GROUP F — MISCELLANEOUS CIRCUITS

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Introduction

1. This group deals with the circuits which cannot be arranged conveniently elsewhere in this Chapter. The components used are described in the specialist Air Publications listed below.

Equipment	Air Publication
Micro switches, Type 1, 1A, and 2A	4343C, Vol.1, Sect.1, Chap.4
Solenoid, Type MS.7609 (A/G lever lock)	4342C, Vol.1, at a later date
Switch, Type D5406	4343C, Vol.1, Sect.1, Chap.28
Pressure regulating valve, Mk.11	◀1275A, Vol.1, Sect.20, Chap.4 ▶
Electro-pneumatic valve, Type FKF/A/5	4343E, Vol.1, Sect.1, at a later date
Push-switch, Type B3	4343C, Vol.1, Sect.3, Chap.3

ALIGHTING GEAR POSITION INDICATOR

Description

2. An indicator, fitted to the instrument panel, employs nine lamps to show the attitude of the aircraft's alighting gear. The indicator is described in Chapter 2, Group B of this Section.

3. The nine lamps are divided into two groups, one of three lamps and one of six lamps. The group of three is covered by a red screen, the lamps lighting individually to signify when the nose undercarriage and port and starboard main undercarriages, respectively, are in a travelling state, i.e., neither locked up nor locked down. The group of six lamps is covered by a green screen, and is again sub-divided to form two groups of three. One group only is used, the other forming a standby group which can be used should any of the first green group of lamps fail.

4. The green lamps light individually when the respective undercarriage is locked down. When the alighting gear is locked up and the wheel doors are closed, no lamps remain alight.

5. Fig. 2 shows the routing chart whilst fig. 3 shows the circuit theoretically for clarity. Both figures show the alighting gear down and locked, the green lamp circuits being completed through the leg lock (A-C) and down lock (A-C) micro switches. As the alighting gear selector lever in the cabin is moved to UP hydraulic pressure operates the alighting gear jacks (*Sect.* 3, *Chap.* 6) to move the alighting gear.

6. Immediately, the leg lock and down lock micro switches change (A-B), disconnecting the green lamp circuits and completing the red lamp circuits via the leg lock (A-B) and door lock (A-B) micro switches. When each undercarriage locks up the uplock and leg lock switches change (A-C), and a supply is connected to the alighting gear warning lamp via the leg lock (A-C), down lock (A-B) and up lock (A-C) micro switches, and the alighting gear warning micro switch (A-C). This latter switch is fitted to the aft face of bulkhead 4 and is closed (A-C) whenever the throttle is less than a quarter open.

7. When each main undercarriage leg has locked up, the doors mechanically lock closed, changing the door lock micro switches (A-C) and thus disconnecting the red lamp circuits. The nose undercarriage has no door-operated switch, the door lock micro switch being an additional micro switch operated by the up lock. All lamps are then OFF, and the alighting gear locked up for flight.

Servicing

8. The equipment in this circuit is described in the specialist Air Publications listed in para. 1. All micro switches should be kept clean and free from moisture, particular attention being given to weather-proofing (*Gen. Inf., para.* 21) and to the tightness of the lamps in the indicator.

9. During alighting gear retraction testing, the sequence of the lamps should be checked including the standby lamps and the throttle warning lamp. The standby lamps (green only) may be switched into circuit by operating the switch having horizontal lugs in the centre of the indicator.

Microswitch setting

Note . . .

Any adjustment of one or more micro switches in the alighting gear position indicator circuit must be followed by an alighting gear retraction test.

10. The settings of the various micro switches in this circuit are important, and should be carried out in collaboration with the airframe tradesman (*Sect.* 3, *Chap.* 5). They are as follows :—

Note . . .

The hydraulic system must first be exhausted, and the aircraft jacked with its wheels clear of the ground. Before operating the hydraulic hand pump in the cabin READ THE WARNING contained in Sect. 3, *Chap.* 5, *preceding para.* 7.

(1) *Main undercarriage* (*Port and Starboard*).

(a) Leg lock micro switch

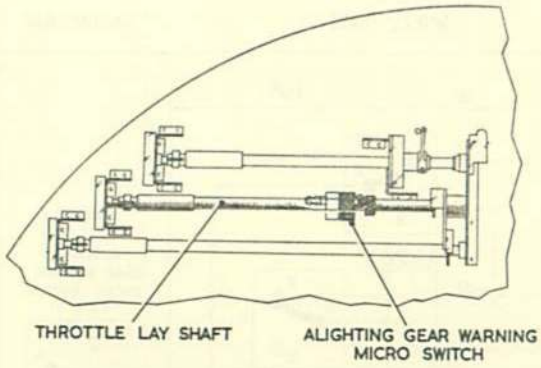
From the leg locked down position the micro switch must operate when the undercarriage radius rod roller is 0·75 in. from its locked position. Select the alighting gear UP and move the leg by use of the hand pump (NOTE in para. 10) in the cabin until the mechanical leg lock is broken. The switch can then be set by altering the setting of the switch striker plate adjuster bolt. Lock the bolt in its set position (*Sect.* 3, *Chap.* 5, *fig.* 4). The adjuster bolt is accessible in the wheel bay. The GREEN lamp in the position indicator should light when the micro switch plunger is compressed, whilst the RED lamp should light when the plunger is extended.

