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## GROUP 5A

## GAUGES AND INDICATING INSTRUMENTS

◀ (Including Mods. 375, 699, 1273, 919, 521 and 1279) ▶

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## Introduction

1. This group describes the miscellaneous gauges and indicating instruments installed in the aircraft which are not given in other groups of the chapter. A general description of the instrument installation is given in Group 1.A. The location of, and means of access to all the instruments and their associated equipment is described in Group 1.C.

## Equipment employed

2. The miscellaneous gauges and indicating instruments installed are listed below, together with the appropriate Air Publications to which reference should be made for detailed descriptions and information on the servicing required to maintain them in an efficient condition.

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◀ A.P.113F-0607-1 ▶	
Alighting gear indicator, Type D.1.	
Alighting gear warning lamp, Iris Type B	
Hydraulic failure warning lamp, Type B	
Oxygen flow indicator, Type C	
Relay J, Type Q No.3	
Microswitches, Type 1A, 4A and Pye 401/S (Mod.521)	
Microswitches, Type Dowty 1322Z Mk.2 (Mod.1279)	
Hydraulic failure audio warning cut-out switch single pole, change-over, spring return one side (Ref. 5CW/6432)	
Brake and main hydraulic pressure gauge, Mk.2 (Post Mod.699) or Dunlop ACO.9719 (Pre Mod.699)	
Anti-G and emergency air pressure gauges MK.14KK	
Brake accumulator pressure gauge, Mk.14LL	
Fatigue meter, Mk.15 (Mod.1273)	
Hydraulic pressure switch, Type T.P.5207	
Oxygen pressure gauge, Mk.3	
Oxygen regulator, Type 17E (Mod.919)	
◀ A.P.1275A, Vol.1, Sect.15 ▶	
◀ A.P.112G-0400-1 ▶	
◀ A.P.112G-0203-6 ▶	
A.P.1275A, Vol.1, Sect.24	
A.P.1275G, Vol.1, Sect. 1	
◀ A.P.107D-0201-2 ▶	

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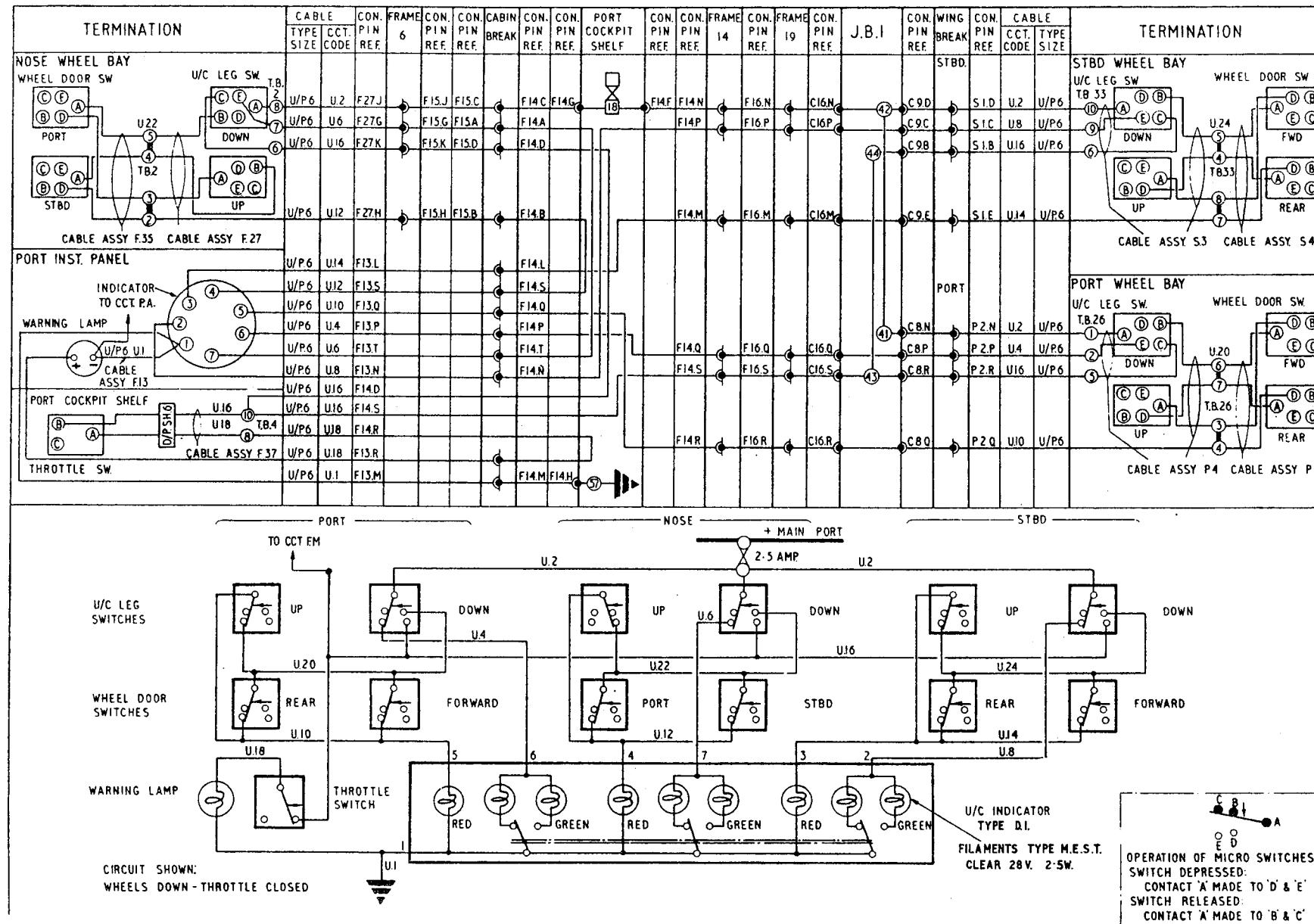


