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CHAPTER K

FUEL SYSTEM AND CARBURETTERS

SECTION K1 — FUEL SYSTEM

Description

On all cars the fuel tank is mounted within the rear of the chassis frame and is secured by two flexible metal straps. It can easily be removed from the car, with the minimum amount of disturbance of other parts.

The fuel filler is fitted in the rear wing; **on Phantom V cars** it is situated on the right-hand side of the car and on all other cars it is on the left-hand side.

The fuel filler door provides access to the tank filler tube and is normally released by operating a switch on the facia board.

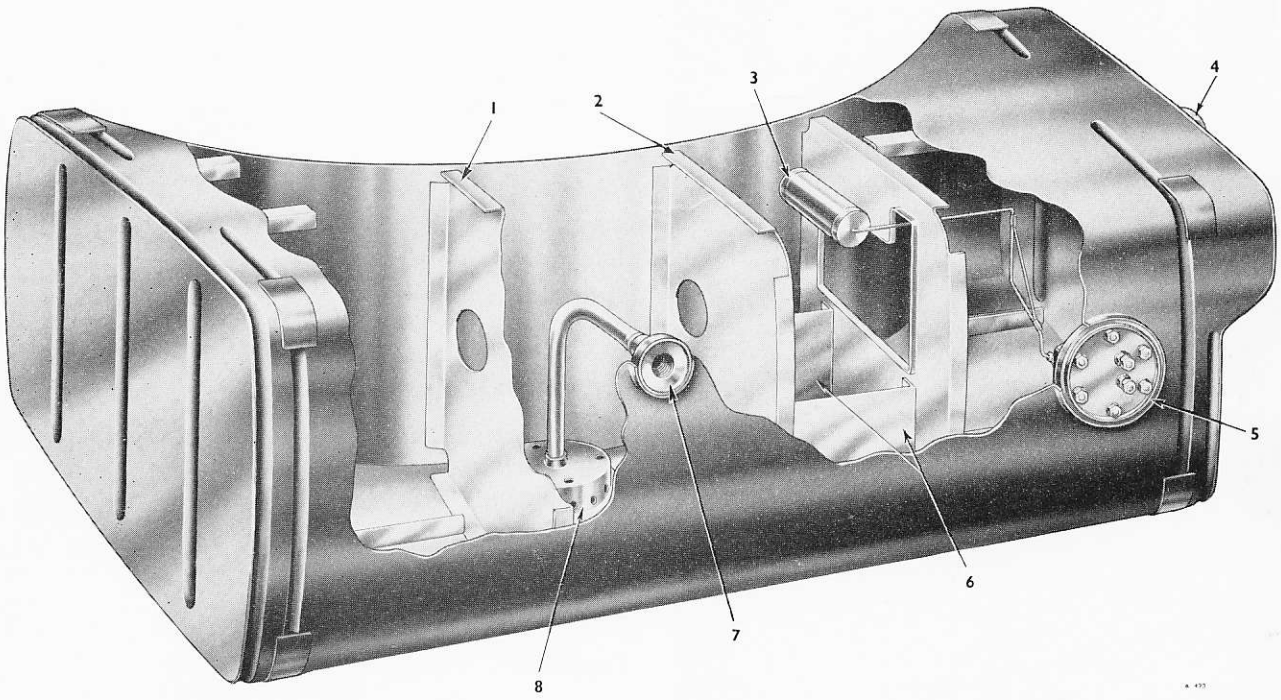

Fig. K1 Fuel tank

1. BAFFLE
2. BAFFLE
3. FLOAT IN FULL TANK POSITION
4. FUEL FILLER
5. FUEL GAUGE
6. GAUGE UNIT BAFFLES
7. OUTLET CONNECTION
8. ANTI-SURGE TOWER

Should the solenoid fail to operate by means of this switch, the locking catch on the fuel filler door can be released manually from within the luggage compartment.

The electric fuel gauge, mounted on the facia, is operated by a rheostat mounted inside the fuel tank.

The fuel gauge, the fuel filler door switch and the filler door solenoid are described in detail in the Electrical System, Chapter M of the Workshop Manual.

The fuel pipe line from the tank is connected to the main fuel filter, mounted on the rear crossmember of the chassis frame, from where it passes along the right-hand side member to the electrically operated fuel pumps, which are mounted on the chassis frame. The pipe then continues along the frame and connects to the flexible feed pipe leading to the carburetter float chambers.

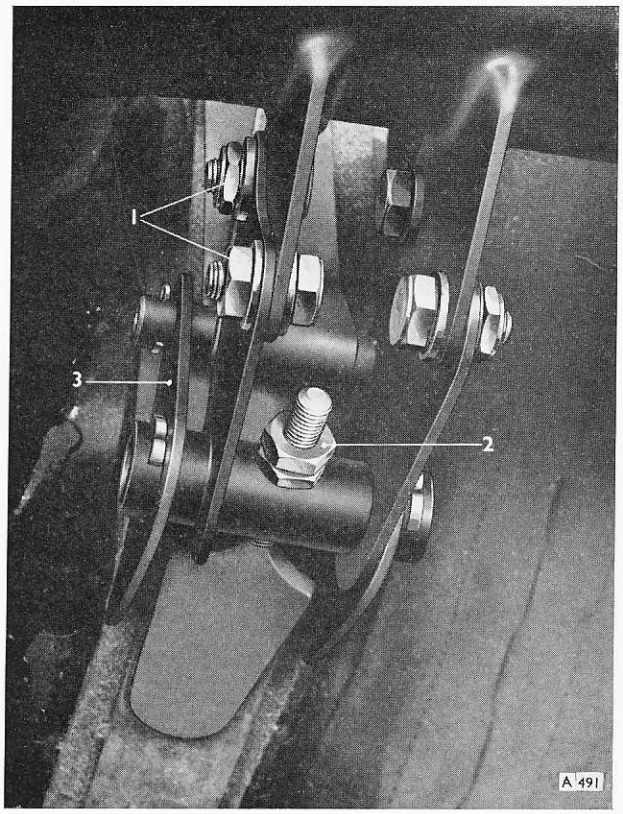

Fig. K2 Fuel tank support strap

1. SADDLE BOLTS 2. TENSIONING BOLT 3. INTERMEDIATE BRACKET

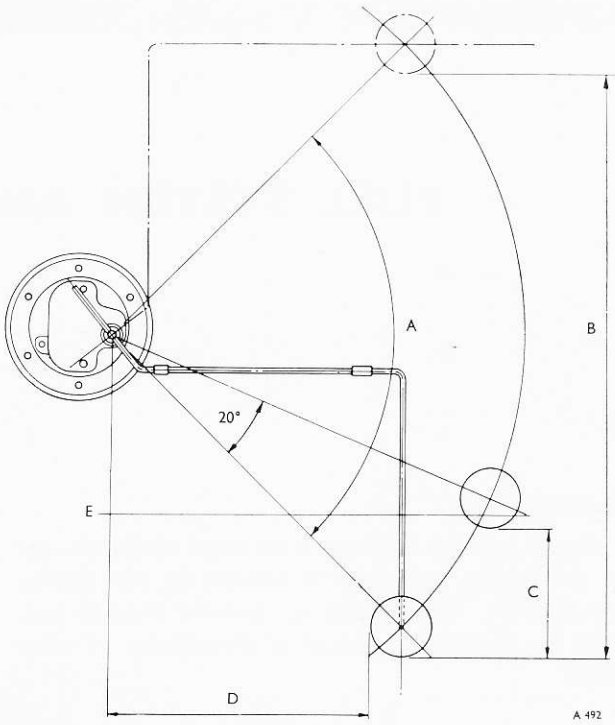

Fig. K3 Float setting

A. 90 deg. FREE TRAVEL
B. 11·609 in. (29·487 cm.)
C. 2·390 in. (6·071 cm.)
D. 5·406 in. (13·731 cm.)
E. WARNING LAMP TO OPERATE WHEN FUEL FALLS TO THIS LEVEL (3·5 GALLONS APPROXIMATELY)

On Phantom V cars, the fuel filter is situated on the left-hand side of the chassis; **on all other cars** the filter is on the right-hand side.

Service Operation

The rear fuel filter and the gauze filters in the carburetter float chambers and the fuel pumps should be removed and cleaned every 10,000 miles (16,000 km.).

Fuel Tank

Capacities

All cars except Phantom V	...	18 Imperial gallons (81·8 litres)
Phantom V	... ...	23 Imperial gallons (104·5 litres)

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The fuel tank is fabricated from 16 S.W.G. 0·064 in. (1·625 mm.) gauge aluminium alloy and is fitted internally with baffles to prevent any surging of the fuel. An additional anti-surge tower is fitted around the lower end of the outlet pipe on the base of the tank.

The electric fuel gauge mechanism is fitted to the tank, the float being protected by extra baffles which are provided to prevent flickering on the gauge.

On Phantom V cars, the tank is fabricated from 21 B.G. Zintec 0·035 in. (0·8890 mm.) thick.

All cars

A vent pipe is fitted at the top of the fuel tank filler tube; the pipe is clipped to the upper surface of the rear crossmember to minimise the possibility of the open end becoming blocked.

Fuel Tank — to remove and fit

Run the car over a pit or, alternatively, jack up the rear end of the car and support it on stands.

Disconnect the battery. Disconnect the electrical leads from the electric fuel gauge unit and remove the earthing strip which is fitted between the chassis crossmember and the fuel gauge unit.

Remove all dirt from around the drain plug, then, using the special adapter and spanner from the tool kit, remove the plug and drain the fuel into a suitable storage container.

Remove the carpet from the luggage compartment, then remove the three screws which secure the trim cover in position over the fuel filler hose where it passes through the boot. Slacken the worm drive clip securing the hose connection to the filler tube.

Disconnect the fuel pipe line at the tank outlet union.

Using a box spanner, remove the two nuts from the tensioning bolts which secure the tank straps, then remove the four saddle bolts and nuts from the mounting bracket (see Fig. K2).

Remove the tank together with the fabric packing strips.

To fit the fuel tank, reverse the procedure adopted for its removal.

Rear Filter

The rear filter, shown in Figure K4, contains two circular gauze filters. The fuel passes upwards through these gauzes and any dirt present settles on the lower faces of the gauzes and in the filter bowl.

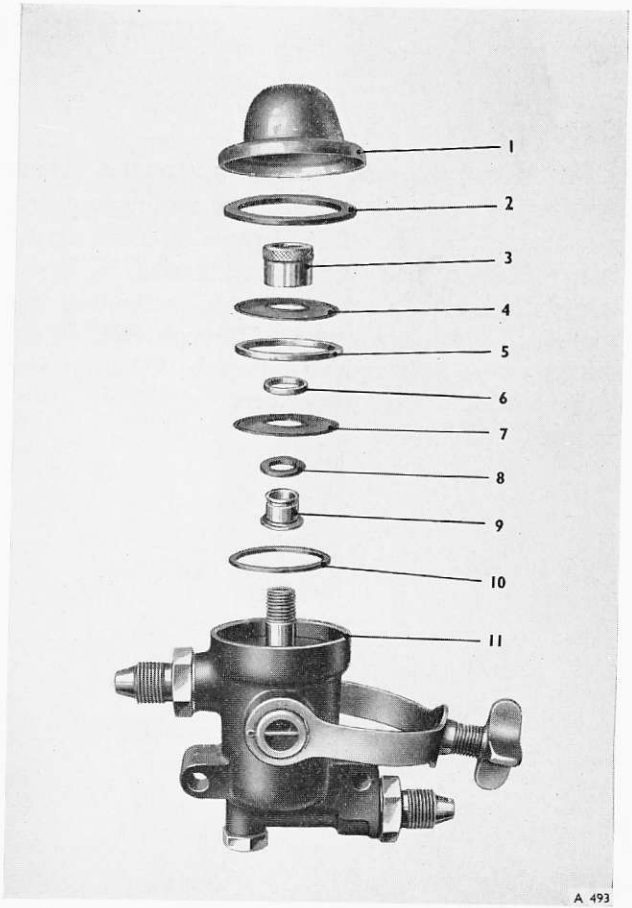

Fig. K4 Rear filter

1. COVER
2. COVER SEAL
3. KNURLED NUT
4. FILTER GAUZE
5. DISTANCE WASHER (OUTER)
6. DISTANCE WASHER (INNER)
7. FILTER GAUZE
8. RUBBER WASHER
9. REMOVAL SLEEVE
10. RUBBER WASHER
11. FILTER BODY

To remove the gauzes for cleaning, unscrew the yoke retaining nut, move the stirrup to one side and remove the cover. Unscrew the knurled nut securing the gauzes in position, and withdraw the gauzes by means of the centre sleeve, then clean them in petrol with a stiff brush. Remove the drain plug from the filter bowl and wipe out the bowl.

When re-fitting the cover, ensure that the sealing washer is in good condition and is correctly positioned. Care should be taken to ensure that when securing the yoke it is not over-tightened. Any leaks on the suction side of the pumps, although not apparent by the leakage of fuel, will impair the engine performance.

SECTION K2 — THE FUEL PUMPS

Description

On S1 and S2 cars, the fuel pump unit, which consists of two electrically operated pumps, is mounted on the outer side of the right-hand chassis frame member. Each pump has a flexible Neoprene fabric diaphragm, a solenoid, a trip mechanism and suction and delivery valves. Although each of the pumps works independently, they both deliver fuel into a common delivery chamber.

Failure of the Pump Unit to Deliver Fuel

If the pump fails to operate, proceed as follows:

Switch on the ignition system, then slacken the outlet union of the pump unit. If fuel is pumped out, filters in the carburetter inlets should be examined for the presence of foreign matter; also check the operation of the float chamber needle valves.

