Chapter 11

PUMP, DP.022-1 (550-1-21059) AND FILTER ASSEMBLY PS.3 Mk. 4 (550-1-21088)

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Type	*DP.022-1 (550-1-21059)*
Fluid	*Methyl Alcohol (Methanol) AL-14 (BS.506)*
Net dry weight	$5\frac{1}{4}$ *lb*
Delivery pressure	60 lbf/in^2
Delivery flow	1,800 cm^3/min
Voltage (normal)	28*V d.c.*
Current consumption	6*A at full load*
Rating	12 *min max followed by* 12 *min cooling period*
Operation (normal)	3 *sec at* 1 *min intervals under full load*
Pump unit	550-1-21074
Type	*Single stage spur gear pump driven through a* 4:1 *reduction gearbox*
Delivery pressure (range)	0 *to* 62 lbf/in^2
Motor unit	*CV.*7305
Type	1/16 *h.p. flame-proof totally enclosed motor featuring a long shunt compound winding*
Voltage (range)	18 *to* 29*V d.c.*
Filter assembly	*PS.*3 *Mk.*4 (550-1-21088)
Type	100 *mesh 'in line' element*
Weight	$\frac{1}{2}$ *lb.*

Introduction

1. The Plessey DP.022-1 (Fig. 1) is a self lubricating, single stage, spur gear pump, driven by its own electric motor via a 4:1 reduction gearbox. The pump is used for engine fuel filter de-icing. A saddle type bracket is provided to facilitate attachment of the pump to the aircraft.

DESCRIPTION

Motor assembly

2. The $\frac{1}{16}$ h.p. flame-proof, totally enclosed motor has a long shunt compound winding. The motor is fully described in A.P.4243D, Vol. 1, Book 4, Sect. 20, Chap. 69.

3. The motor has four 2 B.A. studs which are used to secure the pump and gearbox. A pinion is fitted to motor spindle and transmits the drive, through the reduction gearbox, to the pump driveshaft gear. The pinion is retained by a split taper pin.

Gearbox

4. The gearbox, (Fig. 2), comprises a gearcase assembly and an idler assembly. The gearcase houses an oilite bush, which supports one end of the idler spindle, and locates on spigots formed on the motor end plate and the pump body. The idler assembly consists of a gearwheel and a pinion mounted on a common spindle and secured by a split taper pin. The gearwheel is engaged with the motor pinion and the idler pinion is meshed with the pump driveshaft gear. The other end of the spindle is supported on an oilite bush located in the pump bearing housing.

Pump assembly

5. The pump assembly (Fig. 2) consists of an aluminium alloy body, two shaft mounted spur gears, a seal housing assembly, a drive shaft assembly and a relief valve assembly (pump cover).

Pump body

6. The pump body houses two bronze bushes, which form bearings for the gear shafts. The bearings are lubricated with fluid, at inlet pressure, through ducts drilled in the pump body. The pump gears are located on the shafts by steel balls. A gland drain is provided at one of four alternative positions on the pump body, 90 degrees apart, to facilitate installation of the pump in the aircraft.

Seal housing assembly

7. The carbon faced seal housing locates in a recess on the gearbox side of the pump body. An 'O' type sealing ring prevents leakage passed the housing. The housing is secured in the pump body by a collar and a retaining ring and is prevented from rotating by a dowel pin in the pump body.

