

# **BSA SERVICE SHEET No. 708C**

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## **CARBURATION. "D" Group Models.**

### **A CARBURETTOR WITH NEEDLE CONTROLLED SINGLE JET**

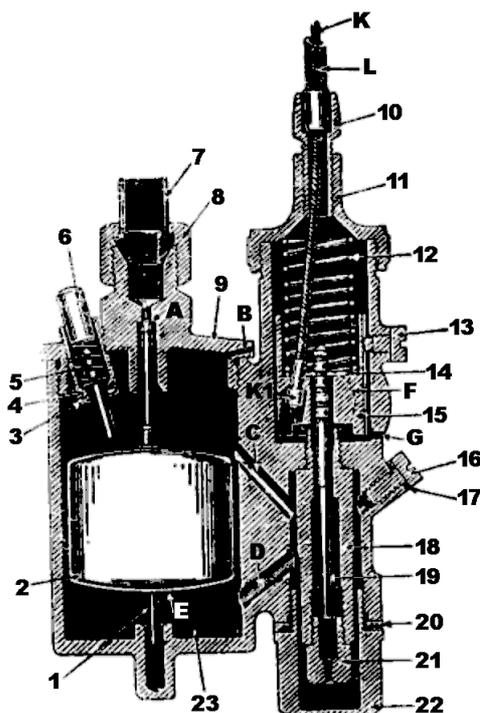


Fig. X13.

*This sectioned diagram is taken through the centre of the mixing chamber and float chamber, showing the float and jet and throttle mechanism. The float and needle are shown as one piece as for types 259 and 261, but in type 223 the float needle (1) is separate from the float (2), but is attached thereto by a spring bow fastened to the float at the place marked (E). The cable (K) and its anchoring (K1) are diagrammatic as in practice the cable anchoring is in front of the jet.*

### **HOW IT WORKS**

This carburettor is designed to suit small engines and to eliminate any difficulty arising out of the use of very small jets. The control is automatic, the hand lever on the bar operating the throttle (15), which in its turn controls the mixture according to engine speed.

The full power control of mixture is by the main jet (21) feeding the engine through a needle jet (18), in which there is a needle (19). The taper on the needle controls the mixture at lesser throttle openings, and the position of the taper in the needle jet, providing a means for richening or weakening the mixture at various throttle positions. The needle is located in the throttle (19) by a circular spring clip (14) held down by the throttle spring (12) and the needle itself is positioned by the particular groove that the clip (14) is fixed to.

For idling, the fuel supply is controlled by the parallel portion of the needle (19) entering the bore of the needle jet (18), the difference in diameter being the jet orifice, which is small—although in case of obstruction or gumming up due to the petrol and oil system, it can be instantly cleared by opening the throttle.

The petrol feed is into the top of the float chamber (7) where constant levels are maintained, and the petrol at these levels flows to the main jet (21) through a passage (D), and air locks are liberated through the passage (C), back into the float chamber at the top.

The jets (18 and 21) can be got at by undoing jet plug (22). The throttle (15) and adjustable needle (19) can be removed by unscrewing the mixing chamber top (11). The throttle is guided by screw (13) working in a groove in the throttle, and the slot in the throttle enables the cable (K) to be quickly detached.

The intake of the carburetor may have an air strainer and a strangler for closing off the air only for starting when cold.

### **CARBURETTOR WITH NEEDLE CONTROLLED SINGLE JET**

#### **Names of Parts:—**

- |                              |                                    |                       |
|------------------------------|------------------------------------|-----------------------|
| 1. Float needle.             | 9. Float chamber cover.            | 17. Feed hole washer. |
| 2. Float                     | 10. Cable adjuster.                | 18. Needle jet.       |
| 3. Tickler cotter.           | 11. Mixing chamber top.            | 19. Jet needle.       |
| 4. Tickler bush.             | 12. Throttle spring.               | 20. Jet plug washer.  |
| 5. Tickler spring.           | 13. Throttle valve location screw. | 21. Main jet.         |
| 6. Tickler                   | 14. Jet needle clip.               | 22. Jet plug.         |
| 7. Petrol pipe union nipple. | 15. Throttle valve.                | 23. Float chamber.    |
| 8. Petrol pipe union nut.    | 16. Feed hole screw                |                       |

