Chapter 7

WARNING LAMPS WITH PUSH SWITCH COMBINED, ROTAX, H4300 SERIES

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Voltage	28V *d.c.*
Bulb required ...	28*V*, 3·5 *watt, Inter Service Ref. No.* 5*L*/9951271
Operational temperature range	—65 *deg.C. to* +70 *deg.C.*
Operational ceiling	60,000 *ft.*
Length	3·280 *in.*
Width	1·062 *in.*
Height	1·062 *in.*
Weight (without bulb)	2·87 *oz.*
Weight of bulb	0·09 *oz.*

Introduction

1. These units combine the functions of a warning lamp and an operating switch and are intended for use in 28 volt d.c. circuits, i.e. fire warning and fire extinguisher circuits. The switch is operated by pushing in the knob which houses the bulb. In all but the H4305 the bulb may be tested by pulling out the knob, which returns automatically to the central position from both the "in" and "out" positions.

2. The units in the series are similar in construction except for the following colour and marking details.

Ref. No.	*Rotax Type No.*	*Glass details Colour*	*Marking*
5CX/5088	H4301	Red	Letter "F"
5CX/5282	H4302	Red	—
5CX/5331	H4303	Amber	—
5CX/5381	H4304	Green	—
5CX/5346	H4305	Red	Letter "F"

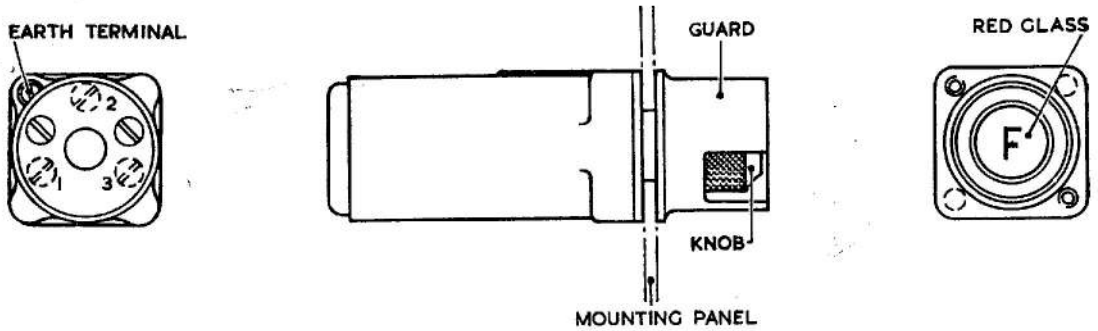

Fig. 1. Typical H4301 series warning lamp

DESCRIPTION

*H*4301, 2, 3 *and* 4

3. Each unit consists of a cylindrical moulded body in which are fitted three silver-plated phosphor-bronze contacts connected to three terminals at the rear end. A bulb holder assembly is free to slide within the body but is normally held in the central position by two opposed coiled springs. The bulb holder and springs are retained in the body by a metal mounting plate which also provides a connection between the bulb holder and an earth terminal moulded into the mounting flange of the body.

4. The bulb has a single-pole bayonet cap and is enclosed in the bulb holder by a metal screw-on cover which forms a knurled knob for operating the switch contacts and also contains the coloured glass. The knob is protected against inadvertent operation by a steel tubular guard having two finger slots set mutually at 180° to enable the knob to be pulled out.

5. Connection between the three contacts is made by a cylindrical contact and a contact ring fitted at the end of the bulb holder. The cylindrical contact is connected to the bulb contact plunger in the bulb holder. The three contacts are so positioned in the body that contact No. 2 makes with the cylindrical contact in the centre position, contact No. 1 makes with the cylindrical contact in the "out" position and contacts No. 1 and 3 are commoned by the contact ring in the "in" position.

6. An important feature of the units is that, whether the knob is pushed in or pulled out, contact No. 2 breaks from the cylindrical contact before the other contacts make. The possibility of feeding back to contact No. 2 is thereby eliminated. The contact terminals are enclosed by a screw retained cover.

*H*4305

7. The construction of the H4305 is similar to that of the other units in the series except that a stop plate in the body of the unit prevents the knob from being pulled out. This eliminates the "pull to test" action.

Operation

8. Terminal 1 is connected to 28V d.c. positive, terminal 2 to the appropriate warning circuit in the aircraft, and terminal 3 to the external circuit. Terminal E is commoned to the aircraft earth. The knob is normally in the neutral position with contact 2 connected to the bulb via the cylindrical contact. If a warning occurs a switch will operate and supply terminal 2 with 28 V d.c. so that the bulb will light. When the knob is pressed in, a 28 V d.c. supply at terminal 1 is connected to the external circuit via terminal 3.

