

Section K5 - Carburettors and Automatic Choke

Part 2 - S.U. HIF7 Carburettors

Two different carburation systems are used dependent upon the specification of the vehicle. Either a Solex 4A1 or twin S.U. HIF7 carburettors are fitted, both having an automatic choke system.

For details of the carburettor(s) fault diagnosis, refer to Section K8.

S.U. HIF7

For details of the S.U. HIF7 carburettors fitted to cars with emission control systems (i.e. cars destined for Australia, Canada, Japan and the U.S.A.) refer to the appropriate 'model year' section within Chapter U - Emission control systems.

Description

Two S.U. HIF7 (Horizontal Integral Float Chamber) carburettors with 4,76 cm. (1.875 in.) choke bores (see Fig. K75) are fitted to the engine on a central 'tee' piece which is mounted over an eight branch induction manifold.

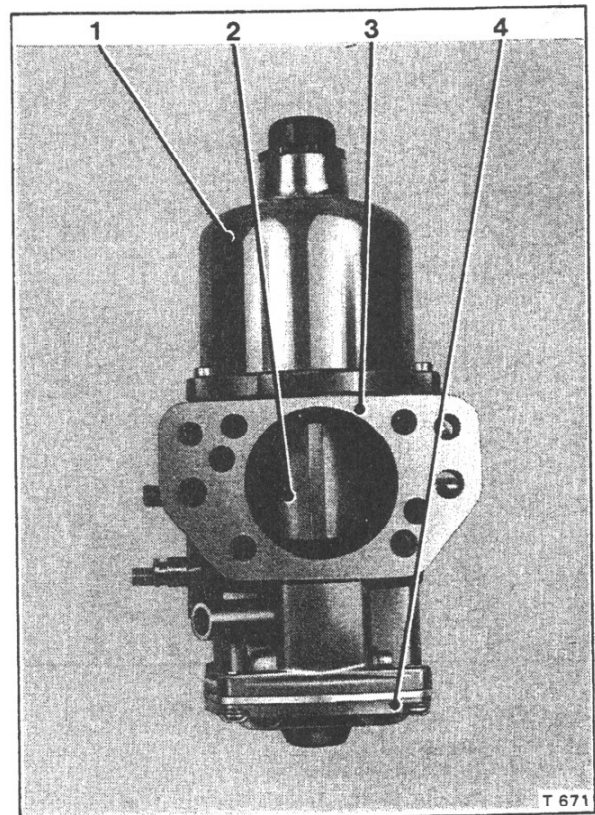


Fig. K75 S.U. HIF7 carburettor

- 1 Suction chamber
- 2 Piston
- 3 Carburettor body
- 4 Bottom cover-plate

This type of carburettor automatically adjusts both its choke and jet area to meet the demand of the engine which is dependent on engine speed and loading. As air is drawn through the carburettor, the piston acting as an obstruction will cause a depression to be formed in the area between the throttle and the piston. This depression is communicated by means of transfer holes in the base of the piston to the area above the piston, causing an upward force to be imposed on the piston. The piston will rise in response to this force, relieving the depression in the area between the piston and the throttle as it does so, until a point is reached where the force acting on the piston is balanced by the weight of the piston and the load exerted by the piston spring.

A spring-loaded jet needle is fitted to the carburettors, which is biased downstream and operates in a 2,54 mm. (0.10 in.) diameter main jet; this jet does not require centralising.

Float chamber (see Fig. K76)

The float chamber is incorporated in the main body

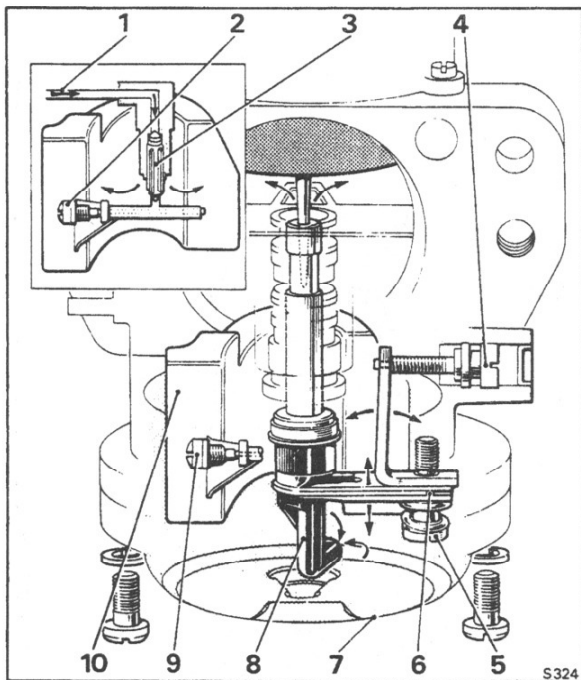


Fig. K76 Float chamber layout

- 1 Fuel inlet
- 2 Float fulcrum screw
- 3 Needle valve
- 4 Jet adjusting screw
- 5 Bi-metal pivot screw
- 6 Bi-metal assembly
- 7 Bottom cover-plate
- 8 Jet head
- 9 Float fulcrum screw
- 10 Concentric float

casting; access to the chamber is obtained by removing the bottom cover-plate (item 7). The moulded float (item 10) is shaped so that it surrounds the jet tube and is pivoted along a line parallel to the inlet flange. The float is retained by a spindle (items 2 and 9) which screws into the body casting.

Entry of the fuel into the float chamber is via a brass tube (item 1) in the side of the carburettor body to a needle valve assembly (item 3).

The jet is pressed into the top of an aluminium tube which is in turn pressed into a plastic moulding (item 8). This hollow moulding known as the jet head is open at its lower end allowing fuel to enter the jet tube.

Mixture adjustment (see Fig. K76)

The jet tube of the HIF type carburettor is moved in the vertical plane to provide mixture adjustment.

The jet adjustment assembly is comprised of a right-angled adjusting lever of unequal length arms riveted to a bi-metal blade (item 6).

The blade is cut out to accept the jet head (item 8) and the shape of the jet head is formed so that any movement of the bi-metal blade is transmitted to the jet head, moving it in the vertical plane.

The right-angled adjusting lever and bi-metal blade (item 6) are attached to the body casting by a spring-loaded retaining screw (item 5) positioned in the short arm of the lever. This attachment allows the adjusting lever to be pivoted at the outer edge of its short arm and is loaded by the spring towards the jet adjusting screw (item 4).

The jet adjusting screw is located at the outer end of the long arm of the adjusting lever; screwing the adjusting screw inward will lower the jet, enriching the mixture and unscrewing the adjusting screw will allow the spring to return the lever together with the jet, weakening the mixture.

After the mixture has been set the jet adjustment can be sealed by fitting a plug into the jet adjusting screw recess of the carburettor body.

HIF7 carburettors are set and balanced by accurate flow measuring techniques during manufacture and therefore, adjustment of the mixture screws should not be necessary.

Fuel temperature compensation (Viscosity compensator) (see Fig. K76)

This device alters the jet position in relation to the metering needle to compensate for changes in fuel viscosity which take place with changes in fuel temperature.

When the fuel temperature rises, the viscosity is lowered and in an uncompensated assembly this would allow more fuel to flow for a given jet/needle relationship.

In the HIF jet assembly the jet head is attached to a bi-metal blade (item 6). This bi-metal is immersed in the fuel in the float chamber and will

move in the vertical plane in response to changes in fuel temperature. The jet will be raised to a weaker position on the jet needle when the fuel temperature rises and will be lowered to a richer position when the temperature falls.

From this it will be seen that once the jet position has been selected by adjusting the mixture screw, alterations of fuel temperature will bring about slight alterations in jet position to compensate for the change in fuel viscosity.

The effect of this device is that drivability is improved over wide ranges of temperature, and that exhaust emissions can be kept within closer limits during cold starting and the warm-up period. Temperature compensation also allows carburettors to have the mixture setting pre-set and sealed before the car is delivered.

Overrun valves (see Fig. K77)

During overrun (i.e. when decelerating with the throttles closed), insufficient mixture is supplied to the engine to maintain satisfactory combustion. The overrun valves alleviate this condition by allowing some mixture to pass through the throttle plates (butterflies) at high inlet manifold depressions.

An overrun valve is fitted into the throttle plate of each carburetter

An overrun valve consists of a small disc retained in each throttle plate by a spring loaded plunger. Under normal conditions the disc is seated against the throttle plate. When the throttle is suddenly closed, the increased inlet manifold depression lifts the disc from its seating and allows a metered quantity of air/fuel mixture to pass through the throttle plate.

The action of the overrun valves maintains satisfactory combustion on overrun, thus reducing hydrocarbon emissions.

After the sudden closure of the throttles and as soon as the manifold depression falls, the overrun valve disc returns to its seat on the throttle plate.

Spring-loaded jet needle (see Fig. K78)

The jet needle fitted to each carburetter is biased towards a predetermined position in the jet orifice by means of a spring-loaded fixing.

The shoulder of the needle abuts a protrusion formed on the needle guide. Under the pressure of a spring the needle is held permanently in one position relative to the air flow. As the needle is retained in a predetermined position no jet centring is required and a non-centreable jet bearing is fitted. To ensure correct fitting the needle guide carries an etched alignment mark which should be positioned mid-way between the two cut-outs in the piston.

Carburetter fuel filter

A filter element is fitted into the fuel filter housing attached to the side of each carburetter. At the intervals specified in the Service Schedules these

two filter elements should be discarded and new ones fitted.

