

GROUP 5 A
GAUGES AND INDICATING INSTRUMENTS
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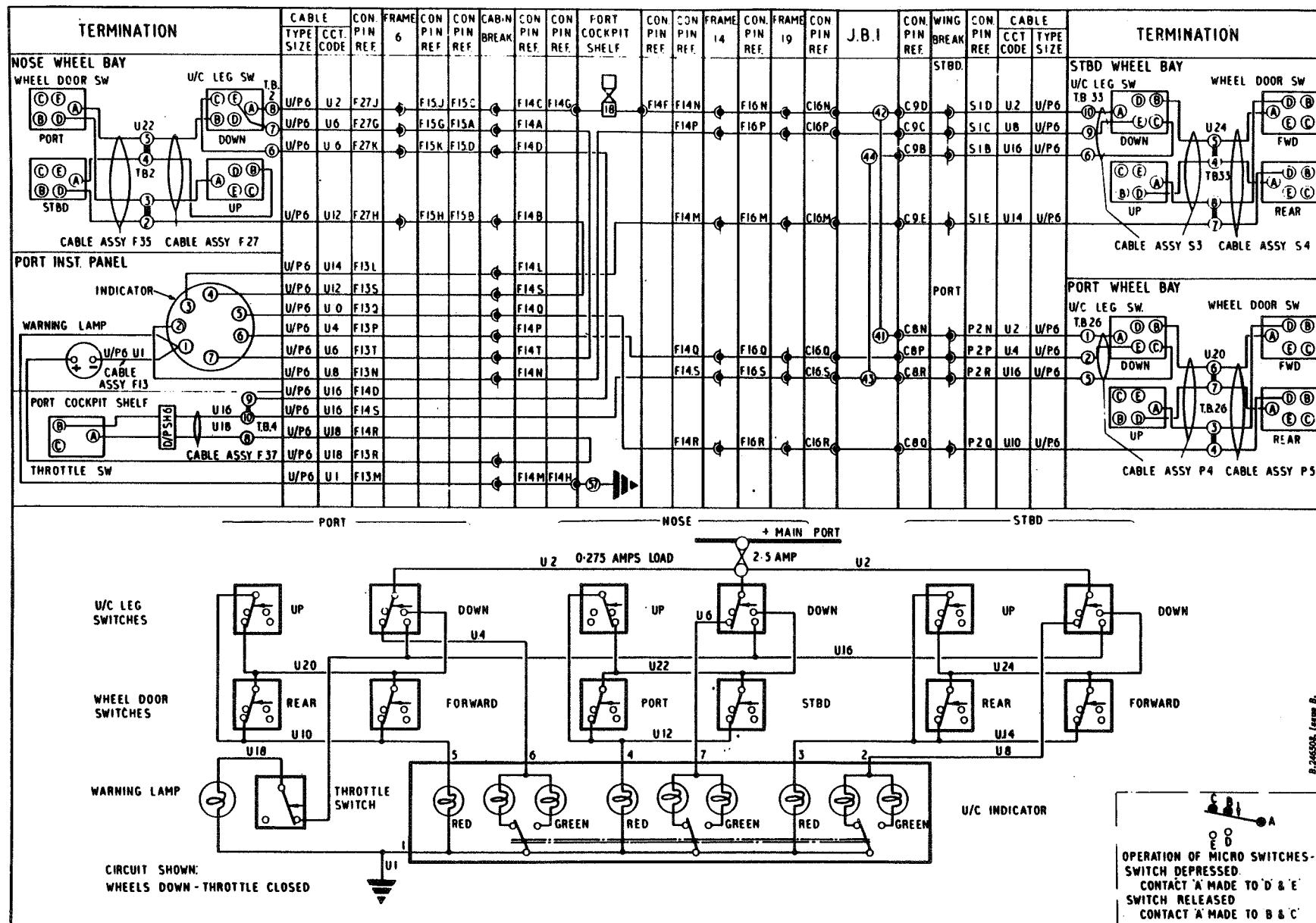


Fig.1 Alighting gear indicator and warning lamp (routeing and theoretical)

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A.P. 101B-1309-1B, Sect.5, Chap.2, Group 5.A

A.L.38, Nov.70

Introduction

1. This group describes the miscellaneous gauges and indicating instruments installed in the aircraft which are not described 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. Routing and

theoretical circuit diagrams are included. Detailed information on the servicing of the items of equipment used will be found in the Air Publications listed in Table 1.