(b) Down lock micro switch

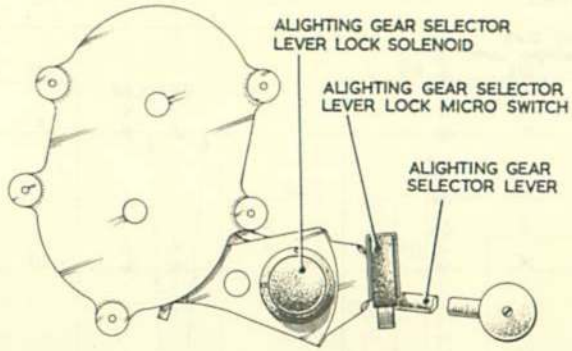
With the leg locked down the micro switch plunger should be compressed between 0·5 in. to 0·8 in. of its full travel. Adjustment is achieved by positioning the switch on its bracket, the upper hole of the bracket being slotted for this purpose. The two bolts securing the switch to its bracket are easily accessible in the wheel bay. The GREEN lamp in the position indicator should light when the switch plunger is compressed, whilst the RED lamp should light when the plunger is extended.

(c) Up lock micro switch

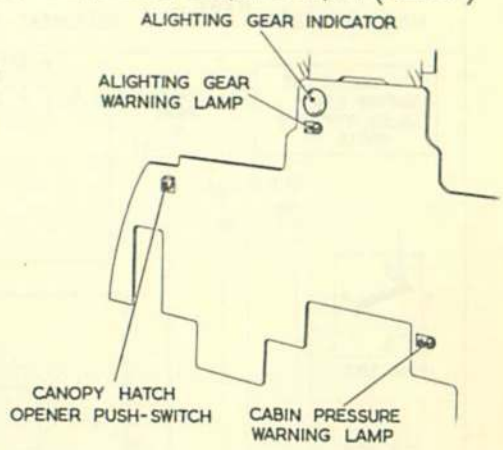
With the leg locked up the micro switch plunger should be compressed just sufficiently to light the alighting gear warning lamp ; for this circuit to be completed the throttle must be closed also cable U11 should be disconnected from T.B.6 on the nose wheel up lock micro switches bracket, and the alighting gear ground lock (*Sect.* 2,



