LAND ROVER S.U.

ELECTRICAL MECHANICS

ASSIGNMENT 8

FUEL PUMP. 1948-58.

INTRODUCTION

The majority of electrical units and systems discussed in these assignments are essential for the operation of a motor vehicle i.e. generators, starting motors, ignition systems and lighting systems.

The many other units which are more optional, and varied in type, are grouped together in the general category of ACCESSORIES.

This assignment will discuss fuel pumps (electric), warning devices, windscreen wipers, power operated windows and seats, and briefly discuss automotive air conditioning.

1. ELECTRIC FUEL PUMPS

An electrical fuel pump performs a similar function to that of the mechanical fuel pump, i.e. it draws petrol from the fuel tank and supplies it to the carburettor.

The electric fuel pump has several advantages:-

since it operates from battery voltage it provides immediate priming of the carburettor when ignition is switched on.

It may be mounted in a cool position as reducing the possibility of vapour locking. The majority of modern electric fuel pumps are mounted adjacent to the fuel tank, in the vehicle luggage trunk.

(1) Construction of an electric fuel pump

The electric fuel pump consists basically of three parts:-

- a solenoid assembly
- a contact system
- a fuel body

a. Solenoid assembly:- This consists of a coil, wound to suit the operating voltage (either 6V or 12V), a control rod and magnetic plate attached to a diaphragm, and a body.

b. The contact system:- This consists of a pair of contacts, operating on an "over centre" or "rocker action" and actuated by the control rod or a similar mechanism which moves with the diaphragm.

c. The fuel body:- This houses inlet and outlet valves, fuel filter and unions and provides a pressure chamber.

The construction of a typical electric fuel pump is represented diagrammatically in Figure 103.

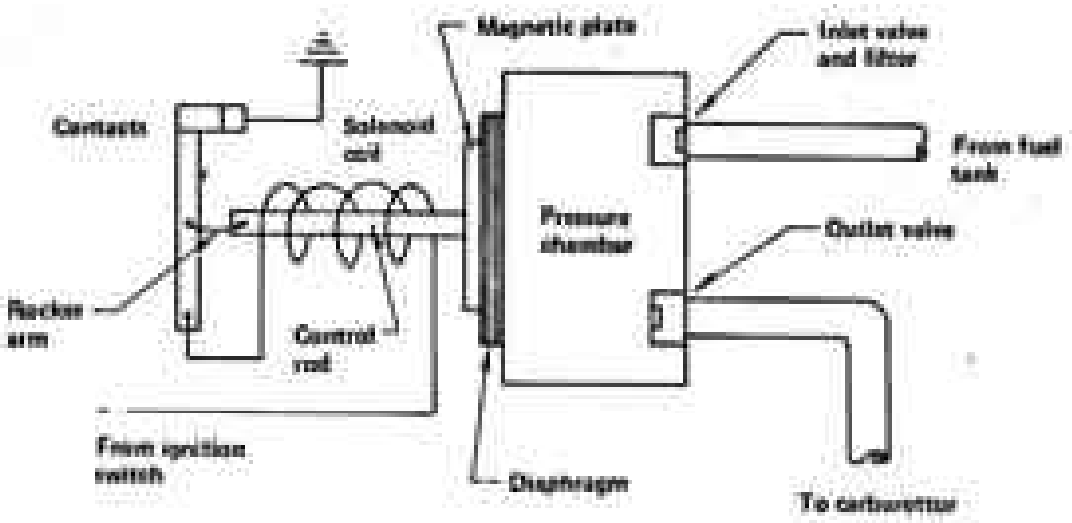


FIG. 103 ELECTRIC FUEL PUMP CONTRUCTION

(2) The operation of a typical electric fuel pump can be described with reference to Figure 103.

- When the solenoid coil is energised (i.e. current flows through it), it attracts the magnetic plate. This causes both the diaphragm and control rod to move to the left (in the diagram).

