Group 6 MISCELLANEOUS INSTRUMENTS

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CROSS REFERENCES

Fuzing pressure switch (Mod. 1196) ... ... *Book 2, Sect. 5, Chap. 3, Group 2*
Book 3, Sect. 5, Chap. 8, Group 4
Cabin overpressure switch (Mod. 2490) ... *Book 2, Sect. 5, Chap. 5, Group 2*

WARNING . . .

Voltages in excess of 100 volts a.c. or d.c. can be dangerous under certain circumstances. Personnel should therefore ensure that the electrical system is electrically safe before any servicing is attempted. Where it is essential that tests or adjustments are to be made with the electrical power switched on, the greatest care must be exercised.

DESCRIPTION AND OPERATION

Introduction

1. This Group contains brief descriptive and servicing notes on the miscellaneous instrument installations. For detailed information on all items of equipment reference should be made to the relevant Air Publications.

2. Information on the lay-out and interpretation of the schematic diagrams can be obtained from the General Information group contained immediately after Section 5 marker card. Also to be found in the General Information group are all the general modifications applicable to all types ◄ of Valiant aircraft. After September 1961, modifications affecting this group are covered by appendices which will periodically be incorporated into the group. ►

GENERAL NOTE ON POSITION INDICATORS

3. The following position indicators operate on the Desynn principle:—

Refrigerator valve.

Intercooler valve.

The indicators become operative when the flight instrument master switch is selected to ON.

CABIN TEMPERATURE CONTROL VALVE INDICATORS (*fig.* 1)

4. Two position transmitters, one mechanically linked to the refrigerator valve and the other to the intercooler valve, are directly connected to a double indicator mounted on the starboard console top panel. The supply for the transmitters is obtained from a single fuse on the starboard fuse panel D.

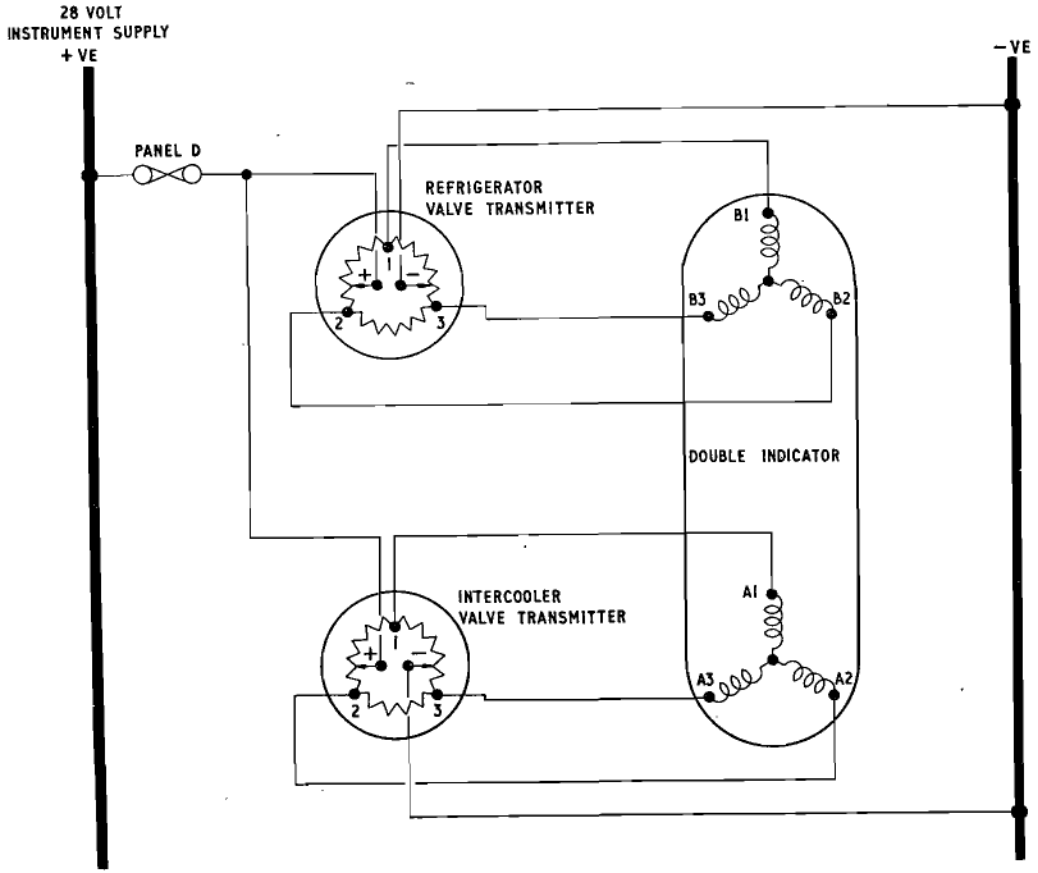

Fig. 1. Cabin temperature valves position indicators

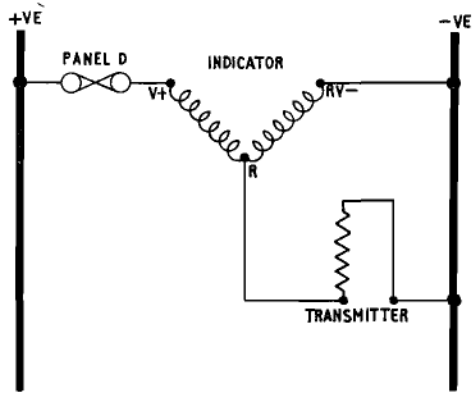

Fig. 2. Bomb bay temperature indicator

BOMB BAY TEMPERATURE INDICATOR (*fig.* 2)

Note . . .

◄ *Mod.* 2560 *introduces Mk.* 4 *thermometer system in lieu of Mk.* 3, *utilizing an indicator* 6*A*/3682 (— 80 *to* + 80 *deg. C.*) *in lieu of* 59 *MV. and temperature bulb* 6*A*/3684 *in lieu of* 6*A*/1566. ►

5. Mounted on the forward bomb bay bulkhead electrical panel is an air temperature bulb which is directly connected to an indicator on the starboard console panel B. The indicator is supplied from a fuse on he starboard fuse panel D and becomes operative when the flight instrument master switch is selected to ON.

◄ **Note . . .**

Post Mod. 2836 *the temperature bulb is repositioned to a bracket in the bomb bay roof at Stn.* 509. ►

OUTSIDE AIR TEMPERATURE INDICATOR (*fig.* 3)

6. Mounted outside the fuselage, beneath the battery bay floor, are two air temperature bulbs each directly connected to an indicator, one on the instrument centre panel and the other on the radio crate. The navigator's instrument is supplied from ► ◄ the starboard fuse panel D.

◄ **Note . . .**

Post Mod. 2062, *the pilot's indicator is moved from the centre instrument panel to the starboard blind flying panel.* ►

AIRSPEED PRESSURE SWITCH

7. Mounted in the fuselage port air conditioning service bay, this unit is connected in series with the undercarriage selector switch override lock solenoid across the 28 volts d.c. system. When an airspeed of 80 to 85 knots is reached, the pressure switch closes and energizes the override lock solenoid, which, in turn, releases the lock on the undercarriage selector switch and enables the undercarriage up button to be pressed and the undercarriage to be raised. The system is fitted to prevent the undercarriage from being raised, whilst the aircraft is on the ground. The selector switch lock is fitted with an override device, whereby, when the air speed pressure switch is in the open position, it is necessary to rotate the UP push switch through 90 deg. before applying pressure to it.

8. The switch consists of a chamber divided into two by means of a diaphragm. One side is connected to the pitot system, whilst the other vents to atmosphere. The pressure differential across the diaphragm builds up as the aircraft speed increases, and the diaphragm pushes on a plunger which in turn operates a micro switch.

FUZING PRESSURE SWITCH ◄ (Mod. 1196) ►

9. A pitot operated switch in the fuselage on the starboard side aft of the rear spar is operated when the aircraft speed increases to 110-120 knots approximately and allows the bomb fuzing circuits to function. The switch is a Thermal Controls Type TP.5099 described in A.P. 1275A, Vol. 1, Sect. 24, Sub-Sect. A, Chap. 2.

