TSD4400 Workshop Manual

Rolls-Royce and Bentley Motorcars

CHAPTER K

FUEL SYSTEMS

Note: fuel injected naturally aspirated and fuel injected turbocharged systems are covered in other sections of this site

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The dates quoted below refer to the issue date of individual pages within this chapter.

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Fuel system

The information contained in this Chapter relates to the fuel systems fitted to cars destined for countries other than Australia, Canada, Japan, and the United States of America.

For details of the fuel systems fitted to cars destined for Australia, Canada, Japan, and the United States of America refer to the appropriate section in Chapter U, Emission control systems.

Part 2 of this Chapter contains information applicable to cars fitted with the turbocharging system.

Contents

Introduction

The fuel system is of the recirculating type as shown in figure K1-1.

For information relating to the fuel and fuel evaporative emission control systems fitted to cars destined for Australia, Canada, Japan and the USA, refer to the appropriate section of Chapter U.

Before draining or siphoning the fuel system, refer to Chapter A – Precautions

Fuel tank

The fuel tank is located between the rear seat and luggage compartment. The filler neck is in the left-hand rear wing.

It is most important that only 97 octane (minimum) fuel is used. This fuel is rated as 4 star in countries where BS 4040 is applicable.

Warning

Do not add cleaning agents to the fuel.

Fuel filter (main)

The main fuel filter is mounted on the centre cross-member under the right-hand side of the vehicle.

At intervals specified in the service schedules, the fuel filter element should be discarded and a new one fitted.

Fuel pump

A Pierburg rotary vane electric pump is fitted to the rear suspension crossmember under the right-hand side of the vehicle.

The fuel pump will only operate when either the engine is being cranked by the starter motor or when there is engine oil pressure.

Check valve

The check valve is fitted into the fuel feed line just forward of the rear suspension crossmember. It allows pressurised fuel from the pump to pass to the engine.

The check valve seals the fuel feed line when the fuel pump is not operating.

Carburetters

The carburetters are twin SU HIF7 (Horizontal Integral Float Chamber), side draught, constant depression units with 4,76 mm (1.875 in) choke bores. The carburetters are fitted on top of the inlet manifold assembly.

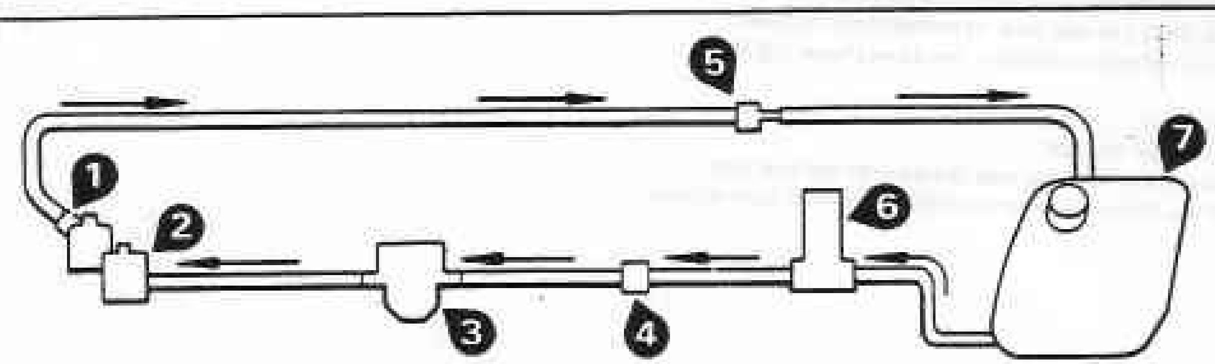
Carburetter fuel filters

Auxiliary fuel filters with paper elements are fitted into a small housing on the side of each carburetter.

At the intervals specified in the service schedules the paper elements should be discarded and new elements fitted.

Fuel recirculation valve (restrictor)

The valve is fitted into 'A' bank carburetter return line.



1 Recirculation valve Fitted adjacent to 'A' bank carburetter

2 Carburetters Two SU HIF7

3 Filter Mounted on the rear face of the centre crossmember

4 Check valve In the fuel feed line just forward of the rear suspension crossmember

5 Non-return valve Mounted in return fuel line

6 Pump Pierburg mounted vertically on rear suspension crossmember

7 Tank Mounted behind the rear seat

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Fig. K1-1 Fuel system

The valve has a small bore to restrict the flow of fuel returning to the tank. The fuel restriction maintains the required pressure in the fuel feed side of the system.

Float chamber drain valve

The float chamber drain valve is fitted at the front of the engine, adjacent to the oil filter. This valve is connected to the fuel receiver which is part of the mixture weakening device.

If fuel flooding of the carburetters occurs the head of fuel in the receiver is sufficient to open the drain valve, thus preventing the engine stalling.

Air intake system

A vacuum operated blending valve attached to the air cleaner assembly is controlled by a thermal sensor in the air intake. This valve blends hot air from a pick-up scoop adjacent to the exhaust manifold with cold air from under the front bumper.

Automatic choke

The twin SU HIF7 carburetters have an automatic (bi-metal operated) strangler choke butterfly valve, fitted onto the side of the air intake butterfly housing. The valve is controlled by hot air from a stove pipe located in the exhaust manifold.

Non-return valve

This valve is a black plastic unit fitted into the fuel return line and situated above the rear wheel half-shaft. It prevents the back flow of fuel into the return line.

Fuel vapour valve

The fuel vapour valve is fitted above the fuel tank. One side of the valve is connected to the centre vent on the fuel tank and the other side is attached to a vent connection in the fuel filler box.

During normal operation the valve allows fuel vapour to pass from the fuel tank to atmosphere. However, in the event of vehicle rollover the valve closes the vent line.

'In-tank' fuel strainer

A fuel strainer is fitted into the base of the fuel tank above the insert carrying the feed and return connections.

Fuel tank assembly

Fuel tank — To remove

1. Carry out the usual workshop safety precautions.
2. Either drain or siphon the fuel.
3. Unscrew the four Pozidriv screws (situated across the top) and the two setscrews (situated along the base) from the carpet covered sealing panel. Collect the screws and washers.
4. Remove the battery master switch knob and special ring nut from the right-hand side of the panel.
5. Release the press stud straps adjacent to each hinge. Withdraw the panel to reveal the fuel tank assembly.
6. Remove the small tools tray and car jack from above the fuel tank.
7. Unscrew the nine Pozidriv screws attaching the base of the tools compartment to the angle iron support beam.
8. Remove the compartment base and lift out the protective foam plastic from the top of the tank.
9. Using special pliers RH 8090, unclip and remove the metal pipe from the top of the fuel tank. Remove the hose between the rollover valve and the fuel tank. The short hose between the tank vent and filler neck pipe should be detached from the vent and positioned away from the tank.
10. Disconnect the three electrical cables from the fuel tank level gauge (see fig. K2-2).
11. Peel the securing tape from the electrical loom situated across the fuel tank. Temporarily secure the electrical loom away from the vicinity of the fuel tank.
12. Unscrew the worm drive clip securing the rubber filler neck hose to the fuel tank (see fig. K2-1); withdraw the hose.

    Blank off the fuel tank connection.
13. From beneath the car, unscrew and detach the fuel pipes. Label the pipes to facilitate assembly.

    Blank off the fuel tank connections.
14. Unlock and unscrew the half-nut and full nut from each of the two tank retaining strap bolts.
15. Withdraw the bolts, and collect the four bridge pieces from the ends of the straps. Remove the crossbeam.
16. Unscrew and remove the two floor mounted fuel tank straps (see fig. K2-3).
17. Carefully withdraw the fuel tank assembly. If difficulties are encountered, proceed as follows.
18. Suitably position four wooden wedges along the base of the fuel tank.
19. Drive the wedges between the bottom of the fuel tank and the luggage compartment floor. Ensure that the wedges do not exert too much force otherwise damage to the fuel tank may result.

    The fuel tank may not become free instantaneously as separation may be a gradual process. Therefore, the wedges should be left in position for a period of time.
20. After a while carry out an examination and check if the fuel tank can be withdrawn. If not, check if the wedges have become loose and if so, drive them in again to maintain the separating force.

    Leave the wedges in position for a further period of time.
21. Continue to repeat the exercise until separation

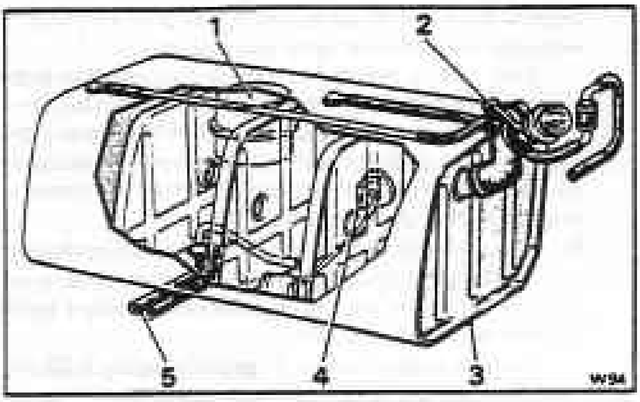


Fig. K2-1 **Fuel tank assembly**
1 Expansion tank and overfill limiter
2 Filler neck
3 Fuel tank
4 Float assembly
5 Fuel lines

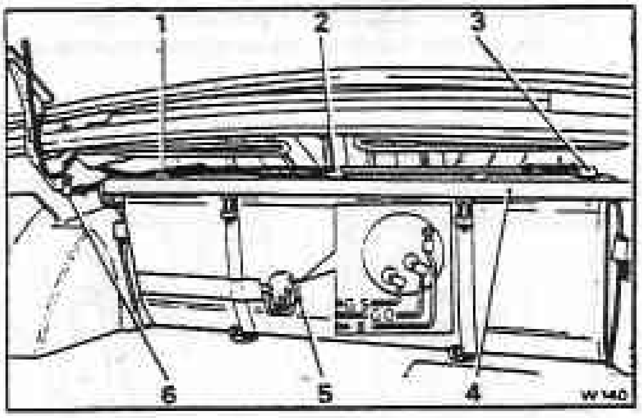


Fig. K2-2 **Fuel tank fittings and vent connections**
1 Vent — filler neck
2 Vent — rollover valve
3 Vent — filler neck
4 Crossbeam
5 Gauge unit
6 Rollover valve

takes place and the fuel tank can be withdrawn.
22. A shaped wooden block with a Compriband strip attached lies behind the tank and may be attached when the tank is removed; ensure that this block and Compriband are replaced behind the rear seat panel.

Fuel tank – To fit

1. Clean the forward end of the luggage compartment.

If loose blanking plugs, nuts, washers, etc, remain in this area when the fuel tank is fitted, they could become the cause of noise which may prove difficult to eradicate once the fuel tank is in position.

Also, ensure that the battery is disconnected and the necessary standard workshop precautions carried out.

2. Ensure that the self-tapping screws that secure the pipe retaining clips beneath the car do not protrude too far into the luggage compartment. Extra long screws could puncture the fuel tank.
3. Check that all the strips and pads of Compriband are in good condition. Renew any that have deteriorated and reposition any that have come loose, using a suitable adhesive such as Dunlop S81.

The two rubber blocks fit approximately 5,08 cm (2.0 in) above the luggage compartment floor. The Vitafoam pad should be fitted approximately 10,16 cm (4.0 in) above the luggage compartment floor.

4. Ensure the loose wooden strip is located correctly at the base of the seat panel (see fig. K2-3) and that the facing Compriband strip is in good condition.
5. Carefully slide the fuel tank into position ensuring that the fuel feed holes in the base of the tank fit correctly into the hole in the compartment floor.
6. Fit the two fuel tank retaining straps together with the special washers into position and secure with the setscrews (see fig. K2-3).
7. Ensure that the Compriband strips situated between the straps and tank are in good condition.
8. Position the crossbeam on top of the tank.
9. Fit the bridge pieces to the ends of the tank securing straps.
10. Secure both the crossbeam and tank straps by fitting the retaining bolts through the crossbeam and bridge pieces in a downward direction.
11. Fit a full nut to each bolt. Tighten the full nut and lock each one with a half-nut (see fig. K2-2).
12. Fit all pipework across the top of the fuel tank (see fig. K2-2). Note that the rubber tubing from the vent in the centre of the fuel tank connects to the rollover valve. Secure all ends with Corbin clips.
13. Replace the rubber intake pipe to the fuel tank neck and secure with a worm drive clip.
14. From beneath the car fit the fuel pipes to the tank.
15. The fuel gauge sender unit electrical loom is situated above the left-hand rear wheel arch. The three cables are coloured black, green/orange and green/slate.

Tape the cables across the fuel tank until they are adjacent to the fuel gauge sender unit.

16. Connect the cables to the fuel gauge sender unit as shown in the inset of figure K2-2.
17. Fit the foam plastic pad over the fuel tank vent pipes.
18. Slide the tools tray into position and secure with nine self-tapping screws.
19. Secure the carpet covered panel to the crossbeam, using four Pozidriv screws. Two setscrews retain the base of the panel. Replace the special ring nut and battery master switch knob to the right-hand side of the panel.
20. Fit the small tools tray and car jack into position. Secure the hinged portion of the panel with the press stud straps.

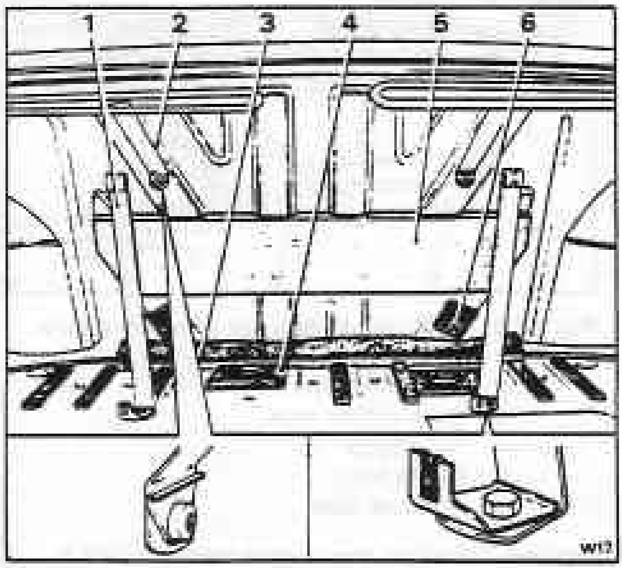


Fig. K2-3 Luggage compartment – fuel tank fittings
1 Lower securing strap
2 Upper securing strap
3 Loose wooden strip Compriband faced
4 Compriband rubber
5 Vitafoam pad
6 Hard rubber blocks

Fuel filler – To remove

1. Carry out the usual workshop safety precautions.
2. Unscrew and remove the four Pozidriv screws (situated across the top) and the two setscrews (situated along the base) from the carpet covered sealing panel.
3. Remove the battery master switch knob and special ring nut from the right-hand side of the panel.
4. Release the press-stud straps adjacent to each hinge. Withdraw the panel.
5. Unscrew the three Pozidriv screws situated across the top of the left-hand side panel and unclip the finger ring from the fuel filler door release wire. Release the press-stud. Fold the floor carpet back from the side panel. Withdraw the panel.
6. Release the Corbin clips from the vent pipe hoses at the neck of the fuel filler using special pliers RH 8090. Remove and blank off the hoses.
7. Unscrew the worm drive clips securing the filler hose to the filler neck and the fuel tank. Remove the hose and blank off the fuel tank inlet.
8. Open the fuel filler flap. Unscrew and remove the filler cap.
9. Unscrew and remove the screws securing the fuel filler head to the body, collect the washers from beneath

the heads of the screws. Withdraw the filler assembly. Discard the gasket.

Fuel filler — To fit

Fit the fuel filler assembly by reversing the procedure for removal noting the following.

1. Fit a new gasket between the filler neck flange and the body. Check that the holes in the gasket align correctly.

2. When fitting the left-hand side trim panel in the luggage compartment, ensure the top edge of the panel fits under the wing channel before the base is pressed into position.

Fuel pumps

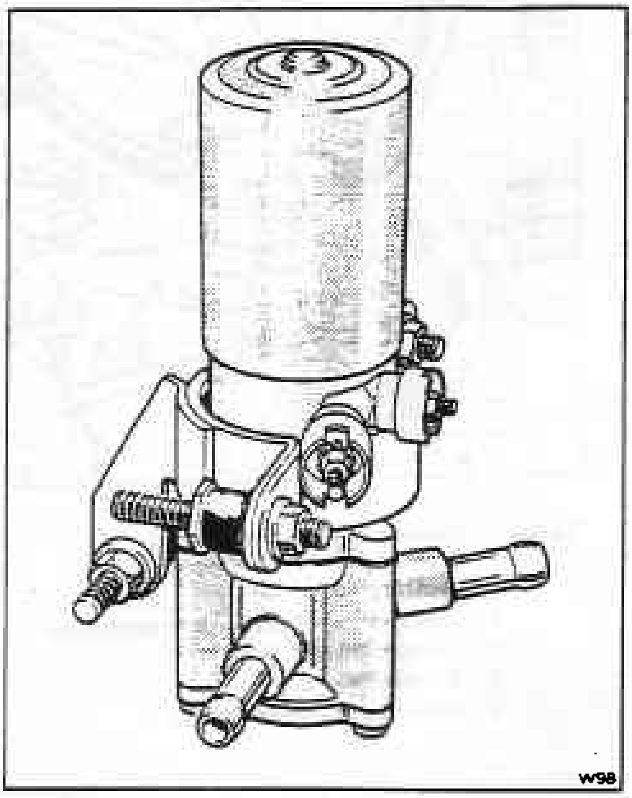


Fig. K3-1 Pierburg rotary vane electric fuel pump

Single Pierburg rotary vane electric fuel pump (see fig. K3-1)

The Pierburg pump is an electrically operated rotary vane pump. It is situated on the right-hand side of the car in a vertical position and secured to the rear suspension crossmember. The pump outlet is indicated by the fuel flow direction arrow cast on the top of the outlet boss.

The electrical terminals have metric threads and to assist identification have positive and negative symbols embossed on the bottom face of their plastic surrounds.

Operation

The pump is driven by a permanent magnet coupling. Situated at the end of the pump shaft are two rotational symmetric permanent magnets; the magnetic field of these is used to transmit the drive. The advantage of this coupling is that the drive is broken when the motor is overloaded, thus, both motor and pump are protected from damage.

The rotary vane pump consists mainly of the rotor which has five vanes, the pressure relief valve and the housing. The vanes are produced from wear resistant artificial carbon, they are positioned in the rotor and will slide radially, being guided by centrifugal force onto the interior wall of the eccentrically positioned stator. The principle of supplying fuel is that by rotation of the rotor the suction volume in the housing is increasing periodically while the pressure volume is decreasing. Therefore, the fuel to be supplied flows via the suction chamber into the pumping chamber between the vanes, it is then accelerated to the pump outlet chamber by the cells which are formed between the vanes.

A pressure relief valve is located in the fuel outlet; it is pre-set to a minimum pressure of approximately 0,5 kgf/sq cm (7.2 lbf/sq in) by the installation of the appropriate rated spring. When the pre-determined pressure is reached, the valve opens against the resistance of the spring and allows fuel to return to the inlet (suction) side of the pump.

A coarse filter is included in the inlet to the suction chamber and may require cleaning under exceptional circumstances.

Pierburg fuel pump assembly — To remove and fit (see fig. K3-2)

1. Drive the car onto a ramp.
2. Carry out the usual workshop safety precautions.
3. From beneath the car unscrew and remove the nut securing the white/pink electrical cable to the terminal stud; withdraw the cable.
4. Unscrew and remove the nut securing the earth braid cable to the terminal stud; withdraw the cable.
5. Unscrew the worm drive clips securing both the fuel inlet and outlet hoses to the pump assembly. Withdraw both hoses and suitably blank the open connections.
6. Unscrew and remove the three nuts and washers securing the pump to the flexible rubber mounts.
7. Withdraw the pump assembly.
8. Fit the fuel pump assembly by reversing the procedure given for removal, noting the following.
9. After connecting the electrical cables to the fuel pump, liberally smear the contact areas with either Keenomax C3 grease or petroleum jelly. Fit the protective rubber boot over the positive connection.

Pierburg fuel pump assembly — To dismantle (see fig. K3-3)

When a fuel pump is found to be faulty, a new or reconditioned pump should be fitted.

If a fuel pump requires dismantling for cleaning purposes, proceed as follows.

1. Remove the pump from the car.
2. Unscrew and remove the three setscrews from the bottom bearing plate. Hold the plate in position.
3. Invert the pump and remove the plate.
4. Withdraw the rotor, vanes, stator and upper bearing plate.

5. Withdraw the bottom of the pump assembly from the motor drive assembly, collect the 'O' ring.
6. Remove the drive-shaft and ball bearing. Care should be taken not to lose the ball bearing.

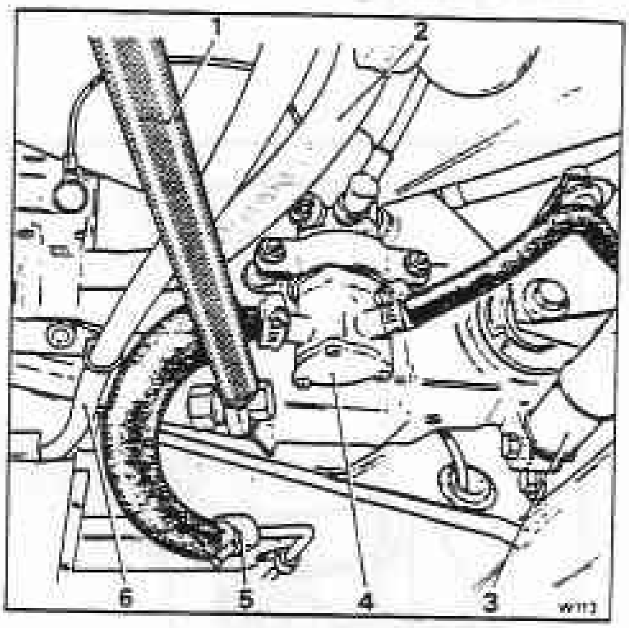


Fig. K3-2 Installation of Pierburg pump
1 Frame tube — rear suspension
2 Stabilizer bar
3 Short in-line damper — rear suspension
4 Pierburg pump
5 Check valve
6 Parking brake cable shroud

7. If necessary, the coarse filter may be carefully removed from the top of the pump housing.

Pierburg fuel pump assembly – To clean

If the pump is dismantled for cleaning, the parts should be washed only in clean paraffin.

The motor assembly must not be washed although the body casing can be wiped clean.

Pierburg fuel pump assembly — To assemble

Assemble the fuel pump by reversing the procedure given for dismantling, noting the following.

1. Take care when replacing the rotor as it has a stepped internal segment. When correctly fitted the stepped internal segment should be uppermost allowing the drive-shaft to be flush with the bottom of the rotor.

Pierburg fuel pump assembly — To flow test on the car (see fig. K3-4)

The fuel pump should deliver approximately 2,30 litres (4.0 Imp pt, 4.8 US pt) of fuel in one minute at zero suction head pressure and zero suction lift.

1. Position the car on a ramp.
2. Carry out the usual workshop safety precautions.
3. Disconnect the outlet pipe from the pump.
4. Connect one end of a suitable flexible hose to the fuel pump outlet and the other end to the test equipment.
5. Disconnect the brown/yellow cable from the outer pressure switch on the oil filter elbow.
6. Switch on the ignition, allow the pump to operate normally for fifteen seconds, then measure the fuel output for one minute. An output of 1,7 litres (3.0 Imp pt, 3.6 US pt) is acceptable.

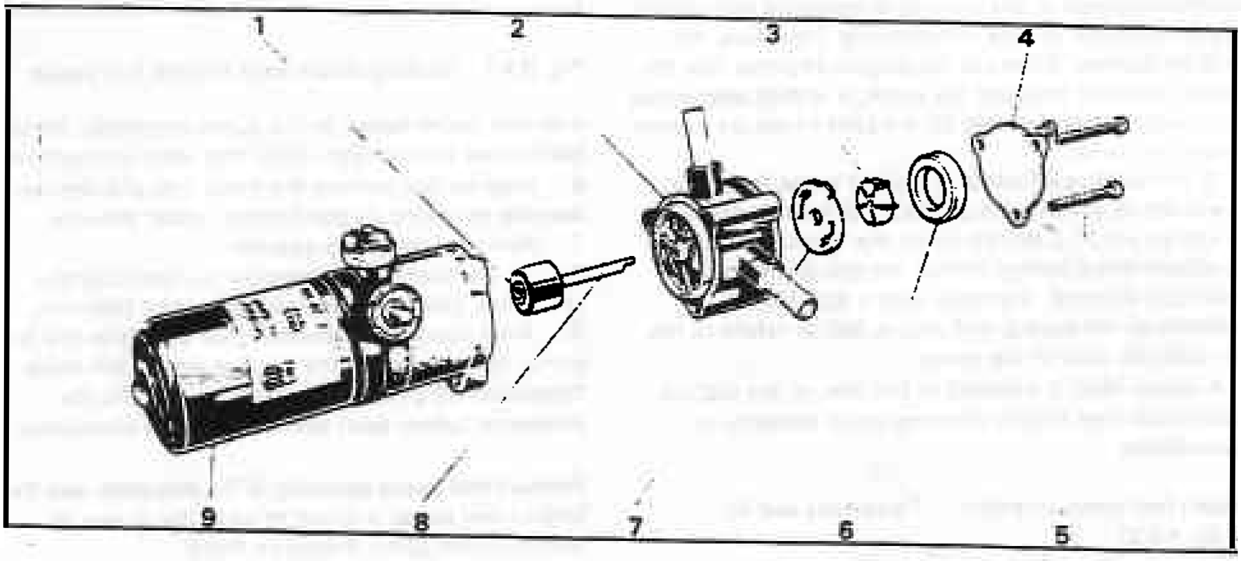


Fig. K3-3 Pierburg pump
1 Ball bearing
2 Pump body
3 Rotor and vanes
4 Lower bearing plate
5 Setscrews
6 Stator
7 Upper bearing plate
8 Drive-shaft
9 Motor body

Pierburg fuel pump assembly – To flow test on a rig
The fuel pump should be tested as shown in figure K3-5. The pump should be sited on the same level as the paraffin in the reservoir and deliver approximately 2.30 litres (4.0 Imp pt, 4.8 US pt) of paraffin in one minute, at zero suction head pressure and zero suction lift. If the fuel pressure is increased by the control valve, the flow should be checked against the flow details given in figure K3-6.

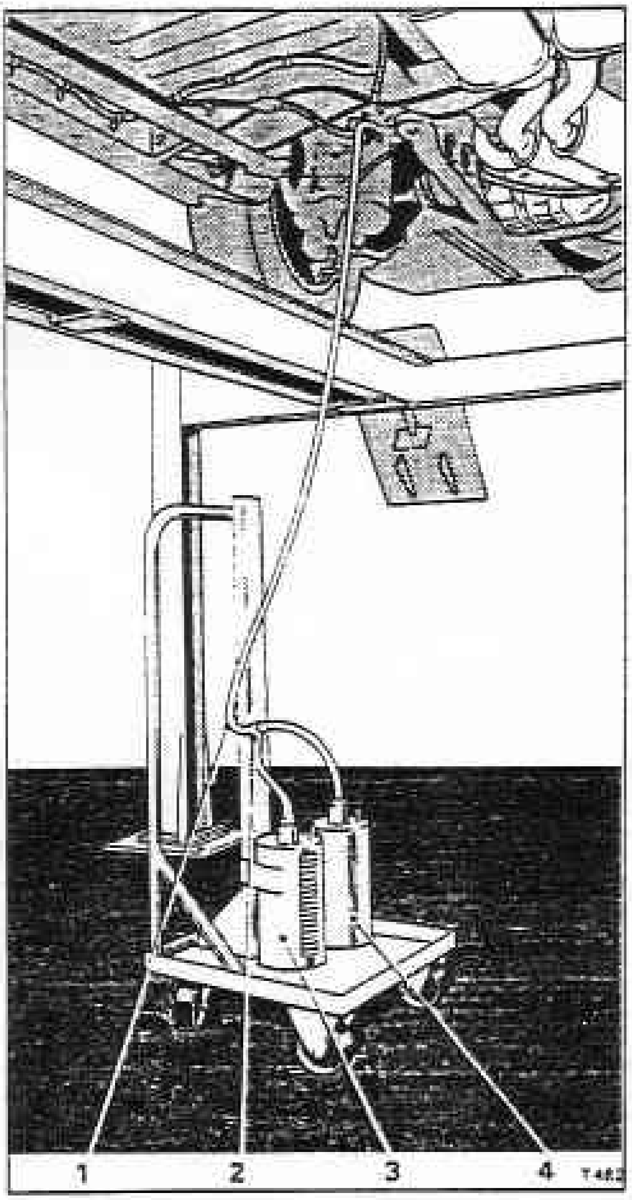


Fig. K3-4 Pierburg pump – on car testing
1 Pump outlet pipe
2 Flow control valve
3 Measuring container
4 Auxiliary container

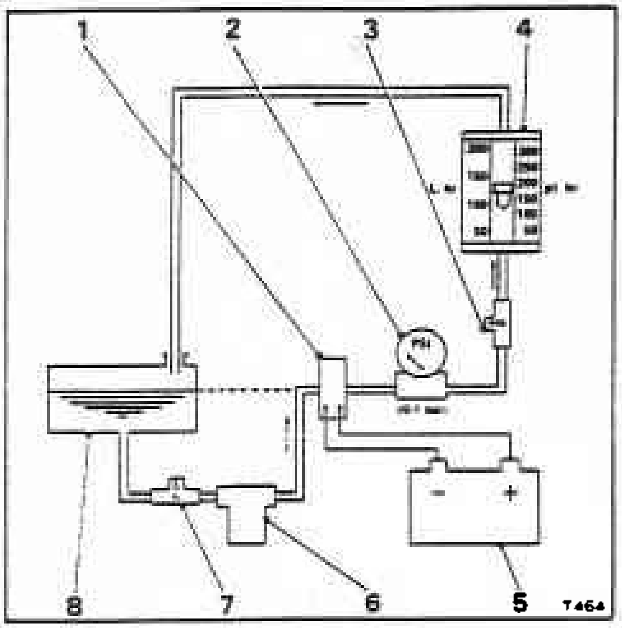


Fig. K3-5 Pierburg pump flow test rig – off car testing
1 Fuel pump
2 Pressure gauge
3 Flow control valve
4 Flow meter – rotameter type
5 12V battery (fully charged)
6 Filter
7 On/off tap
8 Paraffin reservoir 5 litres
(9 Imp. pt., 10.5 US pt.) minimum capacity

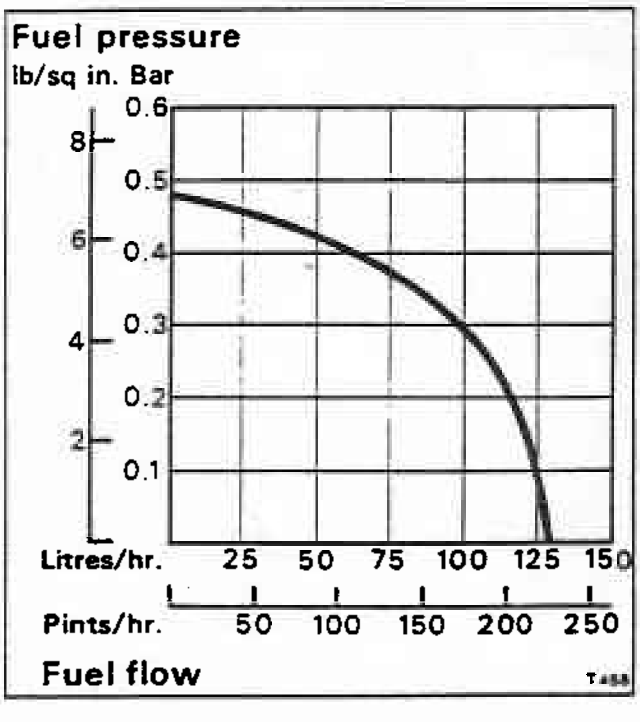


Fig. K3-6 Graph – minimum pump performance (zero suction head)

Fuel lines and Ancillary equipment

This section contains details of the components within the fuel system (with the exception of the fuel pump) that are fitted between the fuel tank and carburetters.

If it is necessary to open any of the fuel lines it is most important to ensure that the workshop safety precautions (i.e. no smoking, fire extinguishers, battery disconnected, etc.) are strictly adhered to.

The components included in this section are the fuel filter (main), check valve, fuel recirculation valve, one-way valve and fuel lines. Their positions relative to the fuel system are illustrated in figure K1-1.

Fuel filter (main)
Access to the filter is from beneath the car. The filter is mounted on the rear face of the centre crossmember (see fig. K4-1).

At the service intervals specified the fuel filter element should be discarded and a new one fitted.

Fuel filter – Element replacement
1. Carry out the usual workshop safety precautions.
2. Unscrew the pipe nut on each side of the filter top cover and free the inlet and outlet pipes. Blank off the pipes to prevent loss of fuel or ingress of dirt.
3. Remove the two nuts, bolts and washers securing the filter to the mounting bracket and lower the filter from the car.
4. Unscrew the three screws securing the top cover, collect the screws and withdraw the filter bowl.
5. Drain the filter bowl.
6. Withdraw the filter element. Resistance may be felt due to the tight fit of the element on the rubber 'O' ring fitted to the centre (outlet) spigot.
7. Thoroughly clean the filter bowl.
8. Fit a new element by reversing the procedure given for removal. Ensure that new rubber sealing rings are fitted.

Check valve (see fig. K4-2)
The check valve is situated in the fuel feed line forward of the rear crossmember.

Fuel under pressure from the pump, moves the small valve from its seating and passes through the holes in the valve disc. When the pump is not operating, the fuel pressure drops and a spring returns the valve disc to the adapter face, thus sealing the feed line.

Check valve – To remove and fit
1. Carry out the necessary workshop safety precautions.
2. Slacken the worm drive clip and remove the inlet pipe. Blank off the pipe to prevent loss of fuel or ingress of dirt.
3. Holding the valve body with an open ended spanner, slacken the outlet fuel pipe nut. Remove the check valve and blank off the pipe.
4. Fit the check valve by reversing the removal procedure.

Check valve – To dismantle
1. Remove the check valve from the car.
2. Remove the circlip from the inlet end.
3. Detach the adapter from the valve body. Take care when withdrawing the adapter as this will release the

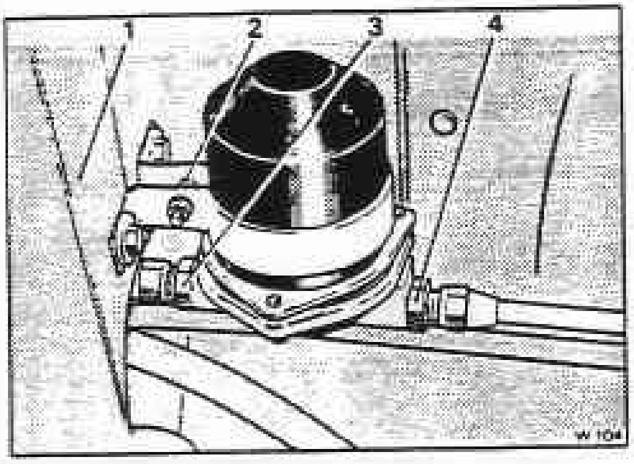


Fig. K4-1 Rear fuel filter (main)
1 Centre crossmember
2 Filter securing bolt
3 Outlet pipe
4 Inlet pipe

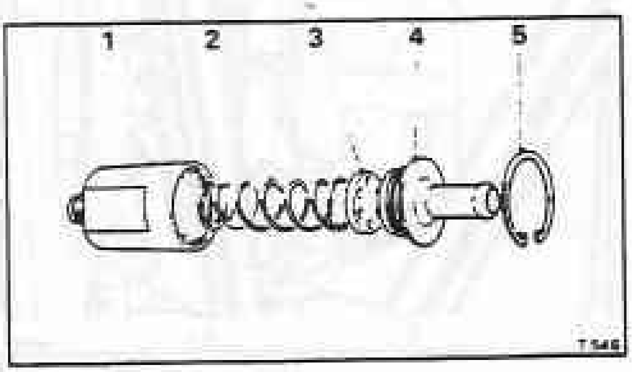


Fig. K4-2 Check valve
1 Valve body
2 Spring
3 Seating disc
4 Adapter
5 Circlip

slight pressure on the internal spring.
4. Withdraw the seating disc and spring.

Check valve — To clean
When the valve has been dismantled it may be cleaned using either clean fuel or paraffin.

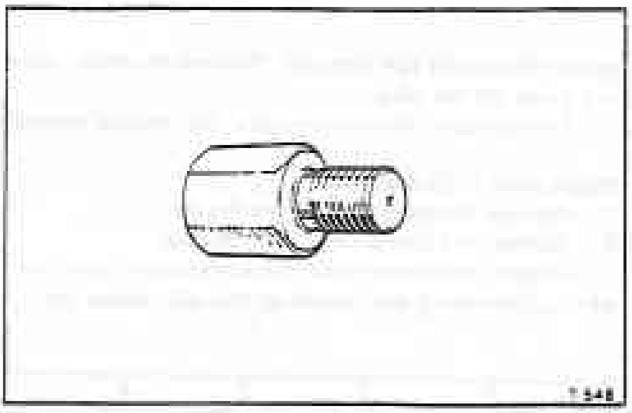


Fig. K4-3 Fuel recirculation valve

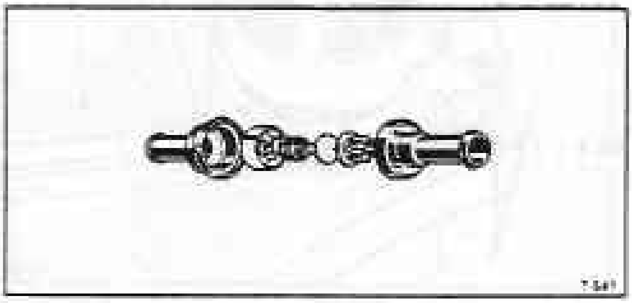


Fig. K4-4 Non-return valve

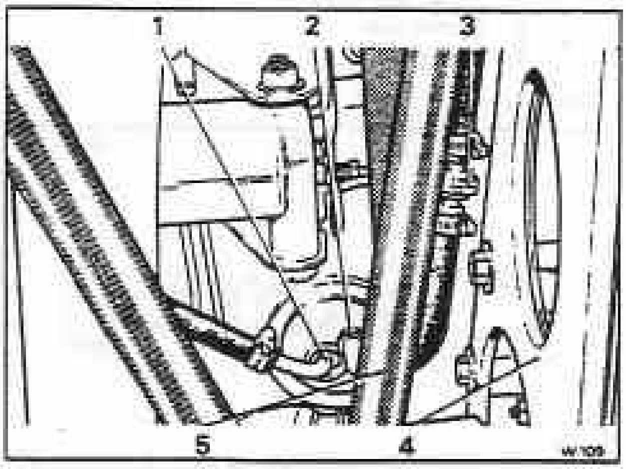


Fig. K4-5 Non-return valve location
1 Fuel feed line
2 Fuel return line
3 Non-return valve
4 Torque arm
5 Rear suspension frame tube

Check valve — To assemble
Assemble the valve by reversing the procedure given for dismantling, noting the following.
1. Ensure a new 'O' ring is fitted to the adapter.

Fuel recirculation valve (restrictor) (see fig. K4-3)
A fuel recirculation valve is fitted in 'A' bank carburetter outlet fuel pipe. The valve restricts the flow of fuel returning to the tank by metering it through a small hole of 1,88 mm (0.074 in) diameter. This maintains the required pressure in the fuel feed side of the system.

Fuel recirculation valve — To remove and fit
1. Hold the recirculation valve using an open ended spanner and slacken the outlet fuel pipe nut. Unscrew the nut and withdraw the pipe.
2. Slacken the recirculation valve and withdraw it from 'A' bank carburetter filter housing.
3. To fit the recirculation valve reverse the removal procedure.

Non-return valve (see fig. K4-4)
The operation of the Pierburg one-way valve which, is manufactured from fuel resistant nylon is described in Section K1. The valve is a non-serviceable unit and if its operation is suspect a new assembly should be fitted. The fuel flow is indicated by the directional arrow embossed on the valve body.

Access to the valve is from beneath the car and its location is in the fuel return line above the rear wheel half-shaft.

Non-return valve — To remove
1. Carry out the necessary workshop safety precautions.
2. Clamp the rubber fuel pipe before and after the valve.
3. Slacken the worm drive clips either side of the valve and withdraw the pipes.
4. Blank off the open pipe connections if the new valve is not to be fitted immediately.

Non-return valve — To fit
To fit the non-return valve reverse the procedure given for removal, noting the following.
1. Ensure that the valve is fitted correctly. Fuel flow directional arrows are situated on the valve body.

Fuel lines
The fuel lines comprise metal bundy tubing and reinforced petrol resistant rubber hoses.

Metal piping is used where possible and is attached to the body and inner longeron, etc. by metal clips (with rubber inserts) and self-tapping screws.

Rubber piping is used where flexibility is required.

The various systems are illustrated in figure K1-1.

Carburetters and Automatic choke

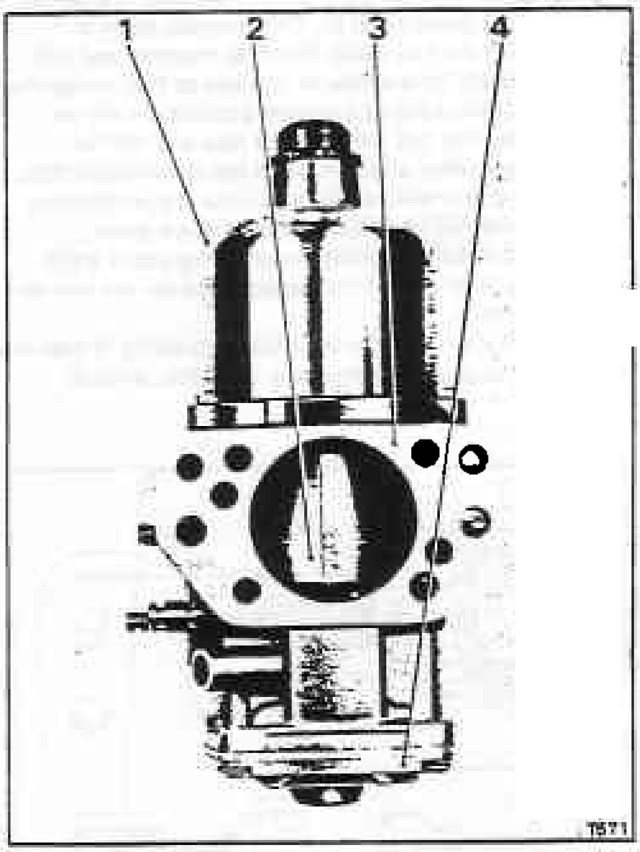


Fig. K5-1 SU HIF 7 carburetter
1 Suction chamber
2 Piston
3 Carburetter body
4 Bottom cover plate

Description
Two SU HIF7 (Horizontal Integral Float Chamber) carburetters with 4,76 cm (1.875 in) choke bores (see fig. K5-1) are fitted to the engine on a central 'Tee' piece which is mounted over an eight branch induction manifold.

This type of carburetter automatically adjusts both its choke and jet area to meet the demand of the engine. As air is drawn through the carburetter, 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 carburetters, 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. K5-2)
The float chamber is incorporated in the main body 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 carburetter 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. K5-2)
The jet tube of the HIF type carburetter 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. 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 carburetter body.

SU HIF7 carburetters 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. K5-2)
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 SU HIF jet assembly the jet head is attached to a bi-metal blade (item 6). This bi-metal blade is immersed in the fuel inside the float chamber and will move vertically in response to changes of 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. Also that exhaust emissions can be kept within closer limits during cold starting and the warm-up period.

Temperature compensation also allows carburetters to have the mixture setting pre-set and sealed before the car is delivered.