DESCRIPTION**Equipment details**

Alighting gear indicator and warning lamp
2. The alighting gear position indicator

TABLE 1**Equipment type and Air Publication reference**

Equipment	Air Publication
Alighting gear indicator	
Alighting gear indicator, Type D.1 (Dowty C.12247.Mk.5)	A.P.4343E, Vol.1, Sect.18
Warning lamp, Iris Type B	
Microswitches, Type 1A, 4A and Pye 401/S (Mod.521)	A.P.4343C, Vol.1, Book 1, Sect.2, Chap.1
Microswitches, Type Dowty 1322Z Mk.2 (Mod.1279)	►
Hydraulic pressure	
Pressure gauge, Mk.2 (Brake and main)	
Pressure gauge, Mk.14KK (Emergency air)	A.P.1275A, Vol.1, Sect.15
Pressure gauge, Mk.14LL. (Hydraulic accumulator)	►
Hydraulic pressure switch, Type T.P.5566	A.P.1275A, Vol.1, Sect.24
Warning lamp, Type B	A.P.4343E, Vol.1, Sect.18
Audio warning cut-out	
Relay, Type 9B. No.2	A.P.4343C, Vol.1, Book 2, Sect.3
Tumbler switch, S.P/C.O Type XD780 No.4	A.P.4343C, Vol.1, Book 1, Sect.1
Anti-'G' system	
Pressure gauge, Mk.14KK	A.P.1275A, Vol.1, Sect.15
Oxygen system	
Oxygen pressure gauge Mk.4	A.P.1275G, Vol.1, Sect. 1
Oxygen regulator, Type 17E	A.P.1275G, Vol.1, Sect. 2
Fatigue meter	
Mk.14	A.P.1275A, Vol.1, Sect.12

is controlled by the alighting gear leg and wheel door microswitches. 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.

The indicator is fitted with an anti-dazzle screen, and a changeover switch; by means of the latter, a spare set of green lamps may be switched into circuit. A red iris type warning lamp mounted on the port instrument panel is provided to remind the pilot to lower the undercarriage before landing. This lamp will be lit automatically during flight if the throttle is moved to less than approximately one third open while the alighting gear is not locked down. The operation of the lamp circuit is effected by a microswitch in the throttle box.

Anti-'G' system pressure gauge

3. 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 Section 3, Chapter 13. Details of the gauge will be found in A.P.1275A, Vol.1, Sect.15.