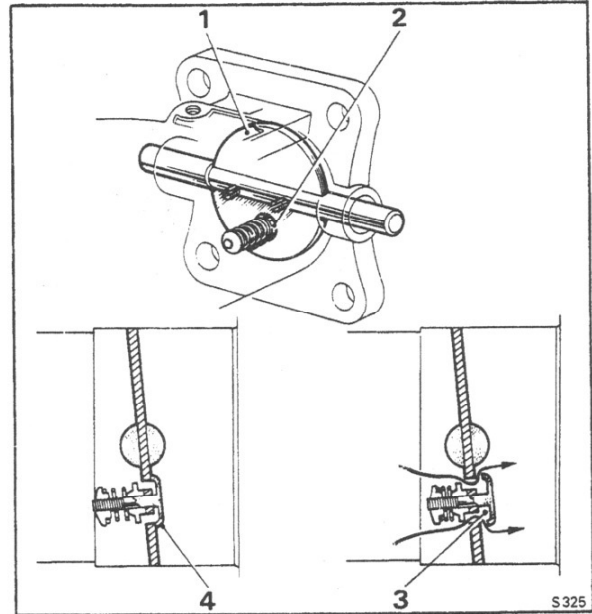


Fig. K77 Overrun valve

- 1 Throttle butterfly disc
- 2 Overrun valve
- 3 Overrun valve open
- 4 Overrun valve closed

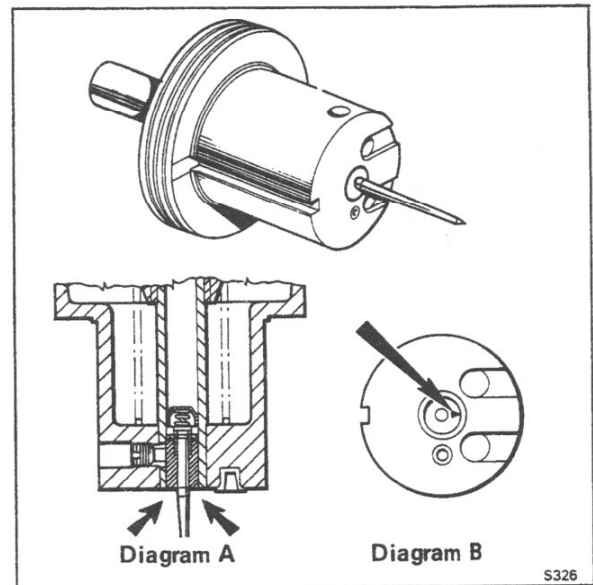


Fig. K78 Spring-loaded jet needle

- Diagram A
Needle guide height setting
- Diagram B
Needle guide alignment setting

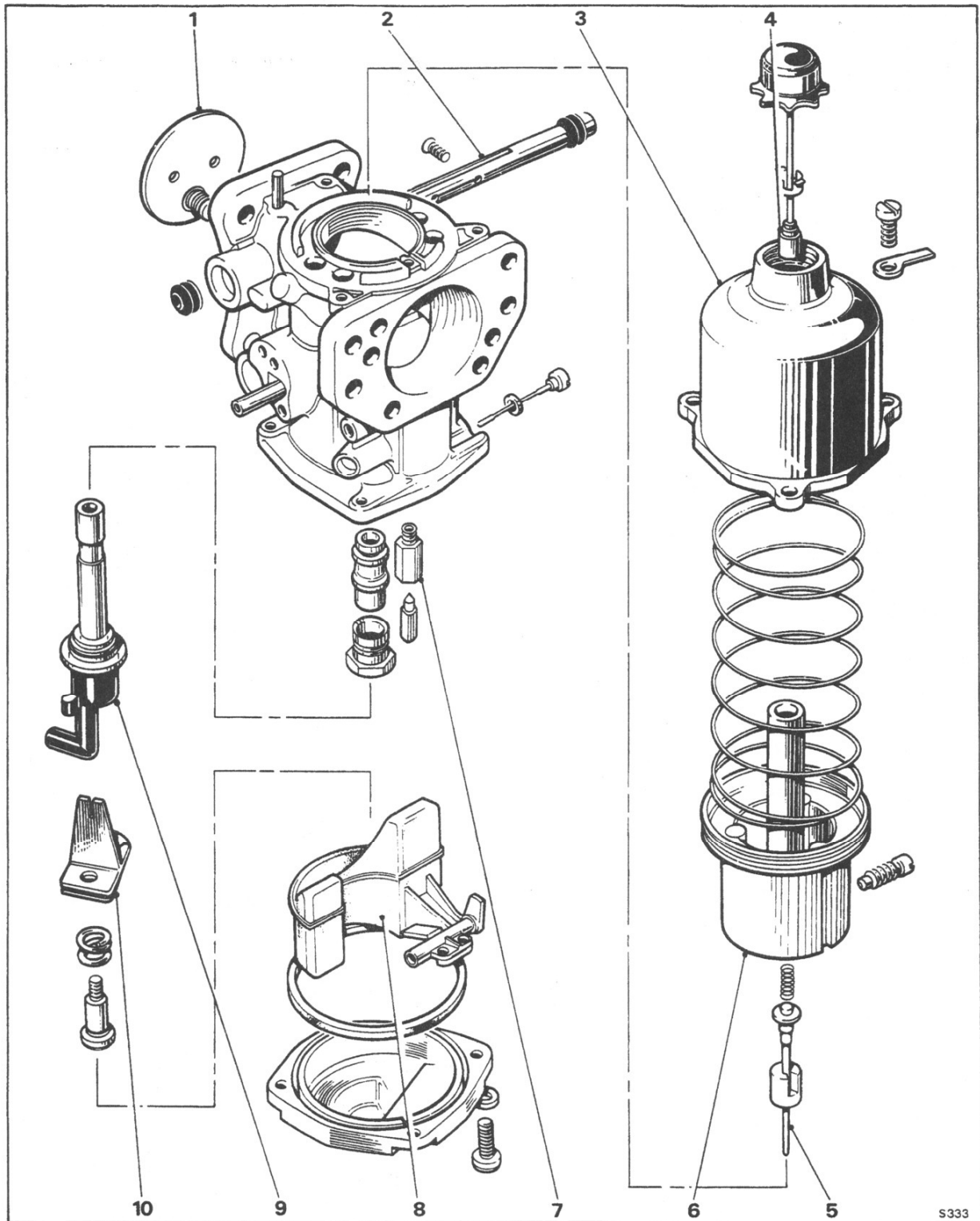


Fig. K79 SU HIF7 carburetter

- 1 Throttle disc with overrun valve
- 2 Throttle spindle
- 3 Suction chamber
- 4 Piston damper
- 5 Jet needle

- 6 Piston
- 7 Float needle valve assembly
- 8 Float
- 9 Jet assembly
- 10 Bi-metal jet lever

Carburetters and air horns assembly - To remove

Before commencing to remove the carburetters observe the following points.

1. When disconnecting the various hoses, pipes and wiring connections ensure that they are suitably labelled to assist identification when assembling.
2. Ensure that all open ends of pipes, hoses, etc. are suitably blanked off to prevent the ingress of dirt, etc.
3. Ensure that the usual safety precautions are carried out (i.e. parking brake firmly applied, gear range selector lever in 'Park', battery disconnected, etc.).

To remove the carburetter and air horn assembly proceed as follows**From 'A' bank side**

1. Remove the air intake elbow casting (refer to Air intake - To remove).
2. Withdraw the vacuum signal hose to the speed control unit. Unscrew the two $\frac{3}{8}$ in. A/F setscrews securing the unit to the air horn.
3. Remove the split pin, washer and clevis pin from the throttle linkage just forward of 'A' bank carburetter.

From 'B' bank side

4. Unscrew the union on the choke stove pipe at the bi-metal housing.
5. Unscrew the fuel feed pipe from 'B' bank carburetter filter housing. Suitably blank the open connections.
6. Remove the setscrew securing the crankcase emission control system pipe connection to the choke butterfly housing; withdraw the housing from the end of the pipe.
7. Detach the distributor vacuum advance signal hose from the 'Y' piece adjacent to the weakening device solenoid.
8. Disconnect the electrical cables to the choke solenoid at the snap connector joints adjacent to the choke butterfly housing.
9. Detach the electrical connections to the anti 'run-on' and the weakening device cut-off solenoids.
10. Disconnect the following hoses from the weakening device.
 - (a) the hose from the float chamber vent valve
 - (b) the hose to the air filter
 - (c) the hose from the fuel receiver
11. Unscrew the $\frac{3}{8}$ in. A/F nut from the dipstick bracket; collect the bolt, nut and washer.
12. Unscrew the $\frac{1}{2}$ in. A/F setscrew from the centre of the carburetter 'tee' piece; withdraw the setscrew and collect the washer.
13. Carefully withdraw the carburetter and air horn assembly, ensuring that no pipes, hoses or electrical items are still connected.

Carburetters and air horns assembly - To fit

Fit the carburetters by reversing the procedure given for their removal, noting the following points.

1. Ensure that all joint faces are clean.
2. Fit new gaskets.

Carburetters - To remove

Remove the carburetters and air horn assembly from the car (refer to Carburetters and air horn assembly - To remove) and then, remove the carburetters from the air horns assembly as follows.

'A' bank carburetter

1. Unscrew the two $\frac{1}{2}$ in. A/F nuts securing the air horn to 'A' bank carburetter.
2. Withdraw the bolts and collect the washers.
3. Move the air horn flange upwards away from the carburetter.
4. Unscrew the union from the fuel filter.
5. Detach the vacuum supply hose from on top of the carburetter body adjacent to the carburetter and 'tee' piece flange.
6. Detach the hose from the side of the carburetter that connects to the fuel receiver in the weakening device.
7. Completely remove the two pinch bolts securing the throttle levers to the 'A' and 'B' bank carburetter butterfly spindles, remove the levers.
8. Unscrew the nut and withdraw the pinch bolt securing the fast-idle lever to the carburetter spindle; withdraw the lever.
9. Unscrew the four half-nuts that retain the carburetter to the 'tee' piece flange; collect the washers.
10. Withdraw the carburetter and collect the gasket.

'B' bank carburetter

1. With a screwdriver, unscrew and remove the two screws securing the solenoid platform in position adjacent to 'B' bank carburetter. One screw is located on the air horn and has a nut underneath, and the other screw is situated in the filter housing.
2. Unscrew the $\frac{1}{2}$ in. A/F nuts from the bolts that retain the air horn to the carburetter flange; withdraw the bolts and collect the washers. Move the solenoid platform away from the carburetter.
3. Detach the hose from the side of the carburetter to the fuel receiver in the weakening device.
4. Carefully ease the air horn upwards away from the carburetter.
5. Completely remove the two pinch bolts securing the throttle levers to the 'A' and 'B' bank carburetter butterfly spindles, remove the levers.
6. Detach the vacuum supply hose from on top of the carburetter body adjacent to the carburetter and 'tee' piece flange.
7. Unscrew the remaining union from the fuel filter housing.
8. Unscrew the four half-nuts that retain the carburetter to the 'tee' piece flange; collect the washers.
9. Withdraw the carburetter and collect the gasket.