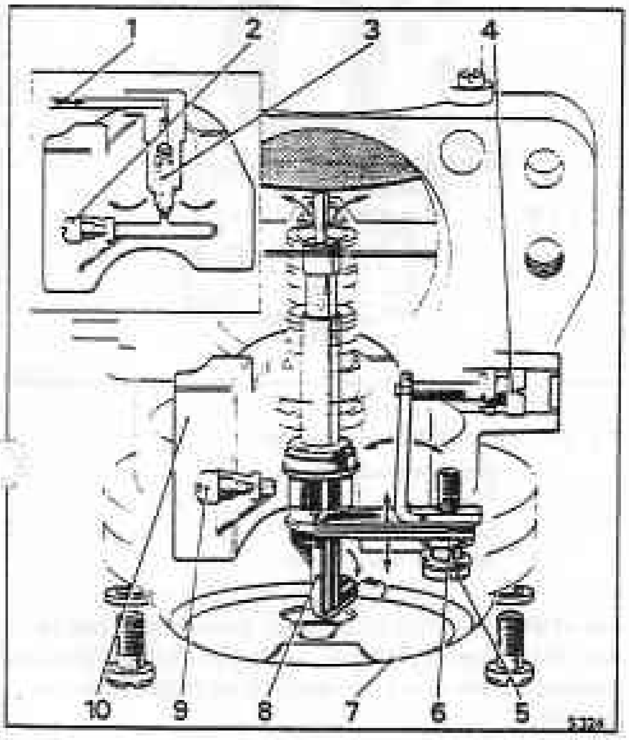


Fig. K5-2 Float chamber layout
1 Fuel inlet
2 Float fulcrum valve
3 Needle valve
4 Jet adjusting screw
5 Bi-metal pivot screw
6 Bi-metal assembly
7 Bottom cover-plate
8 Jet head
9 Float fulcrum screw
10 Concentric float

Overrun valves (see fig. K5-3)
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. K5-4)
The jet needle fitted to each carburetter is biased towards a predetermined position in the jet orifice by means of a

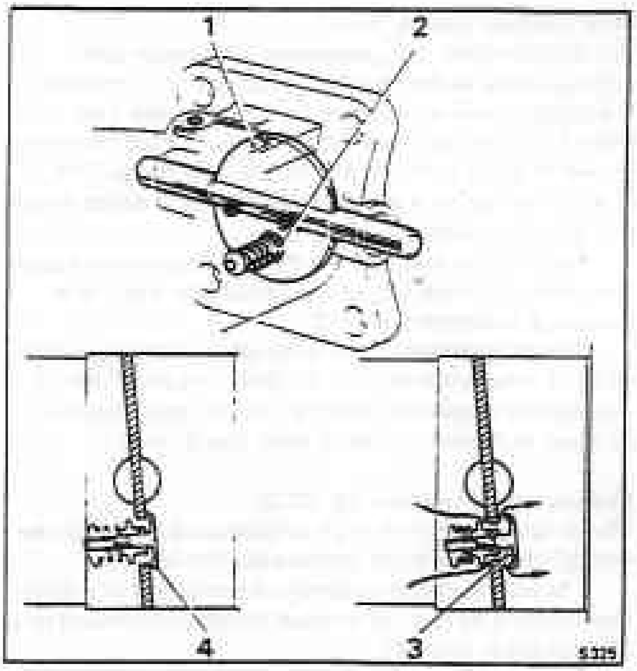


Fig. K5-3 Overrun valve
1 Throttle butterfly disc
2 Overrun valve
3 Overrun valve open
4 Overrun valve closed

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 pre-determined 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 service intervals specified, the two filter elements should be discarded and new ones fitted.

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.
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. Disconnect the electrical connection at the cut-out switch fitted into the carburetter intake elbow.
2. Unscrew the choke stove pipe connection at the carburetter intake elbow.
3. Slacken the worm drive clip securing the intake trunking to the elbow and remove the trunking.
4. Remove the setscrew and washer securing the intake elbow to the thermostat housing bracket; remove the elbow from the choke housing.
5. Remove the sensor vacuum pipe connections; withdraw the intake elbow.
6. Withdraw the vacuum signal hose to the speed control unit. Unscrew the two setscrews securing the unit to the air horn.
7. Remove the split pin, washer and clevis pin from the throttle linkage just forward of 'A' bank carburetter.

From 'B' bank side
8. Unscrew the union on the choke stove pipe at the bi-metal housing.
9. Unscrew the fuel feed pipe from 'B' bank carburetter filter housing. Suitably blank the open connections.
10. 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.
11. Detach the distributor vacuum advance signal hose from the 'Y' piece adjacent to the weakening device solenoid.
12. Disconnect the electrical cables to the choke solenoid at the snap connector joints adjacent to the choke

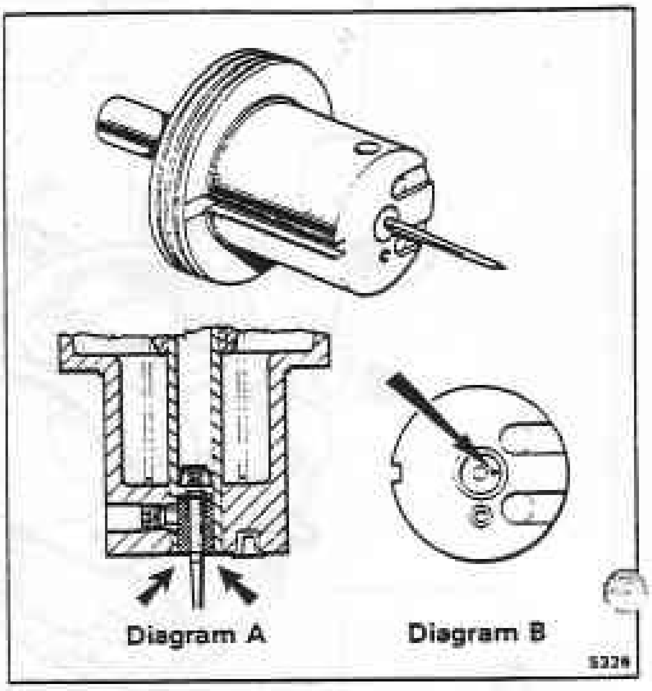


Fig. K5-4 **Spring-loaded jet needle**
Diagram A
Needle guide height setting
Diagram B
Needle guide alignment setting

butterfly housing.
13. Detach the electrical connections to the anti 'run-on' and the weakening device cut-off solenoids.
14. 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.
15. Unscrew the nut from the dipstick bracket; collect the bolt, nut and washer.
16. Unscrew the setscrew from the centre of the carburetter 'Tee' piece; withdraw the setscrew and collect the washer.
17. 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 and air horns by reversing the procedure given for their removal, noting the following.
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 nuts securing the air horn to 'A' bank carburetter.

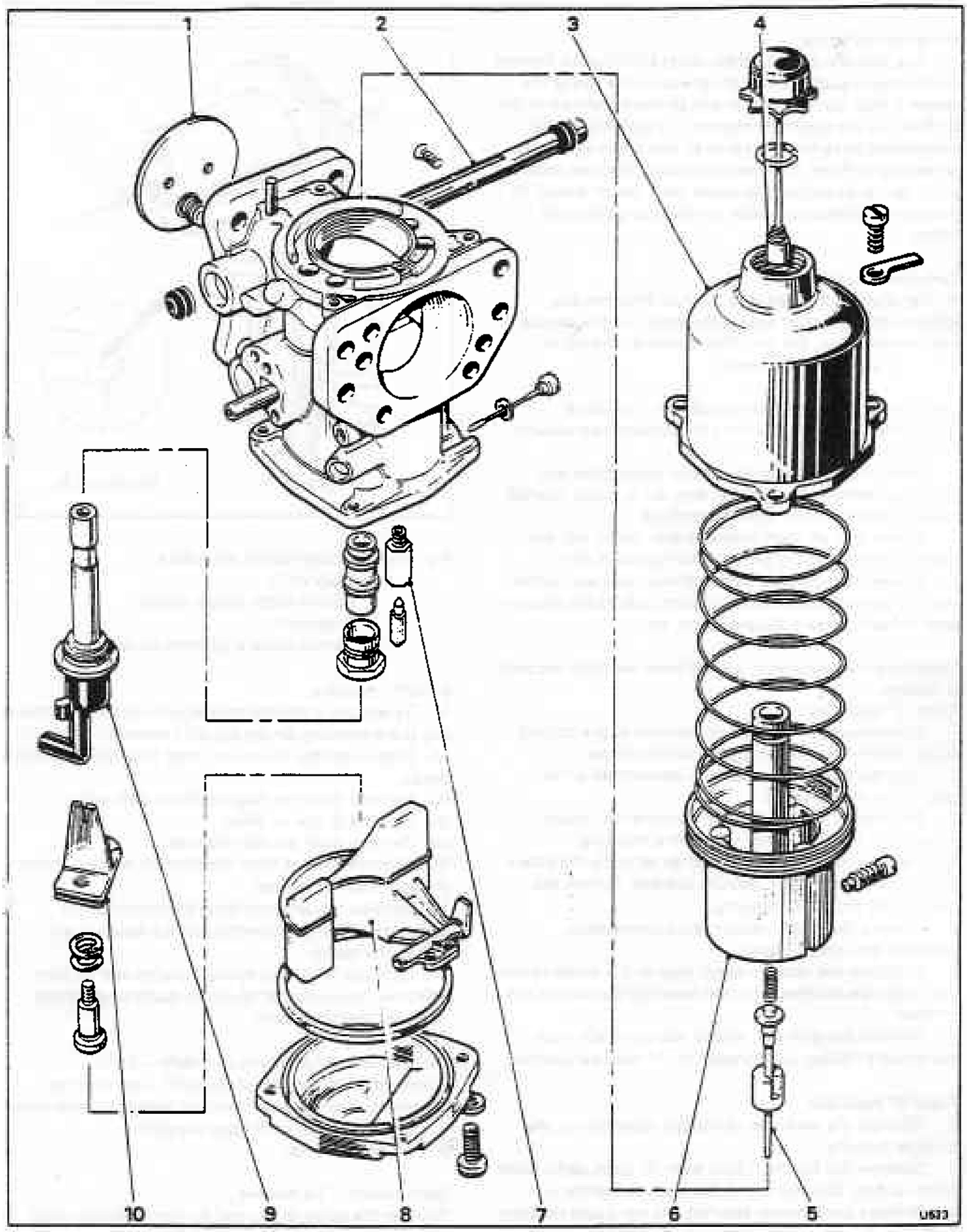


Fig. K5-5 SU HIF7 carburetter

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

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 fitted on the carburetter adjacent to the '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. Unscrew and remove the two screws securing a 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 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 half-nuts that retain the carburetter to the 'Tee' piece flange; collect the washers.
9. Withdraw the carburetter and collect the gasket.

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 maybe necessary to dismantle the carburetters and under these conditions the following procedure should be carefully followed.

Carburetter — To dismantle

Upper half (see fig. K5-6)

1. Thoroughly clean the outside of the carburetter.
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 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 assembly and unscrew the needle guide locking screw.
7. Withdraw the needle, guide and spring.

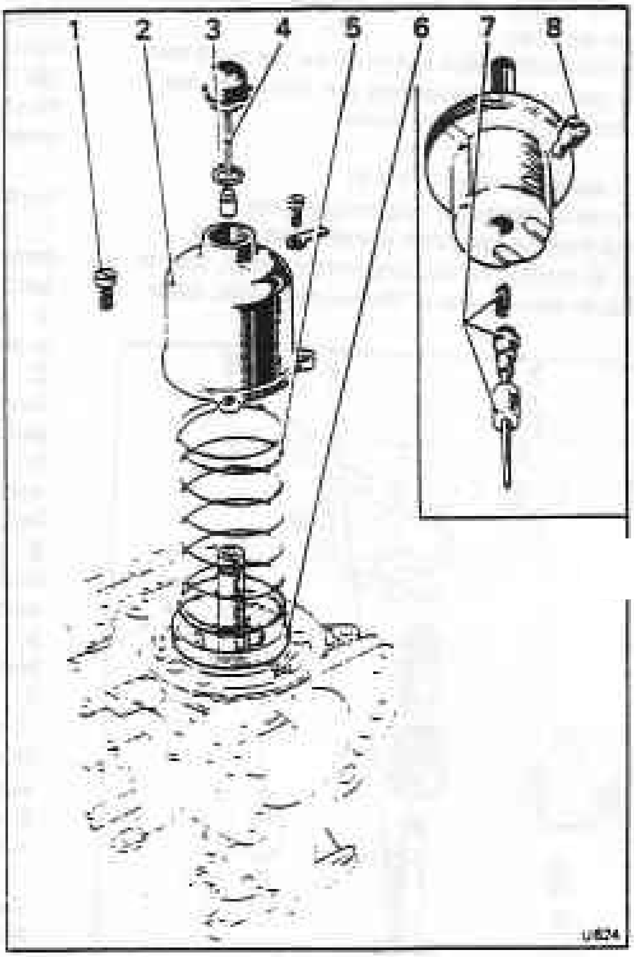


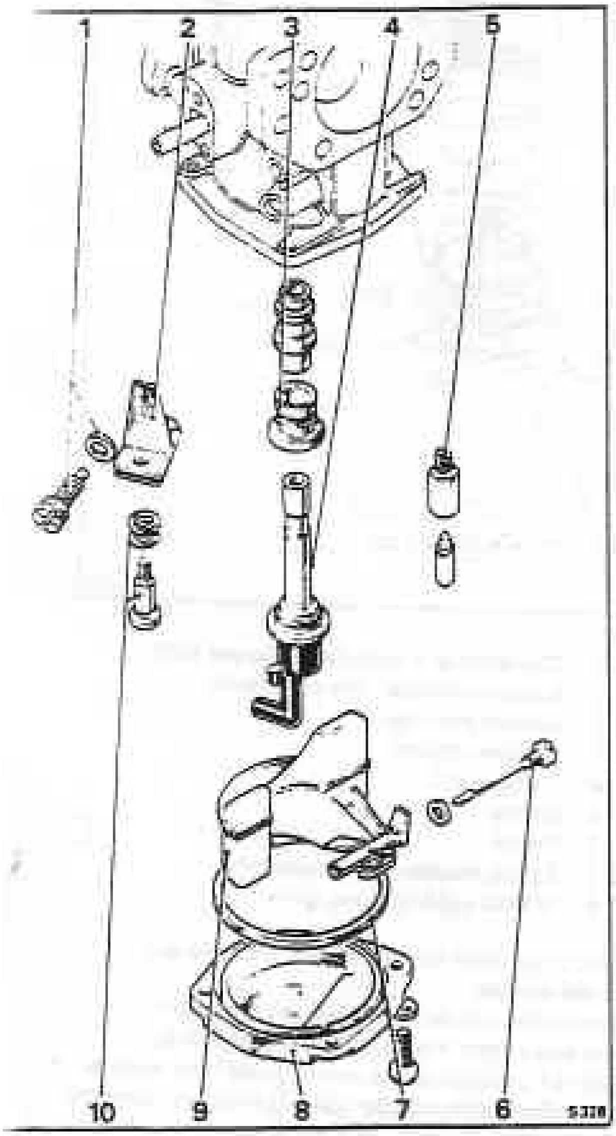
Fig. K5-6 Dismantling a carburetter (upper half)
1 Suction chamber retaining screw
2 Suction chamber
3 Damper retainer
4 Damper rod
5 Spring
6 Piston
7 Spring loaded needle assembly
8 Needle guide locking screw

Lower half (see fig. K5-7)

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.

...ove the float pivot spindle and aluminium washer.
...draw the float.
...nove the needle valve and unscrew the valve seat.
...nscrew the jet bearing locking nut and withdraw ...aring complete with fibre washer.

...tle disc assembly (see fig. K5-8)
...emove the throttle disc retaining screws.
...lose the throttle and mark the position of the ...le disc in relation to the carburetter flange. Do not ... 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. Note the way that the seal is fitted in relation to the carburetter body to ensure correct assembly.



...ig. K5-7 **Dismantling a carburetter (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

Carburetter — To inspect
1. Examine the throttle spindle and its bearings in the carburetter 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 carburetter 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. Ensure that the piston spins freely in the suction chamber without any tendency to stick.

Carburetter — To assemble
Assemble the carburetter by reversing the procedure

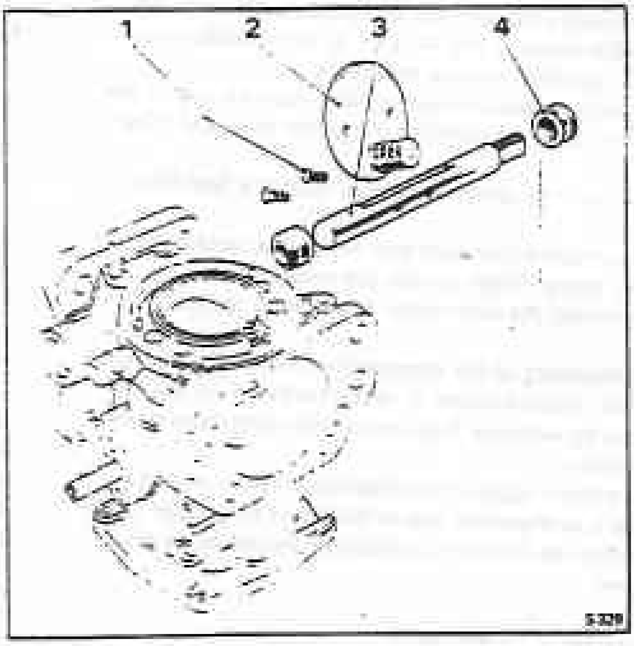


Fig. K5-8 **Dismantling a carburetter (throttle disc assembly)**
1 Throttle disc retaining screws
2 Throttle disc assembly
3 Throttle spindle
4 Seal

given for removal, noting the following.
1. Ensure that the throttle disc is fitted in its original position.
2. New throttle disc retaining screws must be used when fitting 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. Alternatively, anneal the existing washer.

Check the level of the float in its chamber (refer to Carburetter 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 (0.120 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. K5-4).
8. To prevent the piston spring from being 'wound up' during assembly, 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 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 circlip is correctly installed on the piston rod (see fig. K5-9).

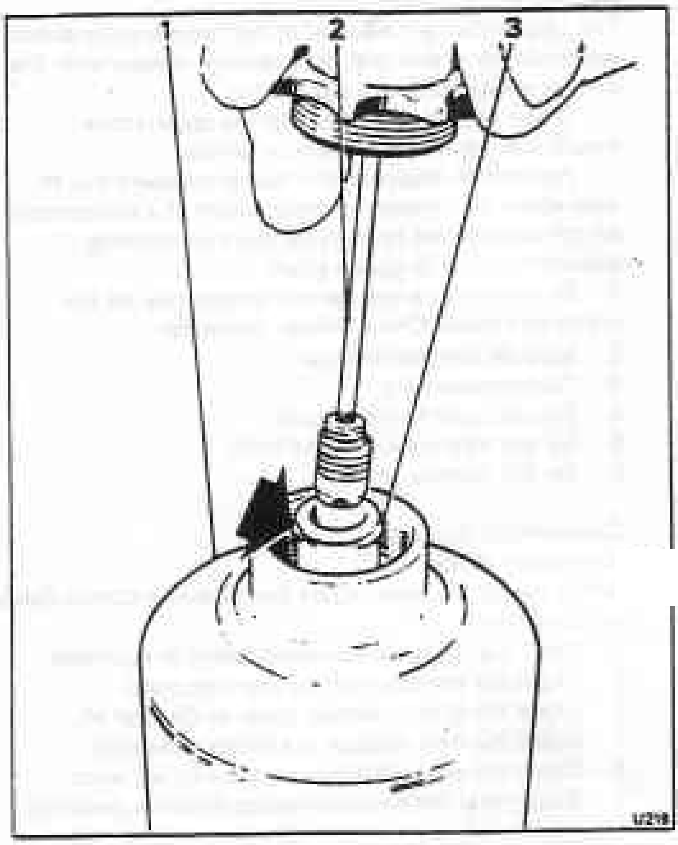


Fig. K5-9 Carburetter damper assembly
1 Suction chamber
2 Damper rod
3 Circlip

Carburetter float level – To set
1. Remove the carburetter from the engine.
2. Invert the carburetter.
3. Mark the bottom cover plate and carburetter to ensure correct assembly, unscrew the retaining screws and remove the cover complete with the sealing ring.

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. K5-10) 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 (0.020 in – 0.060 in)

6. If necessary, adjust the float position by carefully bending the metal pad.
7. Check that the float pivots correctly about the spindle.

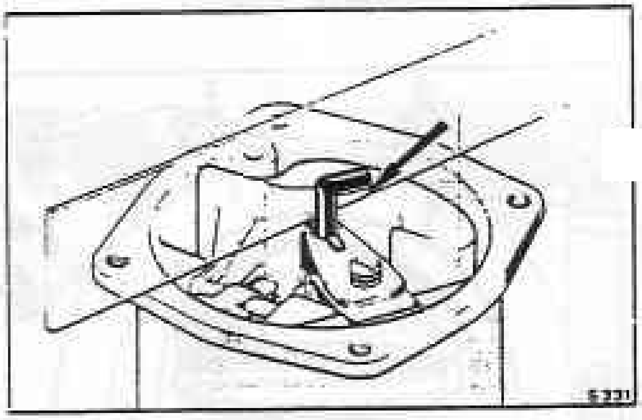


Fig. K5-10 Checking the float level

Carburetter air valve damper – To top-up
The upper portion of the piston rod (guide spindle), attached to the air valve piston in each carburetter, is hollow and is filled with the same type of oil as used in the engine.

At the specified service intervals the damper oil level should be checked and topped-up if necessary.
1. Unscrew and remove the cap and damper assembly from the air valve damper.
2. Top-up the damper reservoir in the air valve with clean engine oil to approximately 13 mm (0.50 in) from the top of the tube. Fit the damper into the tube and screw the cap firmly into position.

Do not overfill the damper reservoir, otherwise the piston may stick in the suction chamber.

Carburetters – To set

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

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

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

1. Set the throttle linkage and temporarily set the engine idle speed. Check linkage clearances.
2. Set cold start fast-idle cam.
3. Tune carburetters.
4. Set cold start fast-idle speed.
5. Set the kick-down micro-switch.
6. Set full throttle stop.

Carburetter tuning

Preliminary checks

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

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

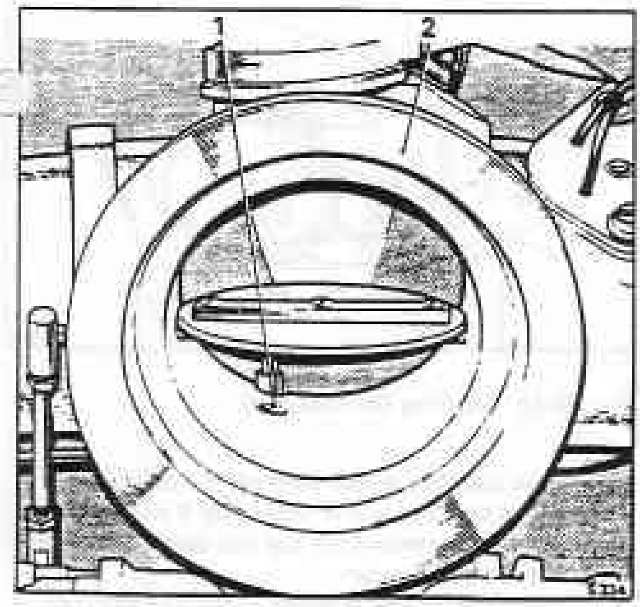


Fig. K5-11 Hot idle mixture compensator feed
1 Hot idle compensator feed
2 Air intake butterfly housing

Carburetter idle air balance

1. Carry out the usual workshop safety precautions.
2. Connect an impulse tachometer in accordance with the manufacturer's instructions.
3. Disconnect the speed control chain.
4. Start and run the engine until normal operating temperature is attained.
5. Stop the engine.
6. Fit the dial gauges RH 8841 with RH 9105 (kit to convert dial gauges to fit the SU HIF7 carburetters) to the carburetter suction chamber in place of the dampers.
7. Zero the gauges with the engine stopped and lightly tighten the gauge clamp screws.
8. Start and run the engine at 900 rpm.
9. With the fast-idle screw on the tip of the cam adjust the carburetter piston lifts to be equal (within 10%) using the eccentric adjuster (see fig. K7-1).

Note

If either the float chamber depression is above 12,70 mm (0.50 in) H_2O or the piston lift is over 2,54 mm (0.10 in) at 650 rpm, the ignition timing should be checked at the idle speed setting. If either of these conditions exist it could result in unsatisfactory driveability.

10. Stop the engine and remove the impulse tachometer.
11. Remove the dial gauges and fit the carburetter dampers. Ensure that the circlip is correctly fitted onto the piston rod of each carburetter (see fig. K5-9).
12. Connect the speed control chain and adjust to give a minimum slack condition, consistant with no impediment to the throttle lever to return to the idle speed position.

Carburetter mixture strength – To set

1. Carry out the usual workshop safety precautions.
2. Connect an impulse tachometer in accordance with the manufacturer's instructions.
3. Remove the air intake, blank off the hot idle compensator feed drilling (see fig. K5-11) and replace the intake.
4. Unscrew and remove the pressure tapping cap from the weakening device.
5. Ensure that the engine has run for at least 25 minutes after the thermostat has opened.
6. Purge the engine at 2000 rpm in Neutral for a quarter of a minute. Allow the engine speed to return to the idle setting and ensure that this is 650 rpm; adjust if necessary using the idle stop screw.
7. Insert the probe of a CO meter into either exhaust system tailpipe and check the reading.
8. The CO meter reading should be between 2.5% and 3.5%. If the reading is outside the limits quoted.
   a. Check for induction system leaks.
   b. Check the choke stove and purge line flow rates.
9. If after carrying out Operation 8 the idle speed CO meter reading is still outside the limits quoted the carburetter mixture screws (see fig. K5-2) may be adjusted by equal amounts up to one half of a turn in the same direction in order to achieve the mean limit of 3%.

No attempt should be made to adjust the CO reading if it is in the region of between 2.5% and 3.5%.

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 2000 rpm in Neutral for a quarter of a minute and then resume the tuning operations. Repeat this purging operation if a further period of three minutes is exceeded.

10. Fit the pressure tapping cap to the weakening device, fit a new sealing washer if necessary.

11. Check the idle speed, this should be 650 rpm; adjust by means of the idle stop screw.

12. Stop the engine, remove the air intake and discard the blank from the hot idle compensator feed drilling; fit the air intake.

13. Remove the impulse tachometer.

Carburetter tamperproofing

The carburetter mixture screws may have tamperproof caps fitted, therefore upon completion of the setting operations fit new caps.

Special tools for fitting the caps are as follows.

'A' bank carburetter mixture screw cap – RH 9096

'B' bank carburetter 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 system 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 carburetter air inlet temperature) to a point in the induction system downstream of the carburetter 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 carburetters and air horns assembly should be removed from the engine so that access may be gained to the two cheese-head screws retaining the bi-metallic valve cover.

2. Position the joint face horizontally (if the joint face is in the vertical position the bi-metallic valve assembly will fall when the cover is withdrawn). Unscrew the two cover retaining screws and lift off the cover.

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 carburetter and incorporates a fuel receiver.

For any given position of the fuel metering needle, the rate of discharge from the carburetters 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. K5-12) the venturi chamber and the fuel receiver chamber. The two chambers are 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 carburetters 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 carburetter float chambers.

The value of the depression is set by the position 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. This prevents the engine stalling if the float chamber needle valves stick.

Weakening device – To remove

1. Label all hoses connected to the weakening device assembly, to 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 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.

Weakening device – To dismantle (see fig. K5-12)

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 and 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, and remove the plug. 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 dirft 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

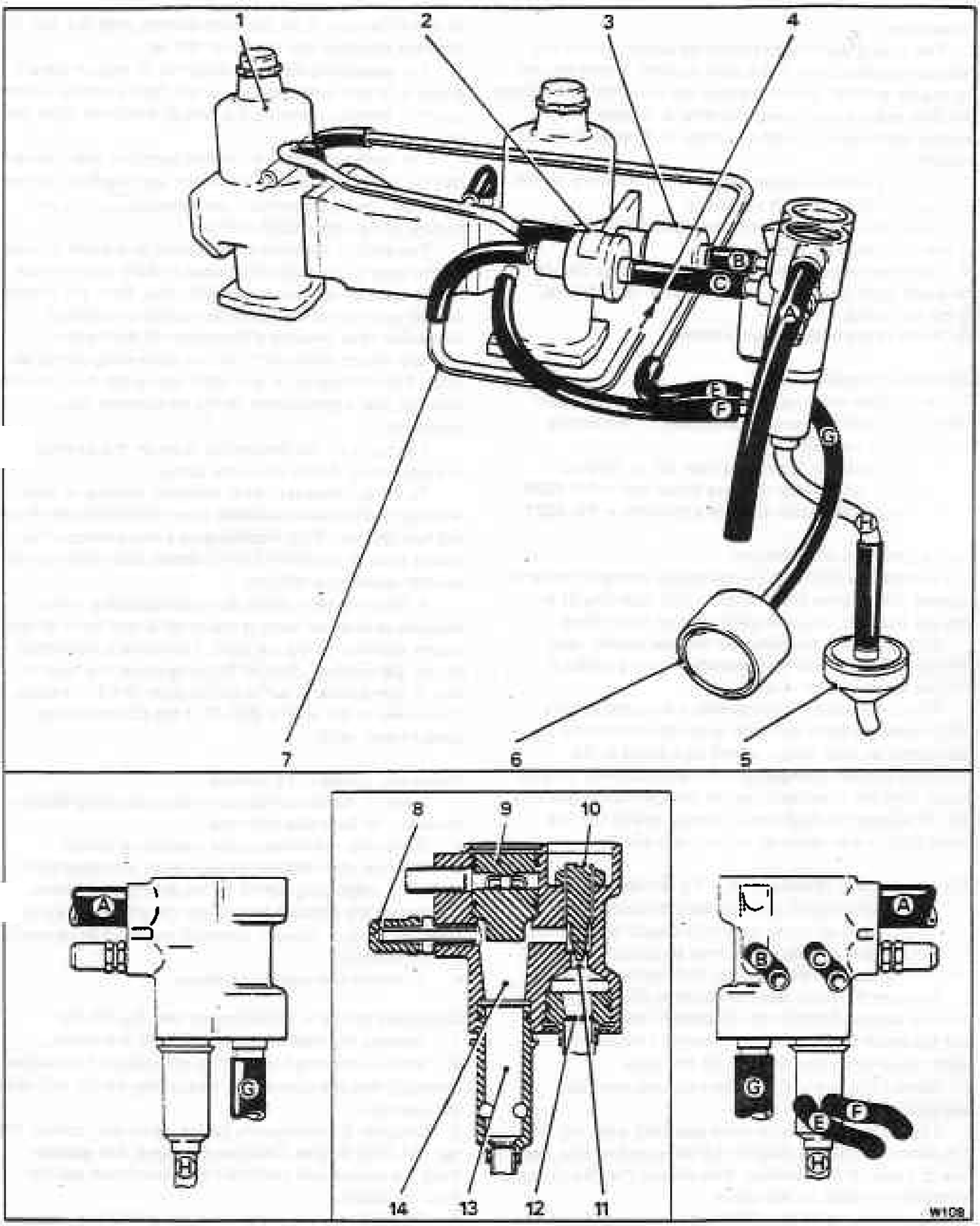


Fig. K5-12 Mixture weakening device

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

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 screw-driver 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. These pipes are situated one on the side of the fuel receiver chamber and the other at the bottom of the venturi chamber.

Weakening device – To fit

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

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

Weakening device signal strength – To check

The float chamber depression should be checked as follows.

1. Start and run the engine until normal operating 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 152 mm (0 to 6 in) water manometer to the weakening device adapter.
5. Start and run the engine at 2000 rpm in Neutral until a steady manometer reading is obtained. This should be 63,5 mm (2.5 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.
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.
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. K5-12) 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 1400 rpm and 1900 rpm.

Weakening device air filter – To remove and fit

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.
3. 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 the Weakening system cut-out switch, Anti 'run-on' solenoid and 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. K5-13).

Weakening system cut-out switch – To remove and fit

1. Withdraw the protective sheath and detach the electrical connections, noting the position of the connections to assist identification when assembling.
2. Using a screwdriver, carefully ease the switch out of its rubber mount.
3. Fit the cut-out switch by reversing the procedure given for removal.

Weakening system cut-out switch circuit wiring – To check

1. Detach the electrical connection from the Weakening system cut-out switch.
2. Fit one side of a test lamp to the white cable in the connector 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. Disconnect the electrical connection from the switch.
2. Bridge the white connection to the switch.
3. Bridge the white/blue connection to the switch with a test lamp.

4. 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. K5-12). 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 and fit

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

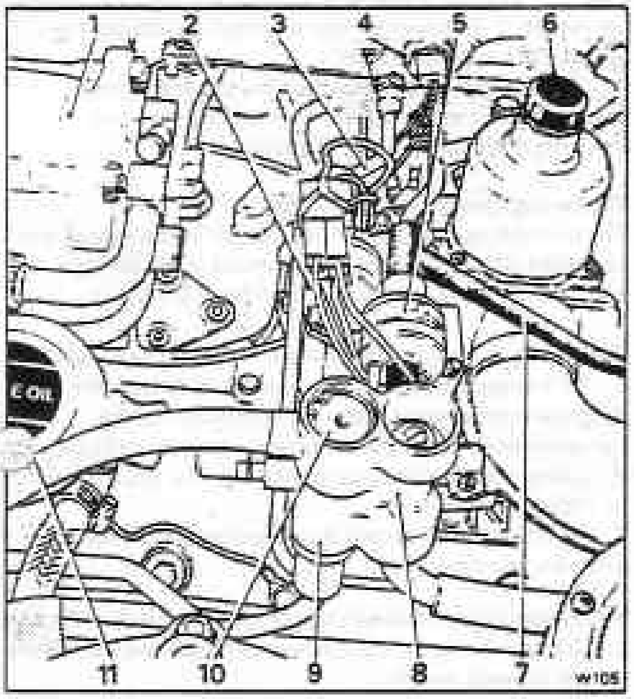


Fig. K5-13 Solenoid platform
1 Refrigeration compressor
2 Anti 'run-on' solenoid
3 Choke stove pipe
4 Weakening system cut-out switch
5 Weakening system cut-off solenoid
6 'B' bank carburetter
7 Distributor vacuum advance hose
8 Mixture weakening device
9 Fuel receiver
10 Float chamber vent valve
11 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.
5. 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 between 0 and 152 mm (0 and 6 in) of water to the tapping.
4. Start and run the engine at the idle speed setting (650 rpm).
5. Switch off the engine and observe the reading on the manometer. The reading should momentarily increase to approximately 152 mm (6 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 one of the following.

a. A blockage in the hose (see fig. K5-12) from the anti 'run-on' solenoid to the weakening device.
b. A blockage in the hose (see fig. K5-12) 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 the 'B' bank carburetter (see fig. K5-13).

Weakening system cut-off solenoid – To remove and fit

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 screws and withdraw the solenoid.
4. 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 that 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. Note that as the engine warms-up and the inlet air temperature reaches approximately 14°C the test lamp bulb should extinguish.
5. Stop the engine and allow it to cool. Note that when the engine becomes cold and the air in the intake drops to a temperature of approximately 12°C 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 air pressure.
5. If the operation of the solenoid is correct, the following conditions should apply.
a. With a cold engine (i.e. the inlet air temperature below approximately 14°C) 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 or above) blowing air through the hose is possible.
c. As the engine again cools (i.e. the inlet air temperature drops below approximately 12°C) the conditions described in (a) should again apply.

Automatic choke system
The engine induction system is provided with an automatic choke device to improve starting with a cold engine.
The automatic choke system comprises five main features.
1. An offset butterfly valve situated 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. This allows the throttle stop to rest on a lower part of the fast-idle cam and gives 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 a thermal time switch will energise the choke solenoid for a specified period,

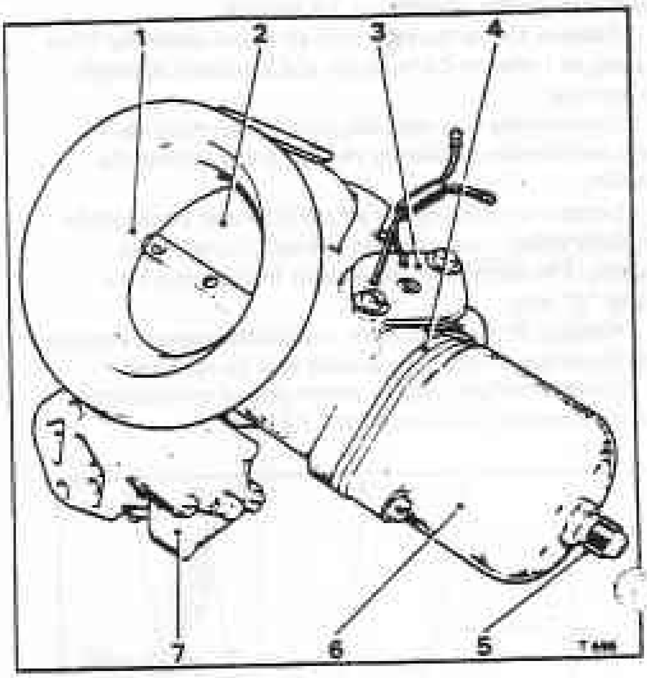


Fig. K5-14 Automatic choke assembly
1 Air intake (induction system)
2 Butterfly valve
3 Solenoid
4 Bi-metal spring assembly
5 Stove pipe connection/restrictor
6 Heat sink/bi-metal cover
7 Hot idle mixture compensator

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, 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 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 from the engine (refer to Carburetter and air horns assembly – To remove).
2. Unscrew the two 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. K5-19).

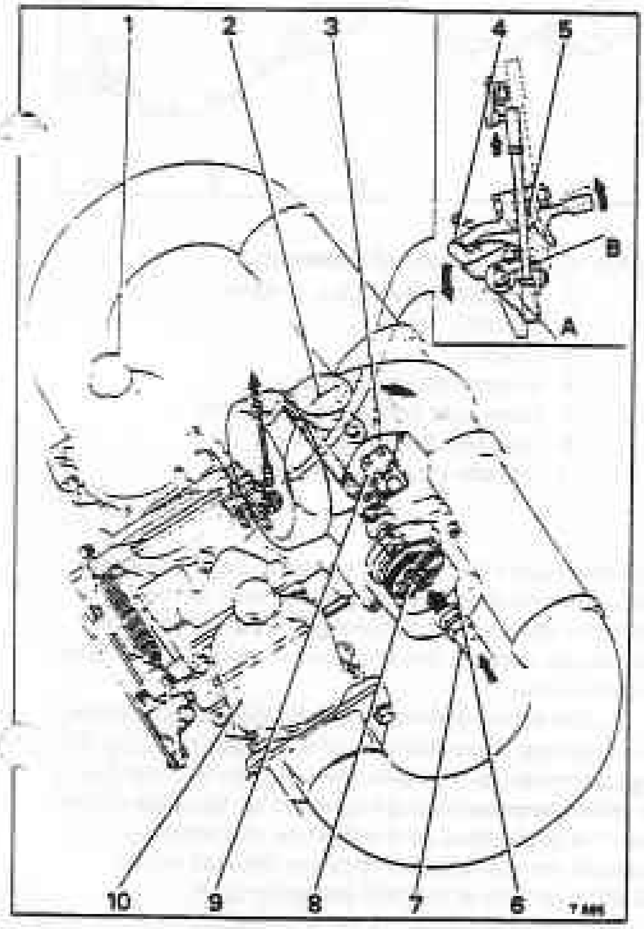


Fig. K5-15 Automatic choke system
1 'A' bank carburetter
2 Crankcase emissions connection
3 Extended fast-idle plunger
4 Fast-idle cam
5 Throttle spindle
6 Heat sink
7 Stove pipe
8 Bi-metal coil
9 Solenoid
10 'B' bank carburetter
A Choke closed/on
B Choke open/off

6. Unscrew the two nuts securing the automatic choke assembly to the hot idle mixture compensator housing and carburetter 'Tee' piece; collect the washers.
7. Withdraw the automatic choke housing.

Automatic choke assembly – To fit

Fit the assembly to the carburetter 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. K5-16)

1. Unscrew the nut retaining the butterfly rod connecting link to the choke butterfly spindle. The nut is situated 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 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. K5-16).

Automatic choke assembly – To assemble

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

1. Always fit new sealing rings and gaskets.
2. Coat the choke housing joint face with Wellseal.
3. Do not disturb the bi-metal coil setting.
4. Use three new screws to retain the choke strangler

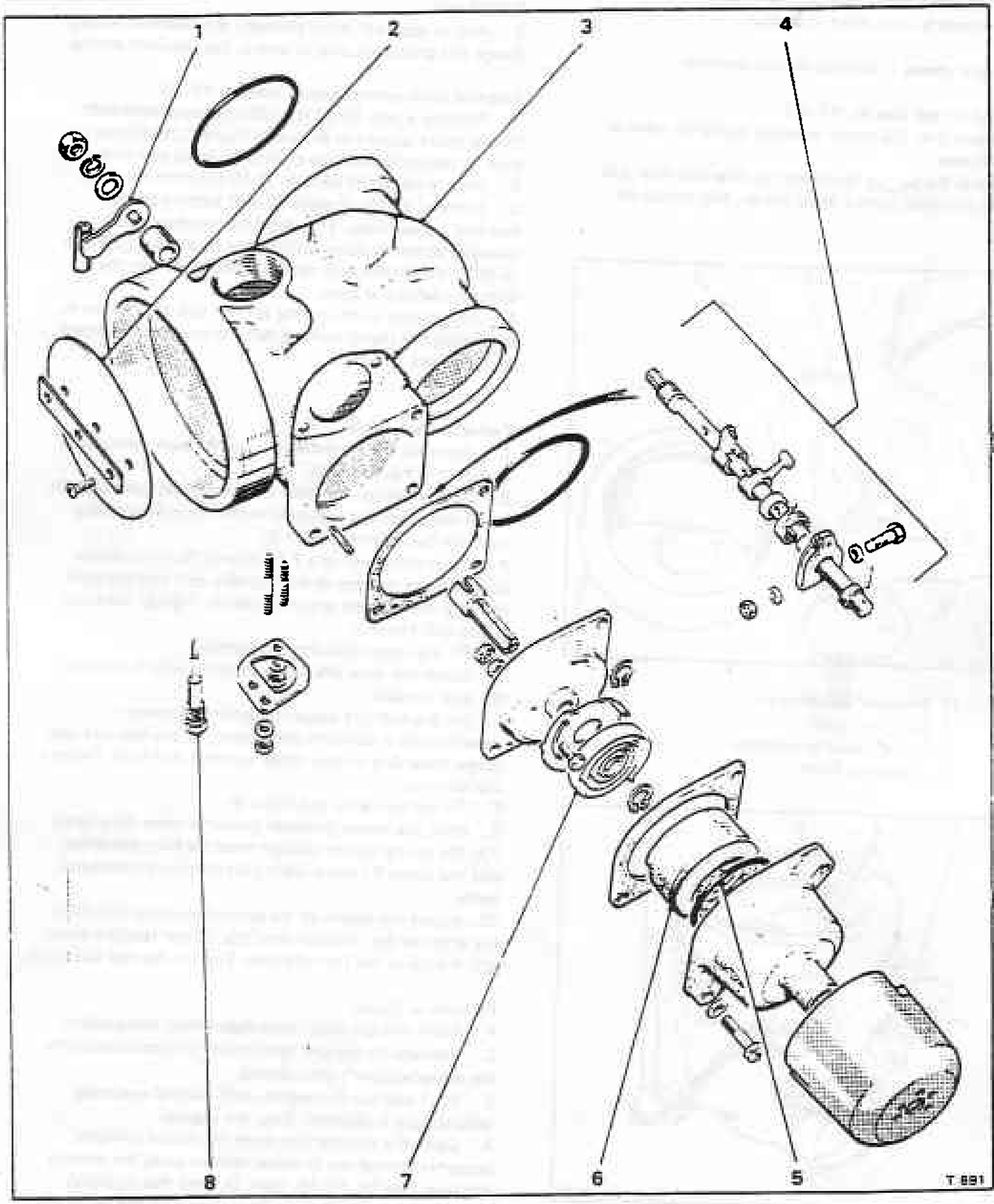


Fig. K5-16 Automatic choke assembly
1 Control rod lever
2 Butterfly valve
3 Choke housing
4 Butterfly spindle assembly
5 Sealing ring
6 Heat sink
7 Bi-metal spring
8 Extended fast-idle plunger

butterfly to the choke spindle and open the 'split legs' of the screws to lock them in position.

Automatic choke – Settings during assembly

Solenoid air gap (see fig. K5-17)

1. Ensure that the choke strangler butterfly valve is firmly closed.
2. Check 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.

