Chapter 36

SWITCH MAGNETIC, ROTAX, TYPE D11601

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Voltage (coil)	28-V d.c.
Voltage (main contacts)	112-V d.c.
Voltage (auxiliary contacts)	28-V. d.c.
Rating of main contacts	30 amperes (continuous)
Rating of auxiliary contacts	5 amperes
Closing coil resistance (at 20 deg. C.)	8 ohm ± 5%
Total resistance of coil (at 20 deg. C.)	57 ohm ± 5%
Minimum operating voltage of coil	16-V. d.c.
Operational temperature range ...	—65 deg. C. to + 70 deg. C.
Operational ceiling	60,000 ft.
Length	9·078 in.
Width	3·500 in.
Height	4·375 in.
Weight	5 lb. 5 oz.

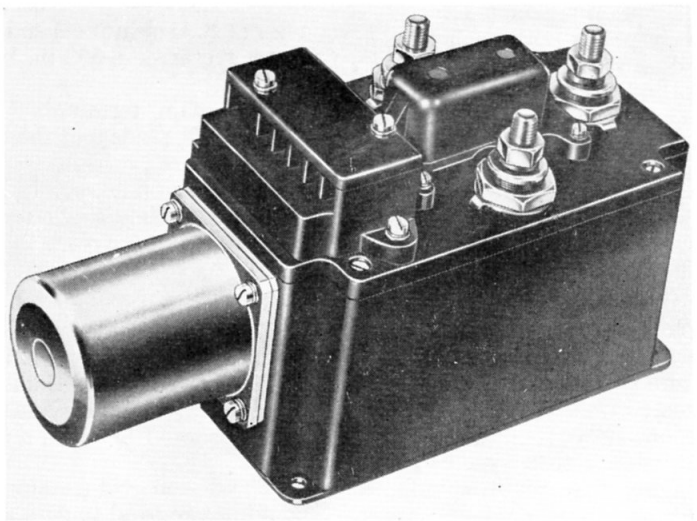

Fig. 1. General view of D 11601 switch

Introduction

1. The Rotax D11601 magnetic switch is a two-way single-pole change-over contactor for use in 112-V. d.c. circuits. Connection is normally made between terminal 1 and terminal 2 with terminal 3 isolated but, on energizing the coil, contact is made between terminals 1 and 3 and terminal 2 is isolated. The coil has a "hold-in" winding which comes into circuit with the low resistance "pull-in" winding at the end of the plunger stroke, in order to render the coil continuously rated. There are two pairs of auxiliary contacts: one pair normally open (terminals 8 and 9) and one pair normally closed (terminals 6 and 7).

DESCRIPTION

2. The switch is housed within a metal case, having a moulded top cover, which carries the main terminals, the auxiliary terminal block and a de-ion grid. The base plate is extended at each end to receive mounting holes. The solenoid is mounted outside the main case, being fixed to one of the end castings.

3. The switch mechanism is carried by the two side plates of a switch frame. The solenoid plunger is connected to a rocker linkage which operates the main moving contact carrier. This carrier is fitted to a spindle borne by a ball bearing at each side. The carrier has four main contacts which operate within the de-ion grid (*para.* 2). The moving contacts mate with four fixed contacts, one at each end of the de-ion grid and two forming a central, double-faced contact (connected to the common terminal 1). One moving contact corresponds with each fixed contact surface and all four moving contacts are commoned, so that the central contact is connected to either one of the other fixed contacts, depending on the position to which the contact carrier has rocked. The contacts are spring loaded to permit adequate follow through.

4. The linkage consists of a swinging link (connected to the plunger and carried by a link spindle which is borne by two ball bearings) and two actuating levers, which are linked to a common pin on the swinging link and are connected one on each side of the contact carrier one above its fulcrum and one below. Two torsion return springs are fitted to the swinging link pivot spindle. The two pairs of auxiliary contacts are mounted within a moulded switch housing fitted outside one of the main frame side plates and the economy switch is mounted in a corresponding position outside the opposite side plate. The auxiliary contacts and economy switch are operated by a single transverse pin fitted to the swinging link and having an actuating arm projecting through a slot in each side plate.

Operation

5. When 28-V. d.c. is applied to the operating coil, the plunger pulls in and the actuating end of the swinging link moves up, causing the upper actuating lever to push the top of the contact carrier away from the solenoid and the lower actuating lever to pull the bottom of the contact carrier towards the solenoid. The contact carrier then rocks from its normal position commoning the fixed contact at the solenoid end of the de-ion grid to the central contact (i.e., terminals 1 and 2) to its operated position, commoning the fixed contact at the other end of the de-ion grid to the central contact (i.e., terminals 1 and 3). The auxiliary contacts are operated by the swinging link pin and the economy switch opens. The "hold-in" coil is therefore energized in series with the initial "pull-in" coil so that coil current is limited to a safe value for continuous operation. When the supply to the coil is switched off, the torsion return springs rotate the swinging link to its original position, pulling the plunger out and returning all contacts to their normal positions.