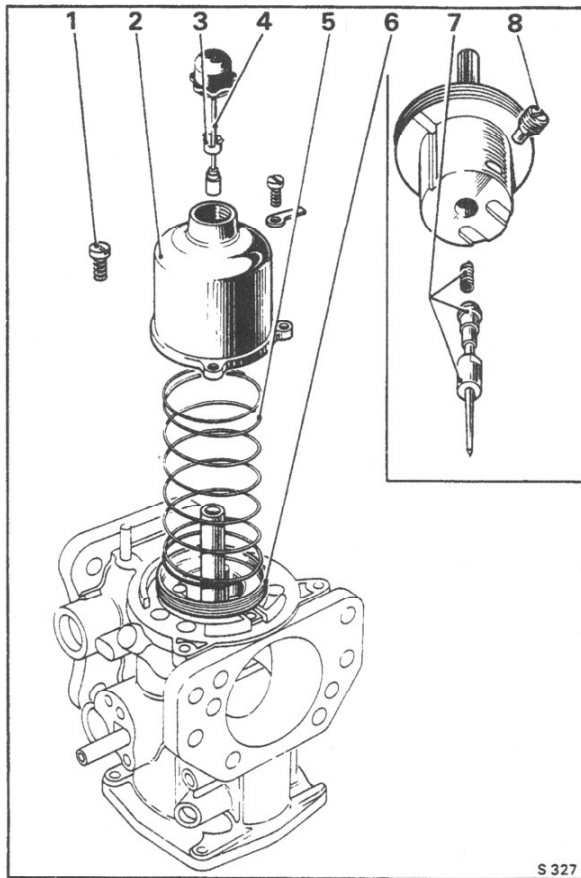


Fig. K80 Dismantling a carburettor (upper half)

- 1 Suction chamber retaining screw
- 2 Suction chamber
- 3 Damper retainer (Piston ball race clip)
- 4 Damper rod
- 5 Spring
- 6 Piston
- 7 Spring-loaded needle assembly
- 8 Needle guide locking screw

Dismantling of the components within the carburetters is not recommended as all carburetters are set and balanced by accurate flow measuring techniques during manufacture.

In certain isolated instances however, it may be necessary to dismantle the carburetters and under these conditions the following procedure should be carefully followed.

**Carburettor - To dismantle
Upper half (see Fig. K80)**

1. Thoroughly clean the outside of the carburettor.
2. Unscrew the suction chamber retaining screws and remove the identity tag.
3. Lift the chamber assembly vertically from the body without tilting it.
4. Hold the piston firmly and pull the suction

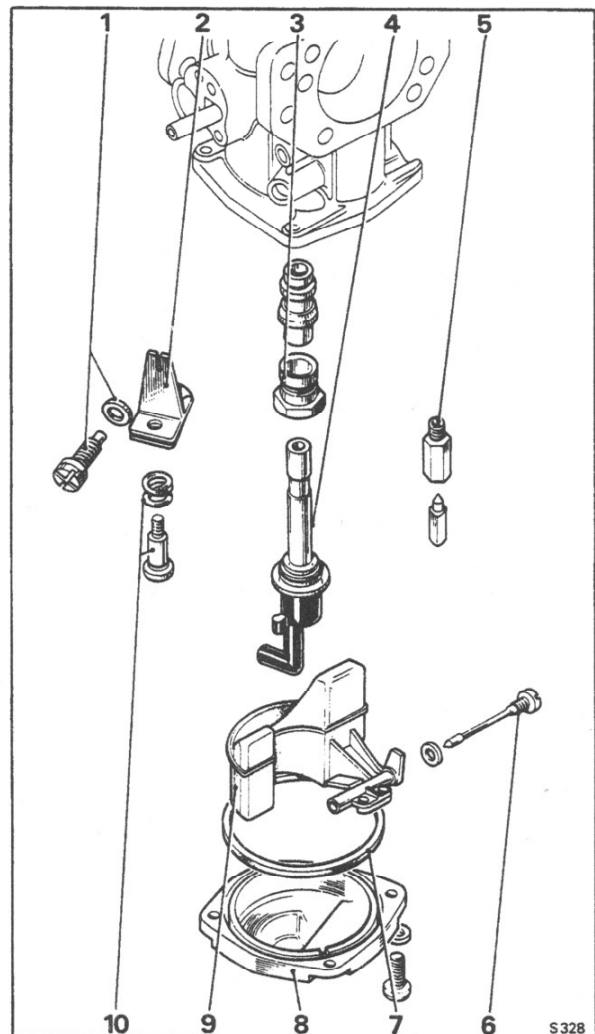


Fig. K81 Dismantling a carburettor (lower half)

- 1 Jet adjusting screw and 'O' ring
- 2 Jet adjusting lever
- 3 Jet bearing assembly
- 4 Jet
- 5 Float chamber needle valve
- 6 Float pivot spindle
- 7 Sealing ring
- 8 Bottom cover-plate
- 9 Float
- 10 Jet lever adjusting screw assembly

chamber, taking care not to bend the damper rod, until the damper retainer is freed from the piston rod. Unscrew and remove the damper.

5. Remove the piston spring, lift out the piston assembly and empty the oil from the piston rod.
6. Note the position of the needle guide etch mark in relation to the piston transfer holes for correct reassembly and unscrew the needle guide locking screw.
7. Withdraw the needle, guide and spring.

Lower half (see Fig. K81)

8. Mark the bottom cover-plate and body to ensure correct assembly, unscrew the retaining screws and remove the cover complete with the sealing ring.
9. Remove the jet adjusting screw complete with 'O' ring.
10. Remove the jet adjusting lever retaining screw and spring.
11. Withdraw the jet complete with adjusting lever and disengage the lever.
12. Remove the float pivot spindle and aluminium washer.
13. Withdraw the float.
14. Remove the needle valve and unscrew the valve seat.
15. Unscrew the jet bearing locking nut and withdraw the bearing complete with fibre washer.

Throttle disc assembly (see Fig. K82)

16. Remove the throttle disc retaining screws.
17. Close the throttle and mark the position of the throttle disc in relation to the carburettor flange. **Do not mark the disc in the vicinity of the overrun valve.** Open the throttle and carefully withdraw the disc from the throttle spindle taking care not to damage the overrun valve.
18. Withdraw the throttle spindle and remove the seals, noting the way it is fitted in relation to the carburettor body to ensure correct reassembly.

Carburettor - To inspect

1. Examine the throttle spindle and its bearings in the carburettor body; check for excessive play and fit new parts if necessary.
2. Examine the float needle and seating for damage and excessive wear; fit new parts if necessary.
3. Examine all rubber seals and 'O' rings for damage or deterioration; fit new parts if necessary. **The cover-plate sealing ring must be renewed.**
4. Examine the carburettor body for cracks and damage and for security of the brass connections and the piston key.
5. Clean the inside of the suction chamber and piston rod guide with fuel or methylated spirit (denatured alcohol) and wipe dry. **Abrasives must not be used.**
6. Examine the suction chamber and piston for damage and signs of scoring.
7. Check that all the balls are in the piston ball race (2 rows, 6 per row). Fit the piston into the suction chamber, without the damper and spring, hold the assembly in a horizontal position and spin the piston. The piston should spin freely in the suction chamber without any tendency to stick.

Carburettor - To assemble

Assemble the carburettor by reversing the procedure given for removal, noting the following points.

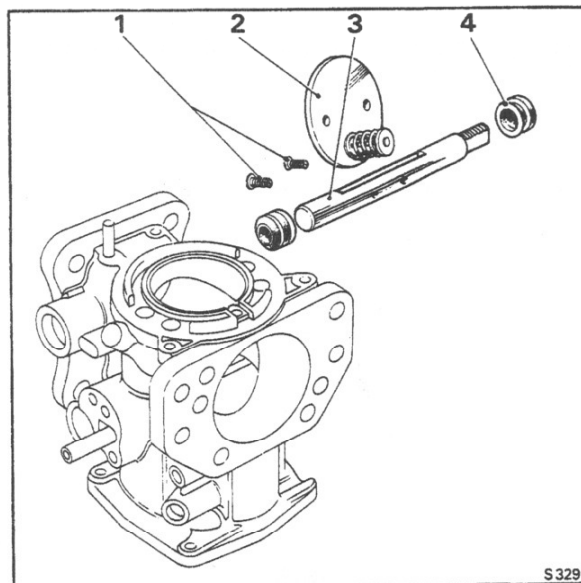


Fig. K82 Dismantling a carburettor (throttle disc assembly)

- 1 Throttle disc retaining screws
- 2 Throttle disc assembly
- 3 Throttle spindle
- 4 Seal

1. Ensure that the throttle disc is fitted in its original position.
2. New throttle disc retaining screws must be used when refitting the disc. Ensure that the throttle disc is correctly positioned and closes correctly before tightening the retaining screws. Spread the split ends of the screws sufficiently to prevent turning.
3. Position the throttle spindle end seals just below the spindle housing flange.
4. When fitting the jet assembly to the adjusting lever ensure that the jet head moves freely in the bi-metal cut-out.
5. Fit a new float pivot spindle sealing washer or anneal the existing washer.

Check the level of the float in the float chamber (refer to Carburettor float level - To set).

6. Check that the small diameter of the jet adjusting screw engages the slot in the adjusting lever and set the jet 3,05 mm. (0.12 in.) below the bridge of the body.
7. Ensure that the needle guide etch mark aligns correctly with the piston transfer holes. After fitting the needle assembly, check that the shoulder of the guide aligns with the face of the piston (see Fig. K78).
8. To prevent the piston spring from being 'wound up' during reassembly, temporarily fit the piston and suction chamber, less the piston spring, to the body and pencil mark their relative positions to each other. Fit the spring to the

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piston, hold the suction chamber above the piston, align the pencil marks and lower the chamber over the spring and piston.

Before assembly ensure that the damper retainer (piston ball race clip) is refitted by pressing it fully into the piston rod (see Fig. K83).

The damper retainer (piston ball race clip) can also be installed with the suction chamber fitted to the engine by using fitting tool RH 9086.

Carburettor float level - To set

1. Remove the carburettor from the engine.
2. Invert the carburettor.
3. Mark the bottom cover-plate and carburettor to ensure correct assembly, unscrew the retaining screws and remove the cover complete with the sealing ring.