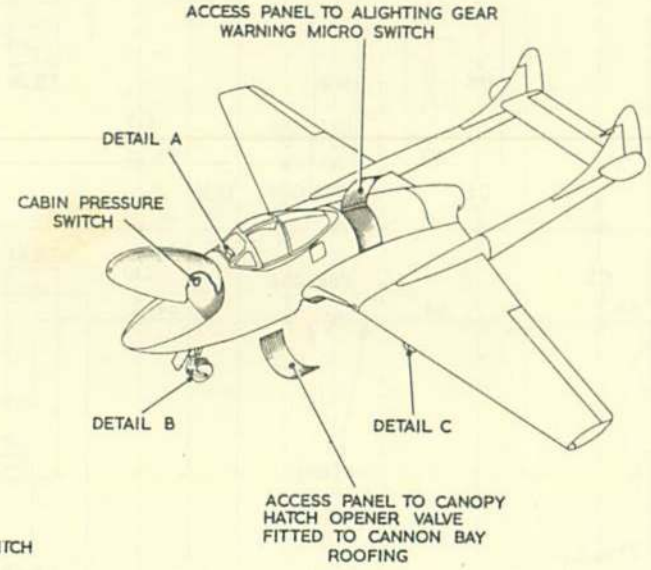
VIEW ON AFT FACE BULKHEAD 4

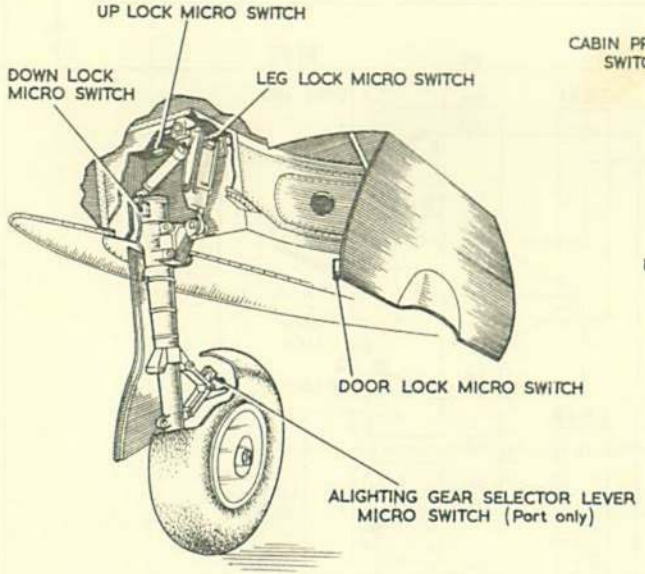


OUTBOARD VIEW ON PUPIL PILOT'S THROTTLE QUADRANT

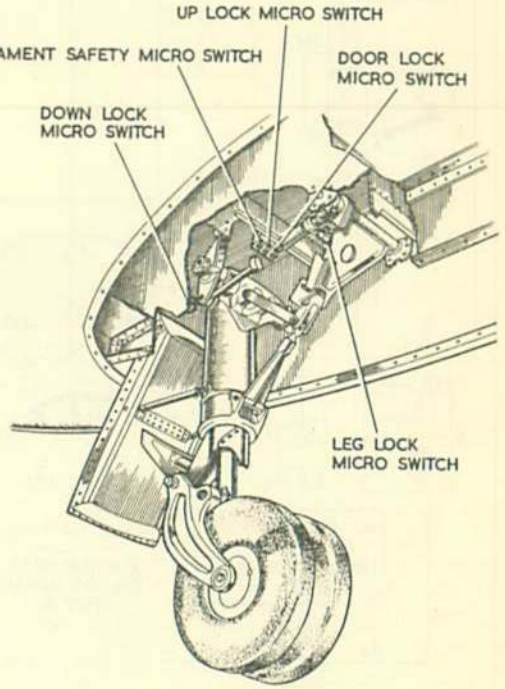


INSTRUMENT PANEL
DETAIL A





DETAIL C
PORT UNDERCARRIAGE (STBD SIMILAR)



