Chapter 9

SWITCH, MAGNETIC, TYPE 8A No. 4 (ROTAX D 8901)

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LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Voltage	
Main contacts	*112 volts*
Auxiliary contacts	*28 volts*
Operating coil	*28 volts*
Current rating	
Main contacts	*15 amperes cont.*
Auxiliary contacts	*2·5 amperes cont.*
Overall dimensions	
Length	*3·250 in.*
Width	*2·600 in.*
Height	*3·200 in.*
Operating temperature range ...	*+ 50 deg. C. to — 65 deg. C.*
Mounting	*Two 2 B.A. Slots spaced 2·750 in.*
Weight	*1 lb. 3 oz.*

Introduction

1. This single pole switch is designed for use in aircraft electrical systems where it is desired to break a 112 volt d.c. supply by means of a 28 volt d.c. control circuit. The switch includes, in addition to the main contacts, one pair of 28 volt d.c. auxiliary contacts which are rated at 2·5 amperes, and an economy switch.

DESCRIPTION

2. The switch (*fig.* 1), comprises a main casting of light alloy containing the contact actuating mechanism, a solenoid which is mounted on the top face of the main casting and two insulated side cases fitted on opposite side faces of the main casting. Each insulated side case houses a pair of main contacts and the auxiliary contacts are fitted in one of the side cases and the economy switch fitted in the other.

3. The two pairs of main contacts are in series, and operation of each contact arm is effected by means of a driving shaft which projects through the side of the main casting and is actuated by the solenoid. A return spring opens each main contact when the solenoid is de-energized.

(A.L.62, Mar. 56)

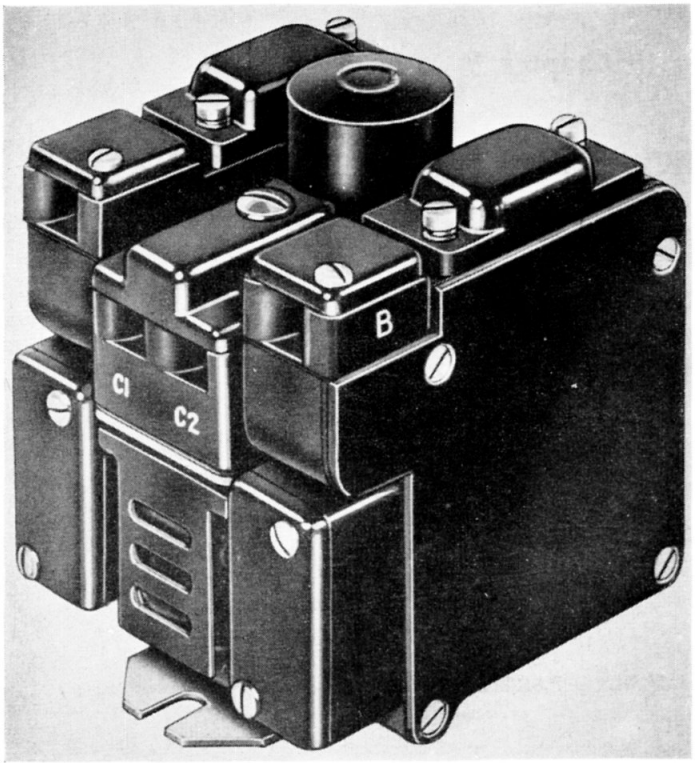

Fig. 1. General view of Type 8A, No. 4 switch

4. The two contact arms are independently mounted and differential movement of the arms is possible. The mechanism includes a contact arm interlock which operates in such a manner that should one pair of contacts weld in the closed position as a result of excessive arcing when the solenoid is de-energized, the other contacts will open and break the circuit. When this occurs, the interlock operates and prevents the open contacts from reclosing until the cause of the fault has been cleared and the interlock mechanism reset.

5. The interlock mechanism (fig. 3 shows a similar mechanism), consists of a locking pin which fits into a bush which is assembled on the inside face of one of the actuating levers. The locking pin is held in position by a leaf spring attached to the outside of the actuating lever and, in the normal operating position, the pin is forced against the inside face of the opposite actuating lever by the action of the leaf spring. The pin is retained in this position when both actuating levers move together, but when one lever remains in the closed position and the other lever returns to the open position the pin is forced either, into a small hole in or against the edge of, the opposite actuating lever, depending on which lever has remained in the closed position. In either position the locking pin prevents the open actuating lever from re-closing. The method of freeing the interlock is described in para. 16.

