

**GROUP 5.A**  
**GAUGES AND INDICATING INSTRUMENTS**  
 ◀ (Including Mods.912, 827, 521 and 1279) ▶

**LIST OF CONTENTS**

	<i>Para.</i>
Introduction ... ..	1
<b>DESCRIPTION</b>	
Alighting gear indicator and warning lamp ... ..	2
Operation	
Alighting gear locked down ... ..	3

	<i>Para.</i>
Alighting gear between locks ... ..	4
Alighting gear locked up ... ..	5
Oxygen regulators, pressure gauge and flow indicator ... ..	6
Hydraulic pressure gauges and warning devices ... ..	8
Anti-G system pressure gauge ... ..	10

	<i>Para.</i>
Warning lamps and indicators ... ..	11
Fatigue meter ... ..	12

**SERVICING**

General ... ..	13
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**REMOVAL AND ASSEMBLY**

General ... ..	14
----------------	----

**LIST OF ILLUSTRATIONS**

	<i>Fig.</i>
Alighting gear indicator and warning lamp (theoretical) ... ..	1
Alighting gear indicator and warning lamp (routeing) ... ..	2
Oxygen flow indicator (routeing and theoretical) ... ..	3
Hydraulic pressure warning (routeing and theoretical) ... ..	4

**TABLE**

	<i>Table</i>
Equipment type and Air Publication reference ... ..	1

## Introduction

1. This group contains a description of the miscellaneous gauges and indicating instruments installed in this aircraft, which are not included with those in the other groups of this chapter. For a general description of the instrument installation as a whole, reference should be made to Group 1.A of this chapter. The location and access to all the instruments and their associated equipment is given in Group 1C also of this chapter. Detailed information on the standard components used, together with the servicing information necessary

to maintain them in an efficient condition, will be found in the appropriate Air Publications quoted in Table 1 of this group.

## DESCRIPTION

### Alighting gear indicator and warning lamp

2. 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:-

TABLE 1

Equipment type and Air Publication reference

Equipment Type	Air Publication
Alighting gear indicator, Type D.1	} ... .. A.P.4343E, Vol.1, Sect.18.
Alighting gear warning lamp, Iris type B	
Oxygen flow indicator, Type C.1	
Hydraulic failure warning lamp, Type B	} ... .. A.P.4343C, Vol.1, Book 1, Sect.2, ▶
◀ 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, on-off, spring return to centre off (Ref.5CW/4221) ...	A.P.4343C, Vol.1, Book 1, Sect. 1.
Fatigue meter, Mk.14 ... ..	A.P.1275A, Vol.1, Sect.12
Brake and main hydraulic pressure gauge, Mk.2 or Dunlop ACO.9719	} ... .. A.P.1275A, Vol.1, Sect.15.
Anti-G and emergency air pressure gauges, Mk.14KK	
Brake and hood accumulator pressure gauges, Mk.14LL	
Hydraulic pressure switch, Type T.P.5207 (Pre-Mod.827)	} ... .. A.P.1275A, Vol.1, Sect.24.
Hydraulic pressure switch, Type T.P.5555 (Post Mod.827)	
Oxygen pressure gauge, Mk.3 ... ..	A.P.1275G, Vol.1, Sect. 1.
Oxygen regulators, Type 17E ... ..	A.P.1275G, Vol.1, Sect. 2.

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 port throttle box, if either throttle is moved to less than approximately one-third open when the alighting gear is not locked down. ▶ ◀

## Operation

### Alighting gear locked down

3. 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 indicator 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, prior to illuminating the red indicator lamps when the circuit is completed by the 'down' microswitches when in the "between locks" position.

#### Alighting gear between locks

4. When the alighting gear is between locks, the 'down' microswitches are making contacts A-B-C and via contacts B, feed the 'up' and wheel door microswitches 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 microswitch, via contacts C of the 'down' microswitches,

thus the alighting gear warning lamp will illuminate if the throttle is closed (para.5).