INSTALLATION

6. The switch may be mounted in any convenient attitude. The four mounting holes in the base plate are 0·196 in. in diameter (2 B.A. clearance) and the fixing centres form a rectangle 6·562 in. by 2·937 in.

7. The main terminals (1, 2 and 3) are $\frac{5}{16}$ in. B.S.F. studs and the coil and auxiliary terminals are 4 B.A. screw and washer terminations. The coil and auxiliary terminals are set in a single terminal block with a screw retained cover.

SERVICING

8. Make a general visual inspection of the switch to ensure that it is in good condition and has not sustained damage. It should be secure on its mounting and all electrical connections should be clean and securely made.

9. The de-ion grid (retained by four screws) should be removed to gain access to the main contacts. The contact surfaces should be examined for excessive burning and pitting.

Coil resistance tests

10. The resistance of the "pull-in" coil, measured between terminals 4 and 5 with the main contacts in their normal position should be between 8·61 ohm and 7·79 ohm (corrected to 20 deg. C. ambient temperature).

11. The main moving contacts should be manually rocked to the operated position and the resistance of the total winding measured between terminals 4 and 5. The resistance should be between 76·9 ohm and 69·5 ohm (corrected to 20 deg. C. ambient temperature).

Coil "pull-in" voltage test

12. Connect a suitable ammeter and a variable supply across terminals 4 and 5, ensuring that the current is set to zero at the commencement of the test. Slowly increase the current from zero until the plunger is pulled in. The product of the current reading at this moment and the actual pull-in coil resistance at 20 deg. C. (*para.* 10) should be between 12-V. and 15·5-V. Ensure that the coil current falls to a value less than 0·5 ampere immediately the plunger pulls in, indicating that the economy contacts have opened.

Coil "drop-out" voltage test

13. Slowly decrease the current flowing in the coil until the plunger drops out. The product of the current reading at this moment and the actual resistance of the full coil at 20 deg. C. (*para.* 11) should be between 2-V. and 10-V.

Note . . .

While the tests in paras. 12 and 13 are being applied, observe the action of the main contacts. Any movement of the contact carrier to the extent of closing contacts must produce the full follow through of at least 0·025 in. at each contact.

Millivolt drop test

14. With the main contacts in the normal position, allow a current of 30 amperes to flow between terminals 1 and 2 and measure the potential drop across these terminals. A reading of not more than 60 millivolt should be obtained. A similar reading should be obtained between terminals 1 and 3 with 30 amperes flowing and the coil energized.

15. With 5 amperes flowing the potential drop across the auxiliary contact terminals 6 and 7 (coil de-energized) and across auxiliary contact terminals 8 and 9 (coil energized) should not exceed 100 millivolt.

Insulation resistance test

16. Measure the insulation resistance between the following points, using a 500-V. insulation resistance tester. A reading of at least 50,000 ohm should be obtained in each test.

(1) Coil de-energized
- (*a*) Terminal 1 and terminal 3
- (*b*) Terminal 1 and terminals 4, 6, 8 and 9
- (*c*) Terminal 1 and frame

(2) Coil energized
- (*a*) Terminal 1 and terminal 2
- (*b*) Terminal 1 and terminals 4, 6, 7 and 8
- (*c*) Terminal 1 and frame.

17. Measure the insulation resistance between the following points, using a 250-V. insulation resistance tester. A reading of at least 50,000 ohm should be obtained in each test.

(1) Coil de-energized
- (*a*) Terminals 4, 6, 8 and 9 and frame
- (*b*) Terminal 4 and terminals 6, 8 and 9
- (*c*) Terminal 6 and terminals 8 and 9
- (*d*) Terminal 8 and terminal 9

(2) Coil energized
- (*a*) Terminals 4, 6, 7 and 8 and frame
- (*b*) Terminal 4 and terminals 6, 7 and 8
- (*c*) Terminal 6 and terminals 7 and 8
- (*d*) Terminal 7 and terminal 8.

Note . . .

The value of insulation resistance given in paras. 16 and 17 applies to switches being tested under normal workshop conditions. Due allowance should be made for the climatic conditions of the locality and those of the aircraft servicing area or dispersal point where the tests are being applied. In particularly damp climates, the readings obtained may be low enough to give apparently sufficient reason for rejection and, in these instances, discretion should be exercised.

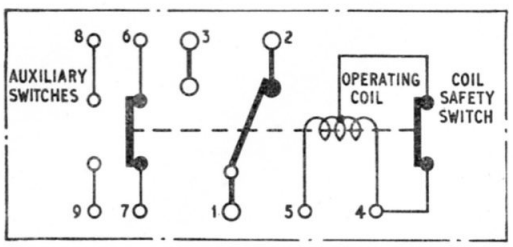

Fig. 2. Diagram of internal connections

(A.L.98, Mar. 57)

P27228 173725/1241 5/57 2375 C & P **Gp. 1**
C (AL98)