1952)

Amal T.T. Carburetters

FOR RACING ON ALL FUELS

Types — 15TT, 10TT.



These later models are made in two sizes and are marked Type 15 T.T.9 and Type 10 T.T.9: they differ from the earlier models prior to 1949 in that they have type 302 top feed float chamber, throttles operated by a large conical spring, and the locking device for the mixing chamber ring is now a leaf spring.

1. BANJO (TWIN) 90°, *horizontal petrol pipe connections.*
2. BANJO NUT with hole *for security wire.*
3. FLOAT CHAMBER COVER SCREW. *See tickler below for flooding.*
4. MIXING CHAMBER CAP. *A screwed ring.*
5. ADJUSTING SCREW FOR LOCK PLUNGER, *to secure ring No. 4.*

NOTE: The latest models do not have this screw: the lock ring 4 is now secured by a leaf spring, the end of which presses into the serrations of the ring.

6. THROTTLE CABLE.
7. THROTTLE CABLE ADJUSTER *with lock nut.*
8. AIR CABLE *for mixture control.*
9. AIR CABLE ADJUSTER *with lock nut.*
10. FLANGE ATTACHMENT TO ENGINE *alternative to clip fitting.*
11. PILOT NEEDLE, *adjustment for slow running.*
12. MIXTURE CONTROL BOSS. *Air admitted through slot.*
13. JET HOLDER PLUG SCREW *remove to get at main jet.*
14. JET HOLDER, *also holds float chamber to mixing chamber body.*

AMAL

THE CARBURETTER of Records & Successes

SPECIFICATION WITH SINGLE FLOAT CHAMBER:—

	TYPE 15 T.T.9	TYPE 10 T.T.9
Price of carburetter in light metal as illustrated without cables and controls (specify angle if inclined) supplied alternatively with flange or clip fitting*	**£10 0s. 0d.**	**£10 10s. 0d.**
Effective choke bores, the diameters of which are measured behind the throttle on the engine side	$\frac{7}{8}$″ $\frac{15}{16}$″ 1″	$1\frac{1}{16}$″ $1\frac{3}{32}$″ $1\frac{1}{8}$″ $1\frac{5}{32}$″ $1\frac{3}{16}$″
*Standard clip fittings for induction pipes of dias.	$1\frac{1}{8}$″ $1\frac{1}{4}$″	$1\frac{1}{4}$″ $1\frac{3}{8}$″
The distance from the centre of mixing chamber: to the end of the clip fitting	$2\frac{1}{4}$″	$2\frac{9}{16}$″
to the end of flange attachment	$1\frac{3}{4}$″ $2\frac{1}{2}$″	$1\frac{3}{4}$″ $2\frac{1}{2}$″
Throttle slide diameter for purposes of identification	$1\frac{9}{32}$″	$1\frac{1}{2}$″

*Alternatively the carburetters that have flange attachment have bolt hole centres of 2″ in both types.

EXTRAS FOR EACH TYPE :—

	s.	d.	
Throttle and air control cables up to 4ft. long or 1·22 metres (if over this, 6d. a ft. extra)	2	6	each
Mid-way cable adjusters	1	6	each
Single lever for air control	9	0	each
Racing twist grips. Long 7″ (178 m/m.) or Short $5\frac{1}{2}$″ (140 m/m.)	11	0	each
Dummy grips	2	0	each
Spare needle jets (interchangeable) ..	2	6	each
Spare main jets (interchangeable) ..	1	6	each
Spare throttles with various cut-aways:			
For Types 15 T.T.	8	6	each
For Types 10 T.T.	8	6	each

A double banjo petrol pipe connection at 90° as illustrated is standard; alternatively the connections may be at 180° in a straight line. If only one connection is required—viz., a single banjo, the price of the carburetter is reduced by 3s. 9d.

Read through above and also notes on foot of page 4 before ordering.