Fig. 1. Alighting gear indicator and warning lamp (routeing and theoretical)

◀ Mod. 375 ▶

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**DESCRIPTION**

**Alighting gear indicator and warning lamp**  
 3. The alighting gear position indicator is controlled by the alighting gear leg and wheel door micro switches. The instrument is mounted on the port instrument panel and indicates the position of the alighting gear as follows:-

All units locked down ... ... ...	Three green lamps
All intermediate positions ... ...	Three red lamps
All units retracted and wheel doors locked up ... ... ...	All lamps out.

There is a change over switch in the centre of the indicator to bring into circuit a spare set of green lamps and an anti-dazzle screen is also provided. To remind the pilot to lower the alighting gear, a red iris type warning lamp is also mounted on the port instrument panel. This lamp is automatically illuminated, via a micro switch in the throttle box, if the throttle is moved to less than approximately one-third open when the alighting gear is not locked down. ► ◀

**Operation***Alighting gear locked down*

4. The theoretical circuit diagram (fig.1 of this group) shows conditions when the aircraft is standing on its alighting gear with the throttle closed. The green indi-

cator lamps are all illuminated as both the main undercarriage legs and the nose wheel leg down switches are making contacts A-E to supply these lamps. The throttle micro switch is making contacts A-B, but the alighting gear warning lamp is not illuminated as the supply is broken at contacts C of the down micro switches. The wheel door and main wheel leg up micro switches are all making contacts A-D, while the nose wheel leg up micro switch is making contacts A-B, preparatory to illuminating the red indicator lamps when the circuit is completed by the down micro switches when in the "between locks" position.

*Alighting gear between locks*

5. When the alighting gear is between locks, the down micro switches are making contacts A-B-C and via contacts B, feed the up and wheel door micro switches so providing three parallel supplies to the red indicator lamps. Thus the wheel legs must be fully retracted and doors locked before the red lamps are extinguished. A supply is also made to the throttle micro switch, via contacts C of the down micro switches, thus the alighting gear warning lamp will illuminate if the throttle is closed (para.6).

*Alighting gear locked up*

6. With the alighting gear retracted and all the wheel doors locked up, the down micro switches are in the same position as when between locks, but the leg up and wheel door micro switches are making contacts A-B-C, thus breaking the supply to the red indicator lamps. As the down