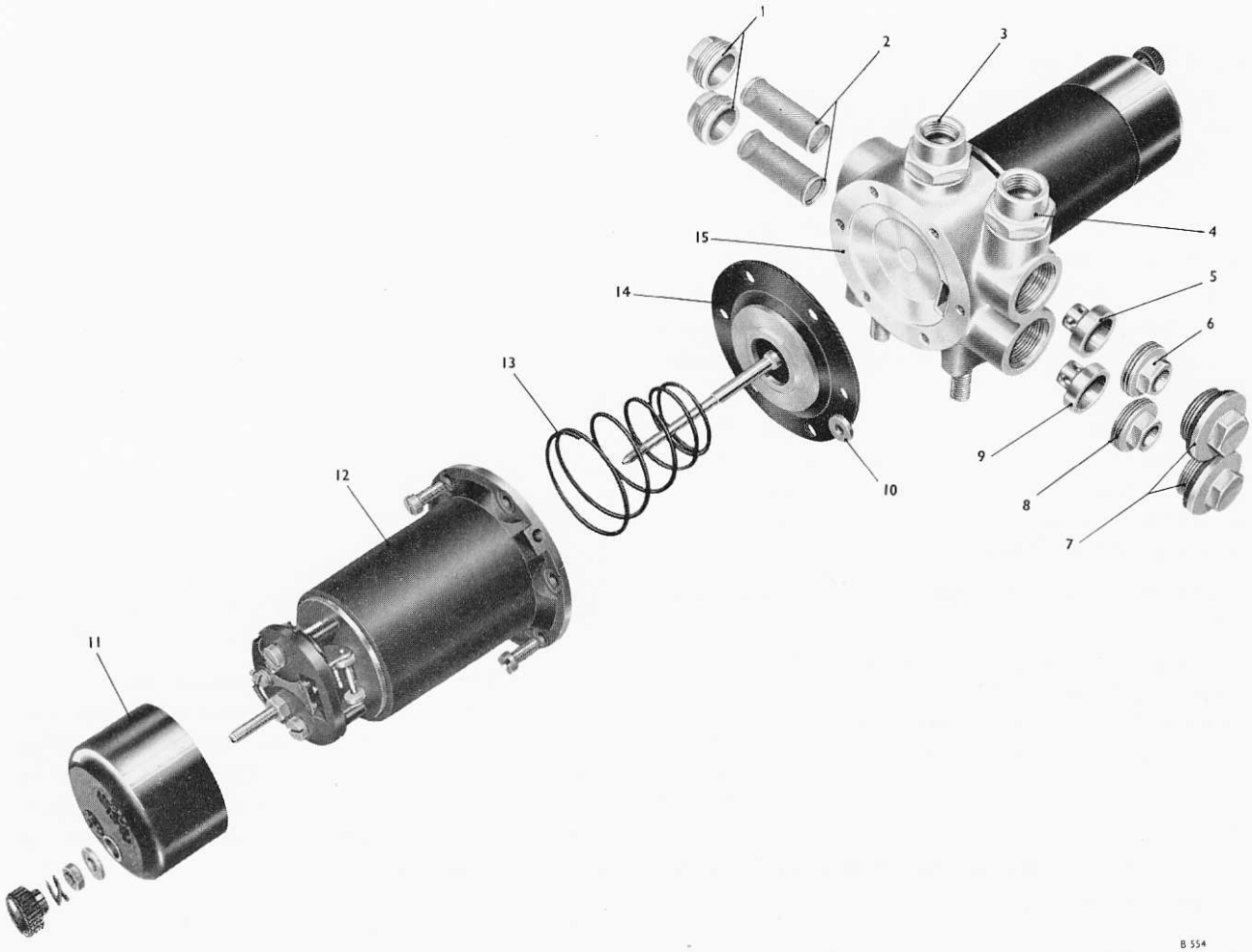

Fig. K5 Fuel pump details

1. CAP NUTS
2. FILTERS
3. PUMP INLET ADAPTER
4. PUMP OUTLET ADAPTER
5. OUTLET VALVE ASSEMBLY
6. OUTLET VALVE RETAINING RING
7. CAP NUTS
8. INLET VALVE RETAINING RING
9. INLET VALVE ASSEMBLY
10. ROLLER
11. END COVER
12. SOLENOID HOUSING
13. SPRING
14. DIAPHRAGM ASSEMBLY
15. PUMP BODY

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If fuel is not pumped out of the outlet union, check the electrical supply to the fuel pump unit by connecting a 12 volt bulb between the electrical supply and the pump body. If the bulb fails to light, check the earthing of the pump and the supply lead back to the main ignition fuse (No. 11).

If the fault still persists after checking the above points, remove the inlet and outlet valve assemblies from the pump (see Fig. K5). Check that the assemblies are clean and that they operate freely. The two valves should be fitted with their smooth faces downwards.

If the pump still fails to operate, disconnect the terminals at each end of the pump unit and remove the end covers. Examine each pumping unit in turn, ensuring that the points are making contact. Clean the points by drawing a piece of fine glass paper across them whilst they are held together.

In order to check the flow of current through the units, touch each end terminal in turn with its corresponding supply lead. If a spark is not obtained then a fault in the electrical circuit of the pump is denoted and the pump should be renewed.

If the pump unit ticks excessively, yet does not deliver fuel to the engine, this is an indication that there is either a shortage of fuel, an air leak or a defect in the unit itself.

A hot pump indicates a restriction on the inlet side of the unit. Check the level of the fuel in the tank and examine all unions and joints between the tank and the pump unit for leaks.

If no leak is apparent, release the cover of the rear fuel filter to prevent siphoning of the fuel from the tank, then remove the fuel inlet pipe from the pump. Replace the pipe with a length of rubber tubing, the end of which should be immersed in a container of petrol. Check the operation of the pump; if it is satisfactory, a blockage is indicated in the fuel inlet pipe or the rear filter. If, however, the fault still persists, remove the pump and examine the diaphragms.

Fuel Pump — to remove and fit

Disconnect the battery leads.

Remove the cover from the rear filter; this will prevent loss of fuel by siphoning, as the level of the fuel in the tank is above the pump.

Disconnect the delivery and feed pipes from the fuel pump.

Disconnect the following electrical leads: the supply lead from the rear pump terminal, the lead to the radio interference suppressor, the connecting lead to the front pump terminal and the suppressor lead from the front pump.

Remove the two nuts and spring washers securing the pump unit to the mounting bracket on the chassis frame.

To fit the fuel pump, reverse the procedure given for its removal. It is essential to ensure that when fitting the fuel pump, the delivery and feed pipes of the fuel system are kept clear of the chassis frame between the insulated mounting clips, in order to prevent excessive transmission of noise from the pumps.

Diaphragms — to renew

Remove the six screws which secure the solenoid housing to the pump body, then withdraw the housing complete with the diaphragm assembly. Release the membranes from the housing flange, then unscrew the diaphragm assembly and remove the eleven brass rollers.

Wash all parts in clean petrol and examine the brass rollers and diaphragm; the diaphragm assembly must be renewed if the membranes are found to be swollen, warped or perforated.

The spherical edges of the rollers should be examined for flats and renewed if necessary.

> **Note:** Before re-assembling the pump, the spring blade retaining screw in the contact breaker should be released sufficiently to ensure that pressure is not applied to the tungsten points and the outer rocker. If pressure is applied at this point during assembly, the correct setting of the diaphragm cannot be obtained.

To re-assemble the pump, place the large end of the spring in the solenoid housing, then check that the impact washer is located correctly in the armature recess. Insert the bronze rod of the diaphragm assembly through the hole in the solenoid core and screw it firmly into the inner rocker trunnion.

Holding the solenoid housing with the flange uppermost, lift the edge of the diaphragm and insert the eleven brass rollers into the annular recess in the armature.

Fig. K6 Adjusting the diaphragm

1. ROCKER HINGE PIN

Turn the solenoid housing horizontally as shown in Figure K6 and progressively unscrew the diaphragm assembly one sixth of a turn at a time; i.e. one hole in the solenoid flange. Whilst unscrewing the assembly, the diaphragm should be moved in and out until finally the outer rocker 'toggles over' when the diaphragm is pressed in. Unscrew the assembly one further complete turn.

Tighten the spring blade retaining screw in the contact breaker.

Secure the solenoid housing to the main pump body with six setscrews, ensuring that the rollers are not trapped.

Remove the rocker hinge pin, allowing the armature spring to press the diaphragm assembly further back and stretch the diaphragm membranes. Tighten the setscrews securing the solenoid housing to the pump body. Re-fit the hinge pin and the end cover.

Test Data

On all S1 cars, both pumps operating together deliver 1 pint of paraffin in 32 seconds with a suction lift of 3 ft. (0·91 m.).

On all S2 cars, both pumps operating together deliver 1 pint of paraffin in 22 seconds with a suction lift of 1 ft. (0·3 m.).

The pump unit should be mounted on a test rig either 1 ft. (0·3 m.) or 3 ft. (0·91 m.) above a paraffin bath, according to the type of car. Fit pipes to the inlet and outlet of the pump and check the pump delivery over a given period.

SECTION K3 — AIR CLEANERS

S1 cars

The air supply to the carburetters is thoroughly cleaned in passing through the combined air cleaner and intake silencer.

The standard air cleaner for 'home' use is the A.C. type, illustrated in Figure K7.

This cleaner should be serviced every 10,000 miles (16,000 km.) as follows:

(i) Remove the butterfly nut and end cover.

(ii) Remove the filter element and wash it in petrol or paraffin, then oil with engine oil. Before re-fitting allow it to drain thoroughly.

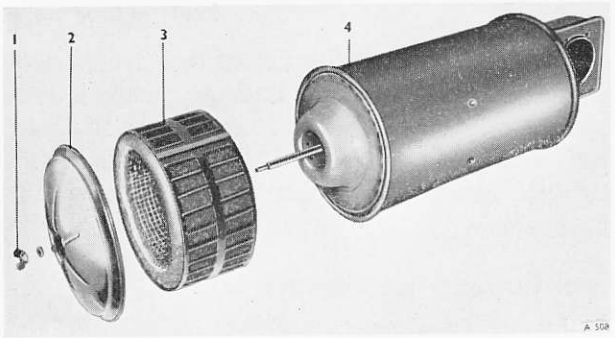

Fig. K7 A.C. type air cleaner — S1 cars

1. WING NUT
2. END COVER
3. FILTER ELEMENT
4. BODY

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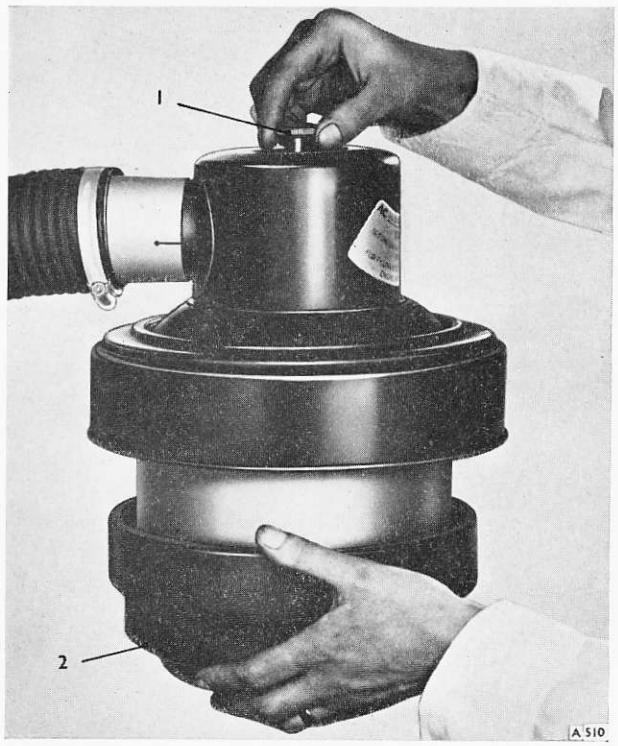

Fig. K8 Removing oil bath air cleaner — S1 cars

1. OIL BATH RETAINING SCREW 2. OIL BATH

The 'oil bath' type cleaner, shown in Figures K8 and K9, is fitted to cars destined for overseas and is available for cars operating in dusty conditions.

This cleaner should be serviced every 1,000 miles (1,600 km.), or more frequently if conditions warrant, as follows:

(i) Support the filter bowl in one hand and unscrew the knurled nut.

(ii) Remove the oil container, then empty and clean it. Wash the filter element in petrol and allow it to dry.

(iii) Re-fit the element, re-fill the filter bowl with SAE 20 oil to the indicated level, and re-fit in position.

The air cleaner fitted to **Continental S1 cars** is the 'Vokes' type.

This cleaner should be serviced every 5,000 miles (8,000 km.) as follows:

(i) Unscrew the wing nut and remove the end cover; withdraw the felt element.

(ii) Blow off any dust and grit with compressed air; it is necessary to clean each corrugation separately.

(iii) Re-fit in position.

Every 20,000 miles (32,000 km.) the felt element should be discarded and a new one fitted.

S2 cars

The air cleaner fitted to all S2 models is the 'Purolator' type illustrated in Figure K10.

The element should be renewed at intervals of 10,000 miles (16,000 km.)

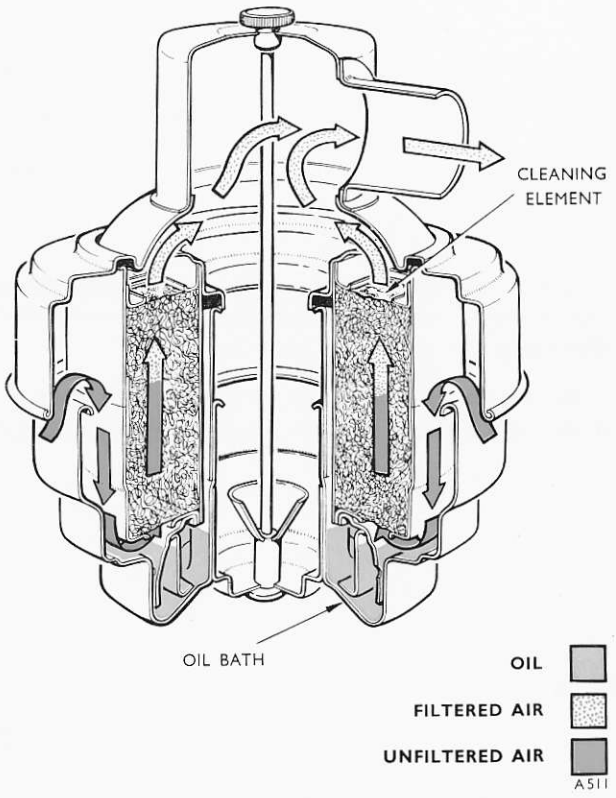

Fig. K9 Air flow through oil bath cleaner

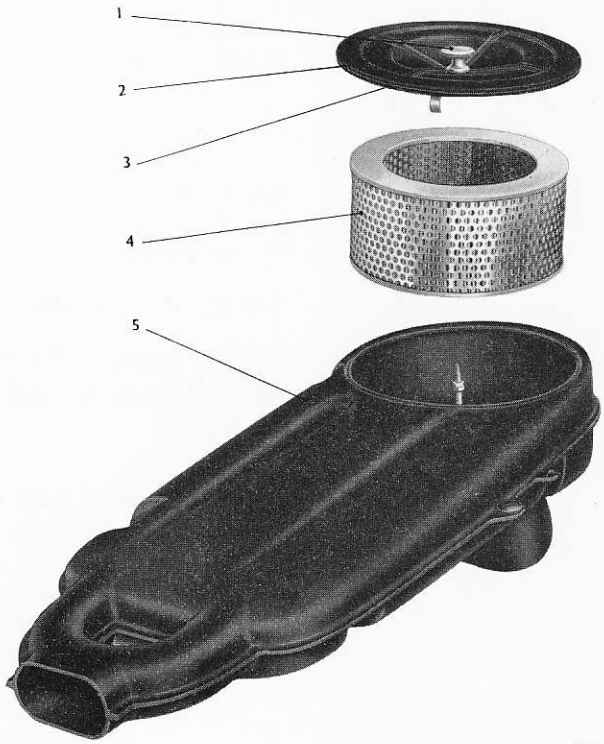

Fig. K10 Air cleaner — S2 cars

1. COVER SECURING NUT
2. TOP COVER
3. RUBBER SEAL
4. FILTER ELEMENT
5. AIR CLEANER CASING

Access to the element is gained by unscrewing the knurled nut from the top of the unit and detaching the top cover and the element.

