Appendix 2

FLAP AND AIR BRAKE TEST BOX
(26SR/95291)

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DESCRIPTION AND OPERATION

Introduction

1. The flap and air brake test box is provided to facilitate the testing and servicing of the flap and air brake circuits, thereby simplifying fault tracing. The test box provides for circuitry checks on the flap and air brake circuits. No provision is made for functioning the flaps and air brakes.

Description

2. All the equipment required to carry out a continuity test of the flap and air brake control circuits is contained in the test box. Two sets of lamps, mounted on the face of the box, are provided to represent the various motor circuits. One set marked MAIN or DIVE BRAKES is provided to represent the flap main and air brake motor circuits whilst the other set, marked EMERGENCY, serves for the flap emergency motor circuits. Certain lamps are initially dimmed by a resistance connected across them, to enable the operator to distinguish between the dim and bright illumination which is used to indicate the direction of rotation of the associated motor.

3. Switches are incorporated in the test box to replace the aircraft limit switches thereby enabling the supplies to be connected to either the up or down control circuits. Normally the series field of the main motor obtains a supply from the negative side of the motor armature via a set of contacts in the reversing relay. To connect a supply to this point a SERIES FIELD switch is provided and when selected will cause the series field lamp to light brightly, proving the series field circuit from the negative connection point of the motor armature through the series field contacts in the reversing relay. At the same time the remaining motor direction indicating lamp will light brightly because it is connected directly on to the connection point for the motor armature negative.

Operation

4. When testing the flap and air brakes circuits the motors and flap gear box are disconnected and the test box connected, via the test looms, to the aircraft wiring to replace the motors ana their respective limit switches. During this test no supplies are distributed from the test box, therefore the aircraft bus-bars must be energized. All the flap and air brake function selections are made from the aircraft cockpit and when made will light lamps in the test box to indicate the various motor circuits and the direction of rotation of the motor if it was connected to the aircraft circuit.

Testing the flap motor circuits

Procedure before testing

5. The procedure necessary before testing the flap motor circuits is as follows:—

(1) Connect the test looms to the test box and aircraft connections as detailed in Table 1.

Note . . .

Uni-pren cables are to be connected to the aircraft cables bearing the corresponding identification and are to be insulated from earth.

(2) Check the following fuses:—

Panel D Nos. 17, 31, 38.
Panel E Nos. 38, 39.
Panel J H.R.C. 160 amp. and 40 amp.

(3) Connect the 112-volt and 28-volt d.c. supplies to the aircraft external connections.

(4) RESET flap main and emergency contactors.

Testing

6. The procedure for testing the flap motor circuits is contained in tables 2 to 5. Where reference is made to the removal of any fuses proceed as follows:—

(1) Disconnect the supply from the aircraft.

(2) Remove the fuse.

(3) Reconnect the supply to the aircraft and check that the test box indication is correct.

(4) Disconnect the supply from the aircraft and put back the fuse.

(5) Reconnect the supply to the aircraft and check that the test box indication is correct.

Table 1

Connections for testing the flap motor circuits

Loom Part No.	Test box connection	Aircraft connection
D	Socket No. 1	Flap gear box
E	Socket No. 2	Flap gear box
F	Socket No. 3	Flap gear box
G	Socket No. 4 (Red)	Emergency motor
H	Socket No. 5	Emergency motor
J	Socket No. 6 (Yellow)	Main motor connections
AG	Motor —ve	Motor —ve

Table 2

Flap main up

Location	Operation	Test box indication	Check
Control pedestal	Move the flap control lever to the UP position and hold		
Test box	Select MAIN UP LIMIT switch	1 and 4 bright, 2 and 3 dim	Main reversing relay UP coil energized
Test box	Select SERIES FIELD MAIN switch	All lamps bright	
Fuselage (Rear spar)	Manually trip flap main motor contactor	All lamps off. (Warning lamp on panel D comes on)	
Panel D	Press flap main contactor RESET push switch	All lamps on. (Warning lamp on panel D goes out)	
Panel D. See para. 6	Break and make circuit with fuse No. 38	All lamps go out and come on again	Main 28-volt supply to MAIN SELECTOR SWITCH
Fuselage (Rear spar)	Bridge terminals 7 and 8 on the start unit. (Terminal 5 and 6 post Mod. 2527)		Reversal interlock relay coil energized
Test box	Select MAIN DOWN LIMIT switch		
Control pedestal	Move flap control lever to DOWN position and hold	1. 2 and 3 lamps off	Supply to main reversing relay DOWN coil disconnected by reversal interlock relay
Fuselage (Rear spar)	Remove the link from the start unit	1, 2 and 3 lamps come on again	Reversal interlock relay coil de-energized
Test box	Select MAIN EXTREME LIMIT switch	All lamps off	Main contactor TRIP coil energized
Test box	Return all switches to OFF		
Control pedestal	Return flap control lever to OFF		
Panel D. See para. 6	Remove fuse No. 17	(Trip warning lamp on panel D goes out)	Main 28-volt supply to main contactor RESET coil
Panel D	Press flap main RESET push switch		
Panel D. See para. 6	Replace fuse No. 17	(Trip warning lamp on panel D comes on)	Main 28-volt supply to main contactor RESET coil
Panel D	Press flap main RESET push switch	(Trip warning lamp on panel D goes off)	Main contactor RESET coil energized
Panel D. See para. 6	Remove fuse No. 31		Main 28-volt supply to main contactor TRIP coil
Instrument top panel	Press flap main motor TRIP push switch		
Panel D. See para. 6	Replace fuse No. 31		
Instrument top panel	Press flap main motor TRIP push switch	(Trip warning lamp on panel D comes on)	Main contactor TRIP coil energized
Panel D	Press flap main RESET push switch	(Trip warning lamp on panel D goes off)	

