Chapter 44

SWITCH, MAGNETIC, TYPE 20A (B.T.H. LDA50–A1/4)

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LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Switch, magnetic, Type 20A	*Stores Ref. 5CW/4819*
Rated voltage	*120V, d.c. (nominal)* *126V, d.c. (maximum)*
Control voltage	*24V, d.c. (nominal)*
Rated current	*50 amp.*
Volt drop across main contacts at rated current ...	*less than 100mV.*
Volt drop across auxiliary contacts at rated current ...	*less than 75mV.*
Rating of auxiliary contacts	*29V, d.c. 5 amp.*
Main coil current at 24V, d.c.	*12 amp.*
Latching coil current at 24V, d.c.	*4·6 amp.*
Length	$5\frac{13}{32}$ *in.*
Width	$2\frac{15}{16}$ *in.*
Height	$2\frac{5}{16}$ *in.*
Fixing centres	$2\frac{9}{16}$ *in. by 2 in.*
Weight	*1 lb. 4 oz.*

Introduction

1. The switch Type 20A (*fig.* 1) is electrically controlled, mechanically latched, single-pole, single-throw, and is designed for the remote control of circuits which carry not more than 50 amp. continuously at 120V, d.c. (nominal).

2. It can be operated from a distant point by a single-pole, double-throw, non-shorting type of manually operated switch or other circuit control device.

3. The switch is flameproof and will operate satisfactorily up to 70,000 ft. Under fault conditions, the switch has a breaking capacity of 250 amps. between the main terminals (1 and 2) at 126V, d.c. in a circuit having negligible inductance over an ambient temperature range of −40 deg. C. to +50 deg. C.