Should it be necessary to remove the element except at the stated intervals, care should be exercised to ensure that the element does not come into contact with petrol, oil or paraffin.

In cases of a choked filter element, the element should be renewed, as effective cleaning is impracticable.

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SECTION K4 — THE CARBURETTER AND THE AUTOMATIC CHOKE SYSTEM

Data

	Early S1 cars	All S2 cars
Carburetter	S.U. HD 6 diaphragm type	S.U. HD 6 diaphragm type
Choke size	1·750 in. (44·45 mm.) dia. bore	1·750 in. (44·45 mm.) dia. bore
Jet size	0·100 in. (2·54 mm.) dia.	0·100 in. (2·54 mm.) dia.
Jet needle	TA — AC type cleaner TC — oil bath cleaner	SH

	Bentley Continental and late S1 cars
Carburetter	S.U. HD 8 diaphragm type
Choke size	2·00 in. (50·80 mm.) dia. bore
Jet size	0·125 in. (3·175 mm.) dia.
Jet needle	Bentley Continental with 'Vokes' cleaner UC late S1 AC cleaner UC late S1 oil bath cleaner UD

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Description

On S1 cars, two S.U. carburetters of the diaphragm type are fitted to the engine on a side induction manifold.

On S2 cars, the carburetters 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 which is dependent on the degrees of throttle opening, engine speed and loading. This is effected by using the manifold depression to raise the air valve carrying the jet needle which regulates the fuel delivery.

Whilst employing the fundamental design and principle of the standard S.U. carburetter, two differences are incorporated. These consist of a flexible synthetic rubber diaphragm, which replaces the jet glands, and a throttle by-pass, which feeds the idling mixture directly from the choke space to the manifold side of the carburetter instead of it passing under the throttle butterfly. The carburetter main jet is secured to the diaphragm by the jet cup and the jet return spring cup. The diaphragm is in turn secured at its

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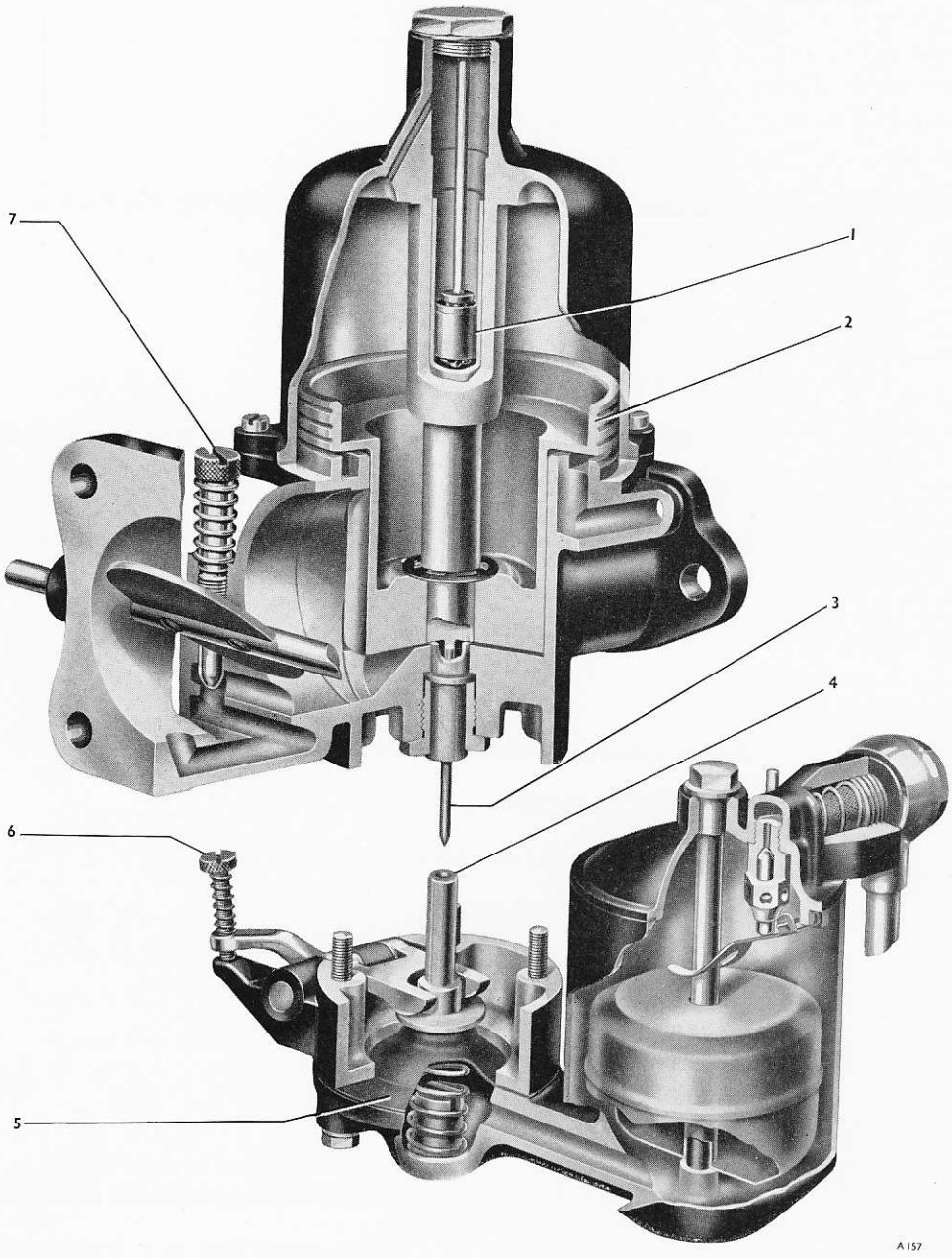

Fig. K11 Carburetter details

1. HYDRAULIC DAMPER
2. PISTON
3. NEEDLE
4. JET
5. DIAPHRAGM
6. MIXTURE ADJUSTMENT
7. SLOW RUNNING ADJUSTMENT

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outer edge between the diaphragm housing and the main jet well. The jet is spring-loaded away from the base of the jet well.

On S2 cars, the carburetters are fitted with a nylon block in the jet well to prevent vaporisation of the fuel.

The jet is fed through its lower end from the main jet well, its movement being controlled by the jet return spring and the adjusting screw which actuates a rocking lever. This lever raises or lowers the jet as required, and so controls the idling mixture. Turning the adjusting screw clockwise lowers the jet and enriches the mixture; turning the screw anti-clockwise weakens the mixture.

When idling with a warm engine the mixture passes through the by-pass. This passage is restricted by an adjusting screw, which controls the amount of mixture passing through the by-pass and so determines the engine's idling speed.

When the engine has attained its normal working temperature and is at idling speed, the throttle butterfly is closed, but when the engine is cold the throttle is slightly open, due to the action of the automatic choke system. In this case the mixture passes both under the throttle butterfly and through the by-pass to give 'fast–idle' conditions.

Defects in Operation

In the event of unsatisfactory running of the engine, a thorough examination should be made of the following:

1. Ignition system, sparking plugs for efficient operation.
2. Fuel pump for correct delivery.
3. Air silencer for a choked element.
4. All manifold joints for security.

If, after examination, it is found that the carburetters are faulty, check the following points:

Sticking piston

A sticking piston can be recognised by any one of the following faults:

1. Stalling.
2. Poor slow running.
3. Lack of power.
4. High fuel consumption.

To determine over which part of the stroke the piston is sticking, proceed as described below.

Remove the hosing from the butterfly housing, then remove the air silencer and hosing from the bonnet. A spring-loaded pin, located on the right-hand side of the suction chamber, is provided for lifting the piston.

Normally, when the engine is not running, the piston rests on the buffer pin in the base of the piston just above the bridge of the main carburetter body. Raise the piston to its highest position, against the resistance of the damper piston, then release it and check that it drops freely. If the downward movement of the piston is sluggish or if the piston does not readily leave the bridge of the carburetter, lower the main jet by means of the mixture adjustment screw and repeat the check on the piston.

The elimination of sticking by lowering the jet indicates that the needle is fouling the jet. First check for a bent needle; if the needle is satisfactory, it will be necessary to centralise the jet (see sub-section 'Main Jet — to centralise').

After lowering the jet, if the piston continues to stick it is probable that the piston is fouling the side of the suction chamber or that the piston rod is not free to move within its bush.

An alternative cause is that the damper may be bent, thereby inducing friction between the damper piston and the bore of the main piston rod.

To check the latter cause remove the oil cap and damper piston assembly and repeat the check for a sticking piston. If it is determined that the damper rod is bent, it should be straightened before re-fitting it to the carburetter.

Dirt between the piston and suction chamber, and piston rod sticking in its bush

Remove the suction chamber and damper piston assembly, then remove the piston and needle. Clean all the parts with clean petrol and wipe dry with a clean lint-free cloth. Apply a few drops of a clean light oil to the piston rod. If there are any signs of

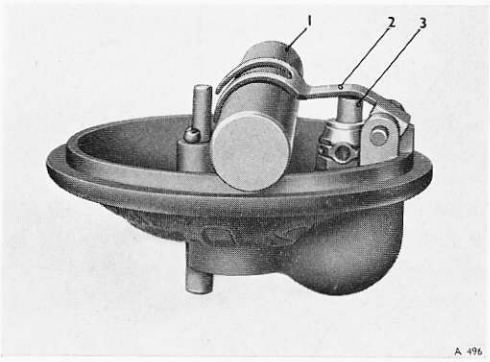

Fig. K12 Checking fuel level

1. TEST BAR 2. FORKED LEVER 3. NEEDLE VALVE

rust or corrosion the oil should be diluted with a few drops of paraffin. Invert the suction chamber and fit the piston, then check that it is free to rotate and slide up and down. On no account must any attempt be made to increase the bore of the suction chamber, or to reduce the diameter of the enlarged part of the piston, as the maintenance of a limited clearance between these two parts is essential for the correct operation of the carburetter.

Flooding of the float chamber or the jet

The following points should be checked if this fault is suspected:

1. Punctured float.
2. Dirty or worn needle valve seating.
3. Incorrectly set float level.

To remedy this fault, remove the centre bolt securing the float chamber lid and remove the lid. Thoroughly clean the float chamber and needle valve or renew the float if it is punctured. When assembling the float chamber, re-set the float level forks and ensure that the cork washer, fitted between the float chamber body and the lid, is correctly seated. Examine the fibre sealing washer fitted to the centre bolt and renew if necessary.

Water or foreign matter in the float chamber

Remove the float chamber lid, then withdraw the float. Thoroughly clean the float chamber and the filter in the lid. If dirt is present in the float chamber, it is possible that the main jet may also be choked. The following method should successfully clear a choked jet:

1. Lower the jet to its bottom position by means of the mixture adjusting screw.
2. Remove the suction chamber and withdraw the piston and needle.
3. Re-fit the suction chamber and seal the air intake.
4. Ensure that the ignition is switched 'Off' and operate the starter motor by means of the solenoid mounted on the chassis frame. This should result in any foreign matter being drawn out of the jet into the carburetter body. Should this fail to clear the blockage, remove and clean the jet. If globules of water are found in the carburetter, the fuel system should be cleaned thoroughly and the fuel tank drained to inspect the fuel for water content.

To Check the Fuel Level in the Float Chamber

The level of fuel in the carburetter float chamber is determined by the position of the forked lever which bears on the top of the float (see Fig. K12). The lever should be set so that when it holds the needle against its seat a $\frac{7}{16}$ in. (11·11 mm.) dia. rod can be just passed between the lever and the sealing rim of the float chamber lip, as shown in Figure K12. Examine the needle and seating for wear and renew if necessary.

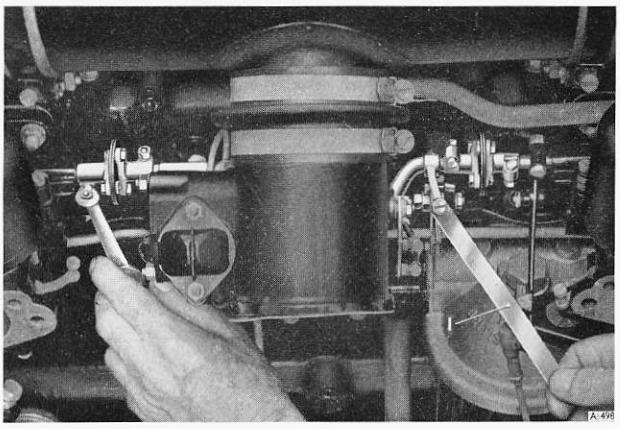

Fig. K13 Synchronising throttles — S1 cars

1. FEELER GAUGE IN POSITION

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Failure of Fuel Supply to the Float Chamber

If the engine stalls when idling or under light running conditions and it is known that a good supply of fuel is available at the float chamber inlet union, it is possible that the float needle valve is stuck to its seating. This results from a gum deposit, which forms in the fuel system after prolonged storage of fuel in the tank. Remove the float chamber lid and withdraw the needle valve, then clean the valve and its seating with a clean cloth soaked in alcohol. Cleaning of the seat will be facilitated by wrapping the cloth around a match stick. Repeated trouble of this nature can only be rectified by completely dismantling and thoroughly cleansing the fuel system and tank.

