Chapter 24

ELECTRO-PNEUMATIC VALVES, DOWTY, TYPE C8409Y AND C7341Y

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LIST OF ILLUSTRATIONS

Introduction

1. The two valves covered in this chapter are electrically identical and vary only in the type of pressure connection used. The Type C8409Y is illustrated in fig. 1 and has a stainless steel double-ended union, whilst the Type C7341Y has a standard cone type adapter.

2. Each unit is essentially a ball type stop valve operated by a solenoid. It is fitted to certain turbo-prop. engines as a pilot valve for another unit which controls the flow of hot air to the hollow blades of a compressor, for de-icing purposes. This flow is either ON or OFF as necessary. When OFF the solenoid is in the energized state.

DESCRIPTION

Valve (*fig. 1*)

3. Two opposing assemblies are housed in a bore through the body of the unit. At one end four bolts secure a flanged sleeve in the bore against a ball seat. A spring-loaded plunger inside the sleeve projects through the seat to contact a ball. The ball is guided in the end of a piston insert from the opposite end and retained by a screwed plug which is recessed for a spindle seal and a backing washer. Shims fitted between the backing washer and the piston provide a means of

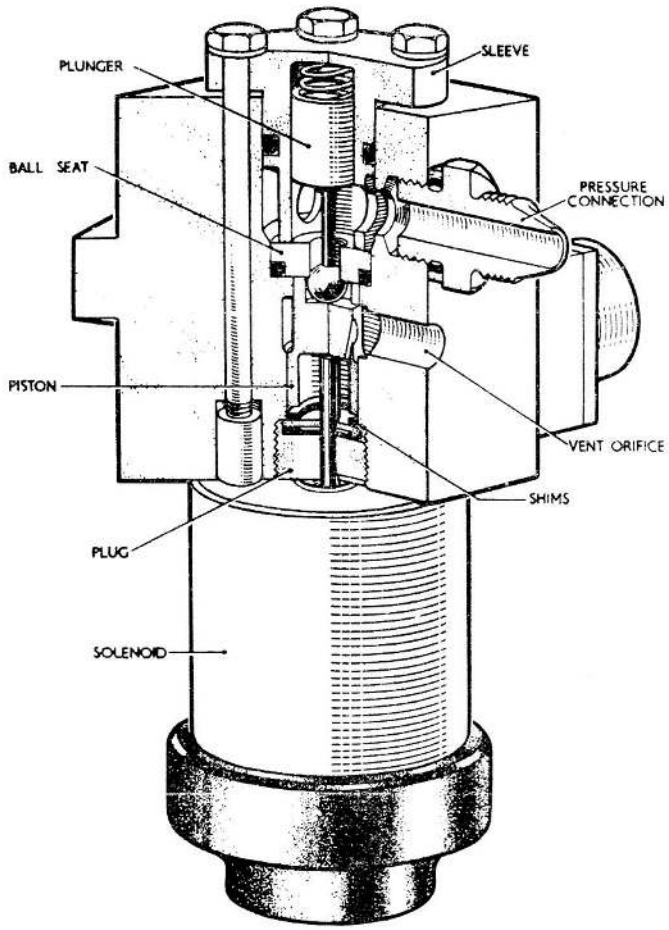

Fig. 1. Electro-pneumatic valve, Type C8409Y

adjusting the piston travel within requirements. The piston is counter bored to receive the solenoid plunger and holes at the bottom of the counter bore facilitate displacement of the air when the piston moves.

4. The housing for the sleeve is intersected by a tapped hole for a double-ended union, which is the pressure connection, screwed in against a bonded seal. Holes through the wall of the sleeve and slots at the inner end of the piston provide a passage from the pressure connection to a vent orifice, when the ball is lifted from the seat.

5. The solenoid is secured over the screwed plug by two of the bolts which hold the sleeve at the other end. The bolts engage with locating sleeves in the solenoid. Under the solenoid, the body is grooved to house an insulating mat and plunger block, and wiring from a two-pole plug runs to the plunger block through an insulating tube. The plug is fitted over a distance piece which has a gasket on each face.

6. Adjacent recesses in the plunger block each contain a spring through which the relevant lead passes. The spring acts against ferrules fixed to the end of the leads to provide flexible contacts which mate with contacts on the face of the solenoid.

Solenoid

7. The solenoid (*fig.* 3) comprises a coil assembly and an armature assembly, located in a yoke assembly fitted with the necessary electrical connections.

8. The coil winding comprises enamelled copper wire and resistance wire wound on to a fibre glass sleeve and suitably insulated. The ends of the wire are soldered into contact pins carried in insulated bushes located in holes in the end plate.

