

Chapter 27

SWITCH, MAGNETIC, TYPE 27A (ROTAX D10202)

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LEADING PARTICULARS

Switch, magnetic, Type 27A ... Stores Ref. No. 5CW/5029

Voltage:

Main contacts ... 112-V, d.c.

Auxiliary contacts ... 28-V, d.c.

Coils ... 29-V, d.c. (Max.)

Current rating:

Main contacts ... 300 amperes (cont.)

500 amperes (for 3 min)

1,000 amperes (for $\frac{1}{2}$ min.)

Auxiliary contacts ... 5 amperes

Coil resistance at 20 deg. C.

Pull-in coil ... 3.45 ohm \pm 5 per cent

Hold-in coil ... 36.4 ohm \pm 5 per cent

Operational temperature range ... -70 deg. C. to +50 deg. C.

Operational ceiling ... 50,000 ft.

Length ... 11.52 in.

Width ... 5.34 in.

Height (from mounting) ... 6.83 in.

Protrusion to rear of mounting surface ... 1.85 in.

Weight ... 15 lb. 12 oz.

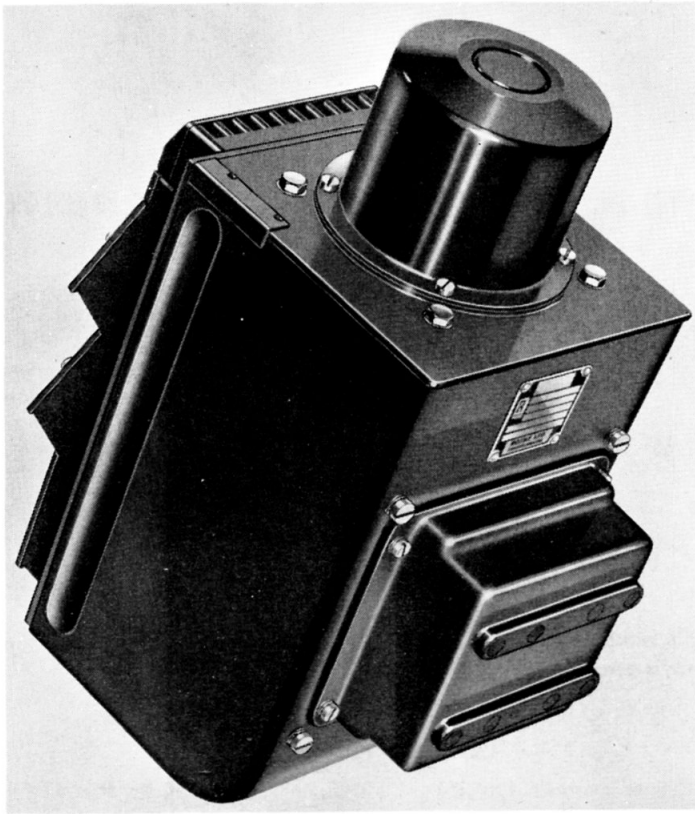


Fig. 1. General view of Type 27A switch

Introduction

1. Type 27 change-over switch is a 112 volt double-pole contactor designed to transfer a load to an alternative supply by the operation of a 28-volt solenoid. There is no "off" position. The common terminals are normally connected to one set of supply terminals and are connected to the alternative set when the solenoid is energized. When the main contacts are moved, two pairs of auxiliary contacts are opened and two pairs are closed.

DESCRIPTION

2. The switch mechanism is mounted on a rectangular moulded base. At one end, a vertical plate carries the solenoid, while the main contacts and the linkage operate between two side frames set at right angles to the solenoid plate. Four main fixed contacts are fitted, two at each end, within a

moulded rectangular contact housing (supported above the side frames) and these contacts are connected to main terminals (set in the base) by copper conductors. The movable contacts which mate with the fixed contacts, are mounted in a carrier pivoted between the side frames and operated through a linkage mechanism by the movement of the solenoid plunger. The linkage between the plunger and the moving contact assembly, consists of a bell crank and two linkage arms which form a toggle mechanism. With the solenoid de-energized, the pairs of contacts nearer the solenoid mate, while the pairs of contacts further from the solenoid mate when the solenoid is energized. The moving contacts are commoned in pairs and are connected by flexible copper braid to the two common terminals set in the base.