◄ CABIN OVERPRESSURE SWITCH (Mod. 2490)

10. A pressure switch mounted on the crew floor beam at frame station 241 (starboard) has one side open to cabin pressure and the other connected to the starboard static line (E3). The switch operates on rising pressure at 9·5 p.s.i. to bring on the cabin overpressure warning lamp on the starboard blind flying panel. The switch re-opens at 9·1 p.s.i. (falling pressure) to switch off the warning lamp. (See Book 2, Section 5, Chapter 5, Group 2). ►

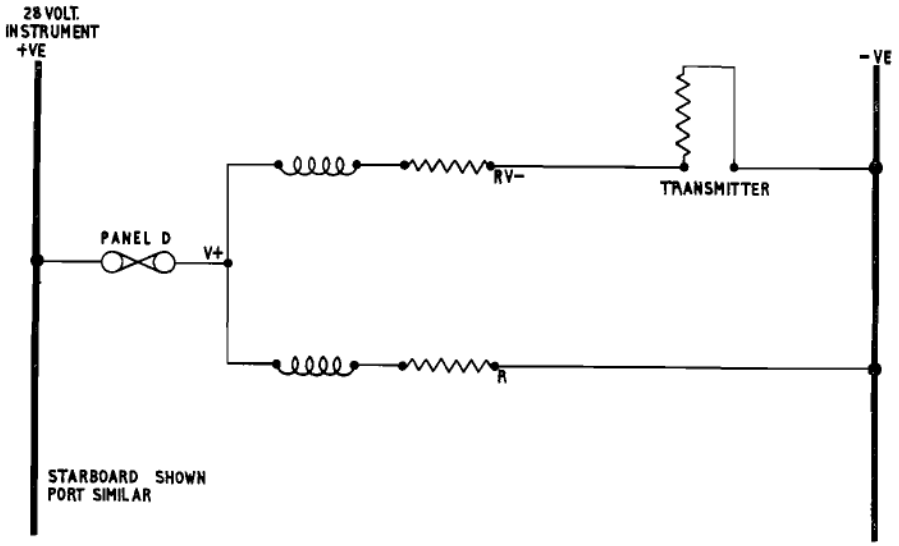

Fig. 3. Outside air temperature indicator

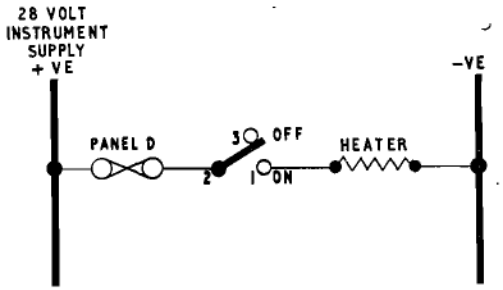

Fig. 4. Pressure head heater

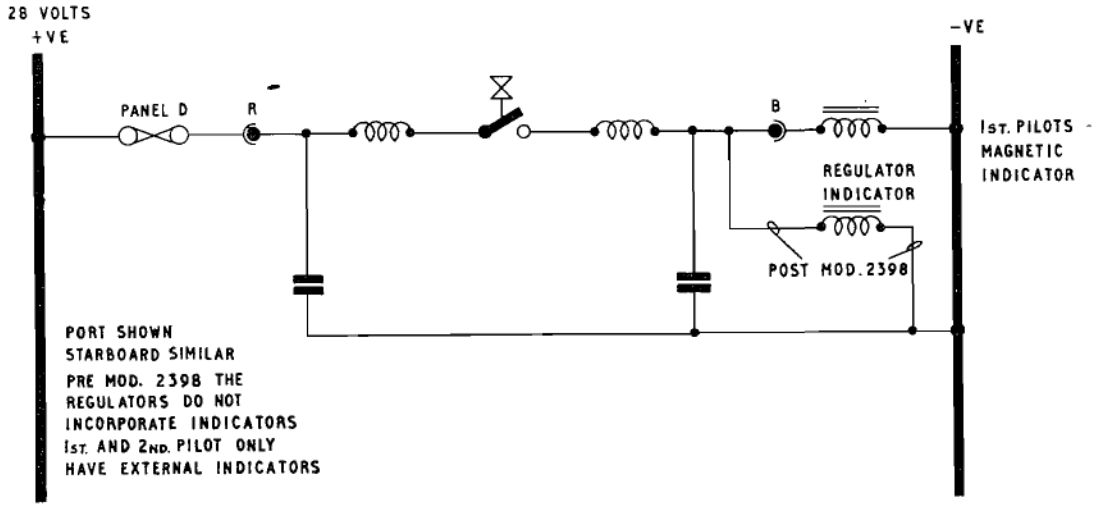

Fig. 5. Oxygen demand regulator indicator

PITOT HEAD HEATERS (*fig.* 4)

10A. Two pressure heads, with built-in electric heater elements for de-icing, are mounted one on each wing tip of the aircraft. The heater elements are supplied from fuse panels E and D respectively for port and starboard. Each element is controlled separately by switches mounted on the port and starboard blind flying panels.

OXYGEN DEMAND REGULATOR INDICATORS

◄ Post Mod. 1604 ►

11. Two magnetic indicators, mounted one on the port and one on the starboard blind flying panels, obtain their separate supplies via a pair of contacts built into their respective demand regulators mounted on the port and starboard consoles. When the oxygen is turned on, at the demand regulator, pressure builds up in the regulator causing a diaphragm to operate a pair of contacts to connect a supply to the respective magnetic indicator. The port and starboard magnetic indicators are supplied from separate fuses on fuse panels E and D respectively.

Note . . .

Mod. 2289 *introduces magnetic indicator Ref. No.* 5CZ/5003 *in lieu of Dowty Mk.* 7 *indicator.*

Magnetic indications are as follows:—

Pre-Mod. 2289

Vertical white bar	ON
Horizontal white bar ...	OFF

Post Mod. 2289

Vertical white bar	ON
Black	OFF

Post Mod. 2398 (*fig.* 5)

12. Mod. 2398 makes provision for a demand regulator Ref. No. 6D/1966, at all stations, as an alternative to demand regulator Ref. Nos. 6D/1700, 6D/1710, or 6D/1730. The regulator incorporates a magnetic indicator and the indicators mounted on the port and starboard blind flying panels are connected in parallel with the 1st and 2nd pilot's regulator indicators respectively. Circuit operation for the 1st and 2nd pilot's indicators is the same as pre-Mod. 2398. The indicators in the regulators at the bomb aimer's, navigator's, radar operator's and air electronics officer's positions (and crew chief's, Mod. 2805) are supplied from a single fuse on fuel panel G. Incorporated into the regulator are two suppressors, one for spark suppression, and the other for radio interference suppression. A bonding screw is fitted to the regulator mounting plate to facilitate the bonding of the regulator to the aircraft. Regulator indications are as follows:—

Vertical white bar	ON
Black	OFF

V.G. RECORDER ALTITUDE SWITCHING (Mod. 1634) (*fig.* 6)

◄ Pre-Mod. 2833 only ►

13. Mod. 1634 introduces electrical wiring

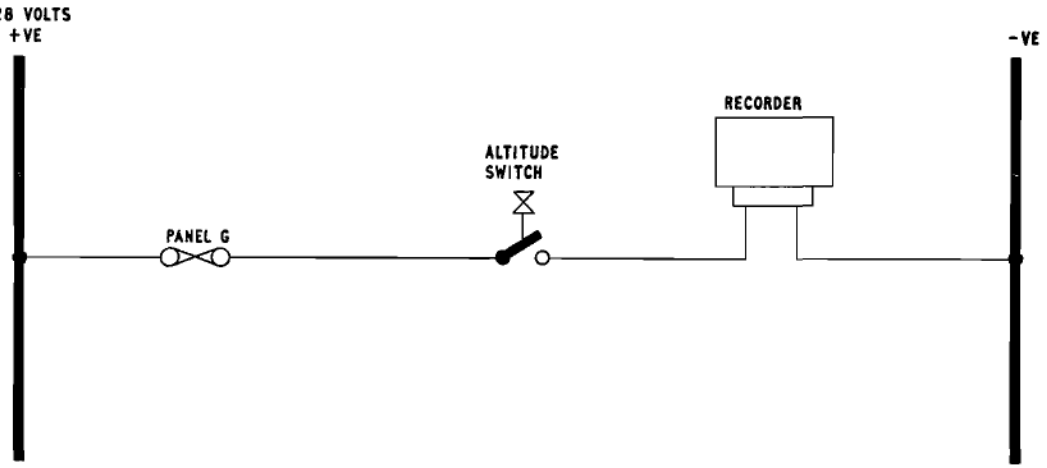

Fig. 6. V.G. recorder (pre-Mod. 2833 only)