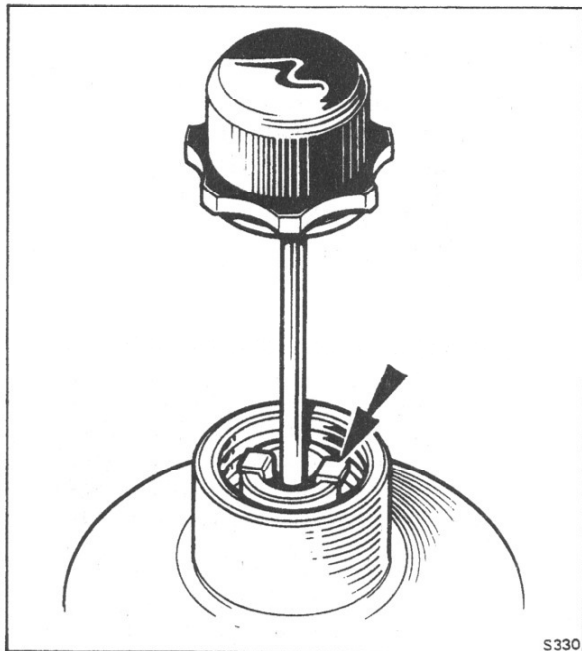


Fig. K83 Position of damper retainer

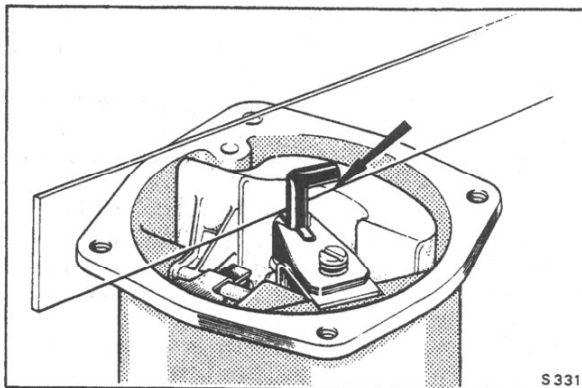


Fig. K84 Checking the float level

A new rubber sealing ring must be installed when fitting the cover-plate.

4. Ensure that the float chamber needle valve is held in the closed position by the weight of the float only.

5. Check that the lowest point on the float (see Fig. K84) is **below** the float chamber face by the dimensions given in the table.

Material	Colour	Dimension
Acetal Resin	White	0,51 mm.-1,52 mm. (0.020in.-0.060in.)

6. If necessary, adjust the float position by carefully bending the metal pad.

7. Check that the float pivots correctly about the spindle.

Carburettor air valve damper - To top-up

The upper portion of the guide spindle, attached to the air valve piston in each carburettor, is hollow and is filled with the same type of oil as used in the engine.

1. Unscrew the damper cap and carefully raise the damper until the damper, **together with the air valve piston**, reach the top of their travel. Ensure that the retainer is not displaced from its position in the piston rod (see Fig. K83).
2. Holding the damper and piston in the raised position; fill the recess in the damper retainer (piston ball race clip) with clean engine oil.
3. Lower the damper until the cap contacts the neck of the suction chamber, then carefully raise the damper and piston again and check the oil level; this is correct if the oil level is just visible in the bottom of the recess in the damper retainer (piston ball race clip). If the oil level is not visible, repeat the topping-up procedure until the oil level is correct.
4. Check that the damper retainer (piston ball race clip) is still in its correct position in the piston rod as shown in Figure K83, then lower the damper and screw the damper cap firmly into position.

Carburettors - To set

The carburettors fitted to these cars are adjusted at the factory using special equipment to ensure that their settings comply with the current emission control regulations.

Under normal circumstances the carburettors should not require adjustment in service.

If however, adjustment is found necessary due to inadvertent disturbance or replacement of a component, set the carburettors by carrying out the following operations in the sequence given.

- a. Set throttle linkage and temporarily set engine idle speed. Check linkage clearances.
- b. Set cold start fast-idle cam.
- c. Tune carburetters.
- d. Set cold start fast-idle speed.
- e. Set the kickdown micro-switch.
- f. Set full throttle stop.

Carburettor tuning

Preliminary checks

Before tuning the carburetters the following checks should be carried out.

Ensure that the vehicle is in 'Park', the parking brake firmly applied and that the gear range actuator thermal cut-off has been removed from the main fusebox.

1. Check the condition of the spark plugs.
2. Check the ignition timing (refer to Chapter M).
3. Check the flow through the choke stove pipe.
4. Check the entire induction system for air leaks.
5. Ensure that the air conditioning system is switched off.
6. Start the engine and warm-up; allow to run for at least 5 minutes after the thermostat has opened.
7. Stop the engine, ensure that the choke butterfly valve is fully open and the choke fast-idle off.
8. Connect an electric impulse tachometer in accordance with the manufacturer's instructions.
9. Check the float chamber depression.

Carburettor idle air balance

1. Ensure that the usual safety precautions are carried out (i.e. parking brake firmly applied, gear range selector lever in 'Park', etc.) and connect an impulse tachometer in accordance with the manufacturer's instructions.
2. Disconnect the speed control chain.
3. Start and run the engine until normal operating temperature is attained.
4. Stop the engine.
5. Fit the dial gauges RH 8841 with RH 9105 (kit to convert dial gauges to fit the HIF7 carburetters) to the carburettor dashpots in place of the dampers.
6. Zero the gauges with the engine stopped and lightly tighten the gauge clamp screws.
7. Start and run the engine at the idle speed setting (650 r.p.m.); adjust the carburettor piston lifts to be equal (within 10%) using the eccentric adjuster (see Fig. K97).
8. The average piston lift reading should now be between 2,03 mm. and 2,54 mm. (0.080 in. and 0.100 in.).

If the idle speed piston lift is over 2,54 mm. (0.100 in.) check the ignition timing at idle as this condition may result in unsatisfactory driveability.

9. Stop the engine and remove the impulse tachometer.
10. Remove the dial gauges and fit the carburettor dampers. Ensure that the dashpot ball race clips (piston damper retainers) are fitted correctly and

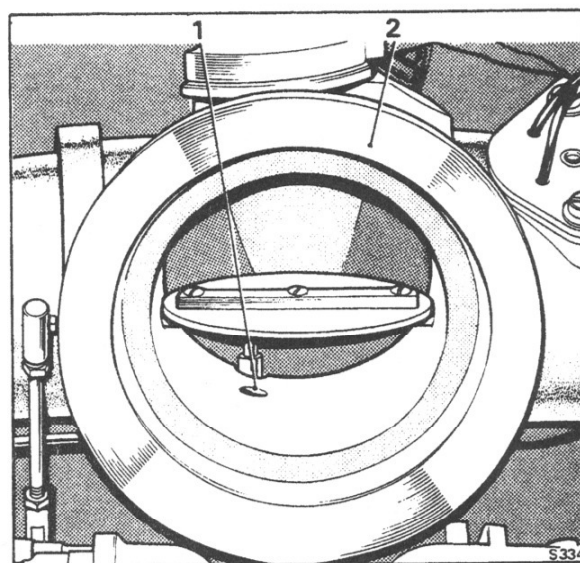


Fig. K85 Hot idle mixture compensator feed

- 1 Hot idle compensator feed
- 2 Air intake butterfly housing

are pressed fully into the piston rod (see Fig. K83) using tool RH 9086.

11. Connect the speed control chain and adjust to give a minimum slack condition, consistent with no impediment to the throttle lever to return to the idle speed position.

Carburettor mixture strength - To set

1. Ensure that the usual safety precautions are carried out (i.e. parking brake firmly applied, gear range selector lever in 'Park', etc.) and connect an impulse tachometer in accordance with the manufacturer's instructions.
2. Remove the air intake, blank off the hot idle compensator feed drilling (see Fig. K85) and replace the intake.
3. Unscrew and remove the pressure tapping cap from the weakening device.
4. Ensure that the engine has run for at least 25 minutes after the thermostat has opened.
5. Purge the engine at 2 000 r.p.m. in 'Neutral' for ¼ minute. Allow the engine speed to return to the idle setting and ensure that this is 650 r.p.m.; adjust if necessary using the idle stop screw.
6. Insert the probe of a CO meter into either exhaust system tailpipe and check the reading.
7. The CO meter reading should be 1% to 4%. If the reading is outside the limits quoted
 - a. Check for induction system leaks (if below 1%)
 - b. Check the choke stove and purge line flow rates.
8. If after carrying out Operation 7 the idle speed CO meter reading is still outside the limits quoted the carburettor mixture screws (see Fig. K76) may be adjusted by equal amounts up to ½ turn in the same direction in order to achieve the mean limit of 2.5%.

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No attempt should be made to adjust the CO reading if it is in the region of 2.5% to 4.0%.

Note

- a. Clockwise rotation of the mixture screws will richen the mixture.
- b. The tuning operations should be carried out in the shortest possible time. If the time exceeds 3 minutes, run the engine at 2 000 r.p.m. in 'Neutral' for ¼ minute and then resume the tuning operations. Repeat this purging operation if a further period of 3 minutes is exceeded.
9. Fit the pressure tapping cap to the weakening device, fit a new sealing washer if necessary.
10. Check the idle speed, this should be 650 r.p.m.; adjust by means of the idle stop screw.
11. Stop the engine, remove the air intake and discard the blank from the hot idle compensator feed drilling; fit the air intake.
12. Remove the impulse tachometer.

Carburettor tamperproofing

The carburettor mixture screws may have tamper-proof caps fitted, therefore upon completion of the setting operations fit new caps.

Special tools have been designed and produced for the fitting of the tamperproof caps as follows.
 'A' bank carburettor mixture screw cap - RH 9096
 'B' bank carburettor mixture screw cap - RH 9097

Hot idle mixture compensator

This assembly is fitted below the choke strangler butterfly housing. Its purpose is to meter a small quantity of air into the induction under certain conditions.

At high engine temperature the idle quality may deteriorate after prolonged periods of idling unless a mixture compensator is used.

The compensator incorporates a bi-metallic valve which meters a small quantity of air (controlled by the carburettor air inlet temperature) to a point in the induction system downstream of the carburettor throttle plates. This has the dual effect of weakening the mixture and increasing the mass flow, thereby raising the idle speed slightly and restoring normal idle quality.