A renewable arcing finger is fitted to each main contact, and de-ionizing grids, set within moulded arc chutes, are located above each pair of contacts.

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3. Two auxiliary switches, each having one normally open and one normally closed pair of contacts, are mounted, one on each side of the switch frame and are operated by a pin extending on each side of the moving contact assembly. An arm fitted to this assembly operates the coil economy switch which brings the hold-on winding of the solenoid coil in series with the pull-in winding, as the plunger completes its stroke. The switch mechanism is enclosed within a metal cover and is ventilated by means of a flame proof cowl.

External connections

4. The three pairs of main terminals are $\frac{1}{4}$ in. B.S.F. studs and are enclosed within moulded shrouds behind the mounting base. All auxiliary switch and coil connections are made to 4 B.A. screw and washer terminations set in a ten-pole moulded terminal block.

Operation

5. When the solenoid is energized, its plunger is pulled in and the moving contact assembly operated through the bell crank and

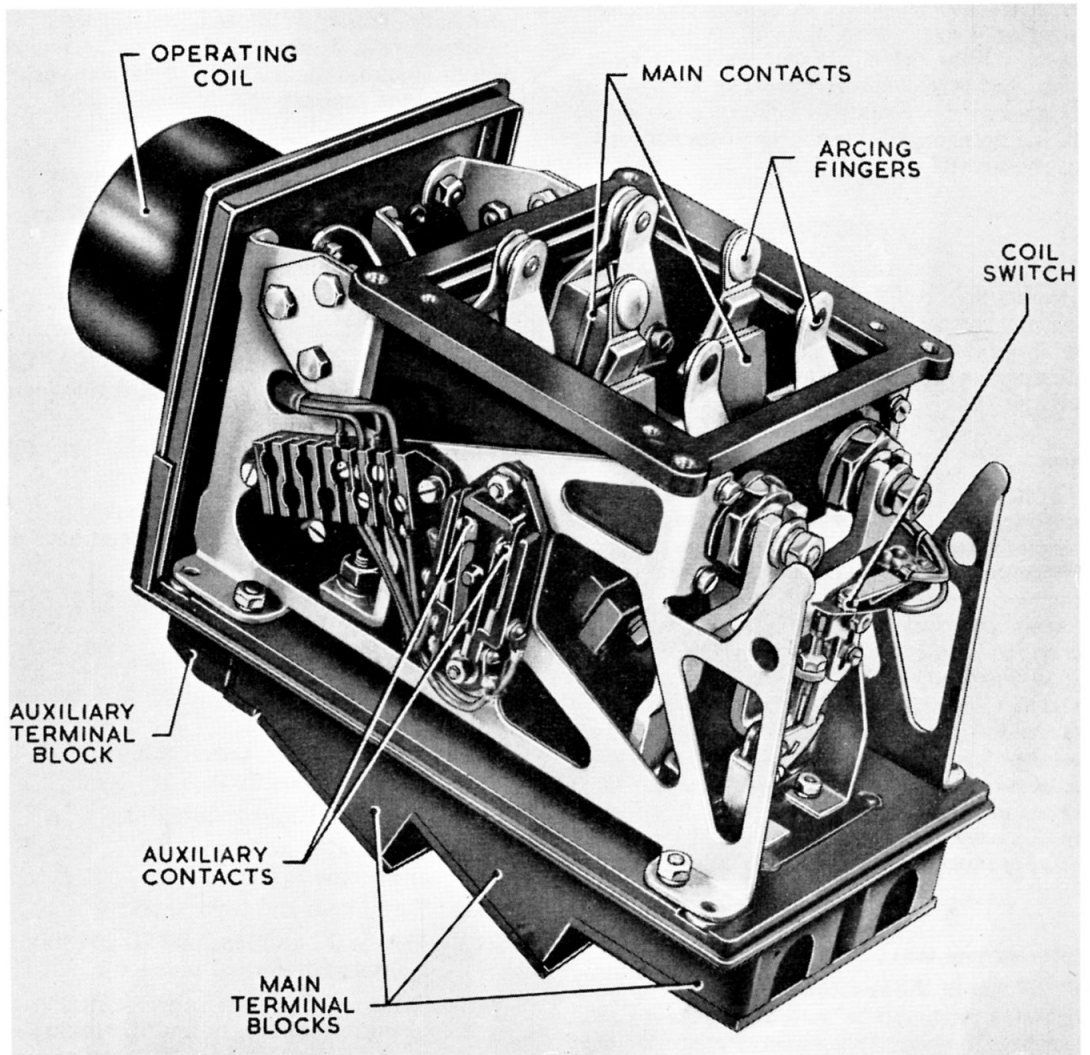


Fig. 2. View of switch with cover removed

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linkage arms. The auxiliary switches operate and the coil economy switch opens. At the commencement of the plunger stroke, the 28-volt positive is connected to the hold-on coil terminal and to the common tapping of the solenoid coil (fig. 3) while the pull-in coil terminal is connected to negative, so that current flows in the pull-in coil only. When the coil economy switch opens, the tapping is disconnected from positive so that the current now flows through the hold-on coil, in series with the pull-in coil. When the solenoid is de-energized the plunger drops out and all contacts return to their normal position.

INSTALLATION

6. The switch may be mounted in any position except with the arc chutes downmost. Four 0.193 in. dia. fixing holes are provided in the mounting base; their fixing centres form a rectangle 7.375 in. \times 4.437 in. It is necessary to remove the cover in order to mount the switch.

