Chapter 24

SWITCH, MAGNETIC, TYPE 11A, No. 1 (ROTAX D9501)

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Switch, Magnetic, Type 11A, No. 1	Stores Ref. 5CW/4390
Main contacts	
Voltage	112-V, d.c.
Current rating	400 amperes (continuous) 1,000 amperes (for three min.)
Auxiliary contacts	
Voltage	28-V, d.c.
Current rating	5 amperes
Coil voltage	28-V, d.c.
Minimum operating voltage of closing coil ...	18·5 volt at 20 deg. C.
Resistance of closing coil at 20 deg. C. ...	2·75 ohm ± 5 per cent
Minimum operating voltage of tripping coil ...	17-V. at 20 deg. C.
Resistance of tripping coil at 20 deg. C. ...	4·75 ohm ± 5 per cent
Overall dimensions	
Length	8·375 in.
Width	5·187 in.
Height (from mounting)	5·187 in.
Weight	8 lb. 8 oz.

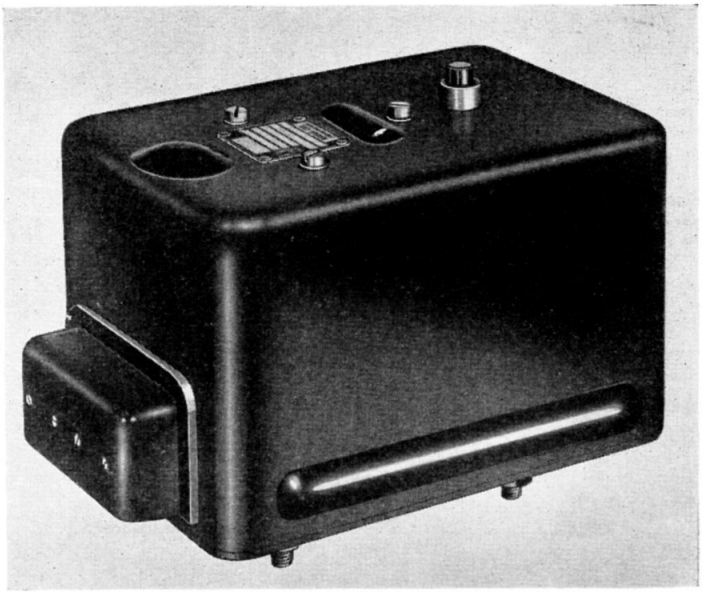

Fig. 1. General view of Type 11A, No. 1 switch

Introduction

1. The Type 11A, No. 1 switch is designed for use in aircraft electrical systems which require a 112 volt contactor to be operated from a 28 volt control circuit. The current rating of the main contact is 400 amperes but currents of up to 1,000 amperes are permissible for periods of not longer than three minutes. There are also three auxiliary switches for 28 volt circuits (one normally open and two normally closed) having a current rating of 5 amperes.

DESCRIPTION

2. The unit is a single pole, latched-in contactor with provision for manual and remote control magnetic tripping. There are two pairs of main contacts in parallel and each pair has arcing fingers projecting into moulded arc chutes. The main contacts are of the rolling butt type and have silver nickel faces.

3. The switch is built on a moulded base, which has four main terminals projecting through to the underside. The main fixed contacts are integral with their terminal posts, while the moving contacts are connected to the remaining two terminals by copper braid. An eight-way auxiliary terminal block is supported on pillars at the opposite end of the switch from the arc chutes.

4. The operating solenoid is supported above the main contacts by a switch frame within which a toggle mechanism is set. The toggle mechanism consists of five links. One end of the operating toggle is hinged to the main contact carrier and the other end to a swinging link which is pivoted in the main frame and has its other end hinged to the trip toggle. The solenoid plunger is linked to the centre pin of the operating toggle and this pin extends beyond the switch frame to operate the coil safety switch. The tripping mechanism is operated either by the manual button which projects through the top of the case or by a small tripping solenoid mounted one side of the switch frame.

5. An auxiliary switch and terminal block for internal connections are mounted on each side of the switch frame. Each switch has two pairs of contacts (one pair normally open, one normally closed) and these contacts are operated by pins projecting from the main contacts carrier. Three pairs of contacts are used as auxiliary switches while one pair, normally open, is connected into the tripping coil circuit. The operating coil safety switch (para. 4) is fitted in order that the supply to the operating coil is broken when the toggle is latched "in".