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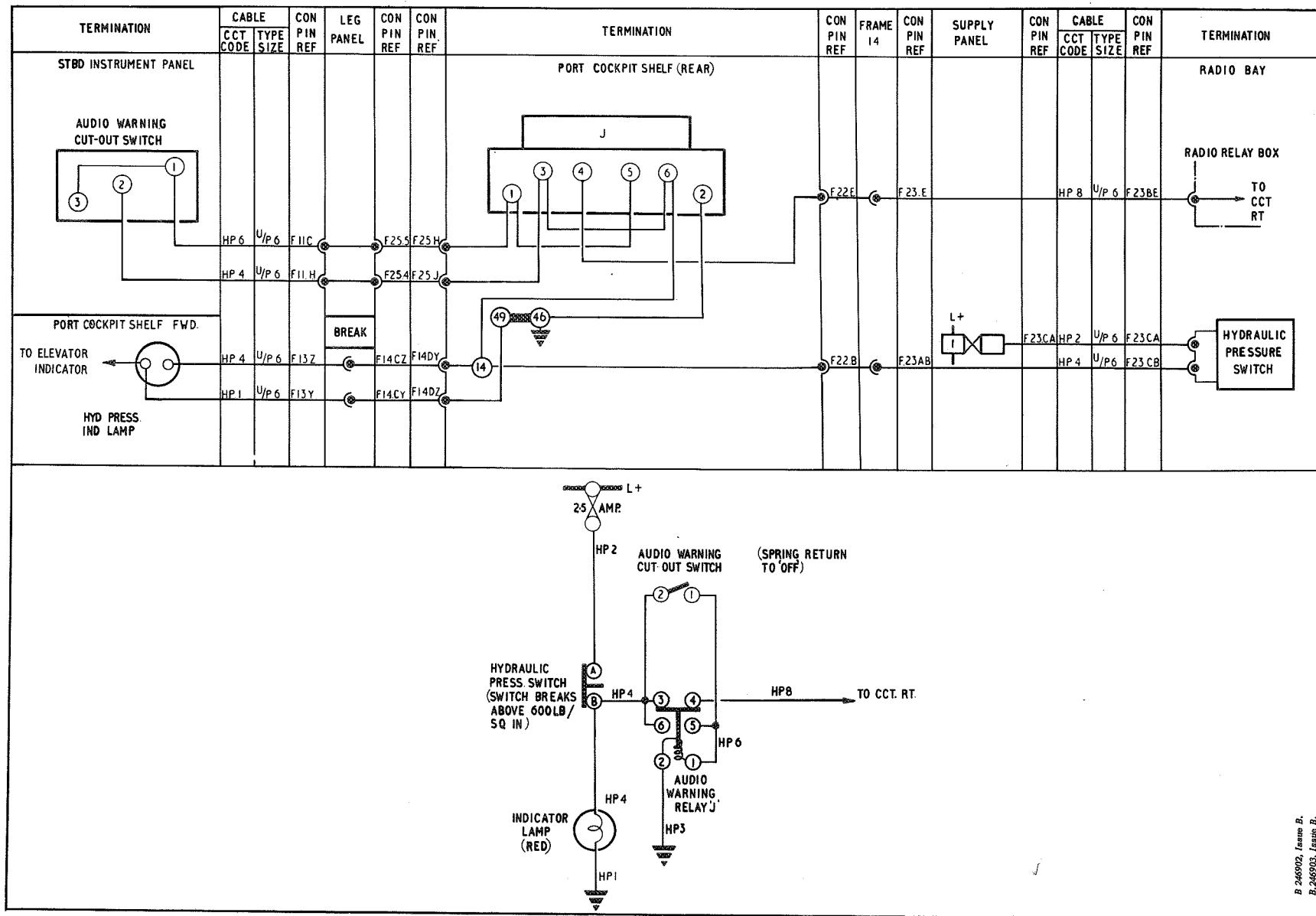


Fig.2 Hydraulic pressure warning (routeing and theoretical)

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T.P.(E) 8201

Hydraulic pressure gauges and warning devices

4. The hydraulic pressure gauges in the cabin are all mounted on the cabin port shelf. They consist of a combined brake and hydraulic system pressure gauge, two air pressure gauges for the undercarriage and flap emergency system, and a gauge for the brake accumulator. The brake and the system pressure gauge is a triple unit, situated at the forward end of the port shelf, it 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 brake accumulator pressure gauge is provided with a label indicating that the brakes will not operate at a pressure below 750 lbf/sq in. A Mk.14LL pressure gauge is provided for the elevator accumulator and is located in the dorsal fin just forward of the tailplane. A similar gauge for the powered ailerons accumulator is located in the starboard wheel bay. The hydraulic system and the emergency air system are both described in Sect 3, Chap 6 of this volume. Information on the pressure gauges

► will be found in AP112G-0400 Series. ◀

5. Indication of failure in the hydraulic system is given when the hydraulic pressure drops below 600 lbf/sq in. The warning is given by a lamp which is situated on the cabin port shelf, and also by an audio signal; this latter being effected by means of an interconnection with the UHF installation.

6. Both these warning devices are supplied from a fuse on the supply panel, and the supply to their circuits is controlled by a pressure switch in the hydraulic pipe-line, situated on the port side of the TACAN bay. The supply to the audio warning circuit is taken through contacts on relay J, (fig.2), which is situated on the underside of the cabin port shelf.

Audio warning cut-out

7. The audio warning circuit of the hydraulic system may be rendered inoperative by a switch on the starboard instrument panel. This switch, which is marked OUT and OFF, is a single-pole, centre off type, with spring return to centre from the OUT position. In operation, it cuts out the audio warning by causing relay J to be energized. Once relay J is energized, it is held on by a supply connected via its own contacts.

