SECTION 5

ELECTRICAL SYSTEM AND INSTRUMENT INSTALLATION

LIST OF CHAPTERS

***Note.**—A list of contents appears at the beginning of each chapter*

Chapter 1 ELECTRICAL INSTALLATION

(Completely revised)

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Note – *A detailed list of contents will be found at the beginning of each group.*

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WARNING

The relevant safety precautions detailed on the LETHAL WARNING marker card must always be observed before entering the cabin or performing any operations on the aircraft.

Introduction

1. This chapter contains descriptive and servicing information relating to the electrical system. It is divided into self-contained groups consisting of descriptive text, illustrations, and tables applicable to the group heading. Theoretical diagrams accompany the appropriate text whilst routeing diagrams appear at the end of the relevant group. The General Information chapter covers the complete installation, describing the wiring system, cable identification and location of equipment. Location of components and the access panels for servicing them are shown on the location diagrams contained in this chapter. Reference to Table 1 – Master Key to Location Diagrams, enables the position of components, the group in which they are described, and the panel through which they are accessible to be established. Further tables included cover fuse locations and ratings, types and references of lamp filaments, and detailed information of the circuits served by the inverters. Provision is made in the electrical installation to cover the use of the aircraft ◀ for normal bombing, S.W.S. low level ▶ attack, and photographic duties.

DESCRIPTION

Power supplies

2. The electrical installation operates on the 24/28-volt voltage-regulated single pole earth return system, d.c. power being supplied by two Type 519 generators operating in series parallel. By means of rotary inverters, power supplies of 115-volts 400 c/s 3-phase and 1600 c/s single-phase a.c. are provided for operating the flight instruments, S.W.S. and radio equipment as shown in Table 1. Except in a few cases where circuit-breakers are employed, circuit protection throughout the aircraft is provided by H.R.C.-type fuses. Table 2 lists fuse numbers, ratings and services shown on the labels fitted to the clip-in covers of the fuse blocks.

Wiring system

3. The Plessey system of wiring uses cables and conduits with multi-pole plugs and sockets and is employed extensively throughout the aircraft. In addition, certain cable assemblies pass through the pressure bulkhead by means of Helvin pressure bungs whilst others utilise Cannon Type AN plugs and sockets. Circuit distribution to the items of equipment is by junction and distribution boxes dispersed throughout the aircraft. Each junction box is referred to by a number such as J.B.1, J.B.2, etc., marked on the box cover. Cable connections to the terminal and fuse blocks in the junction and distribution boxes are made by quick release tags or ferrules.

Circuit identification

4. Each circuit has a code reference which is shown on the appropriate theoretical and routeing diagrams. The code consists of a basic alphabetical reference given to the circuit at the fuse or circuit breaker feed point, and a suffix number which changes after each switch, relay, or other item of operative equipment in the circuit. These changes consist where possible, of incidental alterations to the numerical component i.e. F1 to F11, F11 to F12 etc. Earth returns from components carry similar identification as the earth points to which they are connected. Unipren and uninyven cables of 6, 12 or 24 amp ratings and equipment wire (DEF.12B), Types 2, 3 and 4, are used for the general wiring in the aircraft and for internal wiring of distribution and junction boxes. Cable ratings are indicated on the routeing diagrams by a break in the cable line and the insertion of either 6, 12, 24, Q23, Q40 as the case may be. Coloured rubber sleeves fitted at cable terminations throughout the aircraft are used to denote circuit identification, yellow or pink indicate d.c.; green, 1600 c/s, single-phase a.c.; red, blue and white, 400 c/s, three-phase a.c. In a.c. circuits the phase reference is the second letter of the circuit identification. For example, in a 1600 c/s circuit having the letter and number reference TG2, the letter 'G' denotes green and subsequently a 1600 c/s circuit. Similarly in the 400 c/s, 3-phase circuits, the second letter in references TR2, TB2, and EW, denotes the red, blue and white phases respectively.

Cable assemblies and junction boxes

5. All terminals in junction boxes and panel assemblies have identification tabs marked with their appropriate circuit reference. Conduits and cable assemblies are identified by a letter and number printed on rubber sleeves fitted at each end of the assemblies. Where a cable terminates in tails, each lead is fitted with a marker bearing the circuit reference of the terminal to which it is connected. Conduits or cables with the initial letters, N.F.C. or T, are usually installed, respectively, in either the nose, front fuselage, centre fuselage, or rear fuselage. Cables feeding into a junction box are referenced as above but when leaving a junction box for item of equipment the initial reference is changed to that of the box; for example, cables leaving J.B.3 and J.B.4 are shown as 3A, 3B, 4A, 4B; and so on.

6. Each lead in a cable assembly fitted with multi-pole plugs or sockets is identified by a rubber marker bearing the number or letter reference of the pin to which it should be connected. On the routeing diagrams a cable referenced as N45-1 or N45-A would be identified as cable N45-pin 1 or A, the contact pins being represented by heavy dots shown at the termination of intersection of a lead with bulkhead plug, panel assembly, or other item of equipment. Where Type S relays are illustrated on the diagrams, the letter 'a' shown near the solenoid coil denotes the side of the relay which carries the contacts marked Ca *(the solenoid connection)* and 1a, 2a, etc.

Plessey wiring system

General

7. Both standard and miniature types of Plessey plugs and sockets are employed for making connections between items of equipment. The standard type is more widely used for the general electrical services whilst

miniature types are retained for interconnection in the instrument, radio and armament systems.

8. The joints between plug pins, socket inserts, and conductors in all miniature plugs and sockets, and, in this aircraft, all standard sockets of and above 37 amp size are soldered. Joints in standard-type plugs and sockets of less than 37 amp size are crimped. Certain miniature sockets, where used with multi-core cables, are sealed with special potting compound. Dismantling is not possible, therefore renewal of the complete assembly will be necessary if the cable becomes faulty.

Servicing

WARNING

The disconnection of certain cable plugs and sockets results in the earthing circuits between some assemblies and items of equipment being broken. If disconnections are made while the electrical system is 'live' it is possible that backfeeding in the circuits can cause the fire extinguishers to be inadvertently discharged. It is therefore essential that before disconnecting any cables, the battery isolation switch is off, or the system otherwise made dead.

9. The crimping process is a solderless method of making electrical joints between cable conductors and plug pins, socket inserts, terminal tags, or ferrules. The contact pin or tag, after the insertion of the bared conductor, is swaged by means of a crimping tool. This operation imparts sufficient pressure to contract the pin or tag body round the conductor to make a sound mechanical and electrical joint. The crimping tool carries a detachable die which can be changed to accommodate the various sizes of plug pins, socket inserts, tags or ferrules. There is available a special crimping tool kit No,3 *(Ref.No.5X/3186)* which comprises a hand tool and a range of dies suitable for crimping 4, 7 and 19 amp plug pins, socket inserts, and tags etc.

10. To make a stronger joint when crimping the smaller size of cable such as vin, cel, rubber 2.5, or pren 4, the bared conductor should be doubled over before inserting it in the bore of the plug pin, insert or tag. After crimping, the excess strands should be carefully cut off before fitting a rubber sleeve over the joint.

11. The servicing of Plessey plugs and sockets calls for special care during dismantling and re-assembly. With the standard type, the socket coupling nut must always be slackened off first to allow the socket shell to be unscrewed independently of the inner moulding and cable leads. Pliers must never be used to unscrew tight socket shells — an adjustable wrench *(Ref.No.5X/1564)* is available for this purpose.

12. In the standard type Plessey socket the contact inserts are secured in the moulding by spring lips which must be pressed down before the insert can be withdrawn. Special extractor tools for removing the inserts are available under the following Reference Numbers:

Insert size	Ref. No.
7 amp	5X/2237
19 amp	5X/2238
37 amp	5X/2239
64 amp	5X/2240

13. The fitting of rubber sleeves either as markers or for the protection of joints between cable conductor and plug pins or socket inserts, requires the use of a special stretching tool. Two sizes of Hellerman 3-prong stretching tools are available, the Type A *(Ref.No.1C/5862)* which is suitable for sleeves of sizes 0 to 4, and the Type B *(Ref.No.1C/5863)*, for sizes 5 to 10.

14. Before mating up multi-pole plugs and sockets it is essential to examine all contacts for the presence of metal swarf or other foreign matter which could cause shorting. The plug and socket threads must be kept clean and lightly lubricated with an approved low temperature grease such as XG.275.

15. The Plessey wiring system is fully described in A.P.4343C, Vol.1, Sect.5, the standard types of plugs and sockets being covered in Chap.1 whilst the Mk.4 miniature types are dealt with in Chap.8. General information on the servicing of aircraft wiring systems will be found in A.P.4343, Vol.1, Sect.12, Chap.5.

Cockpit

16. All switches and instruments employed in the control of the aircraft are grouped on panel assemblies arranged round the cockpit. the main items of equipment are carried by the flight, engine, and starboard instrument panels which extend across the cockpit. Below the main panels is the starter panel. The console, take-off and alighting gear panels, together with the throttle box, are situated at the port side of the pilot's seat, whilst the electrical control panel is fitted at the starboard side.

Flight instrument panel

17. The flight instrument panel, situated directly forward of the pilot's seat, embodies the flight instruments, navigational aid indicators, flying control trim indicators and

instruments associated with ancillary services.

Engine instrument panel

18. This panel positioned to starboard of the flight instrument panel, carries all engine instruments, fuel contents gauges, and fuel pump switches.

Starboard instrument panel

19. The starboard instrument panel is fitted diagonally at the starboard side of the cockpit between the engine instrument panel and frame 3. It carries the miscellaneous instruments, cabin air and fire extinguisher controls.

Coaming panel

20. This panel, mounted above the pilot's instrument panels, provides accommodation for various dimmer switches, lamps, the emergency lamps switch and the Type E2A emergency compass.

Starter panel

21. The starter panel is situated below the flight instrument panel and carries the engine master, ignition and starting switches.

Take off panel

22. Services which essentially must be in operation during take-off are controlled by switches grouped on a panel above and to port of the pilot's seat. These switches control the battery isolation, canopy and hatch jettison, fuel cocks, intercomm. canopy demisting, vent valves, pressure head and the direct vision window.

Throttle box

23. The throttle box which is installed forward of the console panel carries the engine re-light switches which are integral with the H.P. fuel cock levers.

Alighting gear panel

24. This panel is located between the throttle box and the flight instrument panel and carries the alighting gear master switch, selector switch and position indicator, the fuel tank jettison and the flaps control switch and indicator.

Console

25. The console is located to port of the pilot's seat. On the top of the console assembly is a removable panel on which are mounted the control switches for the external lighting, and the landing lamp, bomb doors, bomb jettison and flying control trimmers. Also on the console are a number of fuses situated below a small detachable panel, and the canopy jettison switch which is mounted to port of the throttle box.

Control column

26. The right handgrip of the pilot's control column incorporates the tail plane trim switches and the V.H.F. PRESS TO TRANSMIT switch. Fitted in the centre of the control column is the air brakes control switch.

Electrical control panel (E.C.P.)

27. The E.C.P. is installed in the cabin slightly aft and to starboard of the pilot's seat. Mounted on its forward face are the circuit breakers protecting the fuel pump and cock circuits. On its aft sloping face are mounted the generator test sockets, pilot's services circuit breaker, and the inverter and radar control switches. The aft vertical face of the panel is fitted with a number of circuit breakers which protect the inverter input circuits.

Navigator's station

28. Instruments at the navigator's station mainly comprise radar indicators and their respective control units. Control of the inverters and radar systems is effected from the navigator's switch panel which forms the aft sloping face of the E.C.P. Other items consist of a hatch jettison switch, lighting equipment and oxygen indicators.

Air bomber's rear station

29. At this station are the G.M4B compass amplifier and control panel, radio and intercomm. equipment, hatch jettison switch, oxygen regulator and armament equipment. ◀ The armament control panel installed depends on the role in which the aircraft is to be used *(fig.7A, Sect.5, Chap.1, Group A & B and Sect.2, Chap.5).* ▶

Air bomber's forward station

30. At this position is the equipment necessary to the air bomber during normal bombing, this comprises the bomb sighting head, compass repeater and bomb release and jettison switches. Provision is made for a Type F95 camera to be fitted as an alternative to the bomb sighting head with the necessary controls installed on the port wall. Other items consist of the bomb sight computor, zero-reader computor and junction box, R.P. relay box, I.L.S. J.B. and panel lighting ancillaries.

Pressure bulkhead

31. The pressurized and unpressurized sections of the aircraft are divided by the pressure bulkhead at the rear of the cabin. Two methods are employed to take the circuits through the bulkhead; in one of these the cable runs are broken by plugs and sockets and in the other the cables pass directly through it by way of Helvin rubber

bungs. During servicing that involves the removal or refitting of equipment on the bulkhead it is essential that adequate sealing is ensured at the attachment points to prevent loss of pressure from the cabin.

Upper equipment compartment

32. This compartment is situated between the pressure bulkhead and frame 12, the centre portion of its floor forming the roof of the nose wheel bay. Installed in it is the d.c. and 400 c/s distribution box, 1600 c/s distribution box, electronic voltage regulator, No.4 inverter, and various radio components On B(I) Mk.6 aircraft embodying Mod.2623 a Type 103A inverter is fitted in place of No.4 inverter to supply a.c. power for the blue silk installation.

Starboard equipment compartment

33. Situated at the starboard side of the nose wheel bay, between the pressure bulkhead and frame 12, this compartment houses the main electrical panel assemblies, a.c. power supply inverters Nos.1, 2 and 5 and the starting equipment associated with No.1 inverter, access to the equipment is through a hinged door in the starboard side of the fuselage. Illumination of the equipment is provided by a flood lamp fitted above the access door.

Main electrical panel (M.E.P.)

34. Three sub assemblies designated the forward, aft and bus-bar panels comprise the M.E.P. The forward and aft panels are installed on the starboard wall of the nose wheel bay, whilst the bus-bar panel is mounted in an inverted position on the underside of the upper equipment compartment floor. The panel assemblies carry the generator control and test equipment, battery isolation relay, a Type D2 relay used to control the d.c. supply to No.5 inverter, external power supply plug, crash relays and heavy current H.R.C. fuses used in the d.c. distribution.

V.H.F. equipment compartment

35. Situated at the port side of the nose wheel bay, between the pressure bulkhead and frame 12, this compartment houses the two V.H.F. sets and the V.H.F. relay panel. Access to the equipment is through a hinged door in the port side of the fuselage.

Battery bay

36. The battery bay located in the port side of the aircraft immediately aft of the V.H.F. equipment compartment houses the main batteries which are accessible through

Bomb bay

37. Among the many items of equipment installed in the bomb bay are the electrically driven fuel pumps and cocks, J.B.1, 2, 3, 4 and 5, the electrically operated hydraulic valves which control the alighting gear, bomb doors, flaps and air brakes. On the forward bulkhead are a number of micro switches, used in the bombing and the bomb door indicator circuits, which are operated by the opening and closing of the bomb ◀ doors. Illumination of the equipment is provided by four Mk.1A lamps installed in the roof. The lamps are supplied from an external source, via a N.A.T.O. plug and circuit breaker on the forward bulkhead.

Rear fuselage

38. The rear fuselage contains various radio and radar components, J.B.6, the tail trim actuator with its associated relay panel and the fuselage fire extinguishers. A Type F24 camera is also fitted for photographic duties. Access to the rear fuselage is through a hinged door on the underside of the fuselage just aft of the bomb bay. ▶

TABLE 1

◀ *(Completely revised)* ▶

Master Key to location diagrams

Service	Location Fig.	Location Item	Group	Access Fig	Access Item
D.C.POWER SUPPLY (Aircraft post Mod.2155 (or 2393) and 3357)					
Port generator circuit					
Generator, Type 512 or 519	18	13	P	22	6
Generator earth point	18	17	P	23	13
Generator positive terminal block	18	18	P	23	13
Voltage regulator	18	14	P	22	6
Combined cut-out and contactor	15	8	P	23	8
Over-voltage relay	15	7	P	23	8
Generator test switch	15	37	P	23	8
Field circuit breaker	15	3	P	23	8
Reverse current circuit breaker	15	15	P	23	8
Off-line switch	3A	46	P	23	10
	4A	43	P	23	10
Voltage regulator trimmer	15	31	P	23	8
Voltage test socket	15	34	P	23	8
Generator failure lamp	3	50	P	23	10
	3A	17	P	23	10
	4	43	P	23	10
	4A	17	P	23	10
Starboard generator circuit					
Generator, Type 512 or 519	18A	1	P	22	3
Generator earth point	18A	27	P	23	25
Generator positive terminal block	18A	28	P	23	25
Voltage regulator	18A	3	P	22	3
Combined cut-out and contactor	15	5	P	23	8
Over-voltage relay	15	6	P	23	8
Generator test switch	15	36	P	23	8

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Field circuit breaker	15	2		23	8
Reverse current circuit breaker	15	16		23	8
Off-line switch	3A	47		23	10
	4A	44		23	10
Voltage regulator trimmer	15	33		23	8
Voltage test socket	15	35		23	8
Generator failure lamp	3	52		23	10
	3A	19		23	10
	4	46		23	10
	4A	19		23	10
Main relay, Type R (Battery isolation)	15	17		23	8
Generator test panel	10	1		23	10
External supply plug	15	28	P	23	8
Battery isolation switch	3A	45		23	10
	4A	42		23	10
Busbar voltmeter	3	54		23	10
	3A	18		23	10
	4	44		23	10
	4A	18		23	10
Main batteries	1A	19		22	10
Emergency batteries	1A	11		23	10
Busbar panel	15	10		23	8
Heavy current fuses	15	9,14,25		23	8
E.C.P. fuse panel	11	18		23	10
M.E.P. fuse blocks	15	11,21,29		23	8
Console fuse panel	3	1		23	10
	4	90		23	10

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
D.C. POWER SUPPLY (B MK.6 aircraft post Mod.2393 and pre Mod.3357)					
Port generator circuit					
Generator, Type 512 or 519	18	13		22	6
Generator earth point	18	17		23	13
Generator positive terminal block	18	18		23	13
Negative shunt	18	15		22	6
Voltage regulator panel	18	14		22	6
Voltage regulator	18	14		22	6
Field discharge unit	18	14		22	6
Generator control unit	15A	2		23	8
Main contactor	15A	10		23	8
Field circuit breaker	15A	5		23	8
Reverse current circuit breaker	15A	12		23	8
Positive shunt	15A	8		23	8
Auxiliary hold-off relay	15A	16	P	23	8
Voltage regulator trimmer	10	1		23	10
Voltage test socket	10	1		23	10
Generator ON/CHECK switch	10	1		23	10
Generator failure lamp	4	43		23	10
	4A	17		23	10
Starboard generator circuit					
Generator, Type 512 or 519	18A	1		22	3
Generator earth point	18A	27		23	25
Generator positive terminal block	18A	28		23	25
Negative shunt	18A	29		22	3
Voltage regulator panel	18A	3		22	3
Voltage regulator	18A	3		22	3
Field discharge unit	18A	3		22	3
Generator control unit	15A	1		23	8
Main contactor	15A	11		23	8

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Field circuit breaker	15A	6	P	23	8
Reverse current circuit breaker	15A	13		23	8
Positive shunt	15A	7		23	8
Auxiliary hold-off relay	15A	17		23	8
Voltage regulator trimmer	10	1		23	10
Voltage test socket	10	1		23	10
Generator ON/CHECK switch	10	1		23	10
Generator failure lamp	4	46		23	10
	4A	19		23	10
Main relay, Type R	15A	15		23	8
Generator test panel	10	1		23	10
External supply plug	15A	19		23	8
Battery isolation switch	4A	42		23	10
Busbar voltmeter	4	44		23	10
	4A	18		23	10
Main batteries	1A	19		22	10
Emergency batteries	1A	11		23	10
Busbar panel	15	10		23	8
Heavy current fuses	15	14,25		23	8
E.C.P. fuse panel	11	18		23	10
M.E.P. fuse blocks	15	11		23	8
	15A	9,14,18		23	8
Console fuse panel	4	90		23	10
D.C.POWER SUPPLY (Aircraft pre Mod.2155 or 2393)					
Port generator circuit					
Generator, Type P3	18	13		22	6
Suppressor, Type X	18	14		22	6
Voltage regulator, Type 23	16	5		23	8
Differential cut-out, Type A	16	8		23	8
Ammeter shunt	16	18		23	8
Control switch	12	16		23	10
Circuit breaker, Type D	16	9		23	8
Generator failure lamp	4	43		23	10
	4A	17		23	10

TABLE 1 – *continued*

Service		Location Fig.	Location Item	Group	Access Fig.	Access Item
Starboard generator circuit						
Generator, Type P3		18A	1	P	22	3
Suppressor, Type X		18A	31	P	22	3
Voltage regulator, Type 23		16	4	P	23	8
Differential cut-out, Type A		16	2	P	23	8
Ammeter shunt		16	22	P	23	8
Control switch		12	19	P	23	10
Circuit breaker, Type D		16	21	P	23	8
Generator failure lamp		4	46	P	23	10
		4A	19	P	23	10
Main relay, Type R		16	10	P	23	8
External supply plug		16	23	P	23	8
Battery isolation switch		4A	42	P	23	10
Busbar voltmeter		4	44	P	23	10
		4A	18	P	23	10
Master voltage regulator, Type 32		16	6	P	23	8
Generator test panel		16	7	P	23	8
Main batteries		1A	19	P	22	10
Emergency batteries		1A	11	P	23	10
Busbar panel		16	12	P	23	8
Heavy current fuses		16	13	P	23	8
E.C.P. fuse panel		12	42	P	23	10
M.E.P. fuse blocks		16	11	P	23	8
Console fuse panel		4	90	P	23	10
115 VOLTS, 400 C/S A.C. POWER SUPPLIES						
No.1 inverter, Type 103A	Flight Instruments (Aircraft post Mod.1420)	15	18	D	23	8
Control panel, Type 15	Flight Instruments (Aircraft post Mod.1420)	15	4	D	23	8
Magnetic start switch	Flight Instruments (Aircraft post Mod.1420)	15	27	D	23	8
Starting relay, Type T1	Flight Instruments (Aircraft post Mod.1420)	15	26	D	23	8
Ground test switch	Flight Instruments (Aircraft post Mod.1420)	11	12	D	23	10
Torque switch	Flight Instruments (Aircraft post Mod.1420)	13	4	D	22	13
Fuse No.164	Flight Instruments (Aircraft post Mod.1420)	15	25	D	23	8
No.2 inverter, Type 100A	Flight Instruments (Aircraft post Mod.1420)	15	22	D	23	8

