

Chapter 7

PUMP, WINDSCREEN WIPER, SMALL, DUNLOP

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Introduction

1. The Dunlop small Maxivue hydraulic pump is used in aircraft for the operation of windscreen wipers.

2. There are various types of the small Maxivue pump, though each type is similar in design and performance.

3. The complete pump is an integral unit comprising an electrical motor driving through a reduction gearbox to an hydraulic pump for operating the aircraft windscreen wipers.

4. Full details of this type of pump, and of the windscreen wiper installation will be found in A.P.1803S, Vol. 1, Sect. 11, Chap. 1.

DESCRIPTION

Motor and gearbox

5. The driving motor is usually a four-pole compound wound d.c. machine designed for

continuous operation. A reduction gearbox connects the drive from the motor to the hydraulic pump. Information on the motor and gearbox for any particular type of pump of this design will be found in A.P.4343D, Vol. 1, Sect. 20.

Hydraulic pump

6. The pump is attached by a drive shaft, through a reduction gearbox, to the electrical driving motor. An eccentric is formed on the drive shaft and on this is mounted a roller bearing secured by a washer, nut and split pin. The roller bearing is positioned between the inner ends of two pistons which are grooved to fit into the slots of a piston cradle. The pistons are lapped into their respective cylinders which are fitted with gaskets and positioned horizontally on the pump body. Integral with the head of each cylinder is a delivery connection, and a sealing ring is fitted into an annular recess. Cover plates are fitted to the heads of the cylinders, which are secured to the pump body by studs and self-locking nuts.

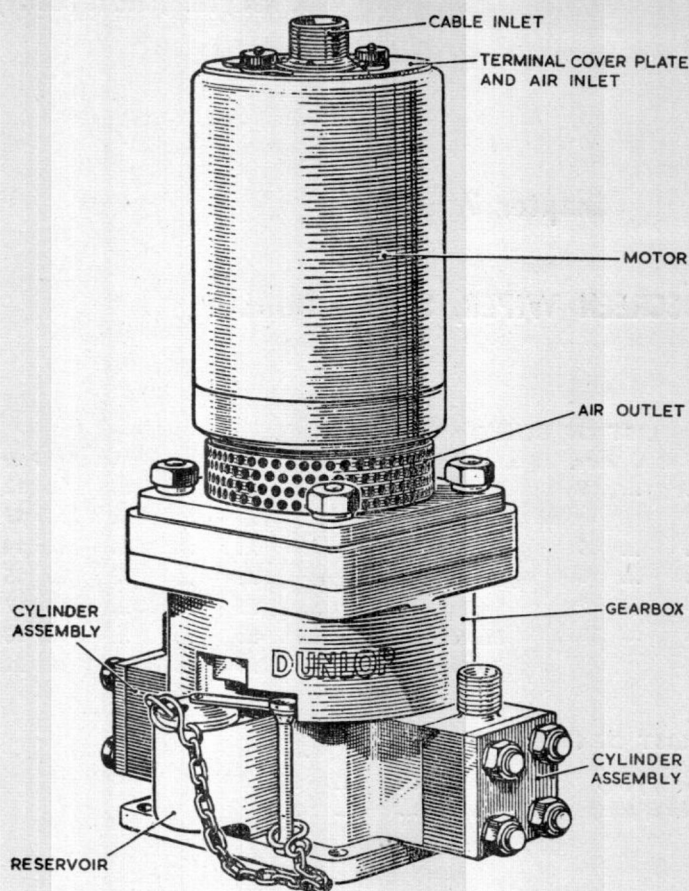


Fig. 1. General view of pump

7. A gasket is fitted between the reduction gearbox and the pump body, which is positioned by two locating pins. A sealing ring is fitted into an annular groove in the pump body. The support plate on which the piston cradle slides is retained in position by a base plate assembly. Csk. hd. screws which pass through the base plate, pump body and gasket, secure the pump assembly to the reduction gearbox.

8. The reservoir is fitted with a filler cap which is secured in position by a flat spring and a chain attached to a peg riveted into the base plate.

Principle of operation

9. The supply of hydraulic fluid to operate the wiper head is derived from the pumping action of the two horizontally opposed pistons which are actuated alternately by the rotation of the eccentric driving shaft. One

cylinder is of slightly larger capacity than the other. Thus during each complete pump cycle, a small quantity of fluid, in excess of that required to operate the wiper head, is delivered to the system. This ensures a constant circulation, which renders the system self-priming and facilitates bleeding.