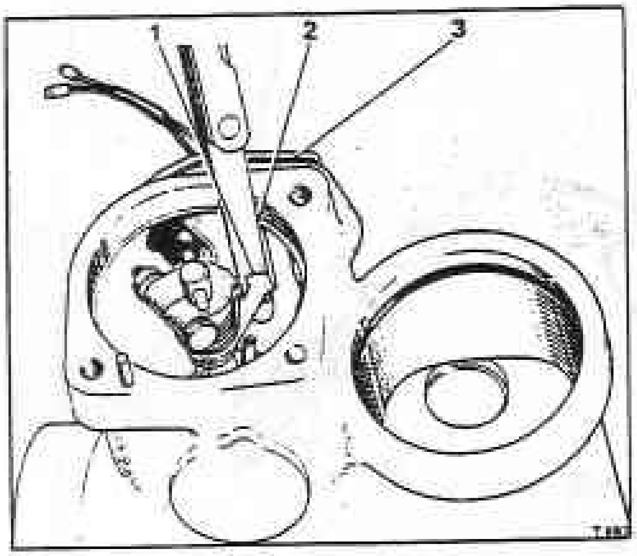


Fig. K5-17 **Solenoid adjustment**
1 Butterfly lever
2 Feeler gauge in position
3 Adjusting shims

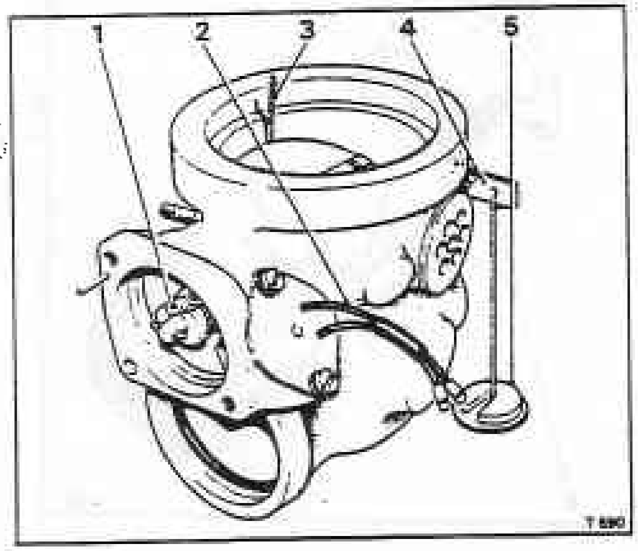


Fig. K5-18 **Lever spring tension**
1 Clamp adjuster
2 Solenoid electrical connections
3 1,58 mm (0.062 in) diameter drill
4 Lever
5 Weight

Solenoid lever spring tension (see fig. K5-18)

1. Produce a lever 50,80 mm (2 in) between centres to fit the choke spindle as shown in figure K-18. Secure the lever in the horizontal position using a nut and washer.
2. Hang a weight of 234 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.

Fast-idle mechanism

1. Assemble the mechanism onto 'A' bank carburetter as shown in figure K5-19.
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

1. Carry out the usual workshop safety precautions.
2. Connect an impulse tachometer in accordance with the manufacturer's instructions.
3. Start and run the engine until normal operating temperature is attained. Stop the engine.
4. Open the throttle and close the choke strangler butterfly against the bi-metal tension using the control rod lever (see fig. K5-19, item 1), until the adjusting screw (see fig. K5-19, item 6) is resting on the tip of the fast-idle cam. At this point an extra load will be felt as the action of the extended fast-idle plunger ceases.
5. Start the engine, if the speed is outside a range of between 850 rpm and 900 rpm, stop the engine, open the throttles to gain access to the adjusting screw and turn the screw approximately one eighth of a turn for

each 20 rpm 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.
9. Finally adjust the idle speed as follows. Remove the air intake trunking and blank off the hot idle compensator feed drilling (see fig. K5-11), again fit the trunking.
10. Start the engine and check the idle speed. If necessary set to 650 rpm by adjusting the throttle stop screw.
11. Stop the engine, remove the air intake trunking, remove the blank from the hot idle mixture compensator feed drilling and again fit the trunking. Remove the tachometer.

Choke stove pipe — To flow check
1. Carry out the usual workshop safety precautions.
2. Connect an impulse tachometer in accordance with the manufacturer's instructions.

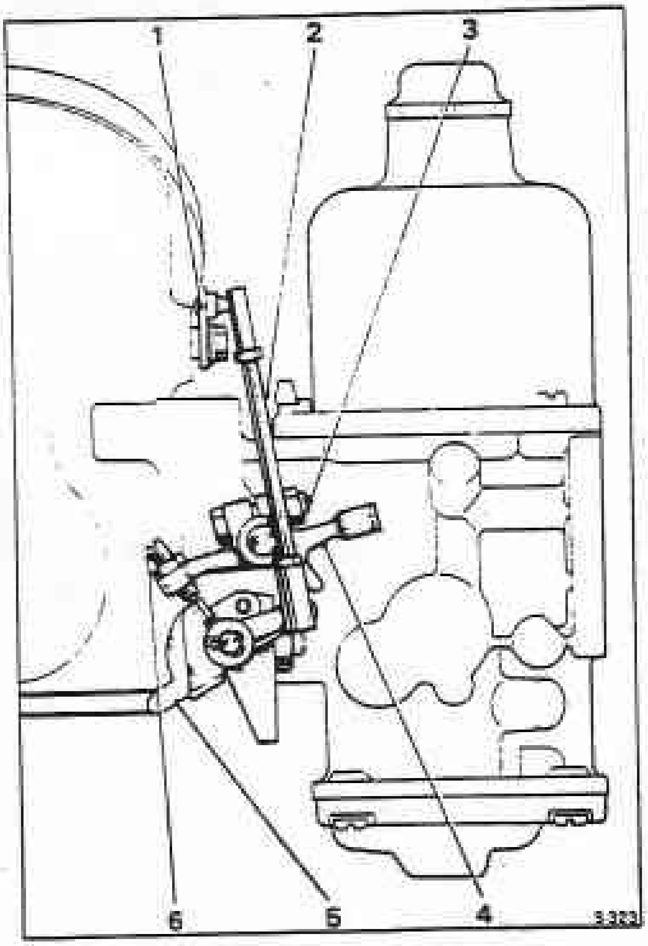


Fig. K5-19 Fast-idle mechanism
1 Control rod lever
2 Butterfly rod
3 Lever clamp bolt
4 Fast-idle lever
5 Cam
6 Adjusting screw

3. Start and run the engine until normal operating temperature is attained. Stop the engine.
4. Disconnect the stove pipe union at the intake elbow (see fig. K5-13) and connect a flowmeter to the pipe via a connector RH 8945. The flowmeter must be a rotameter type capable of measuring 2,9 m^3/hr (100 ft^3/hr).
5. Start and run the engine at idle speed (650 rpm). Observe the flowmeter, a correct reading is between 1,02 m^3/hr and 1,17 m^3/hr (28 ft^3/hr and 32 ft^3/hr).
6. If the flow is less than 1,02 m^3/hr (28 ft^3/hr) check the choke stove assembly, pipes and unions for leaks.
7. If the flow is in excess of 1,17 m^3/hr (32 ft^3/hr), fit a new restrictor in the choke bi-metal housing.
8. To fit a new restrictor, replace the union in the bi-metal cover.

Air intake system

The air cleaner/silencer assembly is secured to the valance under the front right-hand wing (see fig. K6-1).

Cold air from under the front bumper assembly and warm air from a hot air pick-up adjacent to the 'A' bank exhaust manifold, are mixed in a blending valve housing situated adjacent to the air cleaner/silencer assembly. The

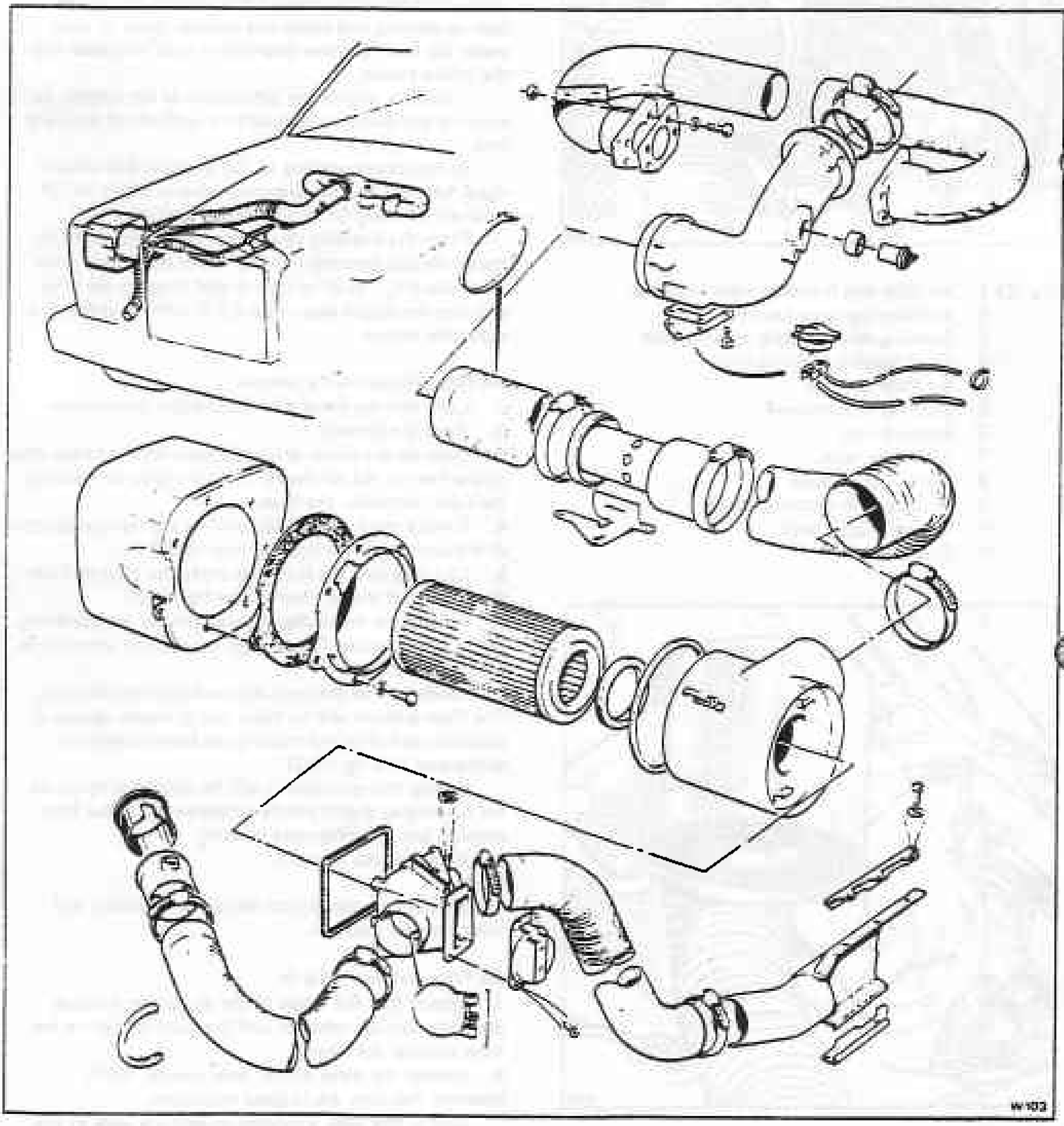


Fig. K6-1 Air intake system

blending valve flap which is vacuum operated via a thermal sensor, controls the proportions of cold and warm air entering the air intake.

From a cold start, the blending valve is closed to air entering the system from under the front bumper, therefore only air from in the vicinity of the hot air pick-up is admitted.

When the control temperature is reached the temperature sensor reduces the vacuum signal to the blending valve. This will allow the blending valve to move from the cold air duct towards the hot air pick-up duct. As the vacuum signal to the blending valve is progressively reduced, the blending valve flap continues to move towards the hot air pick-up ducting. This increases the amount of cold air entering the system.

If the air temperature in the intake hose increases, the sensor will further restrict the vacuum to the blending valve, until the valve moves fully towards the hot air pick-up ducting and closes the passage. Only air from under the front bumper assembly is then admitted into the intake system.

Therefore, within the limitations of the system, air entering the system is controlled at a constant temperature.

At maximum opening of the throttles the vacuum signal falls, causing the blending valve to adopt its full 'cold air' position for maximum performance.

From the blending valve housing, the air passes to the air cleaner housing and into the centre of the paper filter element. The air is then drawn through the filter and into the intake hose, where it is fed into the engine induction system.

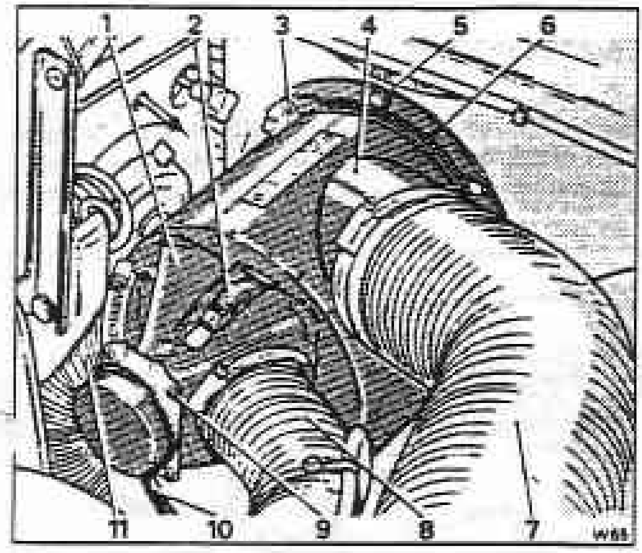


Fig. K6-2 Air filter and blending valve housings

1. Air blending valve housing
2. Blending valve housing securing clip
3. Filter housing securing clip
4. Air filter housing
5. Securing ring setscrew
6. Securing ring
7. Air intake hose
8. Hot air scoop hose
9. Vacuum unit securing screws
10. Vacuum signal hose
11. Cold air hose

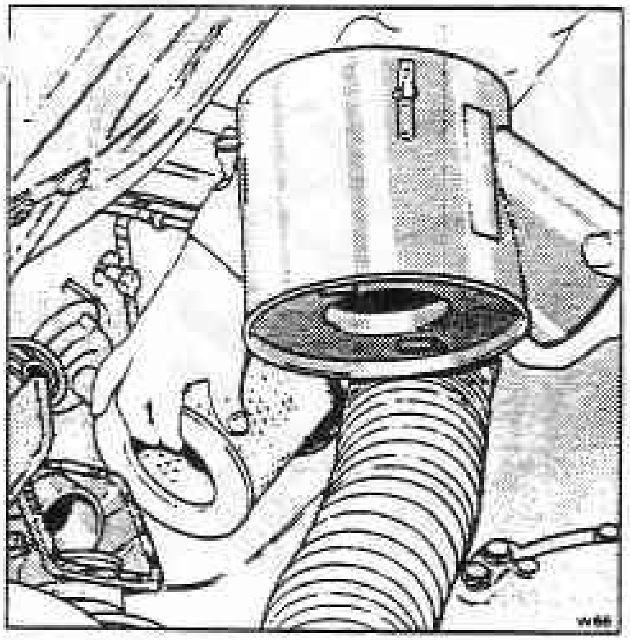


Fig. K6-3 Withdrawing the air filter element

Air filter element — To remove

1. Carry out the usual workshop safety precautions.
2. Raise the bonnet.
3. Unscrew the worm drive clip securing the carburetter intake hose to the air cleaner; free the joint by twisting the hose. Withdraw the hose.
4. Release the two clips situated on the top and bottom of the blending valve housing (see fig. K6-2).
5. Carefully free the joint and move the housing from the vicinity of the air cleaner (see fig. K6-3).
6. Release the three clips located around the periphery of the filter housing. These clips are situated adjacent to the wing valance.
7. Carefully free the joint and withdraw the housing. The filter element will be loose but it should remain in position until after the housing has been completely withdrawn (see fig. K6-3).

During this operation it will be necessary to rotate the housing so that it can be withdrawn past the filter element and blending valve housing

8. Withdraw the element.

Note
An alternative method is to remove the housing and filter element together.

Air filter element — To fit

1. Ensure that the inside of the air cleaner housing (both the section removed and the fixed section in the wing valance) are clean.
2. Inspect the three rubber seals (see fig. K6-4) ensuring that they are in good condition.

One of the seals is located around the edge of the blending valve housing and another around the air cleaner housing. These seals should be secured in position with Bostik 1261 adhesive or its equivalent.

A third rubber sealing ring is placed over the centre spigot in the air cleaner housing and care should be taken to ensure that it does not become dislodged during the fitting operation.

3. Ensure that the five securing clips operate smoothly. Free any clips that are difficult to operate.
4. Examine the cork gaskets secured one on both ends of the paper filter element.
5. Enter the element into the wing valance (see fig. K6-3).
6. Fit the air cleaner housing to the wing valance. Ensure that it is located inside the valance retaining clamp ring. Hold the rubber seal in position over the housing spigot by placing the fingers of one hand through the air intake and onto the seal.

To allow the housing to pass over the end of the filter it will be necessary to slightly withdraw the element during this operation.

7. Whilst ensuring that both the air filter element and sealing ring are correctly positioned on the housing spigot, fit the assembly to the wing valance. If necessary turn the housing so that the assembly passes the air blending valve housing.
8. Ensure that the housing clips are positioned centrally over the lugs of the valance retaining ring.
9. Fasten the two upper clips and then passing one hand downward between the front of the housing and the rear of the headlamp assembly, locate and fasten the third clip.
10. Offer the blending valve housing into position. Ensure that the seal is still in good condition and secure.
11. Fit the blending valve housing, ensuring that it fits between the two clip fastening lugs on the air cleaner housing.
12. Fasten the clips.
13. Fit the convoluted hose from the carburetters to the air cleaner housing and tighten the worm drive clip.
14. Connect the battery, start the engine and inspect the system for air leaks, etc.

Under wing air cleaner housing — To remove and fit

1. Carry out the usual workshop safety precautions.
2. Remove the air filter element (see Air filter element — To remove).
3. Remove the front right-hand road wheel (see Chapter R).
4. Locate the front section of the underwing sheet and remove the small screws situated around the inner edge.

Carefully ease the front underwing sheet free noting that resistance may be encountered as the edges of the sheet are sealed with Seelastik.

5. Free the front portion of the Compriband strip that sits inside the lip of the front wing.
6. From inside the engine compartment unscrew the seven setscrews situated around the air cleaner retaining ring (see fig. K6-2). Collect the washers and retaining ring. From under the wing, withdraw the housing.
7. Fit the housing by reversing the removal procedure, ensuring that the cork gasket attached to the housing is in a good condition.

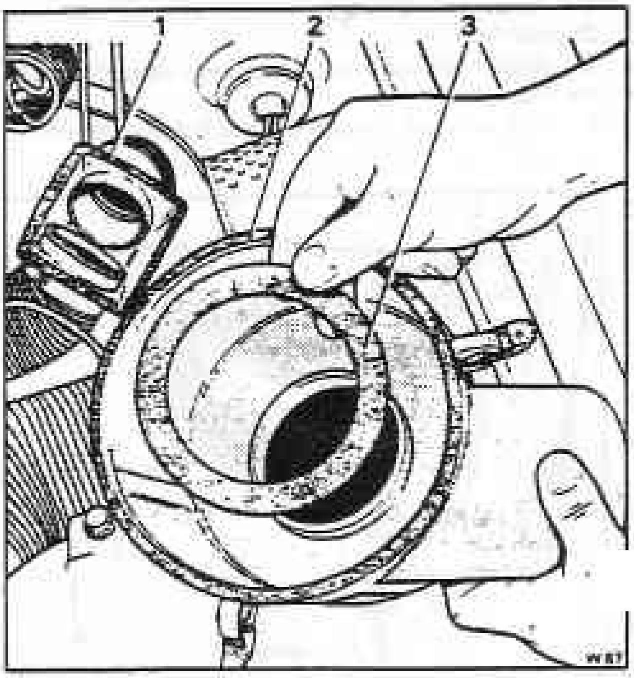


Fig. K6-4 Air cleaner/silencer seals
1 Blending valve seal
2 Cleaner/silencer seal
3 Filter element seal

Hot air pick-up

The hot air pick-up is mounted around the forward section of 'A' bank exhaust manifold. It is connected to the air cleaner/silencer by convoluted trunking (see fig. K6-2).

Warm air from around the exhaust manifold is used to raise the temperature of the intake air under cold start conditions.

Hot air pick-up — To remove and fit

1. Carry out the usual workshop safety precautions.
2. Slacken the worm drive clip securing the air trunking to the hot air pick-up. Withdraw the hose.
3. Unscrew and remove the three setscrews situated on the top of the pick-up assembly. Collect the washers.
4. Move the top of the pick-up outwards away from the exhaust manifold and free the bottom edge from its locating groove.
5. Withdraw the hot air pick-up.
6. To remove the upper and lower hot air pick-up mounting brackets, unscrew the A1 and A2 cylinder exhaust manifold securing setscrews.
7. Fit the assembly by reversing the removal procedure noting that the pick-up should be located in the groove of the lower mounting bracket. Then push the top of the pick-up towards the engine until the screw holes align.

Cold air intake — To remove (see fig. K6-5)

1. Carry out the usual workshop safety precautions.

2. Remove the front right-hand road wheel (see Chapter R).
3. Slacken the worm drive clips securing both ends of the intake hose.
4. Free the joints, collect the worm drive clips and carefully withdraw the hose.
5. Disconnect the electrical connection from the front ambient air sensor.
6. Unscrew the sensor and collect the shakeproof washer.
7. Withdraw the outer connection adapter (grey) rearwards and the inner connection (black) forwards, from their positions in the front wing below the bumper.

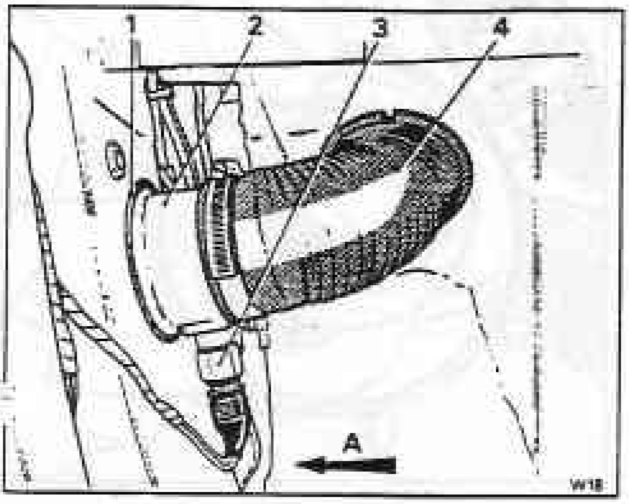


Fig. K6-5 Cold air intake
1 Front seal strip
2 Outer connector
3 Ambient air sensor
4 Convoluted feed hose
A Front of car

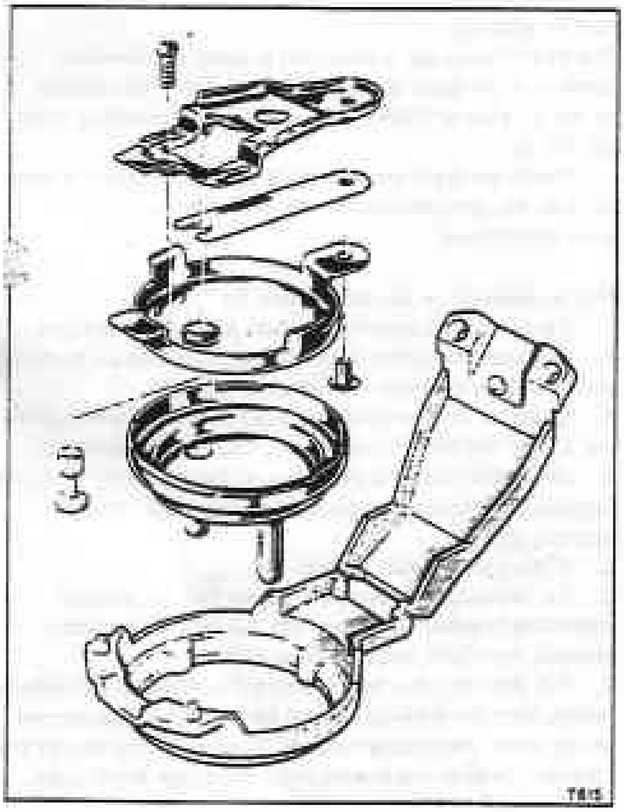


Fig. K6-6 Temperature sensor

Cold air intake – To fit

To fit the cold air intake, reverse the procedure for removal, noting the following.

1. The front seal strip positioned in the wing body hole must be secure and flat. Carefully hammer this sealing ring flat, otherwise the holes in the adapters for the ambient air sensor will not align. Support the opposite face of the seal whilst carrying out the flattening operation.
2. The ambient air sensor should be fitted so that it is at right angles to the road.

Resonator

The resonator is fitted into the rubber trunking between the air cleaner/silencer and the carburetter air intake elbow. Its purpose is to reduce resonance or noise in the intake system.

Resonator – To remove and fit

1. Carry out the usual workshop safety precautions.
2. Slacken the two worm drive clips situated in the centre of the rubber intake trunking that connects the air cleaner/silencer to the carburetter intake elbow. Ease the clips along the trunking.
3. Pull the trunking apart from the centre join and withdraw the resonator.
4. To fit the resonator reverse the removal procedure.

Temperature sensor

The temperature sensor is mounted in the carburetter air intake elbow and operates the air blending valve. A bi-metal strip senses changes in the air intake temperature and regulates the vacuum signal to the blending valve. This valve then varies the proportions of cold and hot air to maintain a constant air intake temperature (see fig. K6-6).

Temperature sensor – To remove

1. Carry out the usual workshop safety precautions.
2. Disconnect the electrical connection at the cut-out switch fitted in the carburetter intake elbow.
3. Unscrew the choke stove pipe connection at the carburetter intake elbow.
4. Slacken the worm drive clip securing the intake trunking to the elbow and remove the trunking.
5. Unscrew the setscrew securing the intake elbow bracket to the thermostat housing, collect the washer.
6. Withdraw the elbow from the choke housing.
7. Withdraw the two vacuum pipes from the sensor.
8. Suitably position the inverted intake elbow on a bench and carefully remove the sensor securing clip, withdraw the sensor.

Temperature sensor – To fit

Fit the temperature sensor by reversing the procedure given for removal, noting the following points.

1. A new securing clip must always be used when fitting the sensor to the air intake elbow.
2. Ensure that the vacuum pipes fitted underneath the sensor do not become trapped (by poor alignment) when the intake elbow is fitted into the choke housing.

Vacuum unit – To remove and fit

1. Carry out the usual workshop safety precautions.
2. Release the two clips situated at the top and bottom of the blend valve housing (see fig. K6-2).
3. Carefully free the joint and move the housing from the vicinity of the air cleaner.
4. Withdraw the vacuum hose (see fig. K6-2).
5. Unscrew the four small screws from around the vacuum unit.
6. Disconnect the vacuum unit link rod from the bush attached to the flap.
7. Withdraw the vacuum unit.
8. Fit the vacuum unit by reversing the removal procedure.

Air blending valve – to dismantle and assemble
(see fig. K6-7)

1. Remove the vacuum unit.
2. Withdraw the circular retaining clips from the top and bottom of the flap operating shaft.
3. Withdraw the shaft, remove the flap valve and collect the nylon bush.
4. To assemble the air blending valve reverse the removal procedure, noting the following.

a) After the flap is assembled but before the vacuum unit link rod is connected, ensure that the flap moves freely and also properly blanks both the warm and cold air ducts at the end of its travel in each direction.

Air blending system – To check

1. Ensure that the engine is cold.
2. Unscrew the worm drive clip and withdraw the hot air pick-up hose from the air blending valve housing.
3. Observe the position of the air flap in the housing through the hot air pick-up opening (the flap should have closed the hot air pick-up port).
4. Through the aperture, push the blending valve flap as far as possible so that it closes the cold air feed. Release the pressure applied to the flap so that it snaps back against the hot air port. The valve should move smoothly over its range of travel and not bind or stick.
5. Remove the vacuum feed hose from the air blending housing and connect a slave hose. Suck on the open end of the hose so that a vacuum is applied to the diaphragm. The air flap should operate smoothly over its full range of travel.
6. Remove the slave hose and connect the system vacuum hose.
7. Remove the vacuum feed hose to the sensor at the metal 'Tee' piece.
8. Ensure that the end of the hose is clean, place it in the mouth and suck. The sensor should allow the vacuum signal to be applied to the diaphragm in the air blending housing and operate the air flap.
9. Connect all hoses.

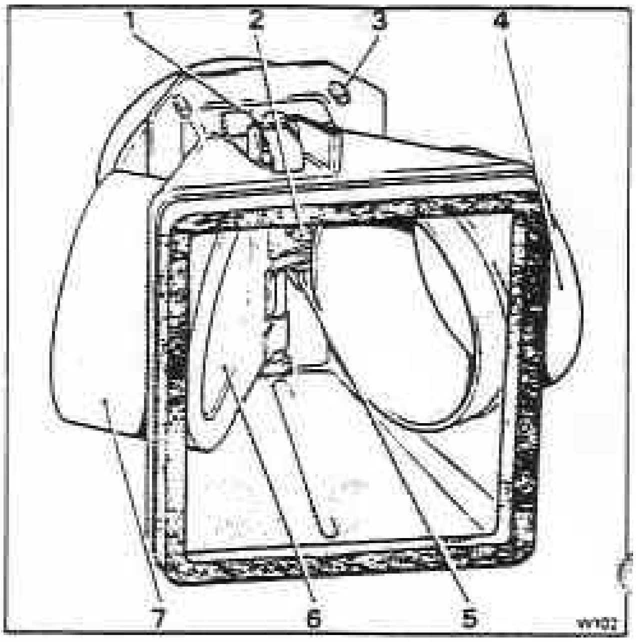


Fig. K6-7 Air blending valve

1 Securing clip
2 Nylon bush
3 Vacuum unit securing screw
4 Cold air feed
5 Operating link rod
6 Air bending flap
7 Hot air feed

Throttle linkage

Carburetter throttle linkage — To fit and set (see fig. K7-1)

1. Assemble 'A' bank and 'B' bank throttle levers (items 6 and 11) onto the carburetter spindles.
2. Fit the setting jig RH 8880 into position on the throttle levers.
3. Fully close 'B' bank carburetter butterfly (item 7).
4. Tighten the pinch bolt securing 'B' bank throttle lever.
5. Fully close 'A' bank carburetter butterfly (item 2).
6. Tighten the pinch bolt securing 'A' bank throttle lever.
7. Fit the throttle spring (item 8) to the throttle levers.
8. Remove the setting jig from the throttle levers.
9. Fit the cross link guide bracket (item 9) to the carburetter 'Tee' piece (item 5). Secure in position with two small screws. Lock the screws using tab washers.
10. Fit the cross link (item10) and the eccentric throttle adjuster (item 4) onto the throttle levers. Ensure that both throttle butterflies are closed when adjusting and tightening the eccentric adjuster.

Note
The eccentric pin should be set in the lowest position possible.

11. Ensure that the clearance between the cross link guide (item 9) and the cross link is between 1,27 mm and 1,78 mm (0.050 in and 0.070 in). If necessary bend the guide to obtain this clearance.
12. Check that the throttle linkage moves freely.
13. Fit the idle stop screw (item 3) and lock-nut; adjust until the screw just contacts the stop bracket ensuring that the throttle butterflies are in the closed throttle position.
14. Screw in the idle stop screw half a turn.
15. Connect one end of the drive link (item 12) to the 'B' bank throttle lever and the opposite end to the manifold shaft lever (item 14).
16. Operate the linkage to ensure free movement.
17. Ensure that the throttles are in the closed position. Check that the 'A' bank control shaft to control rod lever (item 15) on the rear of the manifold shaft lever is vertical, when compared with the angle of the front manifold shaft lever (item 14). Refer to figure K7-1 for details. Tighten the securing bolts on both levers.
18. Operate the mechanism; check for freedom of movement within the linkage. Also ensure that there is clearance with the various engine components.

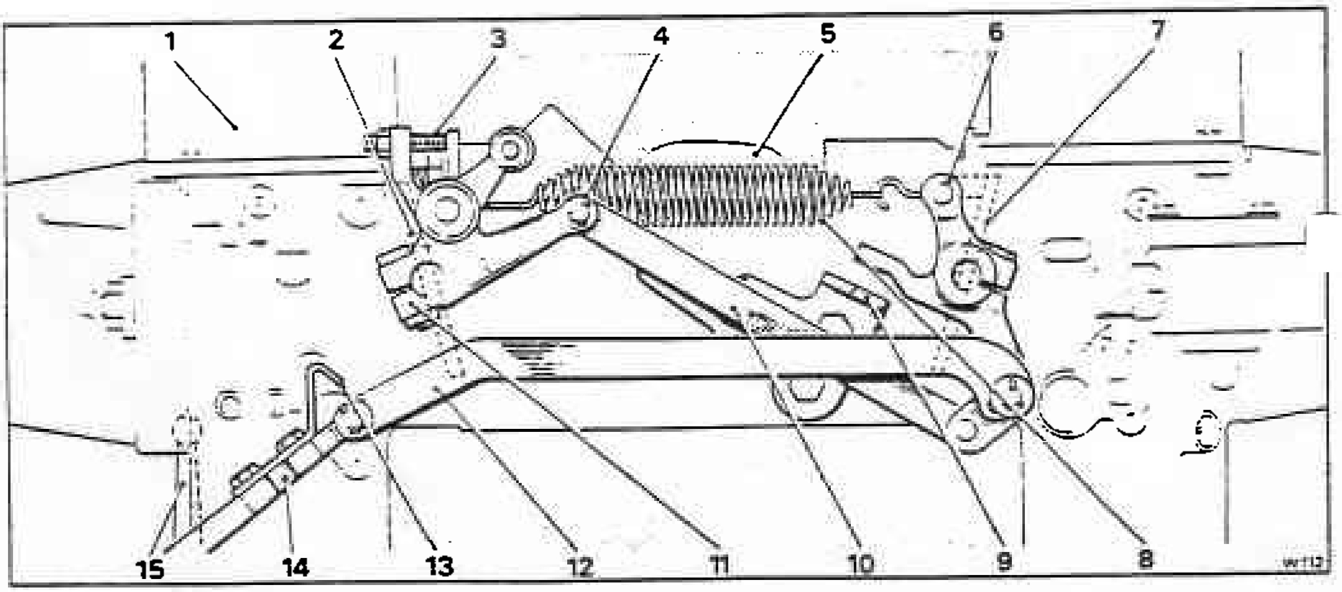


Fig. K7-1 Carburetter throttle linkage

1 'A' bank carburetter
2 'A' bank carburetter throttle butterfly
3 Idle stop screw
4 Eccentric throttle adjuster
5 Carburetter 'Tee' piece
6 'B' bank carburetter throttle lever
7 'B' bank carburetter throttle butterfly
8 Throttle spring
9 Throttle cross link guide bracket
10 Cross link
11 'A' bank carburetter throttle lever
12 Drive link
13 Speed control chain attachment
14 Front manifold shaft lever
15 Rear manifold shaft lever

Accelerator pedal and isolator mechanism — To set
Right-hand drive cars (see fig. K7-2)

1. Assemble the isolator rod (item 3) to give a distance of between 57,50 mm and 58,40 mm (2.25 in and 2.30 in) between the inner faces of the lock-nuts.
2. Set the accelerator pedal off-stop screw (item 9) to between 25,40 mm and 26,10 mm (1 in and 1.03 in).
3. Fit the right-hand mounting bracket (item 11) for the accelerator cross-shaft (item 13).
4. Insert the cross-shaft (item 13) through the longeron. Fit the accelerator pedal lever (item 12) and insert the cross-shaft into the bush in the right-hand bracket (item 11).
5. Mount the control operating lever (item 15) on the opposite end of the cross-shaft (item 13), but do not fit the pinch bolt.
6. Fit the left-hand mounting bracket (item 14) onto the cross-shaft (item 13). Screw the bracket to the underside of the body.
7. Tighten the accelerator pedal lever pinch bolt (item 12).
8. Adjust the cross-shaft end-float to between 0,13 mm and 0,38 mm (0.005 in and 0.015 in) bending the brackets if necessary.
9. Check that the cross-shaft rotates freely.
10. Fit the accelerator pedal return spring (item 17) using the hooks (items 16 and 18).
11. Slide the control operating lever (item 15) into its correct position. Fit the pinch bolt and tighten the nut.
12. Check that the brake pedal is set correctly (the accelerator pedal is set relative to the brake pedal). Ensure that there is a minimum clearance of 99,40 mm (3.915 in) between the underside of the brake pedal and the seal housing.

Note
Full instructions for setting the brake pedal are given in Chapter G — Hydraulic systems.

13. Check that the accelerator pedal is positioned between 6,35 mm and 12,7 mm (0.250 in and 0.500 in) below the brake pedal. If not, reset the off-stop screw (item 9).
14. Connect the isolator trapeze (item 6) to the yoke of the body longeron bracket (item 7).
15. Check that the mechanism moves freely by pressing downwards on the free end of the isolator bell-crank (item 5).
16. Assemble the long rod (item 8) with a distance of approximately 471,70 mm (18.50 in) between the inner faces of the lock-nuts; leave the nuts loose.
17. Fit the jaw of the long rod (item 8) to the control operating lever (item 15); offer up the opposite end to the bell-crank lever (item 5). Adjust the length of the rod until there is a minimum amount of 'free-play' in the control system.
18. Tighten the lock-nuts.
19. Check that the entire accelerator control system operates smoothly.
20. Check that full throttle and kick-down are available.
21. Set the height of the kick-down button (item 10). Ensure that 'pedal feel' is evident when kick-down occurs.
22. Check that when the accelerator pedal is released the throttles fully close.
23. With the engine at normal operating temperature but not running, repeat Operations 19 and 22.

Left-hand drive cars (see fig. K7-3)

1. Assemble the isolator rod (item 3) to give a distance of between 57,50 mm and 58,40 mm (2.265 in and 2.300 in) between the inner faces of the lock-nuts.
2. Set the accelerator pedal off-stop screw (item 16) to between 26,60 mm and 27,10 mm (1.050 in and 1.070 in).
3. Build a sub-assembly of the accelerator pedal lever (item 17), its pivot pin (item 19) and mounting brackets (item 18). Check that the lever moves freely between the brackets.
4. Fit the accelerator pedal assembly to the body. Check that the lever moves freely.
5. Fit the accelerator cross-shaft mounting brackets (item 12) to the longeron.
6. Carry out Operations 8 to 10 inclusive and 12 to 23 inclusive, as described for right-hand drive cars.

Kick-down micro-switch

This micro-switch is situated on the underside of the car body below the accelerator pedal, its purpose is to provide kick-down (detent) for the torque converter transmission.

Kick-down micro-switch assembly — To remove

1. Drive the car onto a ramp.
2. From inside the car, locate the micro-switch operating plunger situated beneath the accelerator pedal.
3. Unscrew the large retaining nut and withdraw the washer.
4. From under the car detach the Lucar connections and withdraw the micro-switch assembly.

Kick-down micro-switch — To dismantle

The assembly comprises the micro-switch, plunger and casing, the assembly should be removed from the car before any dismantling is commenced.

1. Using a screwdriver carefully 'ease back' the indentations which crimp around the cover of the assembly.
2. Remove the cover.
3. Disconnect the two electrical cables from the micro-switch. The white/green cable has a Lucar connection and the white cable is retained by a small screw
4. Unscrew the two 6BA nuts securing the micro-switch to its mounting bracket. Withdraw the screws and collect the two washers from each screw. Withdraw the micro-switch.
5. Remove the screws retaining the micro-switch mounting bracket. Withdraw the bracket.
6. Remove the circlip from around the plunger assembly.
7. Withdraw the plunger assembly and spring.

Kick-down micro-switch — To assemble

Assemble the micro-switch and plunger by reversing the procedure given for dismantling, noting the following.

1. Ensure that the rubber seal is in a good condition and fitted securely to the body of the assembly. Secure the seal with Dunlop S1240 Adhesive or its equivalent.

Kick-down micro-switch — To set

1. Ensure that the carburetter linkage and the

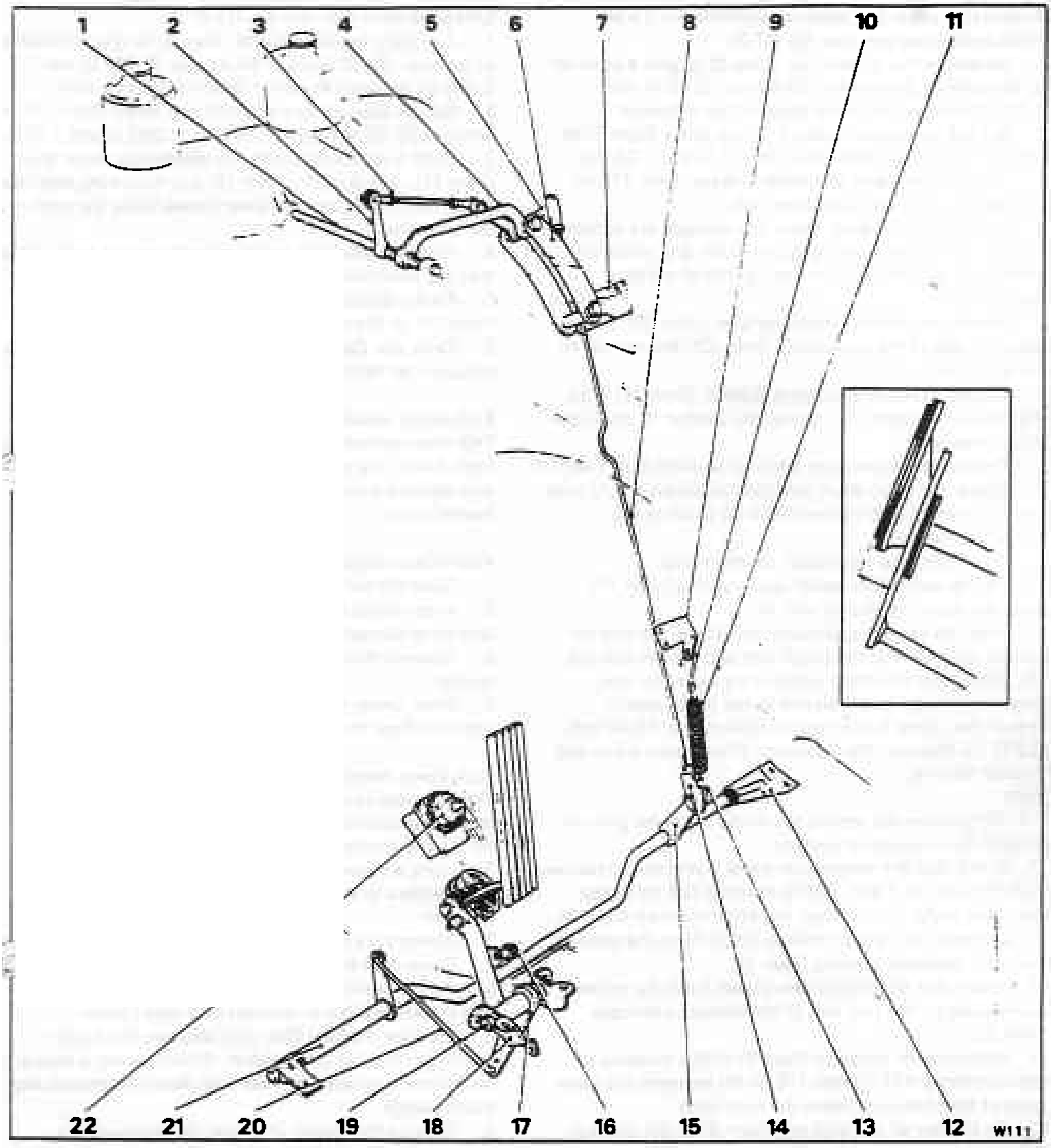


Fig. K7-3 SU carburetter accelerator pedal and isolator mechanism (left-hand drive cars)

1	'A' bank control shaft	12	Cross-shaft mounting bracket
2	Lever	13	Lower hook
3	Isolator rod	14	Jaw-long rod
4	Tie-bar	15	Control operating lever
5	Bell-crank lever	16	Pedal off-stop screw
6	Isolator trapeze	17	Pedal lever
7	Body longeron bracket	18	Pedal lever mounting bracket
8	Long rod	19	Pivot pin
9	Return spring mounting bracket	20	Connecting rod
10	Top hook	21	Cross-shaft
11	Return spring	22	Kick-down micro-switch

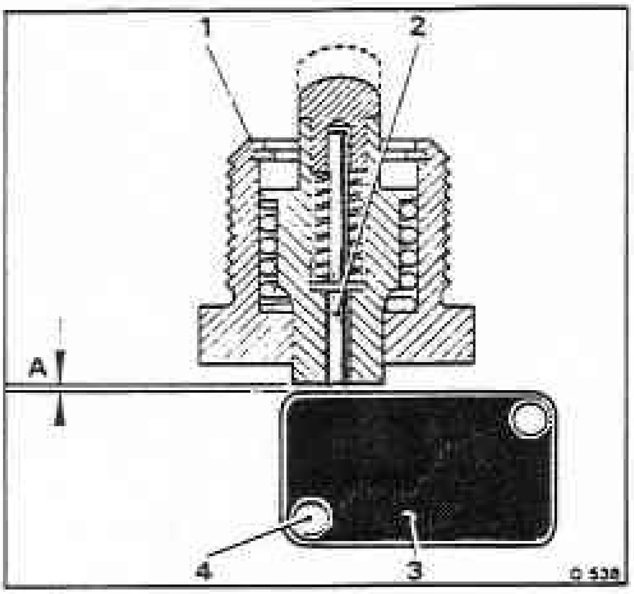


Fig. K7-4 Kick-down micro-switch assembly
1 Plunger assembly
2 Secondary plunger
3 Micro-switch
4 Elongated hole in mounting plate (micro-switch adjustment)
A Clearance of 0,127 mm (0.005 in)

accelerator pedal linkage are correctly set. Swing the micro-switch towards the base of the plunger until a gap of between 0,254 mm and 0,762 mm (0.010 in and 0.030 in) exists between the micro-switch button and the plunger.