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- A. Petrol feed needle seat.
- B. Air vent hole in float chamber cover.
- C. Air release passage from 1st chamber into float chamber.
- D. Petrol feed passage from float chamber to main jet (21).
- E. The illustration shows the float and needle as one piece, but if the needle is separate, the float has a spring bow at this point to hold the needle in a groove.
- F. The choke bore of the carburettor, the size of which is specified according to engine size and maximum revs.
- G. Drain hole from mixing chamber to liberate any excess petrol due to flooding.
- H. Guide groove in the throttle to prevent incorrect assembly.
- J. Cutaway of the throttle. There are various cutaways, which are numbered and marked on the bottom of the throttle. The cutaway affects the mixture up to half-throttle position.
- K. Throttle cable.
- K1. Throttle cable nipple.
- L. Throttle cable outer cover.

### GENERAL MAINTENANCE INSTRUCTIONS

Keep the float chamber free from impurities, which are the commonest cause of flooding. Otherwise, if flooding takes place, remove the petrol pipe connection from the lid and clean out all the passages. See that the float needle is not bent, nor the petrol float clogged. If the needle seating is at fault, rub the needle lightly in by twisting it between finger and thumb. (Never use any grinding compound). If the needle itself has a deep groove in it on the taper end, a new needle and float may be necessary. When replacing the float chamber lid, first see that the blunt end of the float needle is in the guide hole at the bottom of the float chamber, and then guide the lid over the taper end of the needle before screwing down. Also see that the tickler works freely and springs back, and that the air hole in the rim of the lid is clear.

If the carburettor is ever removed from the induction pipe, see that it is pushed right home on to the pipe before locking the ring clip. Never fit the carburettor to a pipe on which it is slack, nor ever drive it in to a tight one. A carburettor should be a good push-fit on to the inlet pipe, and should be pushed on true with a screwing motion after having put a little oil on the pipe.

Keep the air intake or gauze free from obstruction and see that the air strangler, if of the knife type fitted into the intake of the carburettor, remains firmly open when opened. If it is inclined to be slack, bend it slightly to stiffen the movement.

If the throttle should become slack after years of use, it should be replaced, otherwise the slow-running may be interfered with. Also, if a throttle has become badly worn, it may be advisable also to replace the needle jet, as this might wear slightly large in diameter through the movement of the needle in the same, thus causing a richer mixture than necessary.

Also bad petrol consumption will be apparent if the throttle needle jet (18) has been worn; it may be remedied or improved by lowering the needle in the throttle, but if it cannot be—then the only remedy is to get a new needle jet.

### TRACING FAULTS—ASSUMING ENGINE IN GOOD ORDER AND EXHAUST SYSTEM NOT CHOKED

1. Assure yourself of ample petrol supply, good compression, clean sparking plug and good spark at the points. Also rectify if flooding and verify complete closing and opening of throttle and air strangler, and that the air intake gauze or filter are clean.
2. Verify carburettor to be clean internally and that jet and passages are clear and that there is no air leak at the fitting of the carburettor to the engine. Also verify that main jet and needle jet are screwed up firmly.
3. When the above points are in order, there are only two possible faults in carburation—either the mixture is RICH or WEAK, and **you must determine which of the two is causing inefficient running, and at what throttle opening**, so that the carburettor can be tuned correctly. Indications are as follows:—

#### For Richness:

- Black sooty smoke in exhaust.
- Petrol spraying out of carburettor.
- Two-stroke engine “four-stroking”.
- Heavy petrol consumption.
- Sparking plug sooty.
- Heavy lumpy running.
- Four-stroke engines “eight-stroking”.
- 4. Some causes for above producing:—

#### Richness:

- Punctured float or bent float needle.
- Tickler stuck down.
- Needle (19) raised too much.
- Main jet (21) too large or not screwed up.
- In old machines, needle jet (18) worn.
- Air filter choked.

#### For Weakness:

- “Spitting” in the carburettor.
- Erratic slow running.
- Poor acceleration.
- Engine runs better at less than full throttle opening.
- Overheating.
- Sparking plug dry grey colour around the points.

