Chapter 14

ACTUATING SOLENOIDS, ROTAX, D5300 SERIES

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Introduction

1. The D5300 series of actuating solenoids operate in either 12 or 28-volt d.c. circuits where limited linear movement is required, e.g. locking controls for undercarriage and flaps, operation of valves, etc.

DESCRIPTION

2. Details of the units within this series are given in Appendix 1 to this chapter. The units are similar in appearance, but differ in operating voltages, electrical connections and plunger assemblies. An illustration of a typical unit is given in fig. 1.

3. The main body of the unit is formed by a mild steel combined end plate and cylindrical case enclosing the solenoid, core and coil tube assembly. An aluminium end cover is secured to the end plate by two 2 B.A. screws and nuts, and together the end cover and end plate form the mounting flange and retain the plunger in position.

4. The plunger, with its lock, plug or fork-ended projection through the end cover, fits and slides in the tube of the solenoid coil and is spring-loaded at its front end to maintain it in a fully "locked" position when the solenoid is de-energized.

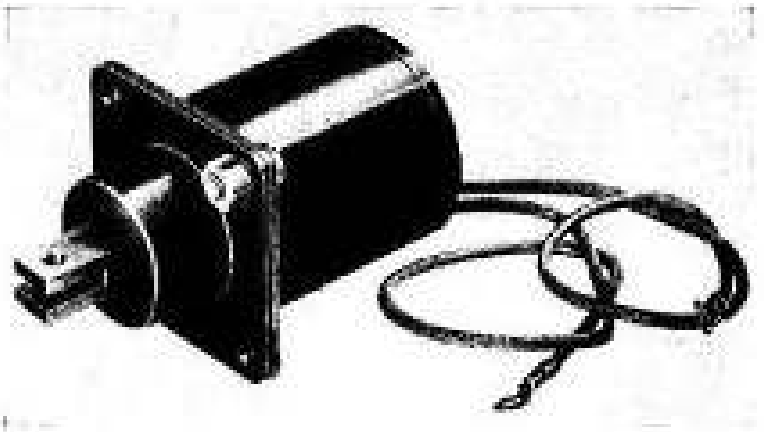

Fig. 1 Typical actuating solenoid

5. Electrical connection is made to the unit either with leads and tags, which enter the rear of the unit via a slot in the cover, or by a 2-way terminal block mounted on a bracket integral with the body. This terminal block may either be fitted with 4 B.A. terminals and be on the periphery of the solenoid case, or be fitted with 6 B.A. terminals and be on the end of the solenoid case, in line with the plunger. The mounting flange is provided with four $\frac{3}{8}$ in. dia. fixing holes.

Operation

6. When the solenoid is energized, the magnetic pull created on the plunger causes it to be drawn in towards the core (against the pressure of the return spring). This action moves any component attached to the plunger fork, or, in the instance of the bobbed plunger, releases the component "locked" in position.

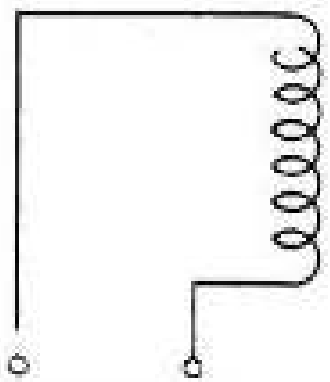

Fig. 2 Wiring diagram

7. On the breaking of the current through the solenoid, the plunger, under pressure from the spring, returns to its normal position.

SERVICING

8. The unit should be visually inspected for cleanliness, security of connections and freedom from damage. The plunger should be free to move, with no tendency to stick, and the spring pressure should be sufficient to return the plunger to the extended position.

Dismantling

9. If the unit is not new, remove the plunger cover by unscrewing two 2 B.A. screws, with nuts and washers. Withdraw the plunger assembly, return spring and locating washer, and examine for damage and wear. Lightly lubricate the plunger with oil OM-13. Refit the locating washer, spring, plunger and cover, and check the plunger for freedom of travel.