Table 3

Flap main down

Location	Operation	Test box indication	Check
Control pedestal	Move the flap lever to the DOWN position and hold		
Test box	Select MAIN DOWN LIMIT switch	2 and 4 bright, 1 and 3 dim	Main reversing relay DOWN coil energized
Test box	Select SERIES FIELD MAIN switch	All lamps bright	
Fuselage (Rear spar)	Manually trip flap main motor contactor	All lamps off. (Warning lamp on panel D comes on)	
Panel D	Press flap main contactor RESET push switch	All lamps on. (Warning lamp on panel D goes off)	
Panel D. See para. 6	Remove and replace fuse No. 38	All lamps go off and come on again	Main 28-volt supply to MAIN SELECTOR SWITCH
Test box	Select MAIN UP LIMIT switch		
Fuselage (Rear spar)	Bridge terminals 7 and 8 of the start unit (Terminals 5 and 6 post Mod. 2527)		Reversal interlock relay coil energized
Control pedestal	Move flap control lever to the UP position and hold	1, 2 and 3 lamps off	Supply to main reversing relay UP coil disconnected by reversal interlock relay
Fuselage (Rear spar)	Remove link from start unit	1, 2 and 3 lamps come on again	Reversal interlock relay coil de-energized
Panel D. See para. 6	Remove fuse No. 31		Main 28-volt supply to main contactor TRIP coil
Test box	Select MAIN EXTREME LIMIT switch and return to OFF		
Panel D. See para. 6	Replace fuse No. 31		
Test box	Select MAIN EXTREME LIMIT switch	All lamps off. (Trip warning lamp on panel D comes on)	Main contactor TRIP coil energized
Test box	Return all switches to OFF		
Panel D	Press flap main RESET push switch	(Trip warning lamp on panel D goes off)	

Table 4

Flap emergency up

Location	Operation	Test box indication	Check
Control pedestal	Select EMERGENCY SELECTOR switch to UP	(Flap MAIN trip warning lamp comes on)	Main contactor TRIP coil energized
Test box	Select EMERGENCY UP LIMIT switch	UP, SHUNT FIELD and CLUTCH bright. DOWN, SERIES FIELD and BRAKE off	Emergency reversing relay UP coil energized
Test box	Select SERIES FIELD EMERGENCY switch	All lamps bright with exception of BRAKE	
Test box	Select EMERGENCY BRAKE switch	All lamps bright	
Fuselage (Rear spar)	Manually trip flap emergency motor contactor	All lamps off. (Warning lamp on panel E comes on)	
Panel E	Press flap emergency contactor RESET push switch	All lamps on. (Warning lamp on panel E goes out)	
Panel E. See para. 6	Break and make circuit with fuse No. 39	All lamps go out and come on again	Main 28-volt supply to emergency reversing relay UP and DOWN coils
Test box	Select EMERGENCY EXTREME LIMIT switch and return to OFF	All lamps off. (Trip warning lamp on panel E comes on)	Emergency contactor TRIP coil energized
Panel E. See note above para. 6	Remove fuse No. 38	(Trip warning lamp on panel E goes out)	Main 28-volt supply to emergency contactor RESET coil
Panel E	Press flap emergency RESET push switch		
Panel E. See para. 6	Replace fuse No. 38	(Trip warning lamp on panel E comes on)	Main 28-volt supply to emergency contactor RESET coil
Panel E	Press flap emergency RESET push switch	All lamps on. (Trip warning lamp on panel E goes out)	
Panel E. See para. 6	Remove fuse No. 38		Main 28-volt supply to emergency contactor TRIP coil
Test box	Select EMERGENCY EXTREME LIMIT switch and return to OFF		
Panel E. See para. 6	Replace fuse No. 38		Main 28-volt supply to emergency contactor TRIP coil
Test box	Select EMERGENCY EXTREME LIMIT switch	All lamps off	Emergency contactor TRIP coil energized
Test box	Return all switches to OFF		
Control pedestal	Select flap EMERGENCY switch to OFF		
Panel D	Press flap main RESET push switch	(Trip warning lamps on panel D goes out)	
Panel E	Press flap emergency RESET push switch	(Trip warning lamp on panel E goes out)	