- Movement of the diaphragm to the left causes a depression (lowering of pressure) in the pressure chamber, and petrol is forced from the fuel tank into the chamber. The low pressure in the chamber pulls the inlet valve off its seat and draws the outlet valve tightly down on to the seat.

- When the diaphragm has moved fully to the left, the rocker arm causes the contacts to open, thereby open circuiting the solenoid coil.
- All magnetic attraction is therefore lost and the diaphragm is returned to its original position by a return spring (not shown in the diagram).
- The return of the diaphragm creates sufficient pressure in the pressure chamber to close the inlet valve, open the outlet valve, and force the petrol out of the pressure chamber into the carburettor float chamber.
- This process continues whilst the float chamber can still accept the petrol. When the float chamber is filled and the needle valve closed, the back pressure in the line will hold the diaphragm against the spring loading of the return spring. The contacts will therefore be held open, and the pump inoperative, until more fuel is required.

To reduce arcing at the contacts, as they open, either a condenser is fitted across the contacts or a fine resistance wire is wound in parallel with the operating coil.

The next section of this assignment discusses the characteristics of and service procedures for several types of one particular brand of electric fuel pump.

2. THE S.U. ELECTRIC FUEL PUMP

This pump is available in several basic types each of which should be considered when fitting a pump to a particular engine. This is important because these pumps are used not only as original equipment (where the mounting position is already determined), but also in new applications, for example, when fitting an engine to a boat.

Types

(1) Low Pressure Type

The L type (low pressure) Fuel Pump, Fig. 104, is manufactured in both 6 and 12 volt versions and distinguishing features are that the 6 volt types originally have brown caps and green sleeving on

the coil ends, while the 12 volt units have black caps and red sleeving on the coil leads.

The ideal mounting position for these types is in the region of the engine and approximately carburettor level. They are capable of delivering 8 gallons of fuel per hour, have a suction lift of 48 inches and a delivery lift of 24 inches. (These are maximum values)