Electrical connections

6. The main terminals are four $\frac{5}{16}$ in. B.S.F.

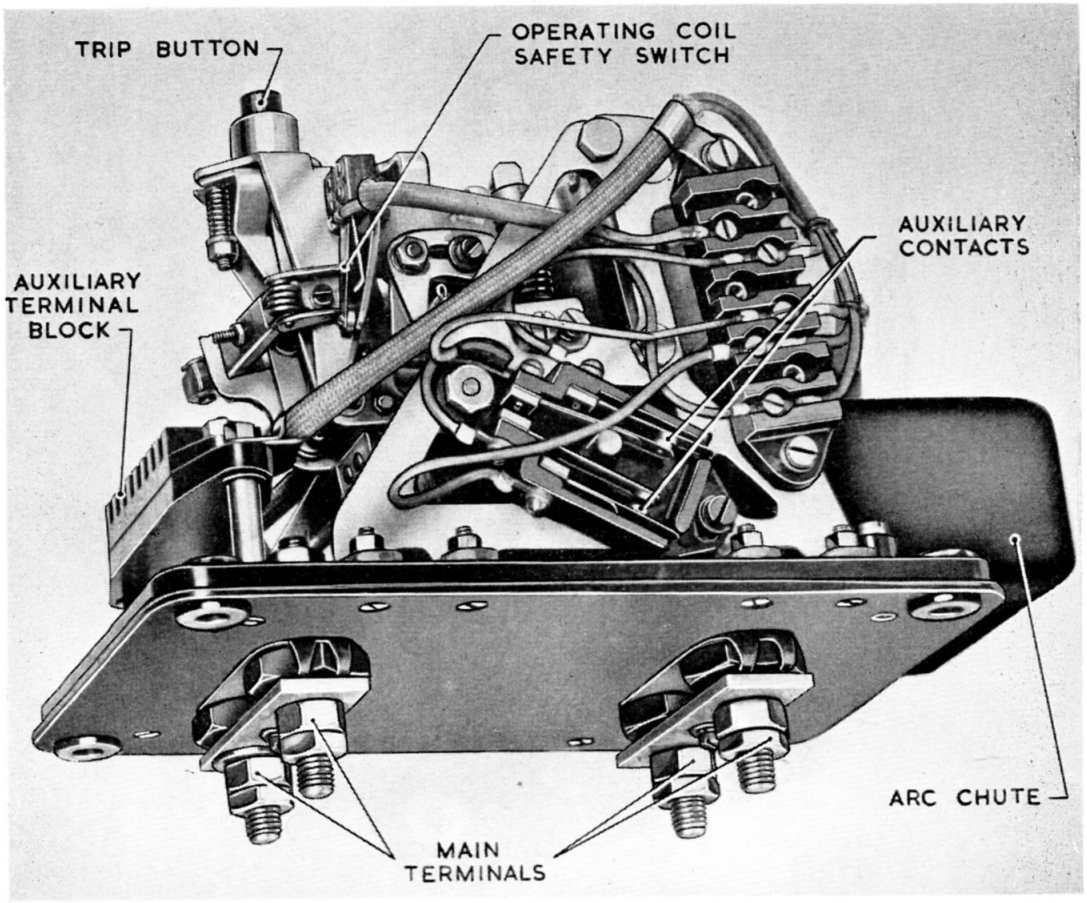

Fig. 2. View with cover removed (showing terminals)

posts protruding from the underside of the moulded base. They are linked in pairs by external bus-bars. The coil and auxiliary connections are made to 6 B.A. screw and washer terminations set in the eight-way internal terminal block, leads entering the cover through a rubber grommet.

Operation

7. When the operating coil is energized, via terminals SC and —, its plunger is drawn into the solenoid and the toggle linkage is pulled "overcentre", thereby operating and latching the main contacts to the closed position. As the main contacts close, the auxiliary switches are operated and the operating coil safety switch opens. The operating coil de-energizes and the plunger drops out, its connecting piece being slotted to enable it to move over the linkage pin.

8. On energizing the tripping coil (terminals ST and–) or depressing the manual button, the toggle linkage collapses and all contacts revert to their normal position. The arcing fingers break contact just after the main contacts, ensuring that arcing takes place only between these fingers within the arc chutes. The fingers are easily renewable when they become burnt.

Note . . .