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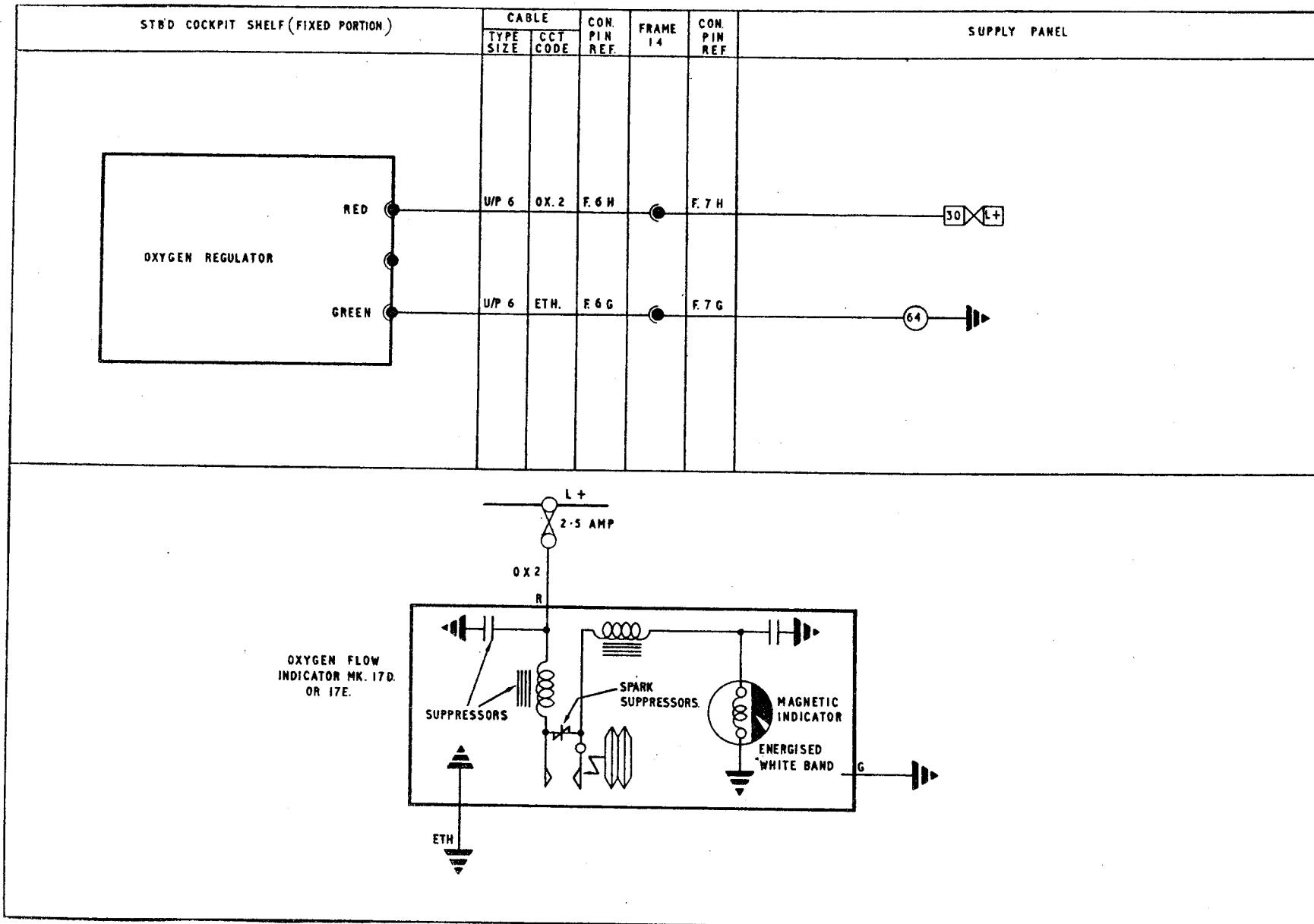
micro switches' contacts are in the same position as when between locks, the supply to the throttle micro switch is maintained to illuminate the alighting gear warning lamp should the throttle be closed, while the alighting gear is still retracted. A full description of the alighting gear indicator and details of the micro switches will be found in the Air Publications quoted in para.2 of this group.

**Oxygen regulator and pressure gauge**

7. The demand regulator controlling the oxygen supply is mounted on the forward end of the cabin starboard shelf. The controls consist of an ON/OFF valve, an air cut-off lever and an emergency toggle switch, together with a combined flow and blinker indicator. The operation of the regulator is fully automatic and once turned on, supplies oxygen in accordance with the demand from sea level to a cabin altitude of 50,000 feet. The Mk.17D and Mk.17E regulators incorporate an electromagnetic oxygen flow indicator, which is controlled by contacts operated directly from the blinker diaphragm assembly in the regulator. A routeing and theoretical diagram of the oxygen flow indicator's electrical circuit is given on Fig.2 of this group.

8. To provide the pilot with an indication of the contents of the oxygen cylinders, an oxygen pressure gauge is situated at the bottom of the starboard instrument panel just above the regulator. The oxygen system is described in detail in Section 3, Chapter 10 of this volume and a full description of the regulators and pressure

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**Fig.2. Oxygen flow indicator(routeing and theoretical)**

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gauge will be found in the Air Publication quoted in para.2 of this group.

