

## Chapter 50

### ROTARY SWITCHES, SANTON

#### LIST OF CONTENTS

	<i>Para.</i>		<i>Para.</i>
<i>Introduction</i> ... ..	1	<i>Significance of coding</i> ... ..	6
<b>Description</b> ... ..	2	<b>Servicing</b> ... ..	9
<i>Operating mechanism</i> ... ..	3		

#### LIST OF ILLUSTRATIONS

	<i>Fig.</i>		<i>Fig.</i>
<i>Typical rotary switch</i> ... ..	1	<i>Exploded view of switch</i> ... ..	3
<i>Cut-away view of switch</i> ... ..	2		

#### LIST OF APPENDICES

	<i>App.</i>		<i>App.</i>
<i>Four positions, large and small frame size</i>		<i>Six position switches</i> ... ..	2
<i>switches</i> ... ..	1	<i>Six position, miniature enclosed switch</i> ...	3

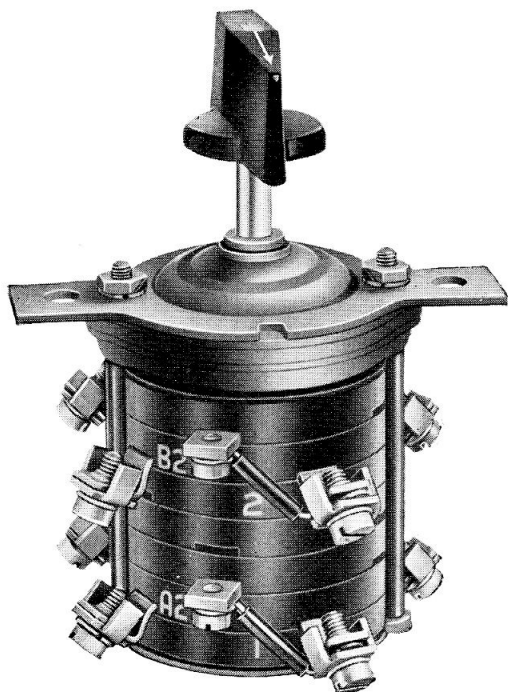


Fig. 1. Typical rotary switch

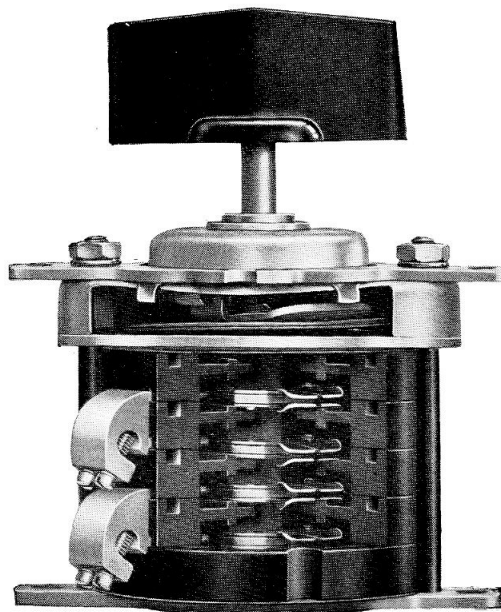


Fig. 2. Cut-away view of switch

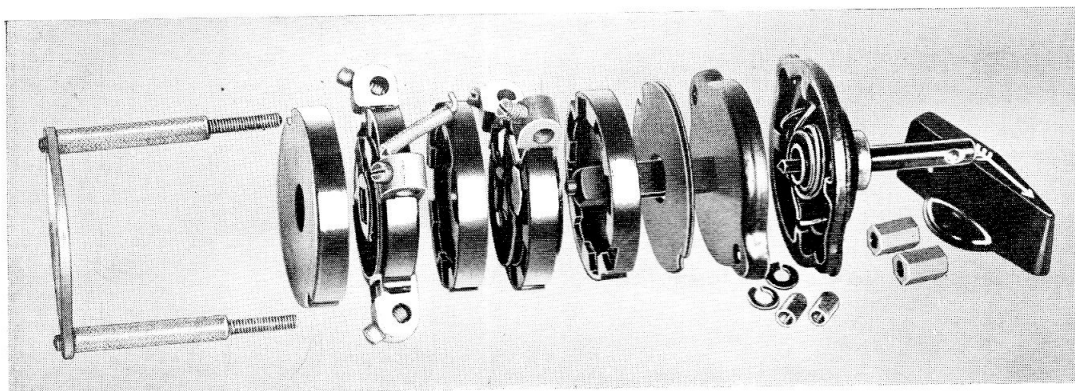


Fig. 3. Exploded view of switch

### Introduction

1. This chapter describes generally the construction and operation of a range of Santon rotary switches, which are used in aircraft. The switches covered are listed, and the details of particular switches given, in the appendices to this chapter.