Table 5

Flap emergency down

Location	Operation	Test box indication	Check
Panel D. See para. 6	Remove fuse No. 31		Main 28-volt supply to main contactor TRIP coil
Control pedestal	Select flap EMERGENCY switch to DOWN	(Flap main trip warning lamp should not come on)	
Panel D. See para. 6	Replace fuse No. 31	(Flap main trip warning lamp comes on)	Main contactor TRIP coil energized
Test box	Select EMERGENCY DOWN LIMIT switch	DOWN, SHUNT FIELD and CLUTCH lamps on	Emergency reversing relay DOWN coil energized
Test box	Select SERIES FIELD EMERGENCY switch	All lamps on with the exception of BRAKE	
Test box	Select EMERGENCY BRAKE switch	All lamps on	
Fuselage (Rear spar)	Manually trip flap emergency motor contactor	All lamps off. (Warning lamp on panel E comes on)	
Panel E	Press flap emergency contactor RESET push switch	All lamps on. (Warning lamp on panel E goes out)	
Test box	Select EMERGENCY EXTREME LIMIT switch	All lamps off	Emergency contactor TRIP coil energized
Test box	Return all switches to OFF		
Control pedestal	Select flap EMERGENCY switch to OFF		
Panel E	Press flap emergency RESET push switch	(Trip warning lamp on panel E goes out)	
Panel E. See para. 6	Remove fuse No. 38		Main 28-volt supply to emergency contactor TRIP coil
Instrument top panel	Press flap EMERGENCY TRIP push switch		
Panel E. See para. 6	Replace fuse No. 38		Main 28-volt supply to emergency contactor TRIP coil
Instrument top panel	Press flap EMERGENCY TRIP push switch	(Trip warning lamp on panel E comes on)	Emergency contactor TRIP coil energized

Procedure after testing

7. The procedure after testing the flap motor circuits is as follows:—

(1) Disconnect the 112-volt and 28-volt external supplies from the aircraft.

(2) Disconnect the test looms from the aircraft connections.

(3) Reconnect the aircraft looms to their associated equipment.

Testing the air brake motor circuits

Procedure before testing

8. The procedure necessary before testing the air brake motor circuits is as follows:—

(1) Connect the test looms to the aircraft and test box connections as detailed in Table 6.

Note . . .

Uni-pren cables are to be connected to the aircraft cables bearing the corresponding identifications and are to be insulated from earth.

(2) Check the following fuses.

Panel D. Nos. 39 and 47
Panel J. 100 amp. H.R.C.

(3) Manually trip the main contactor.

Table 6
Connections for testing the air brake motor circuits

Loom Part No.	Test box connection	Aircraft connection
J	Socket No. 6	Air brake motor
		Series field Shunt field, C/W, AC/W
AG	Motor —ve	Motor —ve

(4) Connect 112-volt and 28-volt d.c. supplies to the aircraft external connections.

Testing

9. The procedure for testing the air brake motor circuits is contained in the following instructions and in Tables 7 and 8. Where reference is made to the removal of any fuses proceed as follows:—

(1) Disconnect the supply from the aircraft.

(2) Remove the fuse.

(3) Reconnect the supply to the aircraft and check that the test box indication is correct.

(4) Disconnect the supply from the aircraft and put back the fuse.

(5) Reconnect the supply to the aircraft and check that the test box indication is correct.

Note . . .

If, when selecting IN or OUT with the air brake control lever in the cabin, the corresponding lamps on the test box do not light, the limit micro switches, in the circuit required, must be bridged. (This will light the relevant lamps in the test box). This can be done by linking connections on panel V to the reversing relay as follows:—

(1) Panel V (B3) to relay (C4) if brake is out, or

(2) Panel V (B2) to relay (C2) if brake is in.

Table 7
Air brake in

Location	Operation	Test box indication	Check
Panel D	Press air brake contactor RESET push switch	(Trip warning lamp on panel D goes out)	
Control pedestal	Move air brake lever to the IN position	2 and 4 bright, 1 and 3 dim	Reversing relay IN coil energized
Test box	Select SERIES FIELD MAIN switch	All lamps bright	
Panel D. See para. 9	Break and make circuit with fuse No. 47	All lamps go out and come on again	Main 28-volt supply to the SELECTOR SWITCH
Fuselage (Gear box)	Link A and B on OVERTRAVEL LIMIT micro switch and remove link	All lamps off. (Trip warning lamp on panel D comes on)	Contactor TRIP coil energized
Test box	Return all switches to OFF		
Panel D	Press air brake contactor RESET push switch	(Trip warning lamp on panel D goes out)	

Table 8

Air brake out

Location	Operation	Test box indication	Check
Control pedestal	Move the air brake lever to the OUT position	1 and 4 bright, 2 and 3 dim	Reversing relay OUT coil energized
Test box	Select SERIES FIELD MAIN switch	All lamps bright	
Fuselage (Rear spar)	Manually trip the air brake motor contactor	All lamps off. (Trip warning lamp on panel D comes on)	
Panel D	Press air brake motor contactor RESET push switch	All lamps bright. (Warning lamp on panel D goes out	
Fuselage (Gear box)	Break and make circuit at terminals A and B on OUT LIMIT micro switch	All lamps go out and come on again	Reversing relay OUT coil de-energized and energized
Panel D. See para. 9	Remove fuse No. 47	All lamps off	Main 28-volt supply to SELECTOR SWITCH
Fuselage (Gear box)	Link A and B on OVERTRAVEL LIMIT micro switch and remove link		No supply to contactor TRIP coil due to fuse No. 47 removed
Panel D. See para. 9	Replace fuse No. 47	All lamps bright	Reversing relay OUT coil energized
Fuselage (Gear box)	Link A and B on OVERTRAVEL LIMIT micro switch and remove link	All lamps off	Contactor TRIP coil energized
Panel D. See para. 9	Remove fuse No. 39	(Trip warning lamp on panel D goes out)	Main 28-volt supply to contactor RESET coil
Panel D	Press air brake contactor RESET push switch		
Panel D. See para. 9	Replace fuse No. 39	(Trip warning lamp on panel D comes on)	Main 28-volt supply to contactor RESET coil
Panel D	Press air brake contactor RESET push switch	(Trip warning lamp on panel D goes out)	
Text box	Return all switches to OFF		
Control pedestal	Select air brake lever to IN Position		

Procedure after testing

10. The procedure after testing the air brake motor circuits is as follows:—

(1) Disconnect the 112-volt and 28-volt external supplies from the aircraft.