DETAIL B
NOSE UNDERCARRIAGE

Fig.1. Location and access of components

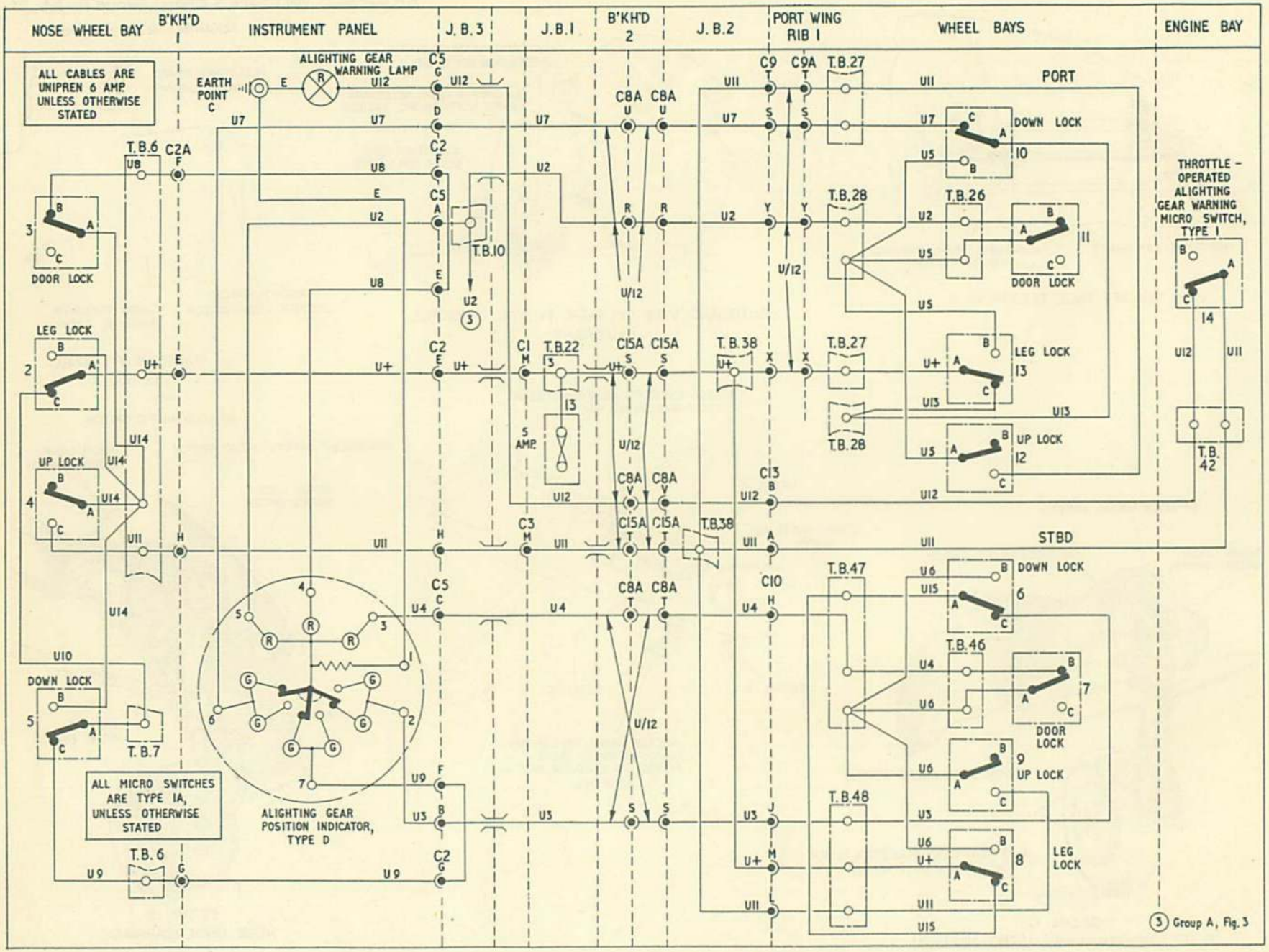


Fig. 2. Alighting gear position indicator – U

Chap. 1, *fig.* 1) should be fitted to the opposite leg to that bearing the micro switch being adjusted). Screw out the striker fitted to the micro switch hinged bracket three complete turns, and lock. The warning lamp should light when the switch plunger is compressed. The micro switch and striker are accessible via a detachable panel in the wing top skinning.

(d) Door lock micro switch

Both the wheel and leg fairing must first be removed, then the leg locked up. Adjust the micro switch so that the plunger is compressed 0·22 in. by the door lock bolt. Adjustment of the switch is afforded by positioning it on its bracket which has slots for this purpose.

When the switch plunger is compressed no lamp in the position indicator should light, but when the plunger is extended the RED lamp should light.

(2) *Nose undercarriage*

(a) Leg lock micro switch

From the leg locked down position the micro switch must operate when the undercarriage radius rod roller is 0·75 in. from its locked position. Select the alighting gear UP and move the leg by use of the hand pump (*NOTE in para.* 10) in the cabin until the mechanical leg lock is broken. The switch can then be set by altering the setting of the striker bolt and locking it in its set position (*Sect.* 3, *Chap.* 5, *fig.* 9). The GREEN lamp in the position indicator should light when the micro switch plunger is compressed, whilst the RED lamp should light when the plunger is extended.

(b) Down lock micro switch

With the leg locked down check that the switch plunger is compressed; the switch mounting bracket has one slot for adjustment purposes. The GREEN lamp in the position indicator should light when the plunger is compressed, whilst the RED lamp should light when the plunger is extended.

(c) Up lock and door lock micro switches

Of the three micro switches fitted to the lower forward face of bulkhead 1, the central and starboard switches are the up lock and door lock, respectively—the port switch is the armament safety micro switch. The plungers of these switches must be compressed when the leg is locked UP; the switches are mounted beneath a cover plate in the nose bay. As the switches are fitted to a common bracket their adjustment is simultaneous, and is achieved by loosening the adjusting screw lock-nut and then the screw until the RED lamp in the position indicator lights. Screw in the adjusting screw until the RED lamp goes out, then lock the adjusting screw using its lock-nut.

(3) *Alighting gear warning micro switch*

The alighting gear must be locked UP. Move the throttle lever to a quarter open. At the aft face of bulkhead 4, port side, check that the plunger of the inboard of the two micro switches is just compressed; adjustment is afforded by loosening the cam fitted to the throttle control shaft. The warning lamp should light whilst the switch plunger is compressed, i.e., between throttle closed and throttle a quarter open.

Removal

11. The method of removal of all the micro switches will be self-evident when viewed on the aircraft.

ALIGHTING GEAR SELECTOR LEVER LOCK

Description

12. A lock is embodied for the alighting gear selector lever to ensure that the alighting gear cannot be inadvertently retracted. The lock consists of a solenoid plunger which, when the solenoid is de-energised, locks the lever in its *DOWN* position.

TABLE 1

Micro switch positions and lamp indications

Alighting gear position	Micro switch position	Circuit effected
Down and locked	Door lock (A to B) Down lock (A to C) Up lock (A to B) Leg lock (A to C)	GREEN lamps *ON*, RED lamps *OFF*, throttle warning supply broken
Intermediate	Door lock (A to B) Down lock (A to B) Up lock (A to B) Leg lock (A to B)	GREEN lamps *OFF*, RED lamps *ON*, throttle warning supply broken
Up and locked	Door lock (A to C) Down lock (A to B) Up lock (A to C) Leg lock (A to C)	GREEN and RED lamps *OFF*, throttle warning supply connected

13. The solenoid is controlled by two micro switches, one, a Type 2A, being operated by the initial movement of the selector lever whilst the other is operated by the port oleo leg only when that leg is extended. The circuit is shown in fig. 4.