### DESCRIPTION

2. A general view of a typical switch is shown in *fig. 1*, a cut-away view in *fig. 2* and an exploded view in *fig. 3*. The range

includes four and six position types and the contact sequence of each switch is given in diagrammatic form in the relevant appendix.

### Operating mechanism

3. Each switch is built up of moulded Bakelite discs, clamped together. The discs are shaped so that chambers are formed between pairs of discs, and enclosed in the chambers are fixed and moving contacts. The moving contacts are copper bridges, driven by an insulated spindle, and the fixed contacts copper bars projecting into the chamber.

**RESTRICTED**

4. The operating mechanism is mounted directly above the discs. The d.c. switch, requiring a faster breaking action than an a.c. switch, is fitted with a different operating mechanism. The quick break mechanism is totally enclosed, and is easily distinguished from the a.c., or slow break type, whose mechanism is open. The mechanism provides positive location of each position of the switch, and operates equally well when rotated in a clockwise or anti-clockwise direction.

5. The terminals are spaced round the discs for easy access. Each terminal is a push-fit in a slot moulded in the rim of the disc, and a projection on the top face of the terminal engages in a recess in the mating disc to prevent the terminal being withdrawn.

#### **Significance of coding**

6. An indication of the characteristics of each switch can be derived from the coding. The prefix S, when present indicates that the

switch is for use on a.c. only; the absence of S indicates that it may be used on d.c. also. The letter R indicates flush mounting, with the body of the switch behind the panel.

7. The first figure is the first digit of the current rating, e.g. 1=10 amp., 2=20 amp., 3=30 amp., and 6=60 amp. The second figure states the number of poles in the switch and the third (and fourth) the number of discs.

8. The suffix letter indicates the sequence of contact operation; this is shown for each switch in the relevant appendix. A suffix such as /TA or /TB indicates further that the switch has only a limited number of operating positions, the rest being stopped.

#### **SERVICING**

9. Little servicing is possible with these switches, beyond inspection for damage and security of electrical connections. The switch should operate in a positive manner; a faulty switch should be renewed.

## Appendix 1

### LEADING PARTICULARS

Code	Ref. No.	Frame size	Rating (amp.) at 250 volts	No. of poles	No. of discs	Remarks
SR114E	5CW/4306	Small	10	1	4	a.c. only
SR125A	5CW/4892	Small	10	2	5	a.c. only
SR126M48/TA	5CW/5259	Small	10	2	6	a.c. only
R127D	5CW/4675	Small	10	2	7	a.c./d.c.
R134AX96	5CW/6359	Small	10	3	4	a.c./d.c.
SR139C	5CW/5112	Small	10	3	9	a.c. only
R145	5CW/4657	Small	10	4	5	a.c./d.c.
R145/TB	5CW/4674	Small	10	4	5	a.c./d.c.
R156	5CW/4656	Small	10	5	6	a.c./d.c.
R156/TB	5CW/4673	Small	10	5	6	a.c./d.c.
SR1515D	5CW/5113	Small	10	5	15	a.c. only
R1613MF73/TA	5CW/5364	Small	10	6	13	a.c./d.c.
R1712BH32	5CW/6361	Small	10	7	12	a.c./d.c.
R215C	5CW/4812	Small	20	1	15	a.c./d.c.
SR349Y26	5CW/4263	Large	30	4	9	a.c. only
R3414BL35	5CW/6340	Large	30	4	14	a.c. only
R615J/9	5CW/4305	Large	60	1	5	a.c./d.c.
SR649	5CW/4611	Large	60	4	9	a.c. only
SRF.46.DA.6	5CW/	Small	5	3	6	a.c. only
SR1412D		Small	10	4	12	a.c. only
R2313C/TA1		Small	20	3	13	a.c./d.c.

#### Description

1. The switches covered by this appendix are the four position type, and are in two frame sizes. The 5, 10 and 20 amp. rating in a small frame, and the 30 and 60 amp. in a large frame. All switches of the same frame size, are the same diameter, but the height varies according to the number of discs. A table of main dimensions is given in table 1 from which the overall height for any switch can be calculated according to the number of discs in the switch. The contact sequence of each switch is given in (fig. 1).

2. The switches are designed for flush mounting, with the body of the switch behind the panel. The switch is secured by two screws passing through a fixing plate; this is normally vertical, but in one R615J/9, it is horizontal in relation to the operation positions of the knob.

3. The switches conform to the coding described in the main chapter with one exception, that is the 5 amp. switch SRF.46.DA6, whose coding numbers do not have any significance in terms of current rating and number of poles.