(2) Disconnect the test looms from the aircraft and reconnect the aircraft looms to their associated equipment.

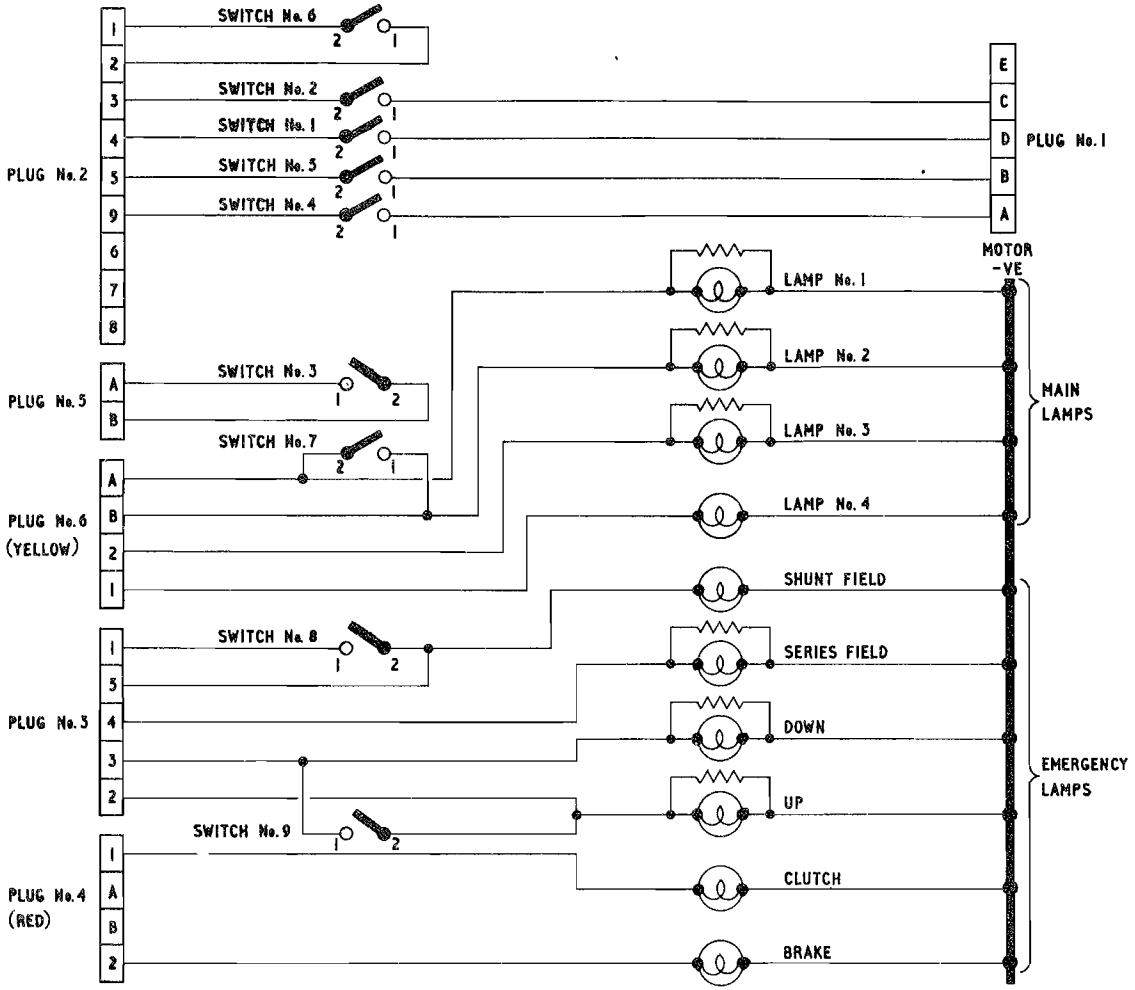
(3) Remove any links that may have been connected between panel V and the reversing relay.

SERVICING

Care and maintenance

11. The test box should be handled carefully to prevent damage to the filaments of the indicating lamps and other equipment contained in the test box. Distortion of the test loom sockets and damage to the threads of the sockets, resulting in difficulty in connecting the test looms to the test box and aircraft plugs, can be avoided by fitting the blanking caps to the sockets when the test looms are not being used. The long test looms should be supported, when connected, to avoid undue strain on the aircraft connections.

12. Frequent continuity and insulation tests should be carried out on the test box wiring and all the indicating lamp filaments should be tested for serviceability. Pin to pin continuity and insulation tests should also be carried out on the test looms.