SERVICING

7. The tests detailed in the following paragraphs are sufficient to ensure the satisfactory operation of the unit. In addition, it is necessary to inspect the mechanism for damage and all contacts for burns and pitting.

Note . . .

To fit a new fixed arcing finger, unlock and unscrew the conductor securing nut and the contact securing nut and remove the contact from the contact holder. The defective arcing finger can now be removed and a new one fitted. Shims are located under the main contact in order to adjust the contact "override" to at least 0.045 in. and it is important to ensure that this "override" is maintained (by adjusting the shims if necessary). To fit a new moving arcing finger, remove the two hexagon-head bolts which secure it to the main contact. The shims under the arcing finger should be adjusted if necessary, to maintain an arcing contact load of approximately one third of the main contact load.

Coil resistance tests

8. Measure the resistance of the pull-in coil between terminals 'F' and 'G' on the internal terminal block. When corrected to 20 deg. C. a reading of 3.45 ohm. \pm 5 per cent must be obtained. Measure the resistance of the

hold-on coil between terminals 'G' and 'H' (the coil switch must be open). When corrected to 20 deg. C. a reading of 36.4 ohm. \pm 5 per cent must be obtained.

Millivolt drop tests

9. Allow the rated current of 300 amperes to flow between each pair of main terminals in turn. The potential drop across each pair of mating contacts should be measured and should not exceed 40 millivolt. The potential drop between each terminal 'B' and its corresponding terminal 'A' should not exceed 125 millivolt while the potential drop between each terminal 'B' and its corresponding terminal 'C' should not exceed 95 millivolt.

10. The potential drop across each pair of auxiliary contacts should not exceed 40 millivolt with 5 amperes flowing; the potential drop across the contacts of the coil switch should not exceed 20 millivolt with 2.5 amperes flowing.