#### Alighting gear-locked up

5. With the alighting gear retracted and all the wheel doors locked up, the 'down' microswitches are in the same position as when between locks, but the leg 'up' and wheel door microswitches are making contacts A-B-C, thus breaking the supply to the red indicator lamps. As the 'down' microswitches are in the same position as when between locks, the supply to the throttle microswitch 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 microswitches will be found in the Air Publications listed in Table 1.

#### Oxygen regulators, pressure gauge and flow indicator

6. The demand regulator controlling the pupil's oxygen supply is mounted on the instrument panel mounting structure between the centre and starboard instrument panels, and that for the instructor's oxygen is located at the aft end of the cabin starboard shelf. The controls on each regulator consist of an ON/OFF valve, an air cut-off lever and an emergency toggle switch, together with a combined flow and blinker

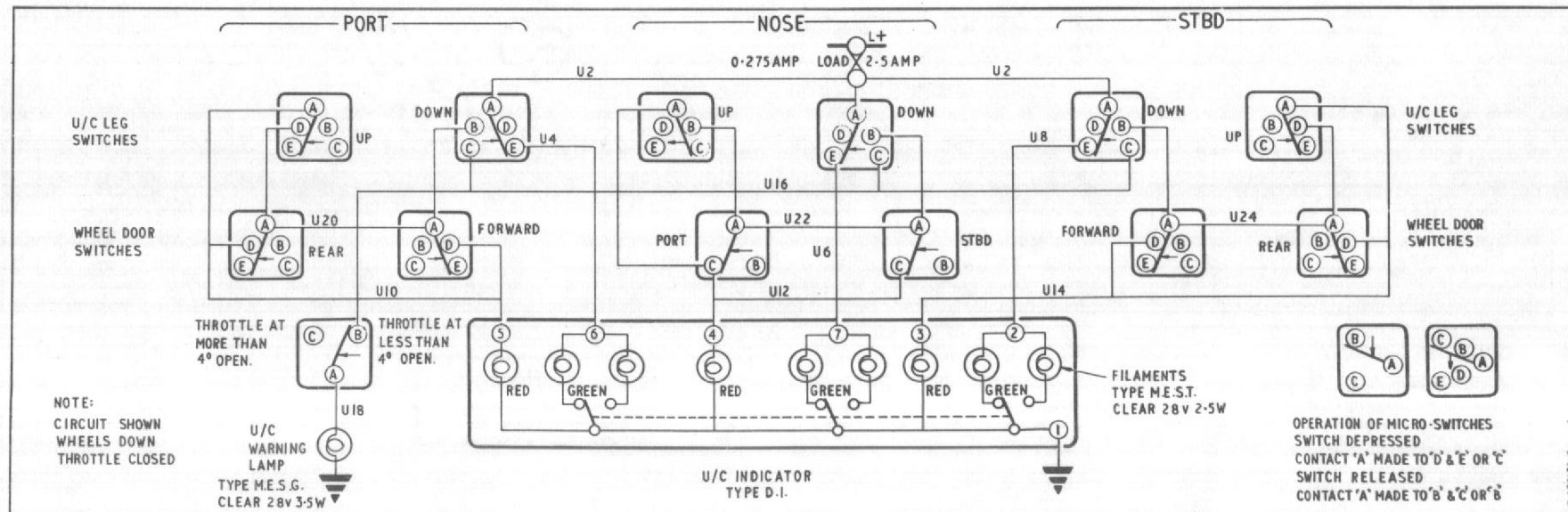


Fig.1 Alighting gear indicator and warning lamp (theoretical)





indicator. The operation of each 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. Due to the location of the instructor's regulator, a remote electromagnetic oxygen flow blinker indicator is provided on the starboard instrument panel. This indicator is controlled by contacts which are operated directly from the blinker diaphragm assembly in the regulator. A routing and theoretical diagram of the oxygen flow indicator's electrical circuit is given on Fig.3.