6. The main contacts are sliding butt type and are faced with silver tungsten.

7. The auxiliary contacts are normally open and they close simultaneously with the main contacts.

OPERATION

8. With the control supply applied to the operating coil, the solenoid plunger is pulled inwards towards the solenoid anvil. The actuating lever of each main contact is connected to the solenoid plunger and pivots on the contact operating shaft when the plunger operates. This action closes the main contacts. Towards the end of the plunger stroke, the economy switch operates and two resistors, connected in parallel (*fig.* 4) are switched into the coil circuit and the coil current is reduced to a value sufficient to retain the plunger in the closed position. The economy switch and the auxiliary contacts are operated by means of cams on the main contact operating shafts.

INSTALLATION

9. The switches may be mounted in any attitude except with the base uppermost. The units are secured to their fixings by two 2 B.A. bolts which fit into slots in the mounting plate spaced at 2·750 in.

Electrical connections

10. All connections are made via externally mounted terminal blocks which are fitted with 4 B.A. screw and washer terminations.

SERVICING

11. When the unit has been correctly installed and operated, it requires little attention in service. If a unit operates

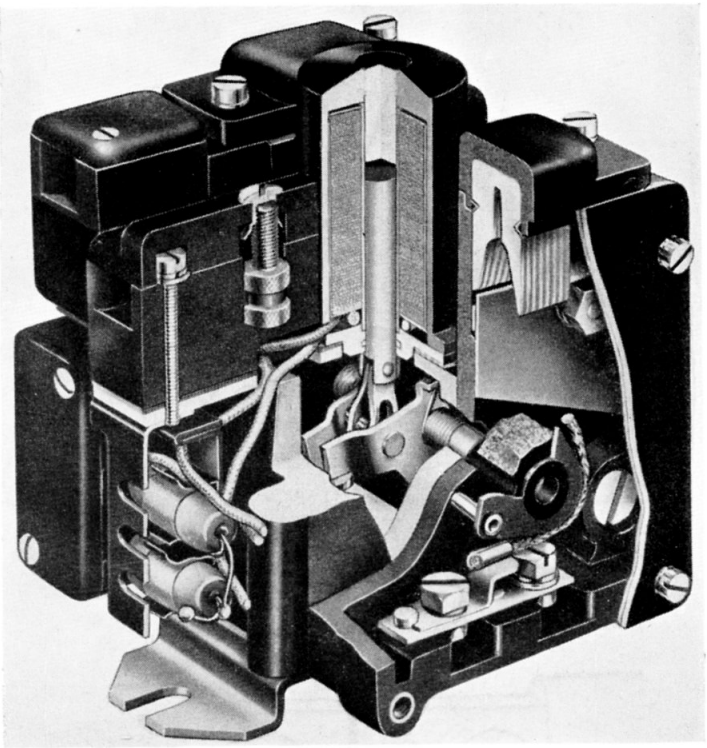

Fig. 2. Sectioned view of Type 8A, No. 4 switch

satisfactorily, it may be assumed serviceable for continued use.

Inspection

12. A visual inspection should be made from time to time to ensure that the unit is not damaged physically. If the unit is accessible, the insulated side case covers should be removed and the contacts examined to ensure that they are not excessively pitted or burnt. If there is any sign of damage, the unit should be removed and a new one fitted in its place.

Insulation resistance tests

13. Insulation resistance tests should be applied to the unit provided that it is accessible and can be isolated readily from its circuit. Using a 250 volt insulation resistance tester, the insulation resistance should be at least 2 megohms between the following points:—

(1) Terminal A and terminal B with the main contacts open.

(2) Terminal A and terminals C1, 1, 2 and the frame with the main contacts closed.

(3) Terminal 1 and terminal 2 with the auxiliary contacts open.

(4) The frame and terminals 1 and 2.

(5) Terminal C1 and terminals 1 and 2.

(6) Terminal C1 and the frame.

14. It should be noted that the values of insulation resistances quoted in para. 13 is applicable 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. In damp or humid climates, insulation resistance readings may be low and discretion should be exercised when considering the unserviceability of switches.

Method of freeing interlock

15. In the event of arcing at the contacts and the possible resultant welding of the contacts, the locking device (*fig.* 3) will need to be freed, as detailed in para. 16.