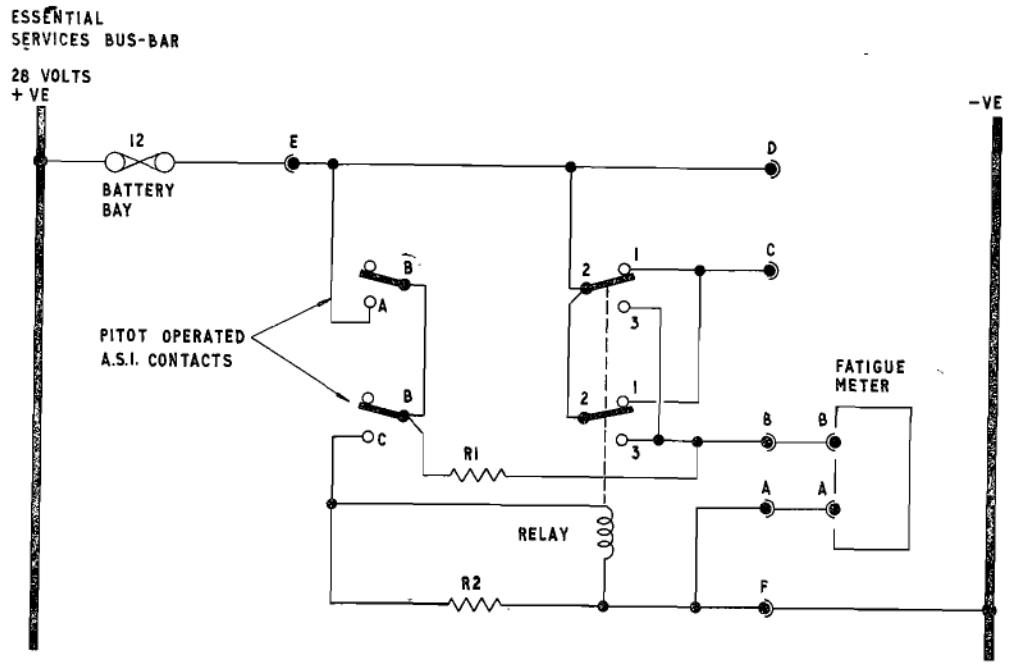

Fig. 6A. Fatigue meter (Mod. 2833)

for an altitude switch to be fitted on the radio-crate by a later mod. The switch will operate from the static system. Various height settings can be made on the switch so that when the aircraft attains the selected altitude, the switch closes to connect a supply from panel G to the pen lift coil of the V.G. recorder in the bomb bay and allows V.G. recordings to be made.

FATIGUE METER AND AIR SPEED CONTACTOR (Mod. 2833 and 2971) (*fig.* 6A)

13A. A fatigue meter, Mk. 1B (Mk. 2 post Mod. 2971) together with the airspeed contactor are fitted to the bomb bay roof at frame station 528. The circuit is supplied from the essential services bus-bar in the battery bay. The A.S.I. contactor is connected to the starboard pitot system and has two speed settings so that the supply to the fatigue meter is switched on at five knots above the take-off speed and is switched off at five knots above landing speed; in this way the "ground bumps" are not recorded. It should be noted that, although on the approach to land the A.S.I. contact A-B opens first, the relay is held in via its own contacts (made 2-3 after take-off) and an economy resistance until contact B-C opens thereby maintaining the supply until five knots above landing speed.

Table 1

List of equipment

Instrument	No. off	Type, Mk. or Ref. No.	Location
Transmitter-refrigerator valve	1	6A/2133	On refrigerator valve
Transmitter-intercooler valve	1	6A/2133	On intercooler valve
Double indicator	1	443.FL	Starboard console top panel
Bomb bay temperature bulb	1	6A/1566 (pre-Mod. 2560) 6A/3684 (post Mod. 2560)	Forward bomb bay panel (pre-Mod. 2836) or Bomb bay roof Stn. 509 (post Mod. 2836)
Bomb bay temperature indicator	1	59.MV (pre-Mod. 2560) 6A/3682 (post Mod. 2560)	Starboard console panel B
Bomb bay temperature lead (20 ft.)	1	6A/3695	
Outside air temperature bulb	2	S110 form 5, Sub. 87 modified post Mod. 1676 to Vickers 67436-Sht. 707	Outside fuselage under battery floor

Table 1—*continued*

Instrument	No. off	Type, Mk. or Ref. No.	Location
Outside air temperature indicator	2	S63 Form 4, 6A/3682	Instrument centre panel (pre-Mod. 2062) or starboard blind flying panel (post Mod. 2062), radio crate
Air speed pressure switch	1	Vickers A.5413-Sht. 1 (pre-Mod. 2065) Vickers A.5781-Sht. 1 26SR/11627 (post Mod. 2065)	Port air conditioning service bay in fuselage
Fuzing air speed pressure switch	1	Thermal Controls TP.5099	Starboard side of fuselage, aft of rear spar
Clock, pre-Mod. 1485	1	Mk. 2D, 6A/1275	Navigator's position, radio crate
Clock	2	Mk. 2D	W/O's position, radio crate
Clock	1	Mk. 4	Port blind flying panel
Clock	1	—	Bomb aimer's panel
Oxygen demand regulator indicator	2	Mk. 7 (pre-Mod. 2289) Mk. 14 5CZ/5033 (post Mod. 2289)	Port and starboard blind flying panels
V.G. recorder (pre-Mod. 2833 only)	1	I.T. 4-3-18	Bomb bay roof
V.G. recorder 'ON-OFF' cock	1	(D.5274)	Radio crate
Pressure head	2	6A/2959 (pre-Mod. 1680) 6A/4461 (post Mod. 1680) 6A/4835 (post Mod. 2332) ◄ 6A/7034 (post Mod. 3080) ►	Port and starboard wing tips
Oxygen demand regulator	6	Mk. 17 (6D/1700 or 6D/1710) (pre-Mod. 1604)	All crew positions
	2	Mk. 17C (6D/1730) (post Mod. 1604)	1st and 2nd pilot's positions
	4	Mk. 17 (6D/1700 or 6D/1710)	Navigator's, W/T, bomb aimer's and radar operator's positions
	6	Mk. 17D (6D/1966) (post Mod. 2398)	All crew positions
	7	Mk. 17D (6D/1966) (Mod. 2398) (post Mod.2805)	All crew positions (including crew chief, post Mod. 2805)
	7	Mk. 17E (6D/1966) (post Amend 2967)	
Cabin overpressure warning pressure switch (Mod. 2490)	1	Smiths 353 P.G.	Under crew floor, starboard side, station 241
Fatigue meter (Mod. 2833)	1	Mk. 1B, 6A/5027	Bomb bay (Station 528)
Fatigue meter (Mod. 2971)	1	Mk. 2, 6A/6485	Bomb bay (Station 528)
Air speed contactor (Mod. 2833)	1	Mk. 1X, 6A/6295	Bomb bay (Station 528)

SERVICING

Introduction

14. For detailed information on the servicing of all items of equipment, reference should be made to the relevant Air Publications.

15. A detailed description of all the general tests to be applied to all aircraft electrical circuits can be found in the General Information group contained in Book 2 immediately after Section 5 marker card.

POSITION INDICATORS

16. All position indicators are to be set-up in accordance with the instructions given in A.P.4377A, Vol. 1, Book 1.

Note . . .
When handling the position transmitters the ratchet arm must be restrained when returned to its normal position. If the ratchet arm is allowed to spring back to its normal position, the setting of the transmitter will be altered. The function of the transmitters should be checked when their relative equipments are functioned.

AIR SPEED PRESSURE SWITCH

17. This system should be tested at the same time as the electrical operation of the undercarriage. When the aircraft is jacked-up check that the undercarriage cannot be raised until air pressure equivalent to 80 to 85 knots is applied to the air pressure switch.

Note . . .
(1) *Retraction of the nose undercarriage is not possible if the nosewheel is out of alignment since in this position the nosewheel central micro switch will not be closed and the nose undercarriage raise circuit will not operate.*
(2) *For detail tests on the pressure switch refer to A.P.1275, Vol. 1, Sect. 24.*

FUZING PRESSURE SWITCH (Mod. 1196)

18. The fuzing pressure switch operates from the pitot and static systems and closes at an air speed of 110 to 120 knots approximately. The pressure equivalent for the speed at the switch is 14·8 ins. water gauge. The switch should be checked for satisfactory functioning at this pressure.

CABIN OVERPRESSURE SWITCH (Mod. 2490)

18A. Check on this switch should be carried out in conjunction with cabin pressure tests, see Book 1, Sect. 3, Chapter 8. The switch should make contact at 9·5 p.s.i. (rising pressure) and break at 9·1 p.s.i. (falling pressure).