TABLE 1 – *continued*

Service		Location Fig.	Location Item	Group	Access Fig.	Access Item
Control panel, Type 12	Flight Instruments (Aircraft post Mod.1420)	15	23	D	23	8
Instrument normal/standby supply indicator		3	72		23	10
		4	60		23	10
No.2 inverter, Type 100B	Flight Instruments (Aircraft pre Mod.1420)	16	17		23	8
No.3 inverter, Type RC.8A		16	20		23	8
Suppressor		16	15		23	8
Torque switch		14	5		22	13
Instrument normal/standby supply indicator		4	60		23	10
Inverters No.6/7 change-over switch	(inoperative)	11	10		23	10
L.A.B.S. normal inverter indicator	(inoperative)	11	9		23	10
L.A.B.S. standby inverter indicator		11	8		23	10
Blue silk inverter, Type 103A	Blue Silk (B(I) Mk.6 aircraft)	13	9	R & S	22	13
Control panel, Type 15		2	7		22	10
Control panel, Type 24		13	10		22	13
Magnetic start switch		1A	1		22	10
Starting relay, Type T1		2	6		22	10
Inverter ON/OFF switch		5	19		23	10
Blue silk START switch		5	13		23	10
Fuse and relay box		13	5		22	13

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
115 VOLTS, 1600 C/S A.C.POWER SUPPLIES					
No.4 inverter, Type 200 (B Mk.6 aircraft)	14	6	R& S	22	13
ON/OFF switch (B Mk.6 aircraft)	12	11	R& S	23	10
No.5 inverter, Type 201	15	20	R& S	23	8
	16	16	R& S	23	8
Electronic regulator, Type 2B	13	11	R& S	22	13
	14	8	R& S	22	13
Suppressor, Type P	13	12	R& S	22	13
	14	7	R& S	22	13
Circuit breaker, Type D2	15	24	R& S	23	8
	16	14	R& S	23	8
Start switch	11	14	R& S	23	10
	12	13	R& S	23	10
Stop switch	11	15	R& S	23	10
	12	14	R& S	23	10
Inverters No.4/5 change-over switch (B Mk.6 aircraft)	12	12	R& S	23	10
D.C. POWER SUPPLIES FOR FLIGHT INSTRUMENTS, RADIO AND RADAR SERVICES					
Periscope mounting butt connector	1A	2	D	23	10
G.M.4B compass and bombsight suppressor, Type P	7	21	D	23	10
	8	13	D	23	10
Turn-and-slip indicator normal/emergency supply switch	3	76	D	23	10
	4	64	D	23	10
Fuel pressure warning resistors	11	38	D	23	10
	12	30	D	23	10
Rebecca T/R, Gee-H and rear warning W.F.G. suppressor, Type B4 (B Mk.6 aircraft)	14	3	R& S	22	13
Rebecca auto transformer	14	13	R& S	22	13
Gee-H auto transformer	14	14	R& S	22	13
I.L.S. voltage regulator	13	13	R& S	22	13
	14	11	R& S	22	13
I.L.S. voltage regulator T.B.	13	14	R& S	22	13
	14	12	R& S	22	13

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
FUEL PUMPS AND COCKS					
No. 1 fuel tank					
Port pump	17	5	Q	23	10
Port pump suppressor	17	4		23	10
Port pump switch	3A	5		23	10
	4A	5		23	10
Port cock actuator	17	6		23	24
Port cock switch	3A	36		23	10
	4A	33		23	10
Starboard pump	17	57		23	24
Starboard pump suppressor	17	58		23	24
Starboard pump switch	3A	6		23	10
	4A	6		23	10
Starboard cock actuator	17	55		23	24
Starboard cock switch	3A	37		23	10
	4A	34		23	10
No. 2 fuel tank					
Port pump	17	13		23	24
Port pump suppressor	17	12		23	24
Port pump switch	3A	4		23	10
	4A	4		23	10
Port cock actuator	17	11		23	24
Port cock switch	3A	33		23	10
	4A	30		23	10
Starboard pump	17	46		23	24
Starboard pump suppressor	17	47		23	24
Starboard pump switch	3A	7		23	10
	4A	7		23	10
Starboard cock actuator	17	49		23	24
Starboard cock switch	3A	35		23	10
	4A	32		23	10

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
No.3 fuel tank					
Port pump	17A	23	Q	23	24
Port pump suppressor	17A	24		23	24
Port pump switch	3A	3		23	10
	4A	3		23	10
Port cock actuator	17A	22		23	24
Port cock switch	3A	31		23	10
	4A	28		23	10
Starboard pump	17A	34		23	24
Starboard pump suppressor	17A	35		23	24
Starboard pump switch	3A	8		23	10
	4A	8		23	10
Starboard cock actuator	17A	36		23	24
Starboard cock switch	3A	30		23	10
	4A	27		23	10
300 gallon overload tank					
Port cock actuator	17A	25		23	24
Starboard cock actuator	17A	28		23	24
ON/OFF switches	3	46		23	10
	3A	13, 15		23	10
	4	38		23	10
	4A	13, 15		23	10
Port wing integral tank					
Pump	18	4		23	15
Pump suppressor	18	5		23	22
Pump switch	3A	2		23	10
	4A	2		23	10
Cock actuator	18	6		23	22
Cock switch	3A	34		23	10
	4A	31		23	10
Transfer cock actuator	18	24		23	22
Transfer cock switch	3A	32		23	10
	4A	29		23	10

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Starboard wing integral tank					
Pump	18A	10		23	4
Pump suppressor	18A	9		23	5
Pump switch	3A	9		23	10
	4A	9		23	10
Cock actuator	18A	8		23	5
Cock switch	3A	39		23	10
	4A	36	Q	23	10
Transfer cock actuator	18A	20		23	5
Transfer cock switch	3A	38		23	10
	4A	35		23	10
Fuel pump test switches	11	3		23	10
	12	2		23	10
Fuel pump ammeter socket	11	2		23	10
	12	1		23	10
ENGINE SERVICES					
Port engine					
Master switch	3	86		23	10
	4	73		23	10
Ignition switch	3	83		23	10
	4	70		23	10
Cartridge firing/selector switch	3	84	J & K	23	10
	4	71		23	10
Relight switch	3	91		23	10
	4	10		23	10
Time delay switch	1A	10		23	10
Anti-icing switch	3	100		23	10
	4	85		23	10
Anti-icing indicator	3	98	H	23	10
	4	84		23	10
Anti-icing gate-valve actuators	21	5		23	12

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Igniter unit (inboard)	18	7		22	6
Igniter unit (outboard)	18	7		23	14
Igniter plugs	21	2		23	12
Triple breech starter	21	4		22	9
Starboard engine					
Master switch	3	85		23	10
	4	72	J & K	23	10
Ignition switch	3	80		23	10
	4	68		23	10
Cartridge firing/selector switch	3	79		23	10
	4	67		23	10
Relight switch	3	91		23	10
	4	10		23	10
Time delay switch	1A	8		23	10
Anti-icing switch	3	102		23	10
	4	87		23	10
Anti-icing indicator	3	101	H	23	10
	4	86		23	10
Anti-icing gate valve actuators	21	5		23	7
Igniter unit (inboard)	18A	2		22	3
Igniter unit (outboard)	18A	2	J & K	23	6
Igniter plugs	21	2		23	7
Triple breech starter	21	4		22	14
FIRE EXTINGUISHER SYSTEM					
Fuselage fire circuit (operative only under crash conditions)					
Extinguisher bottle	1	6		23	26
Fire detectors (inoperative)	2	4		22	10
Port engine fire circuit					
Extinguisher bottles	18	19		23	13
Resetting flame detectors	18	8	W	22	7
Switch/indicator unit	3	43		23	10
	3A	20		23	10
	4	35		23	10
	4A	20		23	10

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Starboard engine fire circuit			W		
Extinguisher bottles	18A	26		23	25
Resetting flame detectors	18A	5		22	2
Switch/indicator unit	3	47		23	10
	3A	21		23	10
	4	39		23	10
	4A	26		23	10
Engine fire indicator test switch	3	45		23	10
	3A	16		23	10
	4	37		23	10
	4A	16		23	10
Crash circuit					
Port inertia switch	1A	18		22	11
Starboard inertia switch	15	32		23	8
	16	1		23	8
No.1 crash relay	15	13		23	8
	15A	4		23	8
No.2 crash relay	15	12		23	8
	15A	3		23	8
CANOPY AND HATCH JETTISON					
Jettison master switch	3A	44		23	10
	4A	41		23	10
◀ Control column snatch unit switch	1A	11A		23	10 ▶
Elevator control explosive collar	1A	14		23	10
Canopy jettison					
Pilot's jettison switch	3	13		23	10
	4	9		23	10
Explosive bolts	3	59		23	10
	4	54		23	10
Resistor boxes	1A	7		23	10
	2	2		23	10
	5	9		23	10
	6	7		23	10
	7	10		23	10
	8	6		23	10

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Jettison relay unit	1A	13	W	23	10
Hatch jettison					
Navigator's jettison switch	5	3		23	10
	6	1		23	10
Air bomber's jettison switch	7	5		23	10
	8	5		23	10
Explosive bolts	5	5		23	10
	6	2		23	10
Resistor boxes	5	5, 8		23	10
	6	2, 5		23	10
	7	15		23	10
	8	10		23	10
	13	3		22	13
	14	4		22	13
WING TIP FUEL TANK JETTISON					
Jettison switch	3	18		23	10
	4	15		23	10
Detonators (port)	18	30		23	18
Detonators (starboard)	18A	14		23	2
Resistors (port)	18	28		23	19
Resistors (starboard)	18A	15		23	1
FLYING SERVICES					
Alighting gear control			G		
Master switch	3	87		23	10
	4	74		23	10
Selector switch	3	17		23	10
	4	13		23	10
Valve actuator	17	7		23	24
Oleo micro switch	18A	25		23	25

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Alighting gear position indicator					
Indicator	3	88		23	10
	4	75		23	10
Throttle microswitch	1A	6		23	10
Port main wheel					
UP microswitch	18	22		23	13
DOWN microswitch	18	21		23	13
Microswitch T.B.	18	20	G	23	13
Starboard main wheel					
UP microswitch	18A	22		23	25
DOWN microswitch	18A	24		23	25
Microswitch T.B.	18A	23		23	25
Nose wheel					
UP microswitch	1A	17		23	11
DOWN microswitch	1A	16		23	11
Door microswitch	1A	15		23	11
Tail plane control					
Cut-in switch	3A	27		23	10
	4A	26		23	10
Fine trim switch	3A	26		23	10
	4A	25		23	10
Tail plane actuator	1	9		23	26
Reversing relay	2A	8		23	26
Isolating relay	2A	6	C	23	26
Limit microswitches	1	8		23	28
Rudder trim					
Control switches	3	92		23	10
	4	78		23	10
Actuator	1	2		22	4
Aileron trim					
Control switch	3	95		23	10
	4	79		23	10
Actuator	1A	12		23	10

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Flaps control					
Control switch	3	20	C	23	10
	4	16	C	23	10
Actuator	17	50	C	23	24
Air brakes					
Control switch	3A	28	C	23	10
	4A	24	C	23	10
Actuator	17	16	C	23	24
Solenoid valve	17	17	C	23	24
Microswitches	18A	17	C	23	33
CABIN AIR PRESSURIZATION					
Cabin air control					
Heating control switch	3	48	H	23	10
	3A	14	H	23	10
	4	40	H	23	10
	4A	14	H	23	10
Mixing valve actuator	18	12	H	22	6
Port engine air control switch	3	42	H	23	10
	3A	11	H	23	10
	4	34	H	23	10
	4A	11	H	23	10
Starboard engine air control switch	3	55	H	23	10
	3A	12	H	23	10
	4	41	H	23	10
	4A	12	H	23	10
Engine air gate valve actuator port	18	11	H	22	6
Engine air gate valve actuator starboard	18A	4	H	22	3
Cabin air warning					
Override switch, warning horn	3	49	H	23	10
	3A	22	H	23	10
	4	42	H	23	10
	4A	22	H	23	10

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Warning horn	7	29	H	23	10
	8	17		23	10
Warning horn relay	7	28		23	10
	8	4		23	10
Pressurization valve	13	15		22	13
	14	10		22	13
HEATER CIRCUITS					
Pressure head heater	1A	9		22	12
Control switch	3A	40		23	10
	4A	37		23	10
Vent valve heaters, port wing	18	3		22	◄ 1 ►
Vent valve heaters, starboard wing	18A	11		22	1
Control switch	3A	43		23	10
	4A	40		23	10
D.V. window					
Control switch	3A	41		23	10
	4A	38		23	10
Heater	3	26		23	10
	4	22		23	10
Canopy de-misting					
Blower motor	1A	5		23	10
Suppressor, Type B4	1A	4		23	10
Control switch	3A	42		23	10
	4A	39		23	10
LIGHTING			L		
External lighting					
Master switch	3	96		23	10
	4	81		23	10
Navigation lamps switch	3	8		23	10
	4	6		23	10
Navigation lamp, port wing	18	1		◄ 22-23	8-17
Navigation lamp, starboard wing	18A	13		22-23	8- 3 ►

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Navigation lamp, upper tail	1	1		22	5
Navigation lamp, lower tail	2A	7		23	29
Wing tip tank navigation lamp contact block, port	18	29		23	19
Wing tip tank navigation lamp contact block, starboard	18A	16		23	1
Taxying lamp, port wing	18	2		22-23	8-17
Taxying lamp, starboard wing	18A	12		22-23	8-[illegible]
Taxying lamps switch	3	6		23	10
	4	7		23	10
Downward identification lamp (B Mk.6)	17	1		23	9
(B(I) Mk.6)	1	7		23	22
Downward identification lamp morse switch	3	99		23	10
	4	83		23	10
Downward identification lamp steady switch	3	97		23	10
	4	82		23	10
Landing lamp	18	25		23	21
Landing lamp switch	3	5	L	23	10
	4	4		23	10
Anti-collision lamps (Mod.3355)	1	2A,7A		23	26
Anti-collision lamps flasher unit (Mod.3355)	2A	4A		23	26
Anti-collision lamps switch (Mod.3355)	3	7		23	10
	4	5		23	10
Anti-collision lamps fuse (Mod.3355)	3	104		23	10
	4	89		23	10
Internal lighting					
Pilot's station (B(I) Mk.6 aircraft)					
Console panel red lamps (3)	3	11,14,16		23	10
Console panel red lamps dimmer switch	3	15		23	10
Take-off panel red lamps (3)	3	19,21,23		23	10
Take-off panel red lamps dimmer switch	3	25		23	10
Port cockpit red lamps (4)(includes E2A compass lamp)	3	30,33,69,74		23	10
Midget panel lamps (Mod.3896)	3	78		23	10
Port cockpit red lamps dimmer switch	3	91A		23	10
Starboard cockpit red lamps (4)	3	44,53,60,63,64,73		23	10
Starboard cockpit red lamps dimmer switch	3	67		23	10

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Port cockpit u/v lamps (2)	3	22, 32	L	23	10
Port cockpit u/v lamps dimmer switch	3	94		23	10
Starboard cockpit u/v lamps (3)	3	34,51,61,62		23	10
Starboard cockpit u/v lamps dimmer switch	3	56		23	10
Emergency lamps (2)	3	58,70		23	10
Emergency lamps switch	3	41		23	10
2.4 volt emergency lamps battery	2	8		23	10
Anti-dazzle lamps (2)	3	24,57		23	10
Anti-dazzle lamps resistance units (2)	3	31		23	10
Anti-dazzle lamps switch (pilot)	3	40		23	10
Anti-dazzle lamps switch (navigator)	5	1		23	10
Pilot's station (B Mk.6 aircraft)					
Console/take-off panels red lamps (5)	4	8,11,14,17,18		23	10
Console/take-off panel red lamps dimmer switches	4	12,62		23	10
Port cockpit red lamps (4)	4	20,23,56,57		23	10
Port cockpit red lamps dimmer switch	4	25		23	10
Starboard cockpit red lamps (4) (includes E2A compass lamp)	4	29,32,36,47,51,53		23	10
Starboard cockpit red lamps dimmer switch	4	30		23	10
Port cockpit u/v lamps (2)	4	19,26		23	10
Port cockpit u/v lamps, dimmer switch	4	24		23	10
Starboard cockpit u/v lamps (2)	4	31,45,52		23	10
Starboard cockpit u/v lamps, dimmer switch	4	33		23	10
Emergency lamps (2)	4	50,59		23	10
Emergency lamps switch	4	28		23	10
2.4 volt emergency lamps battery	2	8		23	10
Anti-dazzle lamps (2)	4	21, 49		23	10
Anti-dazzle lamps resistance units (2)	4	58		23	10
Anti-dazzle lamps switch (pilot)	4	27		23	10
Anti-dazzle lamps switch (navigator)	6	8		23	10
Service lighting					
Bomb bay lamps	17	4A, 13A, 42A		23	24
Bomb bay lamp	17A	21		23	24
Bomb bay lights N.A.T.O. plug	17	2		23	24
Bomb bay lights circuit breaker	17	61		23	24

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Navigator's station (B(I) Mk.6 aircraft)			L		
Midget panel lamps for:–					
Decca controller (3)	5	15		23	10
Air temperature indicator (2)	5	21		23	10
A.S.I. (2)	5	17		23	10
Altimeter (2)	5	18		23	10
Electrical indicator, Blue Silk	5	6		23	10
Rear warning controller (2)	5	12		23	10
Master indicator (3), G.M.4B compass	5	11		23	10
A.M.I.	5	7		23	10
Blue silk switch panel	5	10		23	10
Midget lamps dimmer switches (2)	5	20		23	10
Red lamp, port wall	5	22		23	10
Dimmer switch, red lamp, port wall	5	4		23	10
Cabin lamp	5	2		23	10
Navigator's station (B Mk.6 aircraft)					
Anglepoise lamp, port wall	6	6		23	10
Dimmer switch anglepoise lamp, port wall	6	3		23	10
Cabin lamp	6	4		23	10
Air bomber's rear station					
Wander lamp	7	9		23	10
	8	7		23	10
Dimmer switch	7	12		23	10
	8	8		23	10
Air bomber's forward station					
Wander lamp, starboard	9	7		23	10
	10	7		23	10
Dimmer switch	9	8		23	10
	10	4		23	10
Cabin lamp	9	5		23	10
	10	2		23	10
OXYGEN WARNING SYSTEM			W		
Pilot's indicator	3	75		23	10
	4	63		23	10
Air bomber's indicator	3	65		23	10
	8	1		23	10

TABLE 1 – *continued*

Service	Location		Group	Access	
	Fig.	Item		Fig.	Item
ARMAMENT AND PHOTOGRAPHIC SERVICES					
Bomb door control and indication					
Control switch	3	3		23	10
	4	2		23	10
Valve actuator	17	53		23	24
Pilot's indicator	3	2		23	10
	4	1		23	10
Air bomber's indicator (B(I)Mk.6 aircraft)	7	8		23	10
Microswitches	17	◀ 60 ▶		23	24
Bomb control equipment (B Mk.6 aircraft)					
Bomb distributor unit	8	2		23	10
Bomb control unit	8	3		23	10
Air bomber's firing switch	10	3		23	10
Live jettison switch	10	6		23	10
Safe jettison switch	10	5		23	10
Pilot's firing switch	4A	23		23	10
Pilot's jettison switch	4	3		23	10
Fuzing selector switch	8	15	A & B	23	10
Jettison relay unit	1A	13		23	10
Bombs/F24 camera, Type Q relay	8	14		23	10
Normal bombing equipment, bomb bay (B and B(I) Mk.6 aircraft)					
Main bomb beam release unit	17	15		23	24
Forward secondary bomb beam	17	9		23	24
No.1 slip	17	56		23	24
No.2 slip	17	52		23	24
No.3 slip	17	42		23	24
Fuzing units	17	43,51		23	24
Practice bomb sockets	17	44,54		23	24
Bomb release socket	17	48		23	24
Bomb jettison socket	17	10		23	24
Rear secondary bomb beam	17A	◀ 20 ▶		23	24
No.4 slip	17A	39		23	24
No.5 slip	17A	37		23	24
No.6 slip	17A	29		23	24
Fuzing units	17A	30		23	24
Practice bomb sockets	17A	38		23	24

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Bomb release socket	17A	40	A & B	23	24
Bomb jettison socket	17A	20		23	24
Armament safety break (B (I) Mk.6 aircraft)	7	3		23	10
Normal bombing role control equipment (B (I) Mk.6 aircraft)					
◀ Bomb distributor unit	7A			23	10
Bomb slip indicators	7A	1		23	10
Control test pushbutton	7A	2		23	10
Live jettison pushbutton	7A	3		23	10
Timing control switch	7A	4		23	10
Bomb circuit test pushbutton	7A	5		23	10
Start-stop selector switch	7A	6		23	10
Safe selected jettison pushbutton	7A	7		23	10
Safe jettison pushbutton	7A	8		23	10
Bomb control unit	7A			23	10
Reset jettison warning lamp	7A	9		23	10
Time delay master switch	7A	10		23	10
Time delay selector switch	7A	11		23	10 ▶
Air bomber's firing switch	9	6		23	10
Live jettison switch	9	10		23	10
Safe jettison switch	9	9		23	10
Pilot's emergy jettison switch	3	4		23	10
Pilot's bombs/R.P. firing switch	3A	35		23	10
Bombs/R.P. master selector switch	7	18		23	10
Bombs/R.P. circuit breaker	7	24		23	10
Fuzing selector switch	7	19		23	10
Bombs/F24 camera, Type Q relay	7	25		23	10
Jettison relay unit	1A	13		23	10
Interdictor role control equipment (B (I) Mk.6 aircraft)					
Flares					
Master switch	7	7		23	10
Flares release switch, air bomber	7	11		23	10
Flares release switch, pilot	3	41A		23	10
Flares gone counter	7	13		23	10
Flare distributor, Type 9	17A	32		23	24
Guns					
Gun firing and safety flap	3A	24		23	10
Armament test switch	7	4A		23	10
Gunsight master switch	3	93		23	10
Rockets					
Bombs/R.P. firing switch	3A	25		23	10
Bombs/R.P. master selector switch	7	18		23	10
Rocket battery selector switch (inoperative)	7	27		23	10