To fit a new arcing finger, unlock and unscrew the nut which secures its terminal and lift the terminal from its position in the base. The burnt fingers can now be removed and a new one fitted. Shims are located under the main contact in order to adjust the contact "over-ride" to ·030 ± ·005 in., and it is important to ensure that this over-ride is maintained (by adjusting the shims if necessary). To fit a new moving arcing finger, remove the two hexagon head bolts

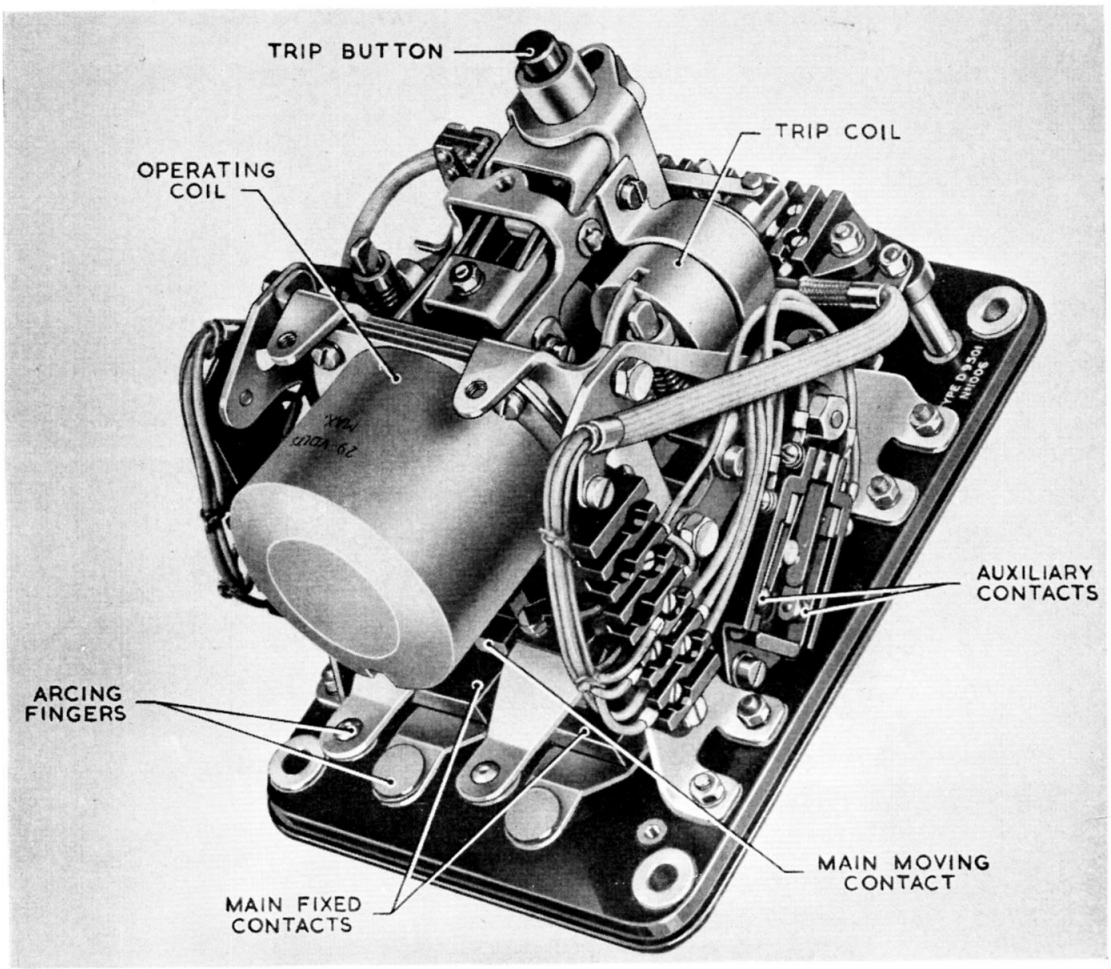

Fig. 3. View with cover removed (showing contacts)

which secure it to the top of the main contact. The shims under the arcing fingers should be adjusted if necessary, to maintain an arcing finger pressure of approximately one third the main contact pressure.

INSTALLATION

9. The switch may be mounted in any position except with the arc chutes downmost. It will operate satisfactorily in ambient temperatures of between −65 deg. C. and + 70 deg. C. and at altitudes up to 50,000 ft.

10. Four clearance holes for $\frac{1}{4}$ in. fixing bolts are formed by steel bushes moulded into the base. The fixing centres form a rectangle 6·156 in. × 4·187 in. The cover must be removed in order to mount the switch.