9. Also mounted on the end plate are two locating sleeves and a hollow soft-iron core, spun over where it passes through the plate to retain it in position. The end plate is located in a recess in the yoke which is spun over to retain it. The two locating sleeves vary in length to avoid any mis-mating with the valve to which it is fitted. A shallow slot, machined in the face of the end plate provides an air vent.

10. The armature assembly comprises a soft iron armature bearing an annular recess in which are located soft iron sectors. These

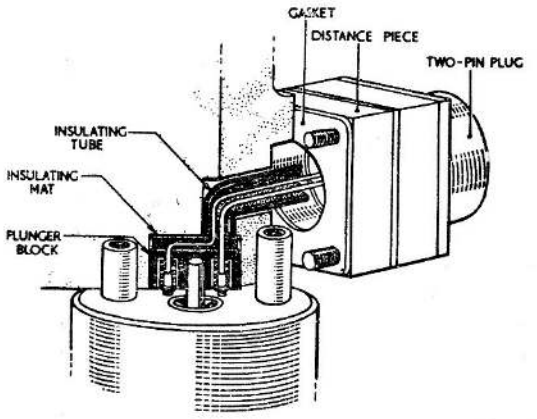

Fig. 2. Wiring details

seat in a recess machined in the yoke where they are retained by a rubber clamping ring. The armature is drilled for a threaded bush which carries a locking spring and is retained by spinning over. A sector anti-vibration spring is located against the sectors and the whole assembly is retained by a cover spun over a lip on the end of the yoke.

11. A plunger carrying a collar, which is retained by riveting, and a spring, is located in the bore of the armature bush and the solenoid core end retained by an adjusting nut which is locked by the locking spring. The locking spring has two arms, one of which fits into one of a number of notches cut in the edge of the nut. The spring arms are diametrically opposite while the number of notches is odd ; a half notch adjustment is therefore provided. A rubber shroud covers the end of the assembly and permits manual operation.

OPERATION

Solenoid

12. When the solenoid is mounted on the valve the contacts mate with the spring-loaded contact pins on the valve body. In the de-energized condition the armature assembly is held away from the coil against the light anti-vibration spring by a small spring in the pilot valve bore.

13. When the coil is energized, it attracts the armature assembly which, by means of the plunger, moves the valve. The spring in the adjusting nut provides the slight amount of flexibility necessary.

Valve

14. When the solenoid is de-energized, the ball and piston are pushed away from the

ball seat by the plunger. As a result, air in the pipe attached to the pressure connection can escape to atmosphere by way of the vent orifice.

15. When the solenoid is energized, the solenoid plunger thrusts upon the piston until the ball seals off the orifice in the seat. The plunger in the sleeve is driven back against its spring. The passage through the valve is thus sealed off and pressure can be built up in the pipe at the pressure connection. This condition is shown in fig. 1.

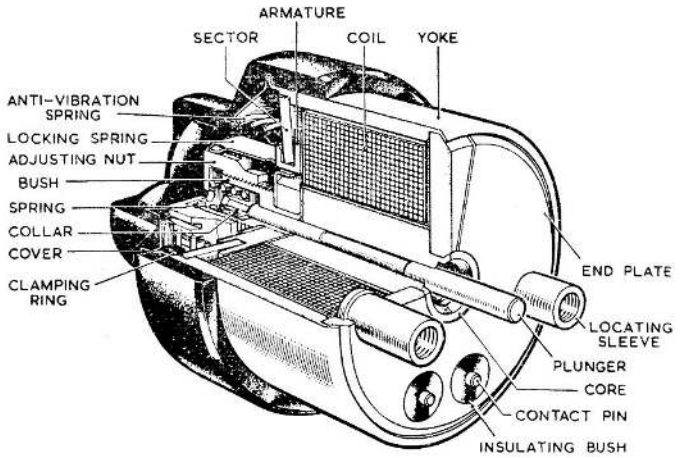

Fig. 3. Solenoid unit, Type C5151Y, Mk. 7

INSTALLATION

16. The letters A and B are marked on the terminal plug and it is important that on installation, A must be connected to the earthed side of the battery, when an earth return wiring system is installed in the aircraft.

SERVICING

Valve

17. Should leakage occur, it will result in failure to build up pressure in the pipe line to the valve. If the seals in the sleeve or seat are faulty they must be renewed. In the case of the ball valve, if cleaning is not effective, or if damage is evident, the faulty items must be renewed.

Solenoid

18. Should any fault occur in the solenoid or if damage is sustained, the unit must be returned to store and a new unit fitted to the valve.

TESTING

Resistance test

19. Measure the resistance of the solenoid coil winding ; this must be within the limits 68–72 ohms.

Insulation resistance

20. The insulation resistance between the body of the solenoid and each pin of the two-pole plug should not be below 20 megohms when measured with a 250-volt insulation resistance tester.

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