PRESSURE HEAD HEATERS

19. Servicing for the heated pressure heads should be in accordance with A.P.1275B, Vol. 1, Sect. 1. Functional testing of the heater element is as follows:—
(1) Connect a 28-volt d.c. supply to the external connection.
(2) Select port and starboard control switches to ON.
(3) Physically check that the elements heat up.
(4) Return the control switches to OFF.
Note . . .
The duration of the test should be as short as possible to prevent possible overheating, and consequent damage, to the element.

OXYGEN DEMAND REGULATOR INDICATORS

20. (1) Connect a 28-volt d.c. supply to the external connection.
(2) Turn on the oxygen at each regulator in turn and check that the magnetic indicators operate as below. When checking the 1st and 2nd pilot's regulator indicators, check also that the magnetic indicators on the port and starboard blind flying panels operate as below.
Magnetic indications to be as follows:—

Pre-Mod. 2289		
Vertical white bar	ON	Blind flying panel indicators
Horizontal white bar	OFF	
Post Mod. 2289		
Vertical white bar	ON	
Black	OFF	
Vertical white bar	ON	Regulator indicators
Black	OFF	

V.G. RECORDER (pre-Mod. 2833 only)

21. (1) Connect a 28-volt d.c. supply to the external connection.
(2) Connect a 28-volt test lamp across the recorder 2-way terminal block.
(3) With a suitable piece of wire, bridge terminals F8 and F9 on panel G and check that the test lamp lights.
(4) Remove the bridge and check that the test lamp goes out.
(5) Disconnect and remove the test lamp.

◂ FATIGUE METER AND AIRSPEED CONTACTOR (Mod. 2833 and 2971) ▸

22. To check for satisfactory operation of the airspeed contactor, proceed as follows:—
(1) Connect an A.S.I. calibrator to the starboard pitot head.
(2) Disconnect the 2-pin electrical connection from the fatigue meter.
(3) With a suitable voltmeter connected across the pins (pin A-earth) increase the A.S.I. indication until at 155 ± 5 knots, the supply is made. The voltmeter should read 24—27·5 volts.
(4) Decrease the A.S.I. indication until at 135 ± 5 knots, the supply is disconnected; voltmeter reading—zero.

Note . . .
Speed settings are adjusted by means of screws A and C for high and low speeds respectively after the front glass has been removed.

23. Servicing instructions for the airspeed contactor are given in A.P.1275A, Vol. 1, Sect. 21, and for the fatigue meter in A.P.1275A, Vol. 1, Sect. 12. Only authorized personnel may service these instruments, however, if the hour meter reading differs appreciably from the airframe log then either the power supply or the hour meter in the fatigue meter is at fault; if after a specified number of flying hours, no differences are recorded on counters No. 3 and 4, i.e., nearest to log, the fatigue meter is probably defective.

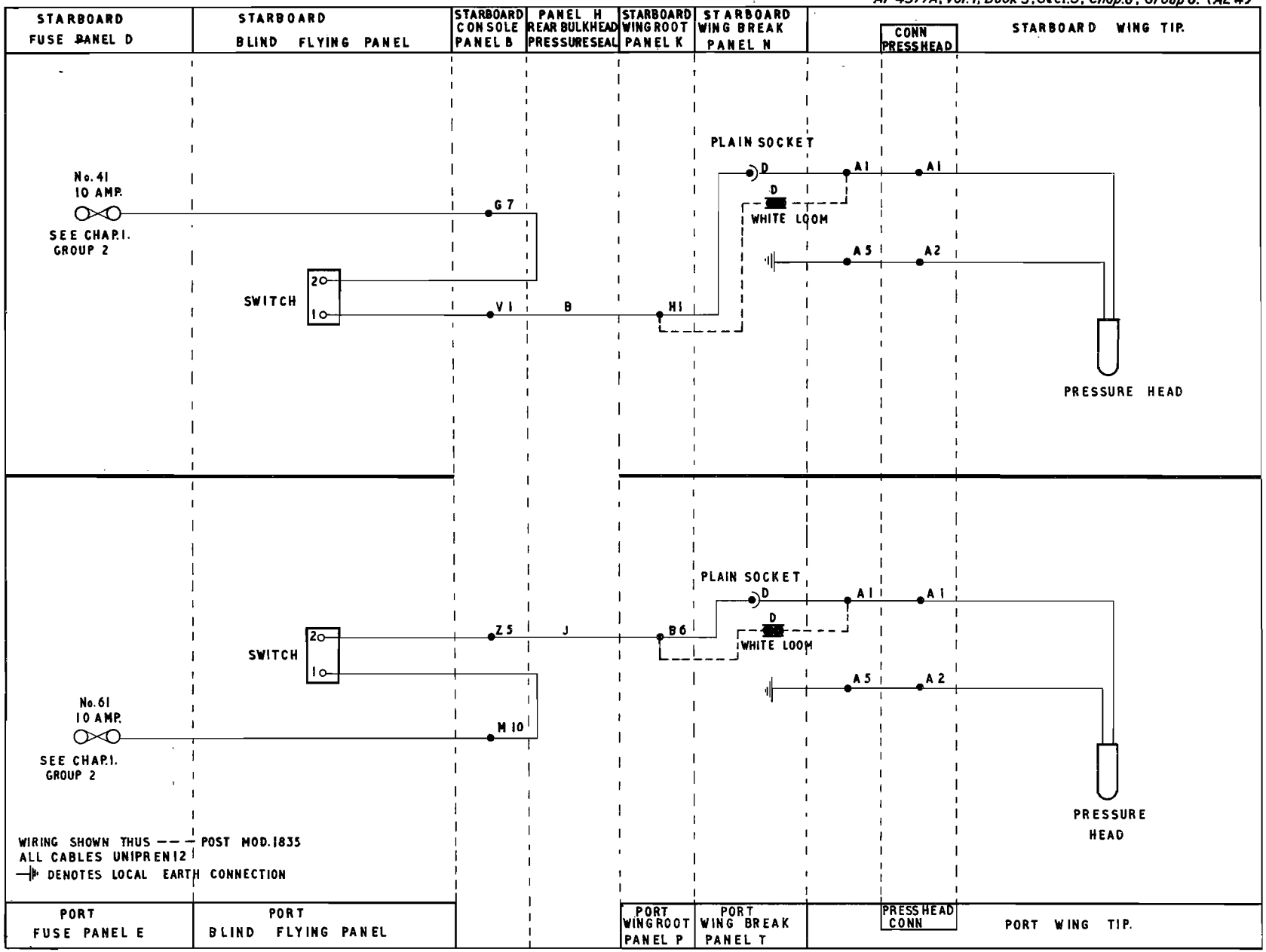

Fig. 7 Pressure head heaters (pre Mod. 1785)

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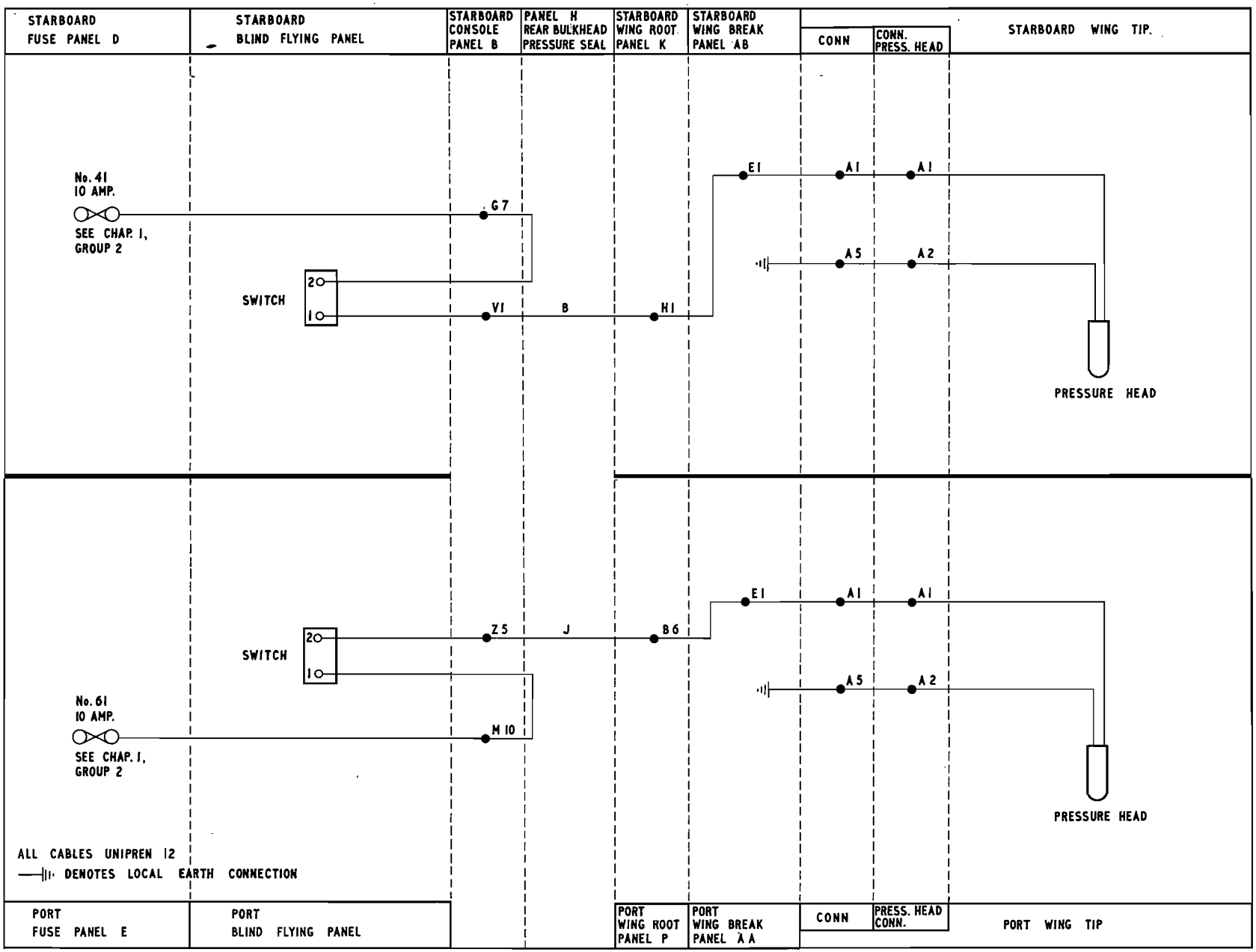