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Wing bombs			A & B		
Bombs/R.P. master selector switch	7	18		23	10
Air bomber's firing switch	9	6		23	10
Pilot's bombs/R.P. switch	3	25		23	10
Wing bombs selector switches	7	6		23	10
Wing bombs fuzing switch	7	23		23	10
Wing stores jettison switch	3	9		23	10
Wing pylon, port	18	27		23	20
Wing pylon, starboard	18A	18		23	31
◀ S.W.S. role equipment (B(I) Mk.6 aircraft)					
A.M.A.C. distribution box	7	1		23	10
S.W.S. control panel	7	2		23	10
Store selector switch	7A	17		23	10
Bomb on station indicator lamp	7A	16		23	10
T.A./T.B. selector switch	7A	18		23	10
Secondary release switch	7A	15		23	10
D.C.U.9/A control unit	7A	19		23	10
Practice bomb facility panel	7A			23	10
Master switch	7A	12		23	10
Bomb doors switches shorted-out indicator lamp	7A	13		23	10
Bomb slip indicator	7A	14		23	10
Gunsight master switch	3	93		23	10
Gun firing switch and safety flap	3A	24		23	10
Gunsight warning lamp (inoperative)	3	35		23	10
T.145 warning lamp (inoperative)	3	37		23	10
Y/R ON/OFF switch (inoperative)	3	36		23	10
Normal/alternate switch (inoperative)	3	38		23	10
Y/R gyro caging test switch (Mod.3926)	3	39		23	10
Cable stowages, bomb bay	17A	33		23	24
S.W.S. carrier	17	8		23	24 ▶
Carrier J.B.	17A	19		23	24
Relay box	2A	1		23	26

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
◄ L.A.B.S. 1600 c/s supply switch (inoperative) ►	11	11		23	10
Bomb safety lock equipment (Mod. 3732)					
Control switch	3	12		23	10
Indicator lamps	3	10		23	10
Safety lock J.B.	1A	18A		22	10
Supply plug	17	49A		23	24
►					◄
◄ G90 camera equipment (B(I) Mk.6 aircraft) ►					
Master switch	7	14		23	10
Sunny/cloudy switch	7	16		23	10
Control switch	3A	24		23	10
►					◄
F95 camera equipment (B(I) Mk.6 aircraft)					
Control box	9	3	A & B	23	10
Iris heater switch	9	1		23	10
Iris selector switch	9	12		23	10
Film indicator	9	11		23	10
Master switch	9	2		23	10
Speed selector switch	9	13		23	10
Control switch	3A	29		23	10
F24 camera equipment (B and B(I) Mk.6 aircraft)					
Master switch	7	17		23	10
	8	11		23	10
Controller, Type 35 (B Mk.6 aircraft)	8	9		23	10
Controller, Type 48 (B(I) Mk.6 aircraft) (post Mod.4056)	7	22		23	10
Motor	1	5		23	26
Remote pushbutton switch (post Mod.4056)	9	14		23	10
JUNCTION BOXES AND PANELS					
J.B.1	17	3		23	24
J.B.2	17	45		23	24
J.B.3	17	59		23	24
J.B.4	17A	31	General Information	23	24
J.B.5	17	14		23	24
J.B.6	2A	5		23	26
J.B.7	18	16		22	6
J.B.8	18A	29		22	3

TABLE 1 – *continued*

Service	Location		Group	Access	
	Fig.	Item		Fig.	Item
J.B.9	18	23		23	23
J.B.10	18A	21		23	30
J.B.13	1A	3		23	10
J.B.14	7	26		23	10
	8	16		23	10
J.B.16	2	1		23	10
J.B.17	18	26		23	16
J.B.18	18A	19		23	32
D.C. and 400 c/s distribution box	13	2		22	13
	14	9		22	13
1600 c/s distribution box	13	1		22	13
	14	2		22	13
Electrical control panel (E.C.P.)	5	16		23	10
	6	9		22	10
400 c/s fuse box	7	20		23	10
	8	12		23	10
Main electrical panel (M.E.P.)	15	30		23	8
	16	3		23	8
Inverter bay	15	19	General Information	23	8
	16	19		23	8
Wing root connections, port	17A	18		23	24
Wing root connections, starboard	17A	41		23	24
Pressure bulkhead	13	16		22	13
	14	1		22	13
Armament fuse and relay panel (B(I)Mk.6 aircraft)	7	4		23	10
Flight instrument panel	3	77		23	10
	4	65		23	10
Engine instrument panel	3	71		23	10
	4	61		23	10
Starboard instrument panel	3	66		23	10
	4	48,55		23	10
Take-off panel	3	90		23	10
	4	77		23	10

TABLE 1 – *continued*

Service	Location Fig.	Location Item	Group	Access Fig.	Access Item
Pilot's console	3	103	General Information	23	10
	4	88		23	10
Alighting gear instrument panel	3	89		23	10
	4	76		23	10
Engine starter panel	3	81		23	10
	4	66		23	10
Blue Silk and Decca D.C. fuse box	5	14		23	10

TABLE 2 – Fuse numbers, ratings and location (B (I) Mk.6 aircraft)

Service	Fuse No.	Rating (amps)	Circuit Ref.	Location
E.C.P. supply	1	160	PP1	
E.C.P. supply	2	160	PP2	
Tail plane trim	3	60	C2	
No.7 inverter supply	4	◄ Spare ►	M7	
Battery isolation	5	10	P91	
Fire extinguishers	6	20	X1	
Bomb/flare bay stores jettison	7	20	B4	
◄ S.W.S. ►	8	20	PP6A	
Spare	9	–	–	
Spare	10	–	–	M.E.P.
Spare	11	–	–	
Crash trip control	12	10	X9	
Starboard equipment bay lamp	13	5	LL4	
No.5 inverter	14	5	M51	
V.H.F. No.1 set supply	15	20	R1	
V.H.F. No.2 set supply	16	20	R2	
Voltmeter	17	5	V+	
Port generator failure warning lamp	18	10	W1	
Starboard generator failure warning lamp	19	10	W2	
Gun pack heating	20	5	HH8	
Gunsight master switch	21	5	A8	
◄ Spare	22		►	
No.6 inverter control	23	◄ Spare ►	MM6	
Bomb/flare doors control	24	10	B3	
Flaps control	25	5	C3	
Flaps indicator	26	5	C4	
Rudder trim control	27	10	C5	
Rudder trim indicator	28	5	C6	
Tail plane position indicator	29	5	C7	
Tail plane trim fine control	30	5	CC5	E.C.P.
Spare	31	–	–	
Spare	32	–	–	
Aileron trim control	33	10	CC1	
Aileron trim indicator	34	5	CC2	
Bombsight head and computor control	35	10	PP4	
Oxygen warning	36	2.5	W5	
Spare	37	–	–	
External air thermometer	38	5	F2	

TABLE 2 – *continued*

Service	Fuse No.	Rating (amps)	Circuit Ref.	Location
Bomb bay overload fuel tank aft pump (post Mod.715)	39	20	ZS1	
Bomb bay overload fuel tank port cock (post Mod.715)	40	10	YS1	
A.M.U. and A.P.I.	41	5	F7	
Cabin air control, port engine air supply actuator	42	5	HH1	
Anti-icing, port engine control	43	10	HH3	
Port engine starting	44	10	J1	
F95 camera	45	20	K4	
Port engine ignition	46	10	J5	
Pilot's red lamps	47	5	L5	
Pilot's U/V lamps	48	5	L6	
No.1 inverter control	49	10	M8	
Exhaust gas thermometers	50	5	Q5	
Fuel contents gauge, port wing integral tank	51	5	Q8	
Alighting gear control	52	10	U1	
Alighting gear indication	53	5	U2	
Fuel pressure warning, port engine	54	5	W3	
Fire extinguishers, port engine	55	10	X1P	
Fire extinguisher warning, port engine	56	5	X3	
F24 camera	57	10	K1	E.C.P.
◀ G90 camera	58	10	K2	
No.7 inverter (L.A.B.S.) control (unused) ▶	59		MM7	
Navigator's pillar lamps	60	5	LL6	
Navigator's pillar lamps	61	5	LL7	
Turn-and-slip indicator	62	5	F4	
Turn-and-slip indicator	63	5	F5	
I.F.F. Mk.10 control	64	5	S1	
Air brakes	65	10	C9	
Tail trim isolator	66	5	CC7	
Bomb bay overload fuel tank fwd.pump (post Mod.715)	67	20	ZS2	
Bomb bay overload fuel tank starboard cock (post Mod.715)	68	10	YS2	
Cabin air control	69	5	H1	
Cabin air indicator	70	5	H2	
Cabin pressure warning	71	5	H3	
Pitot head heater	72	10	H4	
Vent valves heaters	73	20	H5	
Windscreen heater	74	10	H6	
Canopy de-misting	75	5	H7	

TABLE 2 – *continued*

Service	Fuse No.	Rating (amps)	Circuit Ref.	Location
Cabin air control, starboard engine air supply actuator	76	5	HH2	E.C.P.
Anti-icing, starboard engine control	77	10	HH4	E.C.P.
A.Y.F. radio altimeter	78	10	R7	E.C.P.
Starboard engine starting	79	10	J2	E.C.P.
F95 camera	80	2.5	K44	E.C.P.
Starboard engine ignition	81	10	J6	E.C.P.
Air bomber's lighting	82	5	L7	E.C.P.
Pilot's red lamps	83	5	L8	E.C.P.
Navigator's lighting	84	5	L9	E.C.P.
Fuel contents gauges, fuselage tanks	85	5	Q7	E.C.P.
Fuel contents gauge, starboard wing integral tank	86	5	Q9	E.C.P.
Intercommunication	87	5	R3	E.C.P.
Intercommunication	88	2.5	R5	E.C.P.
V.H.F. changeover	89	5	R4	E.C.P.
Fuel pressure warning, starboard engine	90	5	W4	E.C.P.
Fire extinguishers, starboard engine	91	10	X1S	E.C.P.
◀ Bomb/flare doors indicators	92	10	B1 ▶	E.C.P.
Fire extinguisher warning, starboard engine	93	5	X4	E.C.P.
Wing tip tank jettison	94	10	Y7	E.C.P.
No.2 inverter control	95	10	M7	E.C.P.
Oxygen warning	96	2.5	W6	E.C.P.
Spare	97	–	–	400 c/s Distribution Box
Spare	98	–	–	400 c/s Distribution Box
Spare	99	–	–	400 c/s Distribution Box
Spare	100	–	–	400 c/s Distribution Box
Oil pressure gauge, port engine	101	2.5	TR21	400 c/s Distribution Box
Spare	102	–	–	400 c/s Distribution Box
Oil pressure gauge, starboard engine	103	2.5	TB21	400 c/s Distribution Box
Spare	104	–	–	400 c/s Distribution Box
Electronic regulator blower motor	105	2.5	NB1	400 c/s Distribution Box
Rear warning and waveform generator blower motor	106	2.5	SB5	400 c/s Distribution Box
Electronic regulator blower motor	107	2.5	NR1	400 c/s Distribution Box
Rear warning and waveform generator blower motor	108	2.5	SR5	400 c/s Distribution Box
G.M.4B compass amplifier	109	2.5	FR3	400 c/s Fuse Box
Pilot's altimeter and amplifier (post.Mod.3896)	110	2.5	FR9	400 c/s Fuse Box
Zero reader J.B. (Horizon gyro unit)	111	2.5	FR6	400 c/s Fuse Box
Decca roller map	112	5	RR5	400 c/s Fuse Box

TABLE 2 – *continued*

Service	Fuse No.	Rating (amps)	Circuit Ref.	Location
G.M.4B compass amplifier	113	2.5	FB3	400 c/s Fuse box
Navigator's altimeter vibrator (post.Mod.3747)	114	2.5	FB9	
Zero reader J.B. (Horizon gyro unit)	115	2.5	FB6	
Spare	116	–	–	
Bombsight head	117	5	B5	
Bombsight computor	118	5	B6	
Zero reader	119	2.5	M85	
G.M.4B compass amplifier	120	2.5	F3	
Bombsight head	121	2.5	BR5	
Bombsight computor	122	2.5	BR6	
Zero reader flight computor	123	2.5	FR8	
Decca roller map	124	2.5	RRR5	
Bombsight head	125	2.5	BB5	
Bombsight computor	126	2.5	BB6	
Zero reader flight computor	127	2.5	FB8	
Decca roller map	128	2.5	RRB5	
Spare	129	–	–	1600 c/s Distribution Box
Spare	130	–	–	
Rear warning waveform generator	131	5	S5	
Spare	132	–	–	
Spare	133	–	–	
Spare	134	–	–	
Rear warning waveform generator and transmitter	135	5	SG5	
Terminal SG81 (1600 c/s Dist.box)	136	5	SG8	
I.F.F. Mk.10 transmitter/receiver	137	5	SG1	
◀ L.A.B.S. (unused)	138		TG56	
L.A.B.S. (unused)	139		TG55 ▶	
Spare	140	–	–	
	141			
	142			
	143			
	144			
Turn-and-slip indicator	145	2.5	FX4	Pilot's Console
Spare	146	–	–	
Spare	147	–	–	
Landing lamps	148	5	L3	
Navigation lamps	149	5	L1	
Identification lamp	150	5	LL1	

TABLE 2 – *continued*

Service	Fuse No.	Rating (amps)	Circuit Ref.	Location
Taxying lamps	151	10	L2	Pilot's Console
Landing lamp filament	152	20	L4	
	153			
	154			
	155			
	156			
	157			
	158			
	159			
	160			
Canopy jettison	161	40	X5	M.E.P.
Hatch jettison	162	40	X6	
	163			
No.1 inverter supply	164	115	M1	Inverter bay
	165			
	166			
	167			
	168			
	169			
◀ S.W.S.	170	100	PP6	M.E.P.
S.W.S.	171	80	BA7	
No.6 inverter (unused)	172		M6	
No.6/7 inverter magnetic indicators (unused)	173		M61	
S.W.S. bomb safety lock	174	5	BBA2	
S.W.S. bomb safety lock	175	5	BBA1 ▶	
Generator/No.1 inverter control	176	10	MM8	
No.1 generator control	177	10	P15	
No.1 generator control	178	10	P11	
No.1 generator test	179	5	PT1	
Fatigue meter (Mod.3883)	180	2.5	U12A	
No.2 generator control	181	10	P25	
No.2 generator control	182	10	P21	
No.2 generator test	183	5	PT2	
Spare	184	–	–	
	185			
	186			
Blue silk inverter supply	187	115	M10	
	188			

Note... *Numbers 171 to 181 are also allocated to fuses in the Armament fuse and relay panel – see end of table.*

TABLE 2 – *continued*

Service	Fuse No.	Rating (amps)	Circuit Ref.	Location
	189			
	190			
	191			
	192			
	193			
	194			
	195			
	196			
Anti-dazzle lamps	197	2.5	L10	E.C.P.
U.H.F./V.H.F. changeover	198	5	RR2	
U.H.F. supply	199	40	RR1	M.E.P.
Anti-collision flashing lamps (Mod.3355)	200	5	LL9	Pilot's console
Blue silk	201	5	MM10	Blue Silk and Decca D.C. fuse box
Spare	202	–	–	
Blue silk J.B.	203	2.5	S4	
Spare	204	–	–	
Decca	205	60 (Mod.4053)	RR4	
Blue silk	206	7.5	–	Blue Silk fuse and relay box upper equipment bay
Blue silk	207	7.5	–	
Blue silk	208	7.5	–	
	209			
	210			
	211			
	212			
	213			
	214			
	215			
	216			
	217			
	218			
	219			
	220			

TABLE 2 – *continued*

Service	Fuse No.	Rating (amps)	Circuit Ref.	Location
S.W.S.	A1	2.5	A11H	A.M.A.C. Distribution Box
L.A.B.S. unused fuses	A2		–	
	A3		–	
	A4	10	–	
S.W.S.	A5	2.5	BA4	
S.W.S.	A6	2.5	BA3	
Practice bomb facility supply	A7	2.5	BA1	
S.W.S.	A8	20	BA2	
L.A.B.S. unused fuses	A9		T64	
	A10		–	
	A11		T66	
	A12		–	
	A13		–	
	A14		–	
	A15		–	
	A16		–	
	A17		–	
	A18		–	
	A19 (Mod. 3926)		BAA4	
Gun purging	171	5	A7	Armament fuse and relay panel
Gun firing	172	10	A6	
Gun firing	173	10	A5	
Gun firing	174	10	A4	
Gun firing	175	10	A3	
Gun firing control	176	10	A1	
Rocket reset push button (inoperative)	177	5	BB1	
Flares release	178	5	BB2	
Wing bombs jettison	179	20	B7	
Rocket jettison	180	20	B8	
Wing bomb firing	181	2.5	B9	

TABLE 3 – Fuse numbers, ratings and location (B Mk.6 aircraft)

Service	Fuse No.	Rating (amps)	Circuit Ref.	Location
E.C.P. supply	1	160	PP1	M.E.P. (pre Mod.2393)
E.C.P. supply	2	160	PP2	
Tail plane trim	3	60	C2	
Spare	4	–	–	
Battery isolation	5	5	P91	
Fire extinguishers	6	20	X1	
Bomb bay stores jettison	7	20	B4	
Spare	8	–	–	
Spare	9	–	–	
Spare	10	–	–	
Spare	11	–	–	
Spare	12	–	–	
Starboard equipment bay lamp	13	5	LL4	
Inverters No.5/No.3 control	14	5	M51	
V.H.F. No.1 set supply	15	20	R1	
V.H.F. No.2 set supply	16	20	R2	
Voltmeter	17	5	V +	
Port generator failure warning lamp	18	5	W1	
Starboard generator failure warning lamp	19	5	W2	
Spare	20	–	–	
E.C.P. supply	1	160	PP1	M.E.P. (post Mod.2393)
E.C.P. supply	2	160	PP2	
Tail plane trim	3	60	C2	
Spare	4	–	–	
Battery isolation	5	10	P91	
Fire extinguishers	6	20	X1	
Bomb bay stores jettison	7	20	B4	
Spare	8	–	–	
No.1 generator control	9	5	PF3	
No.2 generator control	10	5	PF4	
Inverter control	11	5	P5	
Inverter control	12	5	P6	
Starboard equipment bay lamp	13	5	LL4	
No.5 inverter	14	5	M51	
V.H.F. No.1 set supply	15	20	R1	
V.H.F. No.2 set supply	16	20	R2	
Voltmeter	17	5	V +	
Port generator failure warning lamp	18	10	W1	
Starboard generator failure warning lamp	19	10	W2	
Spare	20	–	–	

TABLE 3 – *continued*

Service	Fuse No.	Rating (amps)	Circuit Ref.	Location
E.C.P. supply	1	160	PP1	M.E.P. (post Mod.3357)
E.C.P. supply	2	160	PP2	
Tail plane trim	3	60	C2	
Spare	4	–	–	
Battery isolation	5	10	P91	
Fire extinguishers	6	20	X1	
Bomb bay stores jettison	7	20	B4	
Spare	8	–	–	
Spare	9	–	–	
Spare	10	–	–	
Spare	11	–	–	
Crash trip control	12	10	X9	
Starboard equipment bay lamp	13	5	LL4	
No.5 inverter	14	5	M51	
V.H.F. No.1 set supply	15	20	R1	
V.H.F. No.2 set supply	16	20	R2	
Voltmeter	17	5	V +	
Port generator failure warning lamp	18	10	W1	
Starboard generator failure warning lamp	19	10	W2	
Spare	20	–	–	
Tail plane isolator	21	5	CC7	E.C.P.
Bomb control and indicator	22	10	B1	
Bomb release	23	5	B2	
Bomb door control	24	10	B3	
Flaps control	25	5	C3	
Flaps indicator	26	5	C4	
Rudder trim control	27	5	C5	
Rudder trim indicator	28	5	C6	
Tail plane position indicator	29	5	C7	
Tail plane trim fine control	30	5	CC5	
Spare	31	–	–	
Spare	32	–	–	
Aileron trim control	33	10	CC1	
Aileron trim indicator	34	5	CC2	
Bombsight head and computor control	35	10	PP4	
Oxygen warning	36	2.5	W5	
Spare	37	–	–	
External air thermometer	38	5	F2	
Bomb bay overload fuel tank aft pump (post Mod.715)	39	20	ZS1	
Bomb bay overload fuel tankport cock (post Mod.715)	40	10	YS1	

TABLE 3 – *continued*

Service	Fuse No.	Rating (amps)	Circuit Ref.	Location
A.M.U. and A.P.I.	41	5	F7	E.C.P.
Cabin air control, port engine air supply actuator	42	5	HH1	
Anti-icing, port engine control	43	10	HH3	
Port engine starting	44	10	J1	
Navigator's periscope mounting	45	5	H8	
Port engine ignition	46	10	J5	
Pilot's re d lamps	47	5	L5	
Pilot's U/V lamps	48	5	L6	
No. 1 inverter control	49	10	M8	
Exhaust gas thermometers	50	5	Q5	
Fuel contents gauge, port wing integral tank	51	5	Q8	
Alighting gear control	52	10	U1	
Alighting gear indication	53	5	U2	
Fuel pressure warning, port engine	54	5	W3	
Fire extinguishers, port engine	55	10	XIP	
Fire extinguisher warning, port engine	56	5	X3	
F24 camera	57	10	K1	
Spare	58	–	–	
Spare	59	–	–	
Inverter No. 5/No. 3 control (pre Mod. 1420)	60	10	M34	
Inverter No. 4 control	61	5	M43	
Turn-and-slip indicator	62	5	F4	
Turn-and-slip indicator	63	5	F5	
I.F.F. Mk. 10 control	64	5	S1	
Air brake control	65	10	C9	
Spare	66	–	–	
Bomb bay overload fuel tank fwd. pump (post Mod. 715)	67	20	ZS2	
Bomb bay overload fuel tank starboard cock (post Mod. 715)	68	10	Y S2	
Cabin air control	69	5	H1	
Cabin air indicator	70	5	H2	
Cabin pressure warning	71	5	H3	
Pitot head heater	72	10	H4	
Vent valve heaters	73	20	H5	
Windscreen heater	74	10	H6	
Canopy de-misting	75	5	H7	
Cabin air control, starboard engine air supply actuator	76	5	HH2	