If the engine shows signs of serious power loss, evident at high speeds and engine loading, it is possible that the delivery of fuel is not sufficient. The fuel pump should be checked for adequate delivery and the filters in the system should be inspected and cleaned.

Sticking Jet

If it is difficult to raise and lower the jet by means of the mixture adjustment mechanism, the jet should be lowered to its bottom position and the lower part of the lever thus exposed should be smeared with petroleum jelly or a similar type of lubricant. Raise and lower the jet repeatedly until the lubricant has coated the jet and its surrounding parts.

Carburetters — to remove

S1 cars

1. Remove the air cleaner by removing the two securing straps and rubber connecting hose.
2. Disconnect the windscreen washer pipe from the induction manifold and the electrical leads from the choke solenoid.
3. Disconnect the fuel pipes from both carburetters.
4. Disconnect the throttle control at the ball joint.
5. Remove the nuts securing the air intake pipe to the carburetter air intake flanges.
6. Unscrew the four nuts retaining each carburetter and remove the carburetters.

Note: If necessary, both carburetters can be removed while attached to the air intake.

S2 cars

The carburetters should be removed in the following manner.

Disconnect the battery lead.

Disconnect the hosing from the air silencer and butterfly housing.

Remove the air silencer from the bonnet.

Disconnect the electrical wiring system from the automatic choke solenoid.

Disconnect the throttle linkage from the fore and aft manifold shaft to 'B' bank carburetter.

Disconnect the fuel feed and drain pipes.

Remove the two choke stove pipes from the 'A' bank exhaust manifold also the butterfly housing and bimetal coil cover.

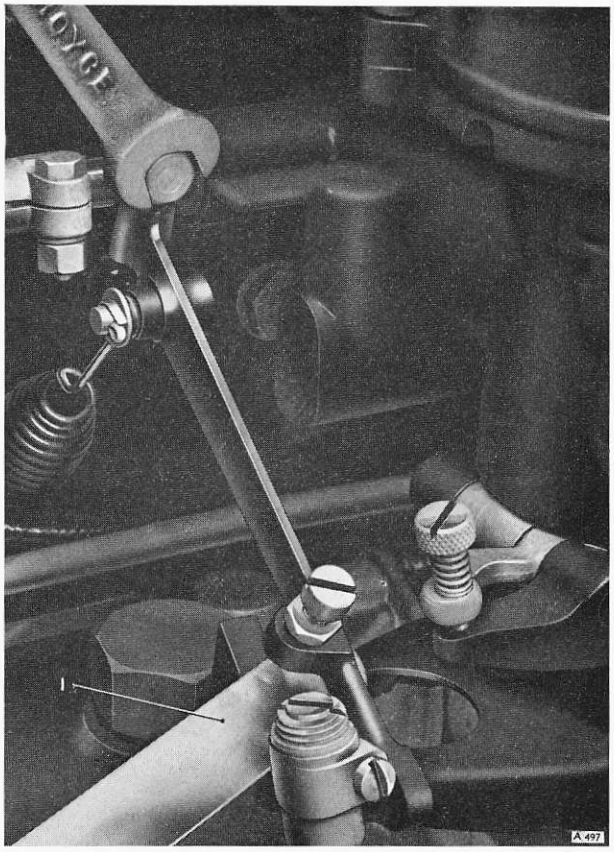

Fig. K14 Setting throttle lever — S1 cars

1. FEELER GAUGE IN POSITION

Remove the air horns, the butterfly housing, the carburetters and the 'Tee'-piece as a complete assembly. The assembly is secured to the induction manifold by a single bolt, location being provided by two dowel pins.

Remove the 'fast-idle' link rod from the choke butterfly.

Remove the link and spring connecting the two throttles.

Remove the air intake assemblies from the carburetters and the butterfly housing.

Remove the carburetters.

Carburetter — to dismantle

Remove the lid of the float chamber, together with the needle valve and filter, then withdraw the float.

Remove the three screws securing the suction chamber to the main carburetter body, then withdraw the piston and needle.

Remove the hydraulic piston damper assembly from the top of the suction chamber. Unscrew and remove the four bolts retaining the float chamber and diaphragm casing to the carburetter body.

Remove the jet diaphragm assembly taking care to retain the spring.

The jet needle may be removed from the piston by unscrewing the small grub screw in the piston.

Fig. K15 Setting throttle lever — S2 cars

1. THROTTLE STOP ADJUSTING SCREW
2. FEELER GAUGE IN POSITION

Main Jet — to centralise

Remove the float chamber and diaphragm casing. Slacken the nut securing the jet bearing, then with the piston resting on the bridge of the carburetter, fit the jet into its bearing so that the jet cup seats on the jet bearing. It is important that the jet and diaphragm be kept in the same radial position relative to the carburetter body, as the jet orifice is not necessarily concentric with its outside diameter; therefore turning may cause decentralisation. Make correlation marks by the diaphragm hole and its corresponding hole in the carburetter body. Then tighten the nut securing the jet bearing. Having tightened the nut, check that the jet is free to move inside the jet bearing and does not foul the needle.

Re-fit the diaphragm, the float chamber and diaphragm casing ensuring that the correlation marks line up with each other.

Carburetter — to overhaul

Check that the piston is not sticking in its bore.

The suction chamber and the piston are fitted as mated pairs and must not be interchanged. Clean the piston and suction chamber with a clean lint-free cloth moistened with petrol. **Do not** use a polishing paste or other abrasive compound.

Inspect the jet and jet needle for wear. Should they require renewal, the same size jet and needle must be fitted. When fitting a new needle, it should be noted that its shoulder **must** be flush with the underface of the piston.

Inspect the diaphragm and jet assembly for wear. Leaks will occur if the jet cup is insecurely fitted, or if the sealing is faulty at its outer edge, between the diaphragm casing and the main jet well.

Leaking at the outer edge may be cured by tightening the four securing bolts but if the diaphragm is leaking around the jet assembly or is torn, it must be replaced by a new assembly. When fitting a new assembly ensure that the jet is of the correct size.

Examine the hydraulic piston damper in the top of the suction chamber, checking that the piston rod is not bent. Re-fill the damper with an approved oil of viscosity SAE 20.

Check that the mixture adjustment mechanism is free to raise and lower the jet.

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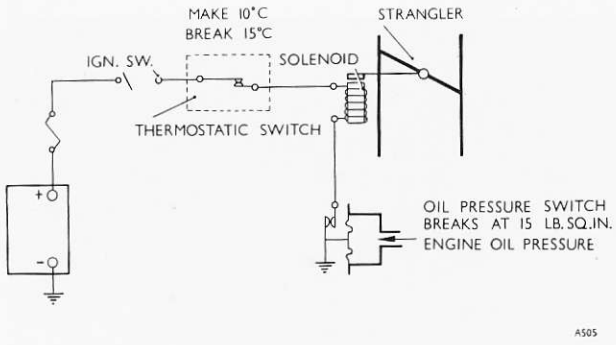

Fig. K16 Temperature control circuit — S1 cars

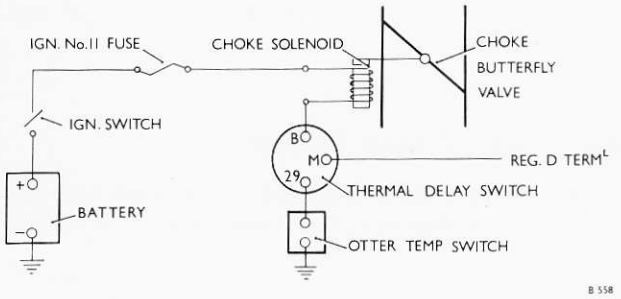

Fig. K17 Temperature control circuit — S2 cars

Throttle Synchronisation

S1 cars

Disconnect the throttle operating lever at the ball joint.

Slacken the throttle operating lever pinch bolt and screw the throttle stop fully out.

Remove the cold start adjusting screw.

Slacken the two inner pinch bolts adjacent to the flexible couplings. Close the choke butterfly and place a 0·098 in. (2·489 mm.) feeler gauge between the 'fast-idle' cam and the lever boss (see Fig. K13). Close both throttle valves by turning the couplings; tighten the pinch bolts.

Place a 0·187 in. —0·002 in. (4·08 mm. —0·05 mm.) feeler gauge between the throttle lever and the out-rigged stop. With the throttles closed while holding the lever on to the stop, tighten the pinch bolt. Enter the stop screw into position. Place a 0·002 in. (0·050 mm.) feeler gauge on the throttle stop and screw in the stop screw until it just nips the gauge (see Fig. K14). Screw in the stop screw one further half turn and tighten the lock-nut.

S2 cars

Unscrew the three screws securing the dashpots of each carburetter and remove the dashpots together with the pistons and dampers.

Slacken the two pinch bolts which clamp the operating levers to the throttle spindles.

Ensure that the choke is in the 'Off' position.

With 'B' bank throttle blade held closed, tighten the pinch bolt on 'B' bank carburetter spindle. Holding 'B' bank throttle blade in the closed position, close 'A' bank throttle blade and tighten the pinch-bolt on 'A' bank carburetter spindle.

Adjust the throttle stop screw until the gap between the screw and the throttle lever is 0·002 in. (0·050 mm.) (see Fig. K15).

Screw in the stop screw one further half turn. This will be sufficient to just 'crack off' the throttles and prevent damage to the bores of the carburetters.

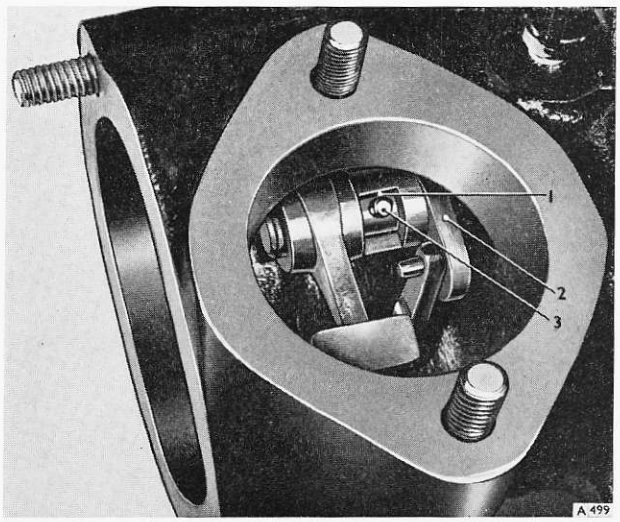

Fig. K18 Pick-up lever clearance — S1 cars

1. 0·010 in. (0·254 mm.) 2. PIN 3. LEVER

Re-fit the carburetter dashpots and pistons. Top-up with the correct oil (see Chapter D) and fit the dampers.

Automatic Choke System

The engine induction system is provided with an automatic choking device to improve starting with a cold engine.

The automatic choke system consists of five main features:

1. An out of balance butterfly valve in the butterfly housing.
2. A rubber diaphragm, subject to induction manifold depression, and indirectly connected to the butterfly valve spindle.
3. A small electromagnet wired in parallel with the starter relay circuit and in series with a thermal delay switch and temperature sensitive switch.
4. A 'fast–idle' cam, loose coupled to a pick-up lever which is in turn connected to the butterfly spindle.
5. A bimetal coil, coupled to the butterfly shaft, which is sensitive to hot air from the exhaust stove on **S2 cars** and heated water in the induction manifold on **S1 cars.**

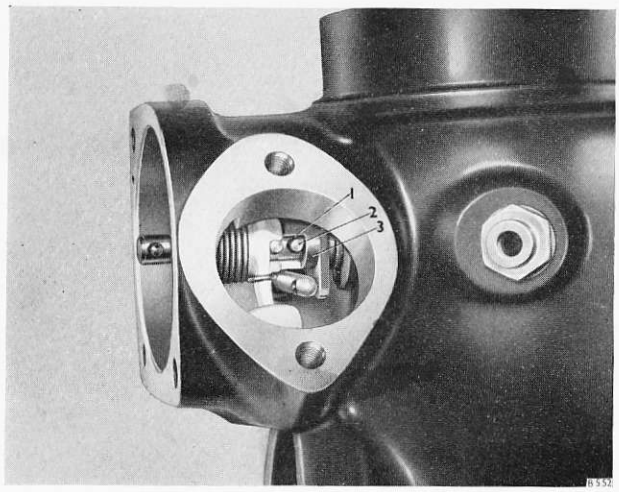

Fig. K19 Pick-up lever clearance — S2 cars

1. 0·010 in. (0·254 mm.) 2. PIN 3. LEVER

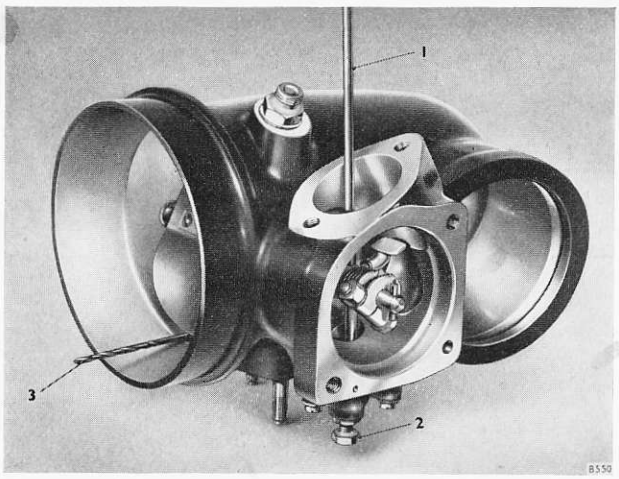

Fig. K20 Kick diaphragm adjustment — S2 cars

1. ROD HOLDING DOWN THE DEPRESSION LEVER
2. ADJUSTING SCREW
3. 0·100 in. (2·57 mm.) DRILL

Before starting the engine, depress the accelerator pedal; with a cold engine this will release the 'fast–idle' cam and allow the bimetal coils to close the butterfly valve. On releasing the accelerator pedal, the throttle stop rests on the high step 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 bimetal coils will start to open the butterfly, thereby allowing the throttle stop to rest on a lower step of the 'fast–idle' cam and giving a smaller degree of throttle opening.