Fig. 8 Pressure head heaters (post Mod. 1785)

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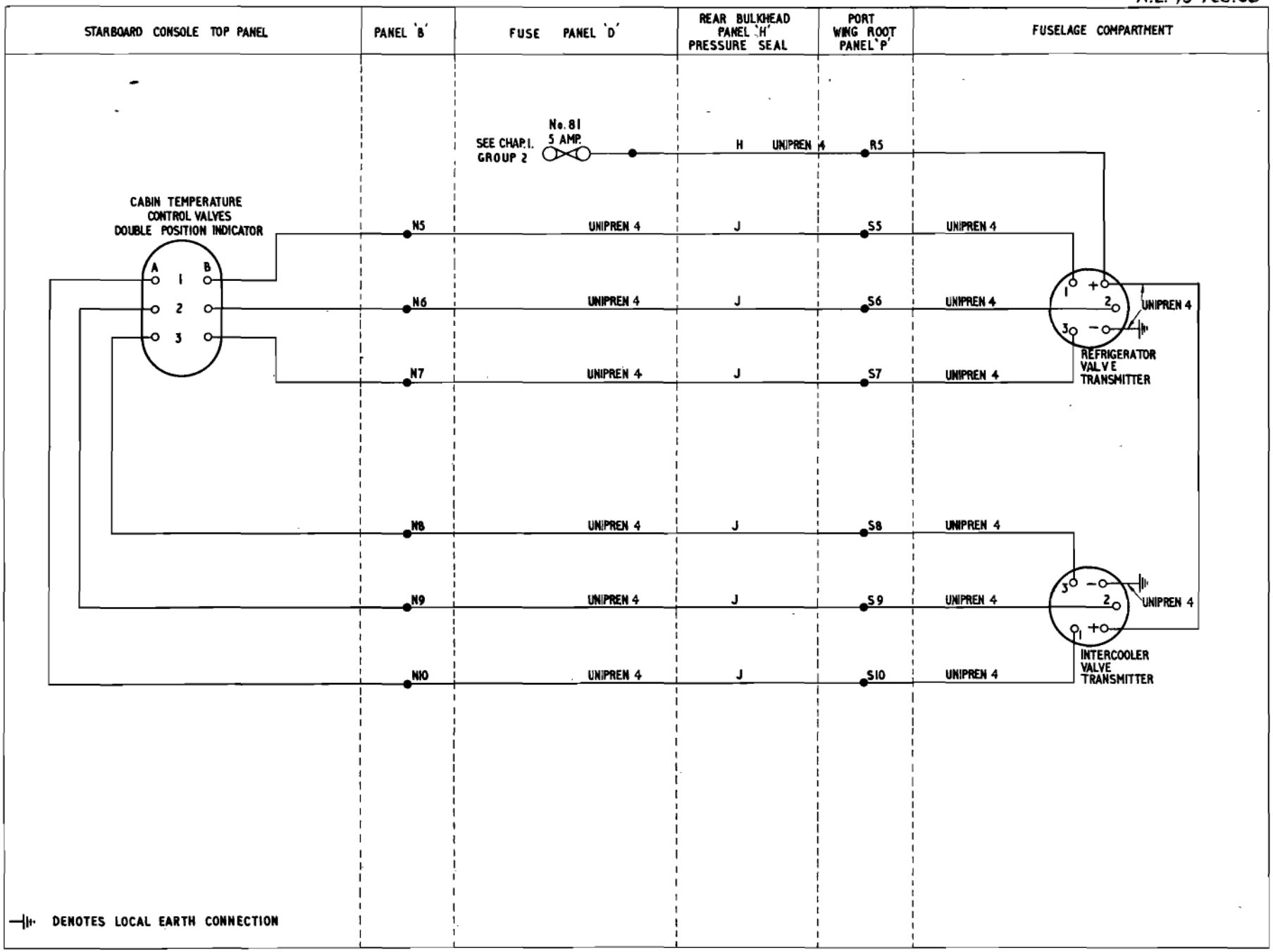

Fig. 9. Cabin temperature valves position indicators

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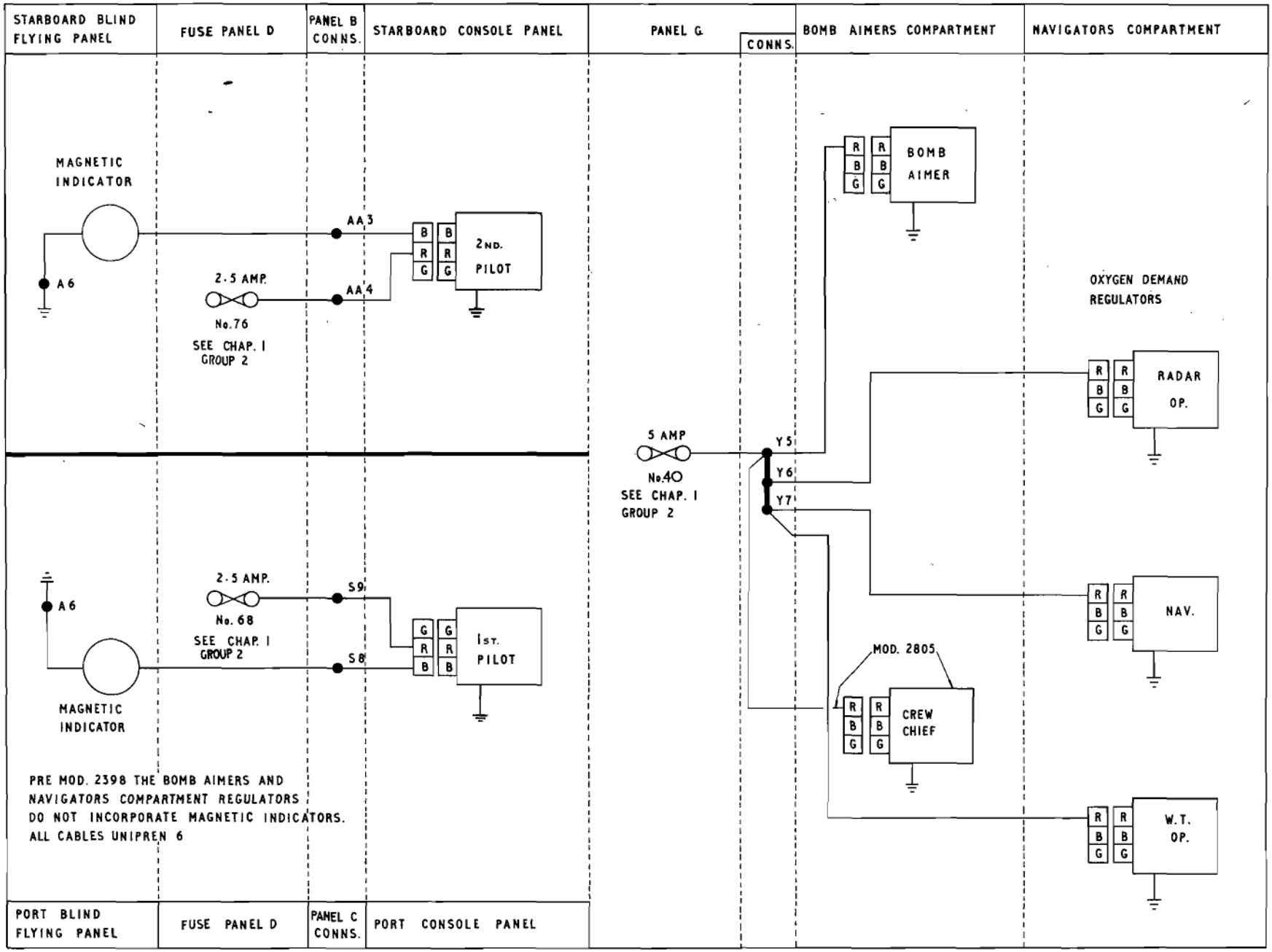