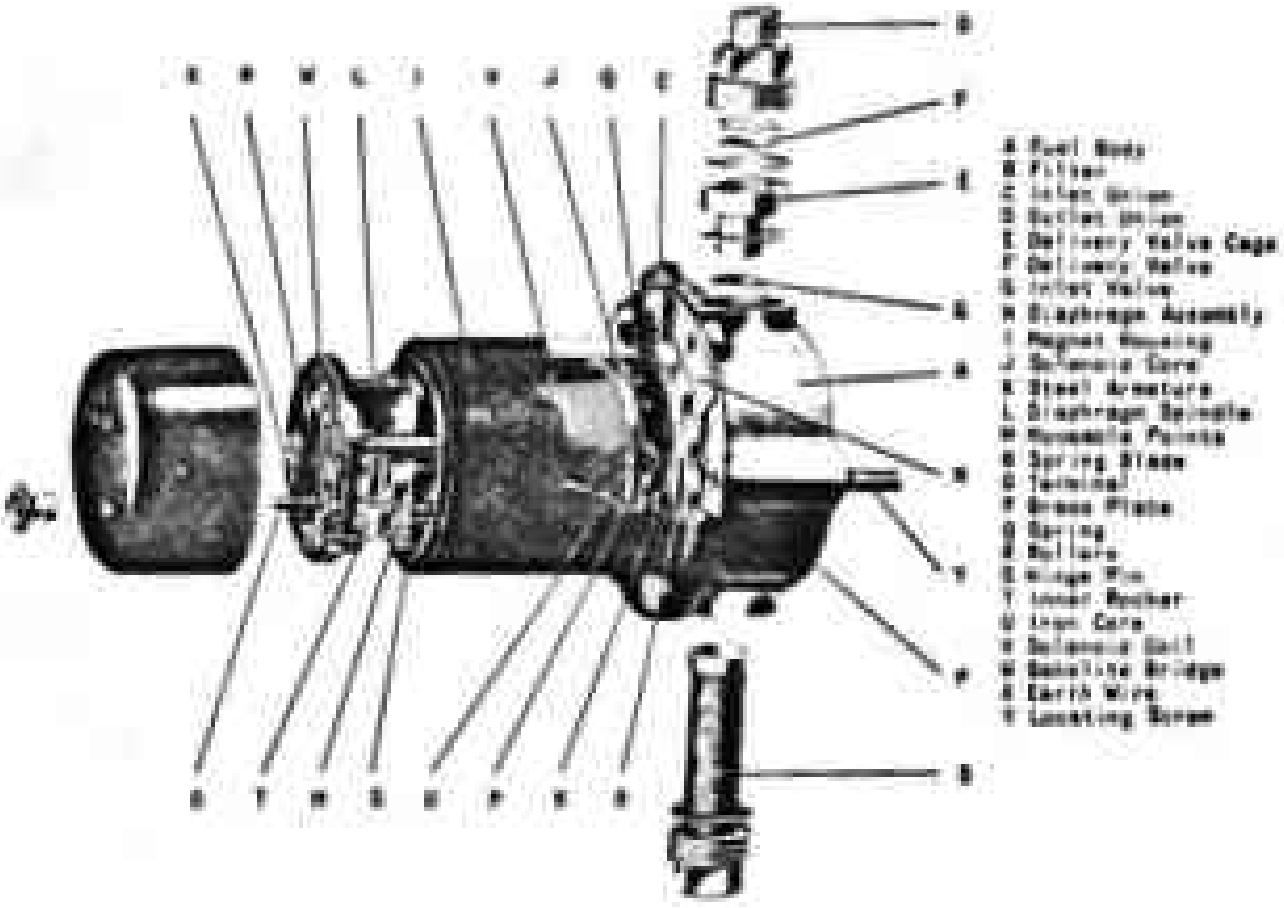


FIG. 104. ELECTRIC FUEL PUMP CONSTRUCTION

The figures given are for single pumps, but dual editions are available which have similar characteristics except that the maximum output is just over double. (Fig. 105).