#### Weakness:

- Air leaks.
- Petrol supply or jet partially choked.
- Too small main jet (21).
- Needle (19) in too low position.
- Air gauze or filter been removed.
- Using petrol with water in it.

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5. If engine "idles" better after tickling the float and gives better power with air shutter partially closed, the mixture is weak.  
Idling with petrol turned off temporarily and no suspicion of spitting when opening throttle quickly when engine is cold—the mixture is rich.
6. Trouble at half to full throttle is most likely to be connected with the main jet (21) supply. Trouble at quarter to three-quarters throttle opening will be due to needle position. If the power is good, at full throttle, very poor acceleration is the effect of too low a needle position, which can be remedied. Bad, slow-running will probably be due to air leaks.

### HOW TO TUNE UP—(READ PARTS TO TUNE UP WITH)

- 1) Generally speaking: for power at full throttle the main jet is selected and at other lower throttle positions, the needle is either raised or lowered to richen or weaken the mixture.
- 2) To tune up precisely throughout the throttle range imagine four throttle positions:—
  - (a) Throttle slightly open as for idling.
  - (b) Throttle about quarter open as for running light.
  - (c) Throttle from one-quarter to three-quarters open as for general running.
  - (d) Throttle three-quarter to wide open as for full power.
- 3) From the preceding paragraph start tuning in this order, having read "PARTS TO TUNE UP WITH" and with the engine warmed up:—
  - 1st (d) use the smallest main jet (21) that will give full power when running under load on the level. If the engine runs slightly better with the throttle not quite wide open, the jet is either just right for economy or on the small side.
  - 2nd (c) set the needle (19) position as low as possible in relation to good acceleration and running at half throttle—"spitting" in the carburettor on acceleration means the needle is too low, so try a groove higher.
  - 3rd (a and b) if the idling mixture at (a) and the take off at (b) are weak—the engine spitting and fading out—use a smaller cutaway throttle, or if the engine runs lumpily on a rich mixture use a higher cutaway.
  - 4th Finally, if any alteration has been made to the throttle cutaway it may be necessary to alter the needle position again: putting in a throttle of a smaller cutaway may require the needle lowering by a groove and alternatively a larger cutaway may necessitate raising the needle.

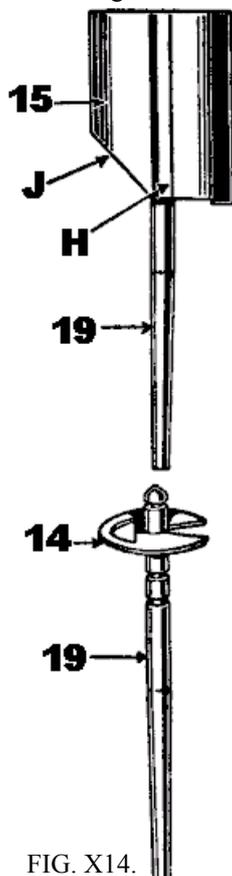


FIG. X14.

### PARTS TO TUNE UP WITH

**Main Jet (21)** with seal. This jet does not control the slow-running mixture, but it controls the maximum supply of petrol from half to full throttle positions. This jet is interchangeable with other larger Amal carburettors except for the number stamped on it, which indicates the amount of petrol that will flow through. The bigger the number the bigger the jet, and numbers go up and down in fives. Example, 20, 25, 30, etc. These jets should never be reamed out—the seal on the jet you may purchase is a guarantee of its size.

**Throttle (15).** This part is controlled from the handlebar, and from the shut-off to full-open position progressively increases the amount of gas taken into the engine. The slope at (J) is called the cutaway, and its number is stamped on the bottom. Throttles can be had with different cutaways—the bigger the cutaway and number the weaker the mixture for idling and up to half throttle positions and vice versa. The throttle holds the needle of the needle jet.

**Needle (19) for Needle Jet (28).** This works up and down with the throttle and the taper end goes into the needle jet, so controlling the amount of petrol at different throttle openings. Its position in the throttle and of its taper in the needle jet is therefore affected by which groove the clip (14) is fixed in: the extreme end groove is No. 1, giving the lowest position and the weakest mixture and vice versa, raising the needle richens the mixture. The spring clip (14) can be sprung off and on. (The illustration shows clip 14 in position 2.)