INSTALLATION

10. It is important that when the unit is installed in the aircraft it is mounted in a vertical position with the motor uppermost. Four holes are drilled in the base plate for securing the unit in its installation position in the aircraft. The actual mounting position and the method of connecting, priming and filling the pump are described in the appropriate section of the Aircraft Handbook.

11. To ensure satisfactory cooling it is essential that 0.5 in. minimum clearance around the inlet and outlet ventilation plates in the commutator end cover be maintained. The unit must not be installed where foreign matter can fall on to the ventilation gauzes of the driving motor and thus impede the free passage of cooling air.

SERVICING

Motor

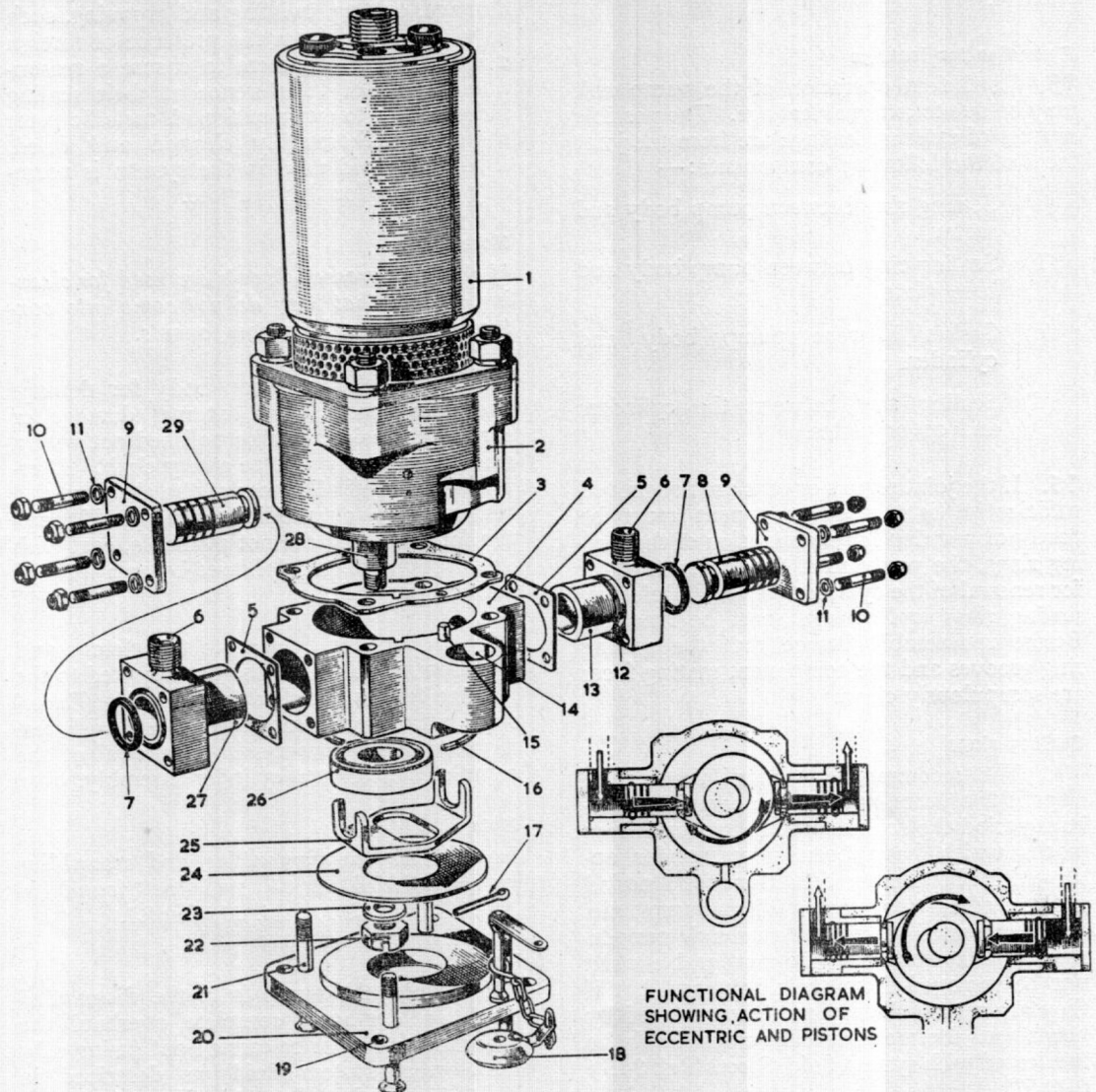
12. General servicing of the d.c. electric motor is fully described in A.P.4343, Vol. 1, Sect. 18, Chap. 1, and App. 1. Further information on servicing of any individual type of motor used with this design of pump can be obtained from A.P.4343D, Vol. 1, Sect. 20.