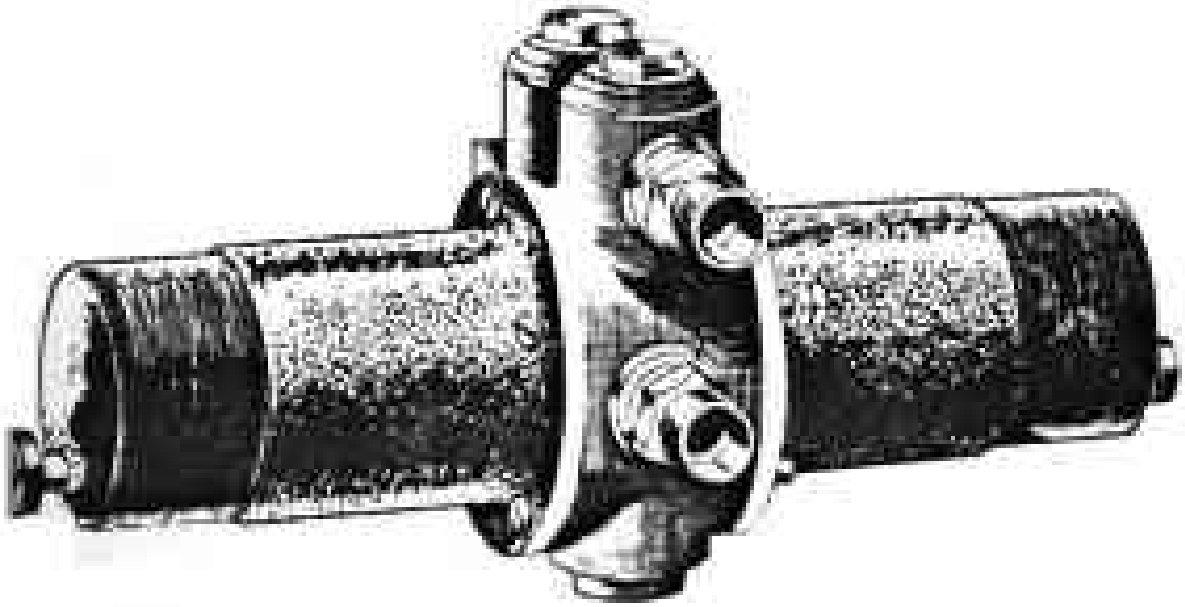


FIG. 105 DUAL VERSION OF AN 'L' TYPE S.U. PUMP

(2) High Pressure Type

H.P. (high pressure) type (Fig. 106) is designed to give an increased pressure feed to the carburettor, and has a maximum capacity of 10 gallons per hour.

This pump is identifiable by the increased length of the cast iron housing.

The high pressure pump can be supplied either as a single or dual unit and its general construction and functioning are very similar to those of the L type from which it differs in the coil housing, diaphragm, diaphragm spring tension and output.

The H.P. type can be fitted with a condenser which reduced contact point arcing.

The recommended mounting position is over the fuel tank at the rear of the vehicle and at about carburettor level.