Drive shaft assembly

8. The drive shaft assembly consists of a drive shaft and a gland sleeve which houses

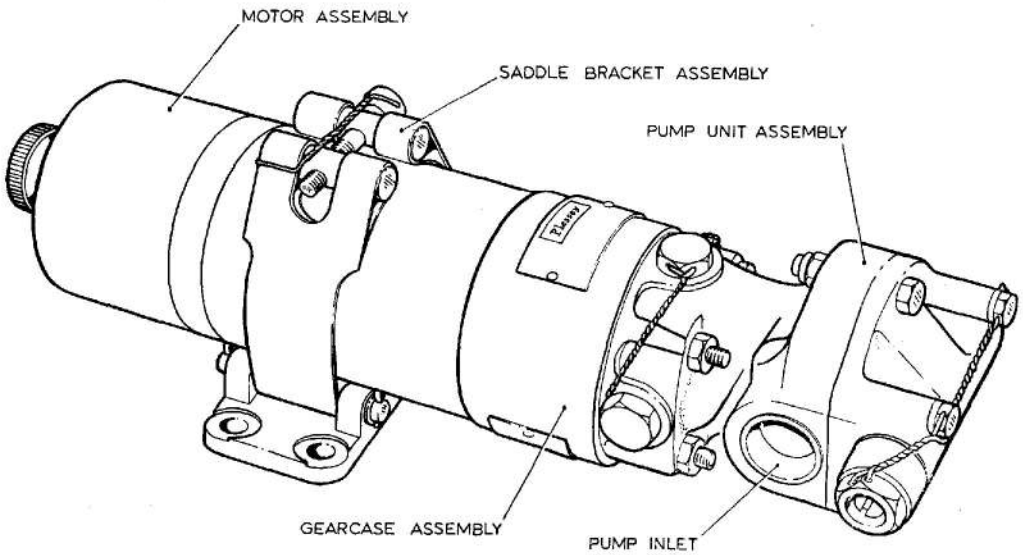

Fig. 1. General view of DP022-1 pump

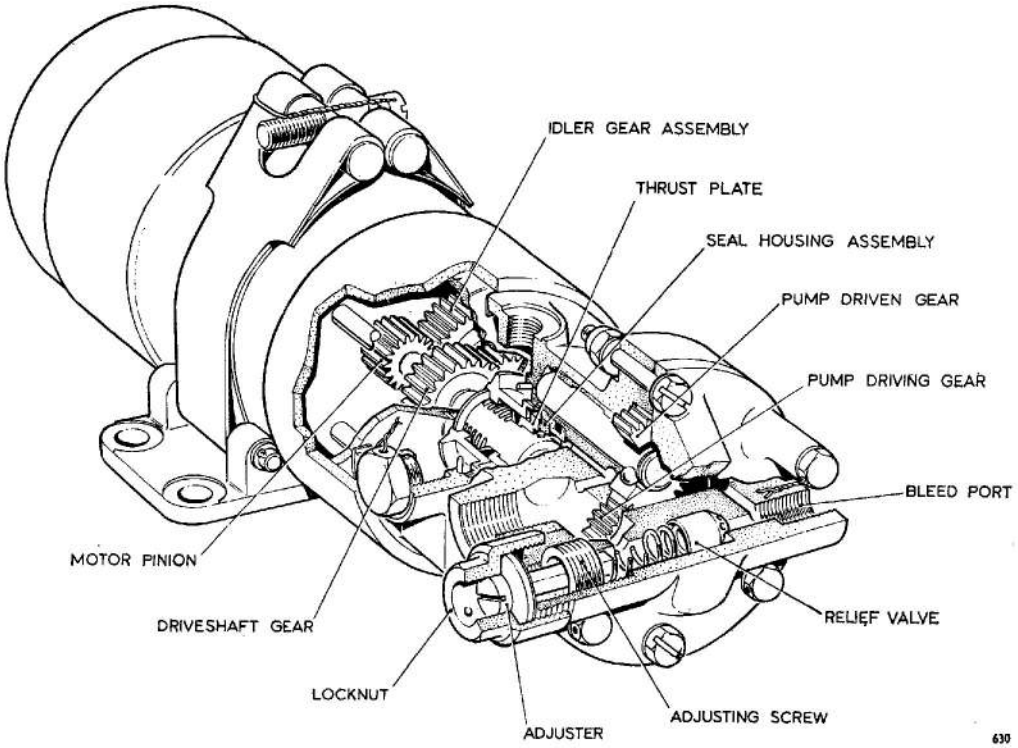

Fig. 2. Sectional view of DP022-1 pump

a spring-loaded gland seal and a thrust plate mounted coaxially with the shaft. The gland sleeve, secured to the shaft with which it rotates, has a projection which engages with the thrust plate. The thrust plate seals against the carbon thrust washer in the seal housing and prevents leakage from the pump into the gearbox. A gear secured to the drive shaft transmits the drive, through a drive pin in the other end of the shaft, to the pump driving shaft.

9. The drive shaft is supported on a ball bearing which locates in the bearing housing. The bearing housing locates in the gearcase and is sealed against the pump body by a gasket.

Relief valve assembly

10. The relief valve assembly consists of a cover which houses a spring loaded valve and an adjusting screw. The cover is bolted to the pump body and is sealed by an 'O' type sealing ring. A bleed hole in the valve cover, which communicates with a duct from delivery side of the pump to the relief valve, vents any air in the system back to the aircraft tank during starting. Two steel balls housed in the relief valve cover, act as thrust bearings for the pump gear shafts. The bearings are lubricated with fluid, at inlet pressure, through ducts drilled in the pump cover.

11. The relief valve permits setting of the maximum delivery pressure. The relief valve is set during manufacture or reconditioning and will not require any further adjustment.

Filter assembly

12. The filter assembly (Fig. 3) comprises a gauze assembly screwed into a cylindrical case. The gauze assembly has a 100 mesh filter element and is sealed to the filter case by an 'O' type sealing ring.