**Needle Jet (18),** see section. The standard jet is not marked in any way, but can be had in other sized bores on request, which are marked accordingly. If the mixture gets rich at half-throttle when the machine is old this needle jet has probably worn large and should be replaced. (Extreme weakness when idling may be corrected by a larger bore needle jet, which can be obtained on special application.)



FIG. X15

**For Tuning with Engine Running, but Cycle Stationary.**

**Air Shutter** on the intake of the carburettor. This is closed only for starting from cold to reduce the amount of air and to increase the suction on the jet. When tuning, however, the shutter might be used experimentally to indicate if richening the mixture improves matters.

**Tickler (6)**, see section. This is for pressing down the float needle off its seat to allow more petrol to come into the float chamber and so raise the petrol level, and consequently richening the mixture.

NOTE:—For Idling, if excessive richness cannot be cured by a larger cutaway nor will the throttle opening range allow a lower needle position—then change the needle jet for a new one, as the old one may be worn. If weakness prevents idling and cannot be cured by a smaller cutaway throttle and a raised needle position, use a larger bore needle jet, which will have its bore marked on it.

**GENERAL HINTS AND TIPS**

**Starting from Cold.** Flood the carburettor by depressing the tickler momentarily three or four times and close the air strangler; set the ignition, say half-retarded, then shut the throttle and open it a little, about one-eighth open; then kick-start.

When started, gradually open the throttle to make the engine run faster and when the engine is warmed up, close down again and open the strangler. Should the engine falter either tickle the float chamber again or partially close the strangler until the engine is warm enough to stand the strangler being opened fully.

**Starting with Engine Hot.** Do not flood the carburettor nor close the air strangler; set the ignition and close the throttle, then, open it again one-eighth of its movement and kick-start. If the engine does not start at once, flood slightly or close the strangler and try again. After starting, open the strangler but if this should cause the engine to falter and not respond to opening the throttle, flood the carburettor momentarily.

**Starting Generally.** Find out by experiment if and how much it is necessary to flood and also the best position for the air strangler on the carburettor intake.

Usually for easy starting a small throttle opening is desirable and the best position is accompanied by a sucking noise when the engine is being turned over. If this noise cannot be heard, the throttle is probably too wide open and there is, consequently, insufficient “pull” on the starting system.

Given a good engine and a fat spark at the plug, if the engine will not start, the mixture is either too rich or too weak.

Over-richness of the mixture, especially with petroil lubrication, may be caused by over-flooding or by the machine being left with the petrol tap turned on and the float chamber flooding. To clear this over-richness open the throttle wide, also the strangler, and turn the engine over several times, then close the throttle and start again. If the engine does not start at once, the sparking plug points may have become damp or oiled up, so remove the plug and dry the points, and whilst it is out, swing the engine over several times before replacing it; then try again without flooding and with strangler open.

**Cable Control.** See that there is a minimum of backlash when the control is set back and that any movement of the handlebar does not cause the throttle to open; this is done by the adjuster on top of the carburettor. See that the throttle shuts down freely.

**Petrol Feed, verification.** Detach petrol pipe union at the float chamber end; turn on petrol tap momentarily and see that fuel gushes out. Avoid petrol pipes with vertical loops as they cause air locks. Flooding may be due to a worn or bent needle or a leaky float, but nearly all flooding with new machines is due to impurities (grit, fluff, etc.) in the tank—so clean out the float chamber periodically till the trouble ceases. If the trouble persists, the tank might be drained, swilled out, etc.

**Fixing Carburettor and Air Leaks.** Erratic slow-running is often caused by air leaks, so verify there are none at the point of attachment to the cylinder or inlet pipe—check by means of an oil can and eliminate. Also in old machines look out for leaks caused by a worn throttle (or worn inlet valve guides if a four-stroke engine).

**Bad Petrol Consumption** of a new machine may be due to flooding caused by impurities from the petrol tank lodging on the float needle seat and so prevent its valve from closing. If the machine has had several years use, flooding may be caused by a worn float needle valve.

**Faults.** Read “Tracing Faults”. The trouble may not be carburation; if the trouble cannot be remedied by making mixture richer or weaker and you know the petrol feed is good and the carburettor is not flooding, the trouble is elsewhere.