SWITCH No. 1	EMERGENCY UP LIMIT
SWITCH No. 2	EMERGENCY DOWN LIMIT
SWITCH No. 3	EMERGENCY EXTREME LIMIT
SWITCH No. 4	MAIN UP LIMIT
SWITCH No. 5	MAIN DOWN LIMIT
SWITCH No. 6	MAIN EXTREME LIMIT
SWITCH No. 7	SERIES FIELD MAIN
SWITCH No. 8	EMERGENCY BRAKE
SWITCH No. 9	SERIES FIELD EMERGENCY

MAIN LAMPS

LAMPS	FLAPS	AIR BRAKE
No. 1	A.C.W. UP	OUT
No. 2	C.W. DOWN	IN
No. 3	SERIES FIELD	SERIES FIELD
No. 4	SHUNT FIELD	SHUNT FIELD

Fig. 1 Flap and air brake test box

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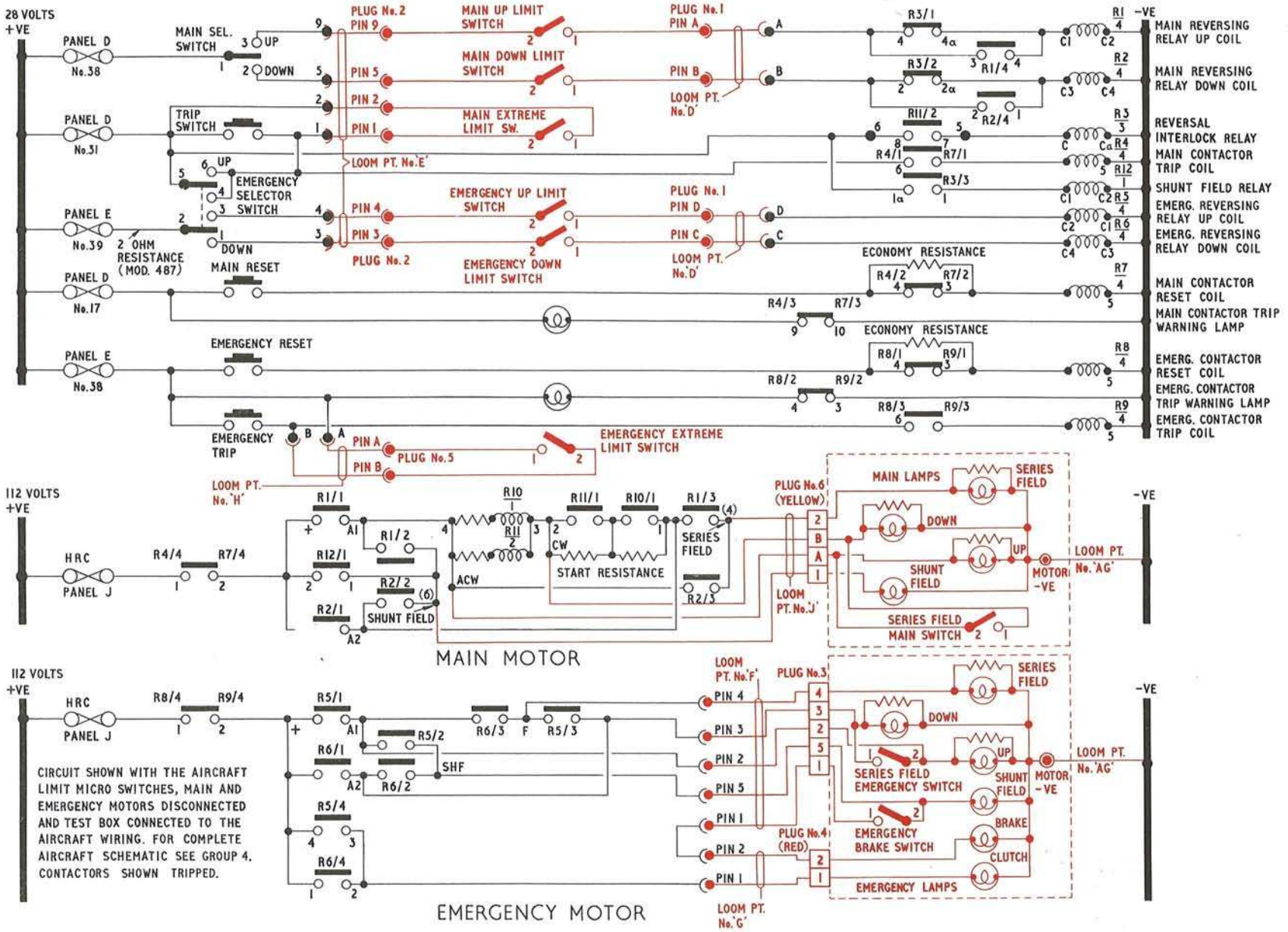

Fig. 2 Flap control (Circuitry check)