#### Hydraulic pressure gauges and warning devices

9. The hydraulic pressure gauges, in the cabin, are all mounted on the cabin port shelf and consist of a combined brake and system pressure gauge, two air pressure gauges for the undercarriage and flap emergency system and a gauge for the brake accumulator. The brake and system pressure gauge is a triple unit, which is located at the forward end of the cabin port shelf and indicates the pressure available in the hydraulic system and that applied to each brake. The undercarriage and flap emergency air pressure gauges are situated on the rear portion of the cabin port shelf. The gauge indicating the pressure in the brake accumulator is also located on the rear portion of the cabin port shelf and is provided with a label indicating that the brakes will not operate at a pressure below 750 lb.per sq.in. The hydraulic system and the emergency air system are both described in Section 3, Chapter 6 of this volume, and information on the pressure gauges will be found in the Air Publication quoted in para.2 of this group.

10. Indication of failure in the hydraulic system is given, when the hydraulic pressure drops below 600 lbs. per sq.in. The warning is given by a lamp situated on the port instrument panel and by an aural warning interconnection with the U.H.F. installation. ▶

11. These warning devices are controlled by a hydraulic pressure switch located in the hydraulic pipe-line on the port side of the gun package bay. The supply to the aural warning circuit is taken through relay J situated on the underside of the cabin port shelf.

12. Provision is made, on Post Mod.554 aircraft, to prevent the warning devices operating and causing annoyance due to transient pressure drops while the hydraulic services are functioning normally. This is achieved through resistance and capacity delay networks provided in the supply lines of the warning devices.

#### Audio warning cut-out

13. Relay J may be energized to cut-out the aural warning by the operation of an audio warning cut-out switch located on the starboard instrument panel. Once relay J has been energized it is held locked-on by a circuit through its own contacts. The audio warning cut-out switch is marked OUT and OFF and is of the single pole, centre off type, with a spring return to centre from the OUT position.

#### Operation

14. The hydraulic pressure warning lamp and audio warning interconnection receive their electrical supply from the aircraft's main supply through a fuse to contact A of the hydraulic pressure switch, the contacts of which close when the hydraulic pressure drops below 600 lbs. per sq.in. The closing of the switch allows the current to pass across contacts A and B. From contact B

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the supply passes to the pressure warning lamp. Another supply from contact B is fed across contacts 3 and 4 of the de-energized relay J and thus to the aural warning relay ▶ in the U.H.F. installation. On Post Mod. 554 aircraft, the supply from contact B is taken through resistance and capacitor delay networks.

15. Terminal 2 of the audio warning cut-out switch and contact 6 of relay J also receive current when the pressure switch contacts are closed. When the cut-out switch is held in the 'OUT' position, current flows across its contacts 2 and 1 to the coil of relay J which is energized and makes contacts 5 and 6, so completing the relay hold-on circuit. The cut-out switch, which, may then be released, will return to its centre position due to the spring return action. Relay J will, however, remain energized until the hydraulic pressure increases sufficiently to open the contacts of the pressure switch, thus extinguishing the warning lamp and de-energizing relay J by isolating its hold-on circuit.

16. Aural warning may be permanently cut-out by placing the cut-out switch in the 'OFF' position thus closing contacts 3 and 2 of the switch. This side of the switch has no spring return to the centre position. Current will therefore flow to energize relay J continuously until the cut-out switch is manually replaced to its centre position.