2. Tighten the micro-switch securing nuts. Check that the gap set in Operation 1 has not been disturbed.

3. Slowly depress the plunger to obtain full stroke. Check that the switch operates (audible click) during this operation.

4. Ensure that with the main plunger fully depressed it is still clear of the micro-switch case (see fig. K7-4).

5. Slowly release the plunger ensuring that the micro-switch contacts open (audible click).

6. Ensure that the clearance set between the plunger and the micro-switch button remains as set in Operation 1.

Fault diagnosis

Symptoms	Possible cause
Fuel pump — Pierburg	
1. Engine will not start due to no fuel being delivered at the carburetters or engine cuts out due to fuel starvation.	
(i) Quiet buzzing or light whine (i.e. pump operating but not delivering fuel).	(i) (a) Electrical connections reversed. (b) Pump not priming due to air lock, caused by insufficient fuel in tank. (c) With the pump inhibit system overriden, if the pump motor can be heard or felt to be running then either. (i) The pump has seized and broken the magnetic drive coupling, or (ii) The internal pressure relief valve has failed.
(ii) No buzzing (i.e. pump inoperative).	(ii) (a) Faulty leads or terminal connections. (b) Faulty electrical feed to pump. (c) Blocked filter in the pump.
(iii) Loud buzzing (i.e. pump operating but not delivering fuel).	(iii) (a) Inlet and outlet filter adapters reversed (b) Blockage in pipes, etc. (c) Pump inlet and outlet pipes reversed (d) Feed and return pipes at the carburetters reversed (e) Non-return valve the incorrect way around.
Carburetters — SU HIF7	
1. Engine will not start. (Starter motor operating).	1. (a) Ignition circuit broken. (b) Failed anti 'run-on' solenoid or failure of electrical supply circuit. (c) Ignition system faulty. (d) Damaged or contaminated ignition high tension circuit. (e) Blocked fuel feed line, fouled float chamber filters. (f) Faulty choke bi-metal coil. (g) Choke solenoid inoperative. (h) Faulty choke fast-idle mechanism. (i) Air leak in induction system. (j) Faulty hot idle mixture compensator. (k) Weakening device filter blocked, weakening device air intake non-return valve failed or blockage in rubber connecting hoses. (l) Faulty weakening device cut-off solenoid or failure of electrical supply circuit. (m) Faulty weakening device control switch or failure of electrical supply circuit. (n) Dislodged venturi in weakening device. (o) Flooding of carburetter float chamber of jet.
2. Engine idles very roughly.	2. (a) Ignition system faulty. (b) Fouled sparking plugs. (c) Damaged or contaminated ignition high tension circuit.

.ıs	Possible cause
ne idles very roughly (continued).	(d) Air leak in induction system. (e) Faulty hot idle compensator. (f) Weakening device filter blocked, weakening device air intake non-return valve failed or blockage in rubber connecting hoses. (g) Badly worn or damaged carburetter control linkage. (h) Flooding of carburetter float chamber or jet. (i) Sticking carburetter piston. (j) Incorrect operation of carburetter jet compensation. (k) Fouled carburetter float chamber or jet. (l) Incorrect operation of temperature controlled air intake system.
ıgine stalls.	3. (a) Ignition circuit broken. (b) Failed anti 'run-on' solenoid or failure of electrical supply circuit. (c) Ignition system faulty. (d) Damaged or contaminated ignition high tension circuit. (e) Blocked fuel feed line, fouled float chamber filters. (f) Air leak in induction system. (g) Faulty hot idle mixture compensator. (h) Weakening device filter blocked, weakening device air intake non-return valve failed or blockage in rubber connecting hoses. (i) Badly worn or damaged carburetter control linkage. (j) Flooding of carburetter float chamber or jet. (k) Sticking carburetter piston. (l) Incorrect operation of carburetter jet compensation. (m) Fouled carburetter float chamber or jet.
Engine shows signs of power loss evident at high speeds and loading. or Engine misfires particularly on hard acceleration from low speed.	4. (a) Ignition system faulty. (b) Fouled sparking plugs. (c) Damaged or contaminated ignition high tension circuit. (d) Blocked fuel feed line or fouled float chamber filters. (e) Choke system operation incorrect. (f) Sticking carburetter piston. (g) Fouled carburetter float chamber or jet.
Engine hesitates or misfires under light load.	5. (a) Failed anti 'run-on' solenoid or failure of electrical supply circuit. (b) Ignition system faulty. (c) Fouled sparking plugs. (d) Damaged or contaminated ignition high tension circuit. (e) Blocked fuel feed line or fouled float chamber filters. (f) Air leak in induction system. (g) Faulty hot idle mixture compensator. (h) Weakening device filter blocked, weakening device air intake non-return valve failed or blockage in rubber connecting hoses. (i) Dislodged venturi in weakening device.

Symptoms	Possible cause
5. Engine hesitates or misfires under light load (continued).	(j) Flooding of carburetter float chamber or jet. (k) Incorrect operation of carburetter jet compensation. (l) Fouled carburetter float chamber or jet. (m) Incorrect operation of temperature controlled air intake system.
6. Increase in fuel consumption.	6. (a) Ignition system faulty. (b) Faulty choke bi-metal coil. (c) Choke system operation incorrect. (d) Air leak in induction system. (e) Faulty hot idle mixture compensator. (f) Weakening device filter blocked, weakening device air intake non-return valve failed or blockage in rubber connecting hoses. (g) Faulty weakening device cut-off solenoid or failure of electrical supply circuit. (h) Faulty weakening device control switch or failure of electrical supply circuit. (i) Air leak in mixture weakening system. (j) Flooding of carburetter float chamber or jet. (k) Sticking carburetter piston. (l) Incorrect operation of carburetter jet compensation. (m) Incorrect purge flow rate.
7. Engine 'backfires' on overrun.	7. (a) Ignition system faulty. (b) Air leak into induction system. (c) Faulty hot idle mixture compensator. (d) Air blending valve spindle binding. (e) Faulty air intake temperature sensor.
8. Sudden increase in engine idle speed.	8. (a) Faulty choke fast-idle mechanism. (b) Failed carburetter overrun valve.

Special torque tightening figures

Workshop tools

Tool Number	Description
RH 8090	Pliers — wire hose clips
RH 8841	Dial gauge — carburetter piston lift
RH 8880	Setting jig — throttle levers
RH 8945	Connector — choke stove pipe
RH 9096	Fitting tool — 'A' bank mixture adjusting screw tamperproof seal
RH 9097	Fitting tool — 'B' bank mixture adjusting screw tamperproof seal
RH 9105	Kit — to adapt RH 8841 to fit S.U. H1F7 carburetters

Turbocharging system

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Turbocharging system

The purpose of the following description is to provide elementary details of the turbocharging system. This information will enable service personnel to familiarise themselves with the operation of the system, so that the servicing procedures given in this Workshop Manual can be carried out.

Basic principle of operation (see fig. K11-4)
The turbocharger is fitted to increase the power and torque of the engine. This it achieves by taking energy from the exhaust to pump extra air into the engine at wide throttle openings. Whenever this occurs the turbocharger is applying 'boost' to the induction system.

The size of the turbocharger has been carefully chosen to give a substantial increase in torque at low engine speeds. However, if not correctly controlled this would result in excessive boost pressure and power output at high speeds.

To overcome this situation a wastegate is fitted into the exhaust system between the engine and the turbocharger. When either the boost pressure or speed reach a predetermined level, the wastegate opens and allows a proportion of exhaust gas to by-pass the turbocharger. This ensures that the power of the engine is limited to a level that will not adversely affect durability.

To prevent surging of the turbocharger compressor when the throttles are suddenly closed, a dump valve is fitted into the side wall of the air chest. This assembly allows the inlet air to be recirculated from the air chest to the compressor and relieves the boost pressure when the throttles are closed.

When the throttles are opened the dump valve is

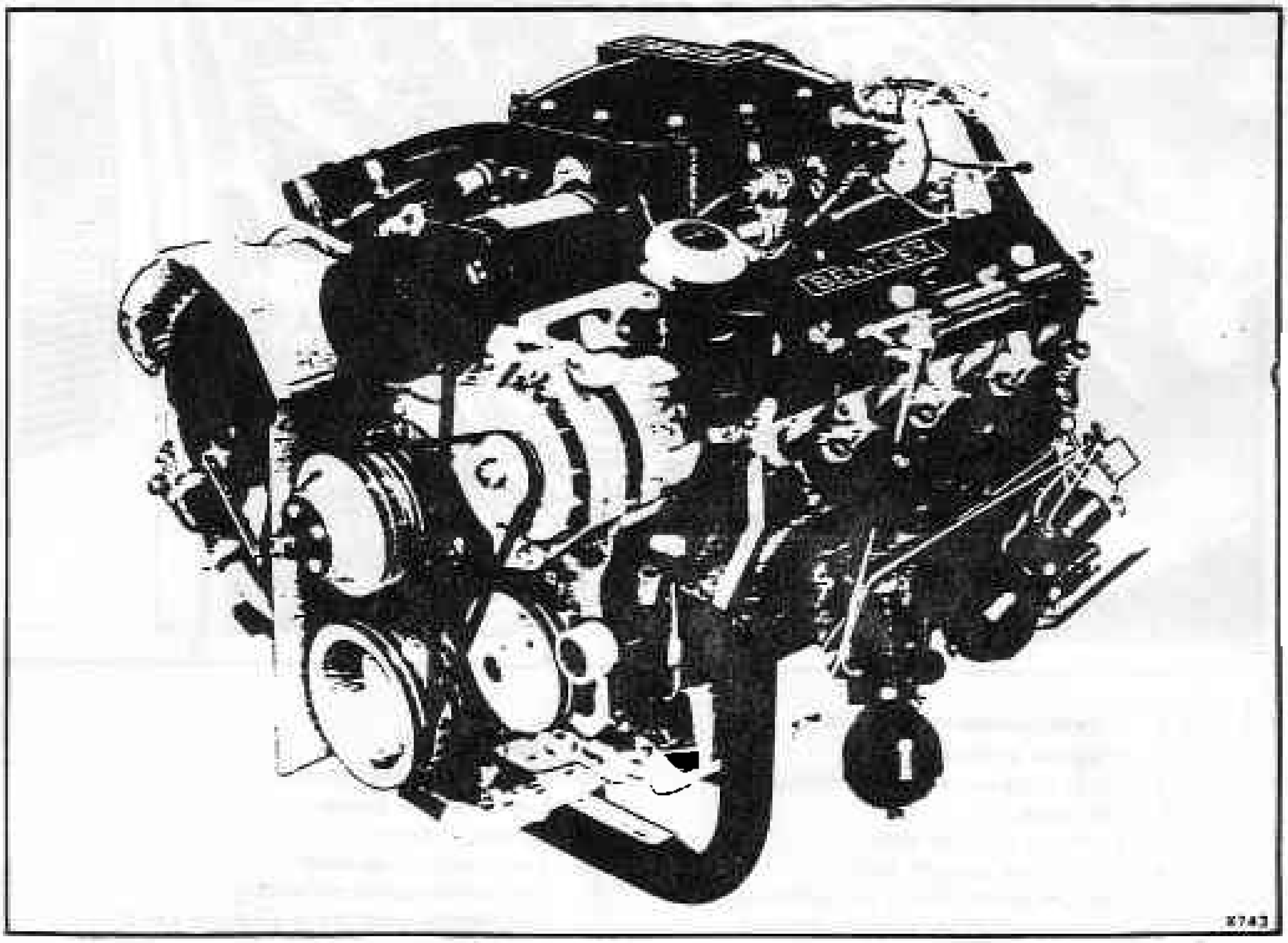


Fig. K11-1 The turbocharged engine

closed and boost pressure is rapidly applied to the engine.

The recirculatory fuel system supplies fuel via a pump and filter to the pressure regulator. This component ensures that the pressure of the fuel delivered to the carburetter is always maintained above that prevailing in the air chest.

The carburetter is a Solex 4 A 1 (similar to those fitted to Corniche and Camargue) and is housed within the airtight chest on top of the engine.

A part throttle enrichment control ensures that the carburetter economy device is in the full rich position whenever boost conditions prevail in the air chest.

The ignition system consists of a magnetic pick-up type of distributor with centrifugal advance and a vacuum/pressure advance capsule. The system also incorporates engine knock sensing equipment to retard the ignition timing if detonation occurs.

Description of the components

Three interconnected systems form the turbocharging system. These are the air flow system (both inlet and exhaust), the fuel system, and the ignition system. All have their various control systems to ensure that they function properly and at the correct time.

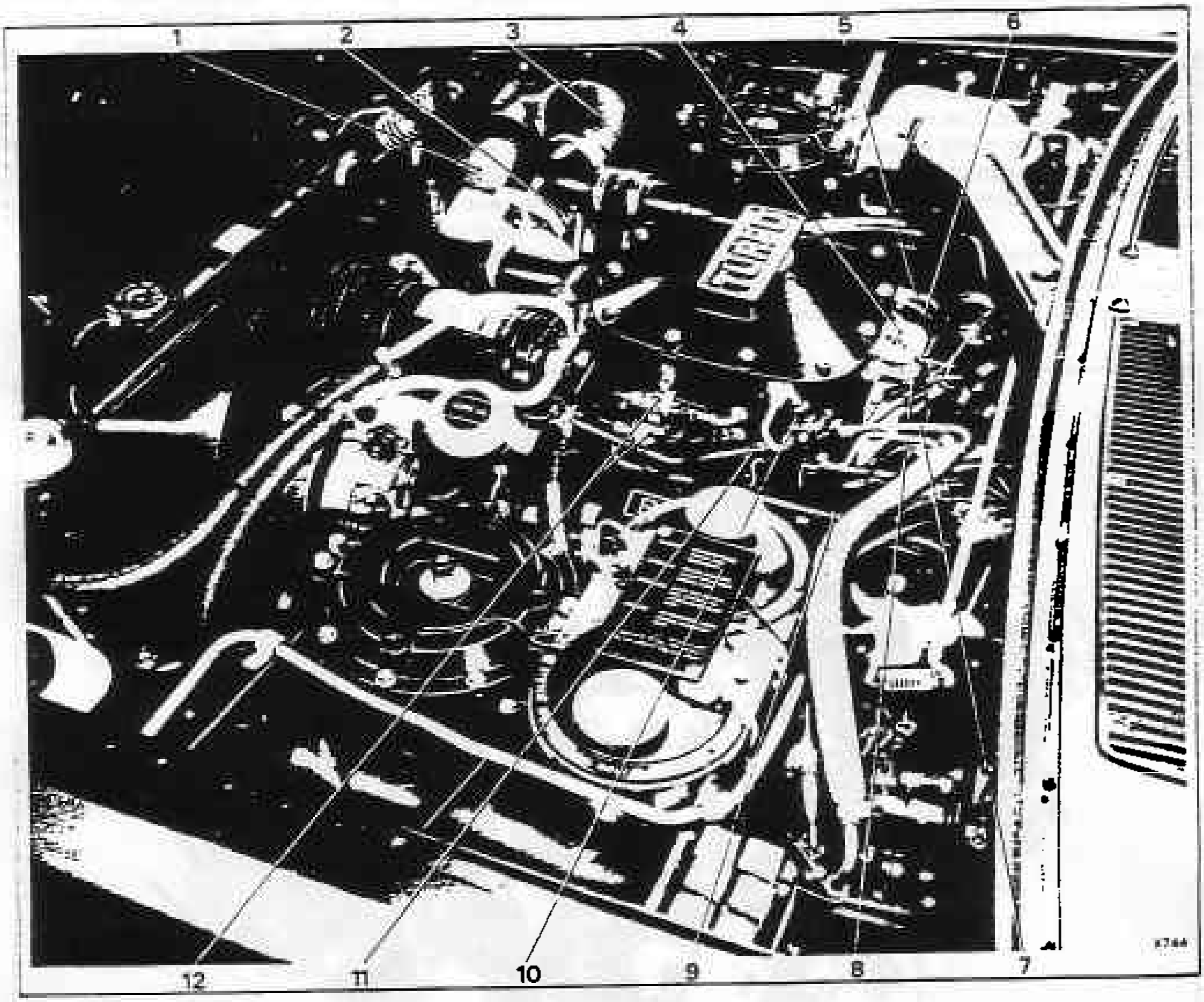


Fig. K11-2 Engine compartment details

1 Intake air pick-up
2 Boost pressure tapping to exhaust wastegate
3 Air intake to compressor
4 Dump valve vacuum switch
5 Vacuum connection to air dump valve
6 Ignition distributor capsule pressure signal pipe
7 Fuel feed pipe
8 Boost inhibit micro-switch
9 Engine 'knock' sensor (partially hidden)
10 Fuel pressure regulator
11 Fuel system pressure tapping
12 Part throttle enrichment pressure switch and solenoid

Air flow system
Air intake filter
Turbocharger assembly
Air chest
Dump valve
Boost inhibit
Boost limiter
Exhaust gas wastegate

Fuel system
Fuel tank
Fuel pump
Check valve
Fuel filter
Fuel pressure regulator
Carburetter (Solex 4 A 1)
Part throttle enrichment control
Non-return valve

Ignition system
Distributor
Vacuum/Pressure advance capsule
Amplifier
Coil
Knock sensor system

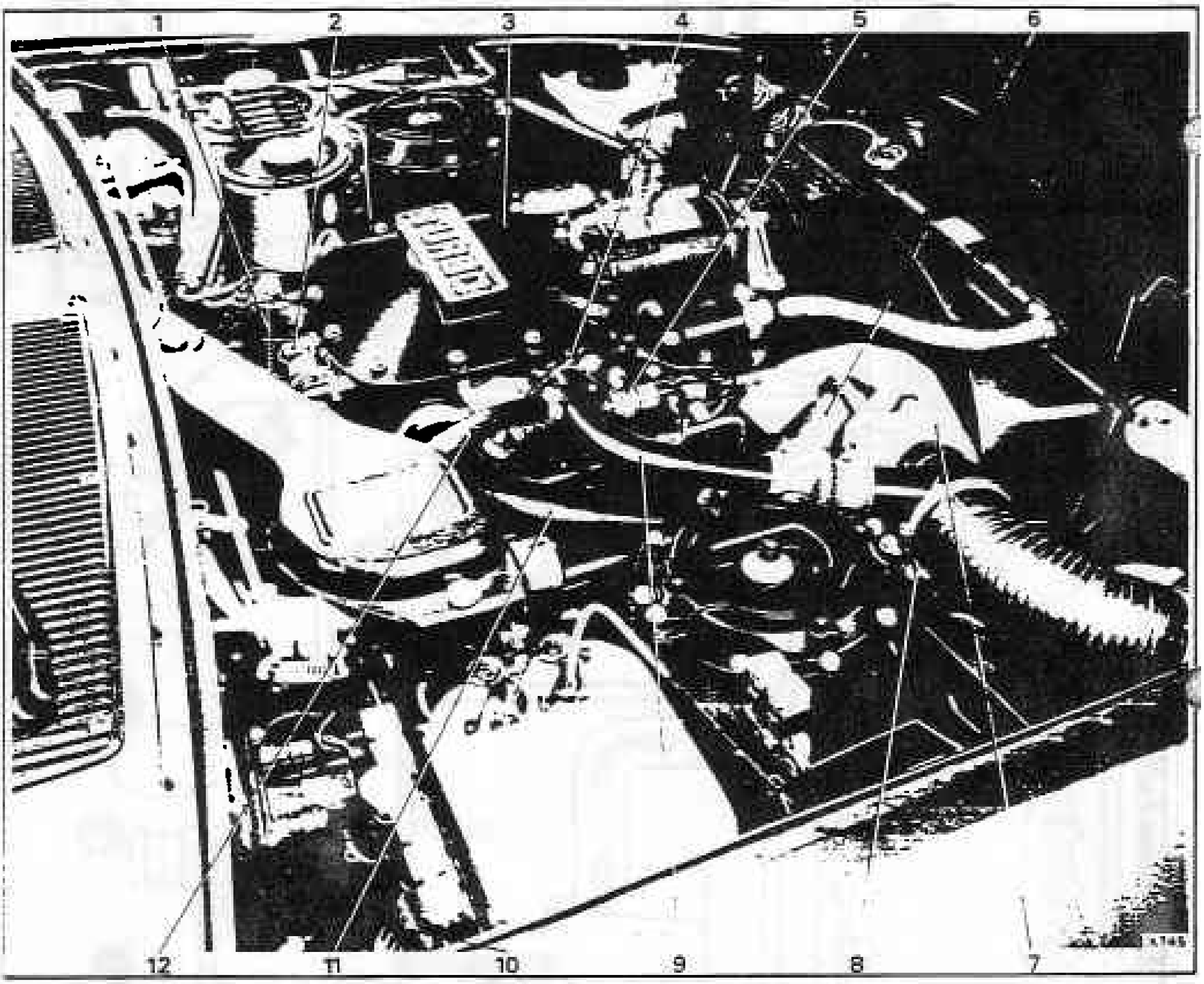


Fig. K11-3 Engine compartment details

1 Automatic speed control chain
2 Choke pulldown heater switch
3 Air chest
4 Ignition distributor capsule vacuum signal pipe
5 Boost limiter solenoid
6 Turbocharger exhaust turbine housing
7 Turbocharger air compressor housing
8 Exhaust gas wastegate (partially hidden)
9 Air dump (recirculation) pipe
10 Ignition system amplifier
11 Air delivery pipe to air chest
12 Crankcase breather pipe

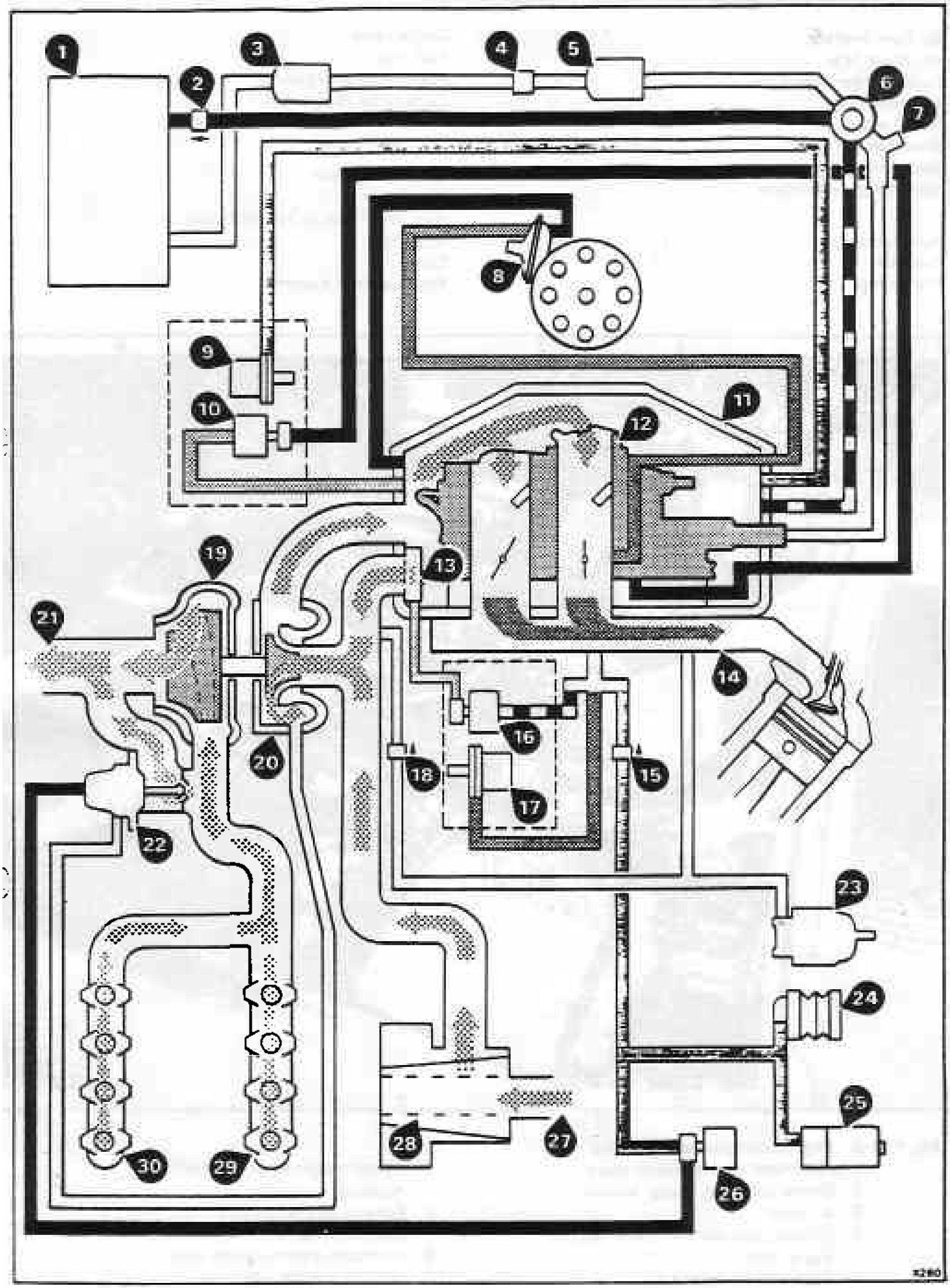


Fig. K11-4 The turbocharging system (theoretical)

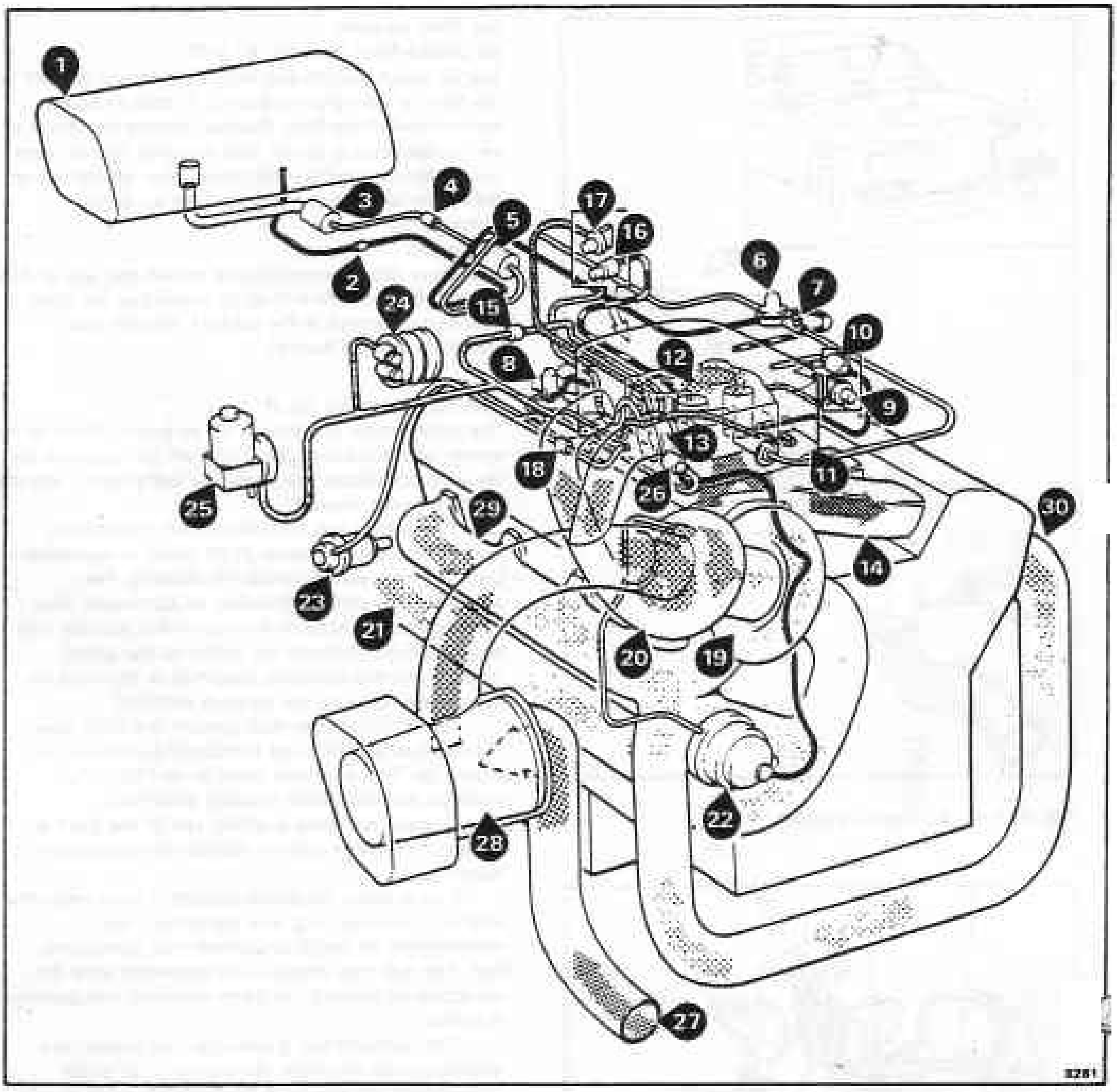


Fig. K11-4 The turbocharging system (practical)

1 Fuel tank
2 Non-return valve
3 Fuel pump
4 Check valve
5 Fuel filter
6 Fuel pressure regulator
7 Fuel pressure tapping
8 Ignition distributor vacuum/pressure advance capsule
9 Part throttle enrichment pressure switch
10 Part throttle enrichment cut-in solenoid
11 Air chest
12 Carburetter (Solex 4 A 1)
13 Dump valve
14 Engine inlet manifold
15 One-way valve (speed control)
16 Dump valve vacuum signal cut-in solenoid
17 Dump valve vacuum switch
18 Pressure relief valve (transmission modulator)
19 Turbocharger exhaust turbine
20 Turbocharger intake air compressor
21 Exhaust gas passing to exhaust system
22 Exhaust gas wastegate
23 Transmission vacuum modulator
24 Speed control system bellows
25 Speed limiter vacuum pump
26 Boost limiter cut-in solenoid
27 Ambient air passing to intake system
28 Intake air filter
29 'A' bank exhaust manifold
30 'B' bank exhaust manifold

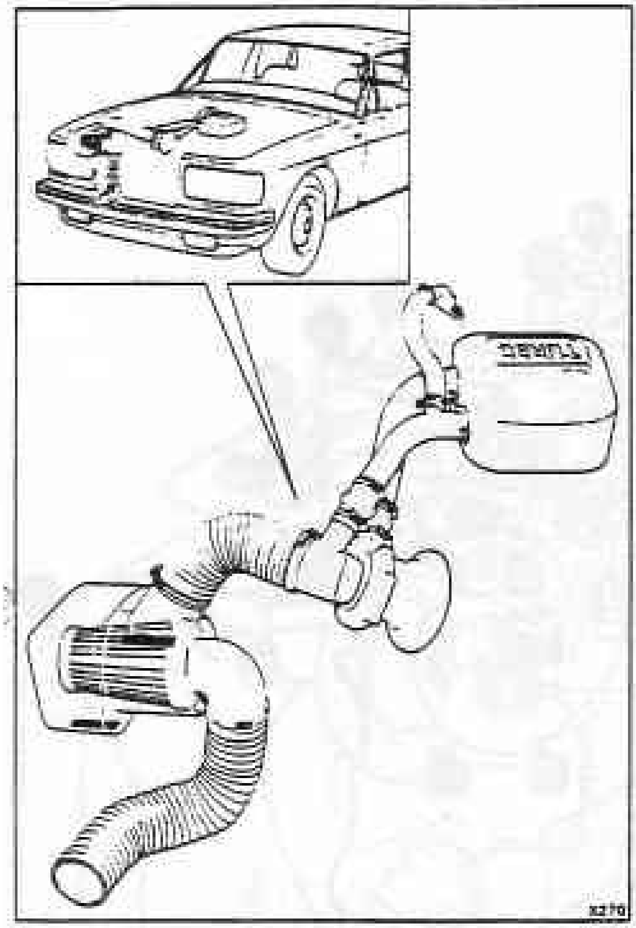


Fig. K11-5 Air intake system

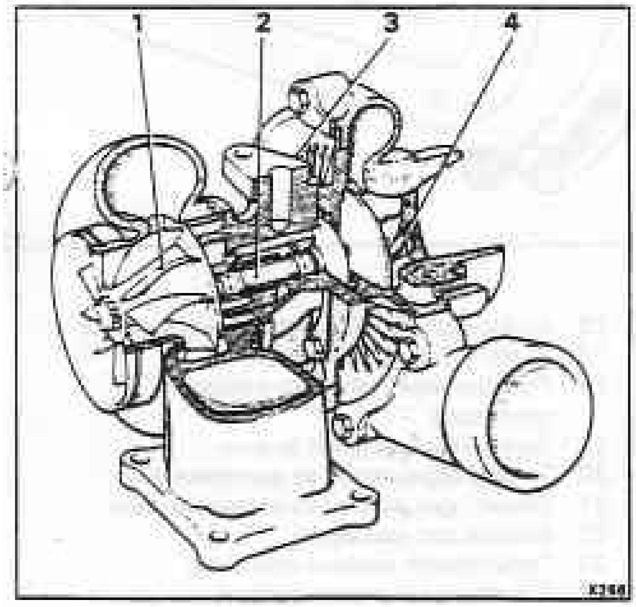


Fig. K11-6 The turbocharger
1 Exhaust turbine
2 Shaft
3 Centre housing
4 Intake compressor

Air flow system

Air intake filter (see fig. K11-5)

The air intake system and filter element are housed at the front of the right-hand wing. A cold air scoop located behind the front bumper, directs the intake air via flexible ducting to the filter housing. The air then passes through the tapered paper filter element (from the centre towards the outside) and on to the turbocharger.

Important

Whenever filter maintenance is carried out, the air flow through the element should be noted (i.e. the clean side of the element is the outside, any dirt will accumulate in the centre).

Turbocharger (see fig. K11-6)

The turbocharger is basically an air pump driven by the energy of the exhaust gas. The main components are the exhaust turbine, the shaft, the compressor, and the centre housing assembly.

The turbine and compressor are mounted at opposite ends of the same shaft which is supported in plain bearings within the centre housing. The compressor is contained within an aluminium alloy housing and the exhaust turbine within the cast iron housing. Both housings are bolted to the centre housing and the complete assembly is mounted via the turbine flange to the exhaust manifold.

The plain bearings that support the shaft have floating bushes which are lubricated by pressurized engine oil. This oil is also used to cool both the bearings and the centre housing assembly.

Oil seals are fitted at either end of the shaft to prevent oil leakage into the turbine or compressor housings.

If an exhaust extraction system is used when the engine is operated (e.g. in a workshop), the turbocharger oil seal arrangement may temporarily leak. The leak may continue for sometime after the extraction equipment has been removed; this condition is normal.

The turbocharger is lubricated by pressurized engine oil and therefore, the supply of oil stops immediately the engine is switched off although, the exhaust turbine and compressor wheels continue to spin freely for sometime before coming to rest. Therefore, damage could be caused during this slowing down time due to lack of lubrication and consequential heat build-up.

Important

After sustained high speed operation the engine should be allowed to run at the idle speed setting for at least one minute before it is switched off.

Air chest (see fig. K11-7)

The air chest is mounted centrally over an eight branch induction manifold and houses the Solex 4 A 1 carburetter.

The assembly is sealed and contains air which is ready for induction into the engine via the carburetter.

Dump valve (see fig. K11-8)

The manifold depression operated dump valve is situated in the side wall of the air chest. At low engine loads [manifold vacuum greater than 368,30 mm Hg (14.5 in Hg)] it allows air to recirculate through the air chest and back into the compressor. At higher engine loads the dump valve closes (due to a fall in the manifold depression) and pressure builds-up in the air chest, increasing part throttle engine power and improving throttle progression on the primary chokes.

A solenoid valve operated by a vacuum switch, connects the dump valve to atmospheric pressure whenever the inlet manifold vacuum is less than 368,30 mm Hg (14.5 in Hg) and allows the dump valve to close.

When the vacuum switch and solenoid are de-energized [inlet manifold vacuum greater than 368,30 mm Hg (14.5 in Hg)], the solenoid connects the dump valve to the inlet manifold vacuum which in turn, draws the valve open.

The dump valve also acts as a relief valve if the boost pressure exceeds approximately 0,59 bar (8.5 lbf/in², 439,50 mm Hg, 17.30 in Hg).

Boost inhibit

This system prevents the build-up of boost pressure when the brakes are applied with the vehicle stationary but the transmission in Drive range, and the accelerator is depressed.

When the boost limiter system control box receives the appropriate signals (brake lights switch, throttle position micro-switch, etc.) to indicate that the above conditions prevail, the boost limiter system is activated.

Boost limiter (see fig. K11-9)

A boost limiter system is used to control the maximum speed of the engine. This is achieved by limiting the amount of boost pressure supplied to the engine.

The electronic control unit (ECU) used in the system senses when maximum speed is being approached and activates an electrically operated vacuum pump mounted under the wing on the right-hand valance.

At maximum speed the ECU energizes a solenoid valve which connects the vacuum pump to the end connection on the wastegate. The vacuum then applied, opens the wastegate to limit the boost pressure and hence, the speed of the engine.

Exhaust gas wastegate (see fig. K11-9)

The exhaust gas wastegate is used to control the boost pressure by regulating the flow of exhaust gas to the turbocharger turbine. This controls the energy available for compressing inlet air.

The boost pressure is taken from a tapping at the end of the turbocharger compressor volute and acts on a diaphragm connected to the wastegate valve. As the boost pressure rises, the diaphragm acts against a spring and at a predetermined pressure the valve lifts off its seat, wasting some of the exhaust gas and limiting the boost pressure.

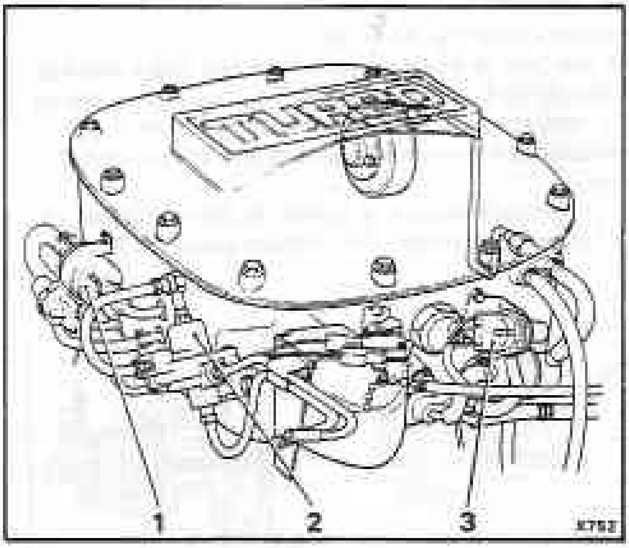


Fig. K11-7 Air chest

1 Part throttle enrichment control
2 Fuel pressure regulator
3 Dump valve control

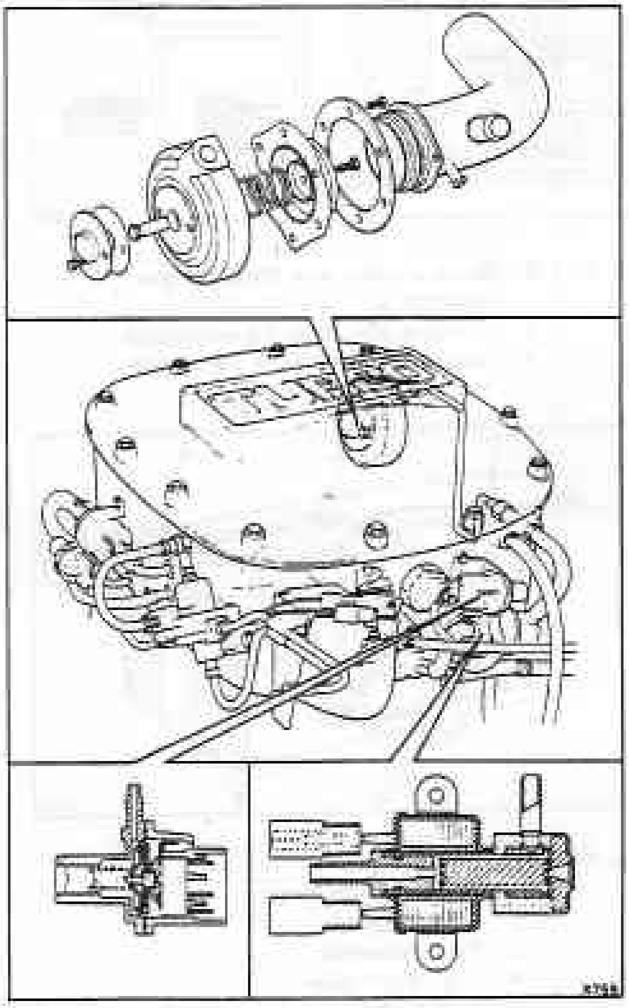


Fig. K11-8 Dump valve and control system

Fuel system

Fuel tank (see fig. K11-10)

The fuel tank is situated behind the rear seats and has a capacity of 108 litres (23.73 gal). The tank is sealed by a ratchet type of screw-on filler cap which incorporates a combined pressure and vacuum relief valve.

An expansion tank is located in the upper part of the fuel tank assembly. This inhibits complete filling of the tank and provides fuel expansion volume to cope with variations in ambient temperature.

The fuel system is of the recirculation type. Both the feed and return pipes are routed down the left-hand side of the car and connect into the base of the fuel tank. The system feed pipe connects from the nylon 'in-tank' filter assembly to the fuel pump.