TABLE 3 – *continued*

Service	Fuse No.	Rating (amps)	Circuit Ref.	Location
Anti-icing, starboard engine control	77	10	HH4	
A.Y.F. radio altimeter	78	10	R7	
Starboard engine starting	79	10	J2	
Spare	80	–	–	
Starboard engine ignition	81	10	J6	
Air bomber's lighting	82	5	L7	
Pilot's red lamps	83	5	L8	
Navigator's lighting	84	5	L9	E.C.P.
Fuel contents gauges, fuselage tanks	85	5	Q7	
Fuel contents gauge, starboard wing integral tank	86	5	Q9	
Intercommunication	87	5	R3	
Intercommunication	88	2.5	R5	
V.H.F. Changeover	89	5	R4	
Fuel pressure warning, starboard engine	90	5	W4	
Fire extinguishers, starboard engine	91	10	X1S	
Spare	92	–	–	
Fire extinguisher warning, starboard engine	93	5	X4	
Wing tip tank jettison	94	10	Y7	
No.2 inverter control	95	10	M7	
Oxygen warning	96	2.5	W6	
Spare	97	–	–	
Spare	98	–	–	
Spare	99	–	–	
Spare	100	–	–	
Oil pressure gauge, port engine	101	2.5	TR21	400 c/s
Spare	102	–	–	Distribution
Oil pressure gauge, starboard engine	103	2.5	TB21	Box
Spare	104	–	–	
Electronic regulator blower motor	105	2.5	NB1	
Rear warning and waveform generator blower motor	106	2.5	SB5	
Electronic regulator blower motor	107	2.5	NR1	
Rear warning and waveform generator blower motor	108	2.5	SR5	
G.M.4B compass amplifier	109	2.5	FR3	
Pilot's altimeter vibrator (post Mod.3747)	110	2.5	FR9	
Zero reader J.B. (Horizon gyro unit) (Post Mod.1447)	111	2.5	FR6	400 c/s
Spare	112	–	–	Fuse box
G.M.4B compass amplifier	113	2.5	FB3	
Navigator's altimeter vibrator (post Mod.3747)	114	2.5	FB9	
Zero reader J.B. (Horizon gyro unit) (post Mod.1447) or Artificial horizon (pre Mod.1447)	115	2.5	FB6	

TABLE 3 - *continued*

Service	Fuse No.	Rating (amps)	Circuit Ref.	Location
Spare	116	—	—	400 c/s Fuse box
Bombsight head	117	5	B5	
Bombsight computor	118	5	B6	
Zero reader (post Mod. 1447)	119	2.5	M85	
G.M.4B compass amplifier	120	2.5	F3	
Bombsight head	121	2.5	BR5	
Bombsight computor	122	2.5	BR6	
Zero reader flight computor (post Mod. 1447)	123	2.5	FR8	
Spare	124	—	—	
Bombsight head	125	2.5	BB5	
Bombsight computor	126	2.5	BB6	
Zero reader flight computor (post Mod. 1447)	127	2.5	FB8	
Spare	128	—	—	
Gee-H power supplies	129	5	S3	1600 c/s Distribution box
Rebecca power supplies	130	5	S4	
Rear warning power supplies	131	5	S5	
Spare	132	—	—	
Gee-H power supplies	133	10	SG3	
Rebecca power supplies	134	5	SG4	
Rear warning power supplies	135	5	SG5	
Terminal SG81 (1600 c/s Dist. box)	136	5	SG8	
I.F.F. Mk. 10 transmitter/receiver	137	5	SG1	
Spare	138	—	—	
Spare	139	—	—	
Spare	140	—	—	
	141			
	142			
	143			
	144			
Turn-and-slip indicator	145	2.5	FX4	Pilot's Console
Spare	146	—	—	
Spare	147	—	—	
Landing lamps	148	5	L3	
Navigation lamps	149	5	L1	
Identification lamp	150	5	LL1	
Taxying lamps	151	10	L2	
Landing lamp filament	152	20	L4	
	153			
	154			

TABLE 3 – *continued*

Service	Fuse No.	Rating (amps)	Circuit Ref.	Location
	155			
	156			
	157			
	158			
	159			
	160			
Canopy jettison	161	40	X5	M.E.P.
Hatch jettison	162	40	X6	
No.1 inverter supply	164	115	M1	Inverter bay (post Mod.1420)
No.2 generator voltage test socket	173	5	P2	M.E.P. (post Mod.2393 and 2340)
No.1 generator voltage test socket	174	5	P1	
No.1 inverter/generator interlock	175	10	M8	
Auxiliary hold-off relay No.1	176	5	PH1	
No.1 generator control	177	10	P11	
No.1 generator control	178	10	P31	
No.2 generator control	179	10	P21	
No.2 generator control	180	10	P41	
No.1 generator failure warning lamp	181	2.5	W11	
No.2 generator failure warning lamp	182	2.5	W21	
Spare	183	–	–	
Fatigue meter (Mod.3883)	184	2.5	U12A	
Generators, crash trip	185	10	X9	
Auxiliary hold-off relay No.2	186	5	PH2	
Spare	173	–	–	M.E.P. (post Mod.3557)
Spare	174	–	–	
Spare	175	–	–	
Generator/No.1 inverter control	176	10	MM8	
No.1 generator control	177	10	P15	
No.1 generator control	178	10	P11	
No.1 generator test	179	5	PT1	
Fatigue meter (Mod.3883)	180	2.5	U12A	
No.2 generator control	181	10	P25	
No.2 generator control	182	10	P21	
No.2 generator test	183	5	PT2	
Spare	184	–	–	
Anti-collision lamps (Mod.3355)	200	5	LL9	Pilot's console

TABLE 3 – *continued*

Service	Fuse No.	Rating (amps)	Circuit Ref.	Location
Spare (Post Mod.3456)	301			E.C.P.
	302			
	303			
	304			
	305			
	306			
	307			
	308			
	309			
	310			
	311			
	312			
	313			
	314			
	315			
	316			

TABLE 4

Lamp filaments, references and location

Service	Location	Ref.No.	No.off	Voltage	Watts
PILOT'S COCKPIT LIGHTING B Mk.6 AIRCRAFT					
Red lamps	Cockpit coaming	5L/9951263	7	24	2.8
Red lamps	Above take-off and console panels	5L/9951263	5	24	2.8
E2A compass lamp	Cockpit coaming	5L/9959211	1	24	2.4
U/V lamps	Cockpit coaming	5L/9952261	4	12	7
Anti-dazzle lamps	Cockpit coaming	5L/9951283	2	28	12
Anti-dazzle lamp (spare)	Cockpit coaming	5L/9951283	1	28	12
Emergency lamps (amber)	Cockpit coaming	5L/9951130	2	2.5	0.75
Power failure warning lamps	Starboard instrument panel	5L/9951273	2	28	3.5
Engine fire warning lamps	Starboard instrument panel	5L/9951272	2	28	3.5
Alighting gear indicator lamps	Port cockpit	◀ 5L/9951286	9	28	2.5 ▶
Fuel pressure warning lamps	Engine instrument panel	5L/9951110	2	6	0.24

TABLE 4 – *continued*

Service	Location	Ref.No.	No. off	Voltage	Watts
PILOT'S COCKPIT LIGHTING B(I) Mk.6 AIRCRAFT					
Red lamps (post Mod.4002)	Cockpit coaming	5L/9951263	6	24	2.8
Red lamps	Above take-off and console panels	5L/9951263	5	24	2.8
E2A compass lamp	Cockpit coaming	5L/9959211	1	24	2.4
U/V lamps (post Mod.4002)	Cockpit coaming	5L/9952261	6	12	7
Anti-dazzle lamps	Cockpit coaming	5L/9951283	2	28	12
Anti-dazzle lamp (spare)	Cockpit coaming	5L/9951283	1	28	12
Emergency lamps (amber)	Cockpit coaming	5L/9951130	2	2.5	0.75
Power failure warning lamps	Starboard instrument panel	5L/9951273	2	28	3.5
Engine fire warning lamps	Starboard instrument panel	5L/9951272	2	28	3.5
Alighting gear indicator lamps	Port cockpit	5L/9951284	9	28	3.5
Fuel pressure warning lamps	Engine instrument panel	5L/9951110	2	6	0.24
Bridge lamps (post Mod.3896)	Above pilot's altimeter	5L/9959118	2	28	0.04
NAVIGATOR'S STATION LIGHTING B Mk.6 & B(I) Mk.6 AIRCRAFT					
Wander lamp, Type C	Port of navigator's station	5L/9952276	1	24	6
Mk.1A lamp	Port of navigator's station	5L/9953271	1	28	7
NAVIGATOR'S STATION LIGHTING B(I) Mk.6 AIRCRAFT					
Bridge lamps	Navigator's instrument panel	5L/9959118(Thorn)	6	28	0.04
Pillar lamps	Navigator's instrument panel	5L/9959118(Thorn)	10	28	0.04
Lamp, Type C No.2	Navigator's instrument panel	5L/9951283(Thorn)	1	28	3.5
Lamp, Type C No.2	Port of navigator's station	5L/9951283(Thorn)	1	28	3.5
AIR BOMBER'S REAR STATION LIGHTING B Mk.6 & B(I) Mk.6 AIRCRAFT					
Wander lamp, Type C	Starboard of air bomber's station	5L/9952257	1	24	6
AIR BOMBER'S FORWARD STATION LIGHTING B Mk.6 & B(I) Mk.6 AIRCRAFT					
Mk.1A lamp	Nose roof	5L/9953271	1	28	7
Hand lamp	Forward nose	5L/9951263	1	24	2.8
SERVICING LIGHTING B Mk.6 & B(I) Mk.6 AIRCRAFT					
Inspection Lamp, Mk.2	Starboard of air bomber's rear station	5L/9953271	1	28	7
Mk.1A lamp	Starboard equipment compartment	5L/9953271	1	28	7
	◀ Bomb bay	5L/9953271	4	28	7 ▶
NAVIGATION LIGHTING B Mk.6 & B(I) Mk.6 AIRCRAFT					
Wing lamps	Wing-tips port & starboard	5L/9952431	2	28	24
Tail lamps	Above and below tail	5L/9952276	2	24	10
Identification lamp	Underside fuselage	5L/9952604	1	24	80
Taxying lamps	Wing-tips port and starboard	5L/9952511	2	24	60
Landing lamp	Underside port wing	5L/9954717	1	26	240
Anti-collision lamps (Mod.3355)	Above and below fuselage (frames 32-34)	5L/9952445	2	28	40