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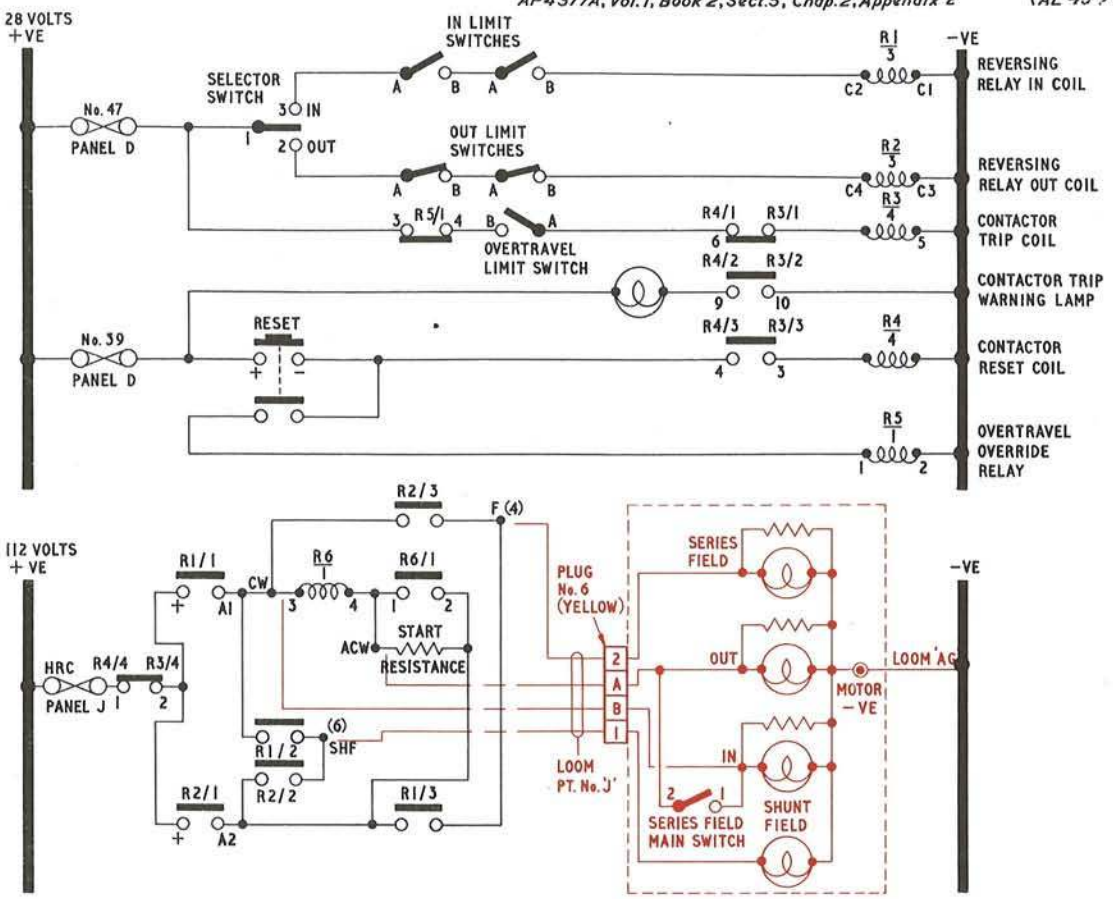

MOTOR

CIRCUIT SHOWN WITH MOTOR DISCONNECTED AND TEST BOX CONNECTED TO THE AIRCRAFT WIRING. FOR COMPLETE AIRCRAFT SCHEMATIC SEE GROUP 4.
AIR BRAKE SHOWN IN.
CONTACTOR SHOWN RESET.

LAMP No. 1	AIR BRAKE OUT
LAMP No. 2	AIR BRAKE IN
LAMP No. 3	SERIES FIELD
LAMP No. 4	SHUNT FIELD

Fig. 3 Air brake control (Circuitry check)