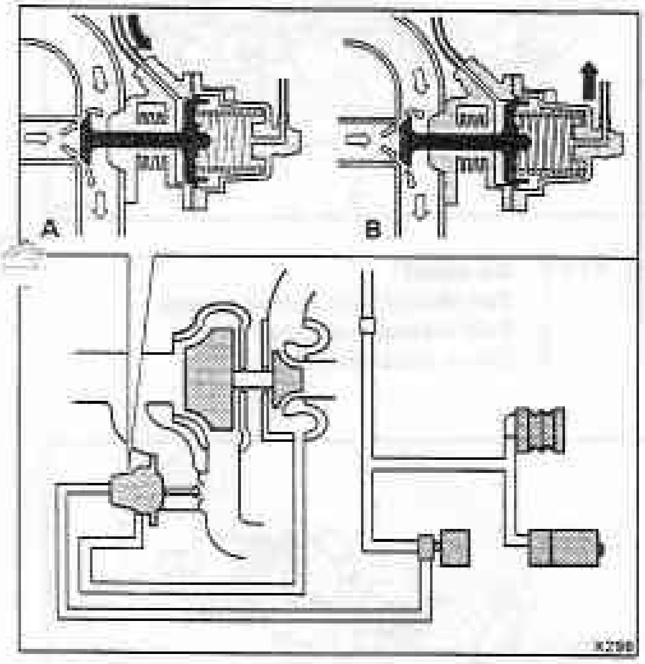


Fig. K11-9 Boost limiter and Exhaust gas wastegate
A Pressure operating the wastegate
B Vacuum operating the wastegate

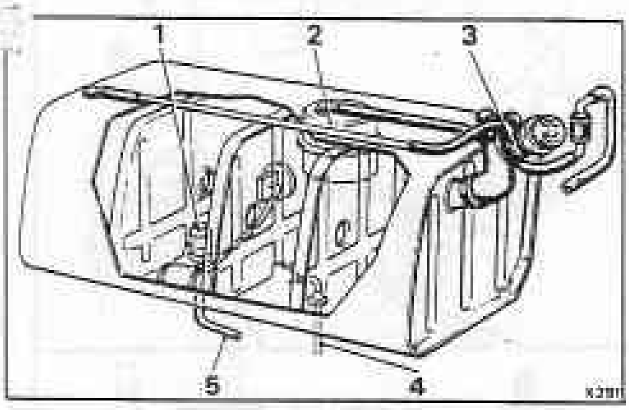


Fig. K11-10 Fuel tank
1 'In tank' nylon filter
2 Overfill limiter
3 Filler assembly
4 Fuel return pipe
5 Fuel feed pipe

Fuel pump (see fig. K11-11)

This is a roller cell type of pump, driven by a permanent magnet motor.

A rotor mounted on the pump shaft, has metal rollers fitted into the slots situated around its circumference. When the pump is operating the rollers are forced against the eccentrically designed pump

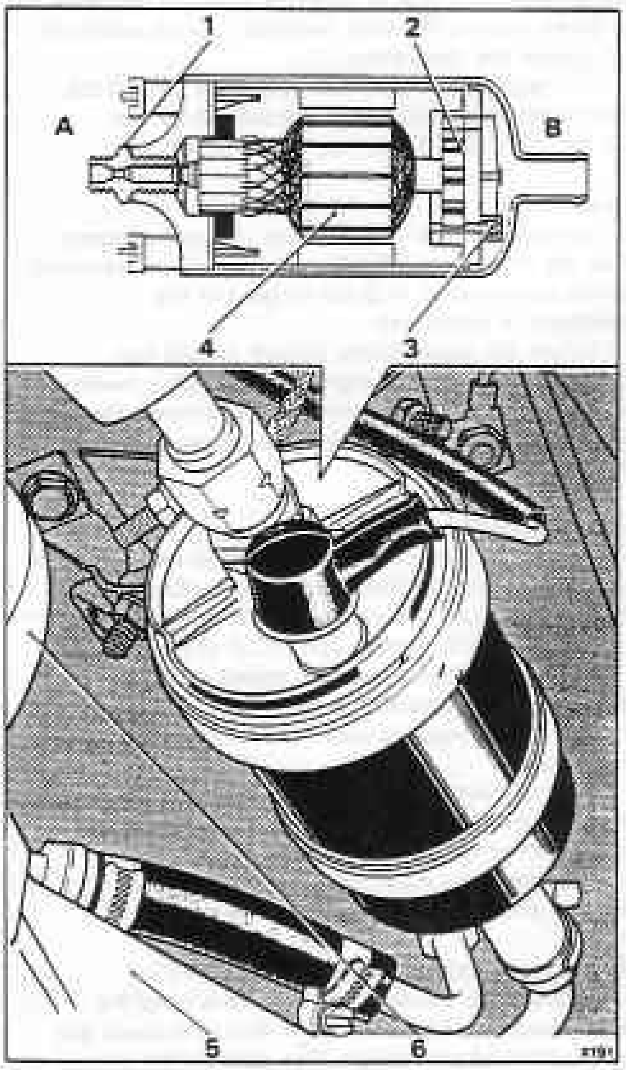


Fig. K11-11 Fuel pump
1 Outlet union
2 Roller cell
3 Safety valve
4 Armature
5 Final drive unit
6 Transmission damper
A Pressure side
B Inlet side

housing by centrifugal force and form sealed individual fuel compartments (cells). As the pump shaft rotates the fuel in the cells is forced from the inlet to the outlet side of the pump, it then travels via a separate check valve to the main fuel filter.

Check valve (see fig. K11-12)
The check valve is situated in the fuel feed line.

Fuel under pressure from the pump, moves the small valve from its seating and passes through the holes in the valve disc. When the pump is not operating, the fuel pressure drops and a spring returns the valve disc to the adapter face, thus sealing the feed line.

Fuel filter (see fig. K11-13)
The main fuel filter is fitted into the fuel feed line between the check valve and the fuel pressure regulator. The filter contains a paper element and a fine mesh screen. The paper element is used to trap any dirt in the fuel. The fine mesh screen retains any particles which may be released by the paper cartridge.

Important
Due to the construction of the filter it is most important that the direction of flow arrow marked on the filter housing is strictly adhered to.

Fuel pressure regulator (see fig. K11-14)
The fuel pressure regulator controls the fuel supply pressure to 0,275 bar (4 lbf/in², 206,84 mm Hg, 8.144 in Hg) above the air chest pressure. This avoids fuel starvation under boost conditions.

The assembly consists of a spring and diaphragm unit that partially restricts the fuel return line to the tank. Boost pressure also acts on the diaphragm (to restrict the flow of fuel returning to the fuel tank) which causes the fuel pressure to rise.

The basic fuel pressure can be set by means of an adjustment screw on top of the assembly. However, once this pressure has been set during manufacture of the vehicle, it should not normally require adjustment in service.

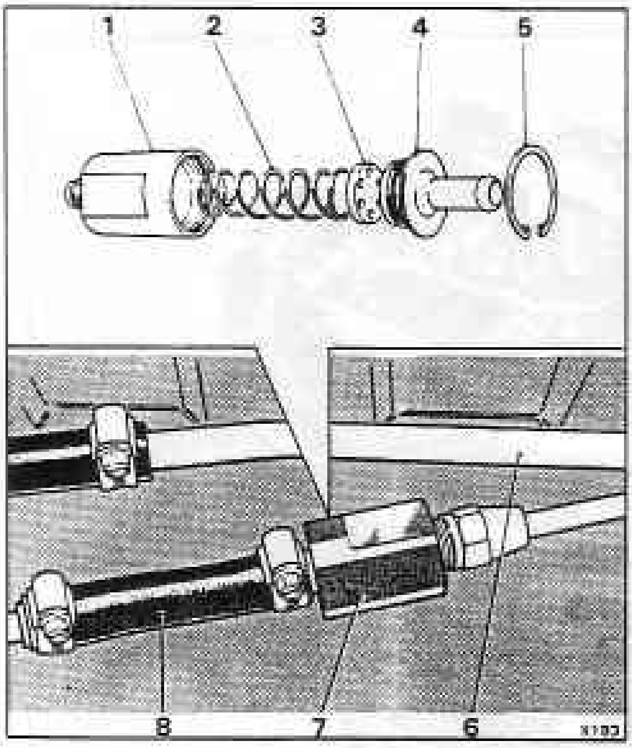


Fig. K11-12 Check valve
1 Valve body
2 Spring
3 Seating disc
4 Adapter
5 Circlip
6 Fuel return line
7 Check valve
8 Fuel feed line

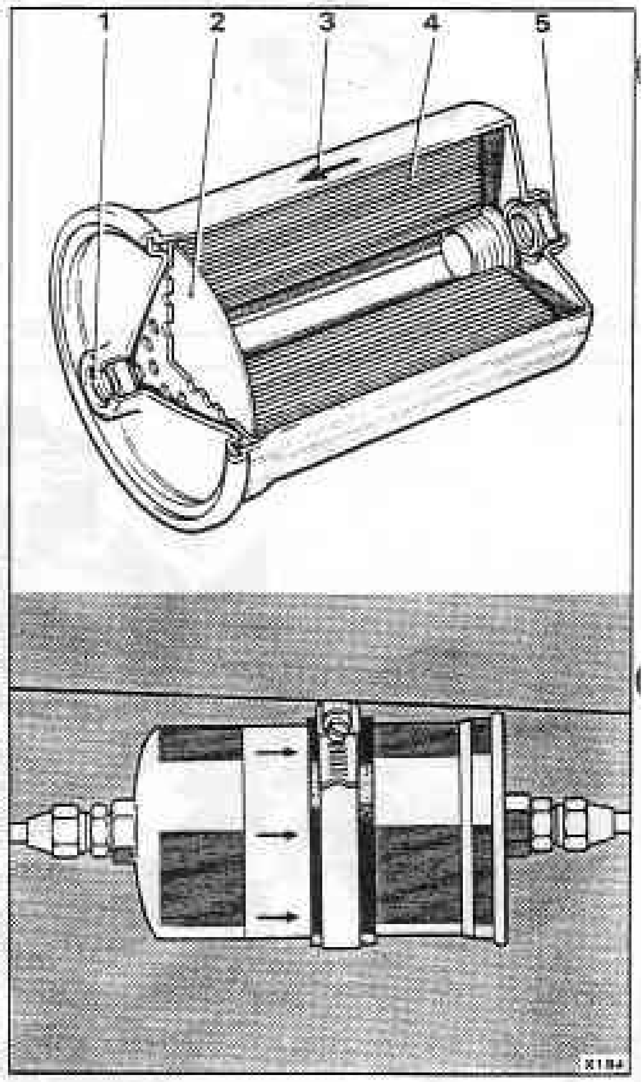
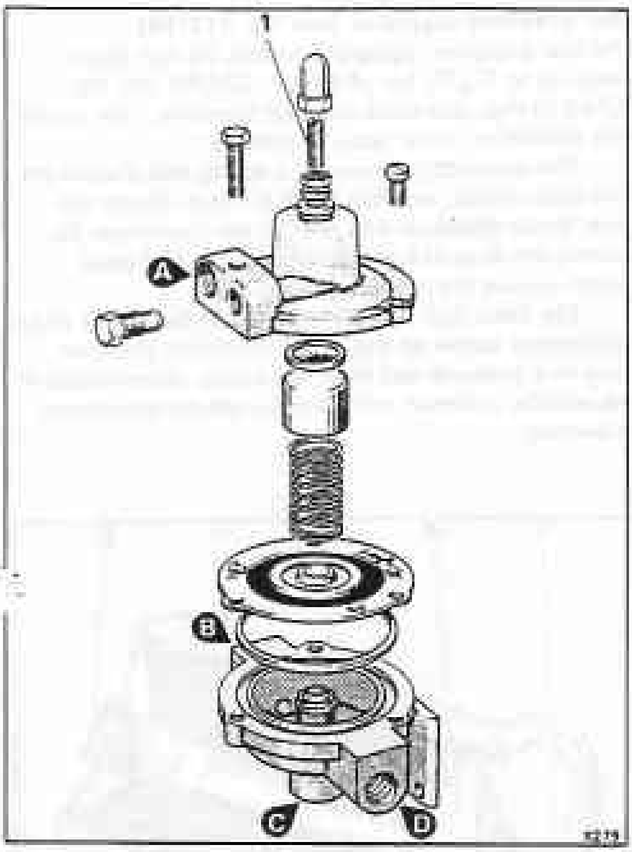


Fig. K11-13 Fuel filter
1 Outlet connection
2 Fibre glass paper filter element
3 Direction of flow arrow
4 Paper filter element
5 Inlet connection



Carburetter (see fig. K11-15)
The Solex 4 A 1 carburetter is a four barrel, two stage down draught carburetter. Two barrels combine to become the first or primary stage; the other two barrels form the secondary stage.

In the primary stage the throttle butterflies are operated directly, whereas the secondary stage butterflies are opened by a cam on the throttle lever of the primary stage, once the lock of the automatic choke mechanism has disengaged.

The carburetter is further refined by an economy device piston (see fig. K11-16). At part throttle openings the inlet manifold depression is sufficient to overcome the spring fitted beneath the economy device piston. The piston is therefore, drawn downwards, moving the twin tapered air correction needles downwards. This allows additional air to enter the primary air correction jets.

A second addition for this application of the carburetter is the choke pulldown heater.

Fig. K11-14 Fuel pressure regulator
1 Pressure adjustment screw
A Air chest pressure
B Fuel to carburetter
C Fuel return to tank
D Fuel feed into regulator

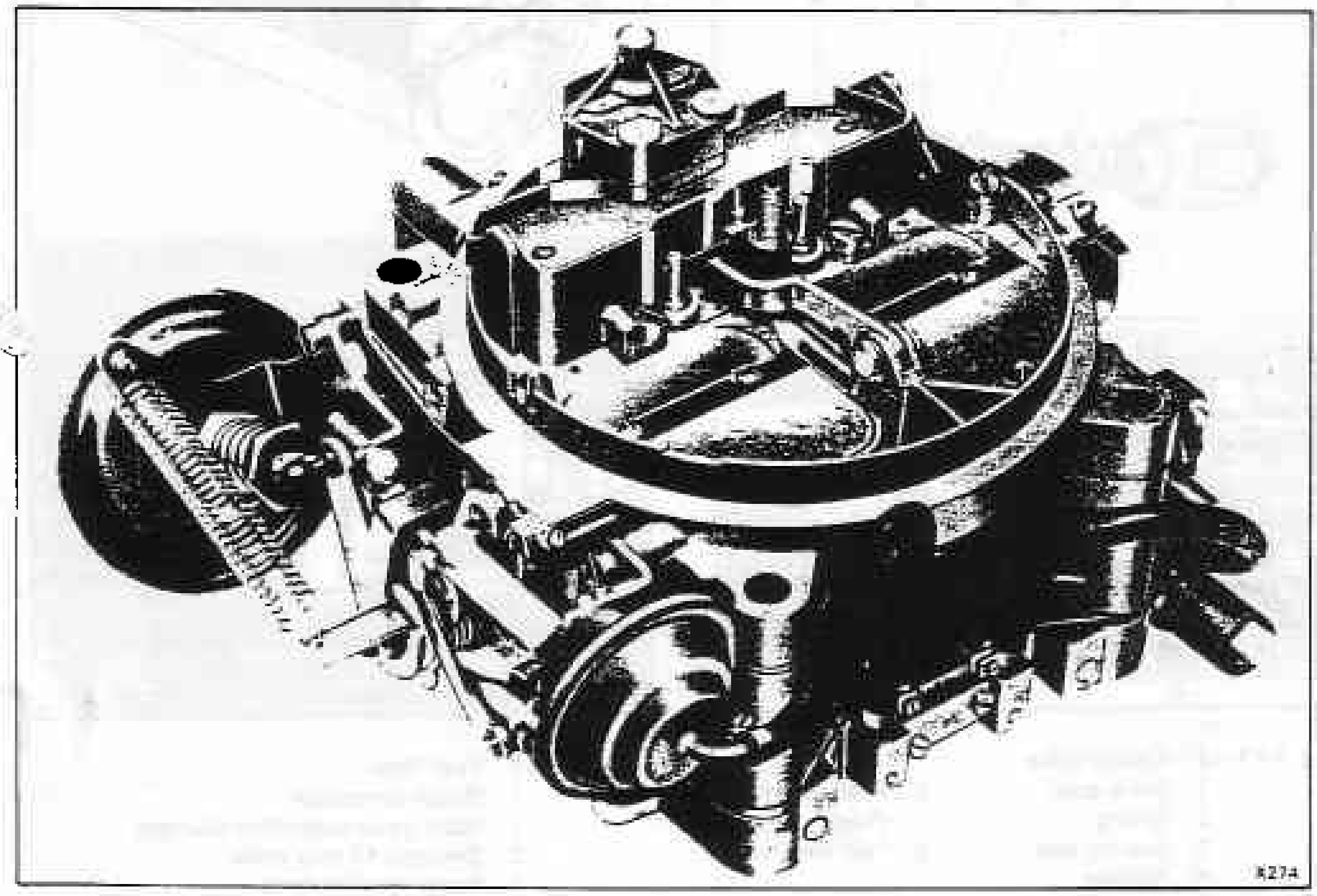


Fig. K11-15 Solex 4 A 1 carburetter

Full details relating to the overhaul of the carburetter are given in Chapter K - Part 1 of this Workshop Manual TSD 4400. The various service settings for the carburetter are given in the fault diagnosis and service adjustment section of this Chapter

Part throttle enrichment control (see fig. K11-16)
When the boost pressure in the air chest exceeds 0,07 bar (1 lbf/in², 51,71 mm Hg, 2.04 in Hg) a pressure switch mounted on the 'B' bank side of the air chest energises a normally closed solenoid valve. This allows air chest pressure to the underside of the carburetter economy device and balances out the pressure difference across it. The force exerted by the spring on the underside of the piston moves the piston and air correction needle valves upwards to reduce the effective opening of the primary air correction jets. Therefore, under boost conditions the economy device is always in the full rich position.

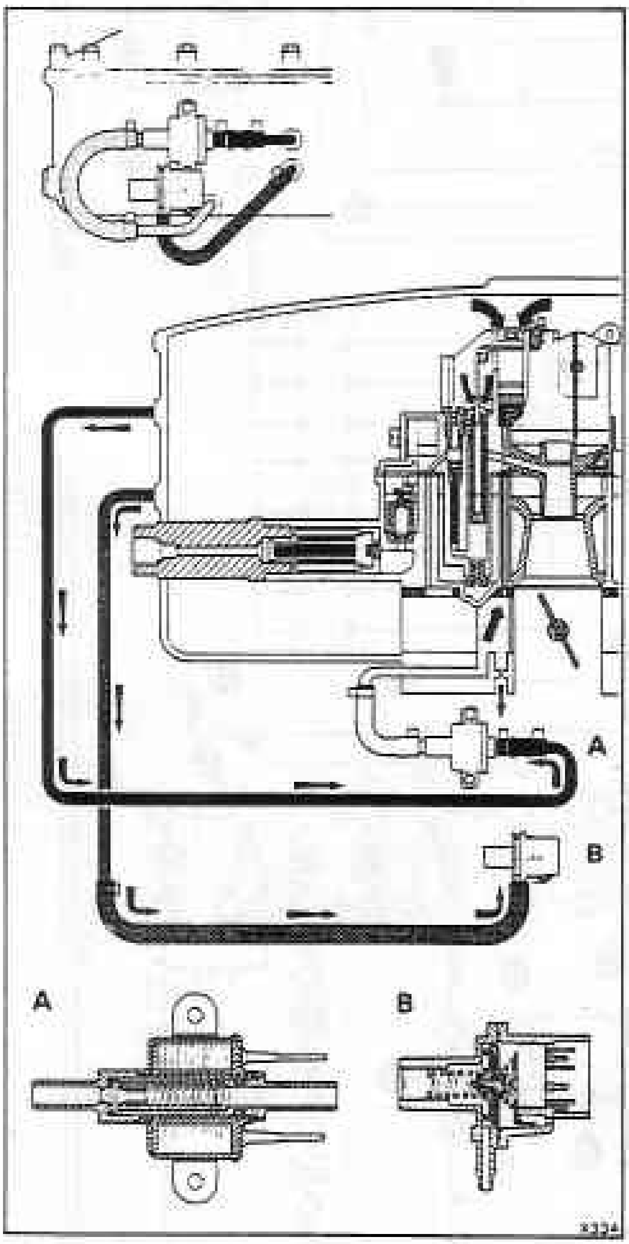


Fig. K11-16 **Carburetter economy device and Part throttle boost enrichment**

Non-return valve (see fig. K11-17)
The non-return valve is fitted into the fuel return line just prior to the fuel tank. The purpose of the valve is to prevent the 'backflow' of fuel.

The valve is manufactured from fuel resistant nylon and is a non-serviceable unit. If its operation is suspect, a new assembly should be fitted. The direction of flow is indicated by the arrow embossed on the valve body.

Electrical circuit
The electrical components associated with the turbocharger and auxiliary systems are shown in figure K11-18.

Specific information and service checks are given in the appropriate section of this Workshop Manual TSD 4400.

Fan delay timer
On turbocharged engines a fan delay timer is fitted. This system enables the electrically operated cooling fan (situated between the radiator grille and matrix) to operate for up to approximately 15 minutes after the ignition has been switched off, if the coolant temperature is above 115°C.

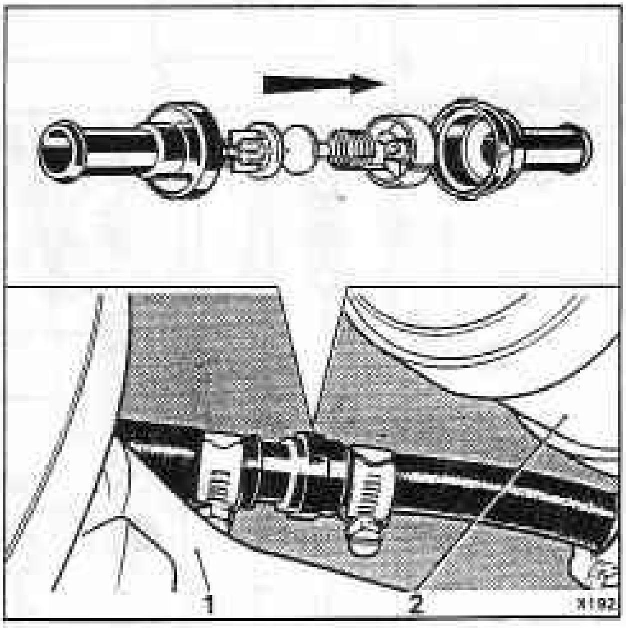


Fig. K11-17 **Non-return valve**
1 Final drive unit
2 Fuel pump

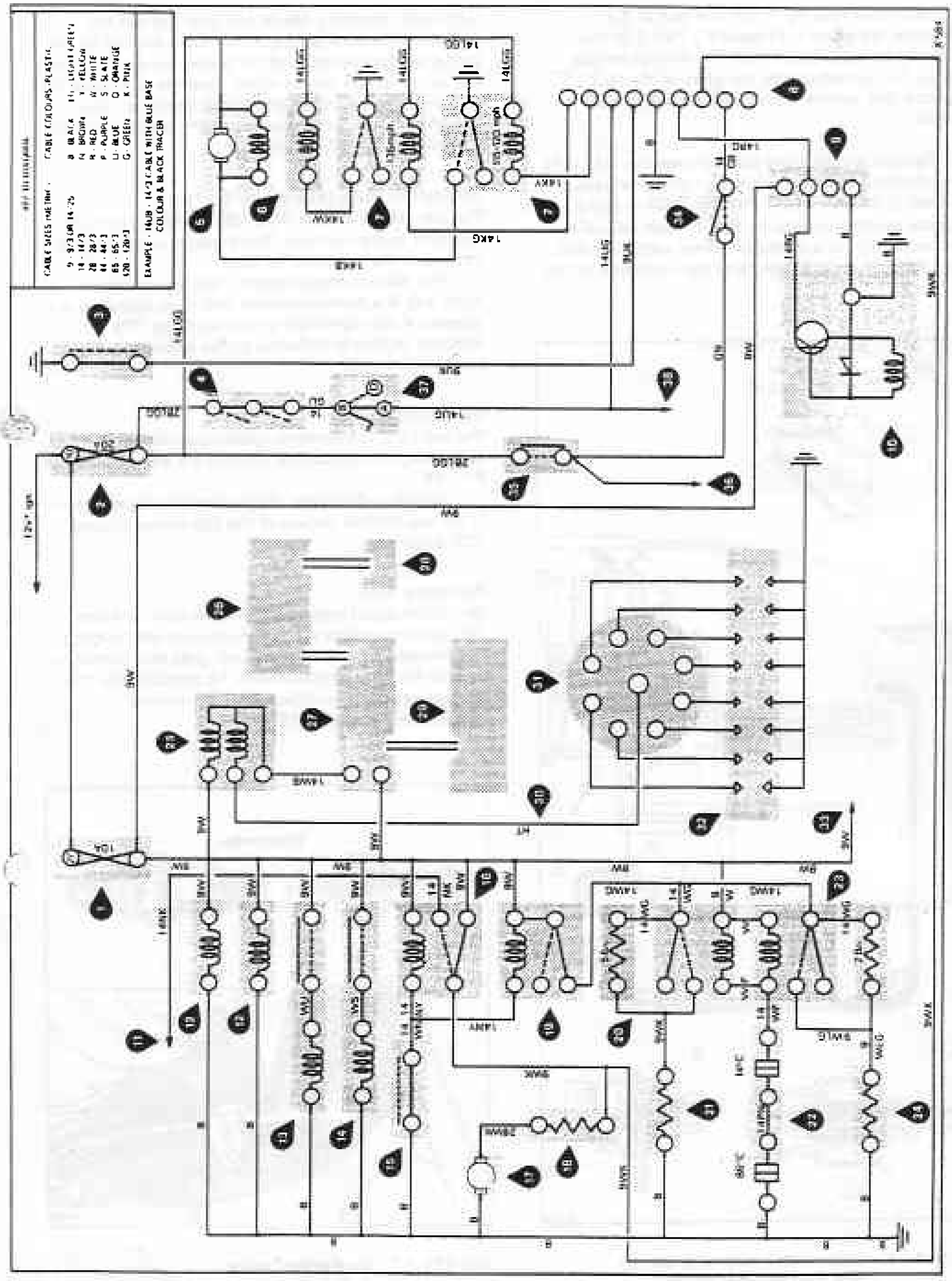


Fig. K11-18 Electrical wiring diagram (theoretical)

Ignition system

A Lucas constant energy ignition system with magnetic pick-up is fitted. A knock sensing system is also incorporated to enable optimum ignition timing to be used without the risk of engine damage due to detonation.

Distributor (see fig. K11-19)
The distributor is a Lucas 35 DM8 and contains a magnetic pick-up (trigger) and reluctor (star wheel). The assembly also has a centrifugal advance mechanism.

Vacuum/Pressure advance capsule (see fig. K11-19)
The advance capsule diaphragm is connected on one side to the carburetter gated orifice (as with a conventional vacuum capsule) and on the other side to the air chest. It therefore, responds to the pressure drop across the carburetter. This provides an ignition characteristic better matched to the degree of boost applied, than if a conventional vacuum capsule was fitted.

Key to Fig. K11-18 Electrical wiring diagram (theoretical)

1 Fuse 27
2 Fuse 10
3 Gearbox top gear switch
4 Gearbox inhibit
5 Vacuum pump and solenoid
6 Boost limiter solenoid valve
7 Relays
8 Control unit
9 Speedometer
10 Speed signal generator
11 To cranking interlock relay
12 Anti 'run-on' solenoid
13 Boost enrichment solenoid valve and switch
14 Dump valve and switch
15 Oil pressure switch
16 Fuel pump relay
17 Fuel pump
18 Fuel pump resistor
19 Choke heater relay
20 Choke pulldown heater relay and resistor
21 Choke pulldown heater
22 Choke heater temperature switches
23 Choke heater relay and resistor
24 Choke heater
25 Ignition coil
26 Electronic control unit (ECU)
27 Ignition system amplifier
28 Engine knock (detonation) sensor
29 Magnetic pick-up (trigger). This is an integral part of the distributor
30 High tension lead
31 Distributor
32 Sparking plugs
33 To kick-down switch and solenoid
34 Throttle position micro-switch
35 Stop lamps switch
36 To speed control electronic control unit
37 Speed control switch
38 To speed control electronic control unit

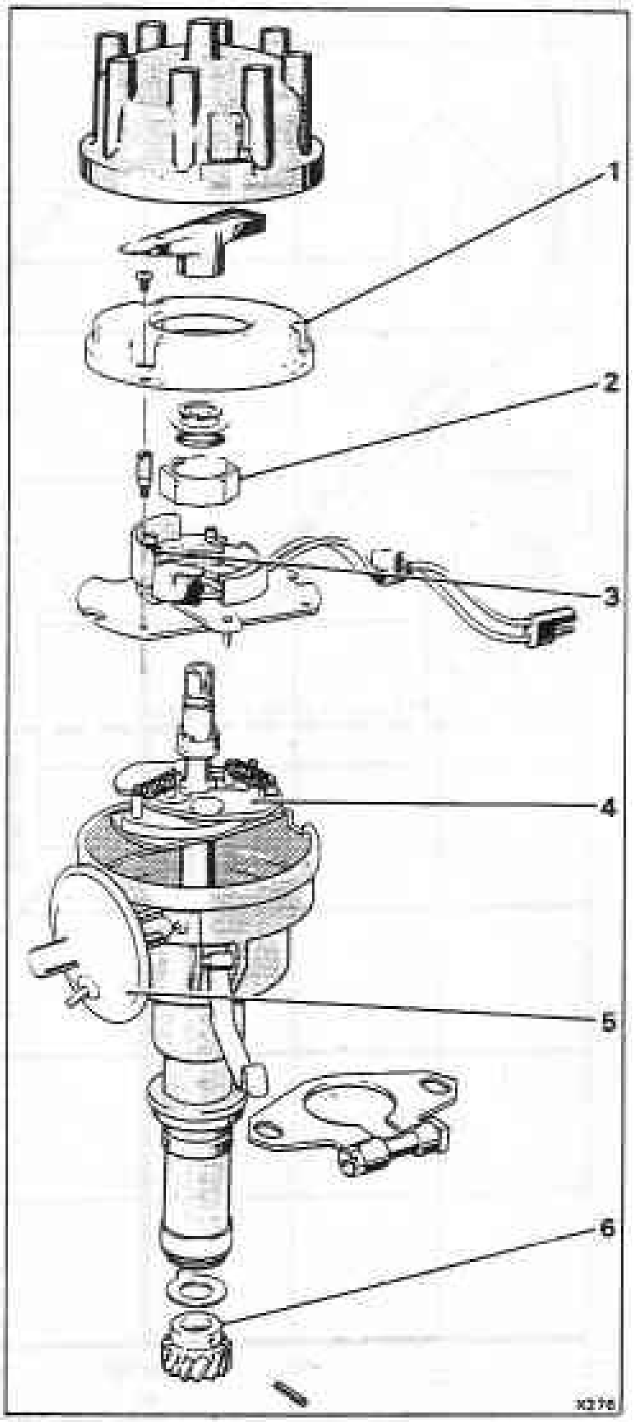


Fig. K11-19 Ignition distributor
1 Flash over shield (dust cover)
2 Reluctor (star wheel)
3 Magnetic pick-up (trigger)
4 Automatic advance mechanism
5 Vacuum/Pressure advance capsule
6 Driving gear

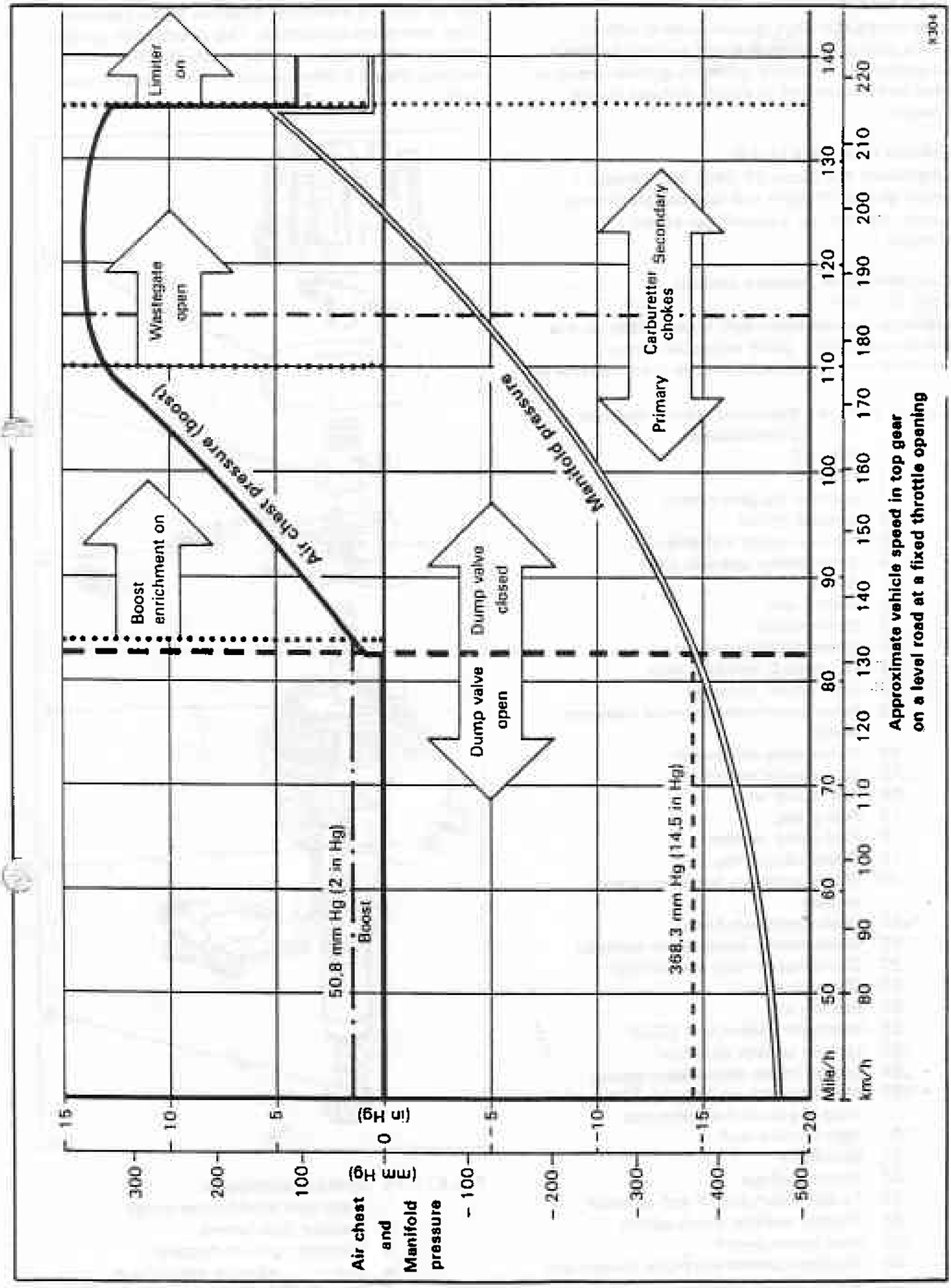


Fig K11-20 Operation of the turbocharging systems

Ignition amplifier (see fig. K11-3)
The ignition amplifier is contained within a finned aluminium box mounted on the right-hand valance below the windscreen wiper motor. The unit amplifies the signal from the distributor pick-up (trigger) and feeds it to the coil, thereby producing a timed spark. The timed spark is retarded by the knock sensing system if engine knock has been detected.

Coil
The Lucas 32 C5 is a special low impedence type coil matched to the ignition amplifier.

Engine knock sensing system
The knock sensor (see fig. K11-21) produces a small output signal when it detects engine knock and other abnormal engine noise. This signal is processed by the electronic control unit (ECU) mounted above the footwell. The ECU filters the signal and decides if engine knock is present. If knock is present the ECU signals the amplifier to retard the ignition until the knock ceases.

Modes of operation

This section comprises a brief description of the operating modes for the system.

Operation of the various control systems is shown in figure K11-20.

Engine light load operation
With a small throttle opening and low engine speed the inlet manifold depression is high. Therefore, the dump valve vacuum switch de-energizes the solenoid valve and allows the inlet manifold depression to open the dump valve.

The inlet air delivered by the turbocharger compressor to the air chest is allowed to return to the compressor via the dump valve. Under these conditions there is no turbocharging effect and the engine operates in the 'conventional' naturally aspirated manner.

Engine part throttle operation (with boost)
When the throttles are partially opened to meet an increase in engine load, the inlet manifold depression will fall below 368,30 mm Hg (14.5 in Hg). Therefore, the dump valve vacuum switch energizes the solenoid valve and closes the dump valve by venting it to atmosphere.

When the dump valve closes the air recirculation pipe, air from the turbocharger compressor is retained within the air chest. This causes pressure to build-up to approximately 0,48 bar (7 lbf/in², 361,97 mm Hg, 14.25 in Hg), dependent upon the throttle openings.

Due to the calibration of the carburetter, the increased density of inlet air permits an increase in the volume of fuel that can be burnt in the engine (whilst maintaining the correct air/fuel ratio). This therefore, produces a correspondingly higher engine power output.

The boost pressure is also piped from the turbocharger compressor to the exhaust gas wastegate

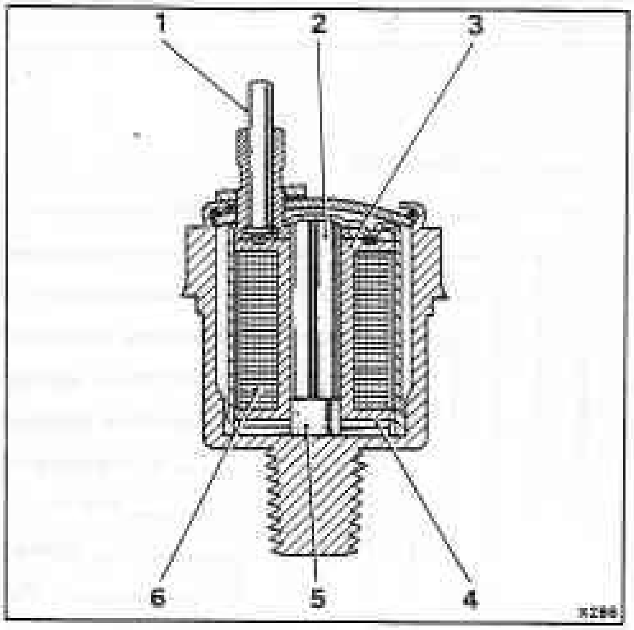


Fig. K11-21 Engine knock sensor
1 Terminal
2 Nickel alloy core (4 off)
3 Isolator bobbin
4 Spring washer
5 Permanent magnet
6 Coil

assembly and at a pre-set pressure it lifts the wastegate valve off its seat. A proportion of the exhaust gas then by-passes the turbocharger turbine limiting the speed and therefore, the power driving the turbocharger compressor. This action limits the boost pressure.

If due to a malfunction, the boost pressure is not limited in the manner described, the dump valve will act as a relief valve when the pressure approaches approximately 0,59 bar (8.5 lbf/in², 439,50 mm Hg, 17.30 in Hg).

Whilst the engine is operating under boost conditions, a pressure switch mounted on 'B' bank side of the air chest energizes a normally closed solenoid valve whenever the air chest pressure exceeds 0,07 bar (1 lbf/in², 51,71 mm Hg, 2.04 in Hg). The effect of this is to feed boost pressure to the underside of the carburetter economy device. This balances the pressure difference across the device and ensures that the load exerted by the economy device spring moves the tapered needle valve into the full rich position.

This ensures that the economy device is always in the full rich position for part throttle 'on boost' operation.

Engine full load operation
With the throttles fully opened, the inlet manifold depression is below the setting required to keep the dump valve open. Therefore, the vacuum switch

No.	Possible faults	Rough idle	Poor low speed primary progression	Poor 'on boost' primary progression	Excessive fuel consumption	Poor secondary throttle progression	Loss or erratic operation of speed control system	Excessive oil consumption	Blue smoke in exhaust	Misfire	Intake system 'spitback'	Power hang on	Excessive induction noise on overrun	Excessive induction noise on boost	Excessive top speed	Detonation	Overheating
1	Fuel flooding	●			●												
2	Fuel starvation			●		●											
3	Excessive richness		●		●												
4	Excessive leanness		●	●		●	●			●	●					●	
5	Insufficient ignition advance		●	●	●	●					●						●
6	Excessive ignition advance									●						●	●
7	Insufficient boost			●		●	●										
8	Excessive boost									●	●	●	●	●	●	●	●
9	Turbocharger oil leak							●	●								
10	Turbocharger compressor surging												●	●			
11	Insufficient vacuum						●								●		
12	Ignition electronics malfunction									●	●					●	
13	Pressurized system air leak			●		●								●		●	
14	Limiter electronics malfunction														●		

Refer to the chart on the facing page for possible causes

Turbocharging system

Basic fault finding chart

Faults

1 — Fuel flooding
2 — Fuel starvation
3 — Excessive richness
4 — Excessive leanness
5 — Insufficient ignition advance
6 — Excessive ignition advance
7 — Insufficient boost
8 — Excessive boost
9 — Turbocharger oil leak
10 — Turbocharger compressor surging
11 — Insufficient vacuum
12 — Ignition electronics malfunction
13 — Pressurized system air leak
14 — Limiter electronics malfunction

1	2	3	4	5	6	7	8	9	10	11	12	13	14	Possible cause	Refer to Workshop Procedure
				●	●									Incorrectly set ignition timing	1
				●	●									Distributor mechanism faulty	1
				●	●									Leaking advance capsule or vacuum pipe	1
				●										Leaking advance capsule pressure pipe	1
				●	●						●			Knock sensing system faulty	1 (and the ignition system flow chart)
											●			Ignition amplifier faulty	1 (and the ignition system flow chart)
		●	●											Incorrect CO level	2, 3
			●			●	●		●	●		●		Dump valve diaphragm faulty	8
						●						●		Dump valve seal faulty	8
						●	●					●		Dump valve solenoid faulty	8
						●	●					●		Dump valve pressure switch faulty	8
						●	●		●			●		Dump valve sticking	8
		●	●											Economy/Boost enrichment device sticking	9
		●	●							●				Boost enrichment solenoid valve faulty	9
		●	●							●				Boost enrichment pressure switch faulty	9
						●	●							Wastegate valve sticking	10
						●	●		●			●		Wastegate diaphragm faulty	10
							●		●			●		Wastegate signal pipe blocked or leaking	10
						●		●	●					Turbocharger compressor intake restricted or blocked	10
										●			●	Boost limiter ECU faulty	10
						●	●			●			●	Boost limiter solenoid faulty	10
							●			●				Inoperative vacuum pump	10
							●			●				Faulty one-way valve (speed control)	10
●	●													Fuel regulator diaphragm faulty	11, 12
●		●												Fuel return line restricted or blocked	11, 12
	●		●											Fuel regulator boost signal pipe blocked or leaking	11, 12
	●													Faulty fuel pump, blocked fuel lines or filters	11, 12
						●								Turbocharger compressor/turbine faulty	Examine the turbocharger turbine and compressor blades for damage
								●						Turbocharger seals faulty	Examine the turbocharger turbine and compressor blades for damage
●														Leaking float needle valve, incorrect float level or sticking float	Chapter K - Part 1
			●											Vacuum leak (i.e. hose or gasket)	Check for induction leaks

Turbocharging system

Ignition system fault diagnosis flow chart

Engine misfires
or
Complete ignition system failure

1. Inspect the sparking plugs and High Tension leads
2. Inspect the distributor cap and rotor arm.
3. Check the Low Tension wiring and connections.
4. Substitute the ignition system coil.
5. Test the engine.

Has the engine misfire cleared?

NO → Disconnect the ignition distributor two-way plug/socket and connect an A.C. voltmeter or multi-tester to the two-way connector leading to the distributor.

Select the lowest A.C. voltage range.

Crank the engine and check that the voltage reading on the testmeter pulsates at approximately 0.5 volts.

With the testmeter still connected change the scale to read up to 5000 ohms (5KΩ). Ensure that with the distributor stationary the reading on the meter is between 3000Ω and 5000Ω (3KΩ and 5KΩ).

Check for poor joints and/or broken cables at the two-way connector.

Are the readings obtained correct?

NO → Replace the ignition distributor.

YES → Disconnect the multi-pin plug from the spark control electronic unit (ECU). Using a suitable link cable bridge the red (terminal G) and the yellow (terminal K) cables at the plug.

Test the ignition system, is there a spark?

Important

Ensure that only the red and the yellow cables are bridged. If any other cables are linked irreparable damage to the ignition amplifier module could result.

NO → Fault in the ignition amplifier circuitry.
1. Check the wiring.
2. Replace the ignition amplifier module.

YES →
1. Check the knock sensor circuits and associated wiring.
2. Replace the spark control unit (ECU).
3. Change the knock sensor if suspect (very unlikely).

Switch on the ignition. Check for a positive voltage at the positive terminal and then at the negative terminal of the ignition system coil.

Is there a 12 volts supply?

NO →
1. Check for a blown ignition system fuse.
2. Check the coil Low Tension cables for poor connections. Also check that they have not shorted to earth.

Rectify as necessary.

YES → Disconnect the king lead at the ignition distributor. Position the end of the lead approximately 5 mm (0.20 in) from a good earth. Switch on the ignition and rotate the engine.

Is there a spark?

NO → Substitute the ignition system coil and carry out the test again.

Is there a spark?