Operation of the automatic choke solenoid is dependent on the underbonnet temperature of the car. If the temperature is below 15 deg. C, the 'Otter' temperature switch will be closed, completing the circuit. On switching the ignition 'On', the choke solenoid will be energised and will hold the choke butterfly valve closed. The thermal delay switch, wired in series with the solenoid and the temperature switch, is dependent on generator output: as the generator builds up to its full charge, the bimetal coil in the switch is heated and finally the switch breaks the circuit at 29½ deg. C.

The solenoid will then no longer hold the butterfly valve closed. Also, as soon as the engine is running the manifold depression acts on the rubber diaphragm, which in turn transmits its energy to the loose lever on the choke butterfly spindle. The solenoid choke lever

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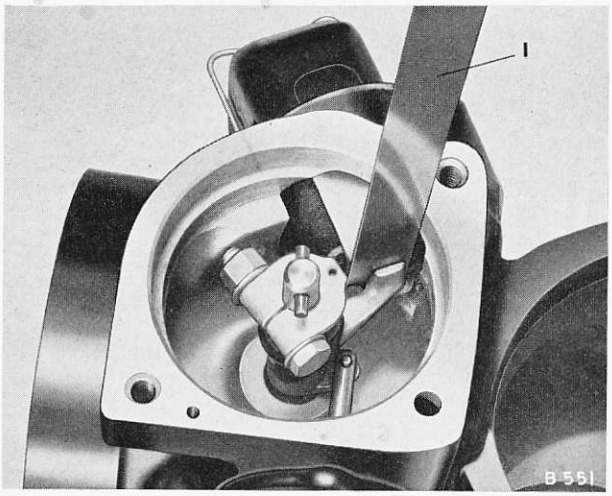

Fig. K21 Solenoid adjustment — S2 cars

1. FEELER GAUGE IN POSITION

and the depression lever are so fitted to the butterfly spindle that whilst the choke solenoid lever is held down by the solenoid, the depression lever can open the choke butterfly; the actual degree of movement being determined by the setting of the depression kick-gap.

Since the depression lever is slotted and its movement is limited, the butterfly spindle can over-ride the movement of the loose lever.

As the engine continues to run, the choke solenoid is cut out, and the movement of the choke butterfly is then controlled by the bimetal coils. The coils are temperature sensitive and heat is fed to them from the exhaust manifold stove. As the bimetal coils are heated, they gradually wind up, thus releasing the load on the butterfly spindle which will gradually open.

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

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

Automatic Choke — to set

S1 and S2 cars

Adjustments of kick diaphragm

Holding the choke butterfly closed, check the clearance between the depression valve operating link and the choke spindle pin. The clearance should be 0·010 in. (0·254 mm.) (see Figs. K18 and K19). The clearance can be adjusted by fitting washers on the diaphragm operating rod.

Adjustment of the kick-gap

The kick-gap should be set to give a reading of 0·100 in. (2·54 mm.) at the top of the choke valve.

To obtain this setting, proceed as follows:

Slacken the choke depression diaphragm locking nut (see Fig. K20). Ensure the choke is in the 'closed' position, then press down the depression valve operating lever so that the depression valve link rod bears against the end of the 2 B.A. adjusting screw.

The screw should then be adjusted so that a 0·100 in. (2·54 mm.) diameter rod or drill can be inserted between the butterfly housing and the butterfly valve (see Fig. K20). Tighten the adjusting screw lock-nut; re-check the kick-gap and adjust if necessary.

Re-fit the solenoid and shims to the butterfly housing.

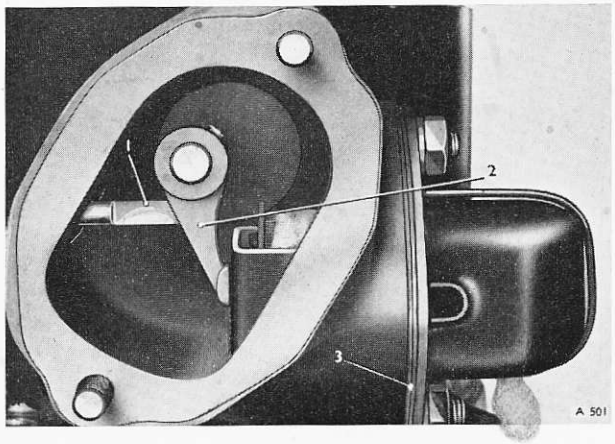

Fig. K22 Solenoid adjustment — S1 cars

1. DIAPHRAGM LINK ROD 2. BUTTERFLY LEVER 3. SHIMS

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Solenoid air gap

Hold the choke butterfly firmly closed. Check the air gap (between the solenoid lever and the solenoid) with a feeler gauge (see Fig. K21). This should be 0·0015 in. + 0·0025 in. (0·038 mm. + 0·063 mm.). Adjustment is effected by fitting shims between the solenoid and the body (see Fig. K22).

Solenoid lever spring tension setting

The spring tension should be set so that a weight of 8·25 oz. (233·88 gm.) acting on a 2 in. (50·8 mm.) arm will open the choke valve just sufficiently to allow a 0·062 in. (1·587 mm.) drill to be inserted between the valve and body as shown in Figure K23.

Having set the kick diaphragm travel and the solenoid air gap, check the setting of the lever spring as follows:

Produce a lever 2 in. (50·8 mm.) between centres to fit the choke spindle as shown in Figure K23. Secure the lever in a horizontal position, using a 2 B.A. nut and washer, connect a 12-volt battery to the solenoid and hang the weight on the lever; this should open the choke valve 0·062 in. (1·58 mm.) as described above.

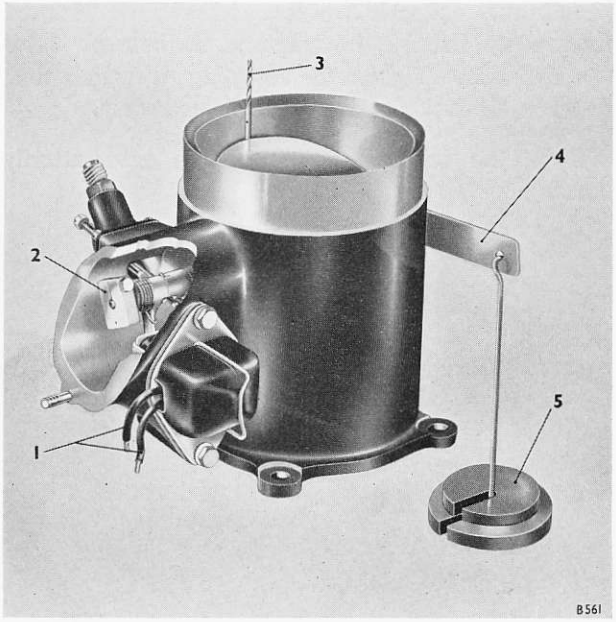

Fig. K23 Lever spring tension

1. CONNECT TO BATTERY
2. CLAMP ADJUSTER
3. ROD OR DRILL
4. LEVER
5. WEIGHT

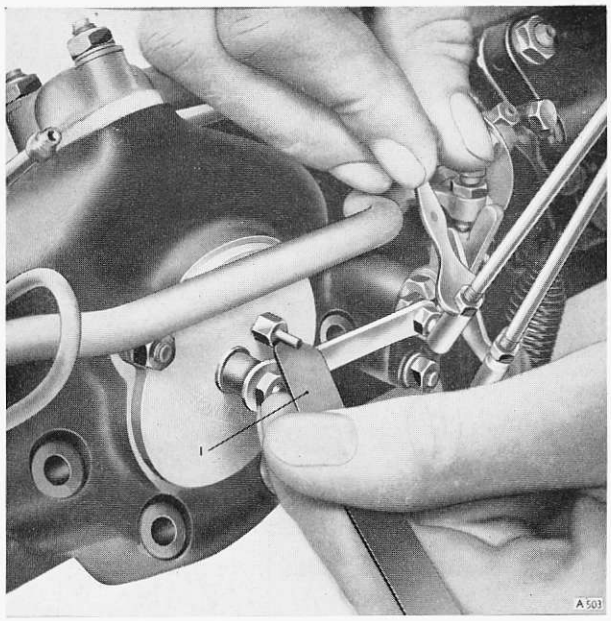

Fig. K24 Adjusting thermostat rod — S1 cars

1. FEELER GAUGE IN POSITION

Adjustment of the spring can be effected by slackening the clamping bolt and turning the clamp (see Fig. K23).

'Fast–idle' cam

Ensure that the 'fast–idle' adjusting screw is directly over the cam.

Remove the 'fast–idle' adjusting screw and ensure that the gap between the high step of the cam and the lever boss is 0·098 in. (2·489 mm.).

The 'fast–idle' cam position should be set so that there is a small clearance between the back face of the cam and the boss of the operating lever.

Adjustment of the cam is provided by lengthening or shortening the rod from the cam pick-up lever to the choke butterfly.

In cases of complaints of the car sticking on 'fast–idle' too long, when starting from cold, the clearance between the back face of the cam and the operating lever boss should be increased.

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Thermocoils

Adjustment of the thermocoils is carried out in a temperature controlled room and under no circumstances should re-adjustment be attempted without specific instructions from the factory.

The factory setting is indicated by a 'centre pop' opposite the pointer. Should any trouble be encountered this setting should be checked.

Adjustment of the thermostat linkage — S1 cars

Adjust the thermostat to butterfly rod to give a 0·031 in. (0·794 mm.) clearance between the lever and stop screw with the choke valve fully closed (see Fig. K24).

Carburetter — to set

Remove the carburetter suction chambers and pistons, taking care that the spring does not cause the piston and suction chambers to fly apart. Check that the needle shoulders are level with the piston base.

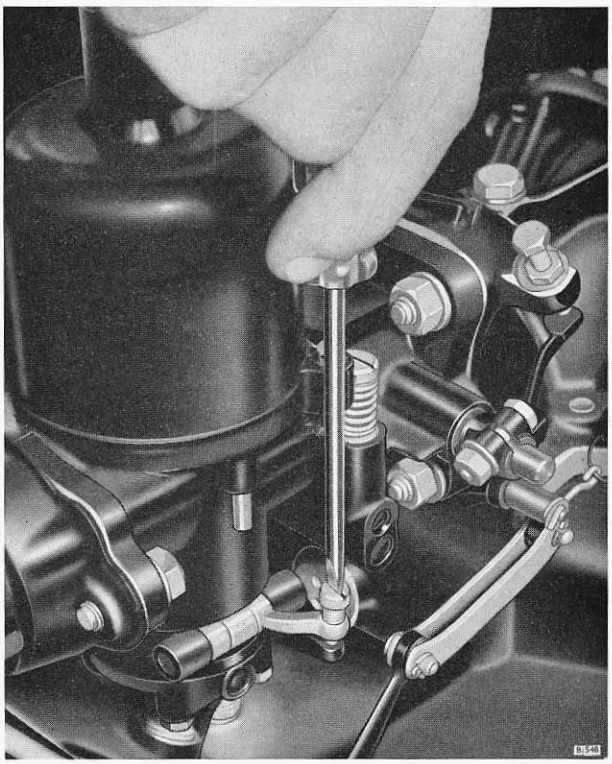

Fig. K25 Adjusting mixture control

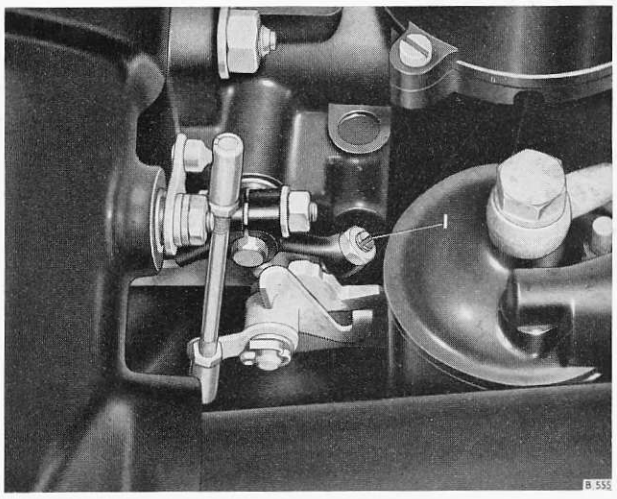

Fig. K26 'Fast-idle' adjustment — S2 cars

1. ADJUSTING SCREW

Check again that each piston is free to slide in its suction chamber.

With the suction chambers removed, roughly set the slow running as follows:

Screw down the idle bleed adjustment screw until its conical end bottoms, then turn the screw four complete turns anti-clockwise.

The mixture strength is regulated by the jet adjusting screw (see Fig. K25) and this should be unscrewed (anti-clockwise) until the jet just begins to tighten on the boss of the operating lever. Then screw it down 1½ turns.

Re-fit the suction chambers and top-up the damper reservoir with oil (see Chapter D).

Run the engine until normal running temperature is reached and carry out the final adjustments as follows:

Slow running: Set the slow running by adjusting the idle speed screws until the engine is running at approximately 400 r.p.m. to 425 r.p.m. for **S1 cars** and 450 r.p.m. to 500 r.p.m. for **S2 cars.**

It is important that both idle bleed screws are turned equal amounts whether it be clockwise to decrease engine speed or anti-clockwise to increase engine speed. If one screw is turned more than the other the carburetters will no longer be synchronised.