Hot idle mixture compensator - To service

1. If the operation of the assembly is suspect the carburettors and air horns assembly should be removed from the engine so that access may be gained to the two cheesehead screws retaining the bi-metallic valve cover in position.
2. Position the joint face horizontally, unscrew the two cover retaining screws and lift off the cover (if the joint face is in the vertical position the bi-metallic valve assembly will fall when the cover is withdrawn).
3. Collect the bi-metallic valve assembly and fibre sealing washer.
4. Inspect the bi-metallic valve assembly ensuring that it is clean (particularly around the valve

seating area) and free to move in the bi-metal. Also ensure that the bi-metal is securely rivetted to the frame.

5. Assemble and fit the unit in the reverse order noting that a new fibre sealing washer should be fitted.

Weakening device

The mixture weakening device is fitted adjacent to 'B' bank carburettor and incorporates a fuel receiver.

For any given position of the fuel metering needle, the rate of the discharge from the carburettors is governed by the difference in air pressure existing over the fuel in the float chamber and that over the jet.

The weakening device is designed to reduce the air pressure (create a depression) in the float chamber at part throttle, thereby reducing the rate of discharge from the jet.

The weakening device housing contains two chambers (see Fig. K86) the venturi chamber and the fuel receiver chamber, the two being interconnected by a passage and an adjustable venturi.

The venturi chamber is connected to a small drilling on the edge of the butterfly plates of both carburettors via the weakening device solenoid valve. With the throttle slightly open the drillings are subjected to manifold depression thus creating a depression in the venturi chamber which draws air from the weakening device air filter. This depression is also apparent in the fuel receiver chamber and subsequently in the carburettor float chambers.

The value of the depression is set by the position of the weakening device adjusting screw.

To obtain adequate float chamber venting to cope with hot soak conditions there is an additional vent from the fuel receiver. This incorporates a low pressure non-return valve to maintain float chamber depression under normal running conditions.

A float chamber drain, also incorporating a low pressure non-return valve is mounted at the front of the engine adjacent to the oil filter, this valve is connected to the fuel receiver. Should flooding occur the head of fuel in the receiver is sufficient to open the drain valve thus preventing engine stalling if the float chamber needle valves stick.

Weakening device - To remove

1. Label all hoses connected to the weakening device assembly, this will facilitate assembly.
2. Disconnect all hoses to the weakening device.
3. Unscrew and remove the two small setscrews that retain the weakening device to the solenoid platform; the two screws are situated just below the pipe/hose connections for the anti 'run-on' solenoid and weakening device cut-off solenoid.
4. Withdraw the weakening device.

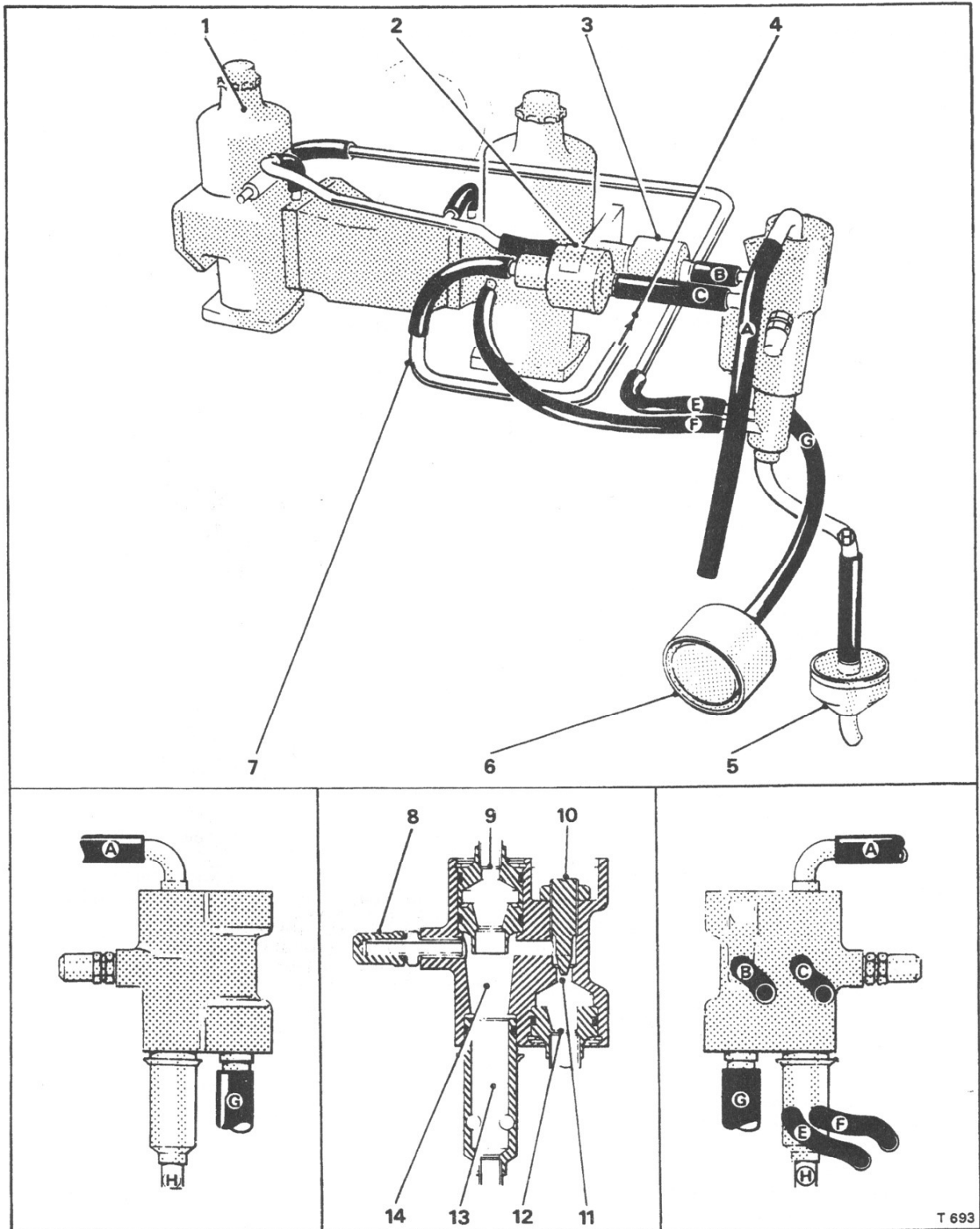


Fig. K86 Mixture weakening device

- | | | |
|-------------------------------------|-------------------------------|--------------------------|
| 1 'A' bank carburetter | 5 Float chamber drain valve | 10 Adjusting screw |
| 2 Anti 'run-on' solenoid | 6 Weakening system air filter | 11 Venturi chamber |
| 3 Weakening device cut-off solenoid | 7 Vacuum manifold | 12 Air inlet |
| 4 Induction manifold connection | 8 Weakening device signal cap | 13 Fuel receiver |
| | 9 Float chamber vent valve | 14 Fuel receiver chamber |

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Weakening device - To fit

Fit the weakening device by reversing the procedure given for removal, noting the following point.

1. Ensure that all hoses connecting to the assembly are in a good condition and that all connections are 'air tight'.

Weakening device - To dismantle (see Fig. K86)

1. Remove the weakening device from the vehicle.
2. Remove the small screw that secures the fuel receiver assembly into the base of the weakening device, withdraw the assembly.
3. Unscrew the weakening device signal cap, collect the cap fibre washer. Unscrew the signal line adapter from the casting and withdraw the aluminium washer from the adapter.
4. Remove the circlip from the top of the fuel receiver chamber, withdraw the float chamber vent pipe (slight resistance may be felt due to the rubber sealing ring). With a soft drift (e.g. wooden pencil), push the float chamber vent valve out of the weakening device assembly (the drift is required because the rubber sealing ring fitted around the vent valve will cause a small resistance).
5. Remove the circlip from the base of the venturi chamber, withdraw the **air intake pipe** containing a one-way valve (slight resistance may be felt due to the rubber sealing ring).
6. Remove the **anti-tamper cover** from the top of the venturi chamber, unscrew the lock-nut and using a screwdriver unscrew the **adjusting screw**.

Weakening device - To assemble

To assemble the weakening device, reverse the procedure given for removal, noting the following.

1. Ensure that all components are clean before assembly.
2. Ensure that the rubber sealing rings are in a good condition and lightly smeared with the minimum amount of grease. Ensure that no grease is applied to the valves otherwise a malfunction may occur due to the grease making the valves stick.
3. After assembly, the operator should check that he can blow but not suck on the metal pipes, one on top of the fuel receiver chamber and the other at the bottom of the venturi chamber.

Weakening device signal strength - To check

The **float chamber depression** should be checked as follows.

1. Start and run the engine until normal setting conditions are attained (i.e. engine cooling system thermostat opened, air conditioning unit switched off and the automatic choke is off).
2. Stop the engine.
3. Connect an electric impulse tachometer to the engine in accordance with the manufacturer's instructions.
4. Unscrew and remove the weakening device signal cap and connect a 0 to 15,2 cm. (0 to 6 in.) water manometer to the weakening device adapter.

5. Start and run the engine at 2 000 r.p.m. in 'Neutral' until a steady manometer reading is obtained, this should be 5,08 cm. (2.0 in.) of water depression.

A low or zero reading may be caused by

- a. A blockage in the weakening device venturi.
- b. A blockage or restriction in the signal pipe(s).
- c. An air leak in the hoses or pipes from the float chambers to the fuel receiver.
- d. Faulty float chamber vent valve or drain valve.
- e. Low air intake temperature [below 14° C. (57° F.)], a faulty weakening device solenoid or weakening device switch.

A high reading may be caused by

- a. An obstruction in the weakening device bleed orifice (weakening device signal strength adjusting screw).
 - b. Obstructed weakening device air filter.
 - c. Obstructed weakening device air filter hose.
 - d. Incorrect operation of anti 'run-on' solenoid.
6. If the float chamber depression is still incorrect after checking through the possible causes in Operation 5, set the weakening device signal strength (float chamber depression) by unlocking and turning the adjusting screw (see Fig. K86) until the correct manometer reading is obtained. Turning the adjusting screw clockwise increases the depression.
 7. Raise the engine speed slowly noting both the manometer and tachometer readings. The maximum steady manometer reading should be obtained between 1 400 r.p.m. and 1 900 r.p.m.