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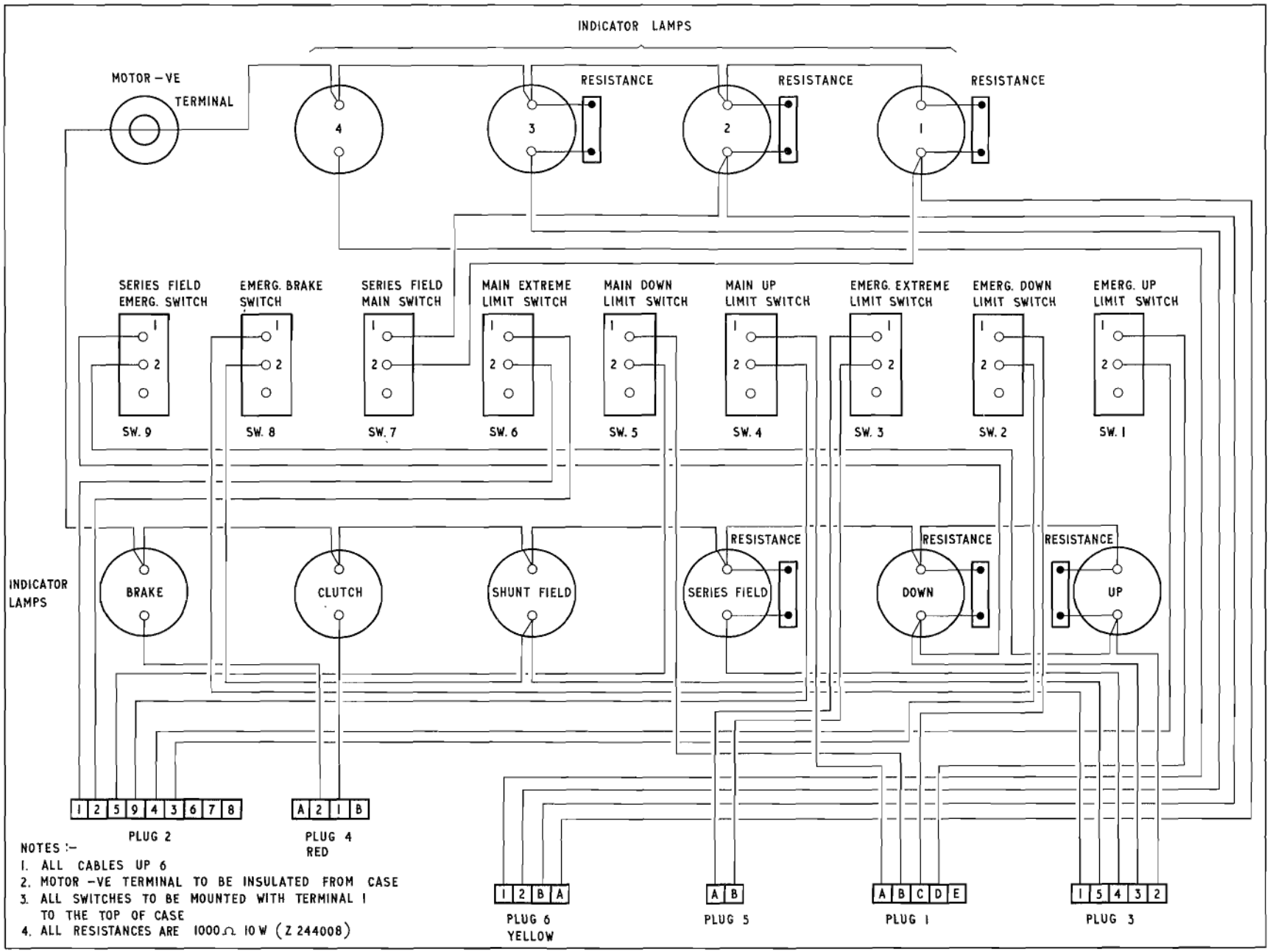

Fig. 4 Flap and airbrake test box (Mod. G.E. 1339)

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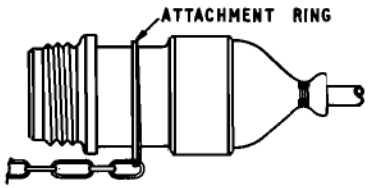
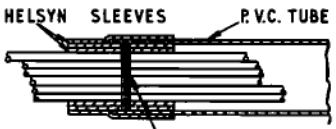
FROM				TO		
PT. No.	END FITTINGS	EQUIPMENT	LENGTH	EQUIPMENT	END FITTINGS	CABLE SIZE
D	(No.1) 5X/6019 5X/240 67479 PT. 6383 5X/3148	TEST BOX SKT. PIN A RED " " " " B BLUE " " " " C YELLOW " " " " D GREEN	6'- 0"	PLUG PIN A RED " " B BLUE " " C YELLOW " " D GREEN	5X/6016 5X/6293 5X/3152 5X/240 67479 PT. 6373 5X/3148	QUINPREN 6
E	(No.2) 5X/6039 5X/1373 67479 PT. 6385 5X/3148	TEST BOX SKT. PIN 1 RED " " " " 2 BLUE " " " " 3 GREEN " " " " 4 YELLOW " " " " 5 WHITE " " " " 9 BLACK	6'- 0"	PLUG PIN 1 RED " " 2 BLUE " " 3 GREEN " " 4 YELLOW " " 5 WHITE " " 9 BLACK	5X/6036 5X/6294 5X/3090 5X/1373 67479 PT. 6375 5X/3148	SEPTOPREN 6
F	(No.3) 5X/6064 5X/1373 67479 PT. 6385 5X/3146 5X/3148	TEST BOX SKT. PIN 1 RED " " " " 2 BLUE " " " " 3 YELLOW " " " " 4 GREEN " " " " 5 WHITE	6'- 0"	PLUG PIN 1 RED " " 2 BLUE " " 3 YELLOW " " 4 GREEN " " 5 WHITE	5X/6061 5X/6294 5X/3090 5X/1373 67479 PT. 6375 5X/3146 5X/3148	QUINPREN 6
G	(No.4) 5X/6034 5X/3146 (RED) 5X/3148 5X/240 67479 PT. 6383	TEST BOX SKT. PIN 1 RED " " " " 2 BLUE	6'- 0"	PLUG PIN 1 RED " " 2 BLUE	5X/6031 5X/6295 5X/3152 5X/240 67479 PT. 6373 5X/3146 5X/3148	TRIPREN 6
H	(No.5) 5X/6004 5X/3148 5X/1383 67479 PT. 6381	TEST BOX SKT. PIN A RED " " " " B BLUE	6'- 0"	PLUG PIN A RED " " B BLUE	5X/6001 5X/6301 5X/3151 5X/1383 67479 PT. 6371 5X/3148	TRIPREN 6
J	(No.6) 5X/6034 (YELLOW) 5X/333 67479 PT. 6383 5X/3146	TEST BOX SKT. PIN A " " " " B " " " " 2 " " " " 1	10'- 0" 10'- 0" 7'- 0" 6'- 0"	'UP' A/CW DOWN CW SERIES FIELD SHUNT FIELD	5K/1884 5K/1884 5K/1884 5K/1884	UNISHEATH GROUND 7 " " " " " " " " "
AG	5K/1809	TEST BOX MOTOR NEGATIVE	10'- 0"	MOTOR NEGATIVE	5K/1884	UNISHEATH GROUND 7