Note . . .

Fig. 3 does not show the actual unit but depicts a similar unit.

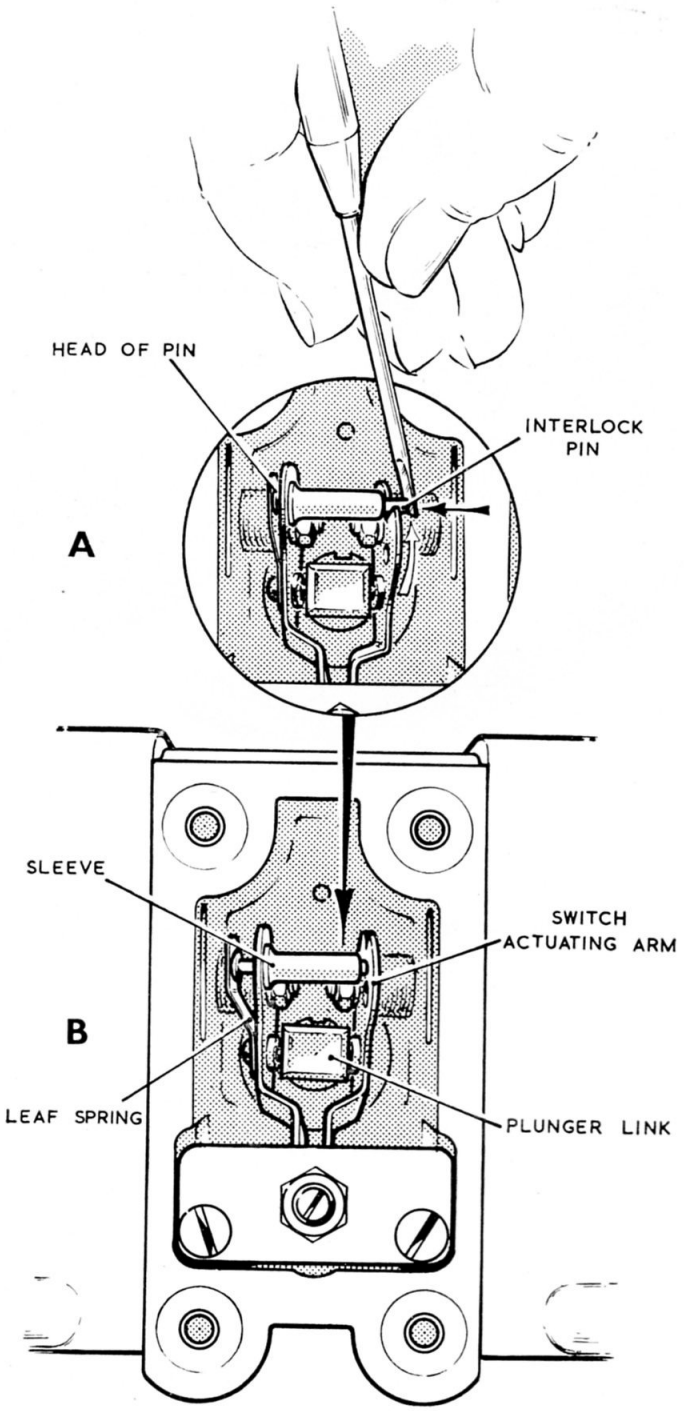

Fig. 3. Method of freeing interlock

16. Fig. 3B shows the interlock pin in its normal position relative to the right hand switch actuating arm. Fig. 3A shows a condition where (as a result of one contact welding) the pin has taken up a position in the notch on the right hand switch actuating arm.

17. After freeing the weld on the affected contact, the interlock mechanism must be reset by using a small screwdriver or other suitable tool to press the interlock pin in the direction indicated by the arrow in fig. 3A. This will allow the switch actuating arm to take up the position shown in fig. 2B and thus render the switch again operational.

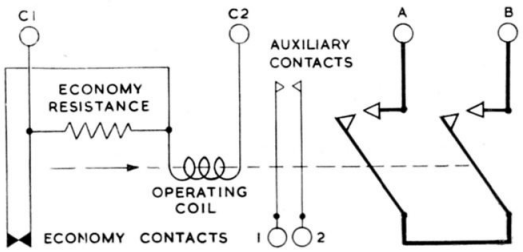

Fig. 4. Diagram of internal connections