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AMAL LTD., Holford Works, Perry Barr, BIRMINGHAM, 20

TELEPHONE: BIRCHFIELDS 4571 (5 lines). ENGLAND. **TELEGRAMS: AMALCARB, BIRMINGHAM.**

RACING CARBURATION CONSIDERED

The " choke " or effective bore of the carburetter is of great importance for maximum speed. The design in this carburetter is such that the maximum volume of air may flow through to charge the cylinder also causing the maximum depression or suction on the jet to supply the fuel and atomise it.

THE CHOKE of the T.T. model may have its smallest diameter between the throttle barrel and the outlet of the carburetter, and not immediately over the jet, as in previous designs. This has been done to minimise any restriction caused by the needle and has increased the power at full throttle to the level of the famous Amal Track Racing Carburetter whilst retaining the quality of mixture at small throttle openings. *Thus* when measuring a T.T. choke size measure the bore diameter at the back of the throttle.

Another thing, when deciding on a choke size for your engine do not simply accept a carburetter because it is for an engine of a certain size. The peak revs. of the engine should be ascertained. For example—leaving out all considerations of valve opening and bore stroke ratio, etc.—a 500 c.c. engine with peak revs. of

5,000 r.p.m. would require a T.T. carburetter bore of $1\frac{1}{16}$".
6,000 r.p.m. would require a T.T. carburetter bore of $1\frac{5}{32}$".

We shall be pleased to advise you on this matter when you give us this information, obtained either from the engine manufacturer or by yourself by calculation from road speed and gear ratio ; other factors governing the size of bore come in, and the chart on page 4 will be a guide to you.

A word about fitting the **CARBURETTER.** Generally speaking, it is well to have a distance of about 7" between the inlet valve and the centre of the mixing chamber, also that the outlet bore of the carburetter matches up smoothly with the inlet port. Flange fitting is recommended to overcome the possibility of air leaks.

These T.T. carburetters can be supplied for *vertical and inclined fittings*—the last named are sometimes called " Down-draught." No doubt a falling mixture is more likely to charge the cylinder effectively, but the important fact to realise is that when the fitting is inclined, the shape of the induction port is straightened out, and this is where the efficiency lies. A vertical carburetter may be inclined to a maximum of 15° and have a special float chamber.
On a twin cylinder engine a carburetter to each cylinder is an advantage for maximum power.

Now about the **NEEDLE** control to the jet ; don't go away with the idea that all you require in a racing carburetter is that it will give you greatest power at full bore, and that in racing you are always on full throttle. Remember there are " Governor's Bridges," and also that you have to " get up " to full bore. Perfect carburation throughout the range of the opening of the throttle means ACCELERATION clean and snappy. This is where the needle control plays its part ; you have a large main jet for power and for cooling the engine, and unless it is controlled it may give you a woolly rich mixture at small throttle openings—bad for acceleration and plugs. The needle reduces the flow of petrol above the main jet, and being taper, it reduces it most at small throttle openings, and as the throttle is opened, so the taper allows a bigger flow until the throttle is about three-quarters open, when the needle ceases to have any effect, and the main jet is fully in play. The needle is attached to the throttle by a clip, the clip embracing one of seven grooves. This enables you to tune on the needle once you have set the main jet for power, by lowering the needle to get less petrol and *vice versa*, in its relation to the throttle opening. The needle is controlling the fuel flow in a needle jet, which has an accurately made bore, and this screws into the bolt that holds the float chamber to the mixing chamber. The standard needle jet bores are numbered ·107 for carburetter bore sizes up to 1.1/32" and ·109 for bore sizes over 1.1/32".

THE THROTTLE valve surrounds the choke block in the carburetter, and when it is open leaves a perfectly shaped passage : Apart from controlling the main jet outlet, it is also used to control the supply of air to the main jet supply at low throttle openings—this actual control is by means of the cut-away on the lower edge of the intake side of the throttle valve—a smaller cut-away increasing the mixture strength at smaller throttle openings and a larger cut-away a weakening effect.

Throttles with different cut-aways can be supplied, the number of the cut-away being the height of the cut-away from the bottom edge measured in sixteenths of an inch.

