Chapter 2

PUMP, WATER-GLYCOL, TYPE SPE 330WG

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

APPENDIX

Introduction

1. The type SPE 330WG pump is designed to circulate water-glycol in an aircraft cooling system and consists of a bracket mounted, single-stage, centrifugal in line pump, directly driven by a 200V, 3-phase, 400 c/s a.c. motor. Leading particulars are included in the appendix to this chapter.

DESCRIPTION

General

2. A general and sectional view of a typical pump are illustrated in fig. 1 and 2. The unit comprises a totally enclosed a.c. motor unit with an extended rotor shaft driving a centrifugal impeller. The rotor is supported at each end by ball bearings. These bearings are of the enclosed type, and are pre-packed with high melting/low freezing point grease.

3. Fluid from the main flow is prevented from entering the motor unit by a seal. This seal consists of a rotating carbon ring in contact with the lapped bronze seating of a metallic bellows type gland. Additional seals prevent any slight leakage past this gland from entering the motor unit, and channels provided in the pump castings drain this fluid leakage to atmosphere.

4. All components in contact with the pumped fluid are either manufactured from materials unaffected by water-glycol or are suitably protected against its corrosive action. The 1 in. B.S.P. inlet and outlet are arranged so that a minimum quantity of water-glycol is trapped in the pump when the system is drained.

5. The inlet and outlet castings of the pump unit are flanged and bolted together. Long bolts are fitted in the two positions for mounting the pump assembly to a bracket or the aircraft structure.

Motor unit

6. The motor unit is a totally enclosed, 6-pole squirrel cage induction motor, operating from a 200V, 3-phase, 400 c/s a.c. supply. The electrical connection to the motor unit is made through three pins of a five-pole Plessey type Breeze plug.

OPERATION

7. Fluid enters through a suction pipe attached to the pump by a 1 in. B.S.P. screwed connection situated at the lower end of the pump and is picked up by a centrifugal impeller which feeds the fluid to the volute chamber and thence to a 1 in. B.S.P. outlet elbow.

REMOVAL AND INSTALLATION

8. Before attempting to remove a pump ensure that the system has been drained or that pump isolating cocks have been closed, and that the electrical supply to the pump has been switched off. The precise method of removing the pump will be found detailed in the appropriate Aircraft Handbook. In general removal will comprise the following operations:—

(1) Disconnection of electrical connection.

(2) Disconnection of gland drain pipe.

(3) Disconnection of system piping from inlet and outlet connections.

(4) Removal of pump unit from bracket or structure to which it is mounted.