Fig. 12 Oxygen demand regulator indicators (post Mod. 2398)

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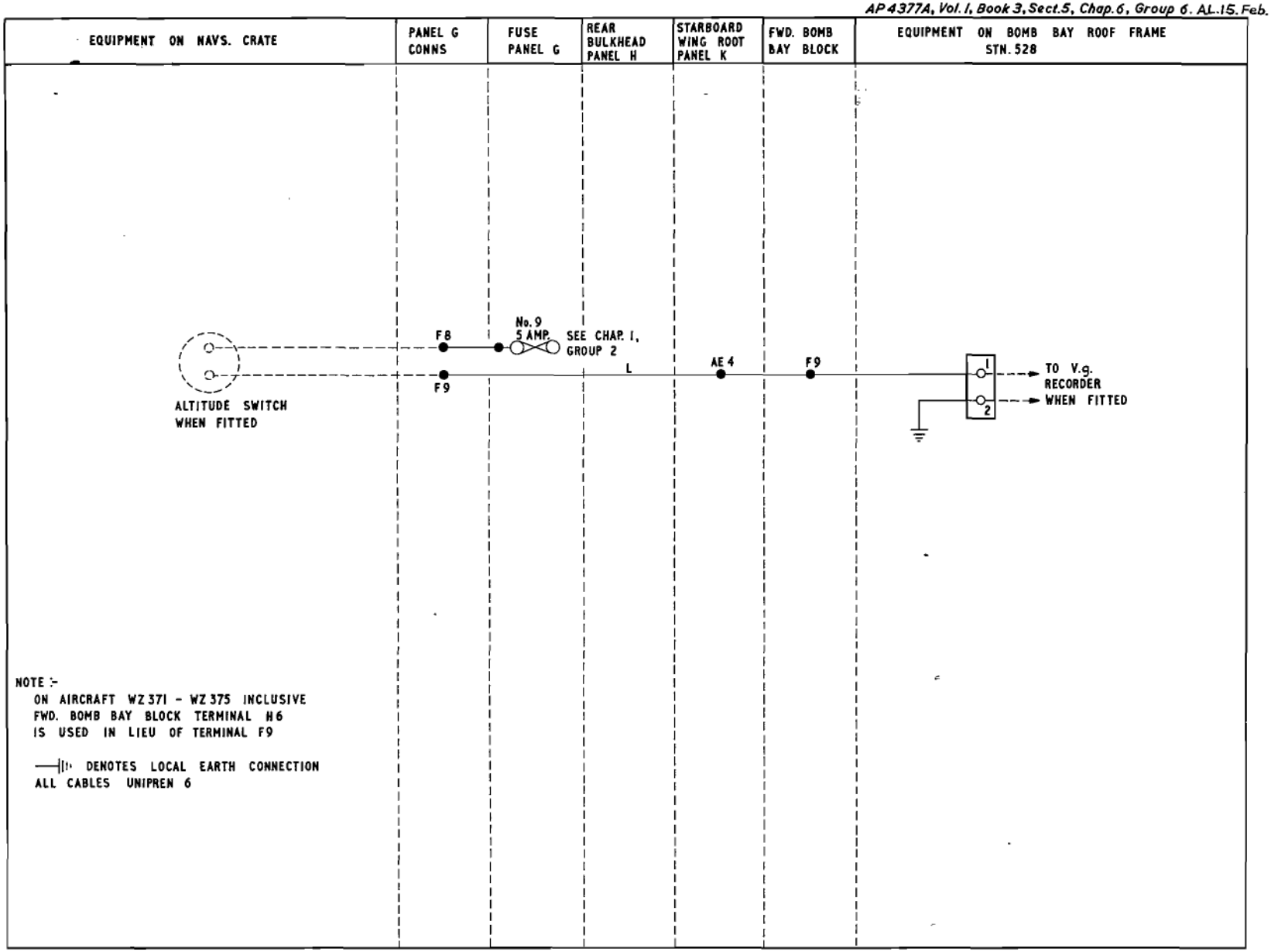

Fig. 13 V.G. recorder (pre Mod. 2833 only)

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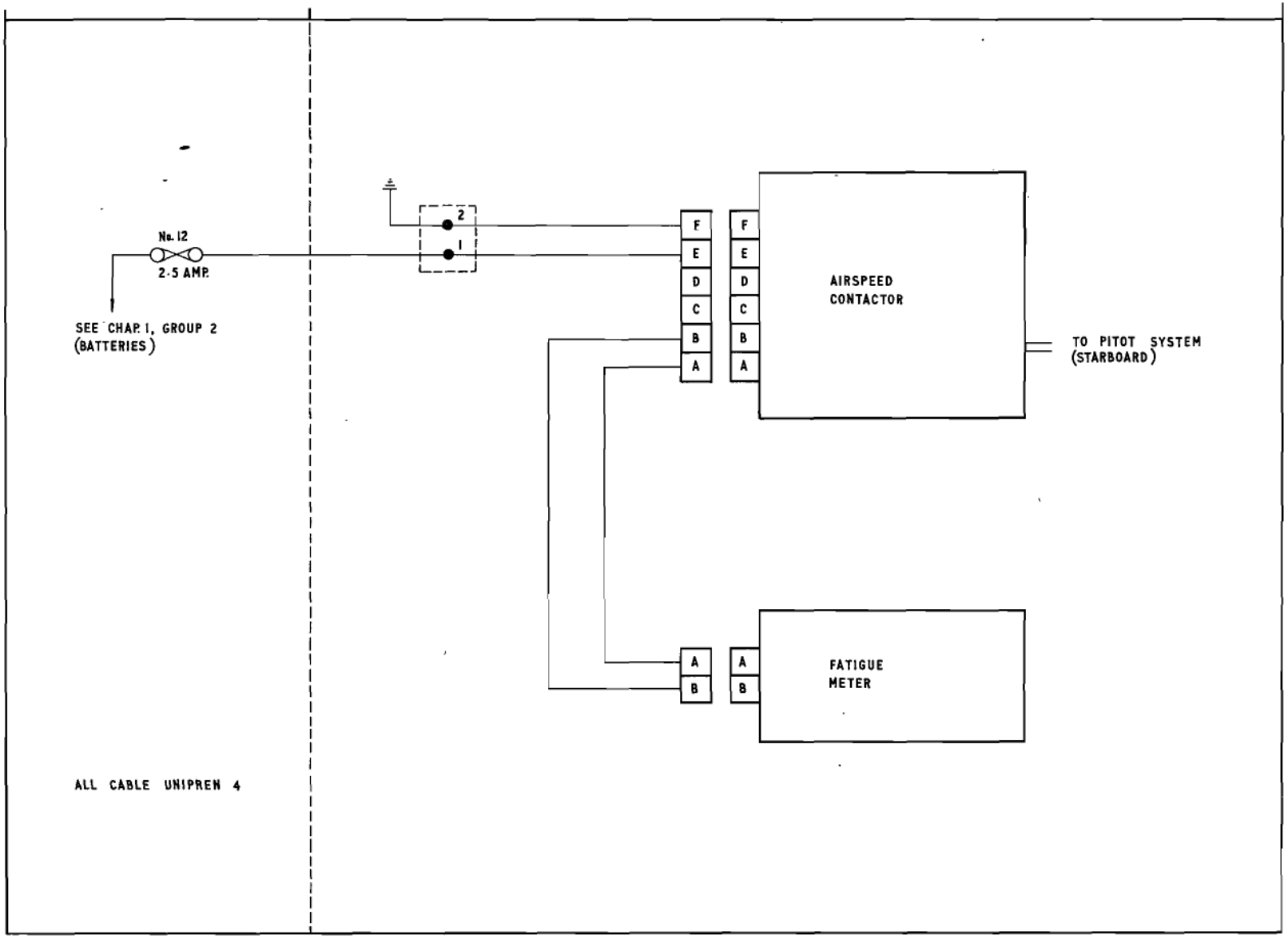

Fig. 14 Fatigue meter (Mod. 2833)

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924/8/6873/35618/625/7/60

67436 SHT. 419 - D

List of Appendices

Appendix 1 PRESSURE HEAD HEATERS (POST-MOD. 2599)

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LIST OF ILLUSTRATIONS

Introduction

1. Mod. 2599 introduces an ice detecting system which is switched on by the action of switching on the starboard pressure heater. The ice detecting system is described in Book 2, Sect. 5, Chap. 5, Group 1, App. 1.