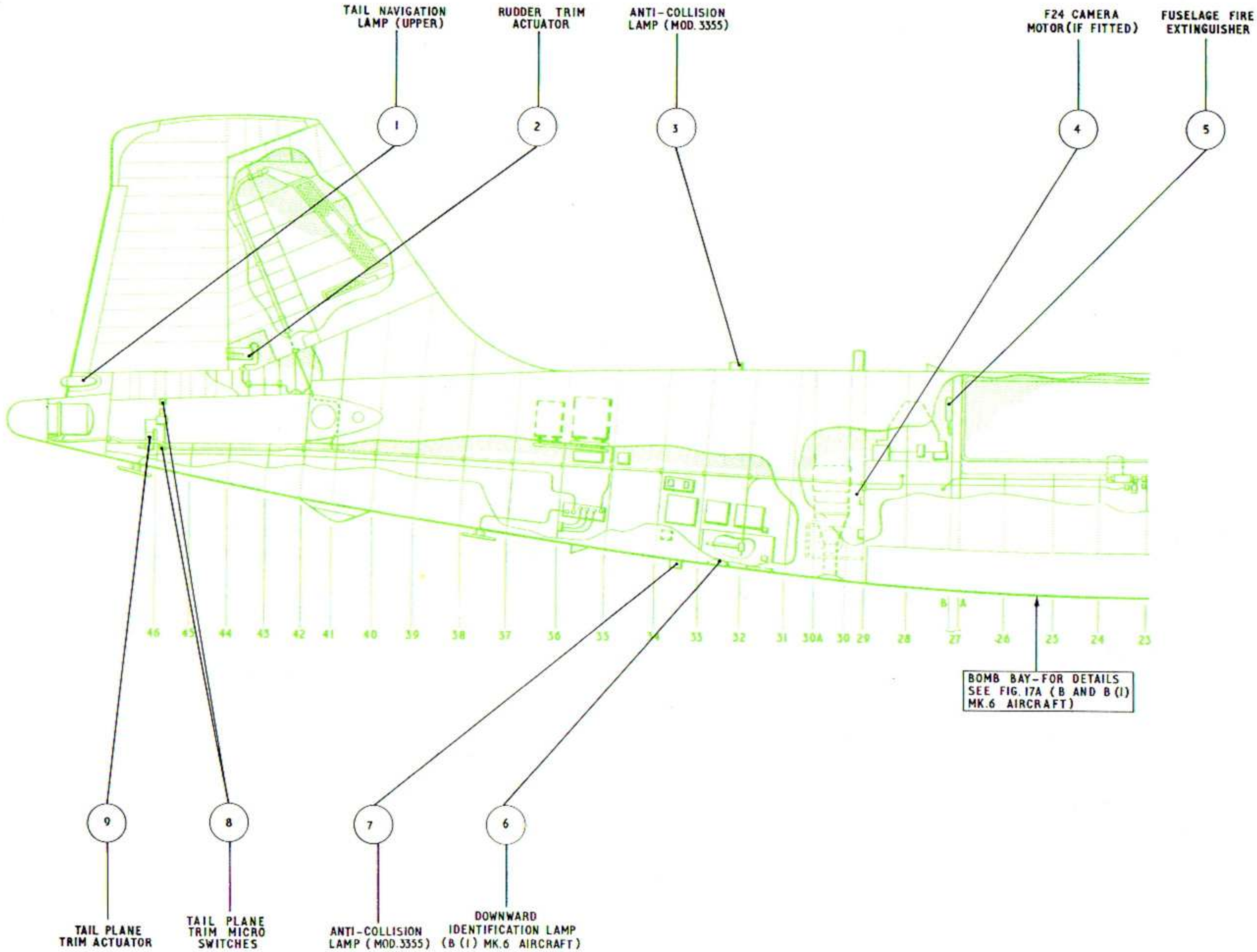


Fig. 1. Electrical installation – port fuselage

◀ *(Mod. 4329 embodied)* ▶

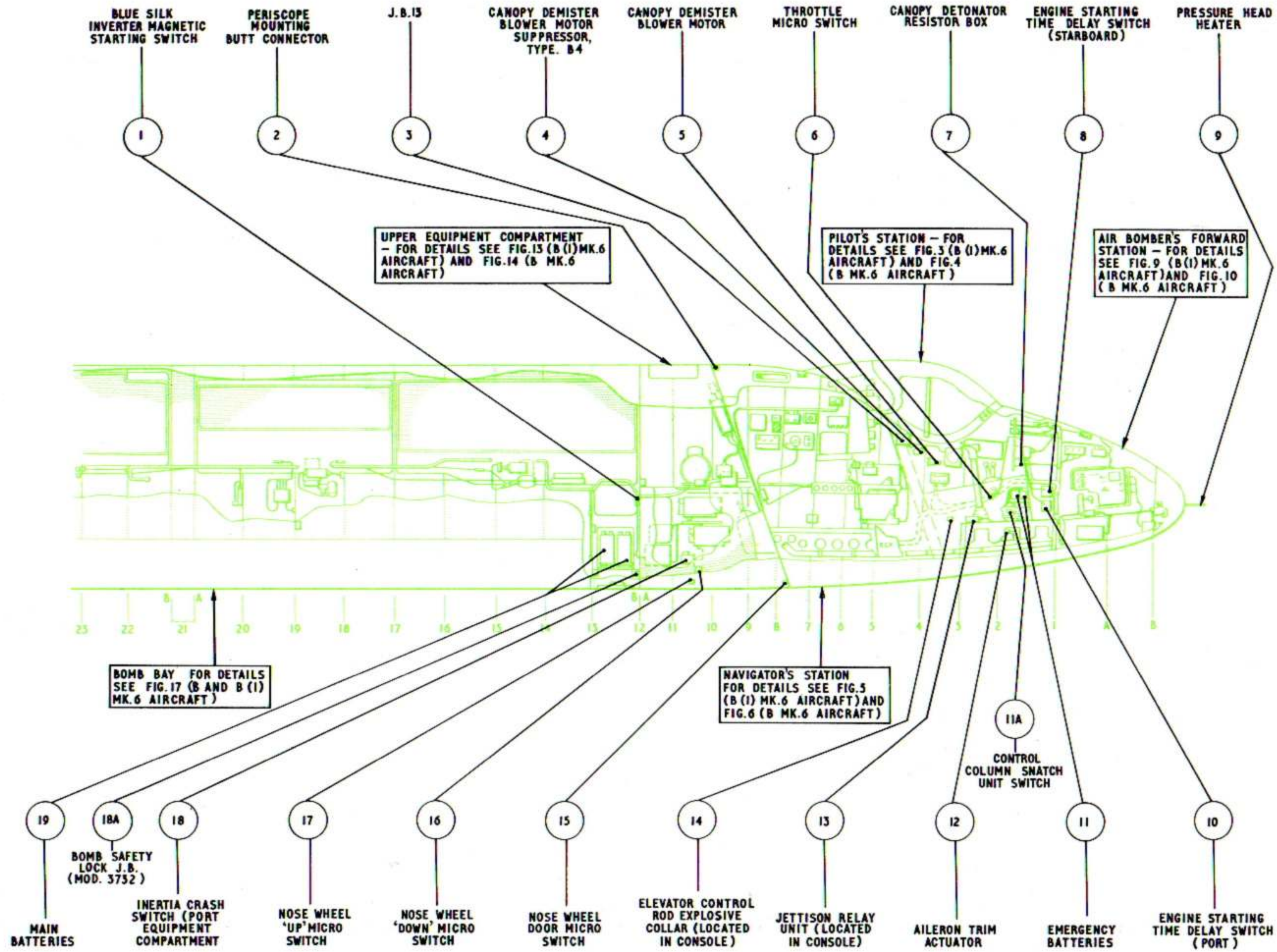


Fig. 1A. Electrical installation – port fuselage

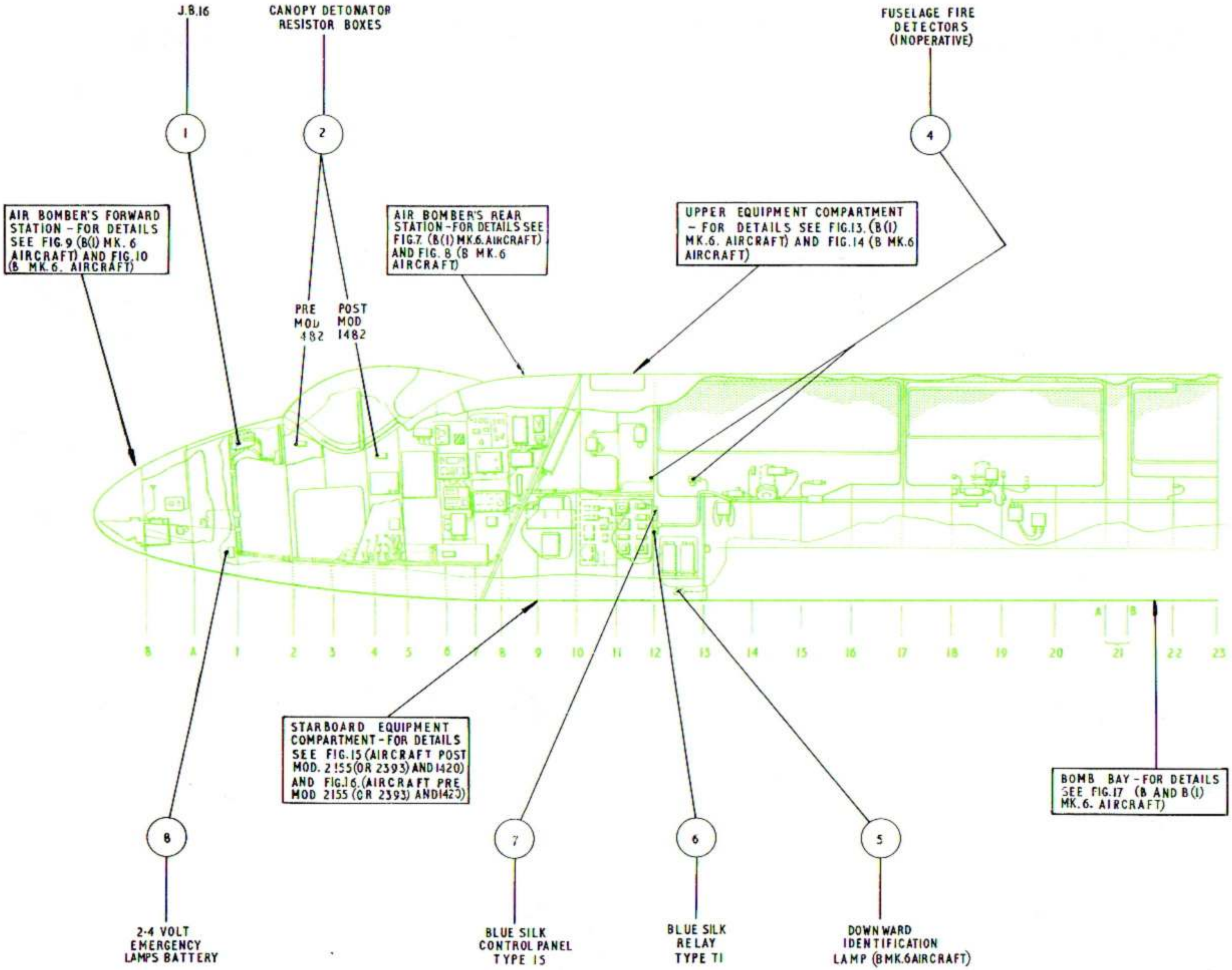


Fig. 2. Electrical installation – starboard fuselage

◀ *(Mod. 3930 embodied)* ▶

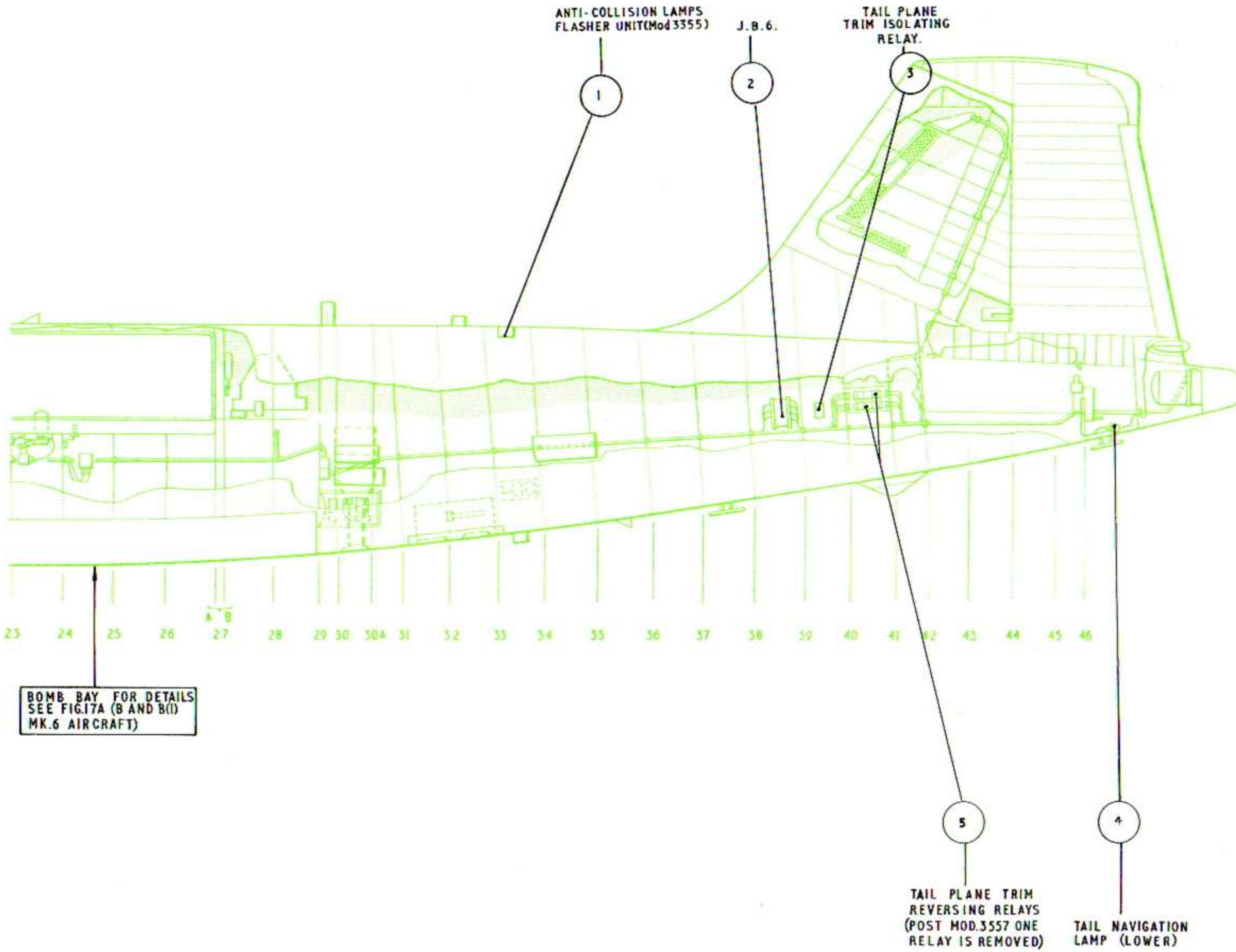


Fig. 2A. Electrical installation – starboard fuselage

◀ *(Mod. 4329 embodied)* ▶

KEY TO FIG. 3 (COCKPIT B(I) Mk.6 AIRCRAFT)

1 CONSOLE FUSE PANEL
2 BOMB/FLARE DOORS POSITION INDICATOR
3 BOMB/FLARE DOORS CONTROL SWITCH
4 PILOT'S EMERGY JETTISON SWITCH
5 LANDING LAMP SWITCH
6 TAXYING LAMPS SWITCH
7 ANTI-COLLISION LAMPS SWITCH (MOD.3355)
8 NAVIGATION LAMPS SWITCH
9 EMERGENCY WING STORES JETTISON SWITCH
10 BOMB RELEASE SAFETY LOCK WARNING LAMPS, LOCKED – UNLOCKED (MOD.3732)
11 RED LAMP
12 BOMB RELEASE SAFETY LOCK SWITCH (MOD.3732)
13 CANOPY JETTISON SWITCH
14 RED LAMP
15 CONSOLE PANEL RED LAMPS DIMMER SWITCH
16 RED LAMP
17 ALIGHTING GEAR SELECTOR SWITCH
18 WING TIP FUEL TANK JETTISON SWITCH
19 RED LAMP
20 FLAPS CONTROL SWITCH
21 RED LAMP
22 U/V LAMP
23 RED LAMP
24 ANTI-DAZZLE LAMP
25 TAKE-OFF PANEL RED LÁMPS DIMMER SWITCH
26 D.V. WINDOW HEATER
27
28
29
30 RED LAMP
31 ANTI-DAZZLE LAMPS RESISTANCE UNITS
32 U/V LAMP
33 E2A COMPASS LAMP
34 U/V LAMP
35 GUNSIGHT WARNING LIGHT (INOPERATIVE)
36 Y/R ON-OFF SWITCH (INOPERATIVE)
37 T145 WARNING LAMP (INOPERATIVE)
38 NORMAL/ALTERNATE SWITCH (INOPERATIVE)
39 Y/R GYRO CAGING TEST SWITCH (INOPERATIVE)
40 ANTI-DAZZLE LAMPS SWITCH
41 EMERGENCY LAMPS CONTROL SWITCH
41A FLARES RELEASE SWITCH
42 PORT ENGINE CABIN AIR CONTROL SWITCH
43 PORT ENGINE FIRE EXTINGUISHER SWITCH/INDICATOR
44 RED LAMP
45 ENGINE FIRE INDICATOR TEST SWITCH
46 300 GAL OVERLOAD FUEL TANK. CONTROL SWITCHES
47 STARBOARD ENGINE FIRE EXTINGUISHER SWITCH/INDICATOR
48 CABIN HEATING CONTROL SWITCH
49 CABI N PRESSURE WARNING HORN OVERRIDE SWITCH
50 PORT GENERATOR WARNING LAMP
51 U/V LAMP
52 STARBOARD GENERATOR WARNING LAMP
53 RED LAMP
54 BUS BAR VOLTMETER
55 STARBOARD ENGINE CABIN AIR CONTROL SWITCH
56 STARBOARD COCKPIT U/V LAMPS DIMMER SWITCH
57 ANTI-DAZZLE LAMP
58 EMERGENCY LAMP
59 CANOPY EXPLOSIVE BOLTS
60 RED LAMP
61 U/V LAMP
62 U/V LAMP (MOD.4002)
63 RED LAMP
64 RED LAMP
65 AIR BOMBER'S REMOTE OXYGEN INDICATOR
66 STARBOARD INSTRUMENT PANEL
67 STARBOARD COCKPIT RED LAMPS DIMMER SWITCH
68 U/V LAMP (MOD.4002)
69 RED LAMP
70 EMERGENCY LAMP
71 ENGINE INSTRUMENT PANEL
72 FLIGHT INSTRUMENTS NORMAL/STANDBY INDICATOR
73 RED LAMP
74 RED LAMP
75 PILOT'S OXYGEN INDICATOR
76 TURN-AND-SLIP NORMAL/EMERGENCY SUPPLY SWITCH
77 FLIGHT INSTRUMENT PANEL
78 MIDGET PANEL LAMPS (MOD.3896)
79 STARBOARD ENGINE CARTRIDGE FIRING SELECTOR SWITCH
80 STARBOARD ENGINE IGNITION SWITCH
81 ENGINE STARTER PANEL
82 CONTROL COLUMN
83 PORT ENGINE IGNITION SWITCH
84 PORT ENGINE CARTRIDGE FIRING SELECTOR SWITCH
85 STARBOARD ENGINE MASTER SWITCH
86 PORT ENGINE MASTER SWITCH
87 ALIGHTING GEAR MASTER SWITCH
88 ALIGHTING GEAR POSITION INDICATOR
89 ALIGHTING GEAR INSTRUMENT PANEL
90 TAKE-OFF PANEL
91 ENGINE RELIGHT SWITCHES
91A PORT COCKPIT RED LAMPS DIMMER SWITCH
92 RUDDER TRIM SWITCHES
93 GUNSIGHT MASTER SWITCH
94 PORT COCKPIT U/V LAMPS DIMMER SWITCH
95 AILERON TRIM CONTROL SWITCH
96 EXTERNAL LAMPS MASTER SWITCH
97 DOWNWARD IDENTIFICATION LAMP STEADY SWITCH
98 PORT ENGINE ANTI-ICING INDICATOR
99 DOWNWARD IDENTIFICATION LAMP MORSE SWITCH
100 PORT ENGINE ANTI-ICING SWITCH
101 STARBOARD ENGINE ANTI-ICING INDICATOR
102 STARBOARD ENGINE ANTI-ICING SWITCH
103 PILOT'S CONSOLE
104 ANTI-COLLISION LAMPS FUSE No.200 (MOD.3355)

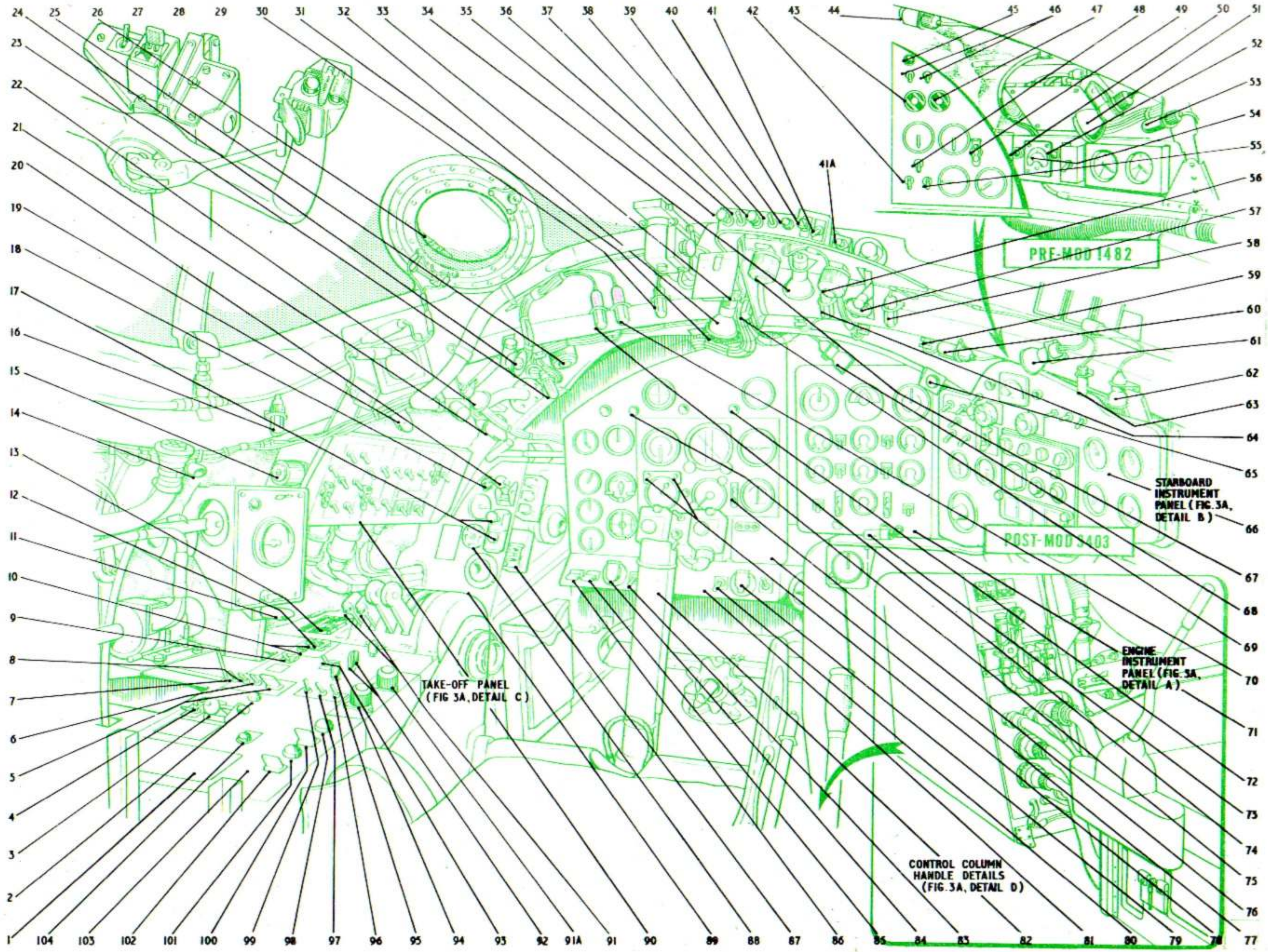


FIG. 3. ELECTRICAL INSTALLATION - COCKPIT (B (I) MK.6. AIRCRAFT)

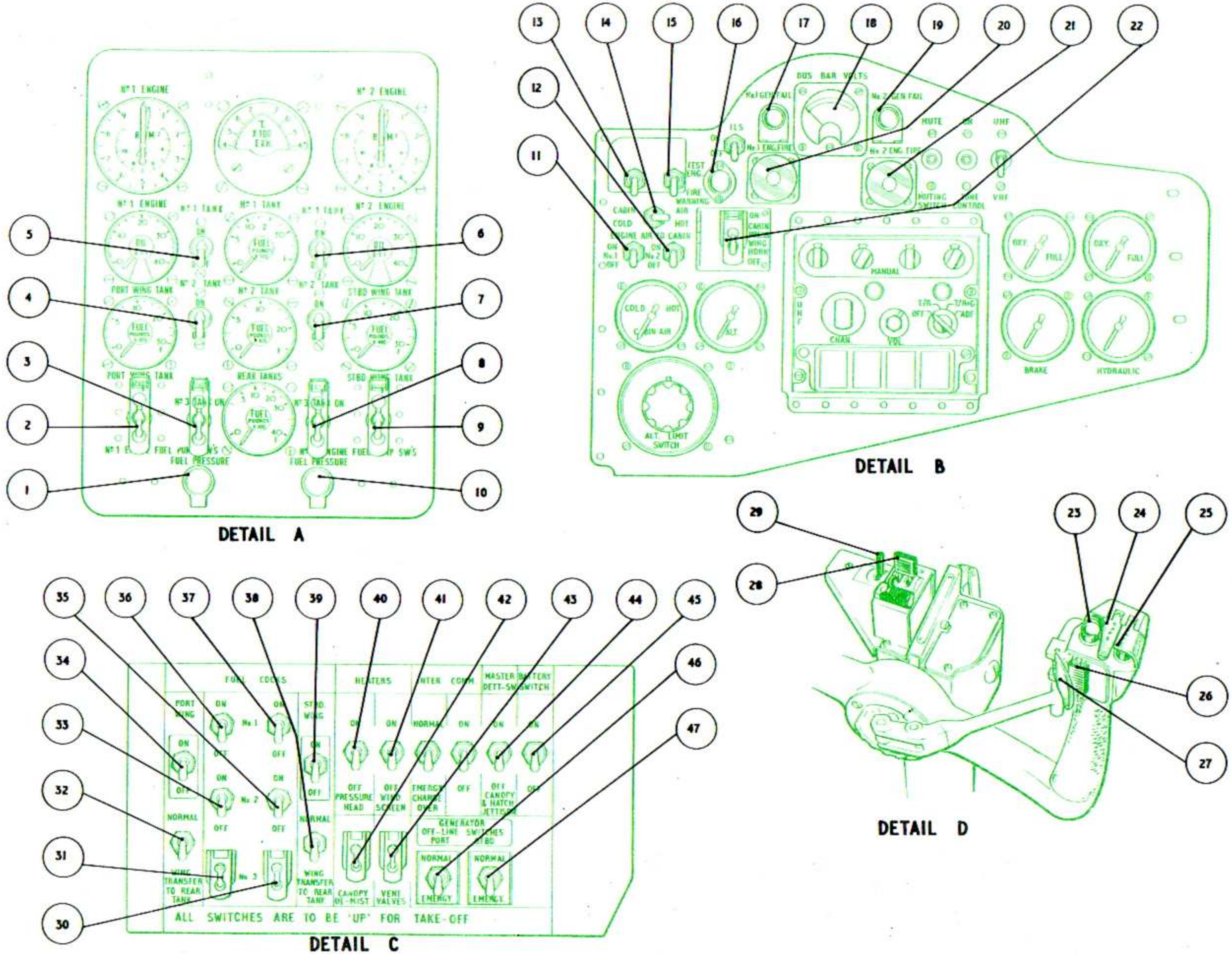


FIG. 3A. COCKPIT PANEL DETAILS - B(I) MK.6 AIRCRAFT

◀ MOD. 4054 EMBODIED ▶

KEY TO FIG.3A (COCKPIT PANEL DETAILS – B(I) MK.6 AIRCRAFT)

1 PORT ENGINE FUEL PRESSURE WARNING LAMP
2 PORT WING INTEGRAL TANK PUMP SWITCH
3 NO.3 TANK PORT FUEL PUMP SWITCH
4 NO.2 TANK PORT FUEL PUMP SWITCH
5 NO.1 TANK PORT FUEL PUMP SWITCH
6 NO.1 TANK STARBOARD FUEL PUMP SWITCH
7 NO.2 TANK STARBOARD FUEL PUMP SWITCH
8 NO.3 TANK STARBOARD FUEL PUMP SWITCH
9 STARBOARD WING INTEGRAL TANK PUMP SWITCH
10 STARBOARD ENGINE FUEL PRESSURE WARNING LAMP
11 PORT ENGINE CABIN AIR CONTROL SWITCH
12 STARBOARD ENGINE CABIN AIR CONTROL SWITCH
13 OVERLOAD FUEL TANK FORWARD PUMP/PORT COCK SWITCH
14 CABIN HEATING CONTROL SWITCH
15 OVERLOAD FUEL TANK REAR PUMP/STARBOARD COCK SWITCH
16 ENGINE FIRE INDICATOR TEST SWITCH
17 NO.1 GENERATOR FAILURE LAMP
18 BUS BAR VOLTMETER
19 NO.2 GENERATOR FAILURE LAMP
20 PORT ENGINE FIRE EXTINGUISHER SWITCH/INDICATOR
21 STARBOARD ENGINE FIRE EXTINGUISHER SWITCH/INDICATOR
22 CABIN PRESSURE WARNING HORN OVERRIDE SWITCH
◀ 23 G90 CAMERA CONTROL SWITCH
24 GUNS/S.W.S. FIRING SWITCH AND ▶ SAFETY FLAP
25 BOMBS/R.P. FIRING SWITCH
26 TAIL PLANE CONTROL FINE TRIM SWITCH
27 TAIL PLANE CONTROL CUT-IN SWITCH
28 AIR BRAKES SWITCH
29 F95 CAMERA CONTROL SWITCH
30 No.3 TANK STARBOARD FUEL COCK SWITCH
31 NO.3 TANK PORT FUEL COCK SWITCH
32 PORT WING INTEGRAL TANK TO NO.3 FUEL TANK TRANSFER COCK SWITCH
33 NO.2 TANK PORT FUEL COCK SWITCH
34 PORT WING INTEGRAL TANK FUEL COCK SWITCH
35 NO.2 TANK STARBOARD FUEL COCK SWITCH
36 NO.1 TANK PORT FUEL COCK SWITCH
37 NO.1 TANK STARBOARD FUEL COCK SWITCH
38 STARBOARD WING INTEGRAL TANK TO NO.3 FUEL TANK TRANSFER COCK SWITCH
39 STARBOARD WING INTEGRAL TANK FUEL COCK SWITCH
40 PRESSURE HEAD HEATER CONTROL SWITCH
41 D.V. WINDOW HEATER CONTROL SWITCH
42 CANOPY DE-MISTING CONTROL SWITCH
43 WING INTEGRAL FUEL TANKS VENT VALVE HEATERS CONTROL SWITCH
44 CANOPY AND HATCH JETTISON MASTER SWITCH
45 BATTERY ISOLATION SWITCH
46 PORT GENERATOR OFF-LINE SWITCH (MOD.3357)
47 STARBOARD GENERATOR OFF-LINE SWITCH (MOD.3357)

KEY TO FIG.4 (COCKPIT B MK.6 AIRCRAFT)