Oxygen regulator and pressure gauge

► 8. Pre-Mod 1429, the oxygen regulator is mounted at the forward end of the cabin starboard shelf whilst Mod 1429 positions the regulator at the rear end of the cabin starboard shelf between frames 10 and 11. The electrical supply for the regulator is taken from a fuse on the supply panel. The manual controls incorporated in the regulator consist of an ON/OFF valve, an air inlet shutter and an emergency button. A pressure gauge and an electro-magnetic indicator are also mounted on the regulator panel. Mod 1429 introduces a repeater electro-magnetic indicator located at the top of the starboard side of the centre instrument panel. In operation the regulator is fully automatic and, when turned on, supplies oxygen

in accordance with the demand from sea level to a cabin altitude of 50 000 feet.

Warning lamps and indicators

9. In addition to the warning lamps and indicators described in the groups of this chapter, various other lamps and indicators are provided in some of the circuits described in Section 5, Chapter 1 of this volume.

Fatigue Meter

10. This instrument is fitted only to aircraft with Mod 912 incorporated. It comprises an accelerometer, with electrical relays for recording counts of acceleration, and an hour meter which records the number of hours the instrument has been functioning. The fatigue meter is mounted on the rear face of frame 25, on the port side of the engine starter bay. Its electrical supply is taken from terminal 5 of T.B.26 on inter-spar rib 'D' in the port wing. The circuit includes a 1 amp fuse and a stud earthing point, both of which are located on interspar rib 'D'. T.B.26 is supplied through the port undercarriage leg down microswitch, hence the fatigue meter is only energized 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 Table 1.

**Operation (Alighting gear indicator)
Alighting gear locked down**

11. The circuit diagram (fig.1), shows the indicator circuit condition when the aircraft is standing on its alighting gear with the throttle closed. In this condition, all the