JETS. The pilot jet, for starting off with, is unlike the standard Amal touring pilot jet because the adjustment regulates the fuel flow and not the air. This adjustment gives a wider range for any fuel which is mixed with air coming through a small hole under the carburetter—this mixture for idling and " starting off " passes through into the carburetter outlet just behind the throttle, and is again mixed with air coming under the throttle through the main bore.

The main jet can be got at easily without disturbing the float chamber by removing the hexagon cap under the bolt that holds the float chamber to the mixing chamber.

FLOAT CHAMBER. The float chamber fitted to the current model T.T. Carburetter is of a modified top-feed design incorporating a large-headed needle and seating, which ensures that the float chamber is capable of passing 10 gallons an hour, which is more than enough even when pure alcohol fuel is used. Consequently, the introduction of this float chamber has removed the necessity for a double float chamber as previously, except in one or two exceptional cases such as dirt track use and occasional sidecar use, but in every normal case we recommend the usage of the single large-flow Racing Float Chamber.

LOCKING DEVICES. Vibration causes parts to come undone, so we have devised simple and quick locking devices that are sure, *viz.*, a screw in the mixing chamber cap* to lock the ring at the top, and a drilled boss for wiring up to hold the float chamber holding screw to prevent it from vibrating loose. For the petrol pipe union we leave you to make your own device.

***Note :**—Certain models may have the mixing chamber cap secured by a leaf spring which is anchored on to the air funnel, instead of the screw 5 as illustrated on page 1.

COMPENSATION AND AIR CONTROL. The main jet does not spray directly into the choke bore of the mixing chamber. It first passes through the needle-jet and is there partially atomised by a blast of primary air, and passes up as a rich mixture through a primary choke, which can be seen at the base of the main choke. The richness of the mixture as it passes through the primary choke can be handlebar regulated by the air control at the side of the carburetter, less air being admitted to richen the mixture for starting or atmospheric conditions demanding more liquid fuel to give the correct mixture strength. As the engine speed increases at a given throttle opening so the mixture would tend to get rich, but as the air flow through the primary choke above the main jet also increases, there is a damping effect on the flow of liquid and a compensated mixture is obtained.

NEEDLE-JET. Before tuning the carburetter, confirm that the correct size needle-jet is fitted as specified below. The needle-jets for Types 10 and 15 T.T. carburetters are the same length but they may have different bores—the diameters of which are stamped on them. The following are the sizes to be used :—

Petrol and Petrol-Benzol Carburetters with bores of up to $1\frac{1}{32}''$, needle-jet ·107.
Petrol and Petrol-Benzol Carburetters with bores of over $1\frac{1}{32}''$, needle-jet ·109.
Alcohol fuels, as set out below. { For 350 c.c. cylinders or less use needle-jet ·113. For cylinders of over 350 c.c. use needle-jet ·120.

ALCOHOL FUELS. When an alcohol fuel is used, the needle-jet as mentioned above must be used and it is also necessary to use a larger main jet than for petrol-benzol fuel.

CHOICE OF FUEL. We are often asked which is the most suitable fuel to use, and we answer :—Consult your engine maker as to valve timing, compression ratio, etc., and when you know the appropriate fuel for these conditions, follow the instructions given here for carburetter tuning.

MAIN JETS FOR ALCOHOL FUELS. The size of these jets has to be calculated as an increase on the size of the jets used for petrol-benzol mixtures, an indication of which is given at the top of page 4 overleaf, for 50-50 mixtures. The increases are set out as follows for different standard fuels :—

Methanol, increase by 150%.	SHELL fuel R.S.1, increase by 150%.
JAP Racing fuel, increase by 150%.	R.S.2, increase by 140%.
ESSO No. 1 fuel, increase by 150%.	R.S.5, increase by 125%.
ESSO No. 2 fuel, increase by 120%.	R.S.7, increase by 100%.
ESSO No. 3 fuel, increase by 130%.	R.S.8, increase by 50%.