SERVICING

11. Inspect the switch for damage to the mechanism and ensure that it functions satisfactorily. Examine all contacts for signs of burning; the arcing fingers should be renewed if necessary (para. 8).

Coil resistance tests

12. Measure the resistance of the operating coil between terminals 'SC' and '—' on the auxiliary terminal block. When corrected to 20 deg. C., a value of 2·75 ohm ± 5 per cent must be obtained. The resistance of the tripping coil, measured between terminals 'ST' and '—' (with the main contacts closed), when corrected to 20 deg. C., must be 4·5 ohm ± 5 per cent.

Millivolt drop tests

13. Allow 200 amperes to flow through each

pair of main contacts in turn (it will be necessary to fit an insulator between the remaining pair as each pair is tested) and measure the potential drop across the main contacts and between the main terminals. In each test, the potential drop across the contacts must not exceed 40 millivolt and that between the terminals must not exceed 75 millivolt.

14. The potential drop across each of the auxiliary pairs of contacts must not exceed 40 millivolt with 5 amperes flowing, while the potential drop across the contacts of the tripping coil switch must not exceed 10 millivolt with one ampere flowing. The potential drop across the contacts of the operating coil safety switch must not exceed 20 millivolt with 2·5 amperes flowing.

Insulation resistance tests

15. Using a 250 volt insulation resistance tester, measure the insulation resistance between the following points:—

(1) Busbar A and busbar L1 (contacts open)
(2) Busbar A and each auxiliary terminal (contacts open and closed)
(3) Busbar A and frame (contacts open and closed).
(4) Terminal 1 and terminals 2, 4, 5, —, SC, and ST. (main contacts open)
(5) Terminal 1 and terminal 3 (main contacts closed)
(6) Terminal 2 and terminal 3, 4, 5, —, SC and ST (main contacts open)
(7) Terminal 3 and terminals 4, 5, —, SC and ST (main contacts closed)
(8) Terminal 4 and terminals 5, —, SC and ST (main contacts closed)
(9) Terminal 5 and terminals —, SC and ST (main contacts closed)
(10) Terminals 1, 2, 3, 4, and 5 and frame (main contacts open and closed)
(11) Terminals SC, —, and ST and frame (main contacts open and closed)
(12) Terminal SC and terminals ST and — (main contacts closed)
(13) Terminal ST and terminal —(main contacts open)

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

Note . . .

The values given in these insulation 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.

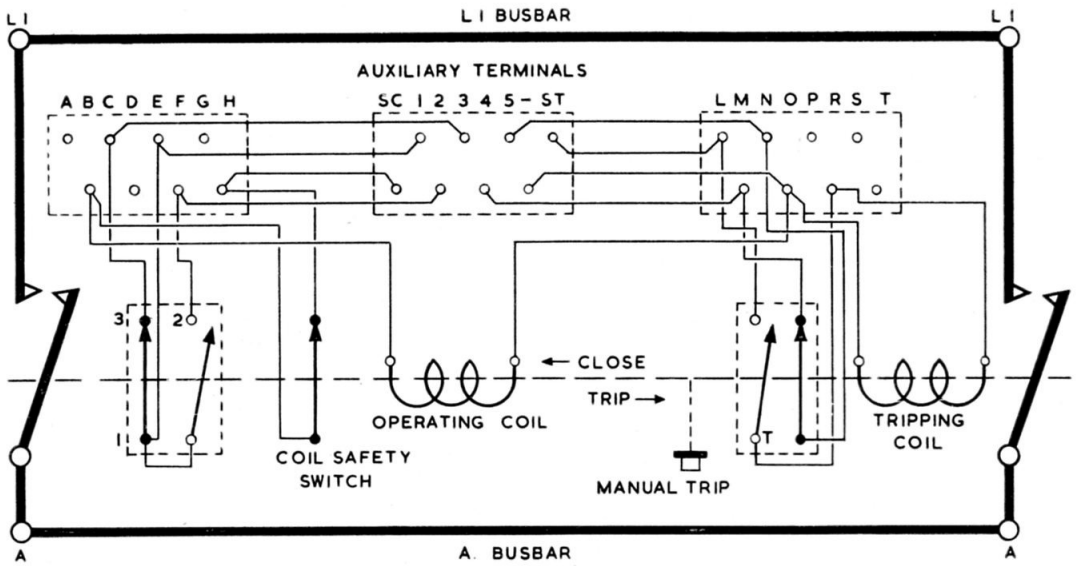

Fig. 4. Diagram of internal connections