Testing

10. If the serviceability of the unit is suspect, it may be tested as laid down in Appendix A.

Appendix A

STANDARD SERVICEABILITY TEST FOR ACTUATING SOLENOIDS, ROTAX, D5300 SERIES

Introduction

1. The following tests may be applied to the unit before it is put into service, or at any time when its serviceability is suspect.

Test equipment

2. The following test equipment is required:—

(1) Bridge-Megger tester, Type B (Ref. No. 5G/1708).

(2) Testmeter, Type F (Ref. No. 5QP/1) or equivalent.

(3) Insulation resistance tester, Type C (Ref. No. 5G/152) (for R.A.F.) or Type 0557/A.P.5047 (for R.N.)

Testing

Resistance of coil

3. The resistance of the coil, when measured between the terminals and corrected to 20 deg. C, should be as shown in Table 1.

Stroke

4. The length of the stroke should be not less than that quoted in Table 1.

Operation

5. *Pull-in voltage.* The minimum voltage necessary for complete operation should not exceed the value shown in Table 1 (where applicable). The plunger should drop out before the voltage is reduced to zero.

6. *Pull-in and drop-out current.* The minimum current through the solenoid winding necessary for complete operation should not exceed the value shown in Table 1 (where applicable). Drop-out should occur when the current is reduced to the value shown, after first energising the coil at 28 volts.

Note . . .

When testing Type D5329, the following test conditions apply. With the lever loaded to 6 lb., and the plunger-unseat air gap set to 0·020 in., the pull-in current should not be greater than 2·3 amp. The drop-out current of the solenoid, with only the return spring load operating upon the plunger, should be between 0·10 and 0·25 amp.

Insulation resistance test

7. With a 250-volt insulation resistance tester, measure the insulation resistance between the coil and the frame; the reading should be not less than 0·5 megohm (for R.N.) or 5 megohms (for R.A.F.)

TABLE 1

Testing data

Type	Coil resistance (ohms)	Plunger travel (in.)	Time rating (min.)	Pull-in voltage (volts)	Pull-in current (amp.)	Drop-out current (amp.)
D5301	16·5–19	0·210	5	16	—	—
D5302	4·8– 5·5	0·210	5	8	—	—
D5303	16·5–19	0·210	5	16	—	—
D5305	16·5–19	0·210	5	16	—	—

Type	Coil resistance (ohms)	Plunger travel (in.)	Time rating (min.)	Pull-in voltage (volts)	Pull-in current (amp.)	Drop-out current (amp.)
D5306	16·5–19	0·210	5	16	—	—
D5308	4·8– 5·5	0·210	1	16	—	—
D5309	16·5–19	0·210	5	16	—	—
D5310	16·5–19	0·210	5	16	—	—
D5311	55 –61	0·210	Cont.	—	0·238	0·025–0·07
D5314	4·8– 5·5	0·210	5	8	—	—
D5315	4·8– 5·5	0·210	5	8	—	—
D5316	16·5–19	0·210	5	16	—	—
D5317	55 –61	0·210	Cont.	—	0·238	0·025–0·07
D5318	55 –61	0·210	Cont.	—	0·238	0·025–0·07
D5320	1·8– 2·1	0·210	0·5	—	2·75	—
D5321	16·5–19	0·210	5	16	—	—
D5322	6·3 7·7	0·210	70 sec.	16	—	—
D5323	19·5–22	0·270	5	16	—	—
D5324	19·5–22·5	0·375 $^{+0·005}_{-0}$	5	18·5	—	—
D5327	55 –61	0·210	Cont.	—	0·238	0·025–0·07
D5328	16·5–19	0·210	5	16	—	—
D5329	5·8– 7·6	0·110 ±0·005 (plunger-anvil air gap)	70 sec.	—	2·3	0·10 –0·25
D5330	49 –61	0·210	Cont.	—	0·280	0·025–0·07
D5331	49 –61	0·210	Cont.	—	0·280	0·025–0·07
D5332	49 –61	0·210	Cont.	—	0·238	0·025–0·07
D5336	55 –61	0·210	Cont.	—	0·238	0·025–0·07
D5338	55 –61	0·210	Cont.	—	0·238	0·025–0·07