9. To test the bulb, the switch knob should be pulled out so that the 28V d.c. supply at terminal 1 is connected via the cylindrical contact to the bulb, which should then light. There is no "pull-to test" on the H4305.

INSTALLATION

10. The unit should be mounted behind the panel with the switch knob and lamp window projecting in front. Two holes tapped 6 B.A. are provided in the mounting plate, being spaced 1·093 in. apart. The two fixing screws are also used for securing the guard to the

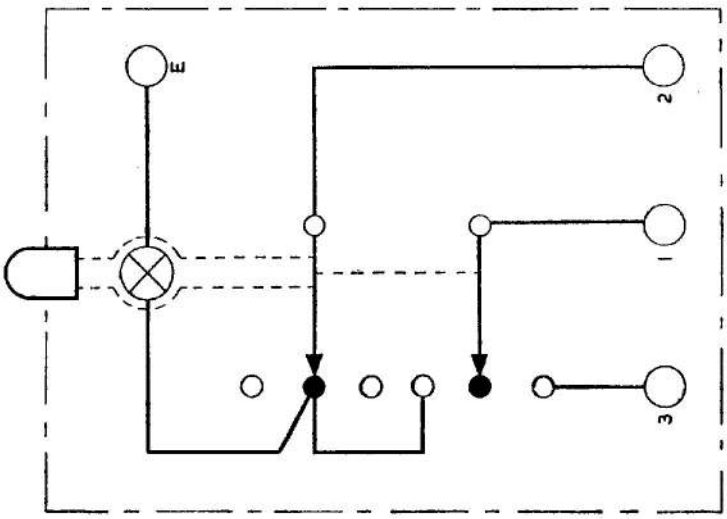

Fig. 2. Diagram of internal connections

front of the panel. The H4301 and H4305 are to be mounted with the letter F upright.

Note . . .

The units are supplied with the guard screwed to the mounting plate. The two screws employed are for storage purposes only and must not be used for mounting. The two countersunk screws securing the mounting plate must not be removed.

11. The four terminals are 6 B.A. combined screw and washer assemblies. The end cover must be removed to gain access to the three contact terminals.

SERVICING

12. Examine the unit for damage and wear ensuring that the glass is intact and that the electrical connections are clean and secure. Ensure that the bulb lights when the knob is pulled out and that the knob returns smoothly to the neutral position from both the "in" and "out" positions. (The above applies to the "in" position only on H4305). Prior to carrying out tests in para. 13 and 15 remove all leads.

"Break before make" test

13. For this test the positive of a 24V battery should be connected to terminals 1 and 2 and an external bulb inserted (28V 3 watt) between terminal No. 3 and the earth terminal. The external bulb negative and terminal E should be commoned to the battery negative. For a satisfactory "break before make" condition to exist the lamp under test should perform as follows :—

Step	*Knob position*	*Warning lamp*
1	Neutral	On
2	Pull out	Warning OFF followed by external lamp ON.
3	Push in	Warning OFF before external lamp ON.

The test procedure for H4305 is as for H4301, H4302, H4303 and H4304, except that tests with the knob in the "out" position should be omitted (*para.* 13 *and para.* 15).

Millivolt drop test

14. Connect a 24 volt d.c. supply to terminals 3 (negative) and 1 (positive), with a suitable resistive load connected in the negative line. With the knob in the "in" position and 1·5 amperes flowing, measure the millivolt drop across terminals 1 and 3. The millivolt drop must not exceed 40 millivolts.

Insulation resistance tests

15. Remove the bulb which is accessible after unscrewing the knob from the bulb

holder. Then test the insulation resistance between the following points, using a 250 volt insulation resistance tester. A reading of at least 50,000 ohms should be obtained in each test for satisfactory aircraft service.

(1) With the switch at its neutral position

(*a*) Terminal E and terminals 1, 2 and 3

(*b*) Terminal 1 and terminals 2 and 3

(*c*) Terminal 2 and terminal 3

(2) With the switch knob held "in"

(*a*) Terminal E and terminals 1 and 2

(*b*) Terminal 1 and terminal 2

(3) With the switch knob held "out"

(*a*) Terminal E and terminals 1 and 3

3 (*a*) above does not apply to the H4305 as there is no "out" position on this unit).

When these tests are satisfactorily completed reconnect all leads.

375/6 Wt. 66416 D.No. 4954 2,750 24/6/60 C S. Co.