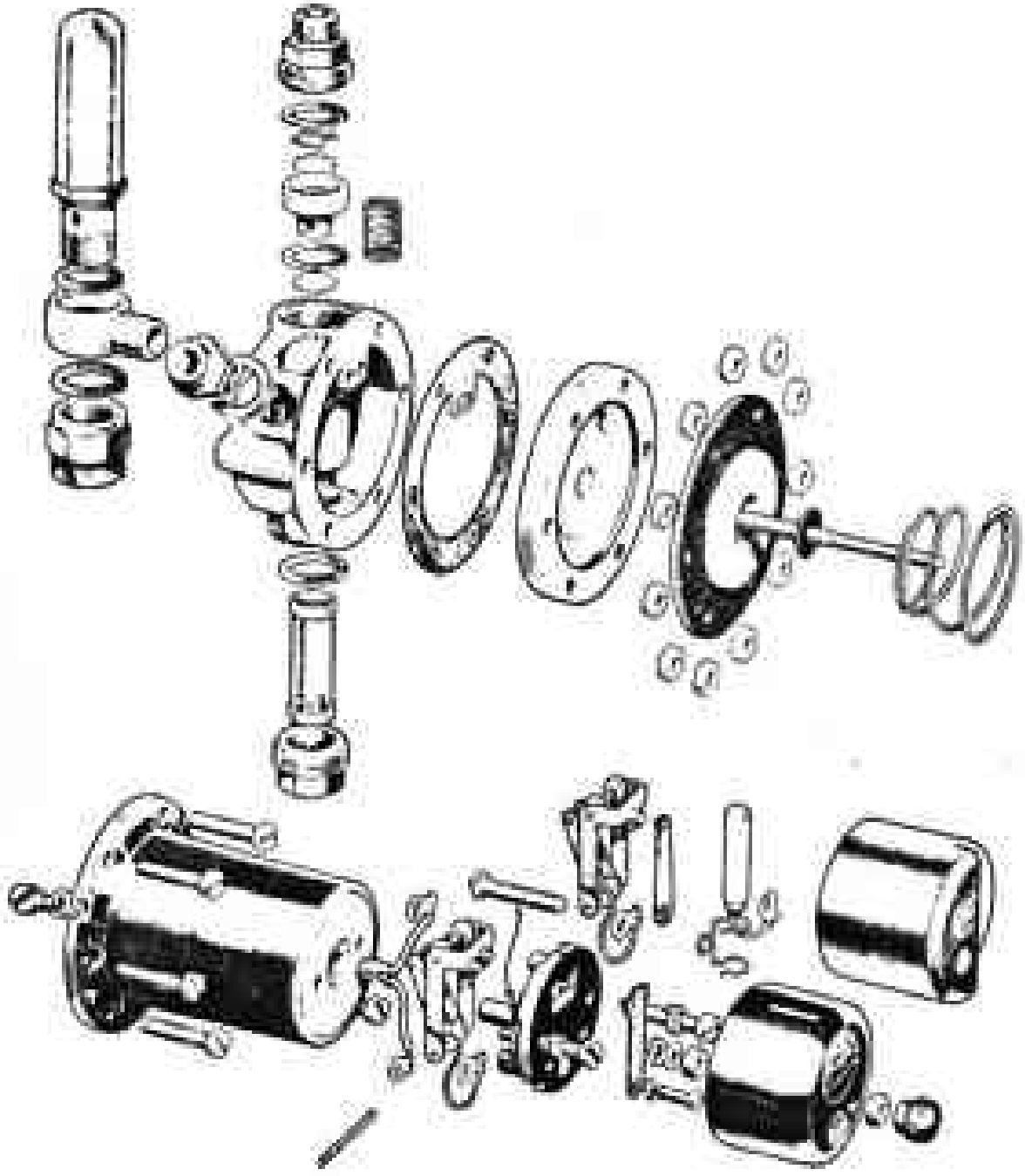


FIG. 108 EXPLODED VIEW OF 'H.P.' TYPE S.U. FUEL PUMP

(3) S.P. Type

The S.P. (Fig. 107), in common with previous S.U. high pressure pumps, is designed to be mounted in the vicinity of the fuel tank and at a level not appreciably above that of the top of the tank. This situation ensures freedom from vapour generation troubles, even under the most severe condition of high ambient temperature and high altitude operation. The maximum output is 10 gallons per hour.

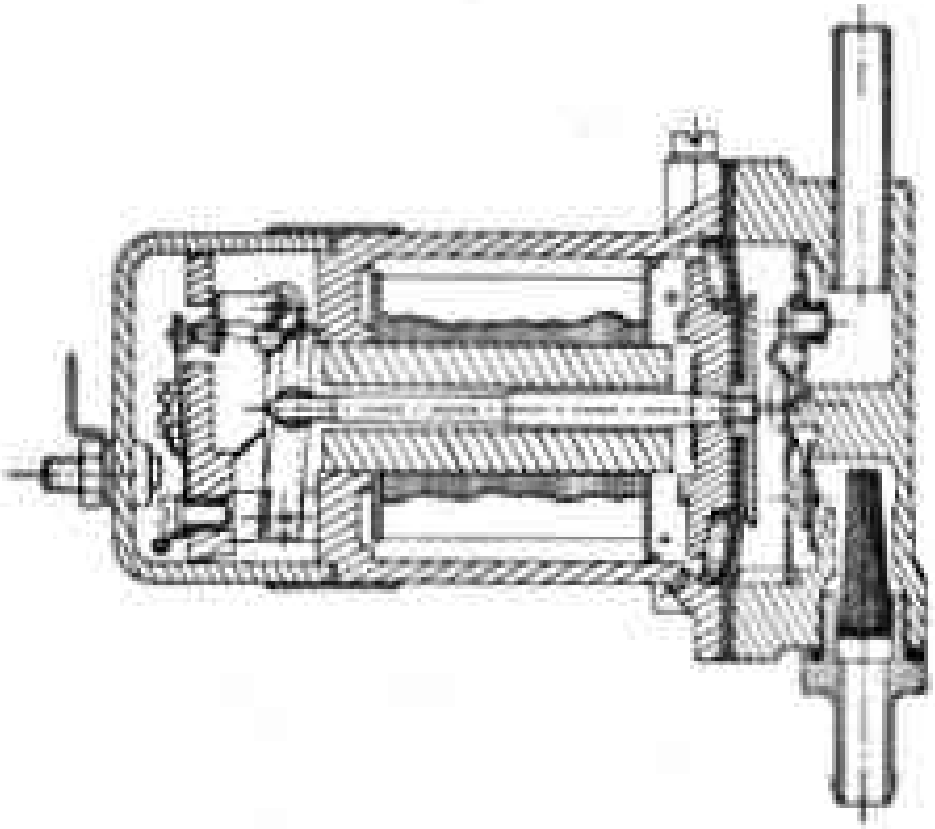


FIG. 107 S.U. 'SP' TYPE PUMP

TESTING THE S.U. PUMPS

If the pump does not operate, connect a voltmeter from the supply terminal to the earth terminal; with the ignition on, the meter should show full battery voltage.