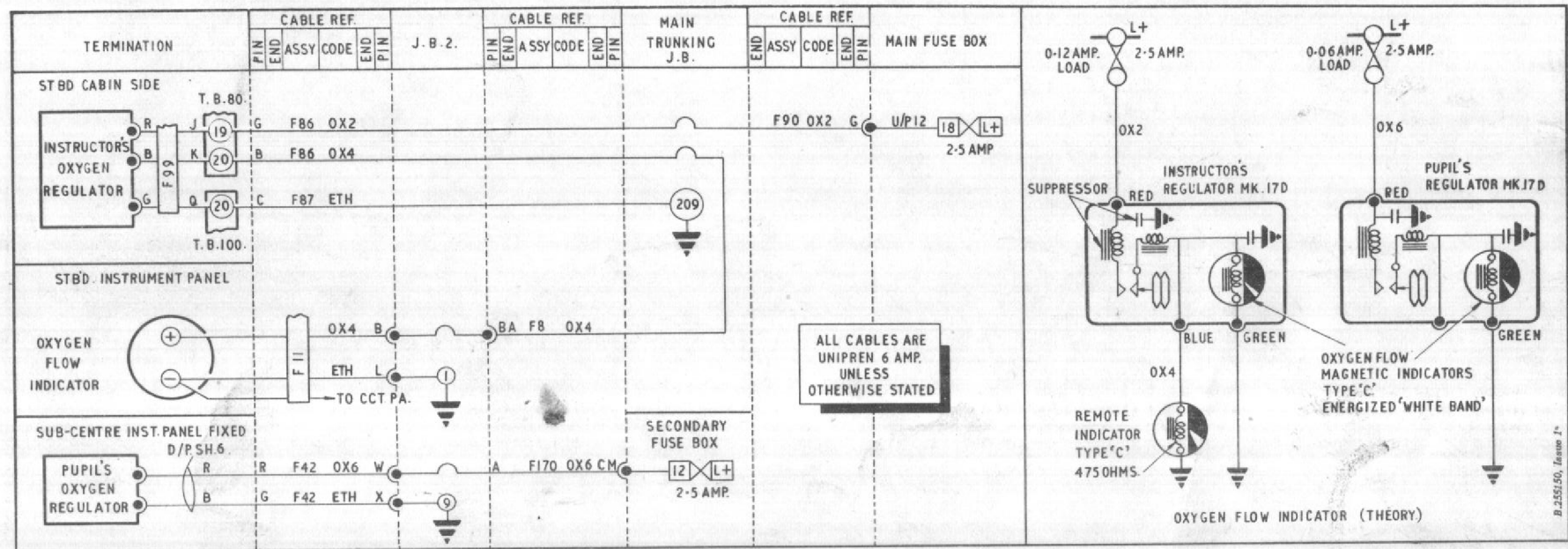
7. To provide the crew members with an indication of the contents of the oxygen

cylinders, an oxygen pressure gauge is situated just above the pupil's oxygen regulator. The oxygen system is described in detail in Book 1, Sect.3, Chap.10 and a full description of the regulators and pressure gauge will be found in the Air Publication listed in Table 1.

### Hydraulic pressure gauges and warning devices

8. The hydraulic pressure gauges, in the cabin, are all mounted on or above 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 a panel above the rear of the cabin port shelf. The gauge indicating the pressure in the brake accumulator is located adjacent to the triple pressure gauge at the forward end of the cabin port shelf and is provided with a label indicating that the brakes will not operate at a pressure below 750 lb/sq in. The gauge indicating the pressure in the hood accumulator is located in the radio bay adjacent to the accumulator charging



**Fig.3 Oxygen flow indicator (routeing and theoretical)**

TERMINATION

CABLE REF

JUNCTION BOX NO 2

MAIN TRUNKING J.B.