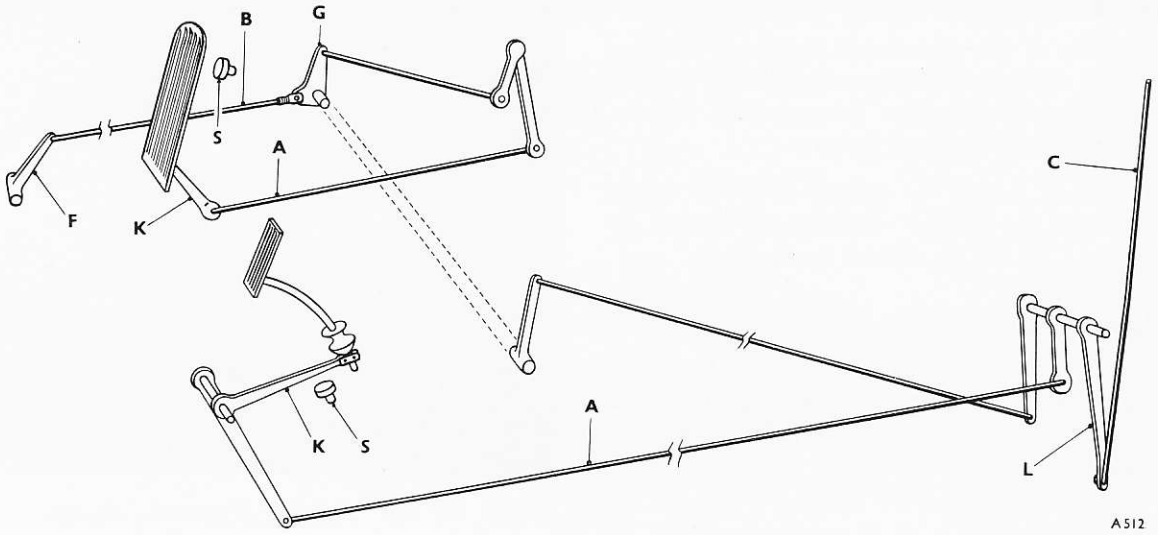

Fig. K27 Throttle valve linkage — early S1 cars

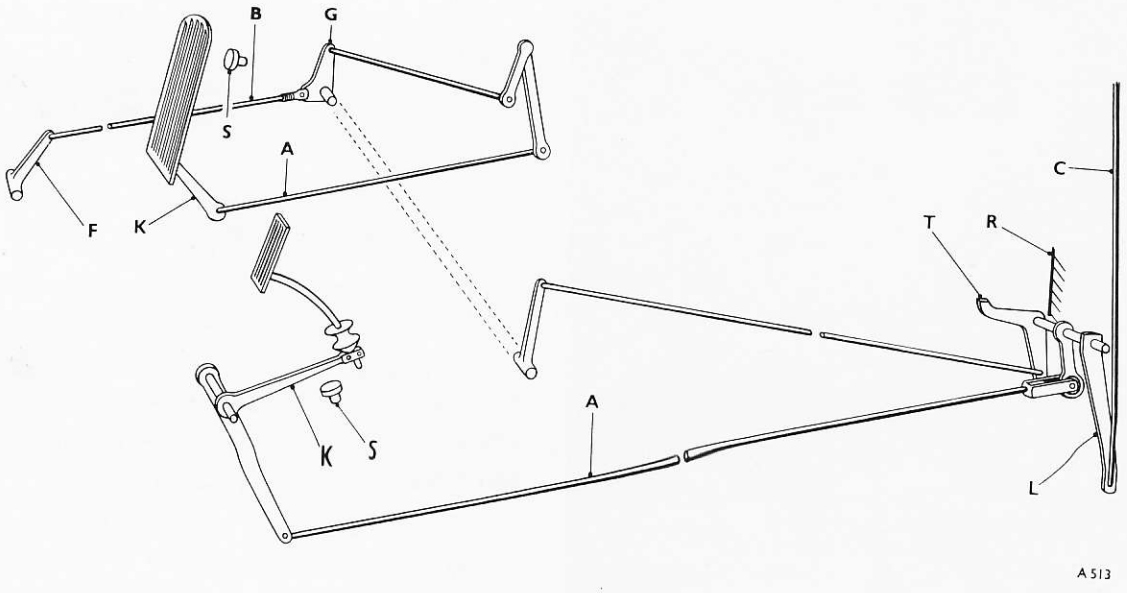

Fig. K28 Throttle valve linkage — late S1 cars

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Mixture adjustment: Slowly screw out the mixture adjusting screw on one carburetter (thereby enriching the mixture) until the engine starts to run roughly, then screw it in one full turn and repeat the procedure for the other carburetter.

It will now be possible to make finer adjustments to the mixture until the engine runs smoothly.

To check for a weak mixture, raise the piston very slightly, using the spring-loaded pin. If the mixture on that carburetter is weak the engine will speed up slightly. If the mixture is correct, the engine will begin to run roughly. Repeat for the other carburetter.

As a final check, raise the 'A' bank piston as high as possible with the spring-loaded pin. This will cut out this carburetter and cause the engine to run on 'B' bank carburetter only. If the engine stalls, richen the mixture very slightly on 'B' bank carburetter. Repeat the test on 'B' bank carburetter to test 'A' bank carburetter. If these tests prove satisfactory, re-check and if necessary set the idle speed.

Cold start engine speed

The cold start engine speed should be set with the engine at normal running temperature.

With the engine stopped, depress the accelerator; at the same time close the choke butterfly by hand. Release the accelerator; this will leave the throttles in the cold start position.

Ensure that the range selector lever is in position 'N'. **On S1 cars,** start the engine and set the speed to 1750 to 1800 r.p.m. **On S2 cars,** set the speed to 2000 r.p.m. This can be done by means of the fast idle lever adjusting screw (see Fig. K26). By slightly opening the throttles the cam will fall away; on releasing the throttles, the engine will idle normally.

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SECTION K5—THROTTLE VALVE CONTROL LINKAGE SETTINGS

Initial Control Settings—S1 cars

On early S1 cars, first disconnect rods A and B (see Fig. K27).

Check the distance between the rear face of the gearbox and the centre of the hole in lever F with the lever held forward to the limit of its travel. This should be 8·375 in. —0·060 in. (209·8 mm. —1·5 mm.). If necessary, remove the lever, and bend to suit.

Ensure that the choke is in the 'Off' position and the 'fast–idle' cam out of action. Adjust rod C so that the lever L hangs vertically or just rearwards of the vertical position. It is sufficient to position this lever by eye.

With lever F held forward to the limit of its travel, adjust rod B until it will just fit the hole in lever G, then lengthen rod B by $1\frac{1}{2}$ turns of the jaw.

Adjust the pedals of left- or right-hand drive cars as follows.

On right-hand drive cars adjust rod A so that in the full throttle position the accelerator pedal will just make contact with the pedal stop. Check that lever K is clear of the toe board in the closed throttle position.

On left-hand drive cars select one of the three holes in lever K which will give the nearest approximation to the 0·375 in. (9·525 mm.) clearance as shown in Figure K29. Connect rod A (using the selected hole), and adjust to give the 1·750 in. (44·450 mm.) dimension shown in Figure K29 in the throttle 'closed' position. Adjust the pedal 'on-stop' so that at full throttle the pedal will just make contact with it.

After the controls have been set initially it will be necessary to test the car on the road.

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On late S1 cars, to set the controls first disconnect rods A and B (see Fig. K28).

Check the distance between the rear of the gearbox and the centre of the hole in lever F with the lever held forward to the limit of its travel.

This should be 8·375 in. —0·060 in. (209·845 mm. —1·586 mm.). If necessary remove the lever and bend to suit.

Ensure that the choke is in the 'Off' position and the 'fast–idle' cam out of action.

Adjust rod C so that the lever L hangs vertically. This can be set by eye.

With lever F held forward to the limit of its travel, adjust rod B until it will fit the hole in lever G, then lengthen rod B by 1½ turns of the jaw.

Adjust the pedals of left- or right-hand drive cars as follows.

On right-hand drive cars hold the lever T in contact with the 'on-stop' R (carburetters in full throttle position) and with the accelerator pedal in contact with 'on-stop' S, adjust rod A so that it will just fit the hole in the pedal lever. Lengthen rod A by 0·250 in. (6·35 mm.) (8 turns).

On left-hand drive cars select one of the three holes in lever K, to give the nearest approximation to the 0·375 in. (9·525 mm.) dimension, as shown in Figure K29. Connect rod A (using selected hole), and adjust to give the 1·750 in. (44·450 mm.) dimension as shown in Figure K29. With the throttles closed, adjust the pedal 'on-stop' S so that the pedal will just make contact with it at the same time as lever T contacts the 'on-stop'. Raise the pedal 'on-stop' S by 2½ turns.

After the controls have been set initially it will be necessary to test the car on the road.

Road Test

With the engine and gearbox at normal running temperature, i.e. after approximately 5 to 10 miles (8 to 16 kilometres) select a suitable quiet stretch of road and proceed as follows:

Place the gear range selector lever into range 4; accelerate the car using light throttle and note the quality of the gear changes.

Gear changes should take place at the following speeds: first to second gear between 5 and 7 m.p.h. (8 and 11 k.p.h.), second to third gear between 10 and 13 m.p.h. (16 and 21 k.p.h.), third to top gear between 19 and 22 m.p.h. (30 and 36 k.p.h.).

It should be noted that the greater the throttle opening the higher will be the speeds at which the gear changes occur.

Starting the car from rest, apply full throttle and again note the quality of the gear changes.

Kick-down — to test

Choose a suitable section of road and with the car running at approximately 40 m.p.h. (64·37 k.p.h.) apply full throttle; 'kick-down' should occur just as the accelerator pedal touches the 'on-stop' S or it may require slight additional pressure. This should finally be set to the customer's requirements.

Kick-down should be obtained in top gear from speeds of 30 m.p.h. to 65 m.p.h. (48 to 105 k.p.h.) and should be tested at various speeds up to 65 m.p.h. (105 k.p.h.).

Jerky Gear Changes — to rectify

Jerky changes can be caused by excessive throttle valve pressure and can be overcome by shortening rod B one half turn at a time until satisfactory gear changes are obtained.

Slipping Gear Changes — to rectify

Slipping gear changes can be caused by insufficient throttle valve pressure. This can be overcome by lengthening rod B one half turn at a time until satisfactory changes are obtained.

Kick-down Adjustment — right-hand drive cars

When satisfactory gear changes are obtained, set the kick-down as follows:

Inability to obtain kick-down can be caused by insufficient travel of lever F towards the rear of the car and can be corrected by shortening rod A. In the case of the kick-down being too easy, lengthen rod A.

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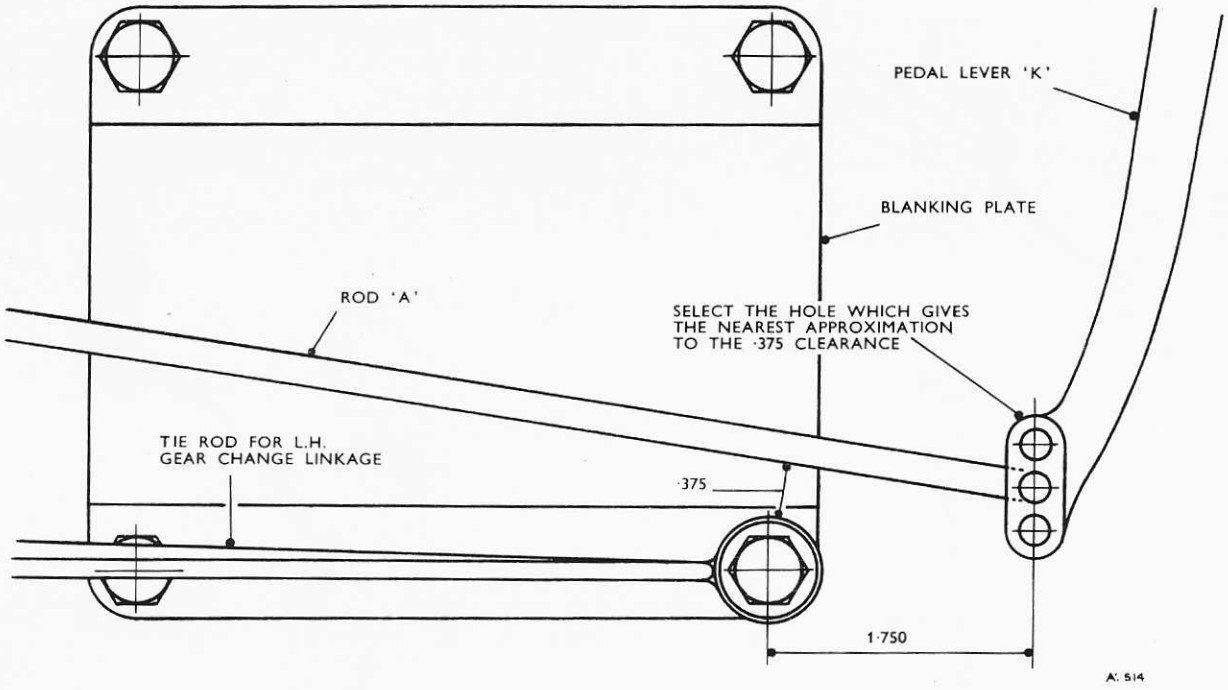

Fig. K29 Throttle valve linkage — S1 cars

Kick-down Adjustment — left-hand drive cars

The kick-down on left-hand cars is adjusted by means of the throttle stop S. To ease the kick-down, lower stop S and to make the kick-down harder, raise the stop S. Further adjustment may be effected by lengthening or shortening rod A.

Initial Control Settings — S2 cars

On right-hand drive S2 cars, first place the car on a ramp or over a pit then disconnect the T.V. rod 2 (see Fig. K30) at the gearbox end by removing the split pin and clevis pin.

Ensure that the choke is in the 'Off' position and the 'fast–idle' cam out of action.

Remove the split lever 1 by slackening the pinch bolt. Slacken the lock-nut on the 2 B.A. adjusting screw and adjust the screw so that it lies approximately half way through the lever.

Tighten the locking nut and re-fit the lever to the gearbox.

Detach rod 3 by removing the pinch bolts and ball joint adjusting screws. Check the distance between the ball joint centres as indicated in Figure K30. This should be approximately 6·200 in. (15·748 cm.).

Slacken the clamp bolts on the carburetter levers 7 and the throttle stop lock-nut. Screw out the throttle stop screw slowly until the joint 6 begins to toggle over. Screw in the throttle stop screw one full turn and lock the lock-nut.

Re-fit rod 3, ensuring that the clearance in the ball joints is a minimum, but that the joints are not tight.

Slacken the clamp bolt 5 on the manifold shaft and place a 0·3125 in. (7·9375 mm.) distance piece between the boomerang lever and the bell housing as indicated in Figure K30. If no assistance is available to hold this in position it may be secured with adhesive tape.