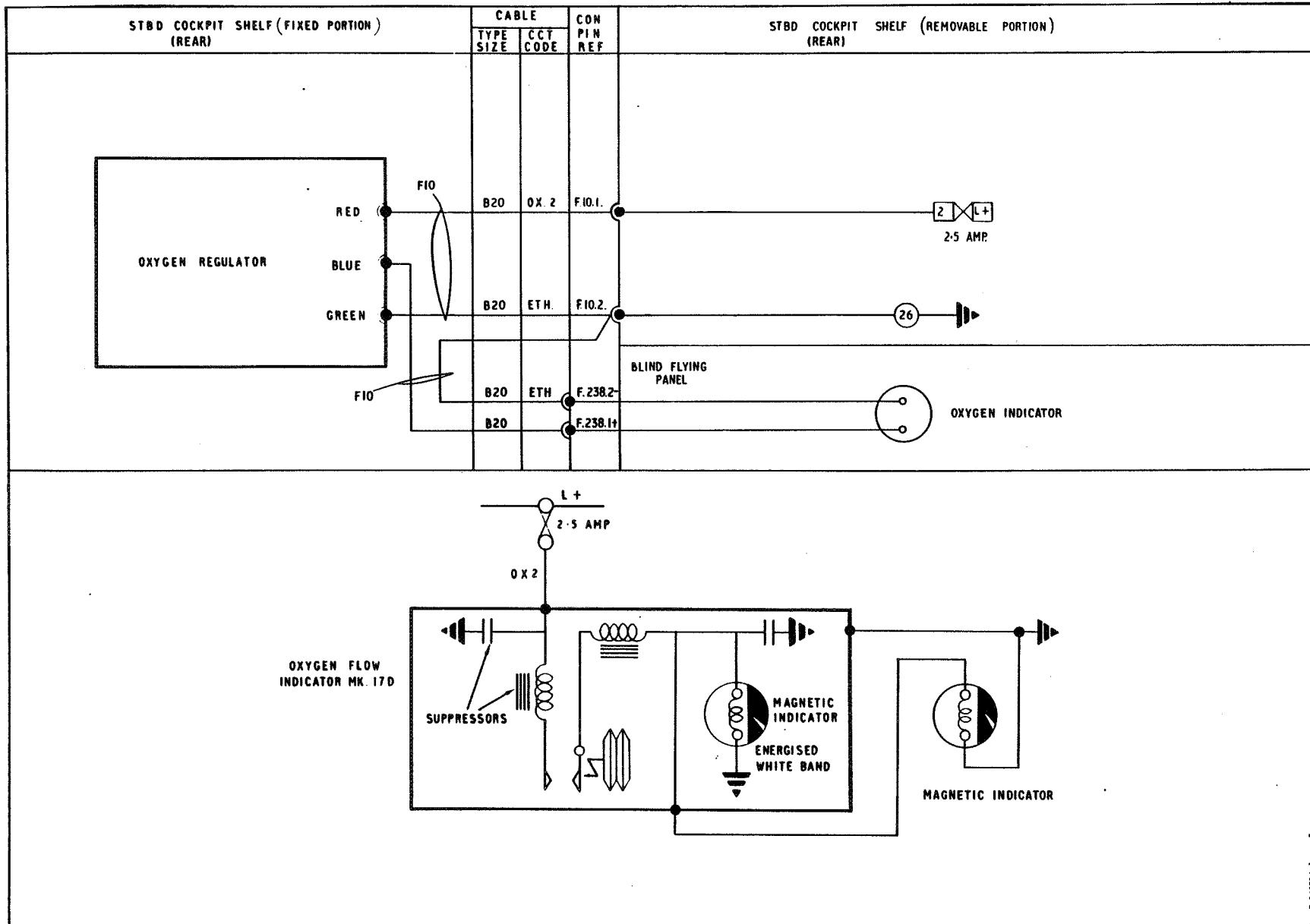
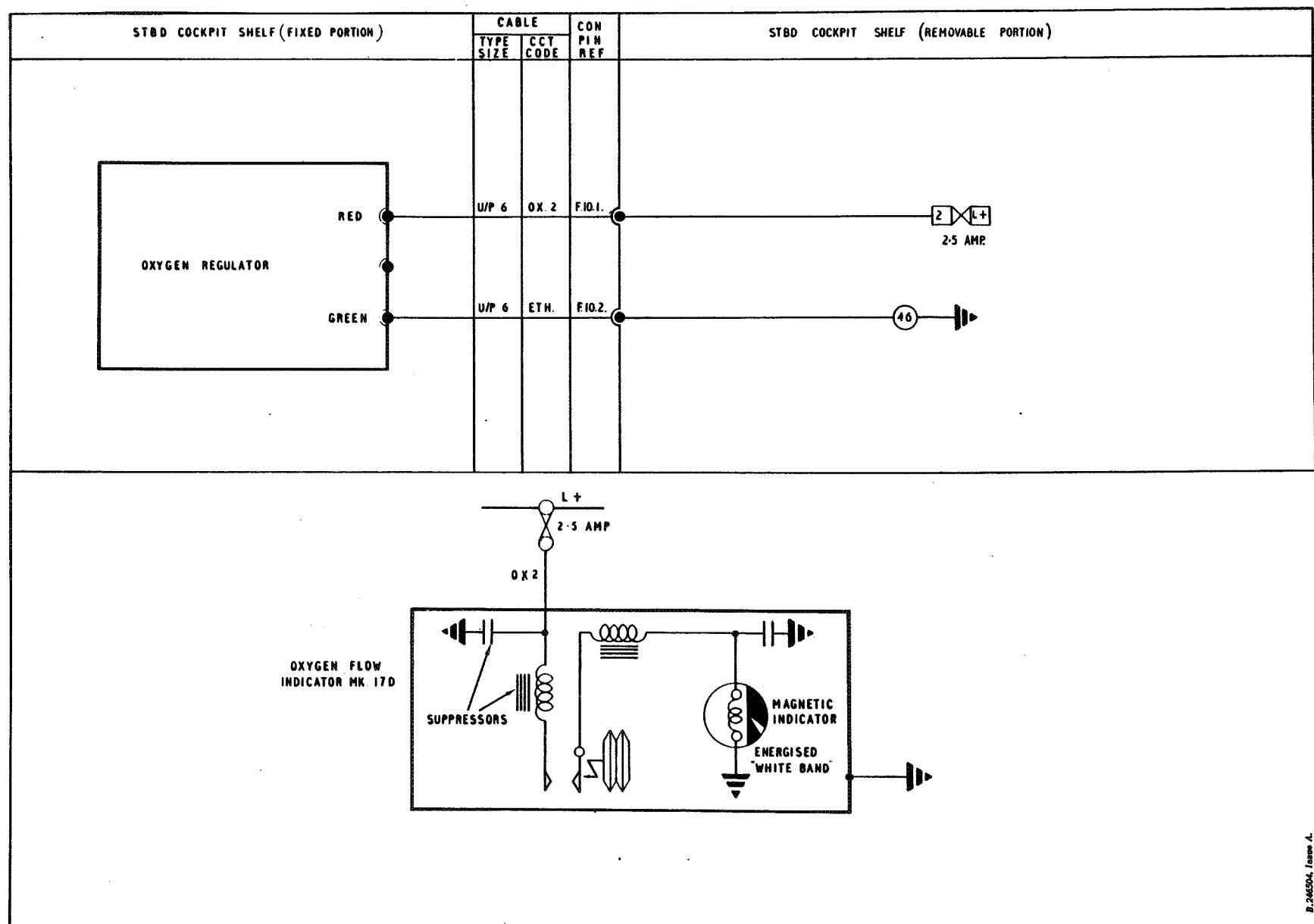