NOTE.—When calculating the jet size on the basis of the jet size used for petrol-benzol mixtures—the per cent. increase must be added to the original jet size and the total is the new size of jet to be used for the particular fuel. EXAMPLE : If a Jet No. 300 was used for petrol-benzol and it was decided to change over to METHANOL, which requires an increase of 150% adding to the original jet size 300.

Calculate this way :— $\left(\frac{\%\text{ increase} \times \text{original jet size}}{100}\right) + \text{original jet size}$ | namely $\left(\frac{150 \times 300}{100}\right) + 300 = 450 + 300 = 750.$

The answer is, use main jet 750 and the appropriate needle-jet for alcohol fuels as given in a paragraph above, entitled *Needle-Jet.*

When using " alcohol mixtures " we cannot say the size of increase, and these sizes must be tried by experiment, always bearing in mind that there is a danger of overheating in a weak mixture, even though the machine is running well. The sparking plug is a good indication :—If after a fast run at full throttle you stop the engine at once and take out the plug, if it is grey at the end put in a bigger main jet. The colour of the plug should be a polished jet black for safety.

P.T.O. for Petrol-Benzol Setting Guide.

Approximate Sizes as a guide for Petrol-Benzol Fuel.

Single cyl. engine at average peak revs.	Carb. type	Effective bore of Carb. at back of throttle	Throttle Valve No.	Needle Jet	Needle position	Main jet in c.c. flow
175 c.c.	15T.T.	$\frac{7}{8}$"	5	·107	4	220
250 c.c.	15T.T.	$\frac{15}{16}$"	5	·107	4	270
350 c.c.	10T.T.	$1\frac{1}{16}$"	5	·109	4	350
500 c.c.	10T.T.	$1\frac{1}{8}$"	5	·109	4	420

TUNING INSTRUCTIONS.

NOTE—These general instructions may also be used for older models prior to 1949, but note however that throttles and springs are not interchangeable between the old and new models. (Spares for older models, see list 441 series).

To get carburation for any stated fuel when the choke bore is correct for the peak revs. of the engine and the correct needle jet for the fuel to be used, the procedure is simple. Start off with an assumed setting, and then tune as follows. There are four phases :

(1) Main jet for power at full throttle ;
(2) Pilot jet for idling ;
(3) Throttle cut-away for " take off " from the pilot jet ;
(4) Needle position for snappy mixture at quarter to three-quarter throttle ; then final idling adjustment of the pilot jet.

Always tune in this order, then any alteration will not upset a correct phase.

SEQUENCE OF TUNING. (1) Main jet size. (2) Pilot jet adjustment. (3) Throttle valve cut-away. (4) Needle attachment.

1. MAIN JET SIZE. This should be determined first : the smallest jet which gives the greatest maximum speed should be selected, keeping in mind the safety factor for cooling. (*The air lever should be fully open during these tests*).

2. PILOT JET ADJUSTMENT. Before attempting to set the pilot adjuster the engine should be at its normal running temperature, otherwise a faulty adjustment is possible, which will upset the correct selection of the throttle valve. The pilot adjuster, which controls the amount of fuel passed, is rotated clockwise to weaken the mixture, and anti-clockwise to richen it. Adjust this very gradually until a satisfactory tick-over is obtained, but take care that the achievement of too slow a tick-over—that is, slower than is actually necessary—does not lead to a " spot " which may cause stalling when the throttle is very slightly open.

3. THROTTLE CUT-AWAY. Having set the pilot adjuster, open up the *throttle* progressively and note positions where, if at all, the exhaust note becomes irregular. If this is noticed, leave the throttle open at this position and close the air lever slightly ; this will indicate whether the spot is rich or weak. If it is a rich spot, fit a throttle valve with more *cut-away* on the air intake side (or *vice versa* if weak).

4. JET NEEDLE POSITION. Tuning sequence 2 & 3 will affect carburation up to somewhere over one-quarter throttle, after which the jet *needle*, which is suspended from the throttle valve, comes into action and when the throttle is opened further and tests are again made for rich or weak spots, as previously outlined, the needle can be raised to richen or lowered to weaken the mixture, whichever may be found necessary. With these adjustments correctly made, and the main jet size settled, a perfectly progressive mixture will be obtainable from tick-over to full throttle. The jet **needles** are interchangeable in both carburetters T15 & 10.