Hold the throttle stop lever 7 against the throttle stop screw and ensure that there is no end float in shaft 4 by pushing towards each other the two levers, then tighten the clamp bolt. Remove the

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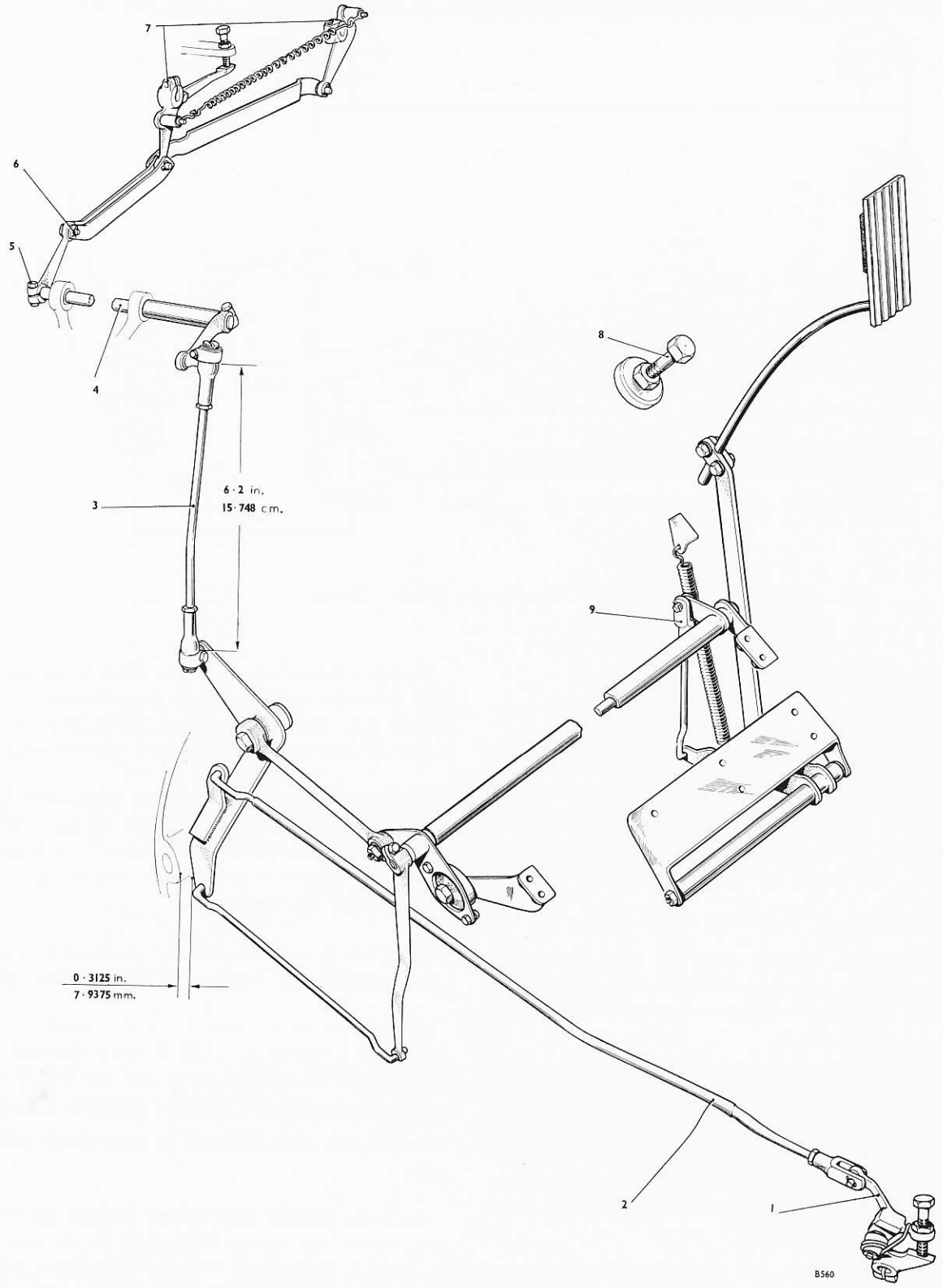

Fig. K30 Throttle linkage right-hand drive — late S2 cars

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0·3125 in. (7·9375 mm.) distance piece. Check that the boomerang lever does not foul the bell housing when it is released. If this occurs, the distance piece size must be increased to obviate this.

Adjust the T.V. rod 2 so that when the clevis pin is inserted into the hole in the split lever, the lever will be held forward to the limit of its travel. Shorten rod 2 by one full turn of the jaw and tighten the lock-nut.

It will now be necessary to synchronise the carburetters (see Section K3).

Before fitting the dashpots check that the butterflies are opening fully by depressing the accelerator pedal onto the full throttle stop.

If the butterflies do not open fully, screw down the full throttle stop 8 or shorten the rod 9. This is dependent upon the position of the accelerator pedal and the customer's requirements. If rod 9 is shortened, the pedal will be higher in the throttle closed position whereas if the stop is screwed down the pedal will be lower in the full throttle position. If the throttles open too wide, reverse the two adjustments.

Check throughout that the split pins, lock-nuts and pinch bolts are fitted and road test the car.

On left-hand drive cars, first place the car on a ramp or over a pit, then disconnect the T.V. rod 2 (see Fig. K31) at the gearbox end by removing the split pin and clevis pin.

Ensure that the choke is in the 'Off' position and the 'fast–idle' cam out of action.

Remove the split link lever 1 by slackening the pinch bolt. Slacken the lock-nut on the 2 B.A. adjusting screw and adjust the screw so that it lies approximately half way through the lever. Lock the 2 B.A. nut. Re-fit the lever to the gearbox.

Detach rod 3 by removing the pinch bolts and ball joint adjusting screws. Check the distance between the centre as indicated in Figure K31. This should be approximately 6·200 in. (15·748 cm.).

Slacken the clamp bolts on the carburetter levers 7, and the throttle stop lock-nut. Screw out the throttle stop screw slowly until the joint 6 starts to toggle over. Screw in the stop screw one full turn and lock the lock-nut.

Re-fit rod 3 ensuring that the clearance in the ball joints is at a minimum, but that the joints are not tight.

Slacken the clamp bolt on lever 5 on the manifold shaft and place a 0·250 in. (6·35 mm.) distance piece between lever 11 and the steady bracket boss 10 as indicated in Figure K31. If no assistance is available to hold this in position, it may be secured with adhesive tape.

Hold the throttle stop lever 7 against the throttle stop screw and ensure that there is no end float in shaft 4 by pushing towards each other the two levers then tighten the clamp bolt. Remove the 0·250 in. (6·35 mm.) distance piece.

Adjust rod 2 so that when the clevis pin is inserted into the hole in the split lever, the lever will be held forward to the limit of its travel. Shorten rod 2 by one full turn of the jaw and tighten the lock-nut.

It will now be necessary to synchronise the carburetters (see Section K3).

Before fitting the dashpots, check that the butterflies open fully, by depressing the accelerator pedal onto the full throttle stop.

If the butterflies do not open fully, screw down the full throttle stop 8 or shorten the rod 9. This is dependent upon the position of the accelerator pedal and the customer's requirements. If rod 9 is shortened the accelerator pedal will be raised; if the stop 8 is screwed in, the pedal will be lower in the full throttle position. If the throttles open past full throttle, then reverse the two adjustments.

Check throughout that all split pins, lock-nuts and pinch bolts are fitted, then road test the car.

Road Test

Run the car on the road for approximately 10 miles (16 km.) to warm the engine and gearbox to the normal working temperature.

Select a suitable quiet stretch of road and proceed as follows.

Place the gear range selector lever into position '4' and accelerate the car using light throttle. Note the

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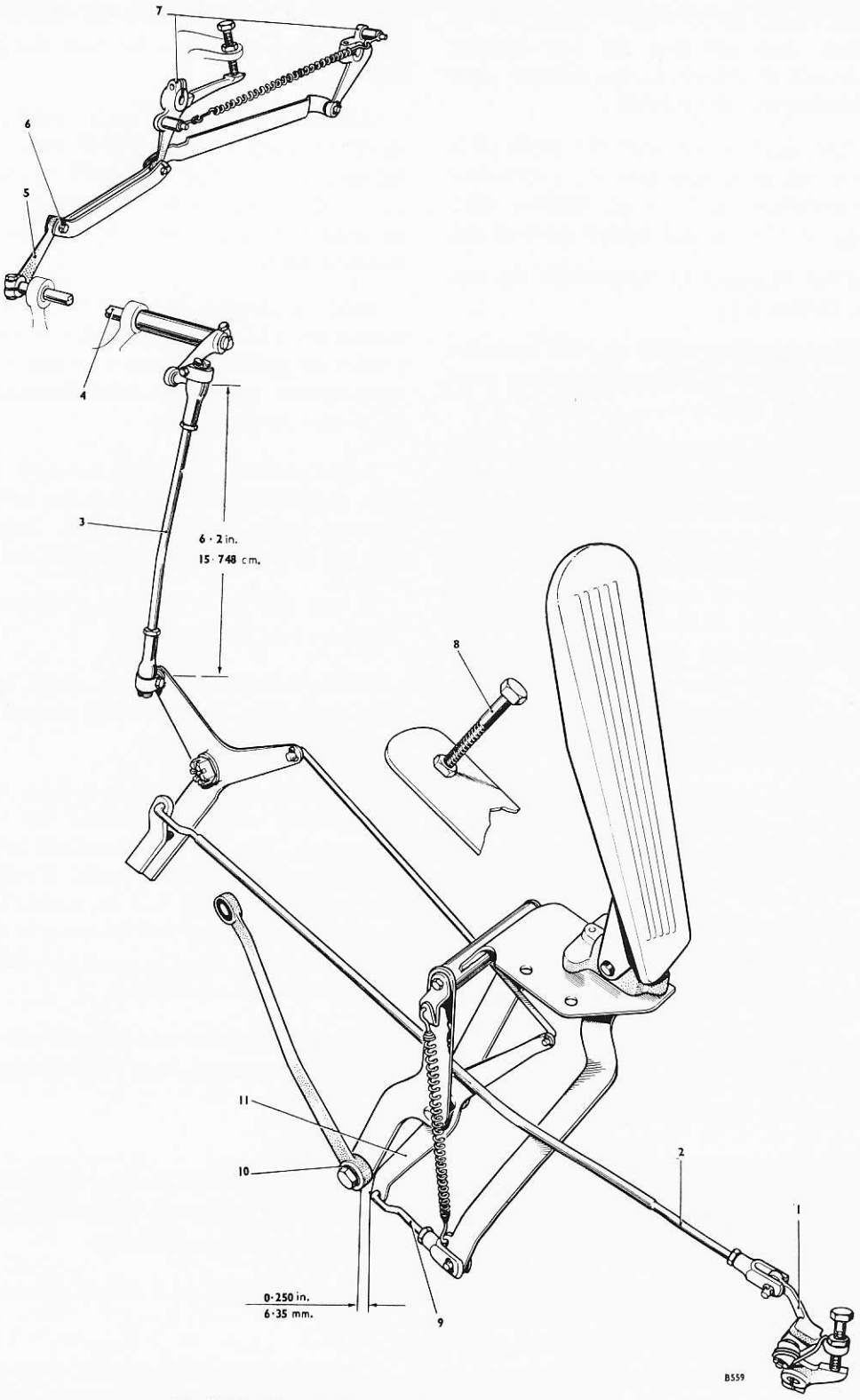

Fig. K31 Throttle linkage left-hand drive — late S2 cars

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quality of the gear changes: on light throttle these should take place as follows:

First to second gear at 7 to 9 m.p.h. (11 to 14·5 k.p.h.).

Second to third gear at 15 to 17 m.p.h. (24 to 27·5 k.p.h.).

Third to top gear at 22 to 24 m.p.h. (35·5 to 38·5 k.p.h.).

It should be noted that larger throttle openings cause the gear changes to be progressively delayed.

Jerky Gear Changes

If the gear changes are jerky or are delayed it will be necessary to adjust the screw on lever 1.

This may be carried out during the road test by first removing the rubber grommet from the floor to the left of the band adjustment blanking plate.

Slacken the lock-nut and screw out the 2 B.A. screw one quarter turn; lock the nut.

Repeat the previous test and adjust again if necessary.

This should be repeated until satisfactory gear changes are obtained.

Slipping During Gear Changes

Remove the rubber grommet from the floor. Slacken the lock-nut or lever 1 and screw in the 2 B.A. adjusting screw one quarter turn. Re-lock the nut. Repeat the test and if necessary adjust the screw again until satisfactory gear changes are obtained.

Kick-down

Choose a suitable section of road to do some fast driving. With the car running at approximately 40 m.p.h. (64 k.p.h.) apply full throttle. The car should kick-down just as the accelerator pedal touches the stop or it may require a slight squeeze. This should finally be adjusted to the customer's requirements. Kick-down should be obtainable from speeds of 30 m.p.h. (48 k.p.h.) to 70 m.p.h. (112·6 k.p.h.) and the car should be tested through this range.

To produce a more easily obtainable kick-down it will be necessary to adjust the accelerator pedal position. This can be effected either by lowering the stop 8 or shortening rod 9. If the kick-down is obtainable too easily, reverse either of these two adjustments. Kick-down should finally be set to the customer's requirements.

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CHAPTER K

FUEL SYSTEM AND CARBURETTERS

SECTION K1 — FUEL SYSTEM

Fuel tank
(Page K2 in Workshop Manual)

For S3 cars the paragraph headed 'All cars' to read
A vent pipe is fitted to the top of the fuel tank; the pipe is connected by a length of rubber hose to a further vent pipe which is fitted in the filler tube assembly. This eliminates the possibility of an air lock forming, when the tank is being filled.

Fuel tank — To remove and fit
(Page K3 in Workshop Manual)

For S3 cars the seventh and eighth paragraphs to read
Allow the tank to drop sufficiently for the rubber hose connected to the tank vent pipe to be removed. Remove the tank together with the fabric packing strips.

To fit the fuel tank, reverse the procedure adopted for its removal, making sure that the rubber hose is connected to the vent pipe as the tank is lifted into position.

SECTION K2 — THE FUEL PUMPS

Test data
(Page K6 in Workshop Manual)

On S3 cars both pumps operating together deliver 1 pint of paraffin in 28 seconds at a delivery head of 4 ft. and a suction lift of 2 ft. 6 in.

Mount the pump on a test rig 2 ft. 6 in. above a paraffin bath. Fit $\frac{5}{16}$ in. bore pipes to both the inlet and outlet unions of the pump; immerse the pipe connected to the inlet union in the paraffin bath and suspend the pipe connected to the outlet union 4 ft. above the pump unit. A measuring jar or receptacle of known capacity should be placed beneath the outlet union, and the delivery of the pump checked against a stopwatch.

The remaining information in this Section which applies to S2 cars is also applicable to S3 cars.