NO → (to the distributor two-way plug/socket test above)

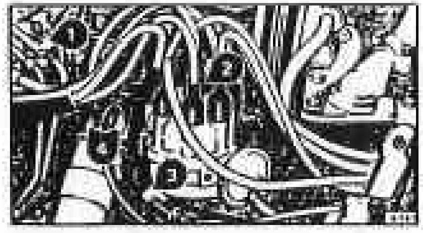
YES → **Has the ignition distributor cap or rotor arm broken down electrically?**

NO → Engine failure is not an ignition system breakdown. Investigate other systems.

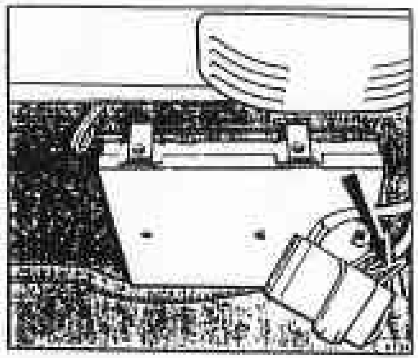
YES → Replace the defective component(s)

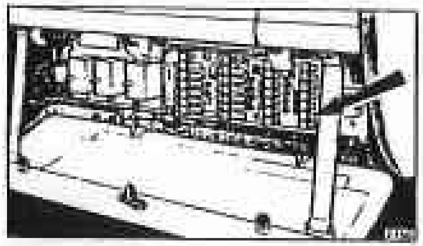
Note

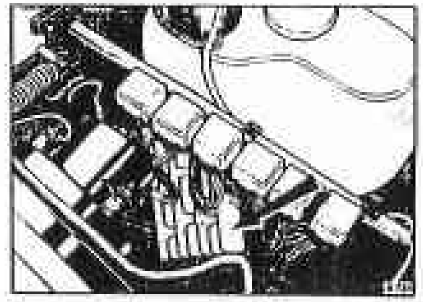
In an emergency the multi-pin plug can be disconnected from the spark control unit (ECU) and the red cable and the yellow cable linked at the plug. This will eliminate the knock sensor circuits and enable the vehicle to be driven a short distance to the nearest service point.



Engine compartment components
1. Knock sensor
2. Distributor king lead
3. Distributor two-way plug/socket
4. Positive and negative terminals of the ignition system coil

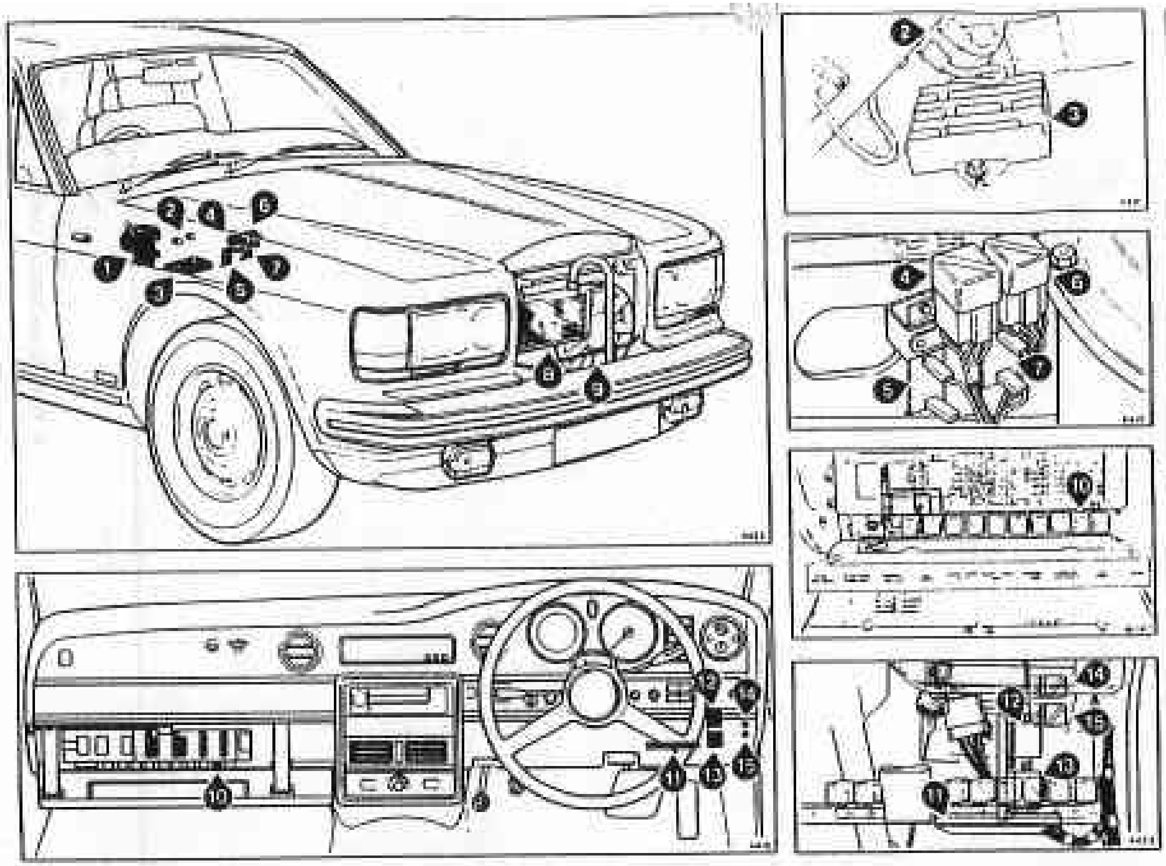


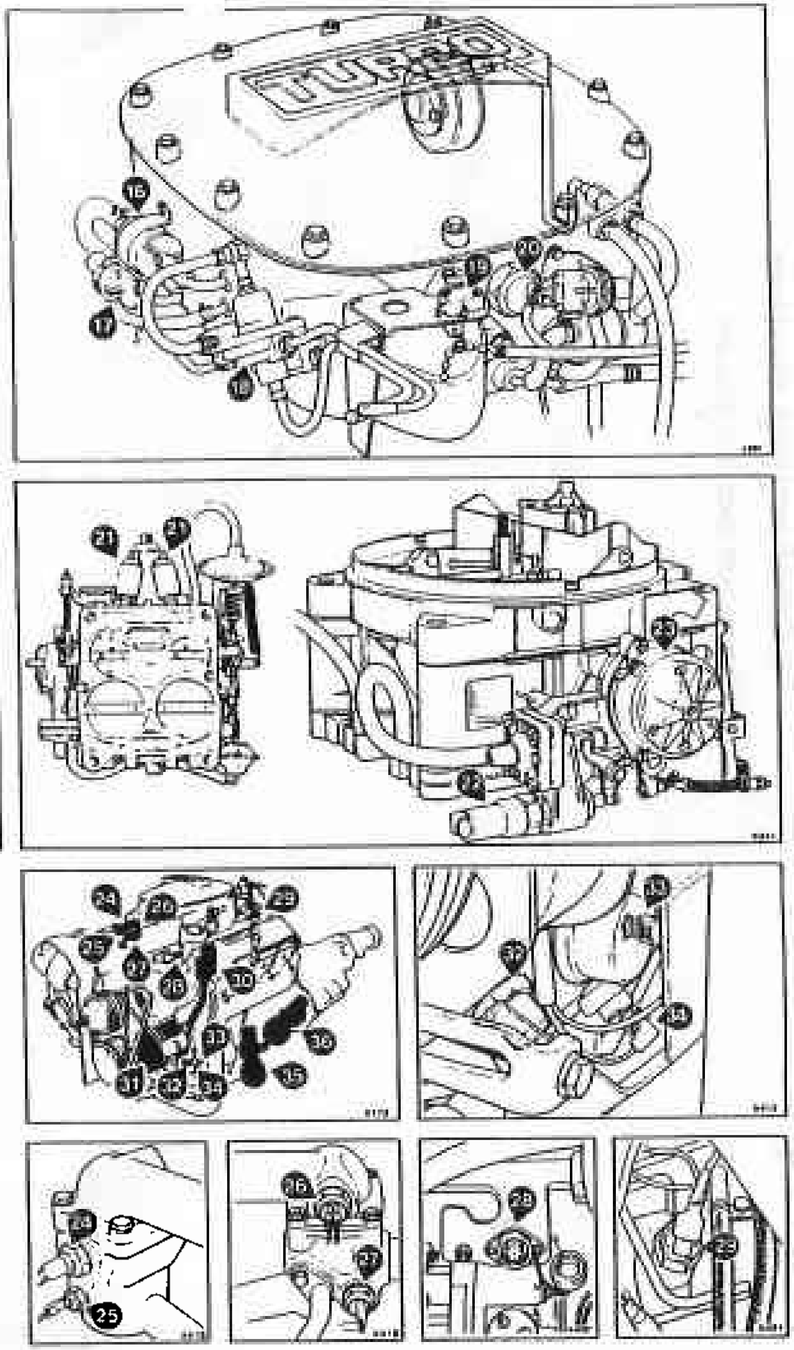




Turbocharging system

Component location diagram





Component location diagram

1 Speed limiter vacuum pump
2 Bulk head connections for ignition E.C.U. retard
3 Ignition system amplifier
4 Choke heater relay
5 Choke heater resistor
6 Pull down heater relay
7 Pull down heater resistor
8 Engine oil cooler
9 Auxiliary cooling fan
10 Fuel pump relay
11 Ignition retard electronic control unit
12 Boost limiter control unit
13 Cooling fan delay timer
14 Vacuum pump relay
15 Boost limit relay
16 Part throttle enrichment control solenoid
17 Part throttle enrichment control pressure switch
18 Fuel pressure regulator
19 Open throttle boost inhibit micro-switch
20 14°C. choke heater temperature switch
21 Anti run-on solenoids
22 Choke pulldown heater
23 Choke heater
24 44°C. A.C.U. fan switch
25 Coolant temperature transmitter
26 115°C. auxiliary coolant fan switch
27 86°C. choke heater temperature switch
28 Diagnostic socket ignition timing
29 Knock sensor
30 Power assisted steering pump remote reservoir
31 Power assisted steering pump
32 Oil diverter temperature valve
33 Oil pressure transmitter
34 Oil pressure switch
35 System 1 accumulator
36 System 2 accumulator

activates the solenoid which vents the dump valve to atmosphere, closing the valve.

Boost pressure from the turbocharger builds-up in the air chest and the turbocharging effect is evident with increased engine power.

The turbocharger boost pressure is also fed to the exhaust gas wastegate assembly. At a pre-set pressure the valve is lifted from its seat and allows some exhaust gas to by-pass the turbocharger turbine. This limits the speed of the compressor and therefore, the boost pressure.

If a malfunction of a component results in excessive boost pressure, the dump valve will operate as a relief valve at approximately 0,59 bar (8.5 lbf/in², 439,50 mm Hg, 17.30 in Hg).

In abnormal conditions, as the engine overcomes the load imposed upon it, it may be possible to detect 'engine pinking' momentarily before the knock sensing system takes control.

The system comprises a knock sensor fitted towards the rear of the induction manifold on 'B' bank side. The sensor produces a small signal when it detects engine detonation. This signal is fed to the electronic control unit for processing. If knock is present the electronic control unit signals the information to the amplifier which retards the ignition sufficiently to eliminate the knock.

When the engine approaches its maximum speed a small vacuum pump is activated. At maximum speed the boost limiter system operates in the following manner.

A signal from the system control box energizes a solenoid valve mounted on the air chest adjacent to the thermostat outlet elbow. This solenoid connects the vacuum pump to the exhaust gas wastegate which then opens and allows exhaust gas to by-pass the turbocharger turbine.

The speed of the turbocharger turbine and compressor is therefore limited by the operation of the wastegate.

Workshop safety precautions

General

Always ensure that the vehicle parking brake is firmly applied, the gear range selector lever is in the Park position and the gearbox isolator is removed from the fuseboard.

A number of nuts, bolts, and setscrews used in the turbocharging system are dimensioned to the metric system, it is important therefore, that when new parts become necessary the correct replacements are obtained and fitted.

Fire

The fuel is highly inflammable, therefore great care must be exercised whenever the fuel system is opened (i.e. pipes or unions disturbed) or the fuel is drained. Always ensure that 'no smoking' signs and foam, dry powder, or CO_2 (carbon doixide) fire extinguishers are placed in the vicinity of the vehicle.

Always ensure that the battery is disconnected before opening any fuel lines.

If the fuel is to be drained from the tank, ensure that is is siphoned into a suitable covered container.

Health risk

All contact with the fuel should be kept to an absolute minimum, particularly inhalation.

The fuel has a sufficient high vapour pressure to allow a hazardous build-up of vapour in poorly ventilated areas. The vapour is an irritant to the eyes and lungs, if high concentrations are inhaled it may cause nausea, headache, and depression. The liquid is an irritant to the eyes and skin and may cause dermatitis following prolonged or repeated contact.

When it becomes necessary to carry out work involving the risk of contact with the fuel, particularly for prolonged periods, it is advisable to wear protective clothing including safety goggles, gloves, and aprons. Any work should be carried out in a well ventilated area.

If there is contact with the fuel the following emergency treatment is advised.

Ingestion (swallowing)

Do not induce vomiting. Give the patient milk to drink (if none is available water can be given). The main hazard after swallowing fuel is that some of the liquid may get into the lungs. Send the patient to hospital immediately.

Eyes

Wash with a good supply of clean water for at least 10 minutes.

Skin contact

Immediately drench the affected parts of the skin with water. Remove contaminated clothing and then wash all contaminated skin with soap and water.

Inhalation (breathing in vapour)

Move the patient into the fresh air. Keep the patient warm and at rest. If there is loss of consciousness give artificial respiration. Send the patient to hospital.

Cleanliness

It is extremely important to ensure maximum cleanliness whenever work is carried out on the system.

The main points are.

1. In order to prevent the ingress of dirt, always clean the area around a connection before dismantling a joint.
2. Having disconnected a joint (either fuel or air) always blank off any open connections as soon as possible.
3. Any components that require cleaning should be washed in clean fuel and dried, using compressed air.
4. If it is necessary to use a cloth when working on the system, ensure that it is lint-free.

Fault diagnosis

This fault diagnosis section includes.

a. Component location diagrams.

b. Mechanical components fault diagnosis charts.
c. Ignition system fault diagnosis flow chart.
d. Workshop procedures that provide details of corrective action.

If a fault cannot be clearly defined, it is suggested that the following procedure is carried out before any involved fault diagnosis work is undertaken. It is important that this procedure is adhered to otherwise, an incorrect diagnosis may be made which could result in both lengthy and costly repairs.

1. Check the ignition timing and the ignition system, including the sparking plugs (refer to Workshop procedure 1).
2. Check the carburetter tuning; ensure that it is correctly set and giving the correct CO reading (refer to Workshop procedure 2).

Note
If the carburetter CO reading is incorrect, carry out a compression test on the engine cylinders before adjusting the idle mixture screws.

Engine cylinder compression pressure 9,66 bar (140 lbf/in²) minimum @ cranking speed
Variation between cylinders must not exceed 1,034 bar (15 lbf/in²)

Procedure 1 Ignition timing
Ignition timing - Basic check
This procedure should be adopted when checking the ignition timing (e.g. at a specified service schedule or to confirm that the ignition timing and its associated systems are functioning correctly).

1. Carry out the usual workshop safety precautions and disconnect the battery.
2. Remove the air chest cover and blank off the gated orifice hose (see fig. K11-22).
3. Connect a suitable diagnostic tester (e.g. Sun OST 104) to the engine (see fig. K11-25).

Note
The diagnostic tester gives a read out of both engine speed and ignition timing without the necessity of a stroboscope. If a suitable diagnostic tester is not available a stroboscope can be used, the ignition timing marks are accessible on the crankshaft damper from beneath the engine.

4. Connect the battery and start the engine.
5. Run the engine until normal operating temperature is attained. Ensure that the gear range selector lever is in Park, the parking brake is firmly applied, the gear range isolator removed, the ACU, and non-essential electrical loads switched off.
6. Check that the ignition timing is 17° btdc ± 1° at 2150 ± 50 rev/min (approach from a higher speed). If the reading is outside these limits, slacken the distributor clamp bolt and rotate the distributor to obtain the correct setting. Tighten the clamp bolt.
7. Switch off the engine and remove the test equipment. Connect all hoses, remove the blank and clamp. Fit the air chest cover.

Ignition timing reference data

Engine rev/min	Ignition timing	Remarks
Static	4° ± ½° btdc	1. Basic setting
650 - 700	4° ± ½° btdc	1. Dynamic setting 2. Vacuum hose to distributor capsule disconnected and hose to carburetter blanked (see fig. K11-22) 3. Carburetter throttle jack/damper retracted. Hose clamped (see fig. K11-22)
From 650 - 700 To 1500 - 1700	Ignition timing advances smoothly up to this point	1. No sudden dips in ignition advance
2100 - 2200	17° ± 1° btdc	1a. Approach this speed from a higher rev/min 1b. If the engine is run using low grade fuel [91 RON (min)] the ignition timing can be retarded to 14° btdc. **Do not retard further than 14° btdc**
2100 - 2200	22° ± 2° **further** advance (i.e. 17° + 22° = 39° btdc)	1. Apply a minimum vacuum of 457,2 mm Hg (18.0 in Hg) to the distributor capsule (see fig. K11-23)
1900 - 2100	Ignition timing retards and engine speed drops	1. Tap the induction manifold adjacent to the knock sensor with an aluminium drift (see fig. K11-24)

Ignition timing - Comprehensive check

This procedure should only be carried out when either the ignition timing or associated systems (e.g. centrifugal advance, vacuum advance, or knock sensing system) are suspect, after carrying out the procedures described under Ignition timing - Basic check.

The respective parts of this procedure also apply if new components have been fitted.

Note

Static ignition timing is 4° ± ½° btdc.

1. Carry out the usual workshop safety precautions.
2. Disconnect and blank off the gated orifice hose (see fig. K11-22).
3. Connect a suitable diagnostic tester (e.g. Sun QST 104) to the engine (see fig. K11-25) and set the analyser to the eight cylinder, 0 to 1500 rev/min setting. Ensure that the mode button is set to read rev/min.

The test equipment settings are illustrated in figure K11-25.

4. Connect the battery and start the engine.
5. Run the engine until normal operating temperature is attained. Ensure that the gear range selector lever is in Park, the parking brake is firmly applied, the gear range isolator removed, the ACU, and non-essential electrical loads switched off.

Centrifugal advance mechanism

6. With the engine running, clamp the carburetter throttle jack/damper hose as shown in figure K11-22 (this will ensure that the throttle jack stays retracted when the engine is stopped).
7. Set the idle speed to between 650 rev/min and 700 rev/min and switch off the engine (this will ensure that the centrifugal advance mechanism settles on its stop).
8. Start the engine (with the throttle jack retracted) and allow the speed of the engine to increase to between the 650 rev/min and 700 rev/min setting (do not exceed 700 rev/min).
9. Switch the test equipment to the ignition timing mode and observe the reading which should be 4° ± ½° btdc. If the reading is outside these limits, slacken the distributor clamp bolt and rotate the distributor to obtain the correct setting. Tighten the clamp bolt.
10. Gradually increase the speed of the engine until the ignition timing stops advancing. Ensure that the ignition timing advances smoothly through the range without any sudden dips.

Change the operating mode of the test equipment to read 0 to 7500 rev/min and note that the engine speed at which the ignition timing stopped advancing is between 1500 rev/min and 1700 rev/min.

Do not exceed 2500 rev/min during this operation.

Note

If there is a sudden loss of ignition advance above 1000 rev/min a fault is indicated in either the knock sensing or diagnostic circuitry.

The fault should be rectified before the test continues, otherwise damage to the engine could result.

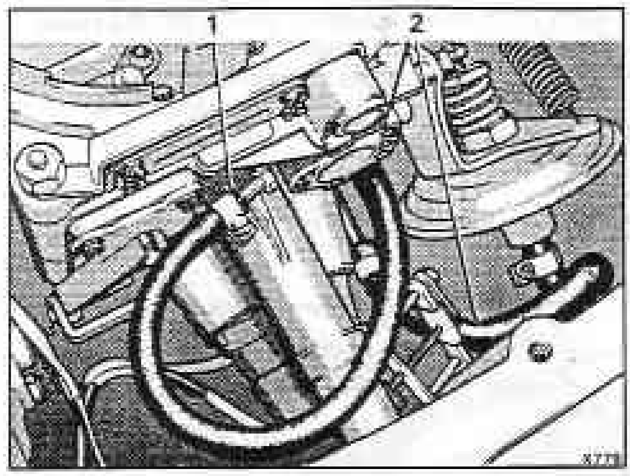


Fig. K11-22 Hoses clamped and blanked for dynamic ignition timing

1 Vacuum hose to distributor connection blanked

2 Throttle jack/damper hose clamped

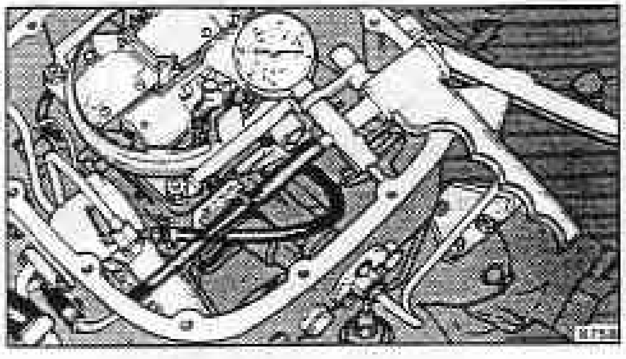


Fig. K11-23 Applying a vacuum to the distributor capsule

11. Increase the engine speed to 2500 rev/min and then reduce it to between 2100 rev/min and 2200 rev/min.

Note

Always approach this setting from a higher speed.

12. Switch the test equipment to the ignition timing mode and check that the ignition timing is 17° btdc ± 1° btdc.

If the ignition timing is outside the limits the fault should be rectified before proceeding.

13. Allow the engine to return to the idle speed setting.

Vacuum advance system

14. From inside the air chest, disconnect the vacuum hose to the distributor capsule. Fit a blank to the open end of the hose to the carburetter and connect a suitable vacuum pump (i.e. Mityvac) to the capsule. This operation is shown in figures K11-22 and K11-23.
15. Repeat Operation 11.

16. Apply a minimum vacuum of 457.2 mm Hg (18.0 in Hg) to the capsule. The ignition timing should advance progressively as the vacuum is applied (the speed of the engine will also increase) and reach a maximum of between 20° to 24° greater than the ignition advance obtained in Operation 12.

Example

If the ignition timing obtained in Operation 12 (centrifugal advance only) is 17° btdc at 2200 rev/min, then the timing should advance to between 37° btdc and 41° btdc when the vacuum is applied.

If the timing is outside the limits the fault should be rectified before proceeding.

17. Release the vacuum and allow the engine to run at the idle speed setting for between 1 and 2 minutes.

18. Switch off the engine and disconnect the vacuum pump.

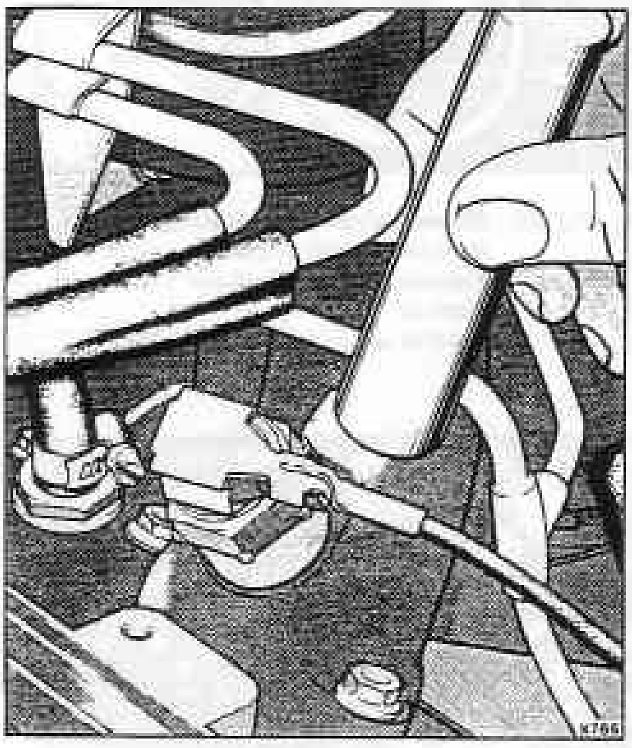


Fig. K11-24 Tapping the induction manifold adjacent to the knock sensor

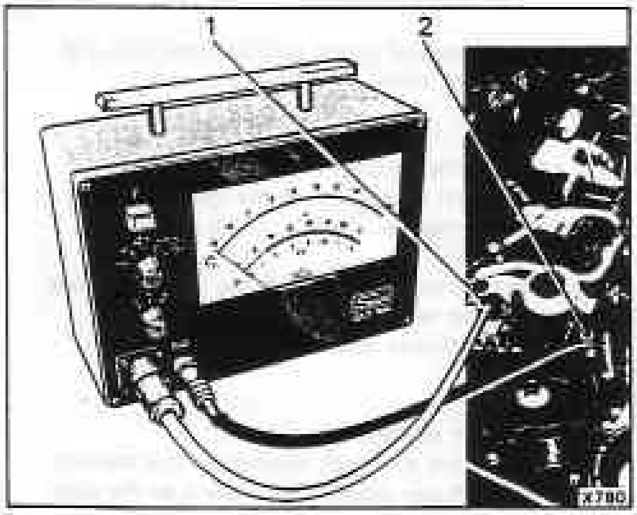


Fig. K11-25 Diagnostic tester connected to the engine

1 Lead to diagnostic socket
2 'Clip-on' lead to sparking plug cable

Knock sensor system

19. Start and run the engine at between 650 rev/min and 700 rev/min. Check the ignition timing as described in Operations 7 to 9 inclusive.

20. Release the clamp from the throttle jack/damper hose and set the engine idle speed.

21. Start and run the engine at between 1900 rev/min and 2100 rev/min and wedge the throttle in this position.

22. Ensure that the test equipment is in the ignition timing mode and repeatedly tap the induction manifold adjacent to the knock sensor boss with an aluminium drift (see fig. K11-24). **Do not strike the knock sensor.**

23. If the knock sensor system is functioning correctly, the engine speed should drop noticeably and the ignition timing should be seen to retard. Once the tapping noise is stopped, the timing should advance and the engine speed increase to their original settings.

If there is no decrease in engine speed and ignition advance, then the operation of the knock sensing system is suspect and the fault should be rectified before proceeding.

24. Remove the wedge from the throttle and allow the engine to run at the idle speed setting for between 1 and 2 minutes.

25. Switch off the engine, remove the blank from the vacuum hose and connect the hose to the distributor capsule connection. Ensure that the hose clips are tight.

26. Visually inspect the components within the air chest and fit the cover.

27. Remove the test equipment and fit the cover to the diagnostic test point on the engine.

Procedure 2 Checking the idle mixture strength

Basic carburetter settings	
Idle Co	0.1% to 0.3%
Idle speed	650 rev/min ± 20 rev/min
Fast-idle speed	1600 rev/min ± 50 rev/min
Throttle jack setting	1600 rev/min ± 50 rev/min

If an exhaust extraction system is used when the engine is operated (e.g. in a workshop) the turbocharger oil seal arrangement may temporarily leak. The leak may continue for sometime after the extraction equipment has been removed; this condition is normal but it may affect the CO reading. Therefore, do not attempt to either check or set the idle CO if extraction equipment has been recently used on the exhaust tail pipe.

1. Ensure that the air conditioning system is switched off.
2. Remove the air chest cover.
3. Connect a suitable CO testmeter into the exhaust tailpipe in accordance with the manufacturer's instructions. Also connect a suitable tachometer (i.e. Sun QST 104) to the diagnostic socket.
4. Run the engine until normal operating temperature is attained, hold the throttle at a fast idle speed for 10 seconds and then allow the engine to return to the idle speed setting.
5. Note the stabilized tailpipe CO reading after at least 1 minute at idle, also note the stabilized engine idle speed.
6. If the engine idle speed is outside the range 630 rev/min to 670 rev/min remove the gated orifice hose (see fig. K11-26) and connect up a vacuum gauge to the hose.
7. Re-adjust the throttle stop screw to give an engine idle speed of between 630 rev/min and 670 rev/min and note that the vacuum gauge reading is in the range of 25,4 mm Hg and 76,2 mm Hg (1 in Hg and 3 in Hg). Also, ensure that when the throttles are opened the vacuum rises rapidly to above 406,4 mm Hg (16 in Hg).
8. If the engine idle speed and/or the gated orifice signal are still outside the specified limits, the most likely cause is one of the following.

a. Idle fuel jets blocked.
b. Idle air correction jets blocked.
c. Anti run-on solenoid valves faulty or not energized.
d. Anti run-on solenoids blocked.
e. Blocked gated orifice signal hose or carburetter drilling.
f. Idle mixture screws incorrectly set.

9. If the idle CO is outside the specified limits and the setting of the ignition system (refer to Workshop procedure 1), sparking plugs, and compression pressures are all satisfactory, then the idle mixture strength should be adjusted (refer to Workshop procedure 3).

Procedure 3 Setting the idle mixture strength

CO Reading	Adjustment required
0.0 - 0.1%	Richen ¼ turn anti-clockwise - both screws
0.1 - 0.3%	Do not adjust
0.3 - 0.5%	Lean off ⅛ turn clockwise - both screws
0.5 - 1.0%	Lean off ¼ turn clockwise - both screws
1% +	Lean off ½ turn clockwise - both screws

In order to achieve a satisfactory idle quality at low CO levels the idle mixture circuits of the carburetter must be accurately balanced before the idle CO levels are set.

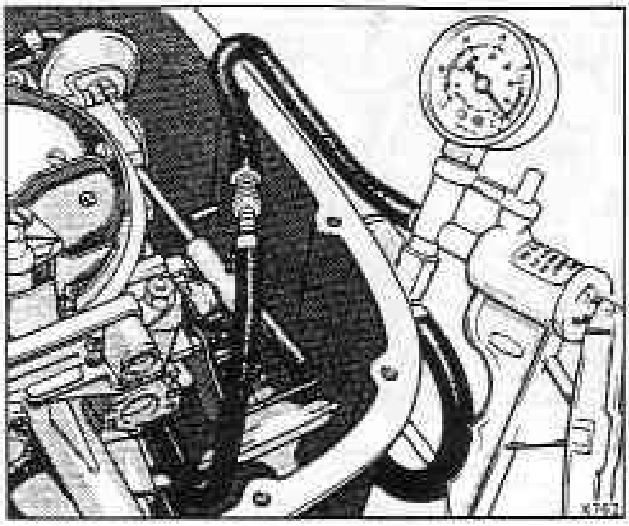


Fig. K11-26 Vacuum gauge connected into the gated orifice signal hose

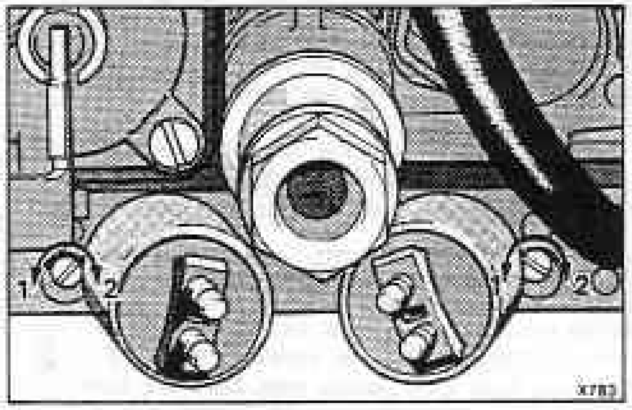


Fig. K11-27 Carburetter idle mixture adjusting screws
1 Turn screw anti-clockwise to richen the mixture
2 Turn screw clockwise to weaken the mixture

This balance is pre-set during manufacture and providing each idle mixture screw is turned by equal amounts either in or out, balancing should not normally be necessary.

If it is suspected that the idle balance has been disturbed Workshop procedure 4 must be carried out before the idle CO is adjusted as follows.

1. Remove the idle screw tamperproof caps. This can be achieved using a pointed tool such as a ground down screwdriver. Puncture the tamperproof caps and then prise them from the idle screw holes.
2. Adjust each idle screw (see fig. K11-27) by **equal amounts** (to maintain the correct air balance) using a screwdriver with a blade width of less than 5 mm (0.20 in). Turn the adjusting screws clockwise to weaken the mixture and reduce the CO level.

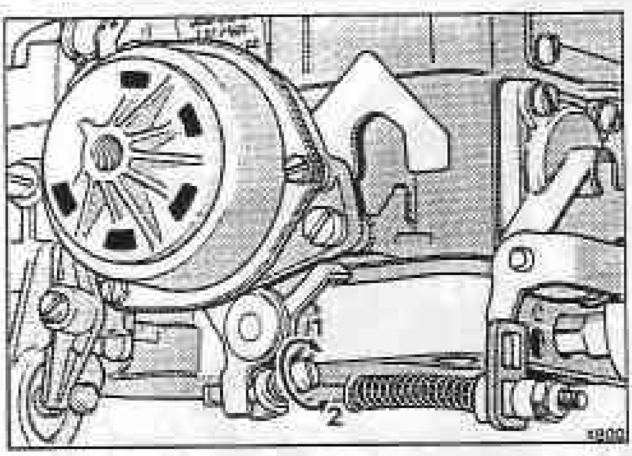


Fig. K11-28 **Fast-idle adjustment**
1 Turn screw clockwise to increase speed
2 Turn screw anti-clockwise to reduce speed

Note
Access to the idle screws can be gained either using a long screwdriver through the holes in the front of the air chest (after first removing the two blanking plugs) or by using a screwdriver of less than 86 mm (3.375 in) in length from inside the air chest.

3. Determine the idle mixture screw adjustment to give an idle CO setting of between 0.1% to 0.3% using the table at the beginning of this procedure.

Procedure 4 Balancing the idle mixture screws

1. If it is suspected that the idle balance is incorrect each idle adjusting screw must be screwed fully in (clockwise). **Do not force the screw as this will deform the light alloy needle seat.** Each idle screw must then be turned three complete turns out (anti-clockwise). This will give a good basis for correct balancing.
2. Start and run the engine until normal operating temperature is attained and set the idle speed to 650 rev/min ± 20 rev/min.
3. Blank off each idle air correction jet in turn and note the speed rise/fall which results in each case. A piston needle from an SU carburetter makes an ideal tool for blanking off each jet.

Note
Balance the idle circuits so that both give a small (25 rev/min to 50 rev/min) but equal speed rise when they are blanked in turn.

4. Determine the idle mixture screw adjustment for each circuit using the reference data table.
5. Start with the idle circuit judged to be furthest away from optimum (25 rev/min to 50 rev/min) and adjust the relevant idle screw in line with the recommendations given in the data table.
6. To purge the system open the throttles to give a fast idle speed for approximately 10 seconds, then return the throttle linkage to the idle stop and note the speed.
7. Blank off the other air correction jet and note the speed change.
8. Adjust the mixture screw in accordance with the recommendations given in the data table.
9. Repeat this process alternating between the circuits until both idle circuits produce an equal speed rise of between 25 rev/min and 50 rev/min.

When this has been achieved the idle CO measurements can be carried out as detailed in Workshop procedure 2.

When carrying out this work always ensure that the idle mixture screws are turned by equal amounts to ensure that the balance is not disturbed.

Procedure 5 Setting the automatic cold start fast-idle mechanism

The cold start fast-idle setting of the carburetter is determined by a cam ratchet arrangement which holds the throttle off the idle stop during the warm-up period. The fast-idle setting can be adjusted through an adjustment screw linking the ratchet to the primary throttle spindle (see fig. K11-28). The setting procedure is as follows.

1. With the engine stopped and at its normal operating temperature open the throttles and raise the fast-idle cam counterweight to its full travel.
2. Start the engine and allow the speed to stabilize for 30 seconds.
3. Adjust the fast-idle screw (see fig. K11-28) to give a fast-idle speed of 1600 rev/min ± 50 rev/min. Allow at least 30 seconds for the speed to stabilize.
4. Open the throttles and release the fast-idle mechanism.

Procedure 6 Throttle jack/damper setting

The throttle jack/damper has two functions. Firstly, it holds the throttle open during cranking; this assists the engine to start quickly. Secondly, it momentarily holds the throttles open during overrun, thus improving cylinder combustion and reducing emission levels.

Idle mixture screw reference data

Speed change rev/min	Mixture strength	Mixture screw adjustment required
100 + Rise	Lean	Richen each screw ¼ turn anti-clockwise
50 - 100 Rise	Slightly lean	Richen each screw ⅛ turn anti-clockwise
25 - 50 Rise	Correct	Do not adjust
0 - 25 Rise	Slightly rich	Lean off each screw ⅛ turn clockwise
Fall	Rich	Lean off each screw ¼ turn clockwise

The throttle jack/damper setting is varied by moving the adjusting screw relative to the throttle lever (see fig. K11-29).

The setting procedure is as follows.

1. With the engine stopped but at its normal operating temperature, clamp the throttle jack/damper hose using the clamp shown in figure K11-29. This will prevent actuation of the throttle jack on start up.
2. Disconnect the air chest throttle control rod and throttle return spring.
3. Start the engine and with the throttle lever in contact with the throttle jack/damper screw, the engine speed should be between 1550 rev/min and 1650 rev/min.
4. If the throttle jack/damper setting is outside these limits, slacken the setting screw lock-nut (see fig. K11-29) and adjust the screw to give an engine speed of 1600 rev/min ± 50 rev/min. Allow the speed to stabilize for 30 seconds before tightening the lock-nut.
5. After tightening the lock-nut again check the engine speed.
6. Remove the clamp (see fig. K11-29) from the throttle jack/damper signal hose, this will allow the throttle jack/damper to retract. Measure the gap between the adjusting screw and the throttle lever with the engine idling at 650 rev/min.
7. Set the gap between the adjusting screw and the throttle lever by means of the large nut (see fig. K11-29) to between 0,13 mm and 0,25 mm (0.005 in and 0.010 in).

   To reduce the gap turn the nut clockwise (viewed from the end of the adjusting screw). To increase the gap turn the nut anti-clockwise.
8. Stop the engine and re-clamp the throttle jack/damper signal hose to prevent the throttle jack/damper retracting.
9. Again check the engine speed and if necessary adjust. Release the clamp and check the throttle lever to adjusting screw clearance.
10. Fit the throttle return spring and reconnect the throttle control rod. When tightening the throttle control rod lock-nut do not over-tighten the nut against the throttle arm ball joint.
11. Check that the movement of the throttle linkage is not restricted.

Procedure 7 Setting the variable choke pulldown device

The purpose of the variable choke pulldown device is to give improved cold starting over a wide range of ambient temperatures.

To achieve this, the pulldown device varies the gap between the edge of the primary strangler flap and the carburetter cover (see fig. K11-30).

If ambient temperatures are low then improved starting will occur if the pulldown gap is small. This ensures that maximum depression occurs inside each venturi, therefore increasing fuel flow to the engine.

If the ambient temperatures are high, then the requirement is for less fuel flow. Therefore, the depression in each venturi must be lower to reduce

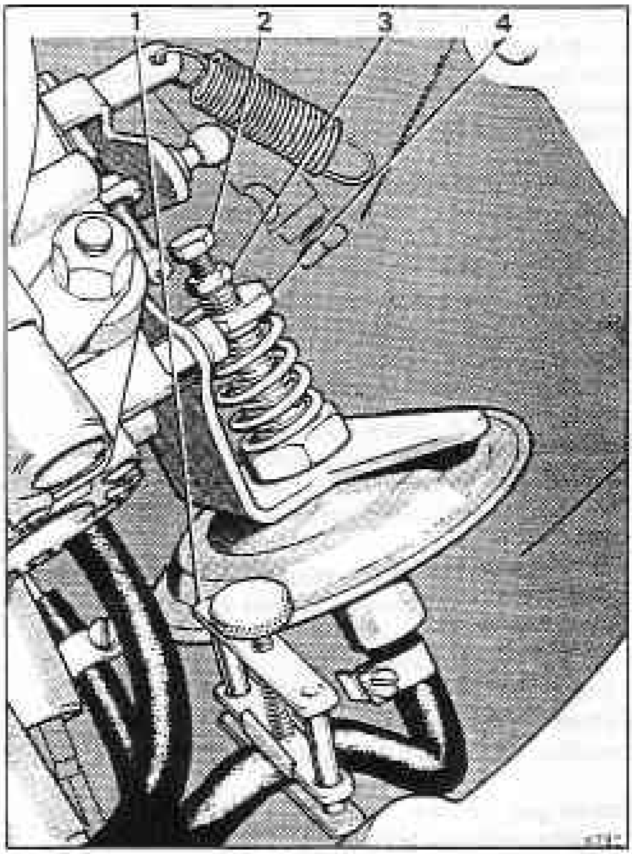


Fig. K11-29 Setting the throttle jack/damper
1 Throttle jack/damper hose clamped
2 Adjustment screw
3 Adjustment screw lock-nut
4 Large nut

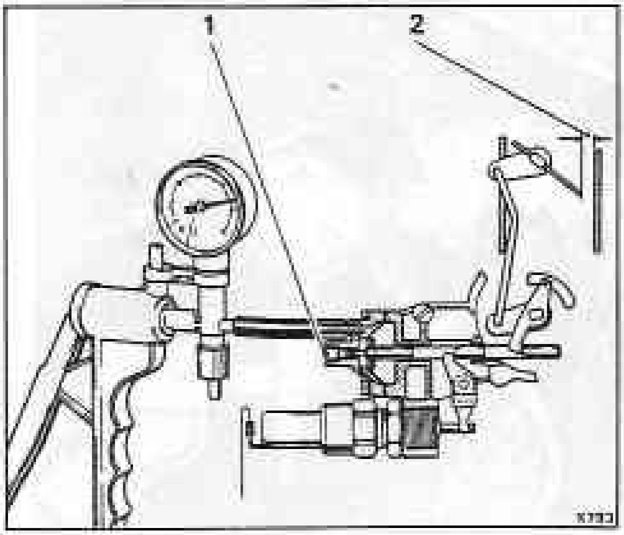


Fig. K11-30 Automatic choke pulldown setting
1 Adjustment screw
2 6 mm ± 0,5 mm (0.236 in ± 0.020 in)

the fuel flow. To achieve a lower depression, hence lower fuel flow the pulldown gap must be made larger.

The variable choke pulldown device consists of an electrically heated 'waxstat' capsule mounted beneath the choke pulldown device diaphragm housing (see fig. K11-30).

If both the engine and the ambient temperatures are low, the wax in the variable pulldown device will contract and pull the operating plunger inwards (see fig. K11-30). This will turn the operating lever clockwise to a set position thus preventing the pulldown rod from opening the strangler flap too far (i.e. smaller pulldown gap).

If both the engine and ambient temperatures are high the wax in the variable pulldown device will expand and push the operating plunger outwards. This will turn the operating lever anti-clockwise allowing the pulldown rod to come into contact with the diaphragm adjustment stop.

The variable pulldown device 'waxstat' is pre-set under controlled environmental conditions during manufacture and should not be tampered with under any circumstances.

The pulldown gap can be checked and set but only when the carburetter has stabilized at a temperature above 20°C for at least 8 hours.

Pulldown gap - To set

1. In order to check and set the carburetter strangler flap pulldown gap it is essential that the car is allowed to stand for a **minimum of 8 hours in a stabilized ambient temperature of at least 20°C.**
2. Remove the air chest lid and disconnect the vacuum hose to the choke pulldown device (see fig. K11-30). Connect a vacuum pump to the pulldown device and depress the throttle so as to engage full fast-idle.

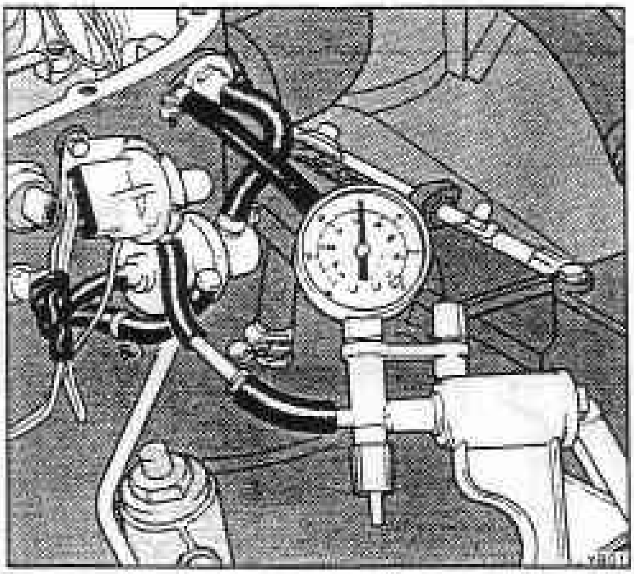


Fig. K11-31 Checking the dump valve and control system

3. Apply a depression to the choke pulldown device of at least 457 mm Hg (18 in Hg).
4. Gently depress the strangler flap downwards to take up any free play until a resistance is felt against the choke bi-metal.
5. Measure the gap between the edge of the strangler flap and the carburetter cover (see fig. K11-30). This should be 6 mm ± 0,5 mm (0.236 in ± 0.020 in).
6. If the gap is incorrect, adjust the diaphragm stop screw (see fig. K11-30) either outwards to increase the gap or inwards to decrease the gap.
7. Release the vacuum and remove the equipment. Fit the manifold vacuum hose and tighten the clip.