1 BOMB DOORS POSITION INDICATOR
2 BOMB DOORS CONTROL SWITCH
3 EMERGENCY BOMB JETTISON SWITCH
4 LANDING LAMP SWITCH
5 ANTI-COLLISION LAMPS SWITCH (MOD.3355)
6 NAVIGATION LAMPS SWITCH
7 TAXYING LAMPS SWITCH
8 RED LAMP
9 CANOPY JETTISON SWITCH
10 ENGINE RELIGHT SWITCHES
11 RED LAMP
12 CONSOLE/TAKE-OFF PANEL RED LAMPS DIMMER SWITCH
13 ALIGHTING GEAR SELECTOR SWITCH
14 RED LAMP
15 WING-TIP FUEL TANK JETTISON SWITCH
16 FLAPS CONTROL SWITCH
17 RED LAMP
18 RED LAMP
19 U/V LAMP
20 RED LAMP
21 ANTI-DAZZLE LAMP
22 D.V. WINDOW HEATER
23 RED LAMP
24 U/V LAMPS DIMMER SWITCH
25 RED LAMPS DIMMER SWITCH
26 U/V LAMP
27 ANTI-DAZZLE LAMPS SWITCH
28 EMERGENCY LAMPS CONTROL SWITCH
29 RED LAMP
30 RED LAMPS DIMMER SWITCH
31 U/V LAMP
32 RED LAMP
33 U/V LAMPS DIMMER SWITCH
34 PORT ENGINE CABIN AIR CONTROL SWITCH
35 PORT ENGINE FIRE EXTINGUISHER SWITCH/INDICATOR
36 RED LAMP
37 ENGINE FIRE INDICATOR TEST SWITCH
38 BOMB BAY OVERLOAD FUEL TANK CONTROL SWITCHES
39 STARBOARD ENGINE FIRE EXTINGUISHER SWITCH/INDICATOR
40 CABIN HEAT CONTROL SWITCH
41 STARBOARD ENGINE CABIN AIR CONTROL SWITCH
42 CABIN PRESSURE WARNING HORN OVERRIDE SWITCH
43 PORT GENERATOR WARNING LAMP
44 BUS BAR VOLTMETER
45 U/V LAMP
46 STARBOARD GENERATOR WARNING LAMP
47 RED LAMP
48 STARBOARD INSTRUMENT PANEL
49 ANTI-DAZZLE LAMP
50 EMERGENCY LAMP
51 RED LAMP
52 U/V LAMP
53 RED LAMP
54 CANOPY EXPLOSIVE BOLTS
55 STARBOARD INSTRUMENT PANEL
56 RED LAMP
57 RED LAMP
58 ANTI-DAZZLE LAMPS RESISTANCE UNITS
59 EMERGENCY LAMP
60 FLIGHT INSTRUMENTS NORMAL/ STANDBY INDICATOR
61 ENGINE INSTRUMENT PANEL
62 CONSOLE/TAKE-OFF PANEL RED LAMPS DIMMER SWITCH
63 PILOT'S OXYGEN INDICATOR
64 TURN-AND-SLIP INDICATOR NORMAL/ EMERGENCY SUPPLY SWITCH
65 FLIGHT INSTRUMENT PANEL
66 ENGINE STARTER PANEL
67 STARBOARD ENGINE CARTRIDGE FIRING SELECTOR SWITCH
68 STARBOARD ENGINE IGNITION SWITCH
69 CONTROL COLUMN
70 PORT ENGINE IGNITION SWITCH
71 PORT ENGINE CARTRIDGE FIRING SELECTOR SWITCH
72 STARBOARD ENGINE MASTER SWITCH
73 PORT ENGINE MASTER SWITCH
74 ALIGHTING GEAR MASTER SWITCH
75 ALIGHTING GEAR POSITION INDICATOR
76 ALIGHTING GEAR INSTRUMENT PANEL
77 TAKE-OFF PANEL
78 RUDDER TRIM CONTROL SWITCHES
79 AILERON TRIM CONTROL SWITCH
80
81 EXTERNAL LIGHTS MASTER SWITCH
82 DOWNWARD IDENTIFICATION LAMP STEADY SWITCH
83 DOWNWARD IDENTIFICATION LAMP MORSE SWITCH
84 PORT ENGINE ANTI-ICING INDICATOR
85 PORT ENGINE ANTI-ICING SWITCH
86 STARBOARD ENGINE ANTI-ICING INDICATOR
87 STARBOARD ENGINE ANTI-ICING SWITCH
88 PILOT'S CONSOLE
89 ANTI-COLLISION LAMPS FUSE (NO.200) (MOD.3355)
90 CONSOLE FUSE PANEL

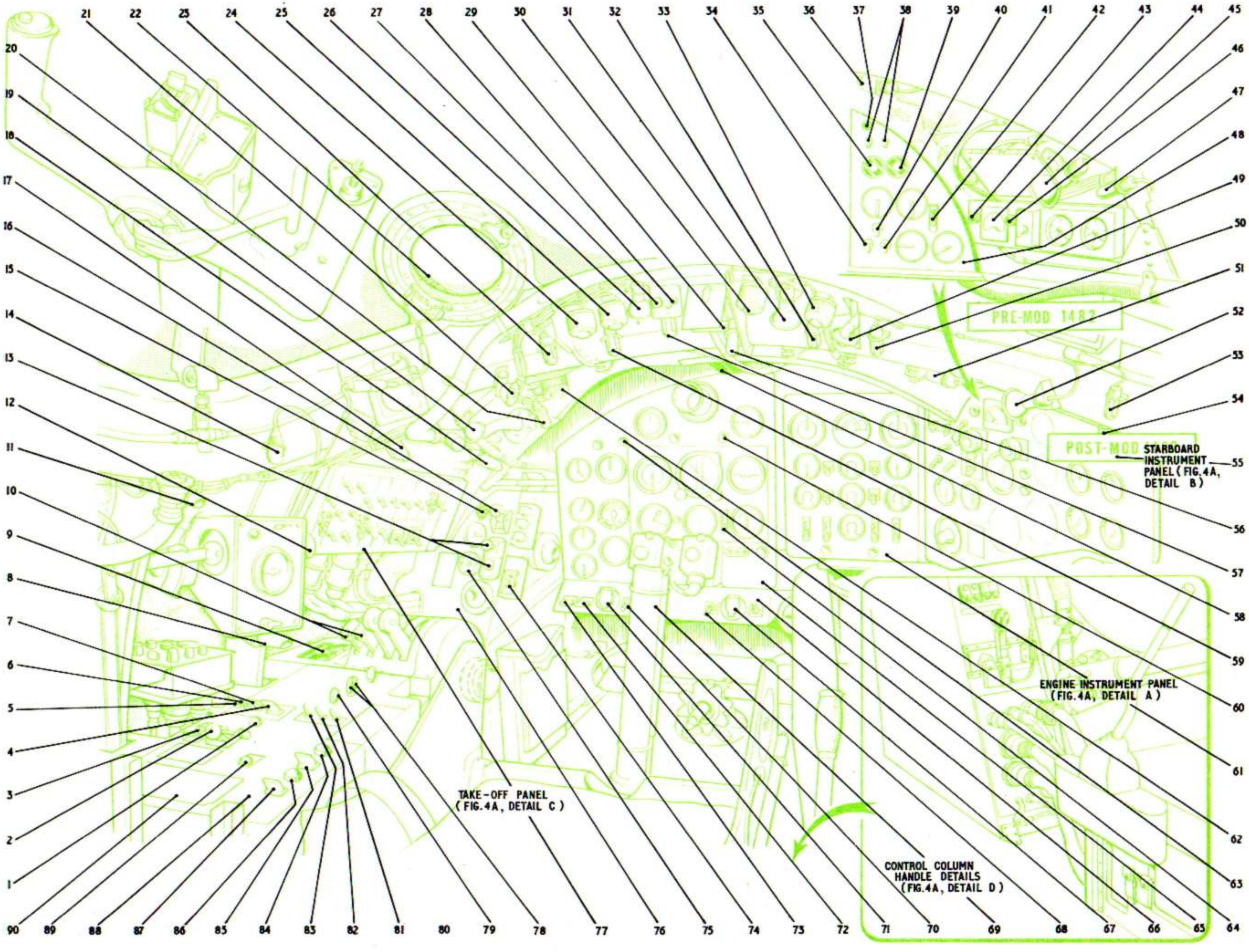


Fig. 4. Electrical installation – cockpit (B Mk.6 aircraft)

◀ *(Mod.4051 embodied)* ▶

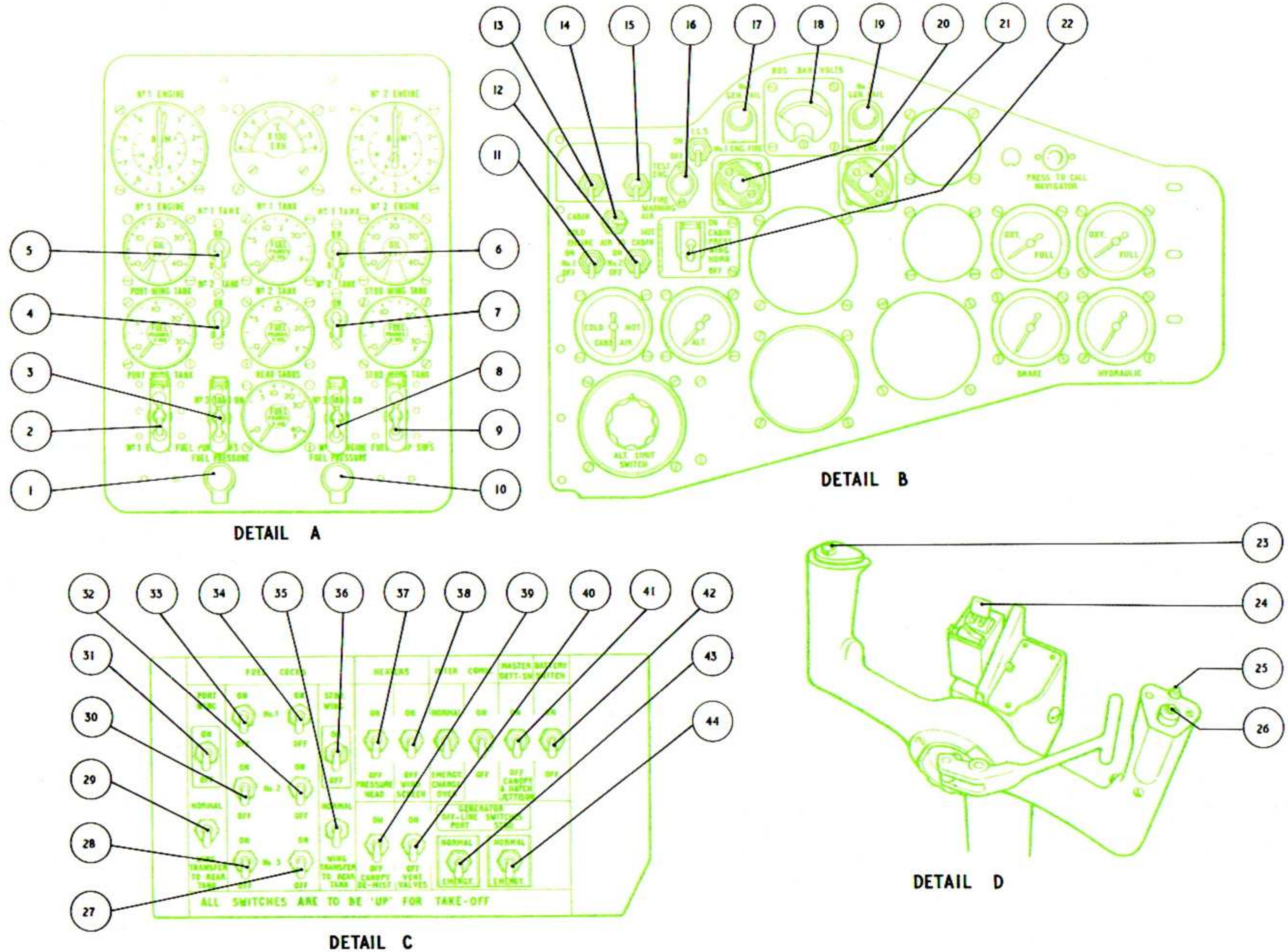


Fig. 4A. Cockpit panel details – (B Mk.6 aircraft)

KEY TO FIG.4A (COCKPIT PANEL DETAILS – B MK.6 AIRCRAFT)

1 PORT ENGINE FUEL PRESSURE WARNING LAMP
2 PORT WING INTEGRAL TANK PUMP SWITCH
3 NO.3 TANK PORT FUEL PUMP SWITCH
4 NO.2 TANK PORT FUEL PUMP SWITCH
5 NO.1 TANK PORT FUEL PUMP SWITCH
6 NO.1 TANK STARBOARD FUEL PUMP SWITCH
7 NO.2 TANK STARBOARD FUEL PUMP SWITCH
8 NO.3 TANK STARBOARD FUEL PUMP SWITCH
9 STARBOARD WING INTEGRAL TANK PUMP SWITCH
10 STARBOARD ENGINE FUEL PRESSURE WARNING LAMP
11 PORT ENGINE CABIN AIR CONTROL SWITCH
12 STARBOARD ENGINE CABIN AIR CONTROL SWITCH
13 OVERLOAD FUEL TANK FORWARD PUMP/PORT COCK SWITCH
14 CABIN HEATING CONTROL SWITCH
15 OVERLOAD FUEL TANK REAR PUMP/ STARBOARD COCK SWITCH
16 ENGINE FIRE INDICATOR TEST SWITCH
17 NO.1 GENERATOR FAILURE LAMP
18 BUS BAR VOLTMETER
19 NO.2 GENERATOR FAILURE LAMP
20 PORT ENGINE FIRE EXTINGUISHER SWITCH/INDICATOR
21 STARBOARD ENGINE FIRE EXTINGUISHER SWITCH/INDICATOR
22 CABIN PRESSURE WARNING HORN OVERRIDE SWITCH
23 BOMB RELEASE SWITCH
24 AIR BRAKES SWITCH
25 TAIL PLANE CONTROL FINE TRIM SWITCH
26 TAIL PLANE CONTROL CUT-IN SWITCH
27 NO.3 TANK STARBOARD FUEL COCK SWITCH
28 NO.3 TANK PORT FUEL COCK SWITCH
29 PORT WING INTEGRAL TANK TO NO.3 FUEL TANK TRANSFER COCK SWITCH
30 NO.2 TANK PORT FUEL COCK SWITCH
31 PORT WING INTEGRAL TANK FUEL COCK SWITCH
32 NO.2 TANK STARBOARD FUEL COCK SWITCH
33 NO.1 TANK PORT FUEL COCK SWITCH
34 NO.1 TANK STARBOARD FUEL COCK SWITCH
35 STARBOARD WING INTEGRAL TANK TO NO.3 FUEL TANK TRANSFER COCK SWITCH
36 STARBOARD WING INTEGRAL TANK FUEL COCK SWITCH
37 PRESSURE HEAD HEATER CONTROL SWITCH
38 D.V. WINDOW HEATER CONTROL SWITCH
39 CANOPY DE-MISTING CONTROL SWITCH
40 WING INTEGRAL FUEL TANKS VENT VALVE HEATERS CONTROL SWITCH
41 CANOPY AND HATCH JETTISON MASTER SWITCH
42 BATTERY ISOLATION SWITCH
43 PORT GENERATOR OFF-LINE SWITCH (MOD.3357)
44 STARBOARD GENERATOR OFF-LINE SWITCH (MOD.3357)

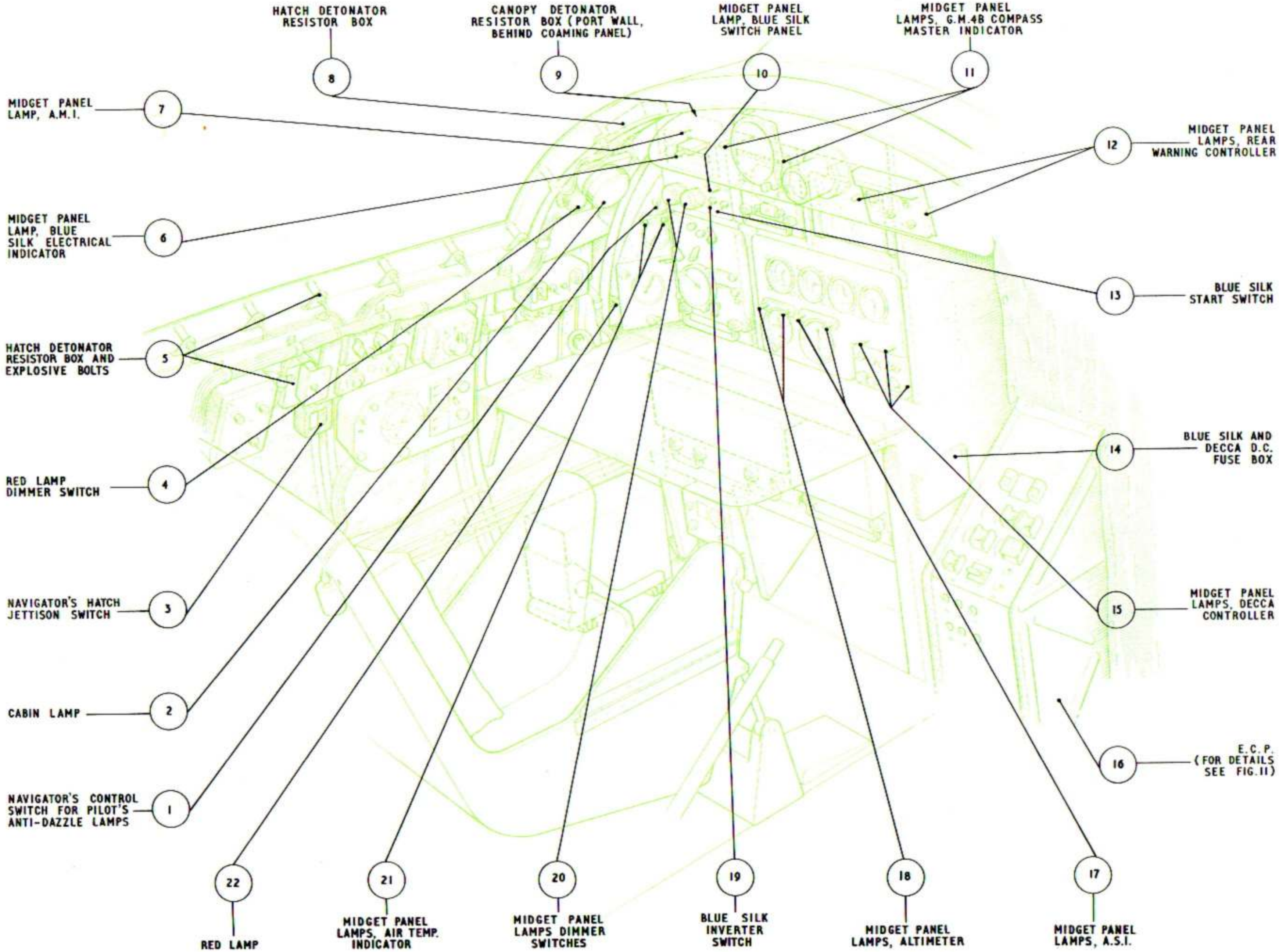


Fig. 5. Electrical installation – navigator's station (B (I) Mk.6 aircraft)

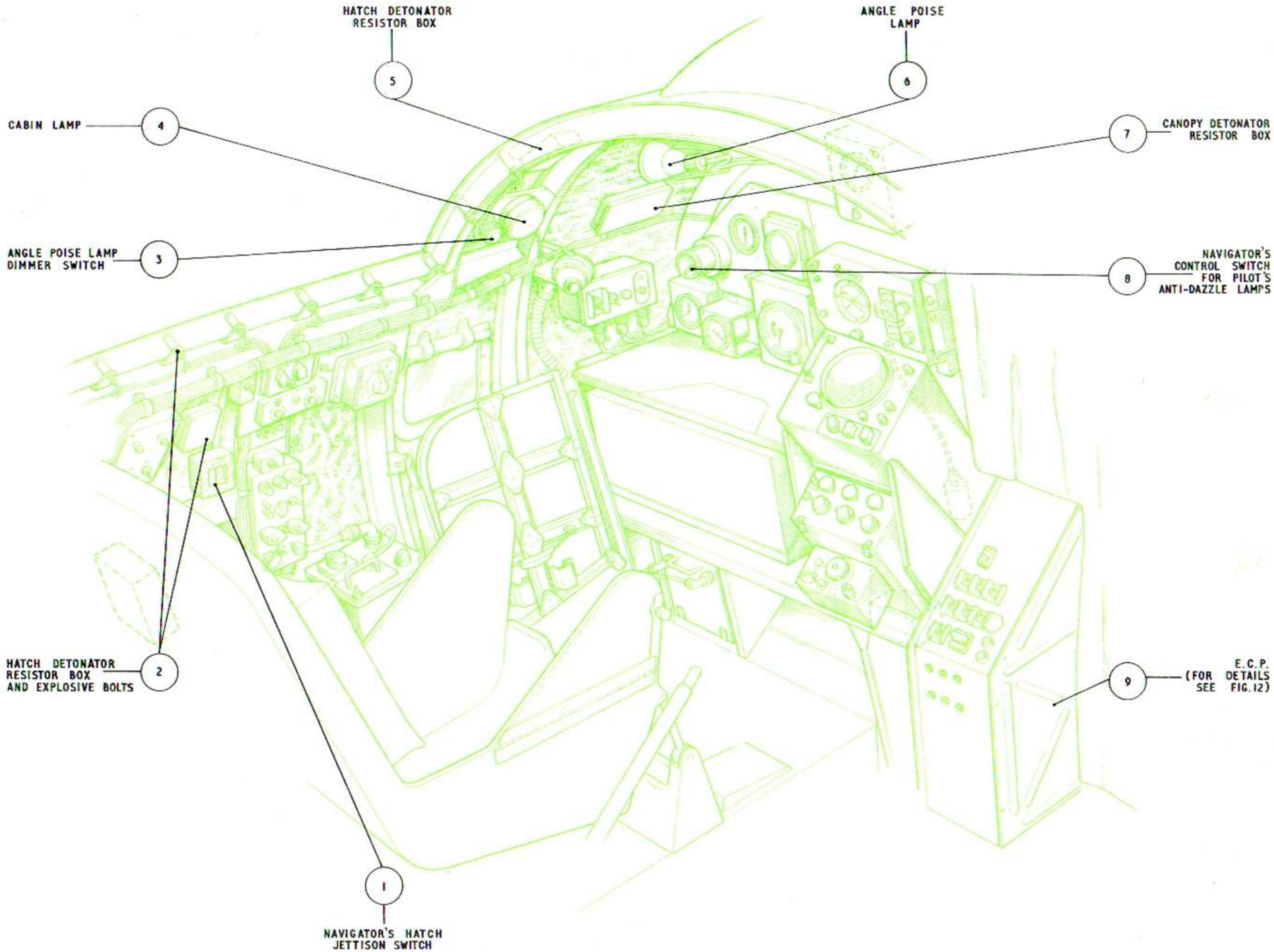


Fig. 6. Electrical installation – navigator's station (B Mk.6 aircraft)