Fig.3 Oxygen flow indicator (routeing and theoretical)

► (Mod 1429 added) ◀



► Fig.3A Oxygen flow indicator (routing and theoretical) — pre-Mod 1429 ◄



door and leg microswitches, except that of the nose leg "up", are operated. In the nose leg "up" switch, the contacts A-B-C are joined and in the others, contacts A-D-E are joined. The circuit of the green indicator lamp of each leg is completed by the related leg "down" switch. These leg "down" switches, at the same time, disconnect the supplies from the red lamp circuits and the warning lamp.

Alighting gear locked up

12. In this condition, all the microswitches, except that of the nose leg "up", will be normal. In the nose leg "up" switch, which is operated, the contacts A-D-E will be joined. In the others contacts A-B-C are joined. The red and green indicator lamps are all isolated from the supply but a supply is connected to contact B of the throttle microswitch via the contacts A-C of each leg "down" switch. In these circumstances, if the throttle lever is moved to any position less than one-third-open, the supply will be connected via the throttle microswitch to operate the undercarriage warning lamp. In addition, if any leg or door moves from the locked up position, the associated microswitch will change over and connect a supply to the red lamp circuit.

Alighting gear between locks

13. The leg "up" and the wheel door microswitches are operated as soon as

their related locks are released and, therefore, the red lamps will be lit while the alighting gear is in any intermediate position between locked up and locked down. The leg "down" switches remain normal until the legs are locked down. The supply to the throttle microswitch is maintained until all the legs are locked down and the warning lamp will light if the throttle is moved to any position less than one-third open before all the legs are locked down.

Operation (Audio warning cut-out)

14. When the hydraulic pressure falls below 600 lb./sq.in., the pressure switch closes, thereby allowing the supply current to pass through a delay resistor to the indicator lamp, and also to contacts 3 and 6 of relay J, and contact 2 of the cut-out switch. At relay J, contacts 3-4 pass the supply to the resistor-capacitor network of the audio warning circuit.

15. If the cut-out switch is held to OUT, a supply passes via its contacts 2-1, to contact 5 and contacts 1-2 of the relay, which is thereby energized, breaking the supply across contacts 3-4 to the audio warning network, and completing a hold-on supply across contacts 5-6. Thus, although the cut-out switch may be released, relay J will remain energized until the hydraulic pressure rises sufficiently to open the

contacts of the pressure switch, thereby isolating relay J and the warning lamp from the supply.

SERVICING

General

16. Information on the servicing required to maintain the oxygen regulator and pressure gauges described in this group in an efficient condition is given in the Air Publications listed in Table 1. These publications also contain information on the standard serviceability tests, the testing equipment used, and the method of conducting tests. The method of adjusting the microswitches of the alighting gear indicator circuit is described in the alighting gear adjustment procedure contained in Sect.3, Chap.5.

REMOVAL AND ASSEMBLY

General

17. The removal of the components described in this group calls for no special instructions, but care must be taken to observe the safety recommendations given in Sect.3, Chap.6, 10 and 13 to ensure that no damages to the aircraft or injury to personnel occurs when carrying out these operations.





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