14. As the weight of the aircraft is removed from the alighting gear the main undercarriage legs extend and the port leg torque link compresses the micro switch plunger, connecting contacts A-B of the switch.

15. The initial movement of the selector lever operates the selector lever micro switch (A-D), thus completing the solenoid circuit to withdraw the lock. The selector lever can then be moved to its fully UP position. When UP the selector lever allows its micro switch contacts to re-open (A-C), thereby de-energising the solenoid as a precaution against its burning out.

16. The port oleo leg micro switch may be overridden in an emergency by either of two single-pole toggle switches. Each of these switches is retained in its OFF position by a spring-loaded guard, one switch being fitted to the cabin port canopy rail, whilst the other is mounted on the centre support strut of the main instrument panel (*Gen. Inf., fig.* 2, *item* 6). With either of these switches ON the selector lever may be moved to its fully *UP* position while the weight of the aircraft is being taken by the alighting gear.

Servicing

17. The servicing of equipment in the alighting gear selector lever lock circuit is given in the specialist Air Publications listed in para. 1. Particular attention should be paid to the serviceability and weatherproofing (*Gen. Inf., para.* 21 *of this Chapter*) of the micro switches.

Micro switch setting

Note . . .

Any adjustment of one or more micro switches in the alighting gear selector lever lock circuit must be followed by an alighting gear retraction test.

18. The settings of the two micro switches are important. They should be effected in collaboration with the airframe tradesman (*Sect.* 3, *Chap.* 5), and it is suggested that the hydraulic system pressure be first exhausted. The method is then as follows:—

Note . . .

The aircraft should be on jacks with all wheels clear of the ground.

(1) Selector lever micro switch
This switch is fitted to a bracket at the aft face of the port throttle quadrant, and is operated by the action of the selector lever which, during its initial upward travel, rides over a curved spring which in turn compresses the micro switch plunger. The switch should be adjusted by altering the position of the spring such that the switch plunger is compressed just before the selector lever meets the lock solenoid fitted inside the throttle quadrant. The switch must return to its inoperative condition BEFORE the selector lever reaches its fully *UP* position. The circuit should then be checked for both *UP* and *DOWN* selection of the lever.

(2) Port oleo leg micro switch
With the leg locked down and fully extended, adjust the striker pin to compress the switch plunger 0·125 in. after the switch has closed ; this can be checked by listening for the lock solenoid to operate with the selector lever micro switch plunger manually compressed.

WARNING

Do not operate the selector lever micro switch for the above test by moving the selector lever if hydraulic pressure is available, or the alighting gear will be retracted.

Removal

19. Both micro switches are removed quite easily, the method being obvious when viewed on the aircraft. The selector lever lock solenoid, however, is built into the port throttle quadrant. This quadrant must first be removed from the cabin port wall, in collaboration with the engine tradesman, before the three 2 BA nuts and bolts securing the solenoid can be removed.

CABIN PRESSURE WARNING

Description

20. The aircraft cabin is pressurised for high altitude flying (*Sect.* 3, *Chap.* 8). A warning lamp is therefore fitted to the main instrument panel to indicate a cabin pressure drop of more than 0·5 p.s.i. below the normal for any cabin altitude.

21. The lamp is controlled by a pressure switch built integrally into the cabin pressure-regulating valve which is fitted to the forward face of bulkhead 1. The electrical circuit is shown in fig. 5.

Servicing

22. The switch, being an integral part of the pressure-regulating valve, is described in the specialist Air Publication dealing with the valve, as listed in para. 1.

23. The warning lamp circuit should be periodically tested by removing the cap-nut adjacent to the terminal block fitted to the valve, taking care not to loosen the locknut, and inserting a $\frac{3}{32}$ in. diameter insulated rod into the hole in the adjusting screw. Pressure on the rod should now close the switch, and the lamp should light. Remove the rod and replace the union cap-nut securely.

Removal

24. As the switch is an integral part of the pressure-regulating valve, the valve itself will have to be renewed should the switch become unserviceable. Removal of the valve is the air-frame tradesman's responsibility.

CANOPY HATCH OPENER

Description

25. The hatch in the cabin canopy is opened pneumatically by depressing an electrical push-switch on the instrument panel, the push-switch actuates an electro-

pneumatic valve fitted in the cannon bay. The circuit is presented on fig. 6.

Servicing

26. The components in this circuit are described in the specialist Air Publications listed in para. 1. The circuit may be functionally tested by closing the hatch from inside the cabin. To effect this, support the weight of the hatch, pull the handle at the top hatch lifting strut to disengage the locking plunger and lock the hatch by using the internal locking handle (*Sect.* 3, *Chap.* 1).

27. To open the hatch it must first be unlocked mechanically by operation of the internal locking handle. The hatch will lift a few inches. Now depress the push-switch to actuate the electro-pneumatic valve which allows air, under pressure, to enter the piston chamber to extend the hatch lifting strut. The push-switch must be kept depressed until the hatch automatically locks open.