OPERATION

13. Pressure is built up on the outlet side

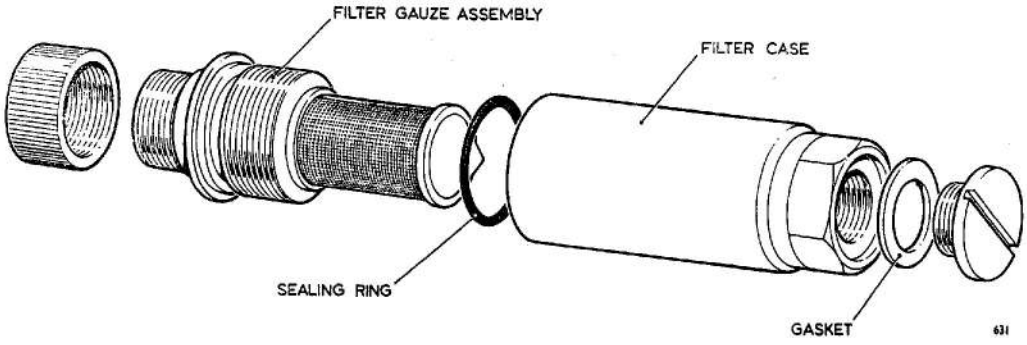

Fig. 3. Filter assembly PS3 Mk. 4

of the pump by the rotation of the spur gears. When the delivery pressure exceeds that set by the relief valve, the valve lifts relieving the pressure back to the inlet side of the pump.

INSTALLATION

14. Drain the pump of inhibiting fluid, then flush with Methyl Alcohol (Methanol) AL-14 (BS. 506).

15. Install the unit in accordance with the instructions contained in the aircraft manual.

Note . . .

The unit may be fitted in any attitude from horizontal to vertical (motor uppermost). The disposition of the inlet and outlet ports may be altered, as required, by rotating the pump, or moving it longitudinally, in the saddle bracket. The drain plugs may be re-arranged, as necessary, to ensure that the drain port is at the lowest point The drain pipe must fall away continuously from the pump.

16. Using a 250V d.c. insulation resistance tester, measure the insulation resistance of the motor; this must not be less than 0·5 Megohms.

Note . . .

The 4-pin electrical connection on the motor is provided with two sizes of pins (Fig.4) which are connected in pairs to permit the use of either pin size.

SERVICING

17. Check the unit for security.

18. Examine the pump for leaks; leakage from any part of the pump, except the gland drain, will entail rejection.

19. Leakage at the gland drain must not exceed 10 cm^3/h.

Insulation resistance test

20. Effect the test detailed in para. 16.

Note . . .

When the aircraft is on dispersal, the relative humidity may be taken into account when considering the minimum permissible insulation resistance, this may be in the order of 50,000 *ohms.*

21. Examine the filter assembly for cleanliness; clean as necessary.

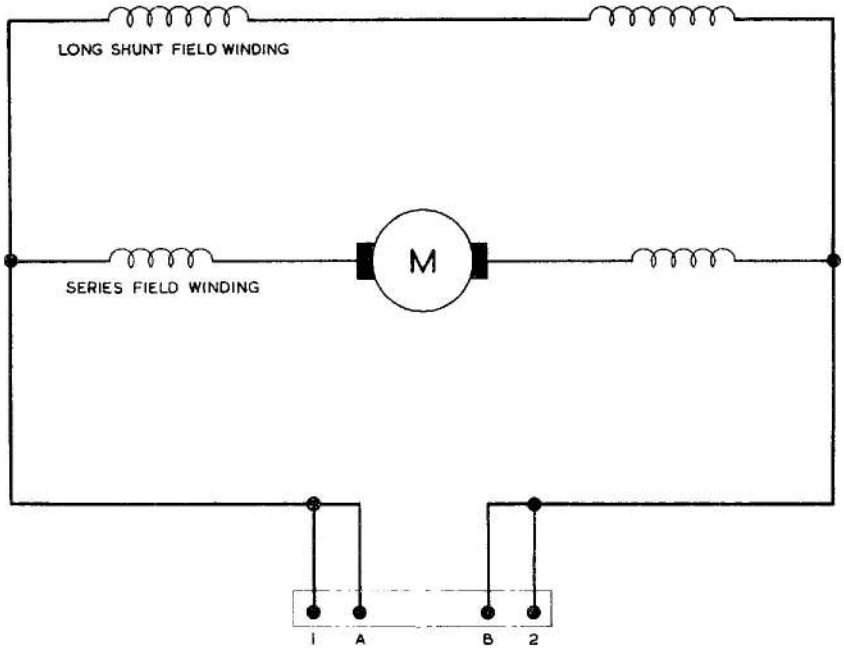

Fig. 4. Circuit diagram

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