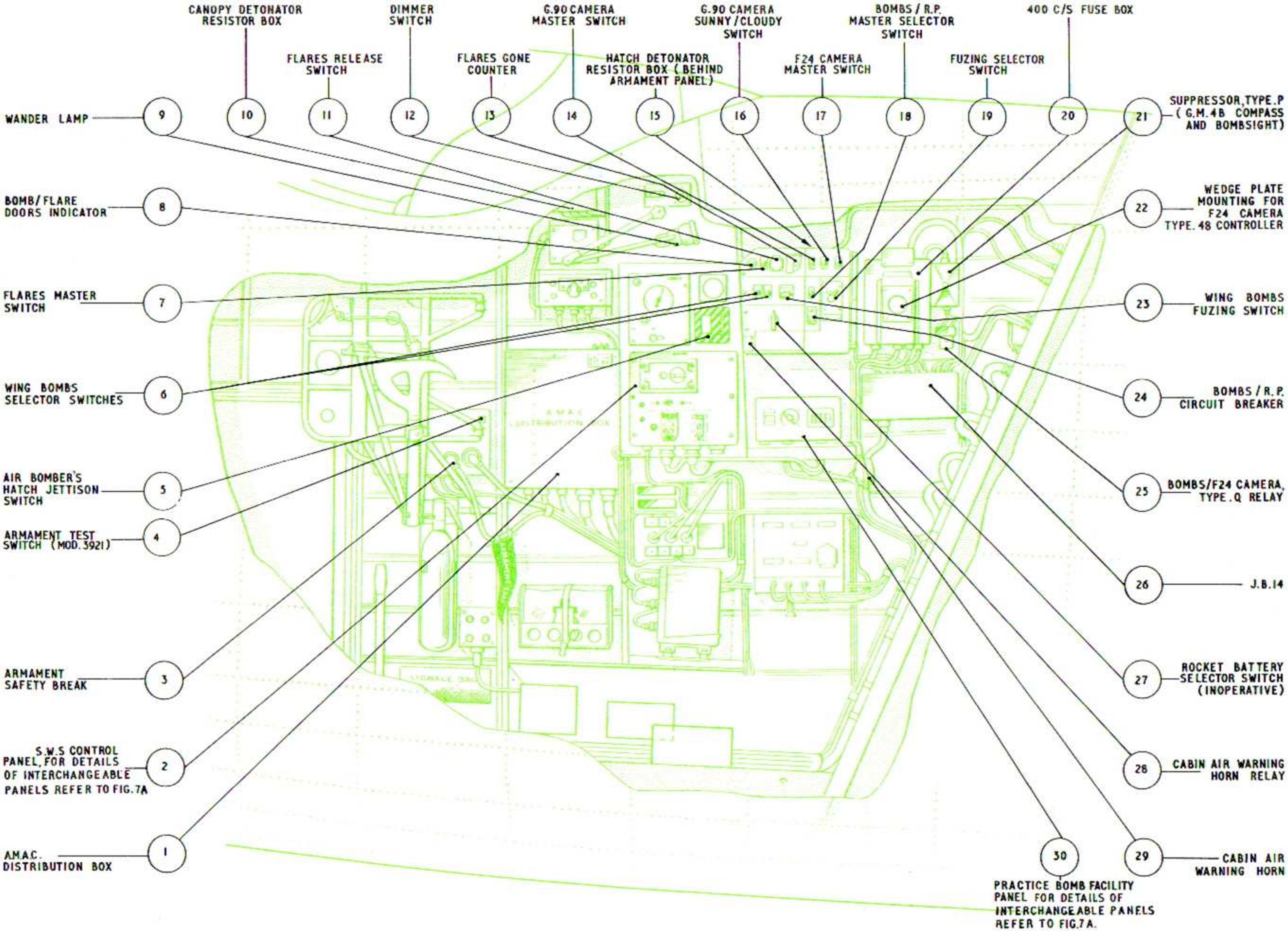


Fig. 7. Electrical installation – air bomber's rear station (B (I) Mk.6 aircraft)

◀ *(Mod. 3930, 4329 and 4345 embodied)* ▶

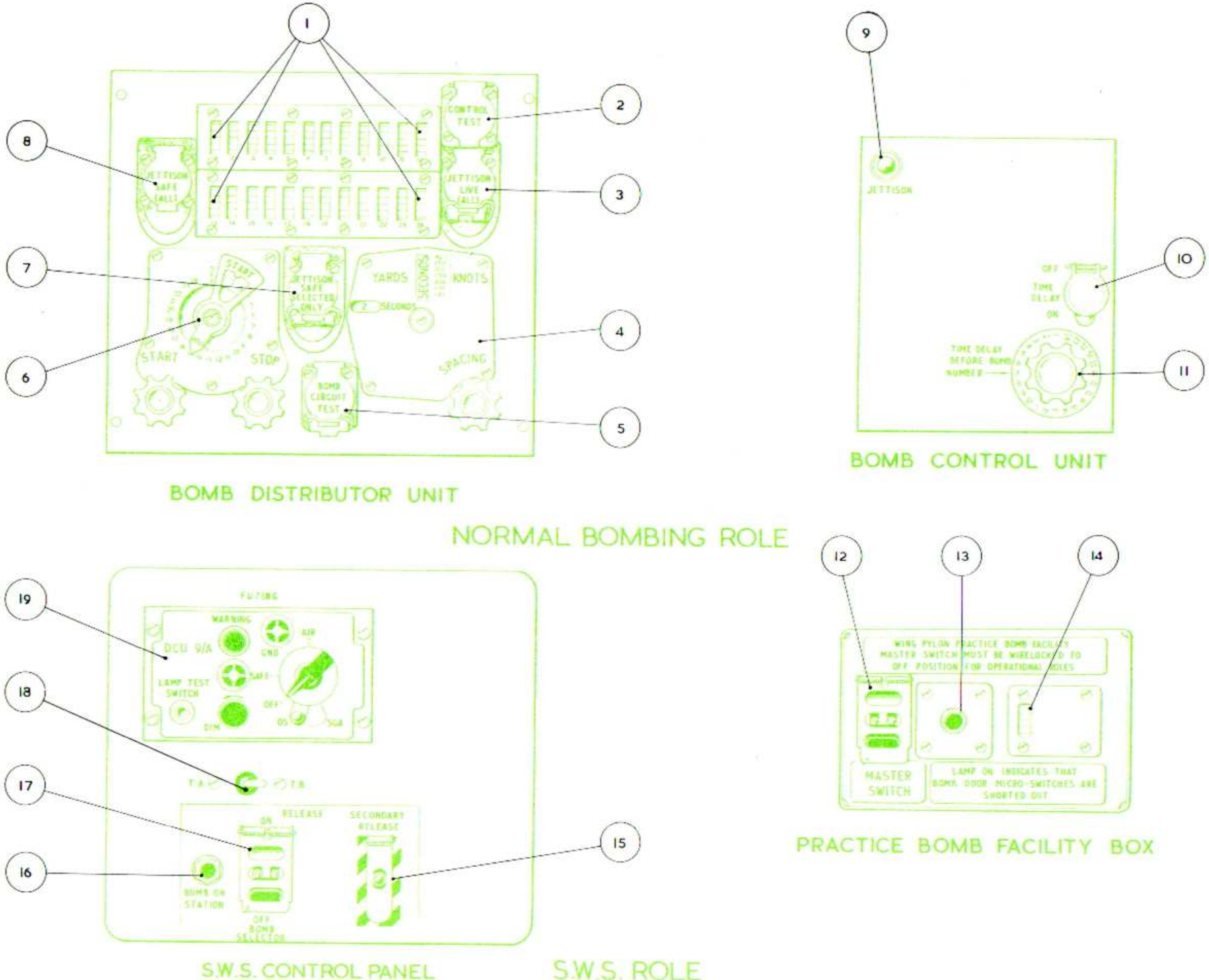


Fig. 7A. Interchangeable bomb panels

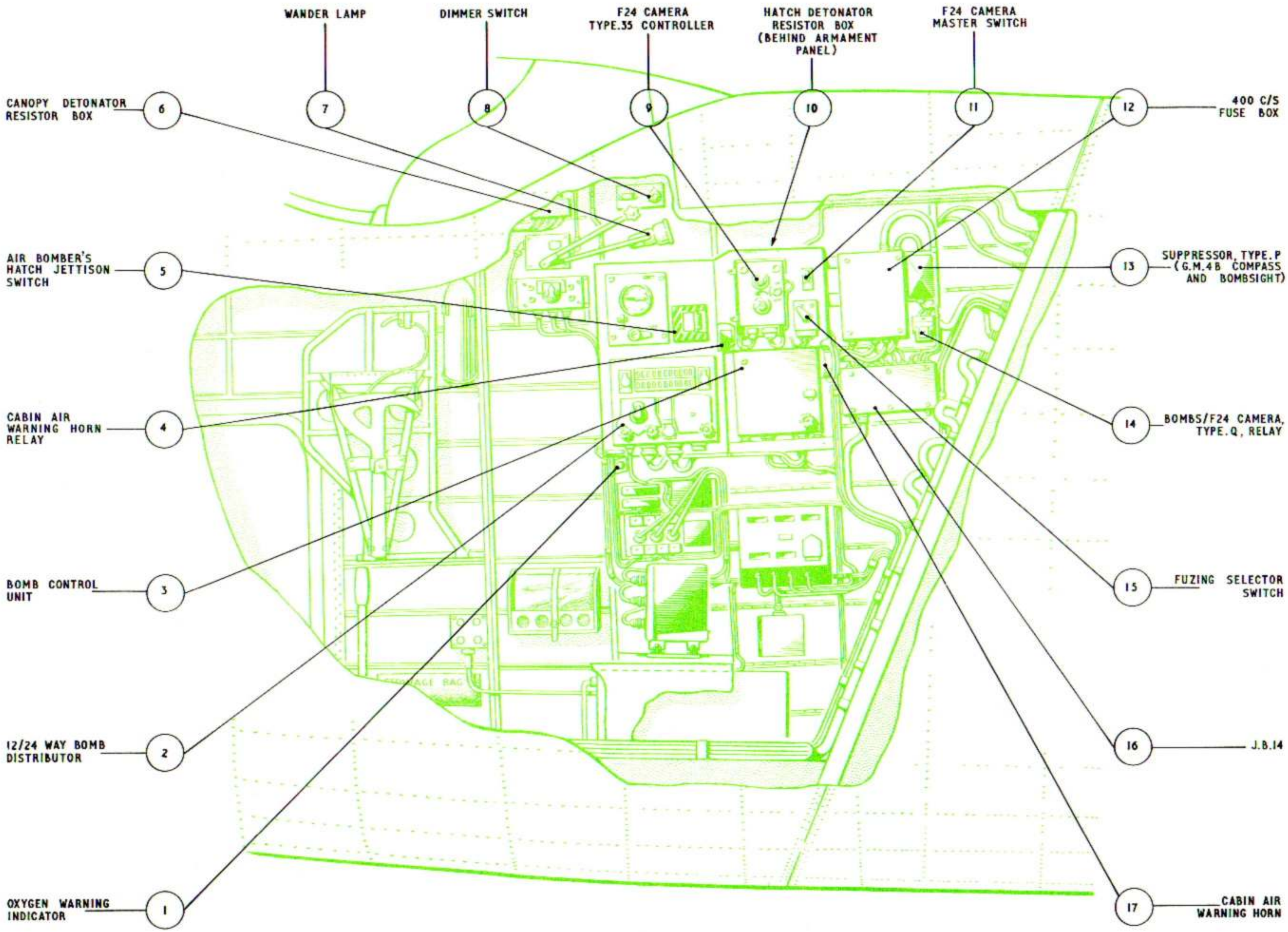


Fig. 8. Electrical installation – air bomber's rear station (B Mk.6 aircraft)

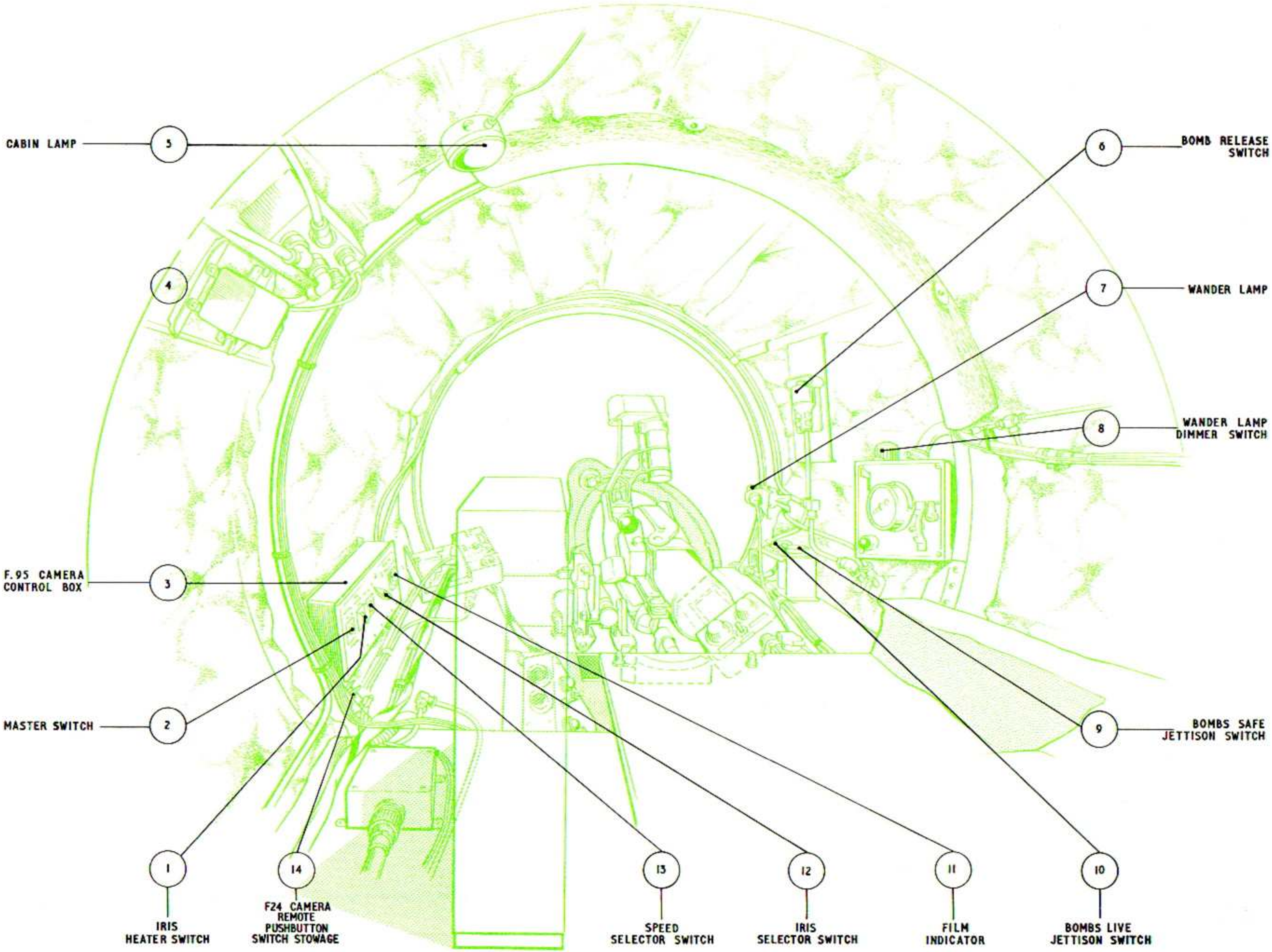


Fig. 9. Electrical installation – air bomber's forward station (B (I) Mk.6 aircraft)

◀ *(Mod.4056 embodied)* ▶

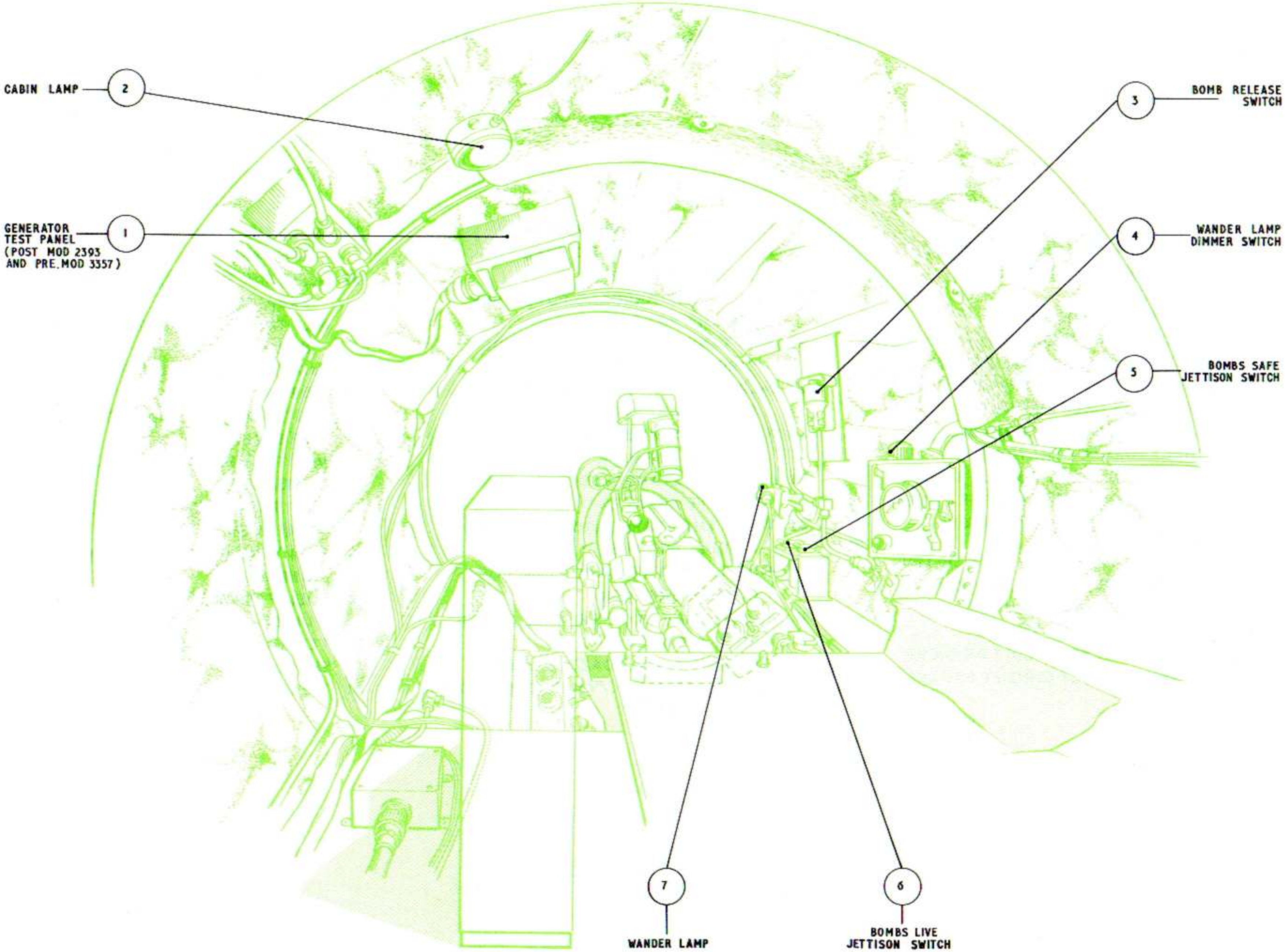


Fig. 10. Electrical installation – air bomber's forward station (B Mk.6 aircraft)

KEY TO FIG.11 (ELECTRICAL CONTROL PANEL) – (B(I) Mk.6 AIRCRAFT)

1
2 FUEL PUMPS TEST METER SOCKET
3 FUEL PUMP TEST SWITCHES
4 FUSE BLOCKS
5 I.L.S. CIRCUIT BREAKER
6 No.2 INVERTER CIRCUIT BREAKER
7 1600 C/S SUPPLY CIRCUIT BREAKER
8 L.A.B.S. No.7 INVERTER (STANDBY) INDICATOR (INOPERATIVE)
9 L.A.B.S. No.6 INVERTER (NORMAL) INDICATOR(INOPERATIVE)
10 L.A.B.S. 400 C/S A.C. SUPPLY SWITCH No.6/No.7 INVERTER(INOPERATIVE)
11 L.A.B.S.1600 C/S SUPPLY SWITCH (INOPERATIVE)
12 No.1 INVERTER GROUND TEST SWITCH
13 REAR WARNING CONTROL SWITCH
14 No.5 INVERTER START SWITCH
15 No.5 INVERTER STOP SWITCH
16 PILOT'S SERVICES CIRCUIT BREAKER
17 ARMAMENT SUPPLY CIRCUIT BREAKER
18 HINGED FUSE PANEL ASSEMBLY
19 No.1 TANK STARBOARD FUEL COCK CIRCUIT BREAKER
20 No.1 TANK STARBOARD FUEL PUMP CIRCUIT BREAKER
21 No.2 TANK STARBOARD FUEL COCK CIRCUIT BREAKER
22 No.2 TANK STARBOARD FUEL PUMP CIRCUIT BREAKER
23 No.3 TANK STARBOARD FUEL PUMP CIRCUIT BREAKER
24 No.3 TANK STARBOARD FUEL COCK CIRCUIT BREAKER
25 WING TANK STARBOARD FUEL PUMP CIRCUIT BREAKER
26 WING TANK STARBOARD FUEL COCK CIRCUIT BREAKER
27 BOMB/FLARE DOOR RELEASE SWITCH LOCK STOWAGE
28 FUSE No.197, ANTI-DAZZLE LAMPS
29 FUSE No.198, U.H.F./V.H.F. CHANGEOVER (post Mod.3403)
30 No.1 TANK PORT FUEL COCK CIRCUIT BREAKER
31 No.1 TANK PORT FUEL PUMP CIRCUIT BREAKER
32 No.2 TANK PORT FUEL COCK CIRCUIT BREAKER
33 No.2 TANK PORT FUEL PUMP CIRCUIT BREAKER
34 No.3 TANK PORT FUEL COCK CIRCUIT BREAKER
35 No.3 TANK PORT FUEL PUMP CIRCUIT BREAKER
36 WING TANK PORT FUEL COCK CIRCUIT BREAKER
37 WING TANK PORT FUEL PUMP CIRCUIT BREAKER
38 FUEL PRESSURE WARNING RESISTANCE UNITS
39 TERMINAL BLOCKS
40 SPARE FUSES
41 TYPE S RELAYS