Weakening device air filter - To remove

The air filter container is mounted on the left-hand valance just forward of the road spring pot.

This is a sealed unit and no attempt should be made to clean the element.

1. To remove the air filter assembly, detach the hose and unscrew the worm drive clip situated around the assembly.
2. Withdraw the assembly.

Weakening device air filter - To fit

Fit the air filter container by reversing the procedure given for removal.

Electrical components

The electrical components described in this section would normally appear in Chapter M - Electrical system, however, as they are used in connection with the weakening system it is thought more practical to include the information in this section.

The components concerned are as follows.

Weakening system cut-out switch**Anti 'run-on' solenoid****Weakening system cut-off solenoid**

Weakening system cut-out switch

The bi-metal cut-out switch is situated in the side of the air intake elbow adjacent to the choke stove take-off pipe and 'B' bank carburetter (see Fig. K87).

Weakening system cut-out switch - To remove

1. Withdraw the protective sheath and detach the electrical connections, noting the position of the connections to assist identification when assembling.
2. Unscrew and remove the three setscrews and spring washers.
3. Withdraw the cut-out switch.

Weakening system cut-out switch - To fit

Fit the cut-out switch by reversing the procedure given for removal.

1. Ensure that the gasket is in a good condition.
2. The setscrews must be fitted with spring washers.
3. The protective sheath must be fitted over the electrical connections.

Weakening system cut-out switch circuit wiring - To check

1. Detach the White/Blue cable from the Weakening system cut-out switch.
2. Fit one side of a test lamp to the White/Blue cable and the other side to a good earth.
3. Switch on the ignition noting that the test lamp bulb illuminates.
4. Switch off the ignition noting that the test lamp bulb extinguishes.

Weakening system cut-out switch - To check

1. Connect a test lamp across the connections.
2. Carry out Operations 2 to 5 inclusive as given in Weakening system cut-off solenoid circuit wiring - To check.

Anti 'run-on' solenoid

The anti 'run-on' solenoid is situated on a platform adjacent to 'B' bank carburetter; it is the foremost of the two solenoids fitted on the platform.

The use of low octane fuel often causes an engine to 'diesel' (i.e. to continue to run-on after the ignition has been switched off, particularly when the engine is hot). To prevent this an anti 'run-on' solenoid is fitted between the fuel receiver and the induction manifold (see Fig. K86). When the ignition is switched off the solenoid valve opens and connects the weakening system to the induction manifold, thus creating a high depression in the float chambers which cuts off the fuel supply.

Anti 'run-on' solenoid - To remove

1. Disconnect the rubber hose from either side of the solenoid.
2. Disconnect the two electrical leads at their connections.

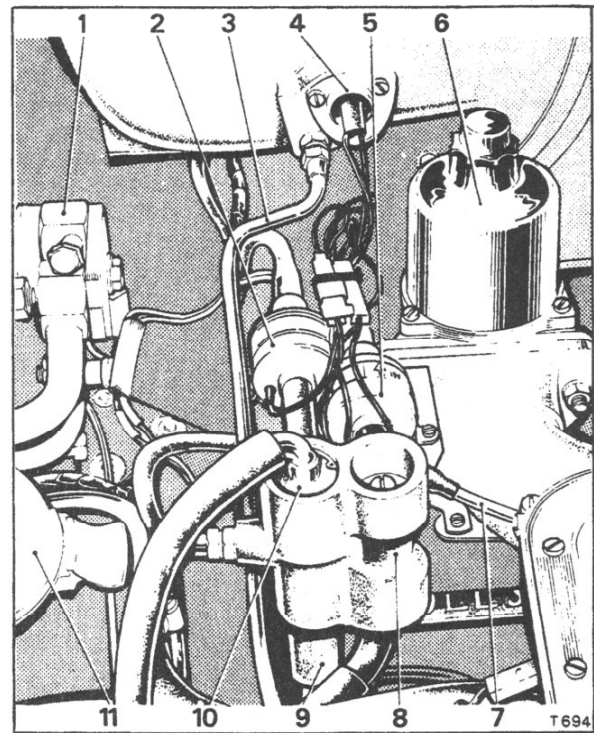


Fig. K87 Solenoid platform

- 1 Refrigeration compressor
- 2 Anti 'run-on' solenoid
- 3 Choke stove pipe
- 4 Weakening system cut-out switch
- 5 Weakening system cut-off solenoid
- 6 'B' bank carburetter
- 7 Distributor vacuum advance hose
- 8 Mixture weakening device
- 9 Fuel receiver
- 10 Float chamber vent valve
- 11 Engine oil filler cap

3. Unscrew and remove the two screws situated one on either side of the solenoid body.
4. Withdraw the anti 'run-on' solenoid.

Anti 'run-on' solenoid - To fit

Fit the anti 'run-on' solenoid by reversing the procedure given for removal.

Anti 'run-on' solenoid circuit wiring - To check

1. Connect a test lamp across the two electrical connections to the solenoid. **Do not disconnect the two connections.**
2. Switch on the ignition and check that the test lamp bulb illuminates.
3. Switch off the ignition and check that the test lamp bulb is extinguished.

Anti 'run-on' solenoid - To check

1. Ensure that the usual safety precautions are carried out (i.e. parking brake firmly applied, gear range selector lever in 'Park', etc.).

2. Connect an impulse tachometer in accordance with the manufacturer's instructions.
3. Detach the weakening device pressure tapping cap and connect a manometer capable of reading 0 to 15,2 cm. (0 to 6 in.) of water to the tapping.
4. Start and run the engine at the idle speed setting (650 r.p.m.).
5. Switch off the engine and observe the reading on the manometer. The reading should momentarily increase to approximately 15,24 cm. (6.0 in.) as the engine stops.
6. If the reading does not increase, the operation of the anti 'run-on' solenoid is incorrect.

This could be caused by the following.

- a. A blockage in the hose (see Fig. K86) from the anti 'run-on' solenoid to the weakening device.
- b. A blockage in the hose (see Fig. K86) from the anti 'run-on' solenoid to the vacuum manifold or in the vacuum manifold.
- c. Incorrect wiring to the anti 'run-on' solenoid.
- d. Faulty anti 'run-on' solenoid.

Weakening system cut-off solenoid

The weakening system cut-off solenoid is the rearmost of the two solenoids mounted on the platform adjacent to 'B' bank carburetter (see Fig. K87).

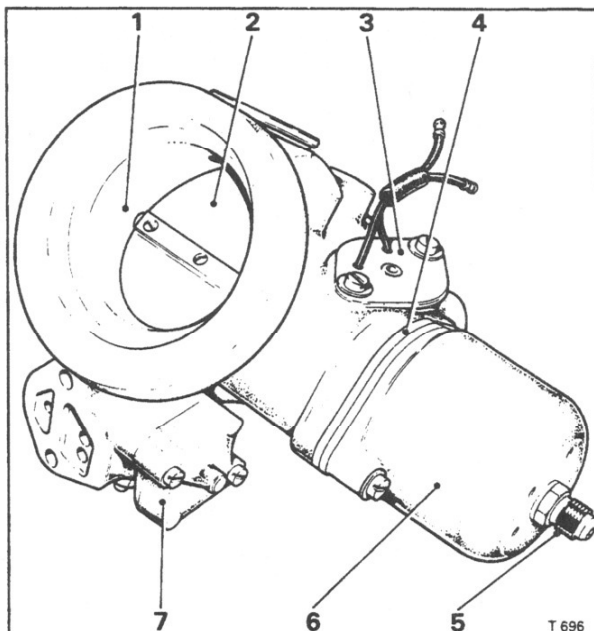


Fig. K88 Automatic choke assembly

- 1 Air intake (induction system)
- 2 Butterfly valve
- 3 Solenoid
- 4 Bi-metal spring assembly
- 5 Stove pipe connection/restrictor
- 6 Heat sink/bi-metal cover
- 7 Hot idle mixture compensator

Weakening system cut-off solenoid - To remove

1. Detach the electrical connections, noting the position of the connections to assist identification when assembling.
2. Detach the rubber hose from either side of the solenoid.
3. Unscrew the two 'cheese-headed' mounting screws and withdraw the solenoid.

Weakening system cut-off solenoid - To fit

Fit the cut-off solenoid by reversing the procedure given for removal.

Weakening system cut-off solenoid circuit wiring - To check

1. Connect a test lamp across the two connections to the solenoid. **Do not disconnect the two connections.**
2. Ensure the engine is cold.
3. Switch on the ignition and start the engine noting that the bulb of the test lamp is illuminated.
4. Run the engine; noting that as the engine warms-up [the inlet air temperature reaches approximately 14° C. (57° F.)] the test lamp bulb should extinguish.
5. Stop the engine and allow to cool, noting that when the engine becomes cold [the air in the intake drops to a temperature of approximately 12° C. (54° F.)] the test lamp bulb again illuminates.

Weakening system cut-off solenoid - To check

1. Detach the carburetter vacuum signal to weakening system cut-off solenoid hose at the solenoid and blank off the hose.

Connect a suitable length of hose to the solenoid connection.

2. Clean the open end of the additional hose.
3. Switch on the ignition.
4. Place the hose in the mouth and apply pressure.
5. If the operation of the solenoid is correct note that the following conditions apply.
 - a. With a cold engine [i.e. the inlet air temperature below approximately 14° C. (57° F.)] blowing air through the hose should not be possible.
 - b. As the engine warms-up [i.e. an inlet air temperature of approximately 14° C. (57° F.) or above] blowing air through the hose should be possible.
 - c. As the engine again cools [i.e. the inlet air temperature drops below approximately 12° C. (54° F.)] the conditions described in (a) should again apply.

Automatic choke system

The engine induction system is provided with an automatic choking device to improve starting with a cold engine. The automatic choke system comprises five main features.

1. An out of balance **butterfly valve** in the butterfly housing.
2. A small **solenoid** wired in parallel with the starter relay circuit and in series with a thermal delay switch and a temperature sensitive switch.

3. A **fast-idle cam**, coupled to the butterfly spindle via a rod.

The fast-idle cam is tapered to provide a progressive closing of the throttle.