HOW TO ORDER.

See specification and extras on page 1.

State size and make of engine and fuel to be used.
If possible, state the peak revs. of the engine and the compression ratio.
State the method of attachment to the engine and the size of the clip fitting or flange dimensions and the inlet bore in the cylinder, also the length of the carburetter attachment (see price list specification).
State whether the mixing chamber is to be vertical or inclined up to a maximum of 15° out of the vertical.
Top feed float chambers with horizontal banjo petrol pipe connections are only supplied ; specify if a 180° double banjo is wanted or if only a single one is required.
State if controls to be supplied, viz., lever for mixture control and twist grip for throttle, double levers, or two single levers, also state lengths of cables and if mid-way cable adjusters are wanted. Do not control the air by twist grip.
State diameter of handlebar and length of straight on it if twist grip is wanted also—touring or racing grip. Do you want a dummy grip to match on left-hand bar ?

USEFUL SPARES TO HAVE WHEN TUNING UP A CARBURETTER:—(Also see Spares List 449).
Needle-jets for use with alcohol fuels (the same needle jet is interchangeable in both carburetters but specify size required).
Main jet, any size calibration according to requirements. (The jets are interchangeable in both carburetters).
Throttles with different cut-aways. State if for type 10 or 15. When a new throttle is fitted see that it closes properly.

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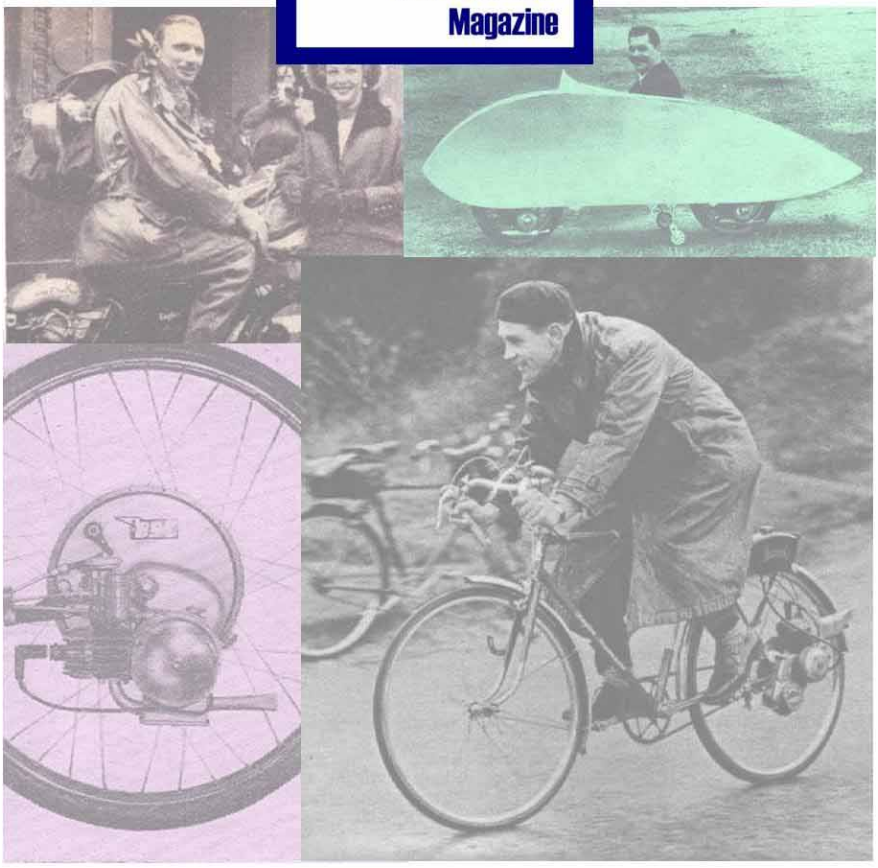

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