TYPICAL METHOD OF SECURING SOCKET BLANKING ASSY. TO SOCKET



TYPICAL METHOD OF SECURING CABLES IN CONDUIT

NOTES:-
1. CABLE ENDS CRIMPED, CABLE SLEEVE Z49397 USED AS REQUIRED.
2. SINGLE CORE LOOMS RUN IN P.V.C. SLEEVING TO SPEC. E & 1659 TO WITHIN 3FT. OF LOOSE ENDS AND BOUND TIGHTLY. LOOSE CABLES SECURED INSIDE P.V.C. CONDUIT BY MEANS OF HELSYN SLEEVES. (SEE DETAIL)
3. PLUG BLANKING ASSY. SECURED TO PLUG BY FIXING TAG UNDER ONE OF PLUG ASSY. BOLTS.
4. CABLES CLEARLY IDENTED BOTH ENDS-PLUG No. AT TEST BOX END.

Fig. 5. Cable looms

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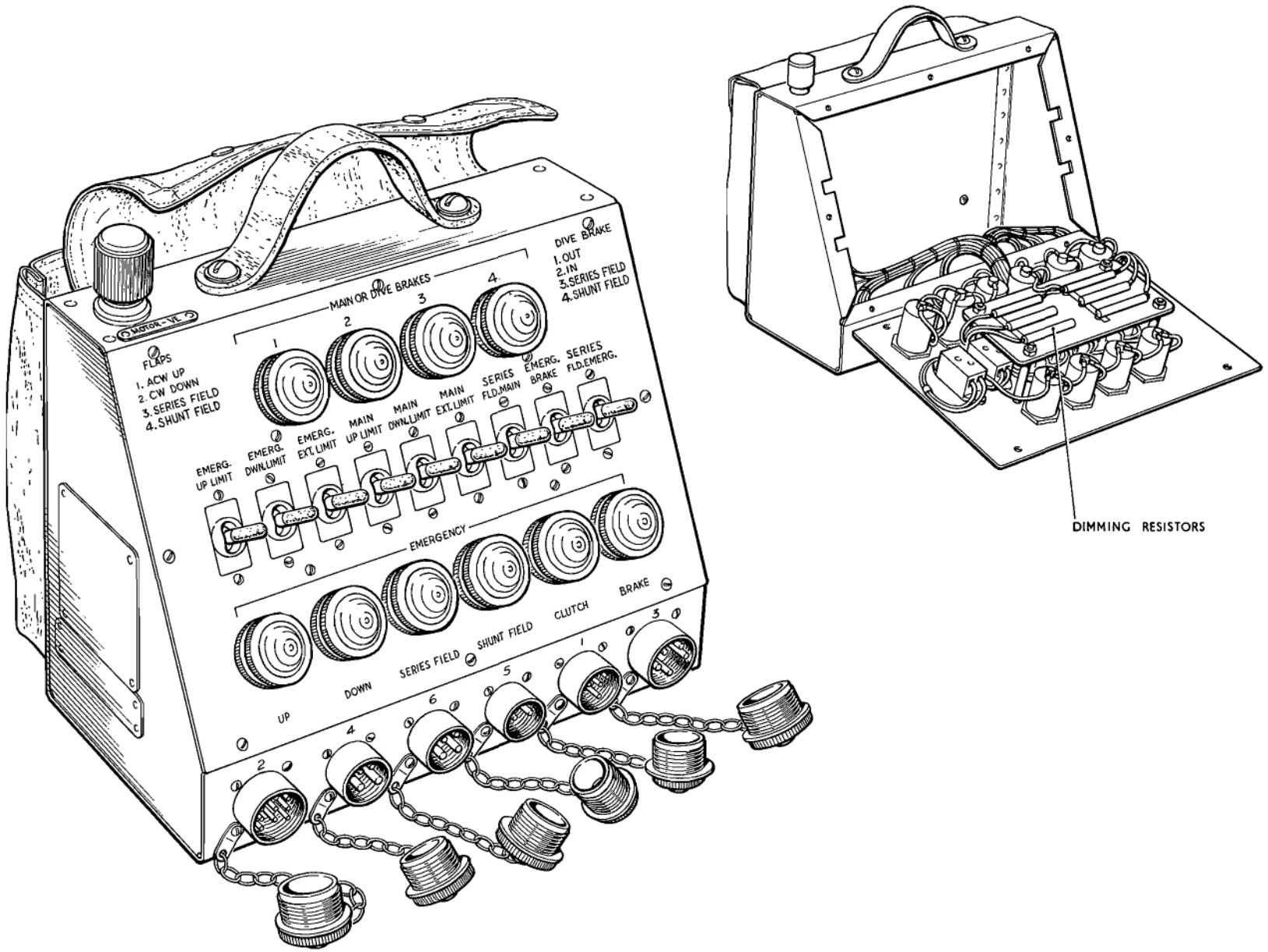

Fig. 6 Flap and air brake test box.