CABLE REF

CENTRE CONSOLE

CABLE REF

MAIN FUSE BOX

CABLE REF

TERMINATION

CENTRE INST PANEL

PORT INST PANEL

AUDIO WARNING CUT-OUT SWITCH

HYDRAULIC PRESSURE WARNING LIGHT

RELAY 'G'

RELAY 'J'

RELAY 'B'

LOCAL EQUIPMENT HOOD FAIRING

HYDRAULIC PRESSURE SWITCH

ALL CABLES ARE UNIPREN 6 UNLESS OTHERWISE STATED

NOTE... DUE TO THE RAPID RESPONSE OF THE HYDRAULIC PRESSURE SW. TO TRANSIENT PRESSURE DROPS WHEN OPERATING VARIOUS SYSTEMS, TIME DELAYS ARE FITTED TO BOTH AUDIO AND LAMP WARNING CIRCUITS TO PREVENT FALSE INDICATION AND ANNOYANCE TO PILOT. OTHER CIRCUIT REFERRED TO RT... V.H.F. RADIO

LAMP DELAY RESISTOR (1/25 SEC)

30 OHMS 5W

HP 12

HYD. PRESS. WARNING LIGHT TYPE M.E.S. G. CLEAR 28V 3.5W

ETH

RELAY 'G' TYPE 'S3'

123 OHMS

OFF

ON

AUDIO-WARNING CUT-OUT SWITCH (SPRING RETURN TO 'ON' POSITION)

HP 10

HP 6

330 OHMS 4.5W

AUDIO WARNING DELAY (1/25 SEC)

HP 8

500MF. 50V.D.C. W.K.G.

RELAY 'J' TYPE SM8/4 SEE CCT RT. 500 OHMS

RELAY 'B' TYPE SM5A-N25 SEE CCT RT 700 OHMS

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valve. The hydraulic system and the emergency air system are both described in Book 1, Sect.3, Chap.6, and information on the pressure gauges will be found in the Air Publication listed in Table 1.

9. Indication of failure of the hydraulic system is given by a warning lamp situated on the port instrument panel above the undercarriage selector switches and by an audio warning interconnection with the U.H.F. radio installation. These warning devices are controlled by a hydraulic pressure switch incorporated in the hydraulic pipe-line in the hood fairing, the supply to the audio warning being taken through relay G in the centre console. This relay may be energized to cut-out the audio signal by operation of a spring-return audio warning cut-out switch mounted on the centre instrument panel. When energized, the relay is maintained in the energized state by a hold-on circuit through its own contacts. The contacts of the hydraulic pressure switch close, to complete the circuit to the indicator lamp and audio warning, when the hydraulic system pressure drops below 600 lb/sq in, but to prevent annoyance should the warning devices operate due to transient pressure drops while hydraulic services are functioning, resistance and capacity delay networks are provided in the supply lines to the warning devices. A routeing and theoretical diagram of the warning devices will be found in fig.4.

#### Anti-'G' system pressure gauge

10. A gauge, to indicate the pressure in

the anti-'G' air bottles, is located on the forward end of the cabin starboard shelf. The anti-'G' system is described in Book 1, Sect.3, Chap.13 and details of the gauge will be found in the Air Publication listed in Table 1.

#### Warning lamps and indicators

11. 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 routeing and theoretical diagrams of the circuits will be found in the relevant groups of Sect.5, Chap.1.

#### Fatigue meter

12. This instrument is fitted only to aircraft with Mod.912 incorporated. It comprises an accelerometer, with electrical relays for recording the 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 inter-spar 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 listed in Table 1.

#### Note . . .

*On aircraft Post Mod.915, the access door to the fuel vent connections on the port side of the aircraft has been divided into two parts, so that the bottom portion can be moved independently to facilitate reading of the fatigue meter.*

### SERVICING

#### General

13. 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 relevant Air Publications listed in Table 1. 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 Book 1, Sect.3, Chap.5.

### REMOVAL AND ASSEMBLY

#### General

14. 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 Book 1, 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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