Gearbox

13. At routine inspection periods ensure that the nuts securing the gearbox are tight, and that the bleed hole is not obstructed by foreign matter. At the end of 500 hours operation the gearbox should be dismantled and its components examined.

Hydraulic pump

14. At all inspection periods the pump unit and its pipe connections should be examined for security. Operate the complete wiper



- 1 ELECTRIC MOTOR
- 2 REDUCTION GEARBOX
- 3 GASKET
- 4 PUMP BODY
- 5 GASKET
- 6 DELIVERY CONNECTION
- 7 SEALING RING
- 8 PISTON
- 9 COVER PLATE
- 10 STUDS
- 11 WASHERS (NOT REQUIRED)
- 12 ANNULAR GROOVE
- 13 CYLINDER
- 4 RESERVOIR

- 15 LOCATING PIN
- 16 SEALING RING
- 17 SPLIT PIN
- 18 FILLER CAP
- 19 ATTACHMENT HOLES
- 20 BASE PLATE ASSEMBLY
- 21 COUNTERSUNK SCREW
- 22 DRIVE SHAFT NUT
- 23 WASHER
- 24 SUPPORT PLATE
- 25 PISTON CRADLE
- 26 ROLLER BEARING
- 27 CYLINDER
- 28 DRIVE SHAFT
- 29 PISTON

Fig. 2. Exploded view of pump

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system on the aircraft to make a functional test of the pump unit. Examine for external leakage.

Remedies for leakage

15. Inefficient operation of the pump unit may be due to external leakage. The possible sources of external leakage are from the joint faces of the following components:—

- (a) Sealing ring between pump body and motor
- (b) Sealing ring between pump body and base plate
- (c) Gasket between pump body and cylinders
- (d) Sealing ring between the cylinders and cover plates.

16. If the joint screws or nuts are not proved sufficiently tight, the component must be partly dismantled for examination of the sealing rings, the presence of foreign matter, or, for renewal of the cylinder gaskets. Defective sealing rings and gaskets must be renewed. Before re-assembly ensure that the sealing ring grooves and the component mating faces are scrupulously clean.

Sealing rings

17. The recommended life of the sealing rings is two years, and at each complete overhaul period the seals should be renewed from stocks which have been stored under approved rubber storage conditions for a period not exceeding two years. When pump units are dismantled between overhaul periods, rings which appear to be serviceable need not be removed from their housings, but if they are removed, they must be replaced by new rings. Before fitting, the rings should be lubricated with system fluid, Stores Ref. 34B/9100572.

Inspection and overhaul

18. Examine the sealing rings for signs of damage, cutting, twisting and grooving, such as would result from the presence of foreign matter, and check them to ensure a reasonable degree of interference at their sealing faces. Prior to examination all metallic parts should be thoroughly cleaned and dried. Hydraulic fluid used in the system is normally suitable for this purpose.

Note . . .

If chemical grease solvents are used for cleaning, ensure that they do not come into contact with the rubber components.

19. Examine the pump body for damage and corrosion. Slight external damage or surface corrosion may be polished out with a smooth hone or very fine emery cloth. Afterwards clean off all traces of the abrasive and restore the black anodic treatment. If facilities for anodising are not available, coat with an approved primer, followed by an approved cellulose varnish.

20. Inspect for damage to the pistons and cylinders, which must also be subjected to the leakage test as specified in para. 15. Excessive damage or failure to conform with test requirements will necessitate renewal of the complete piston and cylinder assembly.

Note . . .

Instructions for dismantling and assembling an individual pump will be found in A.P.1803S, Vol. 1, Sect. 11, Chap.1.

Testing

21. Whilst the pump is in the dismantled condition during a complete overhaul the following test must be carried out (using only the correct system fluid) as described in A.P.1803S, Vol. 1, Sect. 11, Chap. 1.

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