9. Installation of a new pump unit should be preceded by the following checks:—

(1) Ensure that the unit has not been stored for longer than the specified

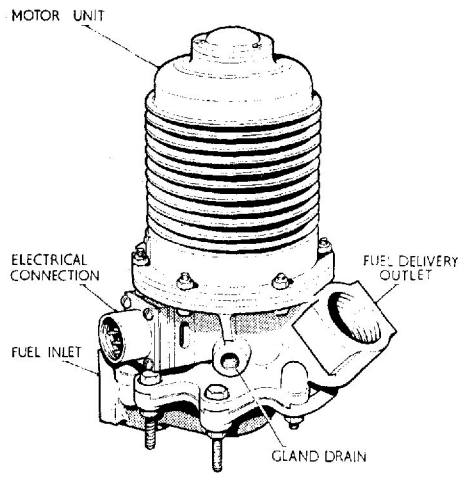

Fig. 1. General view of Type SPE 330WG Water-Glycol pump

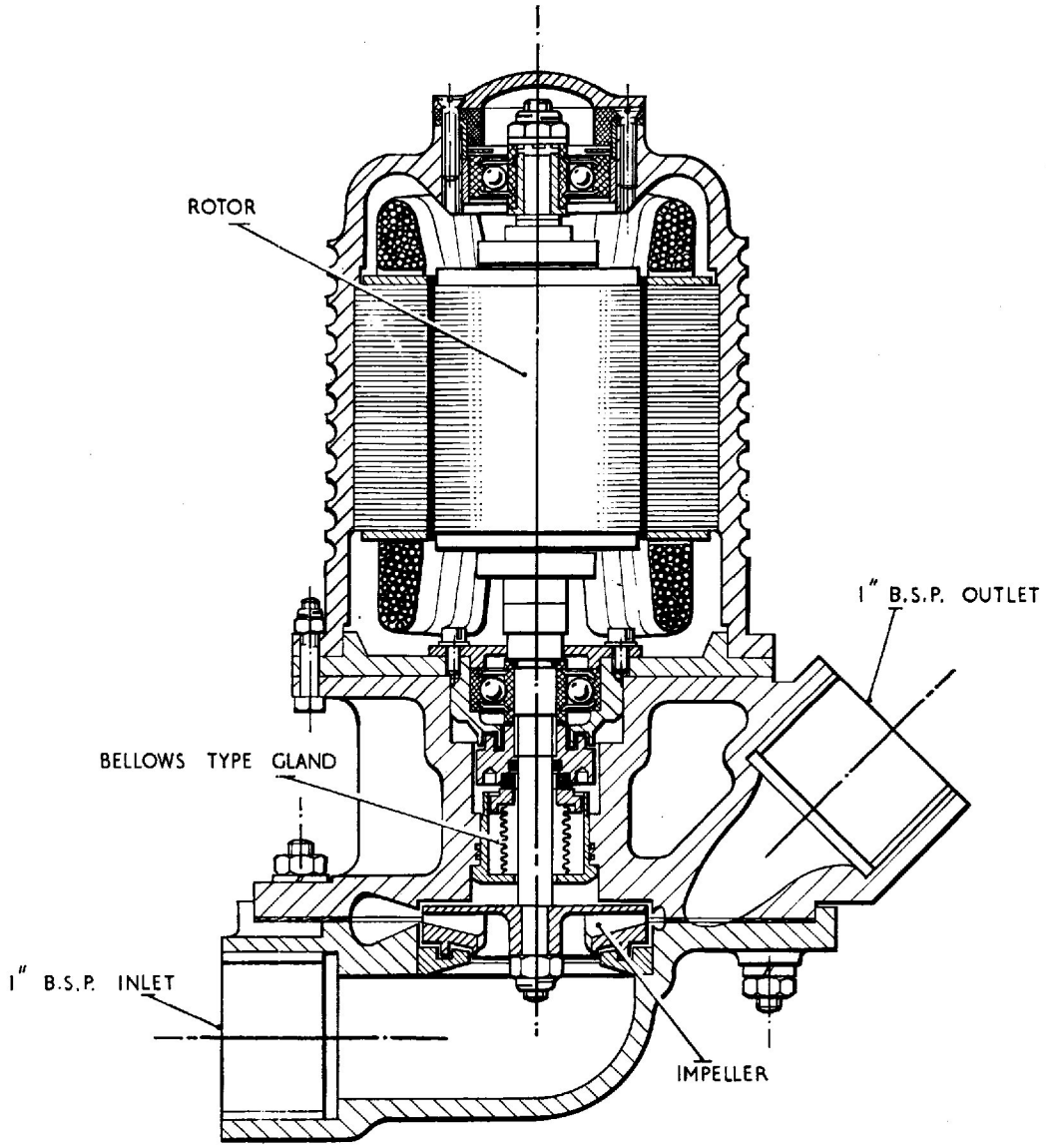

Fig. 2. Sectional view of Type SPE 330WG Water-Glycol pump

maximum period (i.e. 12 months in original packing or two years when special packing has been provided).

(2) Inspect the exterior of pump for evidence of damage. Check for any signs of corrosion and apply an approved protective finish to the unprotected area.

(3) Remove all transit plugs, caps, and masking tape.

Starting check

10. It is recommended that a starting check should be made on the pump before installation. To do this the carbon shaft bearing

should be first lubricated with a small quantity of water poured through the outlet. Take care that none enters the gland drain channel. Connect the pump to a 200V, 3-phase, 400 c/s a.c. supply and check that the pump starts immediately the supply is switched on. Check the starting of the pump by interrupting the supply several times. If the pump fails to start immediately, it should be returned to overhaul base for further serviceability testing using approved equipment.

