Chapter 6

PUMP, WINDSCREEN WIPER, LARGE, DUNLOP

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LIST OF ILLUSTRATIONS

Introduction

1. The windscreen wiper installation may comprise one or two wiper heads complete with arms and blades and an electrically operated twin cylinder hydraulic pump unit.

2. There are various types of these large Maxivue pumps, the pump unit being similar in design for all types.

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

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

DESCRIPTION

Hydraulic pump

5. The forged light alloy pump body (*fig.* 1) carries two horizontally opposed cylinders and pistons, and is bored internally to accommodate an eccentric driving shaft mounted within a ball race housed in the body base. A roller race, fitted to the eccentrically machined portion of the shaft and retained in position by a washer and circlip, makes contact with the reciprocating pistons which are correctly spaced by a cradle. A locknut and tab-washer retain the ball race in position on the driving shaft. To the base of the pump body is clamped a base plate secured by four csk.hd. screws and sealed against leakage by a sealing ring.

6. Each cylinder has an integral pipe connection and is secured to the body by washers and locknuts fitted to the body studs, which also serve to locate a cover plate. A sealing ring is housed between the cover plate and the cylinder head, and a gasket is sandwiched between the cylinder shoulder and the pump body.

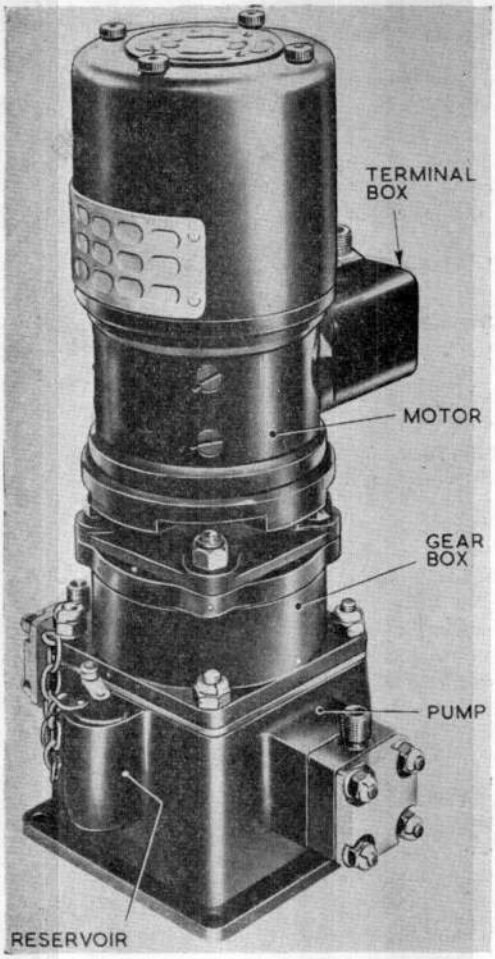

Fig. 1. General view of pump

7. The joint face of the pump body houses a sealing ring, and four screwed studs and locknuts provide means of attachment to the motor unit. The reservoir filler cap is prevented from loss by a chain anchored to a lug which is fastened to the filler cap by a rivet. The free end of the chain is attached to a motor mounting stud. A peg screwed into the pump body is fitted with a spring and cap and ensures that the filler cap remains correctly seated with the reservoir mouth. A nameplate completes the assembly and is secured opposite to the reservoir side of the pump body by four hammer drive pegs.

Motor and gearbox

8. 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 used for any particular type of pump of this design will be found in A.P.4343D, Vol. 1, Sect. 20.

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

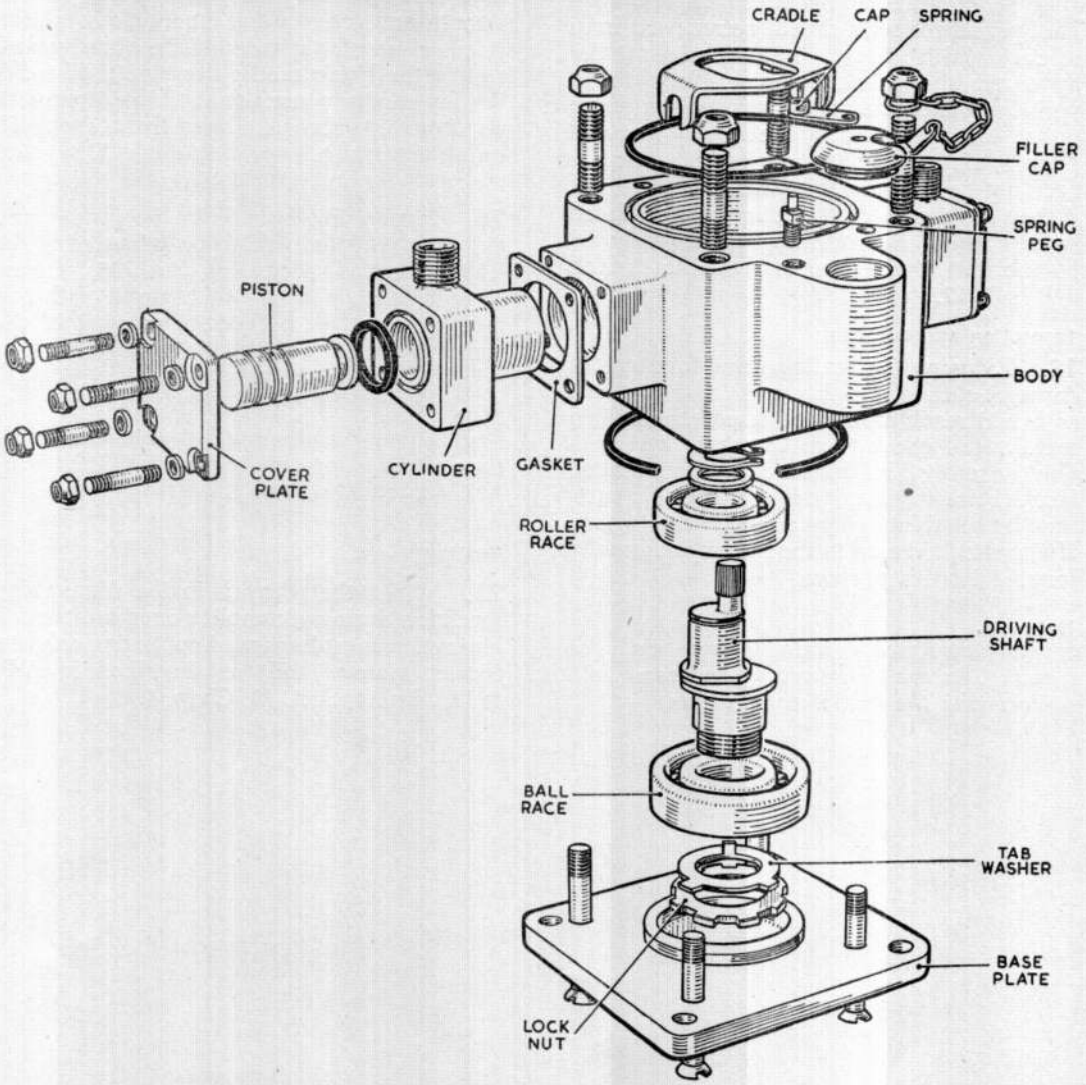

Fig 2. Exploded view of pump

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 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 servicable need not be removed from their housings, but if they are removed, they should 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 for a given pump will be found in A.P.1803S, Vol. 1, Sect. 11, Chap. 1.

Testing

21. Whilst the pump is in the dismantling 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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