Removal

28. The method of removing the push-switch and valve will be obvious when the equipment is viewed on the aircraft. The valve must only be removed with the assistance of the airframe tradesman, ensuring that the pneumatic system pressure is first exhausted.

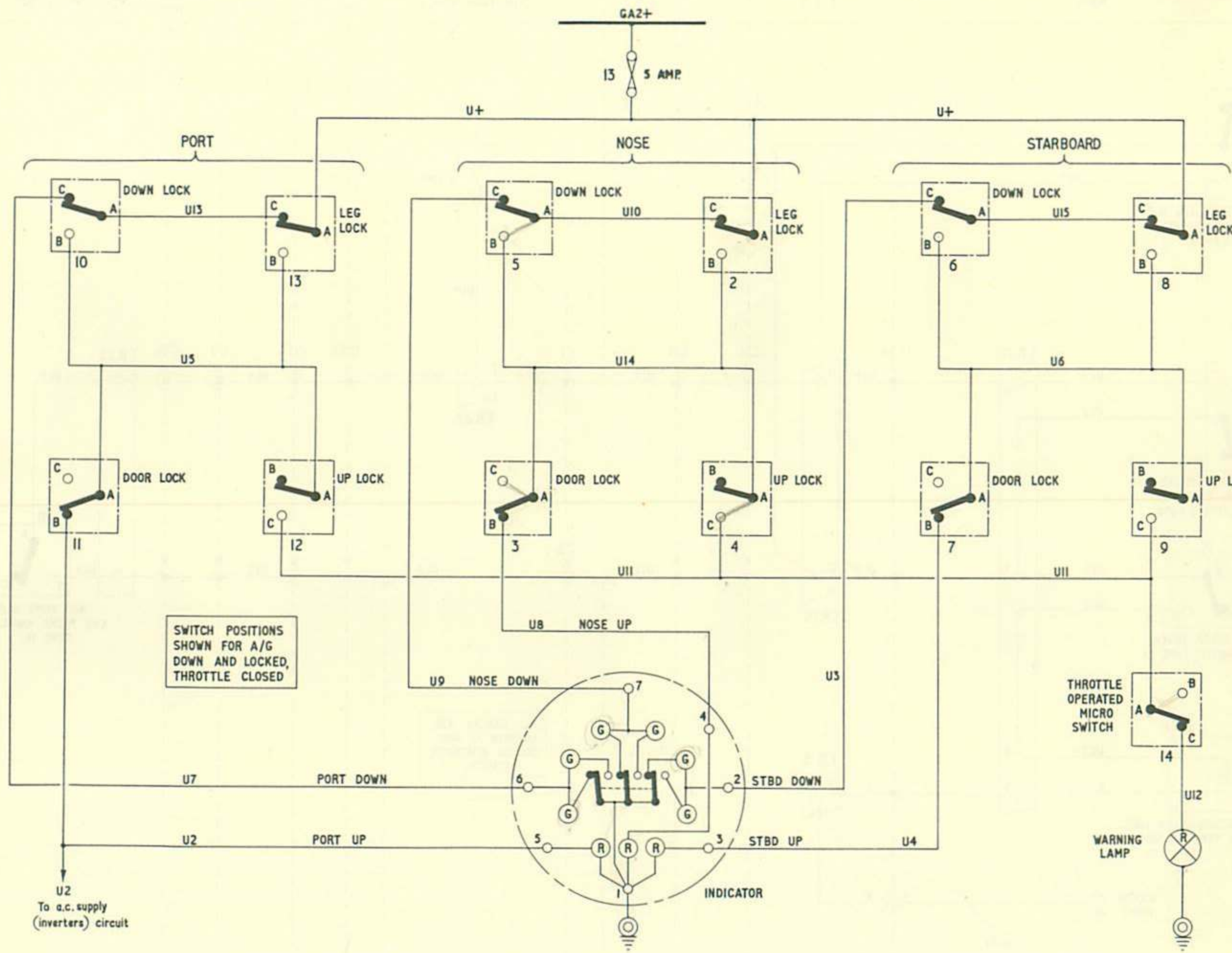


Fig. 3. Alighting gear position indicator theoretical

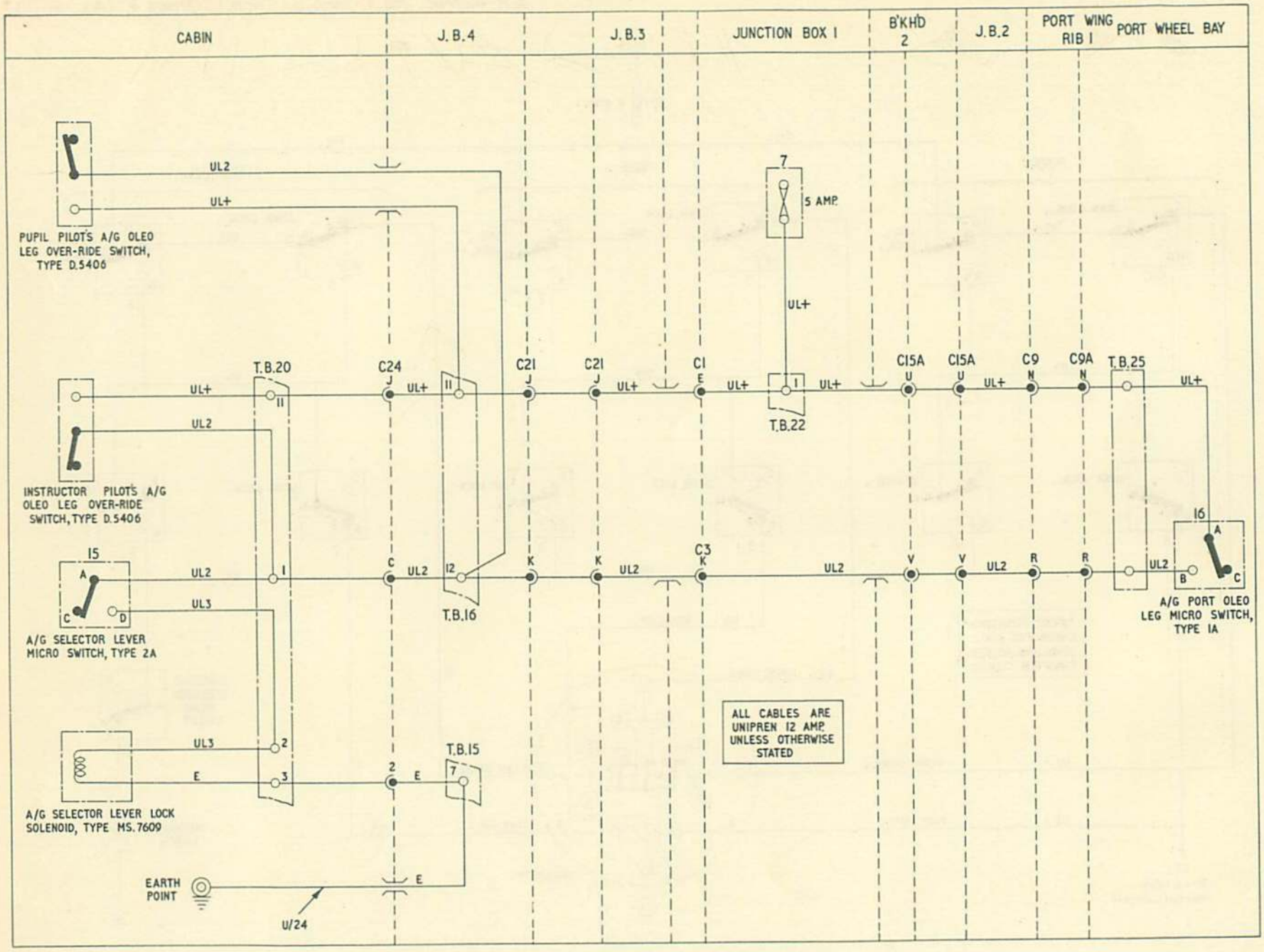


Fig. 4. Alighting gear selector lever lock – UL