11. The above pre-installation instructions apply to all aircraft installations of these pumps. For detailed procedure covering installation in a particular aircraft refer to the appropriate Aircraft Handbook.

12. As a general example, installation will comprise the following operations:—

(1) Fixing the pump unit to its mounting bracket or the aircraft structure.

(2) Connecting the system suction and delivery lines, electrical and gland drain connections.

Note . . .

The pipe connection from the gland drain must face towards the rear of the aircraft to prevent possible pressurisation in flight.

(3) Wire locking all union connections to the pump.

SERVICING

Routine inspection

13. At routine inspections care should be taken to conform to the following procedure:—

(1) Inspect all pipe connections and wire locking to the pump, correct as necessary. Examine the installation carefully for possible fluid leakage either from the pump itself or from the associated pipework. If the pump is found to be defective in any way it should be removed and a new or reconditioned pump fitted. No in-situ maintenance is possible.

14. At the periods laid down in the appropriate Servicing Schedules, all pumps are to be replaced by new or reconditioned pumps drawn from stores. Faulty or life expired pumps must be returned to stores and dealt with according to current authorized procedure.

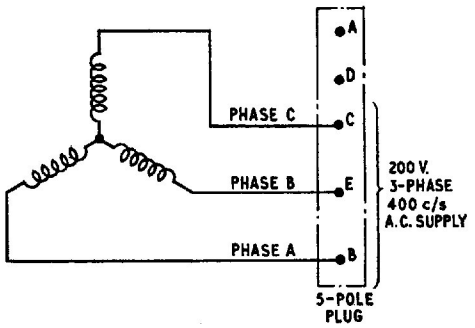

Fig. 3. Circuit diagram

Operational test

15. In accordance with the appropriate Aircraft Handbook, the pump should be tested for proof of performance, and checked against the figures given under the Leading Particulars. Failure to obtain the quoted pressure and rate of fuel delivery could be caused by a faulty motor unit, damaged impeller or an incorrect loading of the pump unit gland. The pump should be removed to ascertain the cause of failure.

Gland leakage

16. During the above tests examination should be made of the gland drain exit for fluid leakage. Leakage must not exceed two drops per minute while the pump is running or one drop per minute while stationary. Any leakage in excess of these figures will necessitate removal of the pump.

Insulation resistance test

17. Using a 500-volt insulation resistance tester, measure the insulation resistance of the pump between live parts and the frame. The insulation resistance tester used for this check should be fitted with an electrical plug to suit the pump electrical socket. When a new pump is installed the insulation resistance should not be less than two megohms. After installation for operational service, due to the humidity in aircraft at dispersal points, the minimum insulation resistance permissible is 50,000 ohms.

Appendix 1

PUMP, WATER-GLYCOL, TYPE SPE. 330 WG, Mk. 1

LEADING PARTICULARS

Pump, water-glycol, Type SPE 330WG, Mk. 1	*Ref. No.*
Operating voltage	200 *V*, 3-*phase*, 400 *c/s a.c.*
Motor	*Flameproof, continuously rated, 6-pole, squirrel cage induction motor*
Rated output	300 *g.p.h.*
Delivery pressures at operating voltage	10 *lb/in²* (*min.*)
Maximum power input	130 *W*
No-flow delivery pressure	19 *lb/in²* (*min.*)
Electrical connection, (Plessey Type CZ.50356)	*Ref. No. 5X/6181*
Phase connections	*Red (A)—to pin B,* *Yellow (B)—to pin E,* *Blue (C)—to pin C*
Maximum shaft eccentricity when running in its own bearings	0·001 *in. total indicator reading*
Motor unit bearings	*Prepacked with XG/295 grease*
Delivery outlet	1 *in. B.S.P. (Female)*
Suction inlet	1 *in. B.S.P. (Female)*
Gland drain	$\frac{1}{8}$ *in. B.S.P.*
Weight of unit	6·7 *lb.*