**RESTRICTED**

CODE	POSITION 1 ↑	POSITION 2 →	POSITION 3 ↓	POSITION 4 ←	REMARKS
SR 114 E					1- POLE, 3- HEAT
SR 125 A					2- POLE, CHANGE-OVER OR 2-WAY (NO OFF)
SR 126 M 48/ TA	STOPPED				2- POLE, 3- WAY (POSITION 1 STOPPED. NO OFF)
R 127 D					2- POLE, 4- WAY (NO OFF)
SR 139 C					3- POLE, 3- WAY WITH OFF
R 145					4- POLE, ON/ OFF
R 145/ TB			STOPPED	STOPPED	4- POLE, ON/ OFF (2 OPERATING POSITIONS ONLY)
R 156					5- POLE, ON/ OFF
R 156/ TB			STOPPED	STOPPED	5- POLE, ON/ OFF (2 OPERATING POSITIONS ONLY)
SR 1515 D					5- POLE, 4- WAY (NO OFF)
R 1613 MF 73/ TA			STOPPED		6- POLE, 2- WAY WITH OFF (3 OPERATING POSITIONS, WITH 2 INTERMEDIATE POSITIONS)
			STOPPED		
R 215 C					1- POLE, 3- WAY WITH OFF
SR 349 Y 26					4- POLE, 3- WAY (NO OFF)
R 615 J/ 9					1- POLE, 3- HEAT (FIXING PLATE HORIZONTAL)
SR 649					4- POLE, ON/ OFF

Fig. 1. Contact sequence diagrams: 4-position switches

RESTRICTED

CODE	POSITION 1 ↑	POSITION 2 →	POSITION 3 ↓	POSITION 4 ←	REMARKS
R 134 AX 96					3-POLE, 3-WAY WITH OFF
R 1712 BH 32					7-POLE, 4-WAY (NO OFF)
R 3414 BL 35					4-POLE, 4-WAY (NO OFF)
SR.F.46.DA.6					3-POLE, 3-WAY WITH OFF
SR I412 D					4-POLE, 4-WAY (NO OFF)
R 2313C-TA1					3-POLE, 3-WAY WITH OFF

Fig. 1. Contact sequence diagrams: 4 position switches (continued)

RESTRICTED

**Table 1**  
**List of dimensions**

Frame size	Overall height (in.) (less disc height)	Disc height (in.)									Fixing centres (in.)
		4	5	6	7	9	12	13	14	15	
Small a.c./d.c.	2 <sup>7</sup> / <sub>64</sub>	<sup>15</sup> / <sub>16</sub>	1 <sup>3</sup> / <sub>16</sub>	1 <sup>13</sup> / <sub>16</sub>	1 <sup>21</sup> / <sub>32</sub>		2 <sup>27</sup> / <sub>32</sub>				2 <sup>3</sup> / <sub>8</sub>
Small a.c.	2 <sup>1</sup> / <sub>8</sub>	<sup>15</sup> / <sub>16</sub>	1 <sup>3</sup> / <sub>16</sub>	1 <sup>7</sup> / <sub>16</sub>		2 <sup>1</sup> / <sub>8</sub>				3 <sup>17</sup> / <sub>32</sub>	2 <sup>3</sup> / <sub>8</sub>
Small a.c./d.c. (limited)	2 <sup>3</sup> / <sub>8</sub>		1 <sup>3</sup> / <sub>16</sub>	1 <sup>13</sup> / <sub>32</sub>					3 <sup>1</sup> / <sub>16</sub>		2 <sup>3</sup> / <sub>8</sub>
Small a.c. (limited)	2 <sup>3</sup> / <sub>8</sub>			1 <sup>13</sup> / <sub>32</sub>							2 <sup>3</sup> / <sub>8</sub>
Large a.c./d.c.	2 <sup>61</sup> / <sub>64</sub>		1 <sup>5</sup> / <sub>16</sub>						5 <sup>1</sup> / <sub>2</sub>		3 <sup>3</sup> / <sub>4</sub>
Large a.c.	2 <sup>3</sup> / <sub>64</sub>					3					3 <sup>3</sup> / <sub>4</sub>

**RESTRICTED**

## Appendix 2

### LEADING PARTICULARS

<i>Code</i>	...	...	...	...	...	...	...	<i>R219FS</i>
<i>Ref. No.</i>	...	...	...	...	...	...	...	<i>5CW/6341</i>
<i>Frame size</i>	...	...	...	...	...	...	...	<i>Six-position</i>
<i>Rating at 250 volts a.c./d.c.</i>	...	...	...	...	...	...	...	<i>20 amp.</i>
<i>Number of poles</i>	...	...	...	...	...	...	...	<i>1</i>
<i>Number of discs</i>	...	...	...	...	...	...	...	<i>9</i>
<i>Overall height</i>	...	...	...	...	...	...	...	<i>4<math>\frac{25}{64}</math> in.</i>
<i>Fixing centres</i>	...	...	...	...	...	...	...	<i>3<math>\frac{1}{4}</math> in.</i>

