Chapter 6

PUMP, DE-ICING, S.P.E., TYPE D.I., Mk. 2

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LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Pump, de-icing, Type D.I., Mk. 2	*Stotres Ref. 5UE/6261*
Operating voltage	*24 V, d.c.*
Normal current consumption	*2·5 amp.*
Delivery rate	*7 gallons per hr.*
Pressure	*15 lb. per sq. in.*
Weight	*2 lb. 4 oz.*

Introduction

1. The D.I. Mk. 2 is an impeller type electrically driven pump designed for horizontal mounting. It is normally connected in the line and is intended for pumping de-icing fluid from the tank to the windscreen de-icing installation.

DESCRIPTION

General

2. The D.I. Mk. 2 is a unit consisting of several sub-assemblies and, as can be seen in fig. 1, is mainly composed of an electric motor driving an impeller, the spindle passing through a flexibox fuel sealing gland. The impeller chamber opens out into a large cavity containing a vapour guide cone and also connects with the vent and inlet orifices.

Motor

3. The motor of the D.I. Mk. 2 pump is a totally enclosed two-pole compound-wound machine. It is designed to operate on 24 volts, d.c., with a speed of approximately 15,000 r.p.m. and a normal current consumption of approximately 2 amp.

4. Surrounding the motor is a cylindrical finned casting which assists with the dissipation of heat. A hollow square boss, integrally cast on the side, carries the Breeze electrical connection from which the supply leads pass through into the motor. Enclosing the brushes and commutator is a spun aluminium cover retained by two screws passing into the motor end frame.

5. The armature shaft is fitted with ball type bearings which locate in the motor frame and bearing housing respectively as shown in fig. 1. The upper bearing is secured to the commutator end of the shaft by a self-locking nut, whilst the lower bearing is retained in a shouldered recess in the bearing housing, with a special nut designed to function as a thrower ring to dissipate any fluid which may have leaked through the gland.

Volute casting assembly

6. The volute casting which is in the form of a bulbous casing has a flanged hole on one side into which fits the spigoted portion of the mounting bracket (*para.* 7). Where the hole emerges inside the casting, it is threaded to receive the impeller adjusting screw, which provides the means of adjusting