Insulation resistance tests

11. Measure the insulation resistance between the following points using a 250 volt insulation resistance tester.

- (1) Terminal A1 and terminals A2, C1, C2, 1, 2, 3, 4, 5, 6, 7, SC and frame.
- (2) Terminal A2 and terminals C1, C2, 1, 2, 3, 4, 5, 6, 7, SC and frame (contacts in normal position)
- (3) Terminal C1 and terminals A1, C2, 1, 3, 4, 5, 7, 8, SC and frame.
- (4) Terminal C2 and terminals A2, 1, 3, 4, 5, 7, 8, SC and frame (contacts in 'operated' position).
- (5) Terminal 1 and terminals 3, 4, 5, 7, 8, SC and frame.
- (6) Terminal 3 and terminal 4.
- (7) Terminal 5 and terminals 7, 8, SC and frame.
- (8) Terminal 7 and terminal 8 (contacts in 'operated' position).
- (9) Terminal 1 and terminal 2.
- (10) Terminal 3 and terminals 5, 6, 7, SC and frame.
- (11) Terminal 5 and terminal 6.
- (12) Terminal 7 and terminal SC and frame. (contacts in normal position).
- (13) Terminal SC and frame (contacts in 'operated' and in normal positions).

A reading of at least 2 megohm should be obtained in each test.

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Note . . .

The values given in these insulation resistance tests apply to units 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 conducted. In particularly damp climates, the readings will be low enough to give apparently sufficient reason for rejection and in these instances discretion should be exercised.

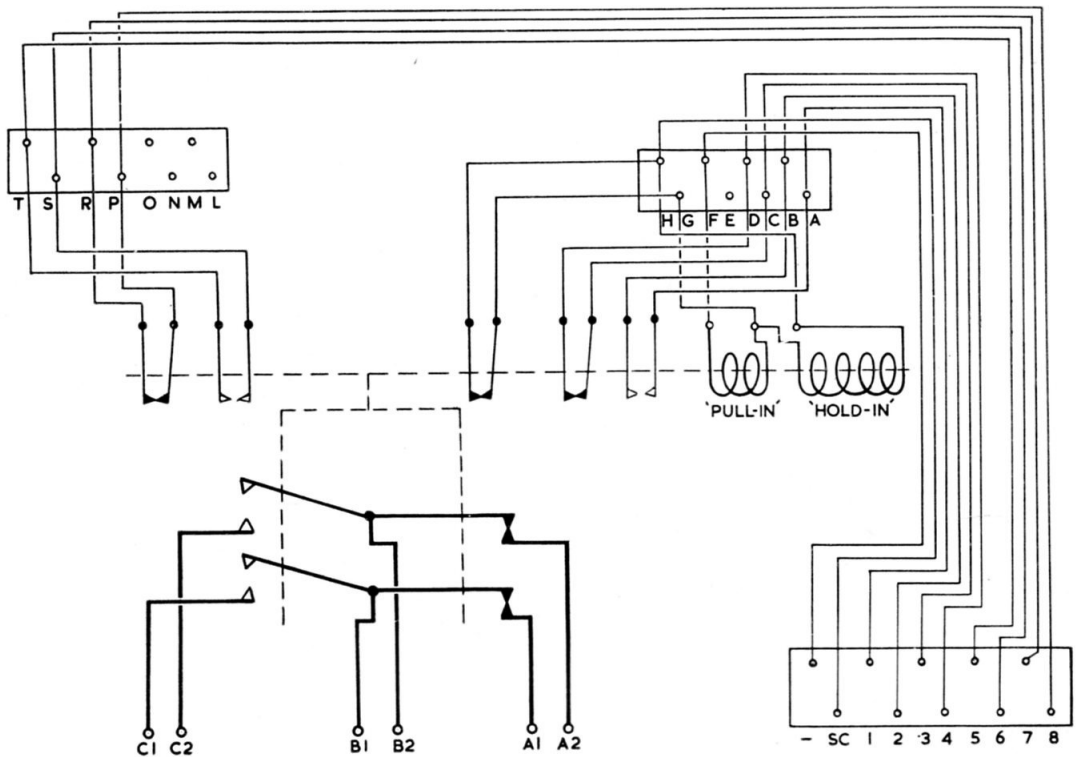


Fig. 3. Diagram of internal connections