Supply for the ice detecting system (*fig.* 1)

2. The 28-volt d.c. supply required for the ice detecting system is obtained from terminal 1 on the starboard pressure head heater switch. In this manner the supply is switched simultaneously with that of the starboard pressure head heater.

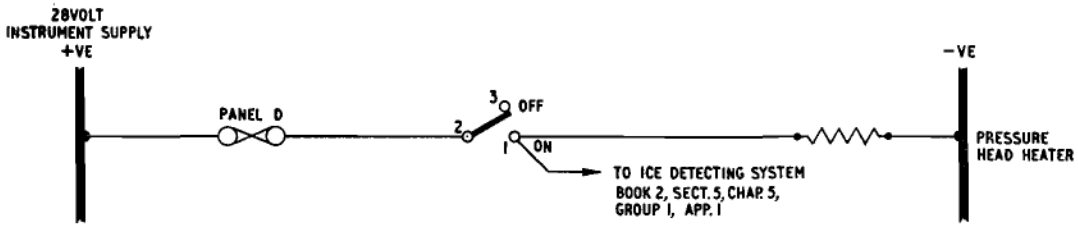

Fig. 1. Starboard pressure head heater (post Mod. 2599)

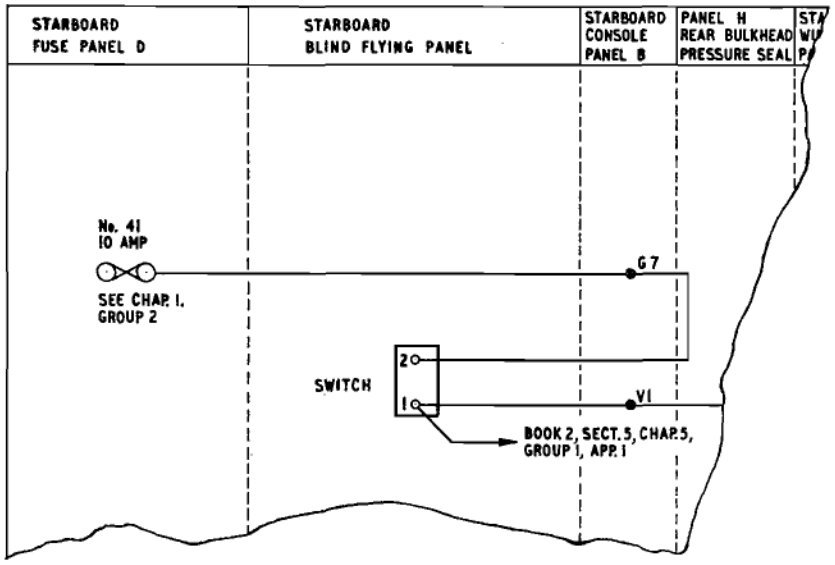

Fig. 2. Alteration to fig. 7 and 8 (Mod. 2599) in Main Group

Appendix 2 OXYGEN DEMAND REGULATOR INDICATORS (POST-MOD. 3003)

Introduction

1. Mod. 3003 introduces a third remote oxygen-flow magnetic indicator which is located on the first navigator's panel where it indicates the flow of oxygen to the bomb-aimer when in the prone position.

Indicator wiring (*fig.* 1)

2. The remote indicator is connected between pin B on the demand regulator plug and a local earth point. One leg of the radio interference suppressor, which is embodied in the regulator, suppresses possible interference from the diaphragm contacts.

General servicing (*fig.* 2)

3. When checking the bomb-aimer's station oxygen regulator, a check must be made that the remote indicator on the first navigator's panel functions.

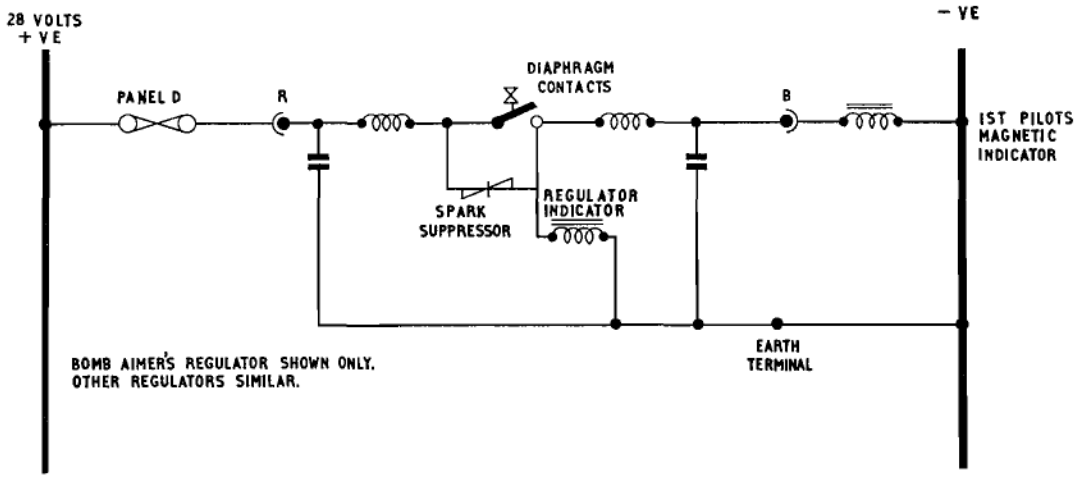

Fig. 1. Oxygen demand regulator indicator (post Mod. 3003)