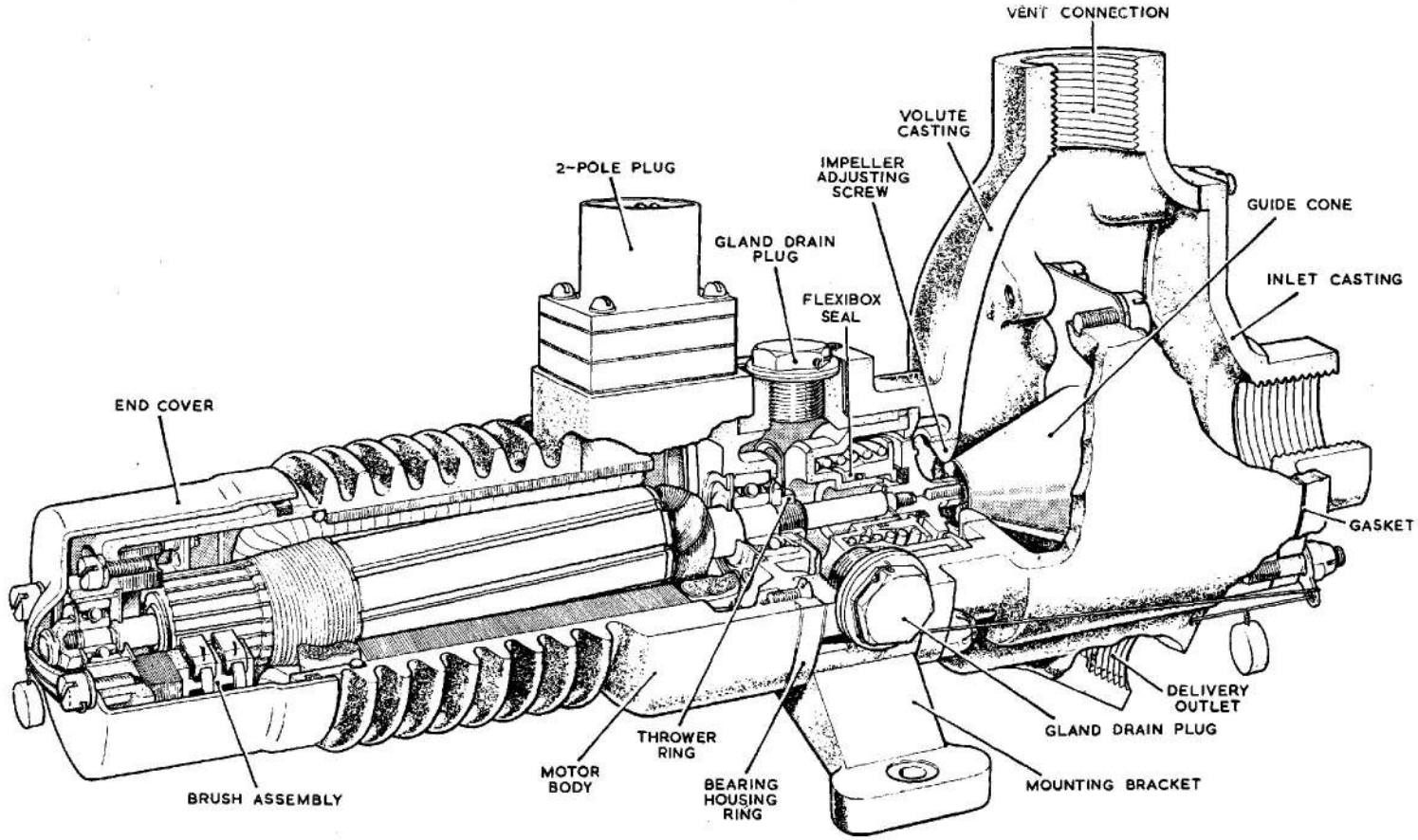

Fig. 1. Sectional view of D.I. Mk. 2 pump

the impeller clearance. Set at an angle below the casting is the $\frac{1}{4}$ in. B.S.P. delivery outlet, whilst at the top is the $\frac{1}{2}$ in. B.S.P. vent connection. Inside the casing are two lugs, tapped to receive the retaining screws for the guide cone. Bolted and sealed with jointing material to the end face of the volute casting is the inlet casting incorporating the $\frac{1}{2}$ in. B.S.P. inlet connection.

Mounting bracket

7. The mounting bracket, which is a circular casting, is clamped between the bearing housing and the volute casting. It is provided with four alternative $\frac{1}{8}$ in. B.S.P. gland drain connections and houses the flexibox gland. The bracket has two drilled lugs for mounting the pump and may be rotated and bolted in any one of four positions to suit the angle of the aircraft member to which the unit is secured.

Impeller and propeller assembly

8. The impeller and propeller assembly is screwed on to the lower end of the motor shaft, and comprises a vaned centrifuge with a twin bladed propeller secured to it by a central screw.

Function

9. De-icing fluid enters the pump from the pipe line through the inlet casting into the volute casting. Drawn by the action of the propeller, the fluid stream passes through the guide cone to the centrifuge from which it is forced into the volute and thence through the pump outlet to the delivery line.

10. Aeration of the fluid due to high rate of climb and the consequent temporary removal of fluid from the vicinity of the impeller is overcome by the pressurizing action of the propeller, from the tips of which air bubbles are dispelled.

INSTALLATION

11. Before fitting a new pump, it is important to ensure that the tank has been emptied of fluid and that the electrical circuit has been rendered dead.

12. Disconnect the inlet pipe, the delivery pipe, the gland drain pipe, the vent pipe and the electrical supply cable from the Breeze plug. Remove the fixing bolts from the mounting bracket and lift the pump clear.

13. Examine the new pump to be fitted and make sure that it is clean externally. Pour a small quantity of de-icing fluid through the pump inlet, allowing it to drain through the delivery outlet, thereby washing out any dust or other foreign matter which may have collected.

14. Before fitting the new pump in the aircraft, make sure that it has been assembled correctly for the installation, i.e., the Breeze plug may be either vertical or horizontal; the gland drain must be at the bottom, and its selection from the four alternatives (*para.* 7), is dependent upon the angle at which the securing lugs on the mounting bracket are to be fixed in the aircraft. The three remaining drain holes which are not in use are fitted with wire-locked plugs. The volute casting should be so assembled that the vent is at the top.

15. When received from Stores, the Breeze plug and the main pipe connection holes will have transit covers fitted; these must be removed before the pump is installed. When pump connections have been made in the aircraft, all unions, union nuts, etc., must be wire-locked.

SERVICING

16. Examine all pipe connections for leaks, and fit new joint washers as necessary. The leakage from the gland drain should not exceed two drops per minute when the pump is running; if the leakage exceeds this amount, the pump should be replaced by a serviceable unit.

17. Check the electrical connection and ensure that all nuts and screws are tight, and the locking wires intact.

18. In the event of excessive current consumption, low delivery pressure or any other form of erratic performance, the pump should be replaced by a serviceable unit.

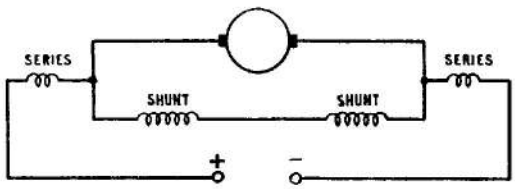

Fig. 2. Wiring diagram