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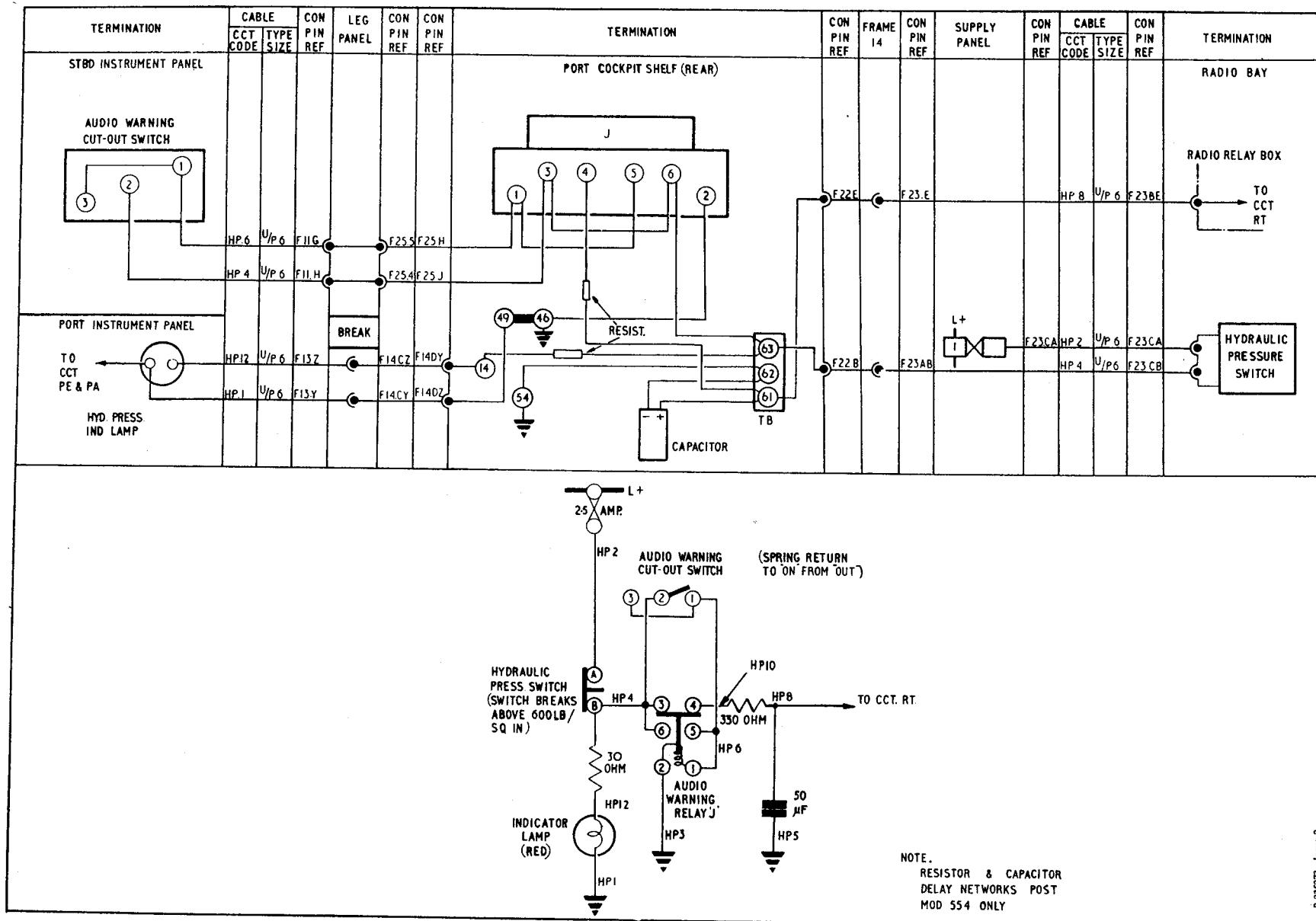


Fig. 3. Hydraulic pressure warning (routeing and theoretical)

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Subsequent operation of the pressure switch will illuminate the indicator lamp, but the audio warning will remain cut off.

**Anti-'G' system pressure gauge**

17. A gauge, to indicate the pressure in the anti-'G' air bottles, is located on a bracket attached to the fuselage structure above the cabin starboard shelf. The anti-'G' system is described in Sect.3, Chap.13 and details of the gauge will be found in the Air Publication quoted in para.2.

**Warning lamps and indicators**

18. Apart from the warning lamps and indicators described in the groups of this chapter, various other lamps and indicators are also provided and descriptions of these, together with routing and theoretical diagrams of the circuits will be found in the appropriate groups of Sect.5, Chap.1.

**Fatigue meter**

19. An electrically operated fatigue meter is installed on a mounting plate attached to

the port side of frame 27 in the centre fuselage. The meter is a counting accelerometer type instrument, the primary function of which is to measure and record the vertical accelerations to which the aircraft is subjected while in flight. The meter obtains its electrical supply from terminal 5 on T.B.26 located on the interspar rib D in the port outer wing and is protected by a 1 amp. fuse also located on this rib. The supply to terminal 5 of T.B.26 is taken through the port leg down microswitch so that the meter is energized only when the alighting gear is retracted. A description of the meter and its method of operation will be found in the Air Publication quoted in para.2 of this group.

**SERVICING****General**

20. The necessary servicing required to maintain the oxygen regulators and pressure gauges described in this group in an

efficient condition and the standard serviceability tests which should be applied, including the equipment to be used and the method of conducting the tests is contained in the appropriate Air Publications quoted in para.2. The method of adjusting the microswitches of the alighting gear indicator circuit to ensure the correct function of the indicator is described in the alighting gear adjustment procedure contained in Sect.3, Chap.5.