No reading could be caused by:-

(1) Open circuit supply line
(2) Faulty fuel pump earth.

Remove the cover, clean the contacts and take note of excess point burning.

If the pump operates, but does not deliver fuel, then slacken the delivery pipe union and switch the ignition ON.

An adequate supply of fuel should be observed at the loose union. No fuel delivery could be caused by:-

- Clogged filter element or inlet pipe
- Empty fuel tank
- Leaking suction line
- Faulty tank venting

If the pump is found to be faulty it should be removed from the vehicle and dismantled for overhaul.

4. OVERHAUL

(1) Dismantling and Inspection

During dismantling the following items can be readily checked:

- Faulty valves and seats
- Diaphragm condition
- Diaphragm spring tension
- The impact washer condition
- Full number of rollers
- Resistance wire connection

Figure 6 shows an exploded view of an S.U. pump. When the pump is dismantled, all the parts should be cleaned and those not fit for further use replaced. The fuel body should be checked for the possibility of leaking.

(2) Assembly and Adjustment

a. Replace the valve seats and replace the valves with their smooth side adjacent to the seats. Ensure that the delivery valve retaining clip is correctly located. Oil the valves as this will facilitate self-priming.

The fibre washers should be replaced in the following positions:

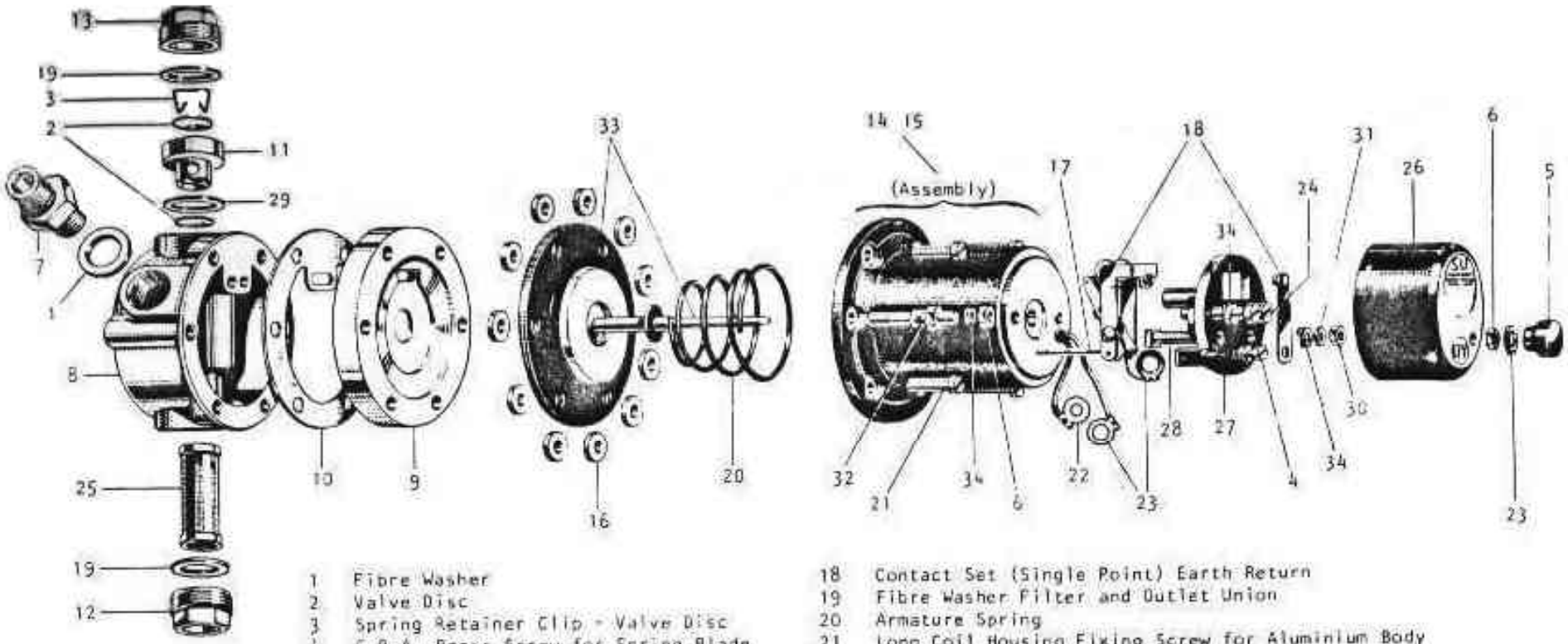
- The thin washer under the delivery valve cage.
- The medium washers fit above the valve cage and filter element.
- The thick one should be placed under the inlet union.