4. A **bi-metal coil**, coupled to the butterfly shaft and sensitive to hot air from the exhaust (choke stove).

Operation

Before starting the engine, depress the accelerator pedal; with a cold engine this will release the fast-idle cam and allow the bi-metal coil to close the butterfly valve.

On releasing the accelerator pedal, the throttle stop rests on the highest point of the fast-idle cam, thereby giving a greater degree of throttle opening than is obtained from normal idling.

As the engine warms-up, the bi-metal coil will start to open the butterfly, thereby allowing the throttle stop to rest on a lower part of the fast-idle cam and giving a smaller degree of throttle opening.

Operation of the automatic choke solenoid is dependent on the under bonnet temperature of the car. If the temperature is below 0° C. (32° F.) a thermal time switch will energise the choke solenoid for a specified period dependent upon the starting temperature. The heating coil within the switch is energised as soon as the alternator develops its full charge. When the thermal time switch cuts out the solenoid will release the choke butterfly valve.

As the engine continues to run, the choke solenoid is cut out and the movement of the choke butterfly is then controlled by the bi-metal coil. The bi-metal coil is temperature sensitive and heated by air from the exhaust manifold stove pipe. As the bi-metal coil warms-up it is gradually wound up, thus releasing the load on the butterfly spindle which will gradually open.

With the depression of the accelerator pedal for driving away, the fast-idle stop on the throttle spindle will move away from the fast-idle cam and the cam will fall onto the cam link pick-up lever which is coupled by a rod to the choke butterfly spindle.

The loading of the bi-metal coil and the radiused section and offset of the choke butterfly have been arranged so that any required air flow greater than that for fast-idle conditions will open the butterfly against the loading of the bi-metal coil, sufficiently for engine demand.

When the butterfly valve is nearly fully open it comes into contact with a spring loaded plunger, this holds the fast-idle stop on the tip of the cam for an extended period until the force of the bi-metal coil is sufficient to depress the spring loaded plunger. This maintains a certain degree of fast-idle without enrichment.

Automatic choke assembly - To remove

1. Remove the carburetter and air horns assembly

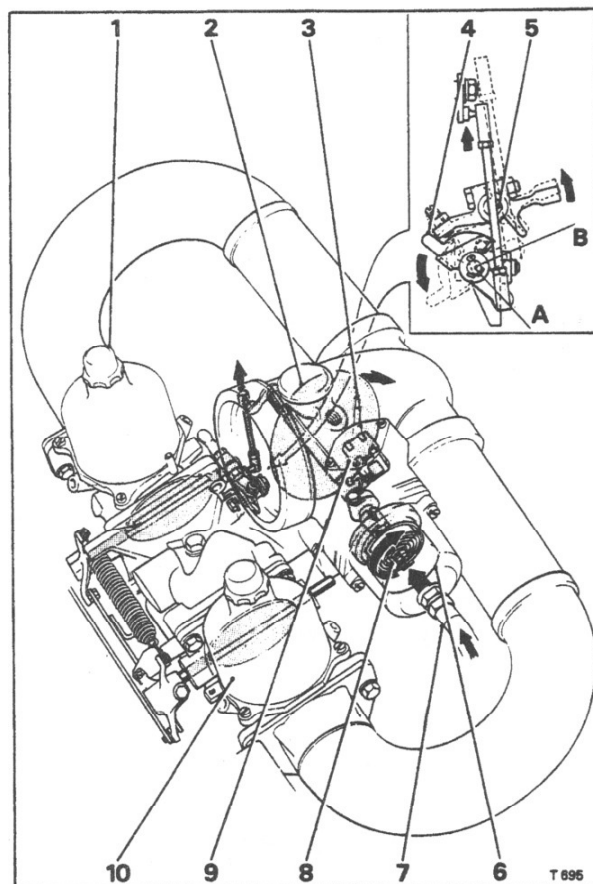


Fig. K89 Automatic choke system

- 1 'A' bank carburetter
- 2 Crankcase emissions connection
- 3 Extended fast-idle plunger
- 4 Fast-idle cam
- 5 Throttle spindle
- 6 Heat sink
- 7 Stove pipe
- 8 Bi-metal coil
- 9 Solenoid
- 10 'B' bank carburetter
- A Choke closed/on
- B Choke open/off

from the engine (refer to Carburetter and air horns assembly - To remove).

2. Unscrew the two ½ in. A/F nuts securing the air horn to 'A' bank carburetter. Withdraw the bolts and collect the washers.

3. Commence moving the air horn up and down whilst carefully withdrawing it from the automatic choke housing. The air horn is sealed into the housing by a rubber 'O' ring.

4. Remove 'B' bank air horn in a similar manner, noting that the solenoid platform should also be removed.

5. Slacken the lock-nut on either end of the butterfly rod and unscrew the rod (see Fig. K93).

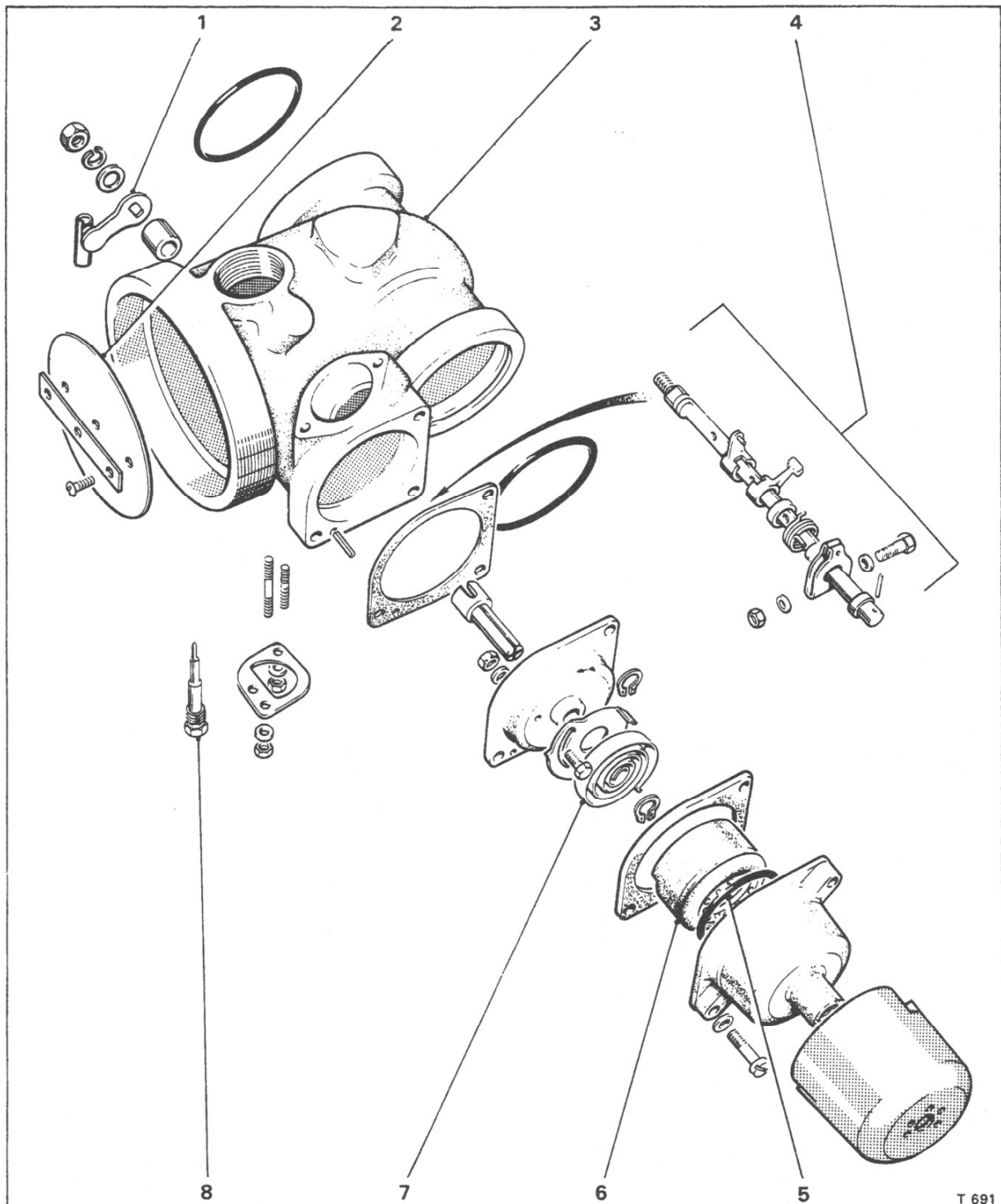


Fig. K90 Automatic choke assembly (exploded)

- | | |
|------------------------------|------------------------------|
| 1 Control rod lever | 7 Bi-metal spring |
| 2 Butterfly valve | 8 Extended fast-idle plunger |
| 3 Choke housing | |
| 4 Butterfly spindle assembly | |
| 5 Sealing ring | |
| 6 Heat sink | |

6. Unscrew the two ½ in. A/F nuts securing the automatic choke assembly to the hot idle mixture compensator housing and carburettor 'tee' piece, collect the washers.
7. Withdraw the automatic choke housing.

Automatic choke assembly - To fit

Fit the assembly to the carburettor and air horns by reversing the procedure given for removal, noting the following.

1. Always fit new seals and gaskets.
2. Ensure that the length of the butterfly rod is correctly set (see Fast-idle - To set).

Automatic choke assembly - To dismantle (see Fig. K90)

1. Unscrew the 2B.A. nut retaining the butterfly rod connecting link to the choke butterfly spindle on 'A' bank side of the choke housing; collect the spring washer, plain washer and connecting link from the spindle.
 2. Close the legs of the three screws retaining the choke strangler butterfly valve to the spindle. Unscrew the screws, collect the bridge piece and withdraw the butterfly valve.
 3. Unscrew the two screws retaining the solenoid assembly in position, collect the plain washer fitted under the head of each screw.
 4. Withdraw the solenoid from the choke housing, note the shim washers fitted under the solenoid seating flange. Remove the shim washers.
 5. Unscrew the union from the choke bi-metal housing. Withdraw the insulated cover and collect the washers fitted to the union one on either side of the cover.
 6. Remove the two screws retaining the metal cover and bi-metal assembly to the choke housing, collect the plain washer fitted to each screw.
 7. Withdraw the cover assembly.
 8. Position a small screwdriver through the threaded hole in the end of the bi-metal cover and carefully push the heat sink out of the housing (the heat sink is fitted with a sealing ring and therefore slight resistance will be encountered as the heat sink is pushed out of the housing).
 9. Withdraw the gasket.
 10. The complete bi-metal coil assembly should be carefully 'prised' from the choke housing using a small screwdriver. A paper gasket is situated between the assembly and housing; the choke housing joint face is coated with 'Wellseal'.
- Note**
The bi-metal coil setting should not be adjusted as it is pre-set at the factory during manufacture.
11. Withdraw the choke spindle assembly.
 12. Dismantle the spindle noting the relative position of the components (see Fig. K90).