Procedure 8 Checking the dump valve and control system

To allow the engine to run in a normally aspirated condition at light throttle and low speed conditions, and also during the high speed overrun period when boost pressures would rise to an unacceptable level, a dump valve opens and allows boost pressure to be relieved from the air chest via the dump valve to the intake side of the turbocharger.

The operation of the dump valve and control system can be checked using the following procedure.

1. Disconnect and blank the vacuum hose to the dump valve switch situated at the rear of the air chest (see fig. K11-31).
2. Connect a vacuum pump (i.e. Mityvac) to the dump valve switch.
3. Start the engine. The dump valve should remain in the closed position and can be checked visually.
4. Operate the vacuum pump until the dump valve rapidly opens. This should occur at between 317,5 mm Hg and 381,0 mm Hg (12.5 in Hg and 15 in Hg).

   With the vacuum above 381,0 mm Hg (15 in Hg) the dump valve should remain fully open.
5. If the dump valve does not open, the possible cause could be one of the following.
   a. Vacuum switch is faulty, wired incorrectly, or set out of limit.
   b. The vacuum pipe from the air chest to the dump valve is leaking or blocked.
   c. Solenoid valve sticking in the energized condition.
   d. Dump valve sticking.
   e. Dump valve diaphragm leaking.
6. If the dump valve opens normally, reduce the depression applied to the vacuum switch until the vacuum falls to 317,5 mm Hg (12.5 in Hg). The dump valve should snap closed.
7. If the dump valve does not snap closed then the possible cause could be as follows.
   a. Vacuum switch is faulty, wired incorrectly, or set out of limit.
   b. Solenoid valve sticking in the unenergized condition.
   c. Solenoid valve wired incorrectly.
   d. Vacuum pipe between solenoid valve and dump valve is partially blocked.

8. If the dump valve operates correctly during both these checks remove the test equipment, connect the vacuum hose to the vacuum switch, and check the operation of the dump valve system by 'blipping' the throttles with the engine running. The dump valve should snap closed as the throttles are snapped open and then open as the throttles are closed.

Procedure 9 Checking the boost enrichment system

The turbocharger control system includes a boost enrichment system device. This ensures that the correct air/fuel ratio is maintained during boost conditions. It also acts as an economy device during part throttle running, when the engine is working in a normally aspirated condition.

The system is checked as follows.

1. Disconnect and blank the switch pressure signal hose. Connect a pressurized air supply and a 0 to 0,34 bar (0 to 5 lbf/in²) gauge to the boost enrichment pressure tapping either inside the air chest (see fig. K11-32) or directly to the boost enrichment switch mounted on the left-hand side of the air chest.

2. Start and run the engine at the idle speed setting. Increase the air pressure to within the range 0,052 bar to 0,86 bar (0.75 lbf/in² to 1.25 lbf/in²). At some point within this range the boost enrichment device will rise rapidly from the full lean (down position) to the full rich (up position), as shown in figure K11-16.

Note

It is quite normal for the idle to appear 'lumpy' with the boost enrichment device operating in the full rich position.

To enable a quick functional check to be made of this system when pressurized air supply is not available, attach a clean hose to the boost enrichment switch and gently blow down the hose to activate the switch and solenoid.

3. If the boost enrichment device does not rise rapidly to the full rich postion when the switch is activated by the air pressure, the cause could be as follows.

a. The boost enrichment solenoid valve is wired incorrectly.
b. The pressure switch is wired incorrectly, faulty, or set out of limits.
c. The solenoid valve sticking closed.
d. The pressure switch signal line is blocked.
e. The solenoid valve signal line is blocked.
f. The economy device is sticking.

4. Remove the air pressure source and note that the boost enrichment device returns to the full lean (down position).

5. If the economy device does not return to the full lean position the possible cause could be one of the following.

a. The pressure switch is wired incorrectly, faulty, or set out of limits.
b. The solenoid valve sticking open.
c. The boost enrichment device signal line is leaking.
d. The economy device is sticking.

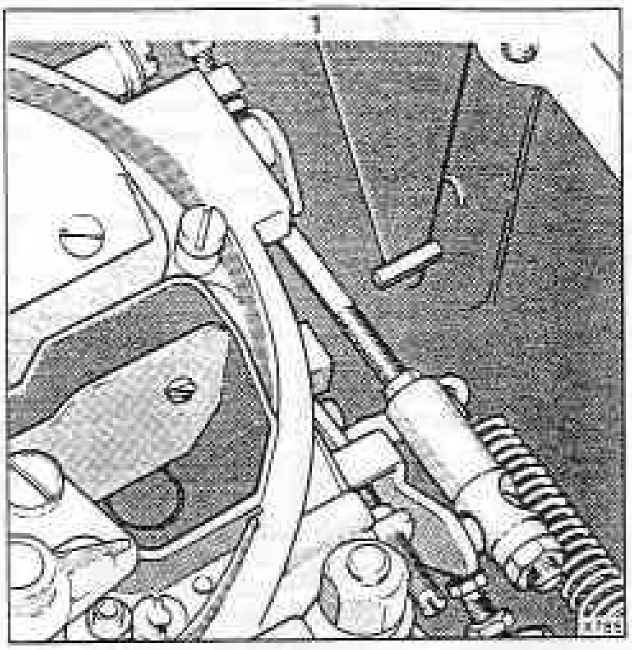


Fig. K11-32 Checking the boost enrichment system
1 Air chest pressure tapping

Procedure 10 Checking the boost limit and wastegate system

The purpose of the wastegate is to control the boost pressure by regulating the flow of exhaust gas to the turbocharger turbine.

This controls the energy for compressing the inlet air. This function is called boost pressure control.

In addition, the wastegate is also used to control the maximum speed of the engine by reducing to an absolute minimum the flow of exhaust gas to the turbocharger turbine. This effectively cuts off the boost pressure at maximum speed and is called 'Boost limit control'.

A system to prevent excessive torque being developed with the car stationery and in Drive, is a boost inhibit system.

Should the brake pedal be depressed and the throttles opened the vacuum pump will engage and the boost limit solenoid will operate. This will open the wastegate valve fully and therefore prevent boost pressure building up in the air chest.

The following details will enable the complete boost limit control system to be checked.

1. Remove the driver's side knee roll (see Chapter S).

2. Locate the speed control unit and disconnect the speed control electrical socket (see fig. K11-33).

3. Connect the boost limit control test box RH 9757 to the loom socket. Ensure that the red cable from the test box connects to a 12 volt feed (see fig. K11-33).

Important

Always ensure that the battery is in a fully charged condition when carrying out this check.

4. Switch on the ignition and depress the test box 'on' switch. Switch to the CAL position and calibrate the meter. Switch to the RUN position and increase the test box frequency by rotating the control knob until the indicated speed on the meter shows between 160 km/h and 200 km/h (100 mile/h and 125 mile/h). Between these figures the vacuum pump should be heard to operate under the rear of the right-hand front wing.

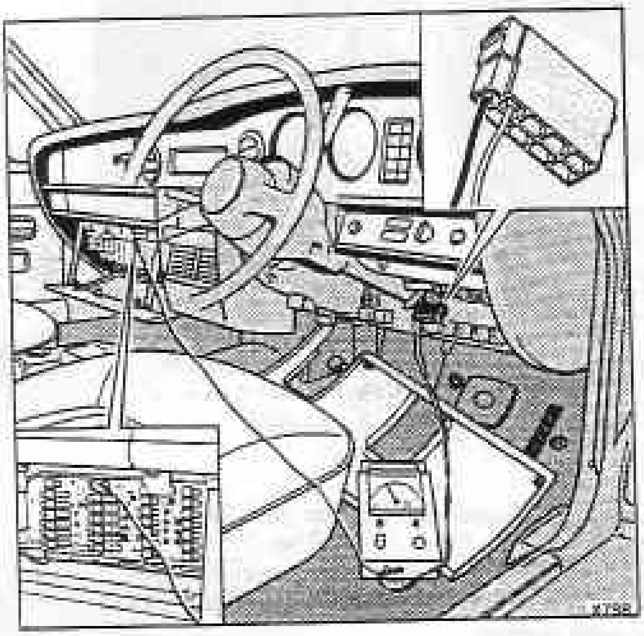


Fig. K11-33 Test box RH9757 in position

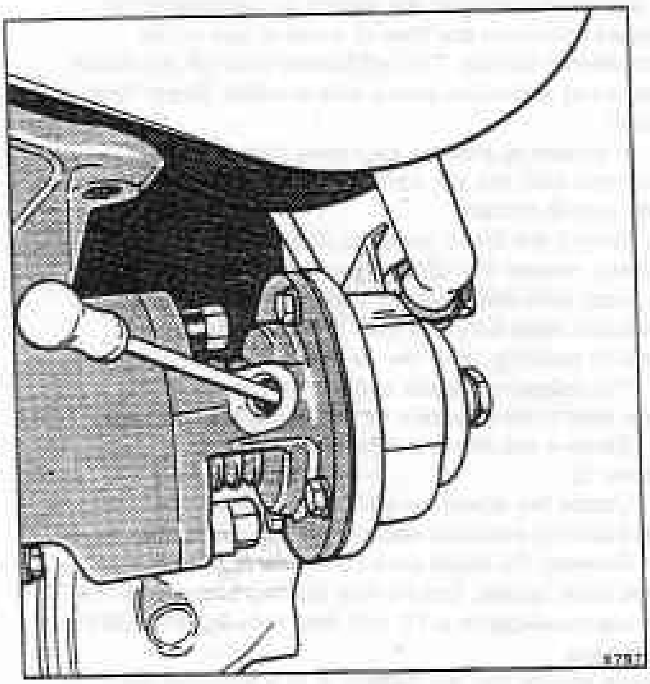


Fig. K11-34 Checking the movement of the wastegate diaphragm

Note
When operating the boost limit control test meter RH 9757 the speedometer will also operate. A discrepancy in readings between the test meter and the speedometer will occur. Only readings observed on the test meter should be noted.

5. Increase the indicated speed by rotating the control knob until the speed on the test meter reads 217 km/h (135 mile/h). At this speed the boost limit solenoid should operate. This can be determined by carefully listening for the solenoid to 'click'. When this occurs the wastegate should open fully and the vacuum pump should continue to run.

6. To ensure that the wastegate has fully opened, remove the boost pressure pipe (see fig. K11-34) to the wastegate and carefully insert a small screwdriver or a piece of rigid wire into the wastegate pressure tapping hole. Immediately the boost solenoid operates, the diaphragm/piston assembly should move fully forward as the vacuum source is applied.

7. Remove the screwdriver or stiff wire and reduce the speed indicated on the test meter to approximately 160 km/h (100 mile/h). Ensure that the boost limit solenoid operates, the wastegate closes, and the vacuum pump ceases operation.

8. Reduce the speed indicated on the test meter to zero. Switch off the test meter and the ignition. Disconnect the test meter. Connect the speed control socket and replace the knee roll.

9. Fit the boost pressure pipe to the wastegate.

Procedure 10a Checking the boost inhibit system

1. Remove the starter relay and disconnect the boost pressure pipe at the wastegate.

2. Open the throttles which will allow the throttle lever cam to release the micro-switch operating roller. Hold the throttles in this position.

3. Depress the brake pedal to operate the brake switch. Hold the brake pedal in this position.

4. Turn and hold the ignition key in the START position.

5a. Ensure that the boost limit solenoid operates by carefully listening for the solenoid to 'click'.

b. That the vacuum pump operates (this can be heard to operate from under the rear of the right-hand front wing).

c. That the wastegate opens fully. This can be checked using a small screwdriver or a piece of stiff wire positioned in the pressure tapping hole. Immediately the boost limit solenoid operates the diaphragm/piston assembly of the wastegate should move fully forward.

6. Release the brake pedal; check that the vacuum pump ceases operation and both the boost limit solenoid and wastegate return to their closed positions.

7. Depress the brake pedal to re-activate the vacuum pump, boost limit solenoid, and wastegate.

8. Release the throttle. The cam on the throttle linkage should now operate the micro-switch, thus de-activating the vacuum pump, boost limit solenoid, and wastegate.

9. Release the brake pedal and ignition key.
10. Switch off the ignition and fit the starter relay.
11. Replace the boost pressure pipe to the wastegate.
12. Start the engine and ensure that the throttle cam operates the micro-switch.

Note

This operation can only be carried out with the engine running so that the throttle jack/damper is fully retracted. Therefore, the throttles should be resting on the throttle stop screw.

Procedure 11 Checking the fuel pressure

The fuel pressure is such that when the engine is running in a naturally aspirated condition at idle or light throttle, the requirement is for a nominal 0,275 bar (4 lbf/in²) fuel feed pressure. However, during conditions when boost pressure is being applied inside the air chest it is necessary to increase this nominal fuel pressure in proportion to the increase in boost pressure.

This always ensures the fuel pressure is 0,275 bar (4 lbf/in²) in a naturally aspirated condition and 0,275 bar (4 lbf/in²) above the boost pressure during a turbocharged condition.

Boost pressure	Fuel pressure
0 bar (0 lbf/in²)	= 0,275 bar (4 lbf/in²)
0,207 bar (3 lbf/in²)	= 0,482 bar (7 lbf/in²)
0,334 bar (5 lbf/in²)	= 0,620 bar (9 lbf/in²)
0,482 bar (7 lbf/in²)	= 0,785 bar (11 lbf/in²)

The fuel pressure is checked as follows.

1. Unscrew the blanking plug and connect an **accurate** 0 bar to 1,03 bar (0 lbf/in² to 15 lbf/in²) pressure gauge to the fuel pressure tapping point (see fig. K11-35).
2. Fit a tachometer to the engine in accordance with the manufacturer's instructions.
3. Start and run the engine at 1000 rev/min.
4. Check that the reading on the gauge is between 0,259 bar and 0,275 bar (3.75 lbf/in² and 4 lbf/in²).

Procedure 12 Setting the fuel pressure regulator

1. **If the fuel pressure is outside the limits described in Operation 4, Procedure 11, ensure that before any adjustment is made to the fuel pressure regulator the following items are checked.**

a. The filters and supply lines are checked for blockage.

b. The fuel return line to the tank is not blocked or restricted in any way. The pressure in this line is a reference pressure for the correct operation of the pressure regulator.

c. The fuel pump is performing satisfactory.

d. There is no leakage or blockage in the boost signal pipe to the bottom of the pressure regulator.

2. **When all the items in Operation 1 are satisfactory the fuel pressure regulator can be adjusted.** This adjustment should be carried out as follows.

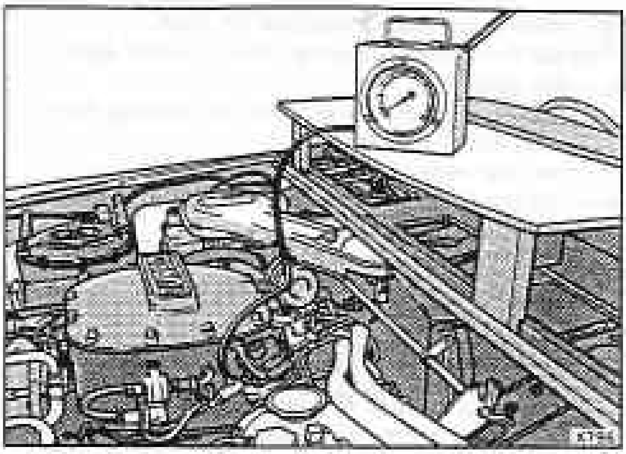


Fig. K11-35 Testing the fuel pressure

3. Remove the tamperproof cap from the top of the fuel pressure regulator, start and run the engine at 1000 rev/min.
4. Release the regulator adjusting screw lock-nuts (see fig. K11-35).
5. Turn the regulator screw anti-clockwise until the reading on the gauge reaches a minimum value. This should be no higher than 0,138 bar (2 lbf/in²). If the minimum pressure is above this figure check for a restriction in the return line to the fuel tank and rectify as necessary.
6. Turn the regulator screw clockwise until the fuel pressure reading is between 0,259 bar and 0,275 bar (3.75 lbf/in² and 4.0 lbf/in²). Tighten the lock-nut and check the setting. Fit the tamperproof cap.

If all the items in Operation 1 have been checked and difficulty is still experienced in adjusting these settings a faulty fuel pressure regulator is the probable cause.

7. Stop the engine, remove the test equipment, and fit the blanking cap to the fuel pressure tapping.

Removal and fitting of components

When removing any parts always blank off the open connections immediately, to prevent the ingress of dirt.

Air intake (see figs. K11-5 and K11-36)

A pick-up situated under the right-hand front bumper directs the intake air along a flexible ducting into the centre of the paper filter. The air is filtered as it is drawn through the element and then directed into the turbocharger via another length of flexible ducting.

The replacement of any components in the air intake is straight forward and reference should be made to figure K11-36. The filter element should be changed at the recommended service intervals as follows.

Air filter element - To remove (see figs. K11-36 and K11-37)

1. Carry out the usual workshop safety precautions.
2. Unscrew the worm drive clip securing the turbocharger intake hose to the air cleaner; free the

joint by twisting the hose. Withdraw the hose.
3. Release the two clips situated one on either side of the intake elbow.
4. Carefully free the joint and move the housing from the vicinity of the air cleaner.
5. Release the three clips located around the periphery of the filter housing. These clips are situated adjacent to the wing valance.
6. Carefully free the clips and withdraw the housing to expose the filter element.
7. Withdraw the element.

Air filter element - To fit

1. Ensure that the inside of the air cleaner housing (both the section removed and the fixed section in the wing valance) is clean.
2. Inspect the two rubber seals (see fig. K11-36), ensuring that they are in good condition.

   The seals are located at either end of the detachable part of the air cleaner housing. The seals should be secured in position with Bostik 1261 adhesive or its equivalent.
3. Ensure that the five securing clips operate smoothly. Free any clips that are difficult to operate.
4. Ensure that the tapered filter element is the correct part and the plastic end fittings are secure.
5. Fit the element over the spigot in the detached portion of the air cleaner housing.
6. Fit the air cleaner housing to the wing valance. The tapered end of the filter should fit into the wing valance.
7. Ensure that the housing clips are positioned centrally over the lugs of the valance retaining ring.
8. Fasten the two upper clips, and then passing one hand downwards between the front of the housing and the rear of the headlamp assembly, locate and fasten the third clip.
9. Offer the intake elbow into position. Ensure that the rubber seal is still in good condition and secure.
10. Fit the intake elbow into the end of the air cleaner assembly, ensuring that it fits between the two clip fastening lugs on the air cleaner housing.
11. Fasten the clips.
12. Fit the convoluted hose from the turbocharger

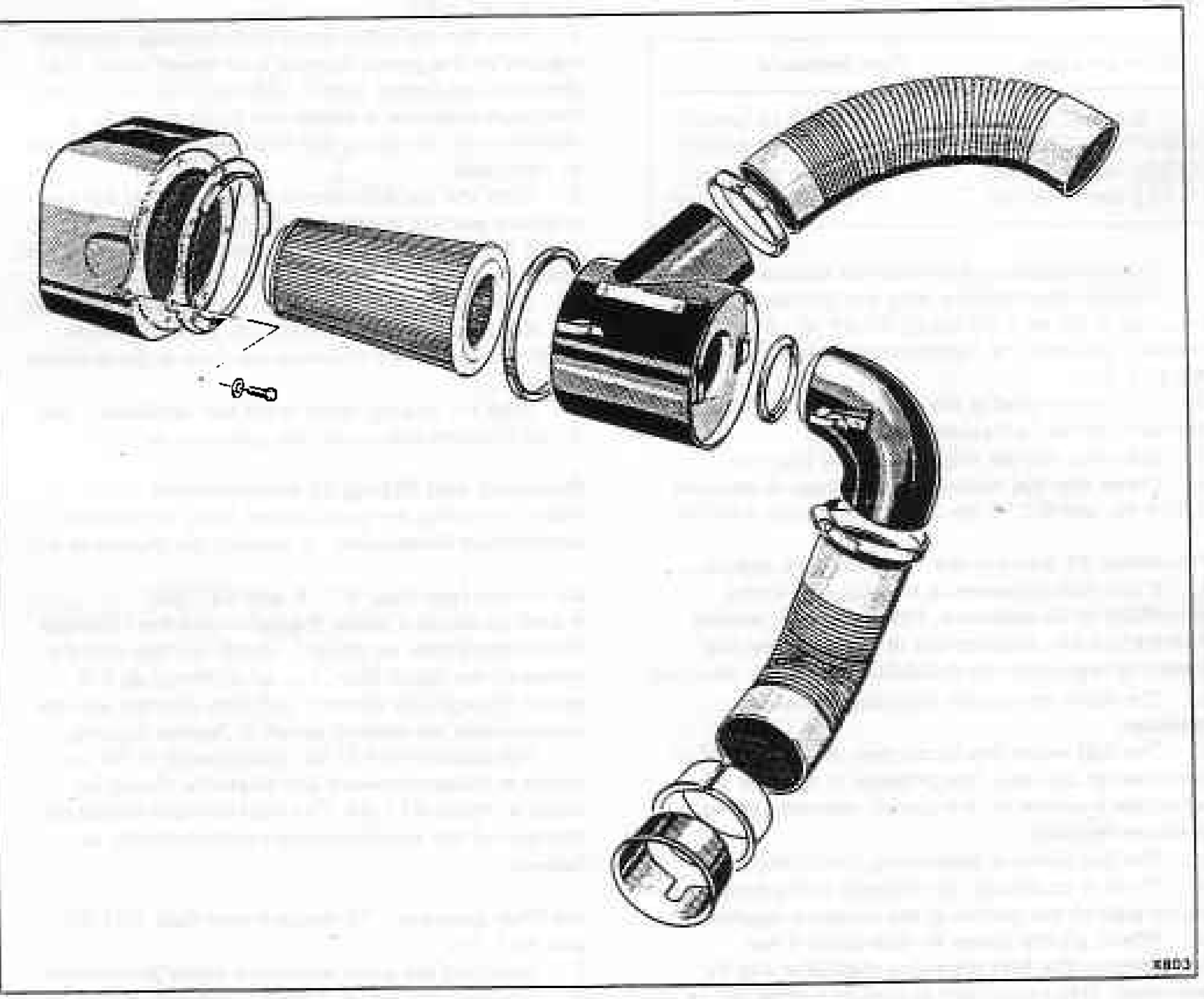


Fig. K11-36 Air intake system

assembly to the air cleaner housing and tighten the worm drive clip.
13. Connect the battery, start the engine and inspect the system for air leaks etc.

Turbocharger assembly - To remove and fit (see fig. K11-37)

1. Carry out the usual workshop safety precautions.
2. Slacken the worm drive clip securing the air intake hose to the turbocharger intake assembly. Free the joint by twisting the hose.
3. Slacken the worm drive clips situated at the flexible section of both the air feed and air dump pipes. Free the joints by twisting each rubber hose.

   A heatshield is attached to the front clip beneath the intake pipe.
4. Unscrew the nut retaining the intake assembly to the turbocharger; collect the washer and withdraw the intake assembly.
5. Unscrew the banjo bolt from the pressure tapping on the end of the turbocharger compressor casing. Free the joint and collect the aluminium sealing washer from either side of the pipe joint faces.
6. Unscrew the two setscrews retaining the large heatshield to the top of the turbocharger assembly.
7. Unscrew the nut and collect the washer from the lower timing cover stud that retains the large heatshield lower mounting bracket. Withdraw the heatshield.
8. Unscrew the two setscrews securing the oil feed pipe flange to the top of the turbocharger. Free the joint and discard the gasket.
9. Repeat Operation 8 on the oil return pipe flange attached to the bottom of the turbocharger. Free the joint and discard the gasket.
10. Unscrew the exhaust clamp ring.
11. Unscrew the four nuts retaining the turbocharger assembly to the exhaust mounting flange, collect the distance washers and discard the gasket.
12. Fit the turbocharger by reversing the removal procedure. However, **before connecting the lubrication pipes, the turbocharger must be primed with clean engine oil** as follows.
13. Slowly pour the engine oil into the feed port on top of the turbocharger and manually spin the compressor blades. Exercise care to ensure that the blades are not damaged.
14. Once the oil drains from the port on the bottom of the turbocharger, clean the joint face and fit both the gasket and oil return pipe.
15. Fill the turbocharger through the feed port and then clean the joint face and fit both the gasket and oil feed pipe.

Air dump (recirculation) pipe - To remove and fit (see fig. K11-40)

1. Carry out the usual workshop safety precautions.
2. Slacken the worm drive clip securing the rubber crankcase breather hose to the air dump pipe. Twist the hose to free the joint. Withdraw the hose.
3. Repeat Operation 2 to the smaller diameter hose situated on the bottom of the air dump pipe.

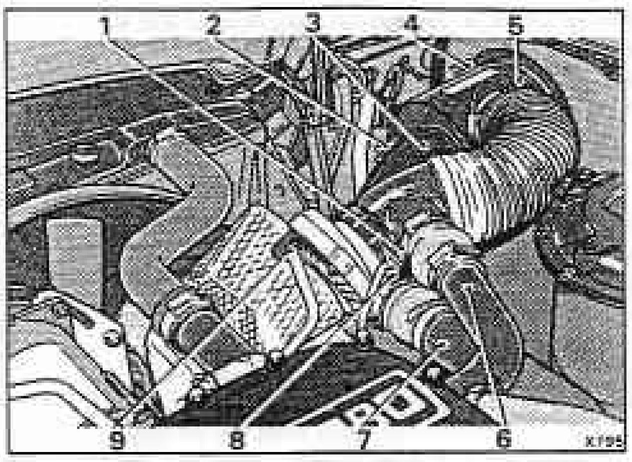


Fig. K11-37 Air filter and turbocharger
1 Turbocharger intake retaining nut
2 Air intake elbow clip
3 Air intake elbow
4 Air filter housing clip
5 Flexible hose retaining clip
6 Air dump pipe
7 Air feed pipe
8 Banjo bolt connection
9 Oil feed pipe

4. Slacken the two worm drive clips securing the flexible rubber hose between the pipe and the turbocharger intake assembly. Twist the hose to free the joint.
5. Unscrew and remove the setscrews securing the air chest cover, collect the washer fitted to each setscrew.
6. Withdraw the air chest cover.
7. Unscrew the two setscrews that secure the air dump pipe to the sidewall of the air chest. Note that this operation will free the dump valve assembly inside the air chest.
8. Withdraw the air dump pipe.
9. Before fitting the pipe always ensure that it is clean and unobstructed.
10. Ensure that the rubber sealing ring fitted to the air chest end of the pipe is in good condition.
11. Fit the pipe by reversing the removal procedure.
12. Ensure that the dump valve is correctly located in the air chest sidewall before securing the air dump pipe with the two setscrews which pass through the pipe flange and air chest sidewall before they screw into the air dump valve.

Air dump valve -To remove

1. Carry out the usual workshop safety precautions.
2. Unscrew and remove the setscrews securing the air chest cover, collect the washer fitted to each setscrew.
3. Withdraw the air chest cover.
4. From inside the air chest, unscrew the pipe nut securing the metal vacuum pipe to the dump valve.
5. Unscrew the two setscrews that secure the air dump pipe to the sidewall of the air chest. As the

second setscrew is unscrewed, take hold of the air dump valve and then as the setscrew is removed withdraw the air dump valve assembly from inside the air chest.

6. Fit the air dump valve by reversing the removal procedure.

7. Ensure that the air dump valve is correctly located in the air chest sidewall before securing the air dump pipe with the two setscrews which pass through the pipe flange and air chest sidewall before they screw into the air dump valve.

Air dump valve - To dismantle, inspect and assemble (see fig. K11-8)

1. Remove the air dump valve from the air chest.
2. Unscrew the two setscrews retaining the small circular end plate to the assembly. Collect the gasket.
3. Unscrew the four setscrews situated around the clamp ring.
4. Hold the centre bolt and unscrew the nut from the centre seal plate assembly. Take care when unscrewing the nut as this will release the tension of the diaphragm spring. All tension will be released from the spring before the nut is removed.
5. Withdraw the seal plate assembly, diaphragm, piston, and spring. Collect the centre setscrew, guide, and washers situated one on either end of the guide.
6. Collect the aluminium washer from the dump valve body.
7. Clean the parts and examine the rubber diaphragm and the centre seal plate.
8. Assemble the components by reversing the dismantling procedure.

Air chest - To remove and fit (see figs. K11-38, K11-39 and K11-40)

The air chest will normally only require removing if certain parts of the engine are to be dismantled. Therefore, it is not advisable to attempt to remove the air chest as an individual part but as an assembly, with some of the ancillary pipes, hoses, and components remaining attached.

To remove the air chest disconnect the battery, carry out the usual workshop safety precautions, and proceed as follows.

From the rear of the air chest

1. Disconnect the electrical leads to the boost inhibit micro-switch.

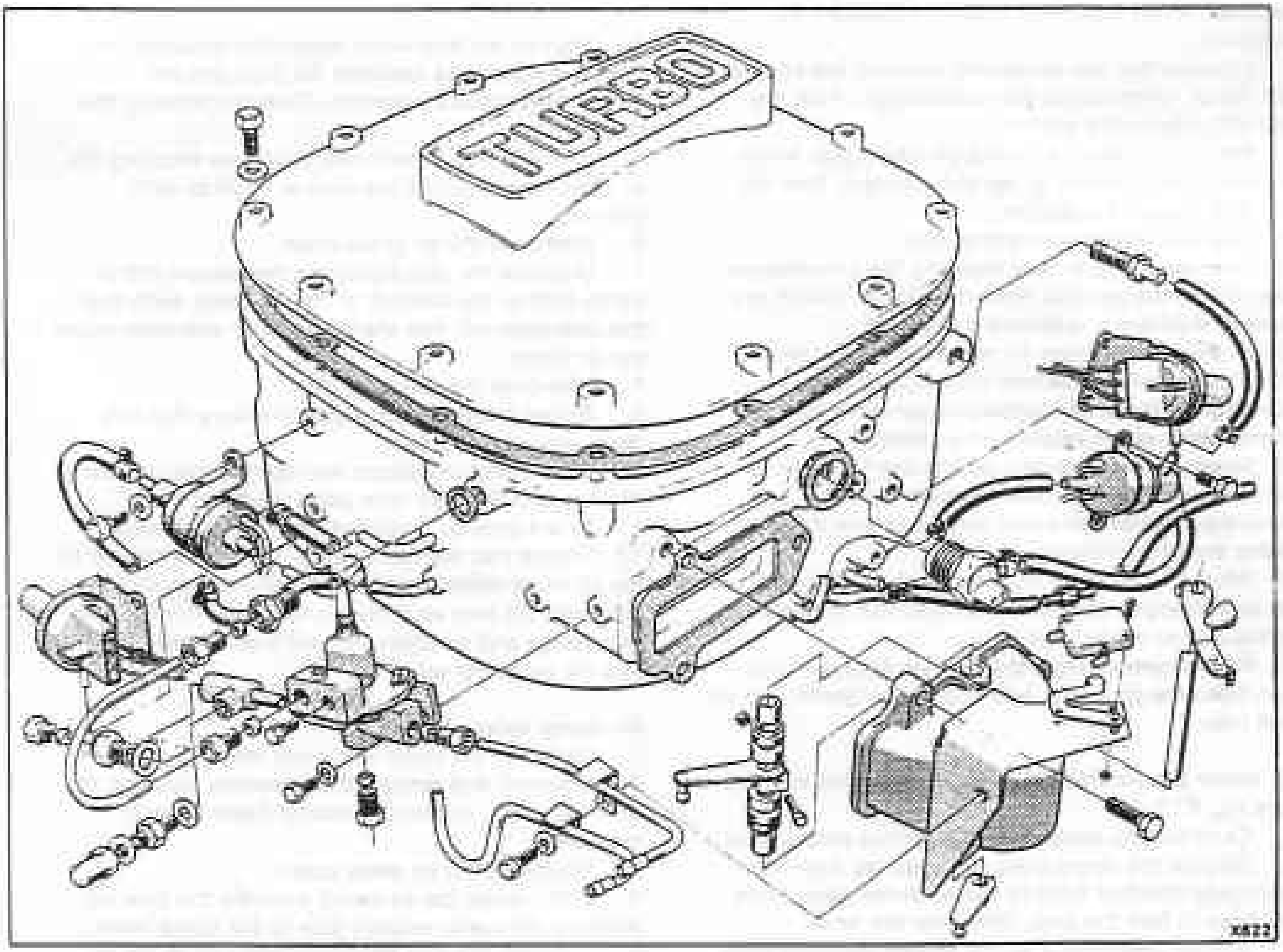


Fig. K11-38 Air chest and associated components

2. Detach the throttle linkage and the speed control chain.
3. Disconnect the electrical plug from the choke heater switch.
4. Detach the electrical connections to both the solenoid and vacuum switch of the dump valve control system.
5. Slacken the clip and withdraw the small diameter flexible hose situated above the solenoid and vacuum switch.
6. Detach the small diameter flexible hose situated directly below the dump valve solenoid. This hose incorporates a one-way valve approximately 150 mm (6.0 in) from the joint.

From the left-hand side of the air chest (see fig. K11-38)

7. Locate the fuel lines adjacent to the boost inhibit micro-switch. Trace back along the pipes until they disappear inside the protective rubber sheath. Draw back the sheath to reveal the joint in each fuel line. Slacken the securing clip and detach each hose. Blank the open connections immediately.

Note

It is advisable to wrap an absorbent cloth around each

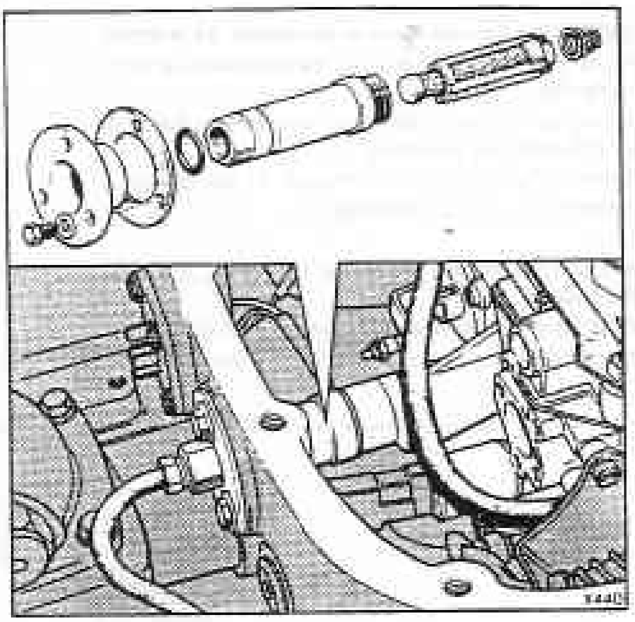


Fig. K11-39 Carburetter fuel inlet assembly

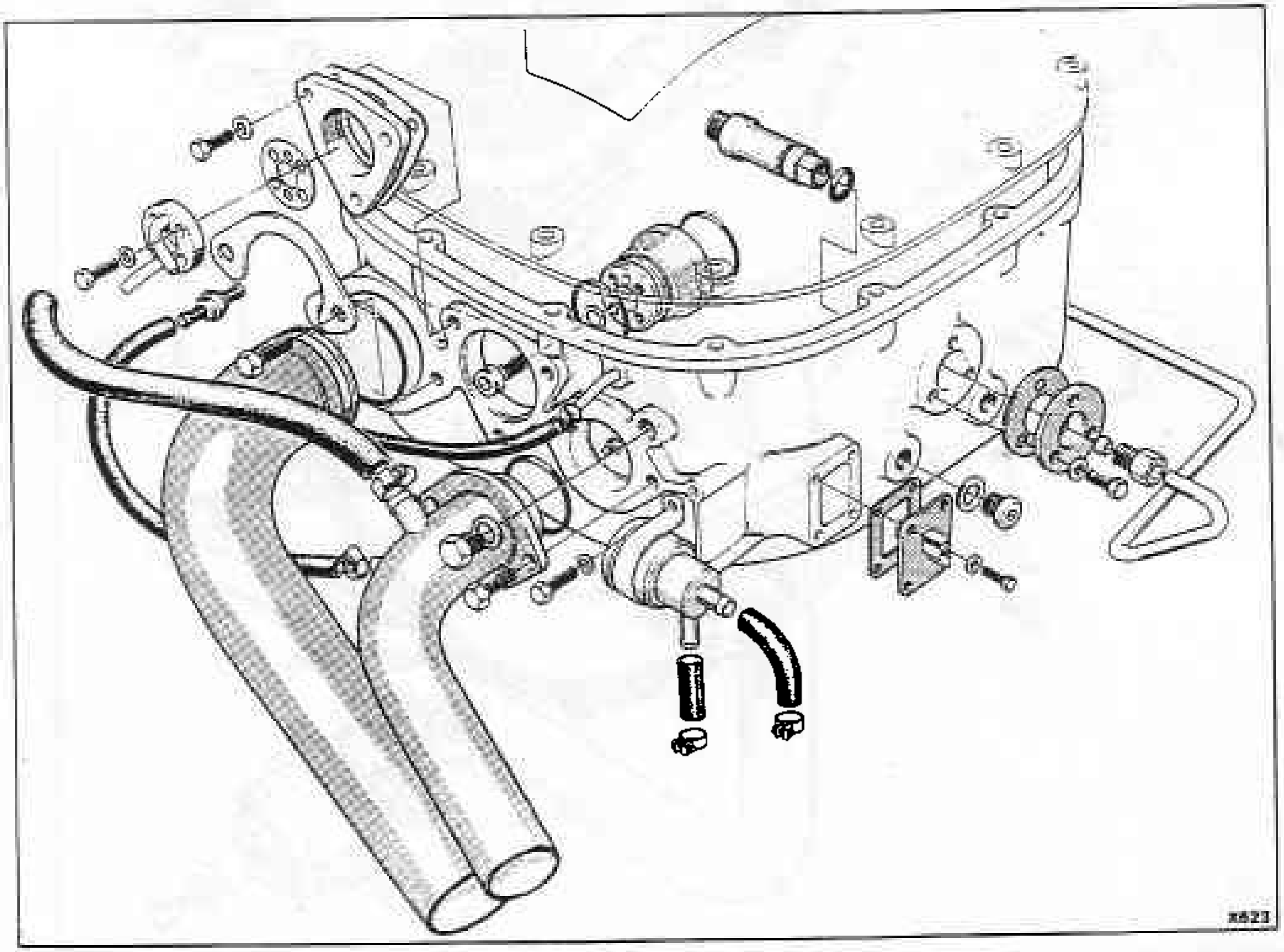


Fig. K11-40 Air chest and associated components

joint before the flexible hose is detached, as a small amount of pressurized fuel may be released as the joint is opened.
8. Unscrew the banjo bolt and detach the fuel drain. Collect the bolt and washers.
9. Detach the electrical connection to the boost enrichment switch and solenoid.

From the front of the air chest (see figs. K11-39 and K11-40)
10. Withdraw the air chest electrical feed plug.
11. Disconnect the fuel pipe. Unscrew the three small setscrews securing the guide plate to the air chest, collect the washer fitted to each setscrew. Withdraw the plate and collect the gasket.
12. Unscrew the fuel feed adapter from the carburetter and collect the aluminium washer. Note the rubber sealing ring on the adapter. Also remove the small fuel filter and spring from the carburetter fuel inlet.

From the right-hand side of the air chest (see fig. K11-40)
13. Detach the electrical connection to the boost limit solenoid.

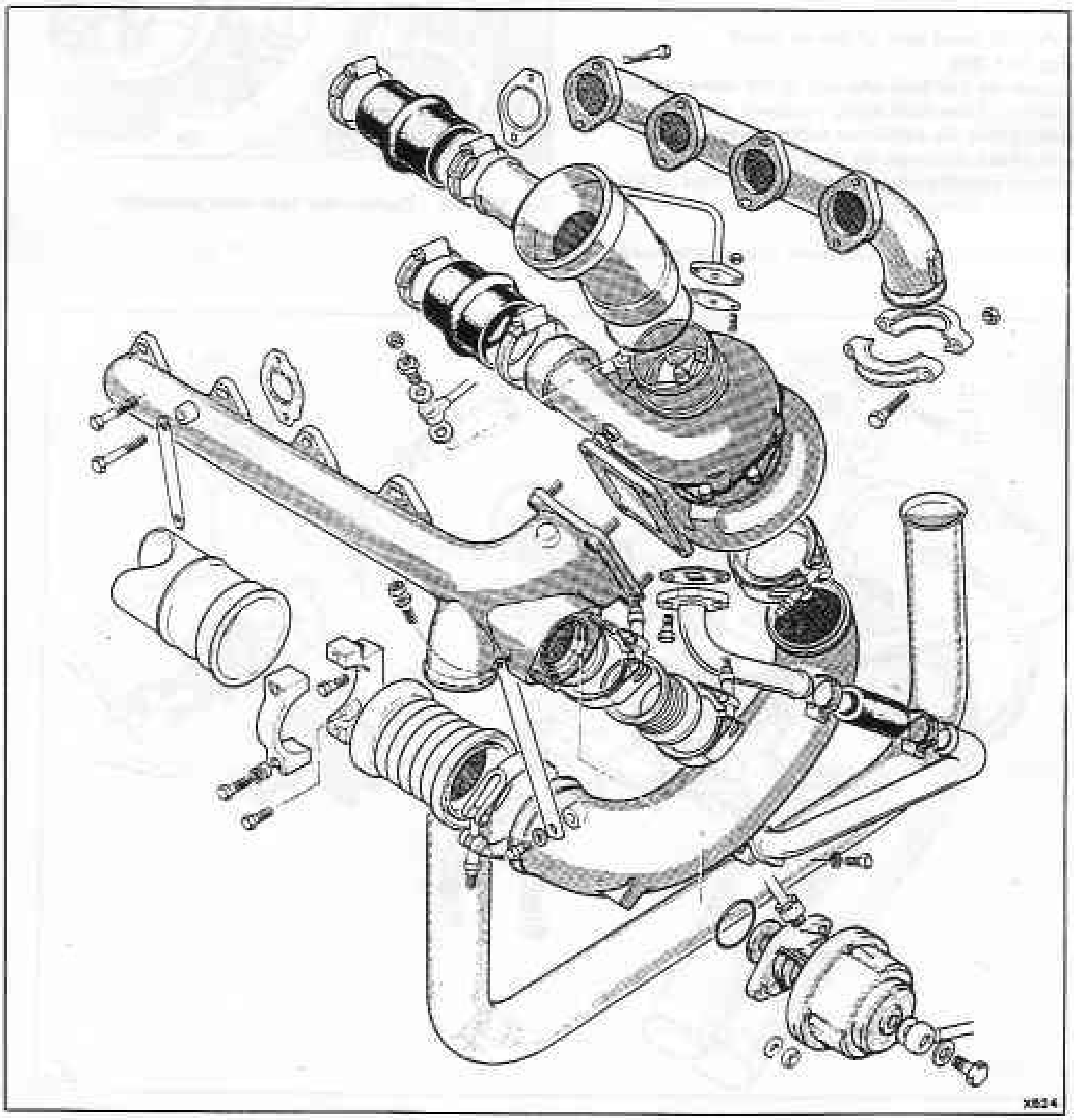


Fig. K11-41 Turbocharger and exhaust fittings

14. Disconnect the hoses to the solenoid.
15. Disconnect the small diameter hose situated above the dump valve.
16. Remove both the air delivery and air recirculation (dump) pipes from the sidewall of the air chest [see Air delivery pipe - To remove and Air recirculation (dump) valve - To remove].
17. Drain the engine coolant to below the level of the choke heater connections situated on the air chest sidewall.
18. Detach the hoses from the choke heater and temporarily fasten them above the level of the coolant and away from the vicinity of the air chest.
19. Unscrew the four setscrews from the coolant adapter to the choke heater. Remove the adapter and collect the gasket.
20. Unscrew the three setscrews from around the guide plate. Collect the washers, gasket, and plate.