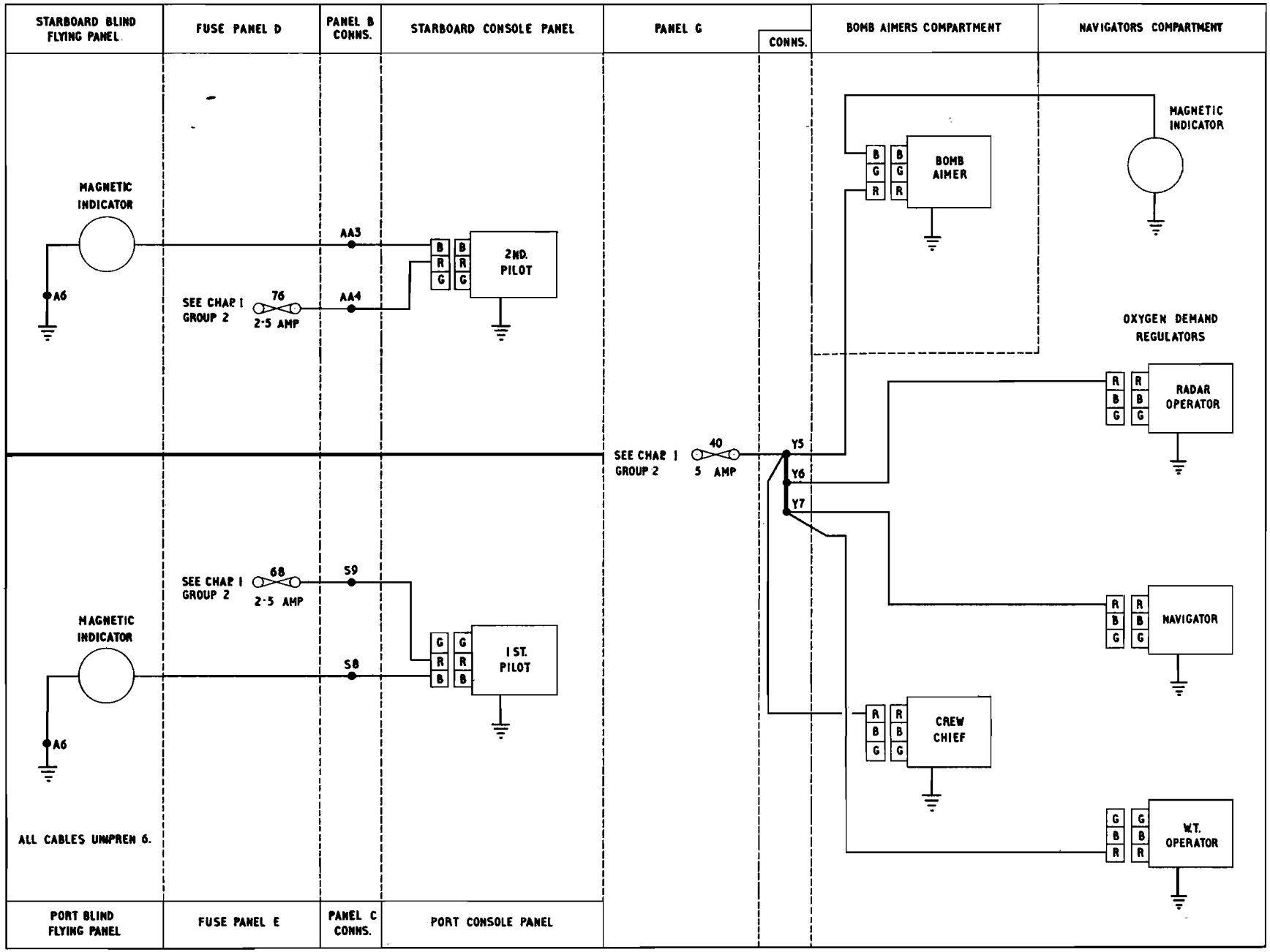

Fig. 2. Oxygen demand regulator indicators (post Mod. 3003)

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Appendix 3

BOMB AIMER'S REMOTE OXYGEN INDICATOR (Post Mod. 2828)

1. Post Mod. 2828, the bomb aimer's remote oxygen indicator is located adjacent to the A.M.I. control switch on the radio crate as shown in the Group 7 location diagram.

Appendix 4

PRESSURE HEAD HEATERS (Post Mod. 3072)

LIST OF ILLUSTRATIONS

Introduction

Relays types 98 No. 1A are introduced in the pressure head heater circuit by Mod. 3072. This minimises the volts-drop due to the long run of cables in the wings, the effect being to increase the wattage available at the pressure head heaters. The relays are mounted adjacent to panels P and K for port and starboard heaters respectively. The new fuses are situated on panel Z, the existing fuses in panels E and D are retained as control fuses for the relays. The location of the relays is illustrated in Fig. 15, Group. 7.

Circuit operation (fig. 1)

On selection of the port pressure head heater switch to ON, a 28-volt supply from panel E fuse is fed to energise relay $\frac{R1,}{1}$ the relay closes its contacts R1/1 and a supply from panel Z fuse is fed to the heater element. Operation of the starboard pressure head heater is similar except that the relay control fuse is in panel D.

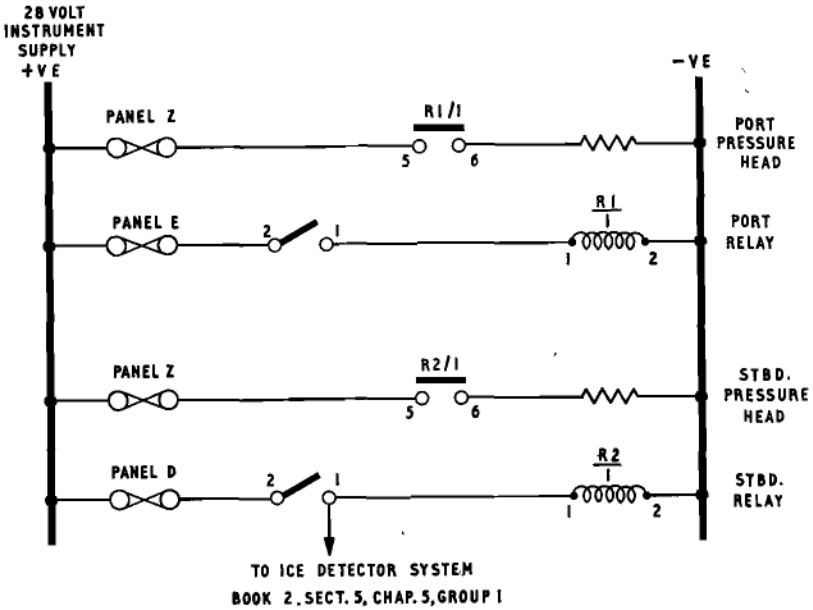
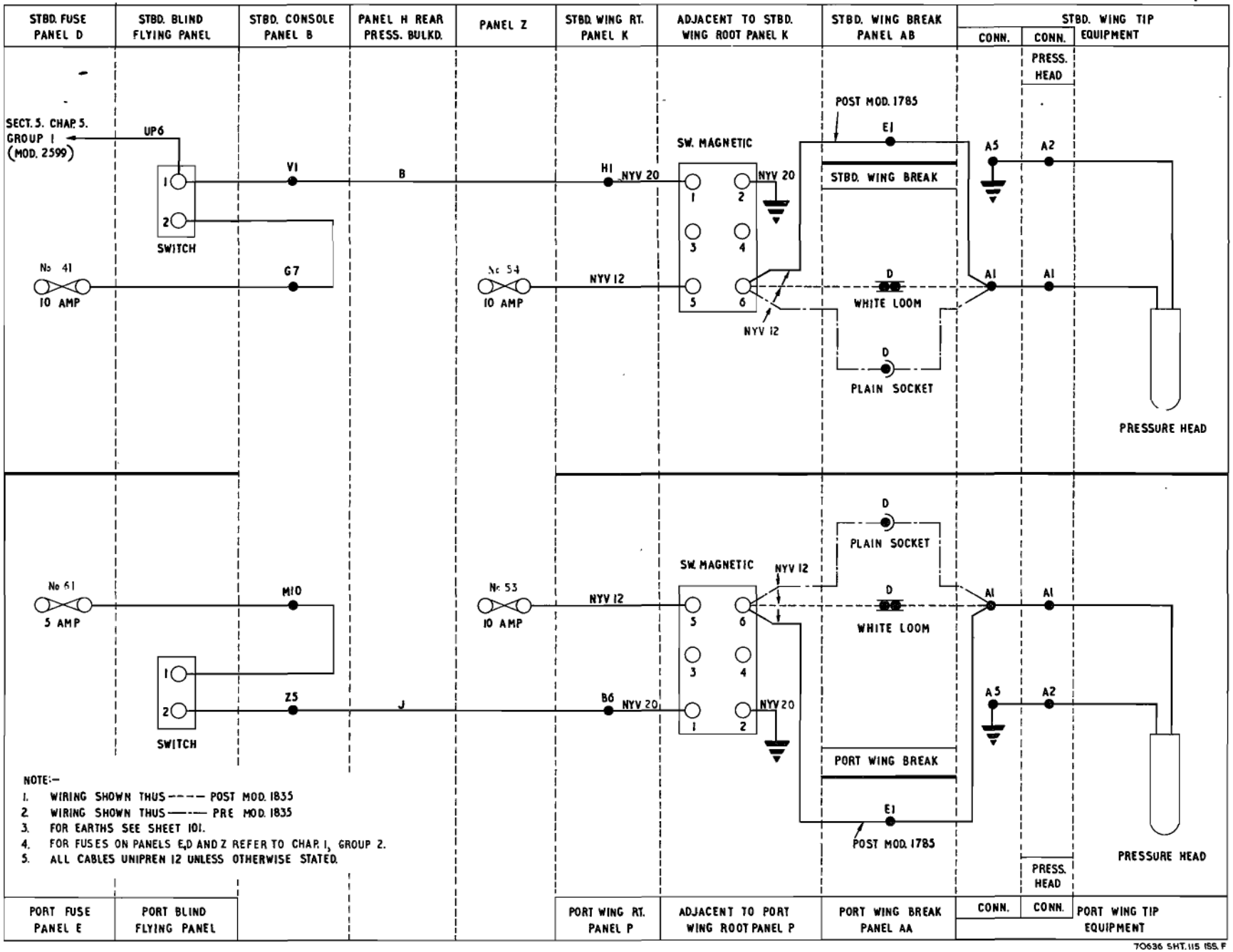


Fig. 1. Pressure head heaters (post Mod. 3072)



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70636 SHT.1793 ISS.C
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Fig. 2. Pressure head heaters (post Mod. 3072)

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