Automatic choke assembly - To assemble

Assemble the automatic choke assembly by reversing the procedure given for dismantling, noting

the following.

1. Always fit new sealing rings and gaskets.
2. Do not disturb the bi-metal coil setting.
3. Use three new screws to retain the choke strangler butterfly to the choke spindle and open the 'split legs' of the screws to lock them in position.

Automatic choke - Setting during assembly

Solenoid air gap (see Fig. K91)

1. Ensure that the choke strangler butterfly valve is firmly closed.
2. Check that the air gap (between the solenoid lever pad and the solenoid) with a feeler gauge, this should be between 0,038 mm. and 0,063 mm. (0.0015 in. and 0.0025 in.).
3. Add or subtract shims between the solenoid seating flange and choke housing to obtain the required setting.

Solenoid lever spring tension (see Fig. K92)

1. Produce a lever 5,08 cm. (2 in.) between centres to fit the choke spindle as shown in Figure K92. Secure the lever in the horizontal position using a 2 B.A. nut and washer.
2. Hang a weight of 233,88 gm. (8.25 oz.) from the lever.
3. Connect a fully charged 12 volt battery to the solenoid connections. This should open the choke strangler butterfly valve sufficiently to allow a 1,58 mm. (0.062 in) diameter drill to be inserted between the butterfly valve and body.
4. Adjustment of the spring tension can be effected by slackening the clamp locking nut and rotating the clamp on the choke spindle.

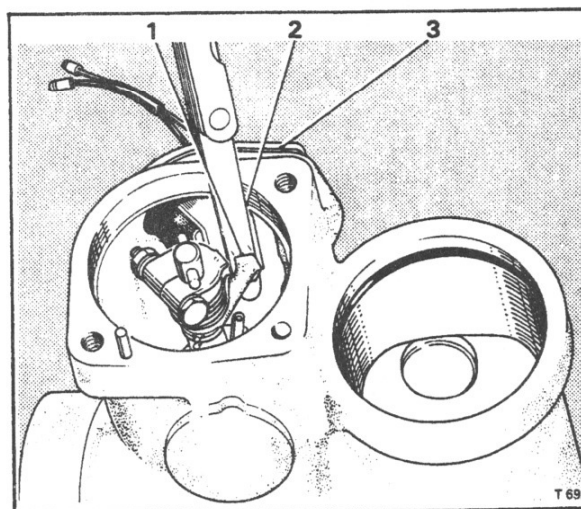


Fig. K91 Solenoid adjustment

- 1 Butterfly lever
- 2 Feeler gauge in position
- 3 Adjusting shims

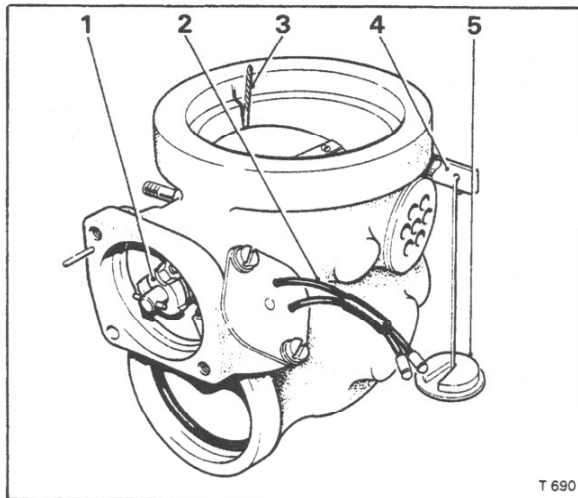


Fig. K92 Lever spring tension

- 1 Clamp adjuster
- 2 Solenoid electrical connections
- 3 1,58 mm. (0.062 in.) diameter drill
- 4 Lever
- 5 Weight

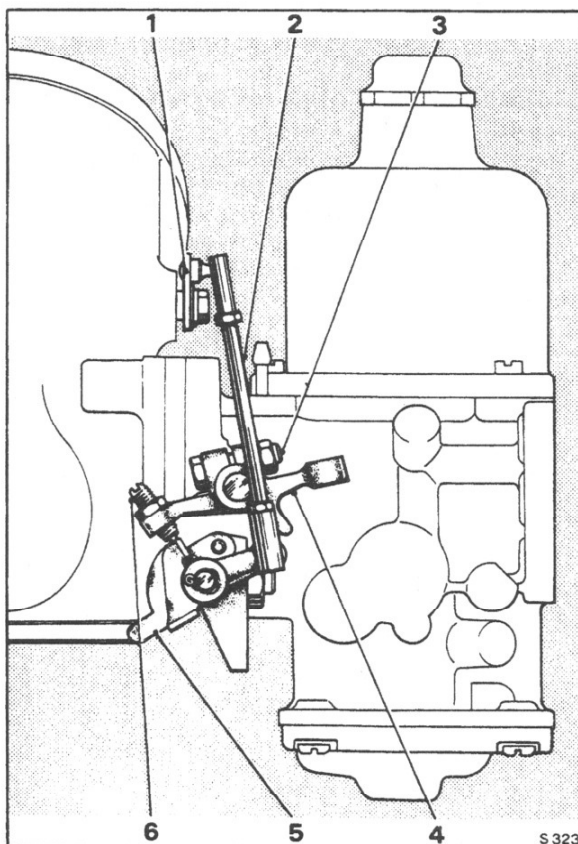


Fig. K93 Fast-idle mechanism

- | | |
|---------------------|-------------------|
| 1 Control rod lever | 4 Fast-idle lever |
| 2 Butterfly rod | 5 Cam |
| 3 Lever clamp bolt | 6 Adjusting screw |

Fast-idle mechanism

1. Assemble the mechanism onto 'A' bank carburettor as shown in Figure K93.
2. Do not tighten the lever clamp nut and bolt (item 3).
3. Ensure that the adjusting screw (item 6) is in line with the fast-idle cam (item 5).
4. Insert the shank of a 2,54 mm. (0.10 in.) diameter drill between the top of the fast-idle cam and the boss carrying the fast-idle adjusting screw. Tighten the lever clamp bolt (item 3).
5. Fit the automatic choke assembly.
6. Screw the slow idle screw inwards until it contacts the stop bracket.
7. Fit the fast-idle adjusting screw and screw it inwards until it contacts the bottom of the fast-idle cam. Screw inwards a further three-quarters of a turn. Tighten the lock-nut.
8. Fit the butterfly rod (item 2).
9. Hold the choke strangler butterfly valve fully open (i.e. the spring loaded plunger must be fully depressed and the butterfly valve resting on the plunger pedestal body).
10. Adjust the length of the butterfly rod so that there is a small air gap between the 'pip' of the fast-idle screw and the tip of the fast-idle cam. Tighten the rod lock-nuts.

Fast-idle - To set

These instructions apply to cars destined for countries other than Australia, Canada, Japan and U.S.A., for details applicable to these countries refer to the appropriate section of Chapter U.

1. Ensure that the necessary safety precautions are carried out (i.e. parking brake firmly applied, gear range selector lever in 'Park' position, etc.). Connect an impulse tachometer in accordance with the manufacturer's instructions.
2. Disconnect the distributor vacuum advance hose from the capsule and blank the hose.
3. Start and run the engine until normal operating temperature is attained. Stop the engine and remove the pressure tapping cap from the weakening device.
4. Open the throttle and close the choke strangler butterfly against the bi-metal tension using the control rod lever (Fig. K93, item 1), until the adjusting screw (Fig. K93, item 6) is resting on the tip of the fast-idle cam. At this point an extra load will be felt due to the action of the extended fast-idle plunger ceasing.
5. Start the engine, if the speed is outside a range of 850 r.p.m. to 900 r.p.m., stop the engine, open the throttles to gain access to the adjusting screw and turn the screw approximately $\frac{1}{4}$ of a turn for each 20 r.p.m. required. Tighten the lock-nut.
6. Start the engine and again check the fast-idle speed.
7. When the engine speed has been adjusted to within the prescribed limits open the throttles to release the fast-idle mechanism.
8. Stop the engine, remove the blank from the

distributor vacuum advance hose and fit the hose to the vacuum advance capsule.

9. Fit the pressure tapping cap to the weakening device.

10. Finally adjust the idle speed as follows. Remove the air intake trunking and blank off the hot idle compensator feed drilling, again fit the trunking.

11. Start the engine and check the idle speed. If necessary set to 650 r.p.m. by adjusting the throttle stop screw.

12. Stop the engine, remove the air intake trunking, unblank the hot idle mixture compensator feed drilling and again fit the trunking. Remove the tachometer.

Choke stove pipe - To flow check

1. Ensure that the usual safety precautions are carried out (i.e. parking brake firmly applied, gear range selector lever in 'Park' etc.) and connect an impulse tachometer in accordance with the manufacturer's instructions.

2. Start and run the engine until normal operating temperature is attained. Stop the engine.

3. Disconnect the stove pipe union at the intake elbow (see Fig. K87) and connect a flowmeter to the pipe via a connector (RH 8945). The flowmeter must be a rotameter type capable of measuring 2,9 cu.m/hr. (100 cu.ft/hr.).

4. Start and run the engine at idle speed (650 r.p.m.); observe the flowmeter, a correct reading is between 1,41 cu.m/hr. and 1,55 cu.m/hr. (50 cu.ft/hr. and 55 cu.ft/hr.).

5. If the flow is less than 1,41 cu.m/hr. (50 cu.ft/hr.) check the choke stove assembly, pipes and unions for leaks.

6. If the flow is in excess of 1,55 cu.m/hr. (55 cu.ft/hr.), fit a new restrictor in the choke bi-metal housing.

7. To fit a new restrictor, replace the union in the bi-metal cover.