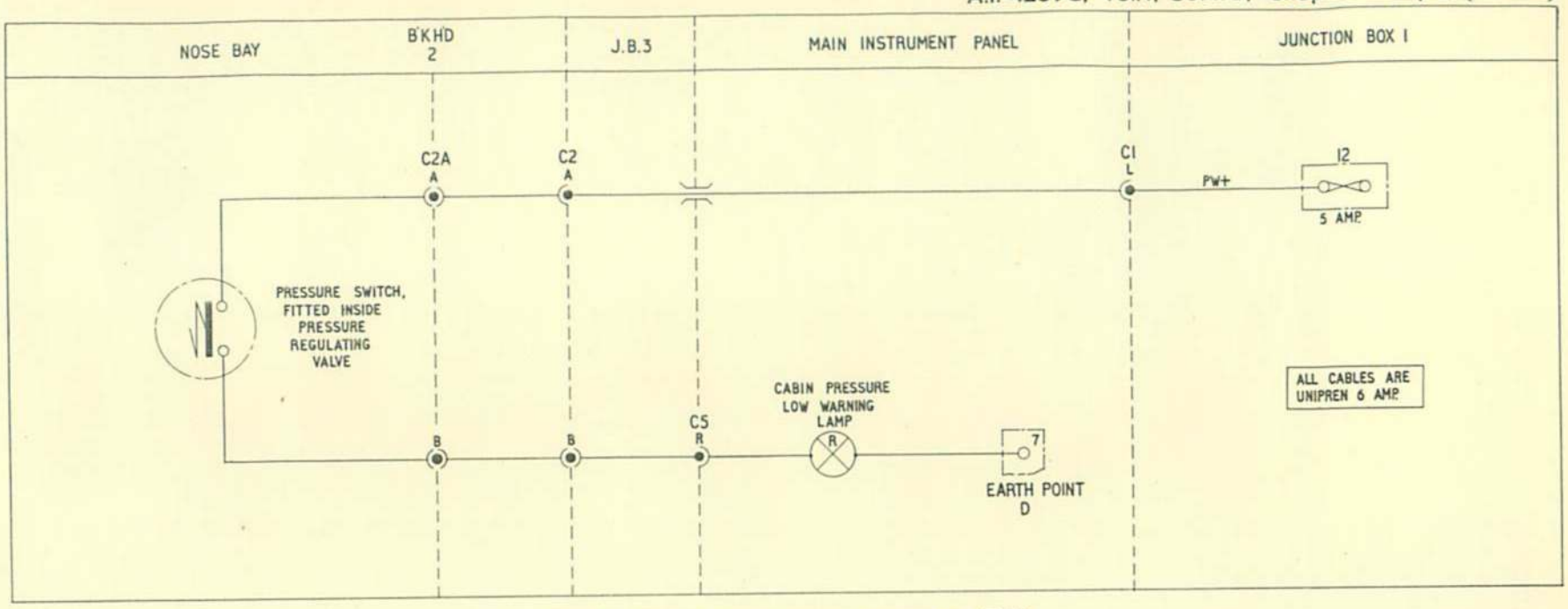


Fig. 5. Cabin pressure warning–PW

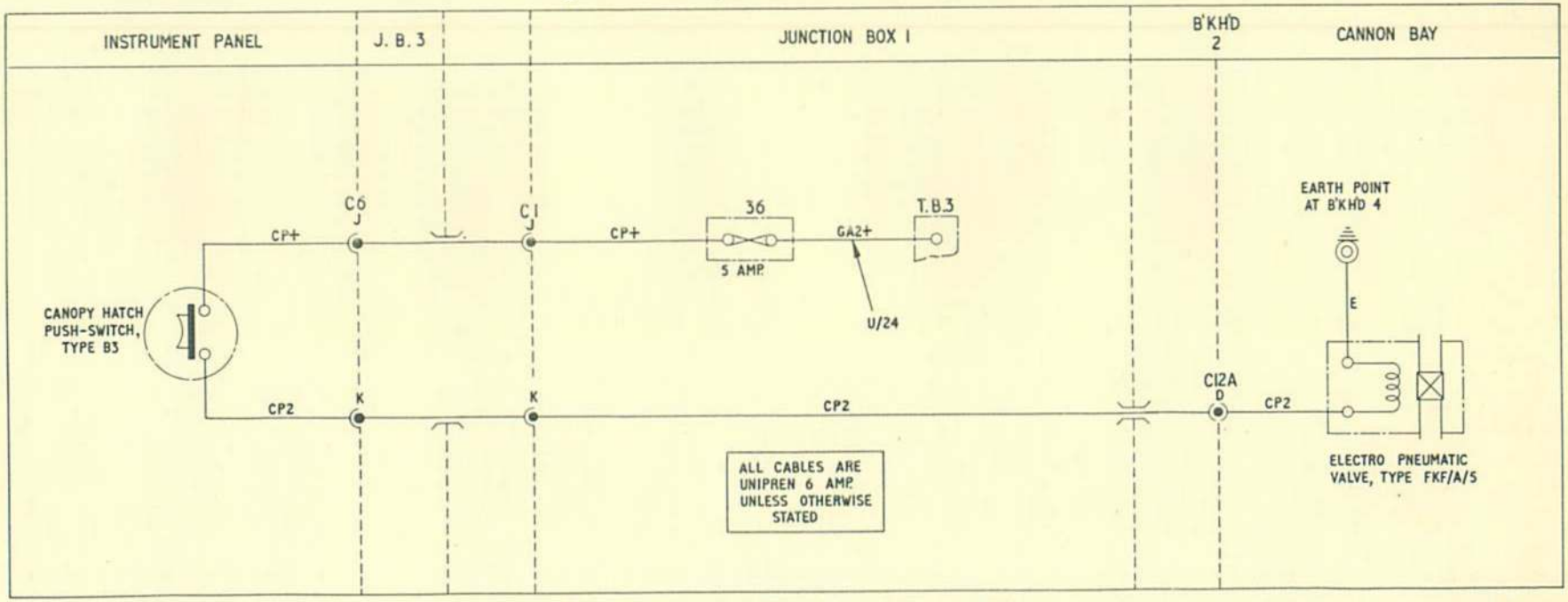


Fig. 6. Canopy hatch opener–CP

7750 247728 11/57 625 C.&S.&S.L.T.P. GP.55.