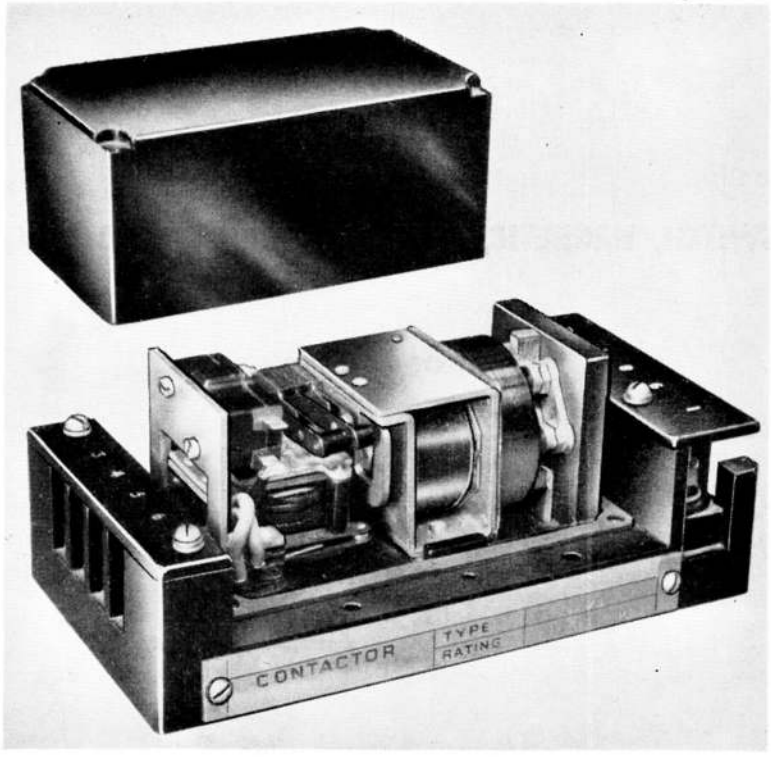

Fig. 1. General view

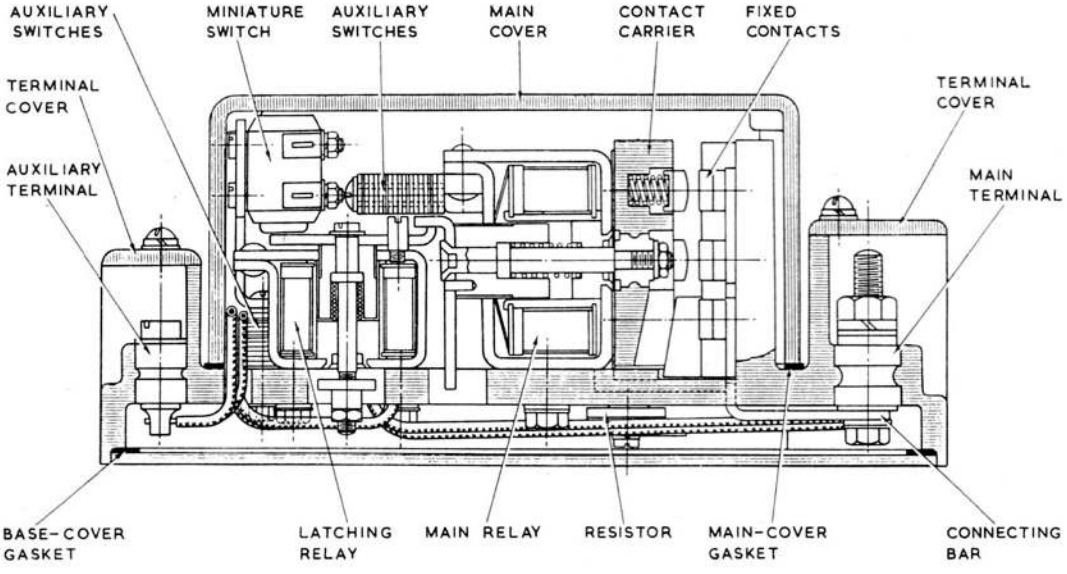

Fig. 2. Sectional view

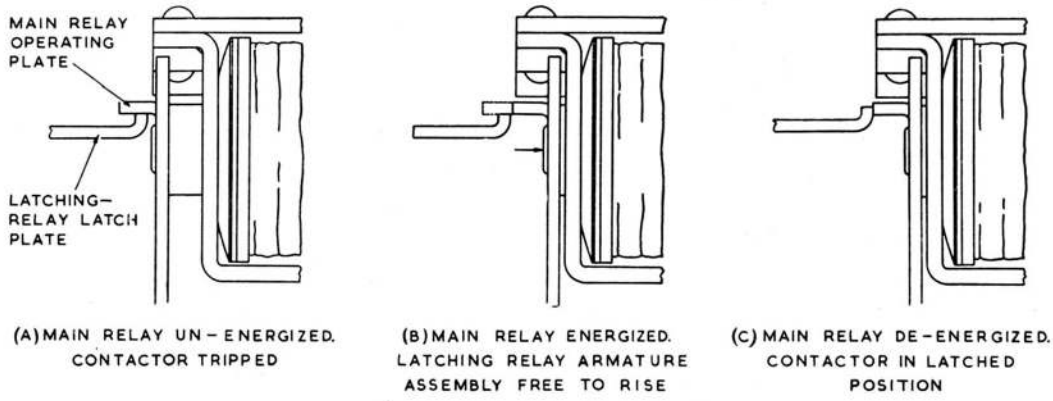

Fig. 3. Operation of latch mechanism

DESCRIPTION

4. Essentially the switch (*fig.* 2) consists of two relays. The main relay operating horizontally and the latching relay working in the vertical plane.

5. When the main relay is energized its armature is attracted to the closed position against the action of the return spring. The contact carrier is carried with it and contact is thus made between the moving contacts (mounted on the contact carrier) and the fixed contacts. The moving contacts are sprung to allow for overtravel, and thus compensate for any contact wear that may occur in service.

6. When the main relay armature has reached its fully-home position, the resultant latch clearance (*fig.* 3) allows the latching relay armature to rise under the influence of its return spring. If now the main relay becomes de-energized its armature is prevented from moving by the latch and the contacts remain closed.

7. To trip the switch the latching relay has to be energized. This pulls down the latch and the main relay armature moves back due to its return spring and the main contacts are broken.

8. A miniature switch is provided in the main switch (*fig.* 2) and its purpose is to momentarily switch current on to the main coil when the latching relay coil becomes energized. This draws the main armature back slightly whilst the latching relay armature moves down and thus prevents excessive wear of the latching plates. At the same time it will be seen (*fig.* 4) that as resistor is brought into the circuit thus limiting the current passing through the short-time rated relay coils.

9. A number of auxiliary contacts are operated by the relays. One of these (terminals 3 and 4) is operated by the main relay armature and closes as the main contacts meet; another (terminals 5 and 6) operated by the latching-relay armature, closes as the main contacts open. A set of contacts in each relay circuit is operated by the armature of the other relay. Thus each coil is only energized long enough to move its armature and is then cut out of circuit.

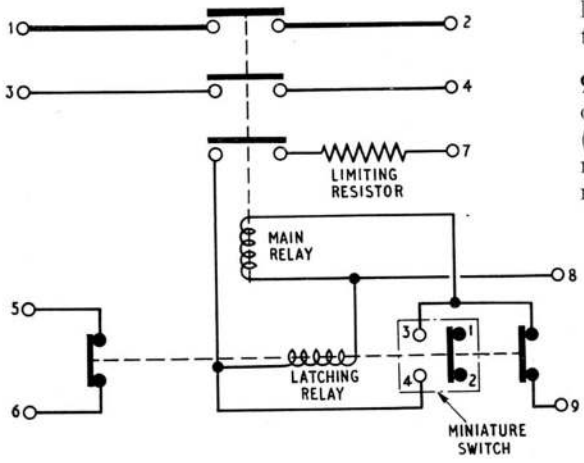

Fig. 4. Circuit diagram

10. The main contacts are grouped in six pairs, connected in series. This arrangement limits arcing when the

circuit is broken, since the voltage between the mating contacts is correspondingly reduced.

11. The terminals are suitable for crimped cable lugs appropriate to the respective cables, and the terminal recesses are made deep enough to accommodate two cable lugs back-to-back for the purpose of looping-in from one switch to another.

INSTALLATION

12. The circuit diagram of the switch is given in fig. 4 and the dimensions in Leading Particulars. The main terminals (1 and 2) are 2 BA studs, the operating terminals (7, 8 and 9) and the auxiliary terminals (3, 4, 5 and 6) are 4 BA screws.

13. It is preferable to mount the switch in a horizontal position but if it must be mounted vertically then the main terminals (1 and 2) should be at the bottom.

14. The switch is weatherproof and flame-proof but it is recommended that as far as possible it should be mounted in a position free from direct splash and condensation, and away from fuel tanks. If subject to vibration it should be on a flexible mounting.

SERVICING

15. Remove the main and terminal covers and inspect the interior for general cleanliness. Check that all nuts and screws are tight, and that all leads are fixed securely and are in good condition. Examine the mouldings for cracks and see that all sealing gaskets are in good condition.

16. Press home the main relay armature and check that the latching mechanism operates correctly. All contacts must make properly and the main contacts should have a minimum overtravel of ·020 in. The contacts should be clean and free from deep scoring or pitting.

TESTING

17. Operate the switch and check that the contacts close in one movement, and that both coils are completely cut out of circuit at the conclusion of the operation.

18. With a 250V insulation tester measure the insulation resistance between all auxiliary contacts not in the same circuit and between all auxiliary contacts and earth. The reading for each should be not less than 2 megohms.