From inside the air chest

21. Remove the gated orifice hose from its air chest connection above the dump valve.
22. Detach the electrical connections to the choke pulldown heater, choke heater, and anti run-on solenoids.
23. Disconnect the throttle linkage at the carburetter.
24. Locate the four carburetter retaining nuts.
25. Tap the tabs back on the two locking pieces and unscrew the four nuts.
26. Carefully lift the air chest assembly from the engine induction manifold, taking care to ensure that no hoses, pipes, or electrical cables have been left connected or have become trapped.
27. Collect the gasket.
28. Lift the carburetter out of the air chest and collect the spacer gasket fitted between the base of the carburetter and the air chest.
29. To fit the carburetter and air chest assembly reverse the procedure given for removal, noting that all gaskets, sealing rings, and hoses are in good condition. Ensure that all holes in the gasket align with corresponding passages in the base of the air chest and/or carburetter base (i.e. part throttle enrichment signal port).

Exhaust wastegate - To remove and fit (see fig. K11-41)

1. Carry out the usual workshop safety precautions.
2. Locate the boost pressure pipe connection on the side of the wastegate assembly. Hold the union and unscrew the male pipe nut, this will enable the pressure pipe to be disconnected.
3. Unscrew the banjo bolt situated on the front end of the wastegate that retains the vacuum pipe in position. Withdraw the bolt, collect the sealing washers and free the connection.
4. Unscrew the two nuts securing the wastegate to the exhaust manifold. Collect the distance washers.
5. Withdraw the wastegate.
6. Fit the wastegate by reversing the removal procedure, noting that the sealing ring fitted between the wastegate and exhaust manifold must be in good condition.

For the remainder of the information relating to the exhaust system refer to Chapter Q.

Fuel pressure regulator - To remove and fit

1. Carry out the usual workshop safety precautions.
2. Carefully unscrew the following fuel pipe connections on the fuel pressure regulator.
a. From the fuel filter to the rear of the fuel pressure regulator.
b. From the front of the pressure regulator to the carburetter.
c. The fuel return pipe on the bottom of the pressure regulator.
d. The boost pressure reference pipe on the side of the regulator.
3. Unscrew the two setscrews securing the fuel pressure regulator to the sidewall of the air chest.
4. Withdraw the pressure regulator assembly.
5. Fit the assembly by reversing the removal procedure.

Carburetter - To remove and fit

1. Carry out the usual workshop safety precautions.
2. Unscrew the setscrews securing the cover to the air chest, collect the washer fitted to each setscrew and withdraw the cover. Collect the gasket.
3. Disconnect the fuel pipe from the front of the air chest (see fig. K11-39). Unscrew the three small setscrews securing the guide plate to the air chest, collect the washer fitted to each setscrew. Withdraw the plate and collect the gasket.
4. Unscrew the fuel feed adapter from the carburetter and collect the aluminium washer, note the rubber sealing ring on the adapter. Collect the small fuel filter and spring from the carburetter fuel inlet.
5. Disconnect the gated orifice hose from the air chest above the dump valve.
6. Disconnect the throttle linkage at the carburetter.
7. Disconnect the following electrical connections from the carburetter.
a. Feed to anti run-on solenoid valves.
b. Feed to choke heater.
c. Feed to choke pulldown heater.
8. Drain the engine coolant to below the level of the choke heater.
9. Unscrew the four setscrews from around the adapter to the choke heater. Remove the adapter and collect the gasket.
10. Unscrew the three setscrews from around the guide plate. Collect the washer from each setscrew, withdraw the plate and gasket.
11. Locate the four carburetter retaining nuts.
12. Tap the tabs back on the two locking pieces and unscrew the four nuts.
13. Manoeuvre the carburetter out of the air chest taking care to ensure that no hoses, pipes, or electrical cables have been left connected or have become trapped.
14. Collect the spacer gasket fitted between the carburetter and air chest.

15. Fit the carburetter by reversing the procedure given for removal, noting that all gaskets, sealing rings, and hoses are in good condition. Ensure that all holes in the gasket align with corresponding passages in the base of the air chest and/or carburetter base (i.e. part throttle enrichment signal port).

For the remainder of the information relating to the carburetter and fuel system refer to Chapter K (Part 2).

Note

All hoses and wiring within the air chest are manufactured from heat/oil resistant material. Only hosing and wiring designed for this installation should be used for replacement purposes.

Electrical components

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

The components concerned are as follows.

Included in this section

Dump valve vacuum switch
Dump valve solenoid
Boost limit solenoid
Vacuum pump
Part throttle enrichment pressure switch
Boost inhibit micro-switch
Choke heater arrangement

Dump valve vacuum switch

The dump valve vacuum switch is situated on the rear face of the air chest, above the dump valve solenoid (see fig. K11-8).

Dump valve vacuum switch - To remove and fit

1. Carry out the usual workshop safety precautions.
2. Disconnect the electrical cables at the junction block.
3. Slacken the signal hose clamp screw and withdraw the hose.
4. Unscrew the two small setscrews retaining the switch bracket to the air chest. Collect the washer from each setscrew and withdraw the switch.
5. Fit the vacuum switch by reversing the removal procedure.

Dump valve vacuum switch - To test

1. Carry out the usual workshop safety precautions.
2. Locate the switch electrical connection block and connect a test lamp between the brown cable and earth.
3. Slacken the vacuum switch signal hose clamp screw and withdraw the hose. Connect a vacuum pump (i.e. Mityvac) to the connection on the switch (see fig. K11-31).
4. Switch on the ignition noting that the bulb of the test lamp is extinguished.
5. Operate the vacuum pump and apply a vacuum to the switch. The bulb of the test lamp should illuminate when the reading on the gauge is between 317,50 mm Hg and 381,0 mm Hg (12.50 in Hg and 15 in Hg).
6. Slowly release the vacuum, noting that the test lamp bulb is again extinguished before the vacuum drops below 317,50 mm Hg (12.50 in Hg).
7. If the operation of the switch is suspect, it should be renewed.

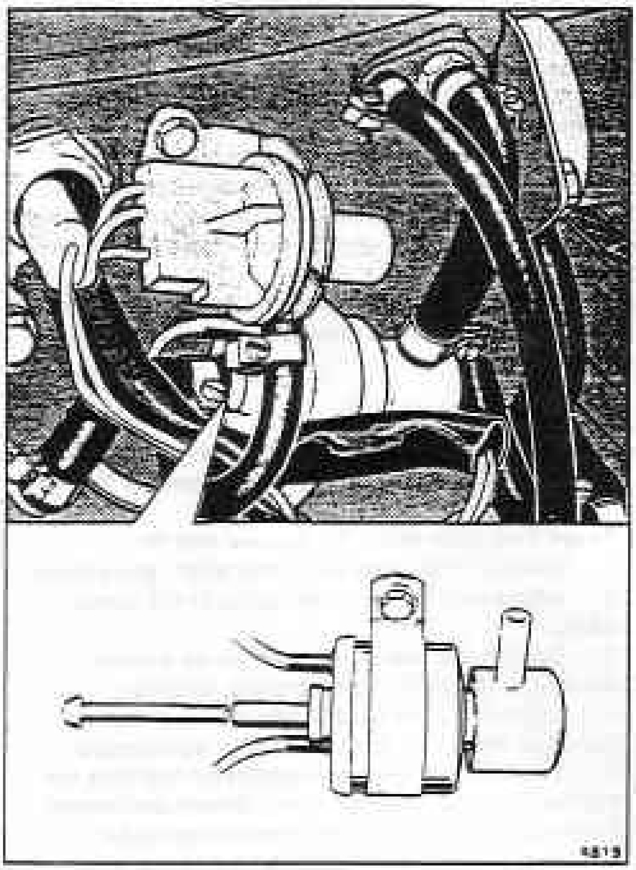


Fig. K12-1 **Dump valve solenoid restrictor**

8. Remove the test equipment. Connect the vacuum hose to the switch and the electrical connection to the junction block.

Dump valve solenoid

The dump valve solenoid is situated on the rear face of the air chest, below the dump valve vacuum switch (see fig. K11-8).

Dump valve solenoid - To remove and fit

1. Carry out the usual workshop safety precautions.
2. Disconnect the electrical cables at the junction block.
3. Slacken the signal hose clamp screws situated one on either side of the solenoid.
4. Label the hoses for identification and then withdraw them from their respective connections. Collect the small restrictor (if fitted) from the solenoid connection on the engine side of the assembly.
5. Unscrew the two small setscrews retaining the

solenoid bracket to the air chest. Collect the washer from each setscrew and withdraw the solenoid.
6. Fit the solenoid by reversing the removal procedure. Note the information concerning the small restrictor fitted into the solenoid spout, on the engine side (see fig. K12-1).

Dump valve solenoid - To test
1. Carry out the usual workshop safety precautions.
2. Connect a test lamp across the two Lucar connections to the solenoid valve. **Do not disconnect the two connections.**
3. Detach the rubber hose from both sides of the solenoid.
4. Connect a length of hose to one side of the solenoid and ensure that the free end is clean.
5. Switch on the ignition; the test lamp bulb **should** be illuminated and it **should not** be possible to blow down the hose.
6. Switch off the ignition; the test lamp bulb **should** be extinguished and it **should be** possible to blow down the hose.

Boost limit solenoid
The boost limit solenoid is situated on the right-hand side forward section of the air chest (see fig. K11-3).

Boost limit solenoid - To remove and fit
1. Carry out the usual workshop safety precautions.
2. Disconnect the electrical cables at the junction block.
3. Slacken the two signal hose clamp screws situated at the front of the solenoid assembly.
4. Label the hoses for identification and then withdraw them from their respective connections.
5. Unscrew the two small setscrews retaining the solenoid bracket to the air chest. Collect the washer from each setscrew and withdraw the solenoid..
6. Fit the solenoid by reversing the removal procedure.

Boost limit solenoid - To test
1. Carry out Operations 1 to 4 inclusive under the heading Boost limit solenoid - To remove and fit.
2. Connect a length of hose to one side of the solenoid and ensure that the free end is clean.
3. Connect a known 12 volts supply to the solenoid; noting that it **is possible** to blow down the hose and through the solenoid.
4. Disconnect the 12 volts supply to the solenoid; note that it **is not possible** to blow down the hose and through the solenoid.

Vacuum pump
The vacuum pump is situated under the front right-hand wing.

Vacuum pump - To remove and fit
1. Carry out the usual workshop safety precautions.
2. Remove the right-hand front road wheel (see Chapter R).
3. Remove the rear section of the front underwing sheet (see Chapter S).
4. Locate the vacuum pump situated adjacent to the radio aerial motor assembly.
5. Disconnect the electrical cables at the junction block, as the vacuum pump is polarity conscious note each connection to ensure that the cables can be correctly fitted.
6. Label the vacuum hoses for identification and then withdraw them from their respective connections.
7. Unscrew the three securing nuts, collect the spacer and washer from each stud.
8. Withdraw the vacuum pump.
9. Fit the vacuum pump by reversing the removal procedure.

Vacuum pump - To test
1. Carry out the usual workshop safety precautions.
2. Locate the toeboard socket under the right-hand blower motor.
3. Disconnect the socket.
4. Connect a 12 volts supply to the vacuum pump via the light green/green cable in the connection.
5. Connect the pink/black cable to earth.
6. When these connections are made the pump should operate. If necessary disconnect the vacuum hose to confirm that the pump is working satisfactorily.

Boost inhibit micro-switch
The boost inhibit micro-switch is located on top of the throttle linkage housing, attached to the rear of the air chest (see fig. K11-2).

Boost inhibit micro-switch - To remove and fit
1. Carry out the usual workshop safety precautions.
2. Label both electrical cables for identification. Detach the cables.
3. Secure the head on one mounting bolt and unscrew the nut, collect the washer and nut. Withdraw the bolt. Repeat the operation on the other mounting bolt.
4. Withdraw the micro-switch.
5. Fit the micro-switch by reversing the removal procedure.

Boost inhibit micro-switch - To test
1. Carry out the usual workshop safety precautions.
2. Label both electrical cables for identification. Detach the cables.
3. Connect a 12 volts supply via a test lamp to the micro-switch, connect an earth cable to the other connection on the micro-switch.
4. Switch on the 12 volts supply and operate the micro-switch, note the bulb of the test lamp, this should extinguish and illuminate as the micro-switch is actuated.

Part throttle enrichment pressure switch
The pressure switch is located on the left-hand side forward section of the air chest (see fig. K11-2).

Part throttle enrichment pressure switch - To remove and fit
1. Carry out the usual workshop safety precautions.

2. Disconnect the electrical cables at the junction block.
3. Slacken the retaining clip and withdraw the signal hose.
4. Unscrew the two securing setscrews located above and below the switch, collect the washer from each setscrew.
5. Withdraw the switch.

Part throttle enrichment pressure switch - To test

1. Carry out the usual workshop safety precautions.
2. Locate the switch electrical connection block and connect a test lamp between the blue cable and earth.
3. Slacken the pressure switch signal hose clamp screw and withdraw the hose. Connect an air pressure supply and gauge to the connection on the switch.

Note

Blowing down a length of hose connected to the switch provides a good quick check.

4. Switch on the ignition noting that the bulb of the test lamp is extinguished.
5. Very gradually apply a **small** air pressure to the switch. The bulb of the test lamp should illuminate when the reading on the gauge exceeds 0,07 bar (1 lbf/in^2).
6. Release the pressure and the bulb of the test lamp should extinguish.
7. If the operation of the switch is suspect, it should be renewed.
8. Remove the test equipment. Connect the hose to the switch and the electrical connection to the junction block.

Part throttle enrichment solenoid

The part throttle enrichment solenoid is situated on the left-hand side forward section of the air chest (see fig. K11-2).

Part throttle enrichment solenoid - To remove and fit

1. Carry out the usual workshop safety precautions.
2. Slacken the hose retaining clips situated at the front and rear of the solenoid.
3. Detach the two electrical cables at the junction block.
4. Unscrew the two small setscrews situated above and below the solenoid. Collect the washer from each setscrew.
5. Withdraw the solenoid and detach the hoses.
6. Fit the solenoid by reversing the removal procedure.

Part throttle enrichment solenoid - To test

1. Carry out Operations 1 to 3 inclusive under the heading Part throttle enrichment solenoid - To remove and fit.
2. Connect a suitable length of hose to a hose connection on the solenoid.
3. Place the other end of the hose in the mouth and blow, note that it **should not be** possible to blow down the hose and through the solenoid.
4. Apply 12 volts across the solenoid and note that it **should be** possible to blow down the hose and through the solenoid.

Choke heater arrangement

The choke mechanism has two electrically operated heaters.

The choke pulldown heater (see page K12-5) is part of the variable choke pulldown device (see page K11-31). Its purpose being to give improved cold starting by setting the gap between the edge of the strangler flap and carburetter cover, depending upon ambient temperature.

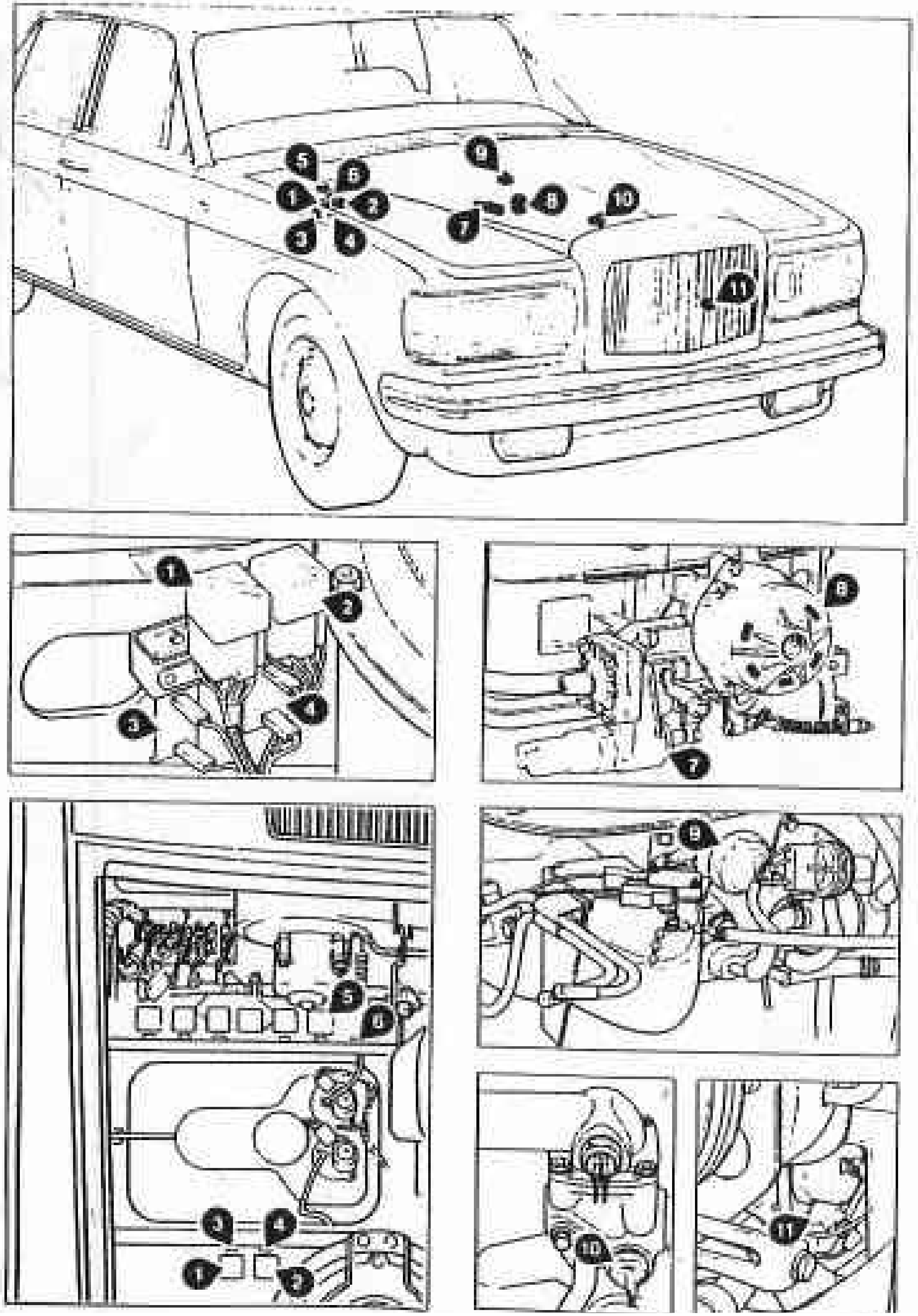
The second heater warms the choke bimetal which progressively allows the strangler flap to open.

Full details of the heaters are given on pages K12-5, K12-7 K12-9, and K12-11.

Choke heater arrangement

Ignition on - Engine not running
Temperature below 14°C

Component location, wiring diagram, and circuit description



Ignition on · Engine not running
Temperature · below 14°C

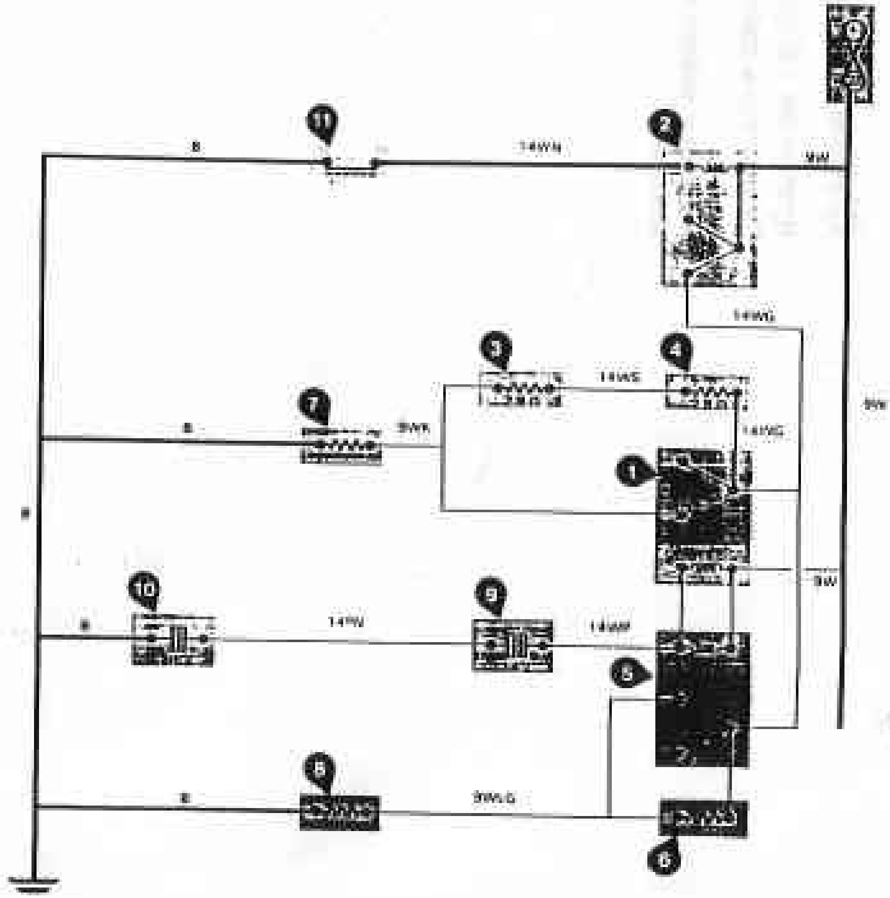
The oil pressure switch is earthed and therefore the choke control relay is energized. There is no feed to either the choke pulldown relay or the choke heater relay contacts.

The choke pulldown relay and the choke heater relay are de-energized due to the condition of the 14°C choke heater temperature switch.

The choke strangler flap is set at the pulldown gap.

Key

1 Pulldown relay
2 Control relay
3 Pulldown resistor
4 Pulldown resistor
5 Heater relay
6 Heater resistor
7 Pulldown heater
8 Bimetal heater
9 Heater temperature switch (14°C)
10 Heater temperature switch (86°C)
11 Engine oil pressure switch



Choke heater arrangement

Ignition on - Engine not running
Temperature between 14°C and 86°C

Engine running
Temperature below 14°C

Wiring diagrams and circuit descriptions

Ignition on - Engine not running
Temperature - between 14°C and 86°C

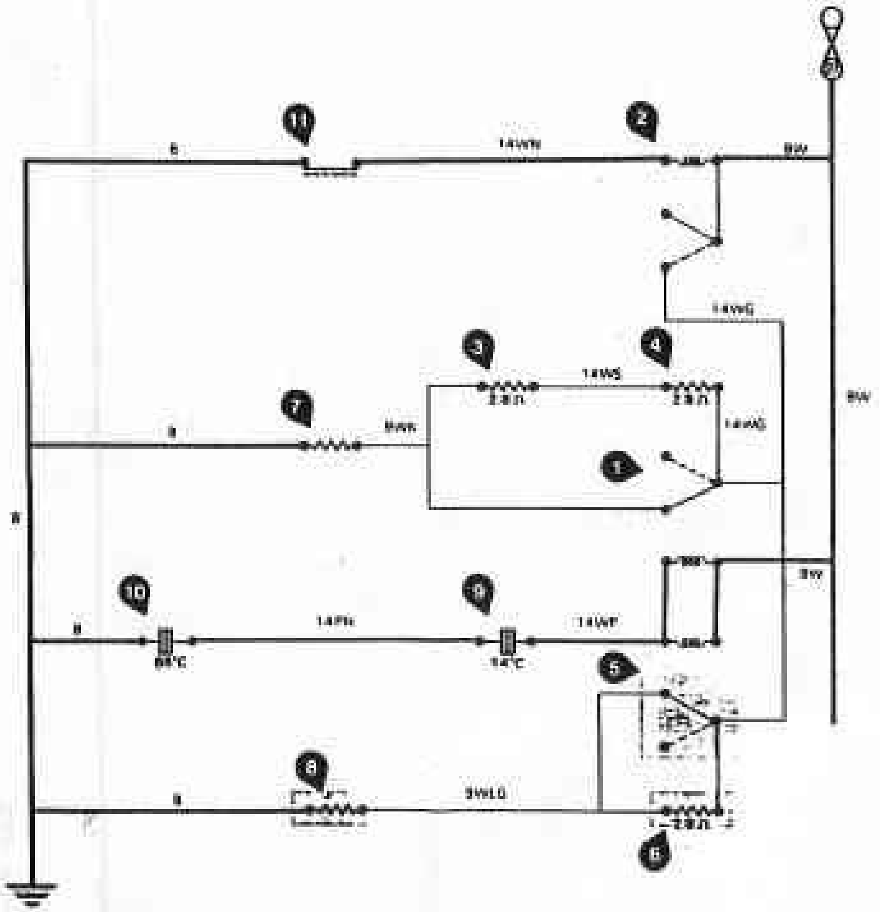
The choke pulldown heater relay and the choke heater relay are both energized via the choke heater temperature switches. However, neither heater will warm-up because the power supply to them is temporarily interrupted by the choke control relay. This relay is energized via the contacts in the engine oil pressure switch.

The choke bimetal and pulldown device are not heated.

The position of the choke strangler flap is variable depending upon the temperature of the bimetal and the pulldown 'waxstat' capsule.

Key

1 Pulldown relay
2 Control relay
3 Pulldown resistor
4 Pulldown resistor
5 Heater relay
6 Heater resistor
7 Pulldown heater
8 Bimetal heater
9 Heater temperature switch (14°C)
10 Heater temperature switch (86°C)
11 Engine oil pressure switch



Engine running
Temperature - below 14°C

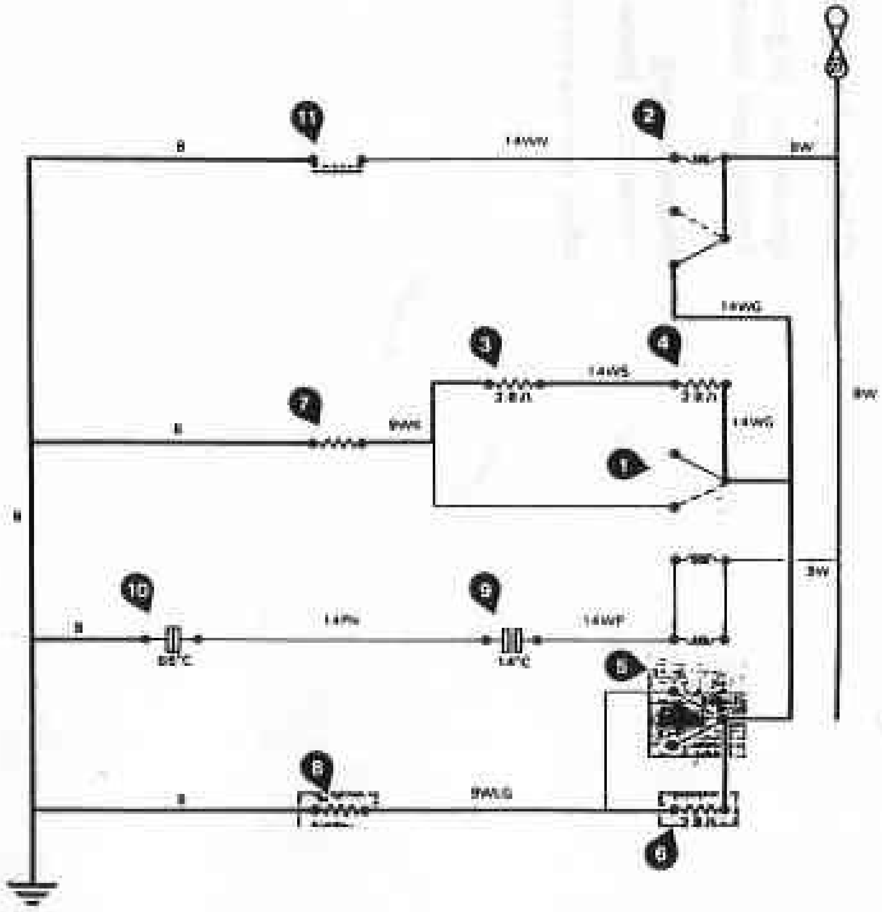
The engine oil pressure switch is not earthed and therefore, the choke control relay is de-energized. This allows a feed from the relay to the choke pulldown relay and the choke heater relay contacts. However, these two relays are de-energized due to the condition of the 14°C choke heater temperature switch.

Both choke heaters are operated at a reduced voltage via the respective resistor(s).

The choke bimetal and the pulldown 'waxstat' are heated slowly (i.e. the choke will remain on)

Key

1 Pulldown relay
2 Control relay
3 Pulldown resistor
4 Pulldown resistor
5 Heater relay
6 Heater resistor
7 Pulldown heater
8 Bimetal heater
9 Heater temperature switch (14°C)
10 Heater temperature switch (86°C)
11 Engine oil pressure switch



Choke heater arrangement

Engine running
Temperature between 14°C and 86°C

Engine running
Temperature above 86°C

Wiring diagrams and circuit descriptions

Engine running
Temperature - between 14°C and 86°C

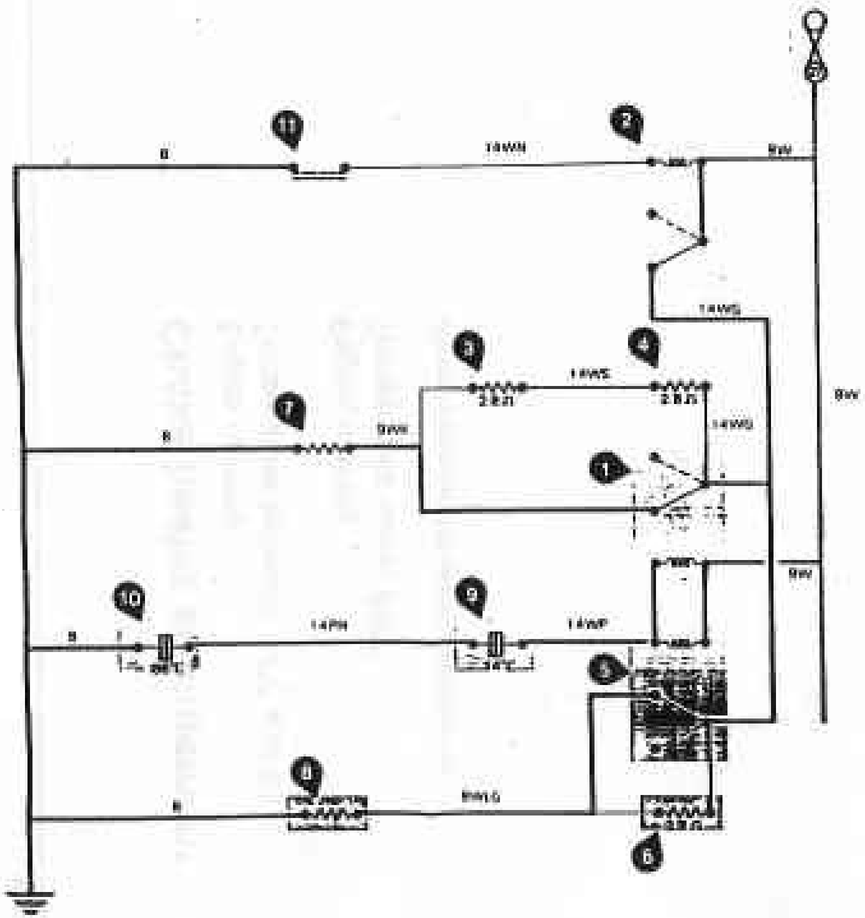
The choke pulldown heater relay and the choke heater relay are both energized via the choke heater temperature switches.

The engine oil pressure switch is not earthed and therefore the choke control relay is de-energized. This allows a feed from the relay via the choke pulldown heater relay and the choke heater relay to warm-up the choke heaters.

The choke bimetal and the pulldown waxstat are both heated with a maximum voltage (i.e. the choke mechanism will progressively release the strangler flap).

Key

1 Pulldown relay
2 Control relay
3 Pulldown resistor
4 Pulldown resistor
5 Heater relay
6 Heater resistor
7 Pulldown heater
8 Bimetal heater
9 Heater temperature switch (14°C)
10 Heater temperature switch (86°C)
11 Engine oil pressure switch



Engine running
Temperature - above 86°C

The engine oil pressure switch is not earthed and therefore, the choke control relay is de-energized. This allows a feed from the relay to the choke pulldown heater relay and the choke heater relay contacts. However, these two relays are de-energized due to the condition of the 86°C choke temperature switch.

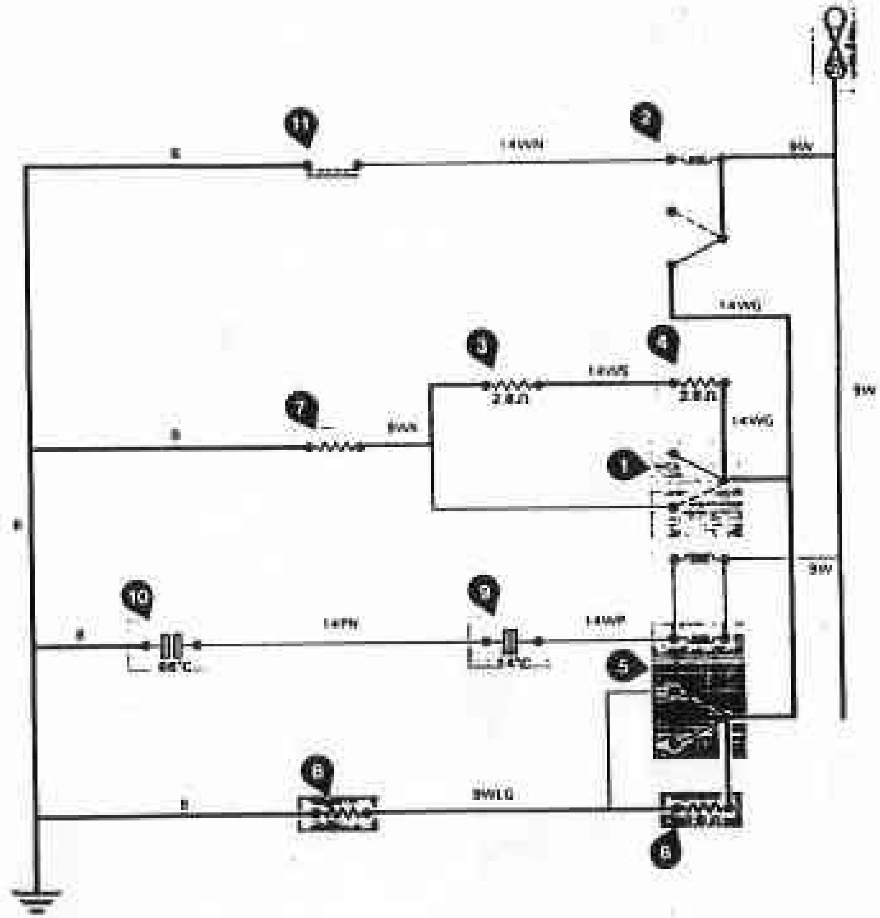
Both choke heaters are operated via the respective resistor(s).

The choke bimetal and the pulldown heater are heated by a reduced voltage.

The choke heater temperature switch situated in the thermostat housing has opened, therefore, the temperature of the coolant must be in excess of 86°C. As the coolant is circulated around the choke heater housing it will warm the bimetal which will release the strangler flap and allow it to open.

Key

1 Pulldown relay
2 Control relay
3 Pulldown resistor
4 Pulldown resistor
5 Heater relay
6 Heater resistor
7 Pulldown heater
8 Bimetal heater
9 Heater temperature switch (14°C)
10 Heater temperature switch (86°C)
11 Engine oil pressure switch



Choke heater arrangement

Fault diagnosis flow chart

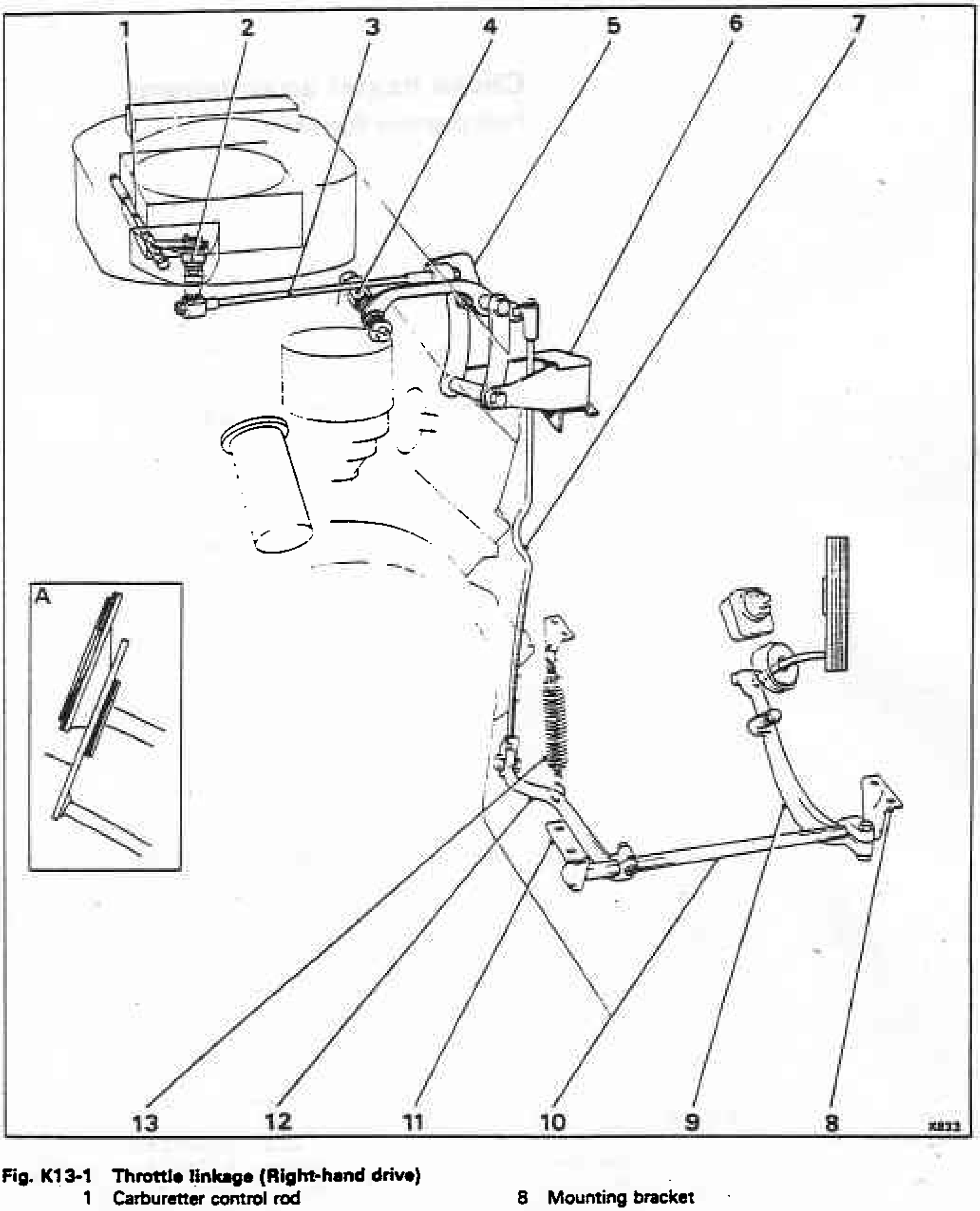


Fig. K13-1 Throttle linkage (Right-hand drive)

1 Carburetter control rod
2 Pivot assembly
3 Pivot to isolator control rod
4 Induction manifold mounting
5 Isolator lever
6 Body longeron bracket
7 Long control rod
8 Mounting bracket
9 Pedal lever
10 Accelerator cross-shaft
11 Mounting bracket
12 Operating lever
13 Return spring

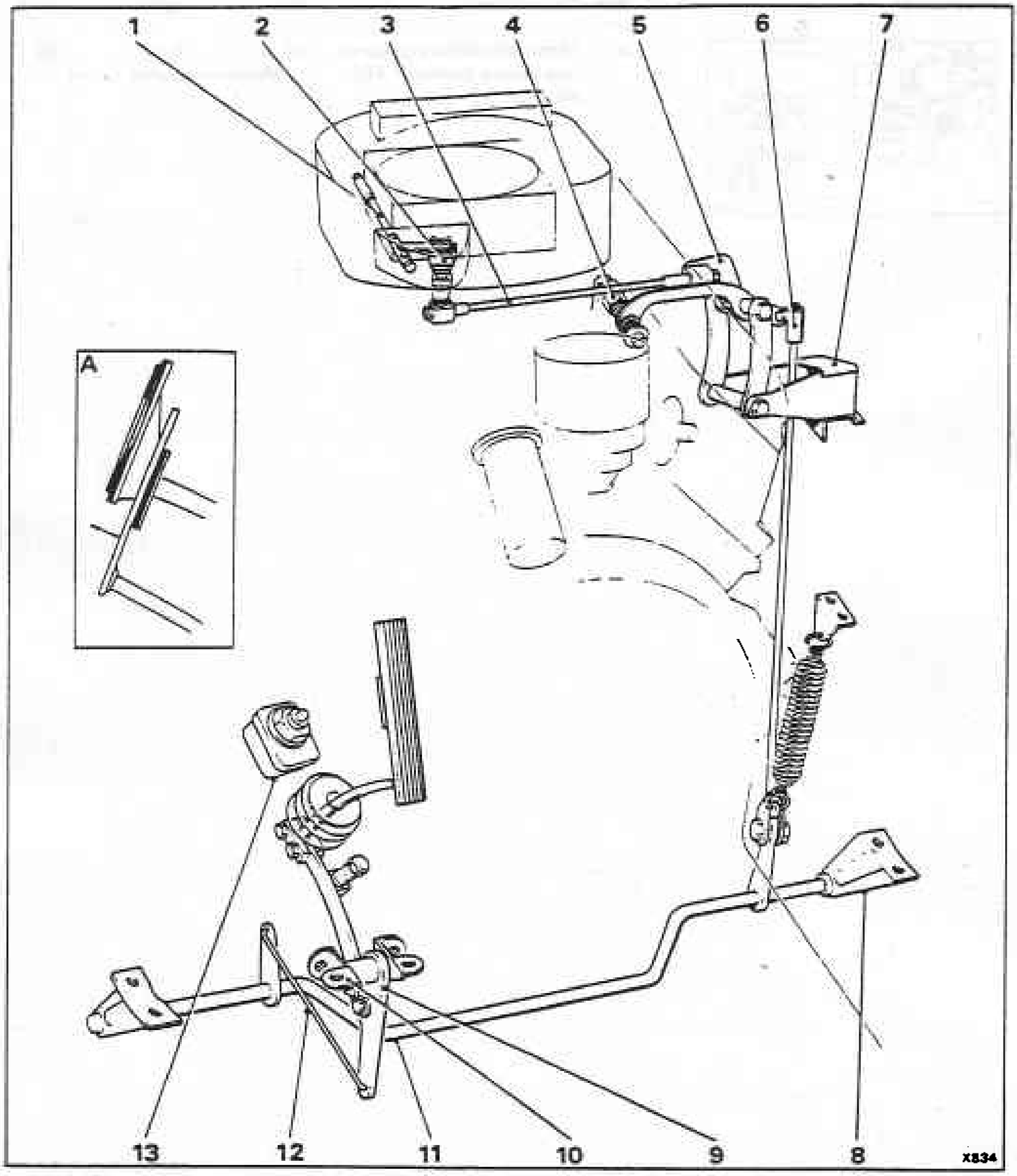
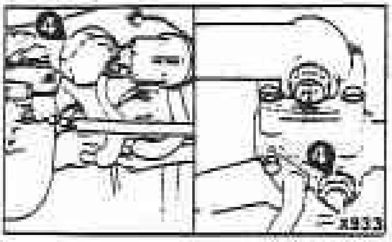


Fig. K13-2 Throttle linkage (Left-hand drive)

1 Carburetter control rod
2 Pivot assembly
3 Pivot to isolator control rod
4 Induction manifold mounting
5 Isolator lever
6 Long control rod
7 Body longeron bracket
8 Mounting bracket
9 Pedal lever
10 Mounting bracket
11 Accelerator cross-shaft
12 Connecting rod
13 Kick-down micro-switch

Section K11



Ref.	Component	Nm	kgf m	lbf ft
4	Choke temperature switches (use Loctite Superfast 572 on threads)	39	4,0	29
		Maximum applied torque		