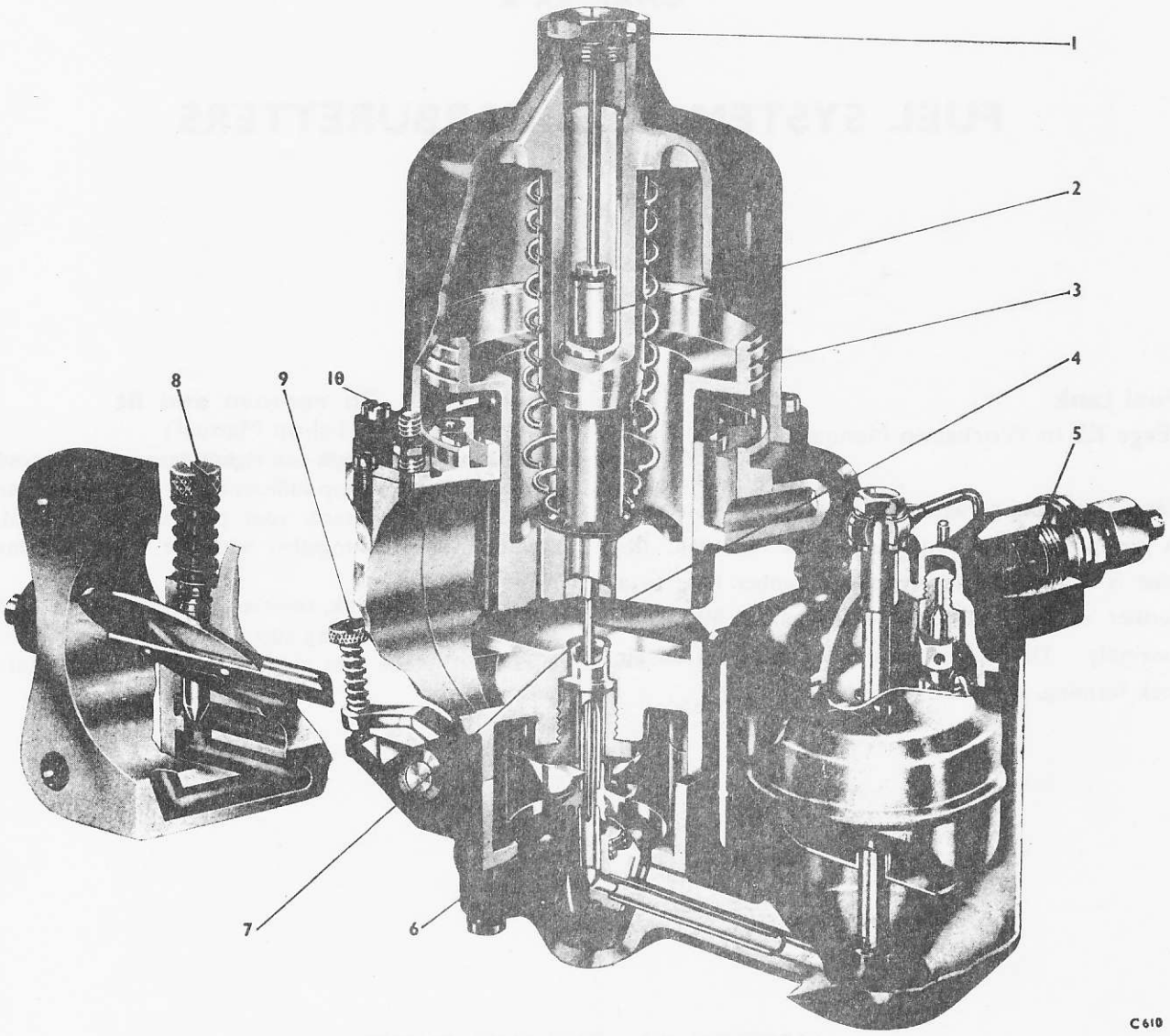

Fig. K1 (S) Cut-away view of one carburetter

1 OIL RESERVOIR CAP
2 HYDRAULIC DAMPER PISTON
3 AIR VALVE PISTON
4 NEEDLE
5 FILTER
6 DIAPHRAGM
7 JET
8 VOLUME ADJUSTMENT SCREW
9 JET ADJUSTMENT SCREW
10 VACUUM PIPE UNION

SECTION K 3 — AIR CLEANERS

S2 cars
(Page K7 in Workshop Manual)

S3 cars only

The air filter and silencer unit fitted may be either an oil soaked wire mesh element or a 'Purolator' paper element depending upon the destination of the car.

All cars destined for the following countries are fitted with a Purolator paper air filter element:

Africa (including Algeria, Egypt, Kenya, South Africa, Morocco, Sudan, Tunisia, Madeira, Tangiers, Nigeria, etc.) also Asia (including India, Turkey, Iran, Iraq, Syria, Lebanon, Israel, Jordan, Hong Kong, etc.) also Australia, New Zealand, Spain, Portugal, Greece, Yugoslavia, Gibraltar, South America, Jamaica, Bahamas and Mexico.

The Purolator element of this filter should be renewed every 12,000 miles (20,000 Kms.).

All cars destined for countries other than those previously listed are fitted with an oil wetted wire mesh air filter element.

Every 6000 miles (10,000 Kms.) the filter should be removed and washed thoroughly in petrol.

After washing, all surplus petrol should be removed by blowing through the filter from the inside with a high pressure air line.

The filter should then be completely immersed in engine oil and allowed to soak for a period of approximately five minutes and afterwards allowed to drain for a period of two hours.

Refit the element to the silencer.

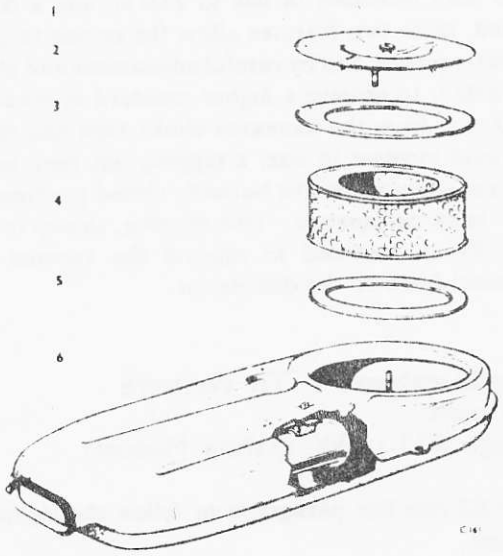

Fig. K2 (S) Exploded view of air filter

1 KNURLED NUT
2 COVER
3 JOINT WASHER
4 FILTER ELEMENT
5 JOINT WASHER
6 SILENCER

SECTION K 4 — THE CARBURETTER AND AUTOMATIC CHOKE SYSTEM

Data
(Page K9 in Workshop Manual)

S3 cars only

Carburetter S.U. HD8 diaphragm type
Choke size 2·00 in. (50·80 mm.) dia. bore.
Jet size 0·125 in.
Jet needle U.S.

S3 cars only

Two HD8 diaphragm carburetters with 2·00 in. choke bores are fitted to the engine on a central 'Tee' piece which is mounted over an eight-branch induction manifold.

Whilst operating on the same principles as the HD6 carburetter fitted to the S2 engine, the HD8 carburetter embodies a number of differences. The choke bore has been increased in size to 2·00 in. and a larger jet fitted, these two features allow the engine to produce greater power, and by careful adjustment and attention to detail, to achieve a higher standard of economy.

Apart from the increased choke bore and resultant general increase in size, a tapping has been provided immediately above the butterfly closed position on the 'A' bank carburetter. This tapping, shown in Figure K1 (S), is provided to operate the vacuum timing control fitted to the distributor.

Carburetters — To remove
S2 cars
(Page K13 in Workshop Manual)

For S3 cars this paragraph to follow the eighth paragraph.

Remove the closed circuit engine breather from the butterfly housing and from the oil filler pedestal.

Carburetters — To fit

S3 cars only

To fit the carburetters reverse the procedure given for removal noting the following points.

New gaskets to be fitted to all the joints.

Clean the flame traps in the crankcase breather tube by washing them in petrol and drying them with a high pressure air line.

Before refitting the union to the oil filter pedestal check the condition of the rubber sealing ring and renew if necessary.

Automatic choke system
(Page K16 in Workshop Manual)

For S3 cars the fourth feature to read

A 'fast-idle' cam, loose coupled to a pick-up lever which is in turn connected to the butterfly spindle. The 'fast-idle' cam has only two steps, the second of which is tapered to provide a progressive closing of the throttle.

'Fast-idle' cam
(Page K18 in the Workshop Manual)

For S3 cars the second paragraph onward to read

Remove the 'fast-idle' adjusting screw and ensure that a clearance of approximately $\frac{1}{16}$ in. exists between the cam link which is mounted alongside the 'fast-idle' cam and the boss on the carburetter 'fast-idle' lever.

Insufficient clearance at this point could result in the cam link fouling the 'fast-idle' lever. In the event of this happening the 'fast-idle' lever would be prevented from returning to the throttle closed position, thus causing a fast idling speed.

Ensure that the throttles are closed.

Screw down the 'fast-idle' adjusting screw until it just makes contact with the high step of the cam.

Place a 0·100 in. drill between the short side of the choke butterfly and the choke housing, as for setting the kick-gap.

With this drill in position adjust the length of butterfly rod so that the tip of the 'fast-idle' screw rests on the edge of the high step of the cam (i.e. the position when the tip of the adjusting screw is about to fall from the high step to the low step).

Remove the 0·100 in. drill from the choke housing.

Carburetter — To set
(Page K19 in Workshop Manual)

For S3 cars the fourth paragraph onward to read

Screw down each idle bleed adjusting screw, shown in Figure K3 (S) of this Supplement, to the full extent of its travel, then unscrew $1\frac{1}{2}$ turns.

The mixture strength is regulated by the jet adjusting screw, shown in Figure K3 (S) of this Supplement, which should be manipulated until the jet is level with the top of the bore in which it is located. Then screw the adjusting screw two complete turns down.

Fit the suction chambers and top-up the damper reservoir with oil. See Chapter D in this Supplement.

Run the engine until normal operating temperature is reached and carry out the final adjustment as follows.

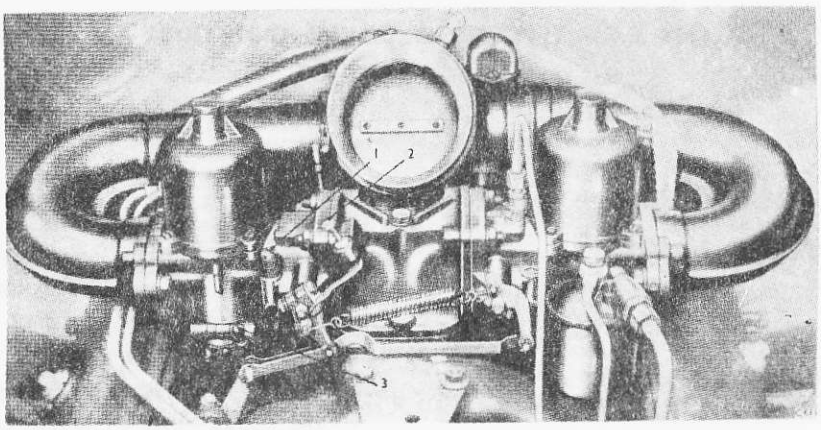

Fig. K3 (S) The carburetters

1 VOLUME ADJUSTMENT SCREW 2 THROTTLE STOP SCREW

3 JET ADJUSTMENT SCREW

Slow running — To adjust

Engage the refrigeration compressor (if fitted).

Adjust the mixture control screw on each carburetter until the smoothest running of the engine is obtained. Turning the screw clockwise lowers the jet and richens the mixture; turning the screw anti-clockwise raises the jet and weakens the mixture.

Then using the volume screws balance the carburetters so that the hiss heard from each carburetter is of equal intensity. The volume screws should only be adjusted within the range, fully closed to two complete turns up, otherwise an obtrusive whistle from the carburetters may result.

After balancing the carburetters with the volume screws, adjust the slow running by means of the throttle stop screw to the maximum speed that will not cause the car to creep when in gear. This is usually in the order of 475 r.p.m. in neutral and 450 r.p.m. in gear. After adjusting the slow running speed, lock the throttle stop screw by means of the lock-nut.

Cold start engine speed

(Page K21 in Workshop Manual)

For S3 cars the following three paragraphs should be read in place of the eleventh

Ensure that the gear change selector is in the neutral 'N' position.

Check to see that the 'fast-idle' adjusting screw is resting on the high step of the cam, then using the 'fast-idle' adjusting screw adjust the engine speed to 1850 r.p.m. Lock the adjusting screw by means of the lock-nut and recheck to ensure that the engine speed is still 1850 r.p.m. By slightly opening the throttles the cam will fall away; on releasing the throttles the engine will idle normally.

Where the engine is required to start below a temperature of 10°F. (—12°C.) the 'fast-idle' speed should be set to 2000 r.p.m.

The remaining information in this Section which applies to S2 cars is also applicable to S3 cars.

SECTION K5 — THROTTLE VALVE CONTROL LINKAGE

Throttle valve control linkage settings

(Page 21 in Workshop Manual)

S3 cars

Throttle valve control settings which apply to S2 cars are also applicable to S3 cars.

The closed circuit engine breather — S3 cars

The engine crankcase is ventilated through a breather pipe connected at one end to the rear of the oil filler pedestal and the other end to the choke butterfly housing. On a number of early S3 cars the breather pipe is connected on the engine side of the choke butterfly; on later S3 cars the pipe is positioned on the air cleaner side of the choke butterfly.

The breather pipe is of double skin construction with insulating material sandwiched between the two skins to prevent condensation forming on the inside of the tube.

A flame trap in the form of six gauze filters is incorporated in the union at the oil filler pedestal end of the breather tube. Every 24,000 miles, the filters in the flame trap should be removed and cleaned.

Breather pipe — To remove

Remove the setscrews securing the breather pipe union to the oil filter pedestal; disconnect the union from the pedestal (slight pressure may be felt owing to the rubber joint on the union).

Remove the setscrews securing the breather pipe to the choke butterfly housing.

Disconnect the pipe from the engine.

Remove from the pipe the union containing the flame trap.

Remove the filters and wash them in clean petrol, then dry them with a high pressure air line.

Breather pipe — To assemble

To assemble the crankcase breather pipe reverse the procedure given for its removal, noting the following points.

Before refitting the union to the oil filler pedestal check the condition of the rubber sealing rings and renew if necessary.

Check the condition of the sealing ring in the union at the choke butterfly housing end of the breather pipe; renew if necessary.

Check the aluminium washer on the centre securing bolt; renew if damaged.