**REMOVAL AND ASSEMBLY****General**

21. Once access has been obtained, the removal of the components described in this group should present no difficulties, but care must be taken to observe the safety recommendations given in Sect.3, Chap.6, 10 and 13 to ensure that no damage to the aircraft or injury to personnel occurs when carrying out these operations.

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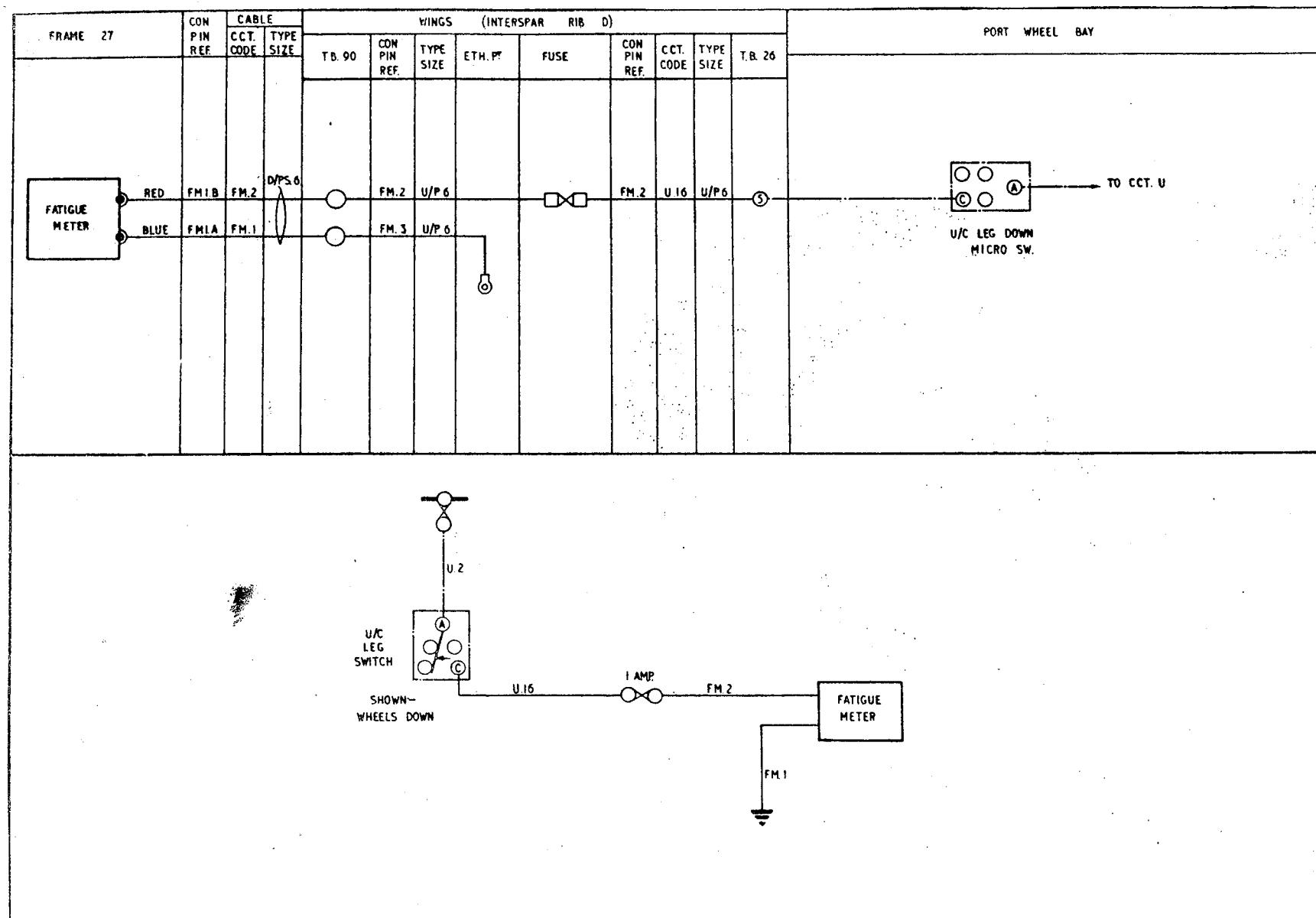


Fig.4 Fatigue meter (routeing and theoretical)

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