#### Description

1. The six-position switch is one of the range described in the main chapter. Its movement is divided into six sectors, and for each operating position the knob is rotated 60 deg. The switch is designed for flush mounting, with the body of the switch behind

the panel, and is secured by two screws passing through a fixing plate. The fixing plate is mounted vertically in relation to the operating positions of the knob. The switch conforms to the code described in the main chapter, and the contact sequence is given diagrammatically in (fig. 1).

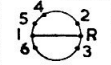

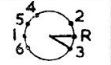
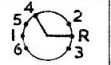
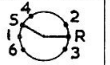
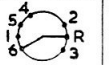
CODE	POSITION 1 ↑	POSITION 2 ↗	POSITION 3 ↘	POSITION 4 ↓	POSITION 5 ↙	POSITION 6 ↖	REMARKS
R 219 F S							1-POLE, 6-WAY (NO OFF)

Fig. 1. Contact sequence diagrams: 6-position switch

RESTRICTED



## Appendix 3

### LEADING PARTICULARS

Code	...	...	...	...	...	...	...	R.O.554.DA9/S
Ref. No.	...	...	...	...	...	...	...	5CW/6377
Frame size	...	...	...	...	...	...	...	Miniature
Rating at 110 volt d.c.	...	...	...	...	...	...	...	5 amp
Number of poles	...	...	...	...	...	...	...	4
Number of discs	...	...	...	...	...	...	...	5
Overall height	...	...	...	...	...	...	...	3 $\frac{61}{64}$
Fixing centres	...	...	...	...	...	...	...	1 $\frac{1}{8}$ in.
Diameter	...	...	...	...	...	...	...	2 in.

### Description

1. The miniature frame size switch is basically similar to the type described in the main chapter, in that its mechanism is built up of discs enclosing switching chambers. The discs are totally enclosed, and the copper bars forming the fixed contacts are brought out of the switching chambers and extended along the outside of the discs

to a terminal block. The terminal block is cylindrical and is in two parts, one of which forms the disc enclosing rear switching chamber. The assembled switch, with the terminal block cover removed is shown in (fig. 1); the leads are brought out through a rubber grommet in the cover. The contact sequence of the switch is given in (fig. 2).

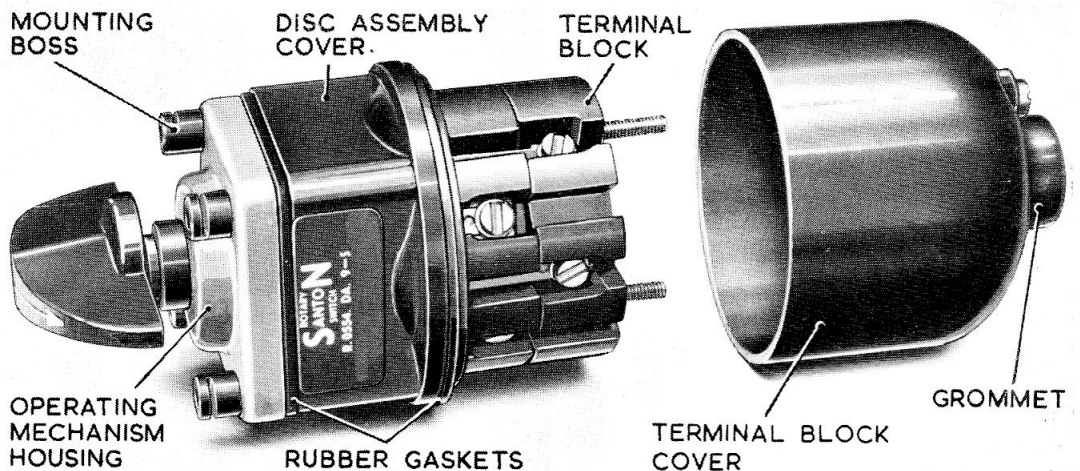














Fig. 1. Miniature six-position switch

CODE	POSITION 1 ↑	POSITION 2 ↗	POSITION 3 ↘	POSITION 4 ↓	POSITION 5 ↖	POSITION 6 ↙	
R.O554. DA 9/5							4 POLE, 3 WAY WITH 3 OFF POSITIONS
							

**Fig. 2. Contact sequence diagram**

**RESTRICTED**