Appendix 1

LEADING PARTICULARS

Type	Ref. No.	Nominal voltage (volts)	Rating (min.)	Plunger Type	Plunger Travel (in.)	Electrical connection	Weight (oz.)
D5301	5CW/3211	28	5	Bevelled lock	0·210	9 in. leads with tags	15
D5302	5CW/3212	12	5	Fork-ended	0·210	9 in. leads with tags	15
D5303	5CW/3816	28	5	Bevelled lock	0·210	Terminal block (4 B.A.)	17
D5303 (mod.) (Hawker Part No. A.222152)	26FX/9027	28	5	Special plunger	0·210	Terminal block (4 B.A.)	17
D5305	5CW/4655	28	5	Fork-ended	0·210	9 in. leads with tags	15
D5307	5CW/6368	28	5	Fork-ended	0·210	Terminal block (4 B.A.)	17
D5308	5D/1839	28	1	Fork-ended	0·210	2 ft. leads with tags	15
D5309	5CW/4701	28	5	Long offset fork-ended	0·210	9 in. leads with tags	15
D5310	5CW/5511	28	5	Plug	0·210	9 in. leads with tags	15
D5311	5CW/5894	28	Cont.	Bevelled lock	0·210	2 ft. leads with tags	15
D5314	5D/1812	12	5	Bevelled lock	0·210	Terminal block (4 B.A.)	17
D5315	5D/1821	12	5	Fork-ended	0·210	Terminal block (6 B.A.)	17
D5316	5CW/6495	28	5	Bevelled lock	0·210	9 in. leads with tags	15
D5317	5CW/6164	28	Cont.	Fork-ended	0·210	Terminal block (4 B.A.)	17
D5318	5CW/5845	28	Cont.	Fork-ended	0·210	Terminal block (6 B.A.)	17
D5320	5CW/6694	28	0·5	Fork-ended	0·210	9 in. leads with tags	15
D5321	5CW/	28	5	Fork-ended	0·210	Terminal block (6 B.A.)	16
D5322	5CW/	28	70 sec.	Fork-ended	0·210	9 in. leads with tags	15
D5323	5CW/7829	28	5	Fork-ended	0·270	9 in. leads with tags	15
D5324	5CW/	28	5	Special plunger post	0·375 $^{+0·005}_{-0}$	9 in. leads with tags	17

Type	Ref. No	Nominal voltage (volts)	Rating (min.)	Plunger Type	Plunger Travel (in.)	Electrical connection	Weight (oz.)
D5327	5CW/8340	28	Cont.	*Fork-ended	0·210	Terminal block (4 B.A.)	17
D5328	5CW/8056	28	5	*Fork-ended	0·210	Terminal block (6 B.A.)	16
D5329	5CW/	28	30 sec.	Special end cap, lever and hinge	0·110±0·005 (plunger-anvil air gap gap)	18 in. leads with AMP terminals to suit No. 6 UNC studs	16
D5330	5CW/8430	28	Cont.	Fork-ended	0·210	2 ft. leads with tags	15
D5331	5CW/8431	28	Cont.	Fork-ended	0·210	Terminal block (6 B.A.)	16
D5332	5CW/8432	28	Cont.	Fork-ended	0·210	Terminal block (6 B.A.)	16
D5336	5CW/9107	28	Cont.	Bevelled lock	0·210	Terminal block (6 B.A.)	16
D5338	5CW/	28	Cont.	Fork-ended with 4 B.A. screw and stiffnut	0·210	9 in. leads of Uninyvin 20	16

* These types have clearance holes through both limbs of fork; other fork-ended types have tapped hold in one limb and clearance hole in the other.