b. Assemble the contact breaker and terminal to the pedestal. Fit the pedestal to the solenoid, keeping the correct order of assembly on the terminal (See Fig. 109). Replace the spring blade under the coil end tag, and, holding the blade against the ledge of the pedestal, check for 0·762 mm clearance on each side of the rocker with the contacts closed as shown in Fig. 110. Fit the armature spring with the large diameter towards the solenoid and screw the diaphragm spindle into the inner rocker trunnion. Feed in all the rollers.

FIG. 109 RELATIONSHIP OF THE VARIOUS PARTS

c. The next step is the contact adjustment, and while this is made it is essential that the spring blade be swung to one side so that the points do not make contact. Hold the solenoid assembly horizontal (Fig. 111) and screw in the diaphragm so that the points do not quite throw over when the armature is pushed in firmly but steadily. Unscrew one hole at a time, until the points just throw over. Re-check this position, and if in doubt unscrew one more hole. From the position when the points just throw over, the diaphragm should be unscrewed 4 holes, that is, two-thirds of a turn for all L. and H.P., type pumps; or 6 holes, which is one complete turn, for S.P. types.

N.B. The points must be out of contact when checking this adjustment.



1 Fibre Washer
2 Valve Disc
3 Spring Retainer Clip - Valve Disc
4 5 B.A. Brass Screw for Spring Blade
5 Moulded Terminal Knob
6 2 B.A. Brass Terminal Nut
7 ¼ Gas Double-ended Inlet Union
8 Body Casting (Aluminium)
9 Plate Casting (Aluminium)
10 Gasket
11 Valve Cage
12 Filter Plug
13 Outlet Union
14 Solenoid complete in Housing - 12-volt
15 Solenoid complete in Housing - 6-volt
16 Roller - Diaphragm
17 Rocker-arm Pin
18 Contact Set (Single Point) Earth Return
19 Fibre Washer Filter and Outlet Union
20 Armature Spring
21 Long Coil Housing Fixing Screw for Aluminium Body
22 5 B.A. Terminal Tag
23 2 B.A. Terminal Tag
24 2 B.A. End Plate Moulding Fixing Screw
25 Filter
26 End Cover Cap - Black - 12-volt
27 End Plate Moulding
28 Terminal Screw
29 Fibre Washer - Valve Cage
30 Brass 2 B.A., Cone Nut for Lead Ring
31 Lead Contact Ring for Terminal
32 Long Earth Stud for Aluminium Body
33 Diaphragm and Spindle Assembly
34 2 B.A. Spring Washer - Terminal Nut and End Plate Screw

FIG. 108 EXPLODED VIEW OF AN 'L' TYPE PUMP