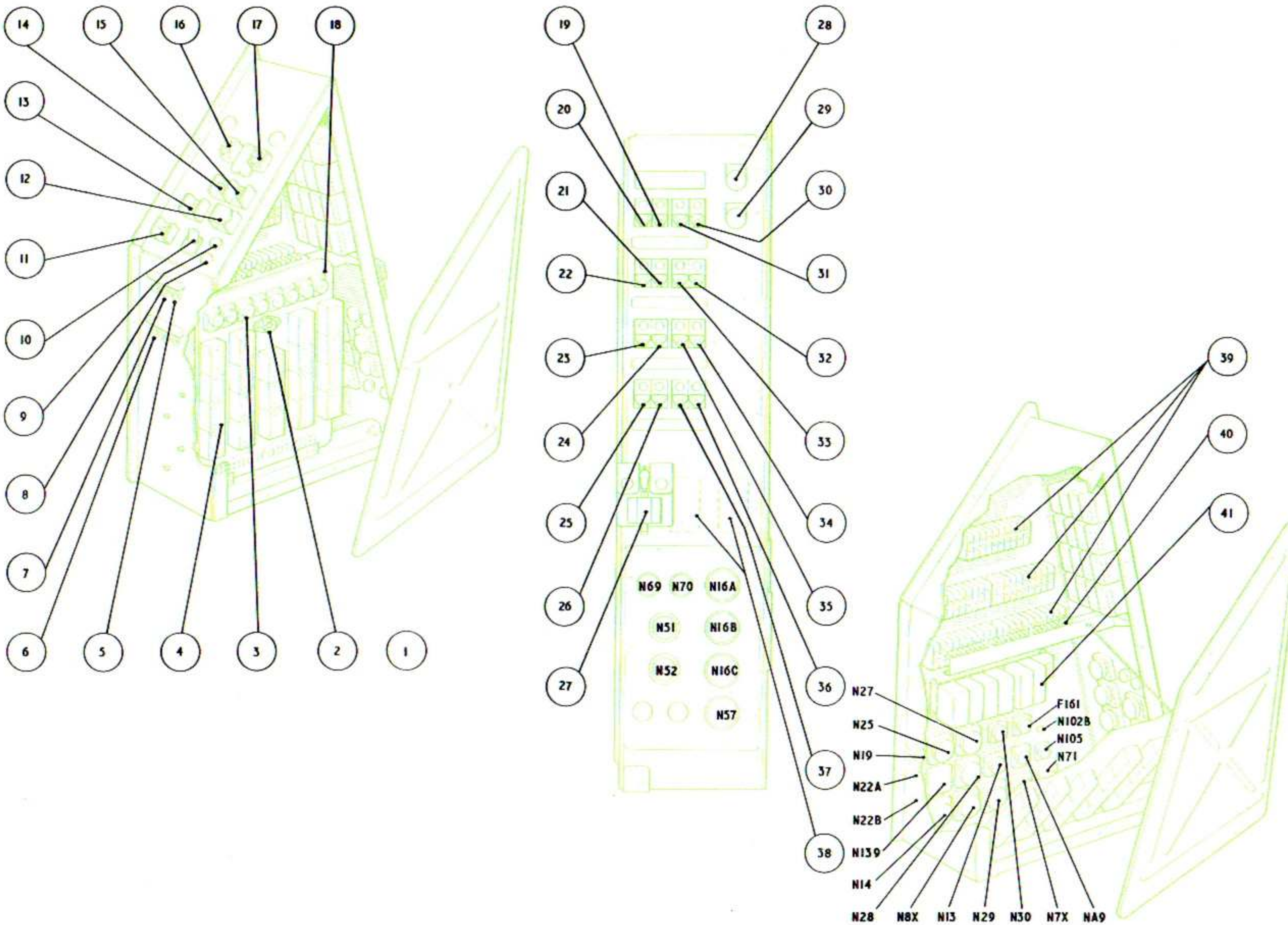


Fig. 11. Electrical installation – electrical control panel (E.C.P.) (B (I) Mk.6 aircraft)

KEY TO FIG.12 (ELECTRICAL CONTROL PANEL) – (B MK.6 AIRCRAFT)

1 FUEL PUMPS TEST METER SOCKET
2 FUEL PUMP TEST SWITCHES
3 FUSE BLOCKS
4 No.4 INVERTER CIRCUIT BREAKER
5 No.3 INVERTER CIRCUIT BREAKER
6 No.2 INVERTER CIRCUIT BREAKER
7 1600 c/s SUPPLY CIRCUIT BREAKER
8 GEE-H CONTROL SWITCH
9 REAR WARNING CONTROL SWITCH
10 REBECCA CONTROL SWITCH
11 No.4 INVERTER CONTROL SWITCH
12 No.4/No.5 INVERTER CHANGE-OVER SWITCH
13 No.5 INVERTER START SWITCH
14 No.5 INVERTER STOP SWITCH
15 PILOT'S SERVICES CIRCUIT BREAKER
16 No.1 GENERATOR SWITCH
17 No.1 GENERATOR FIELD CIRCUIT BREAKER
18 No.2 GENERATOR FIELD CIRCUIT BREAKER
19 No.2 GENERATOR SWITCH
20 I.L.S. CIRCUIT BREAKER
21 No.1 TANK STARBOARD FUEL COCK CIRCUIT BREAKER
22 No.1 TANK STARBOARD FUEL PUMP CIRCUIT BREAKER
23 No.2 TANK STARBOARD FUEL COCK CIRCUIT BREAKER
24 No.2 TANK STARBOARD FUEL PUMP CIRCUIT BREAKER
25 No.3 TANK STARBOARD FUEL PUMP CIRCUIT BREAKER
26 No.3 TANK STARBOARD FUEL COCK CIRCUIT BREAKER
27 WING TANK STARBOARD FUEL PUMP CIRCUIT BREAKER
28 WING TANK STARBOARD FUEL COCK CIRCUIT BREAKER
29 BOMB DOOR RELEASE SWITCH LOCK STOWAGE
30 FUEL PRESSURE WARNING RESISTANCE UNITS
31 No.1 TANK PORT FUEL PUMP CIRCUIT BREAKER
32 No.1 TANK PORT FUEL COCK CIRCUIT BREAKER
33 No.2 TANK PORT FUEL PUMP CIRCUIT BREAKER
34 No.2 TANK PORT FUEL COCK CIRCUIT BREAKER
35 No.3 TANK PORT FUEL COCK CIRCUIT BREAKER
36 No.3 TANK PORT FUEL PUMP CIRCUIT BREAKER
37 WING TANK PORT FUEL COCK CIRCUIT BREAKER
38 WING TANK PORT FUEL PUMP CIRCUIT BREAKER
39 TYPE S RELAYS
40 TERMINAL BLOCKS
41 SPARE FUSES
42 HINGED FUSE PANEL ASSEMBLY
◀ 43 SPARE FUSE BLOCKS (MOD.3456) ▶

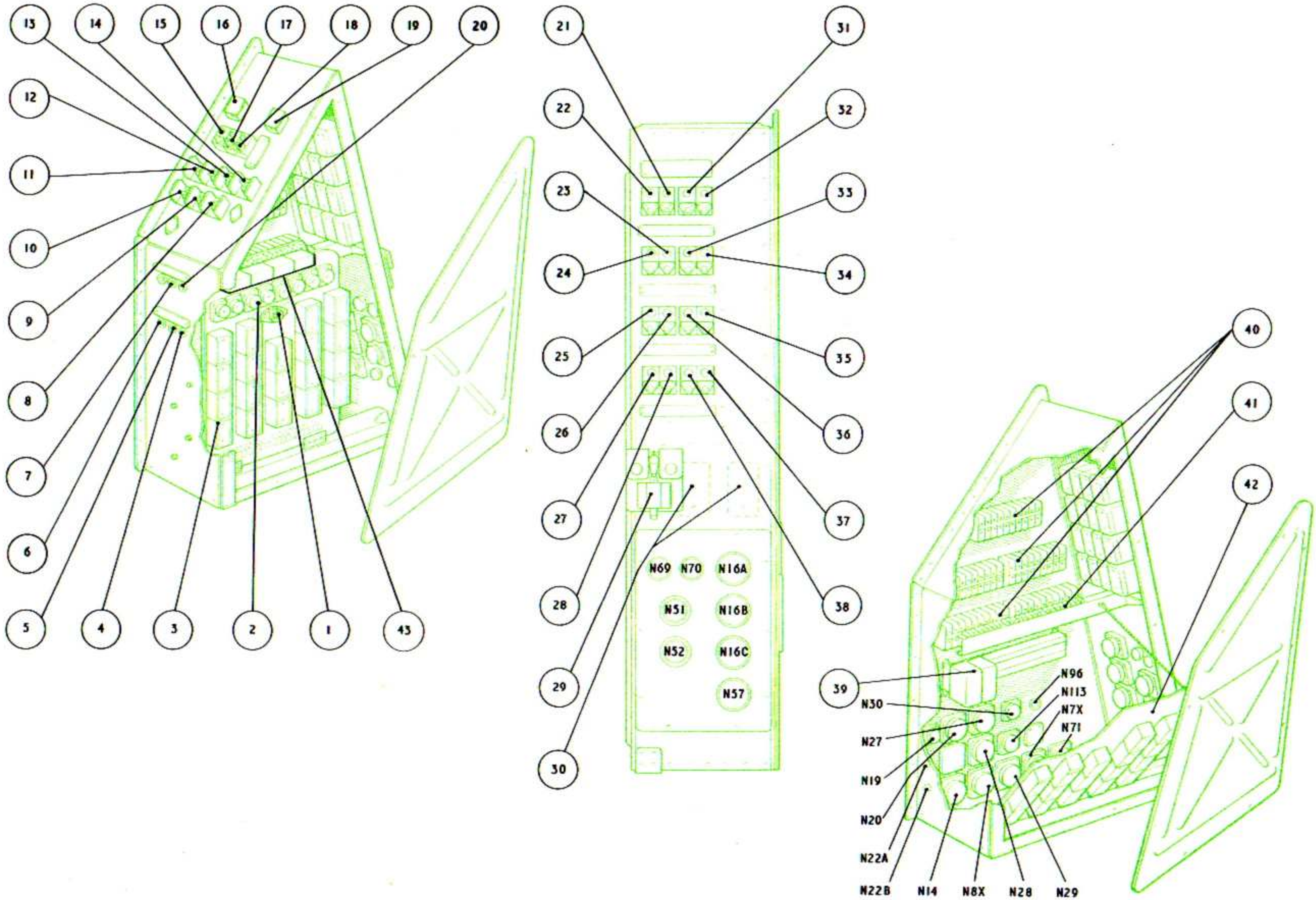


Fig. 12. Electrical installation – electrical control panel (E.C.P.) (B Mk.6 aircraft)

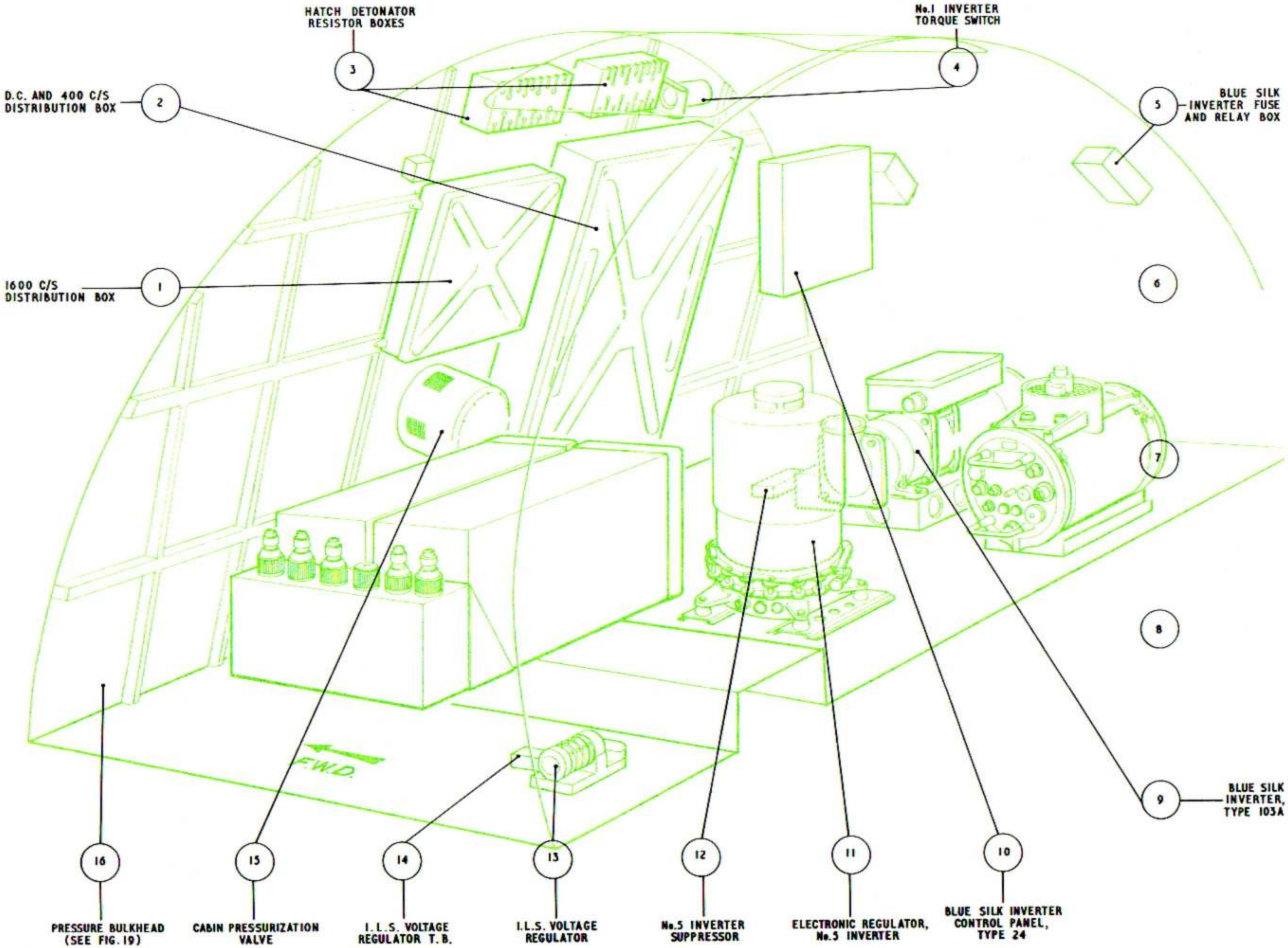


Fig. 13. Electrical installation – upper equipment compartment (B (I) Mk.6 aircraft)

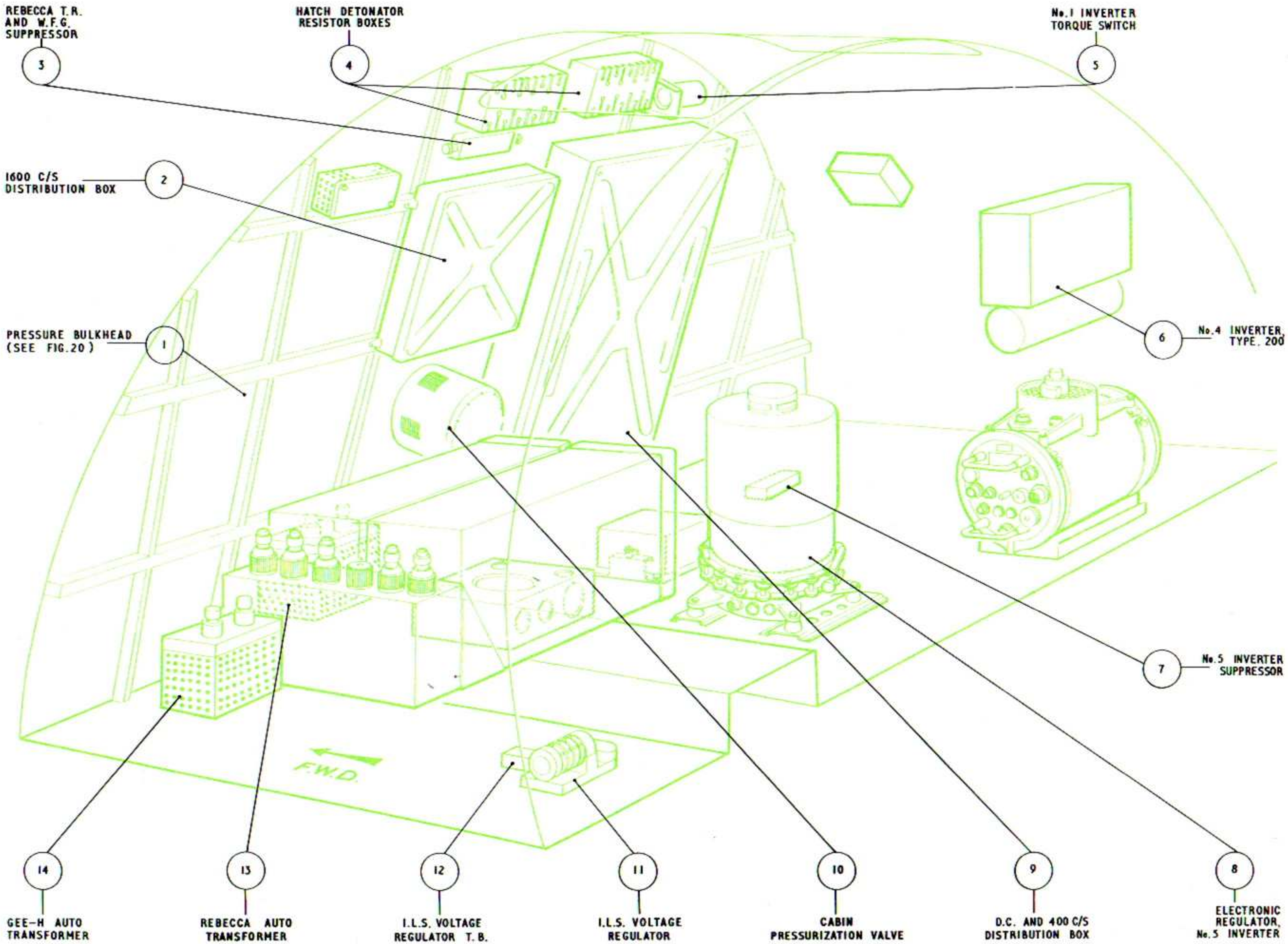


Fig. 14. Electrical installation – upper equipment compartment (B Mk.6 aircraft)

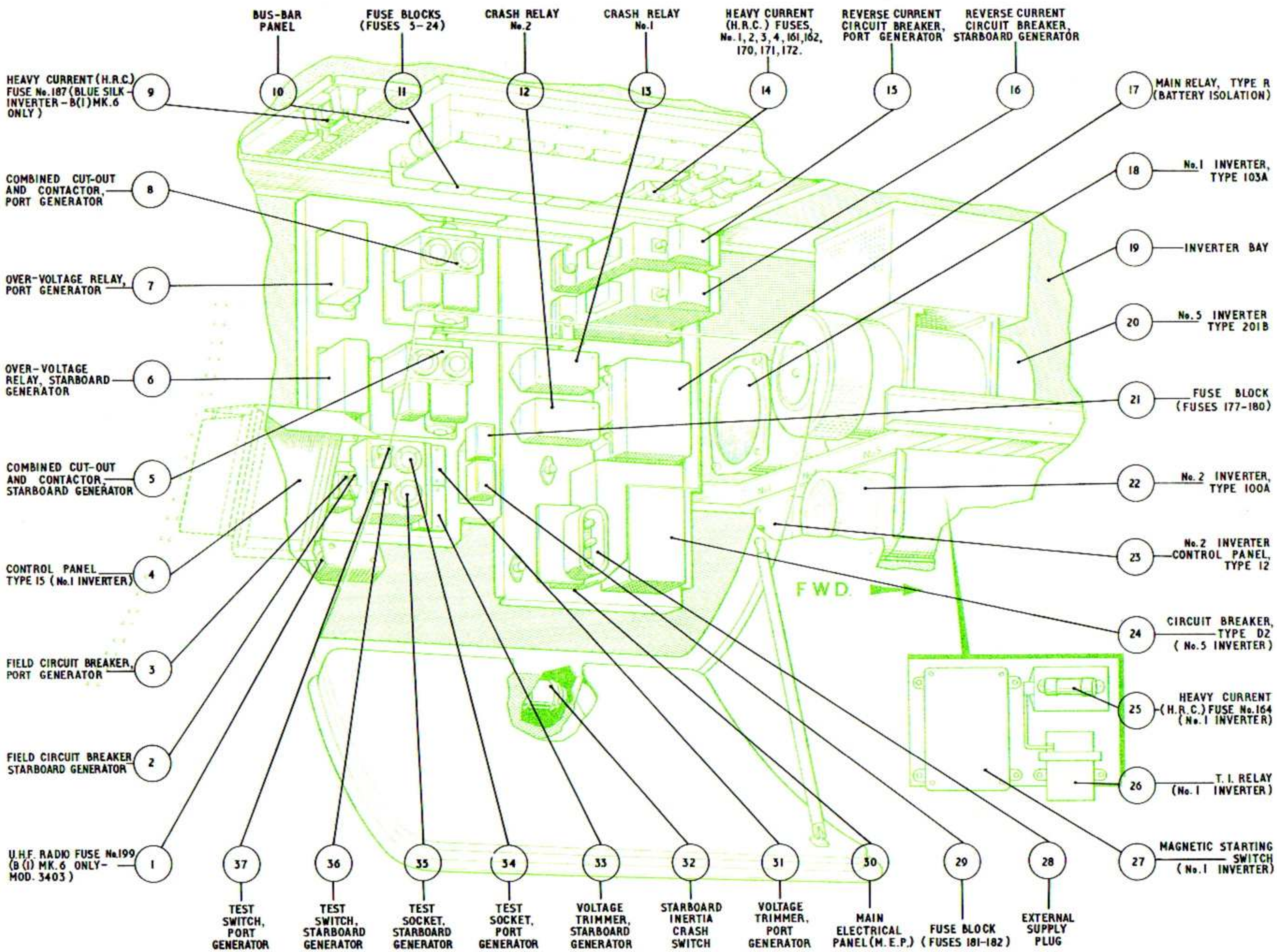


Fig. 15. Electrical installation – starboard equipment compartment (aircraft post Mod.2155 (or 2393) 3357 and 1420)

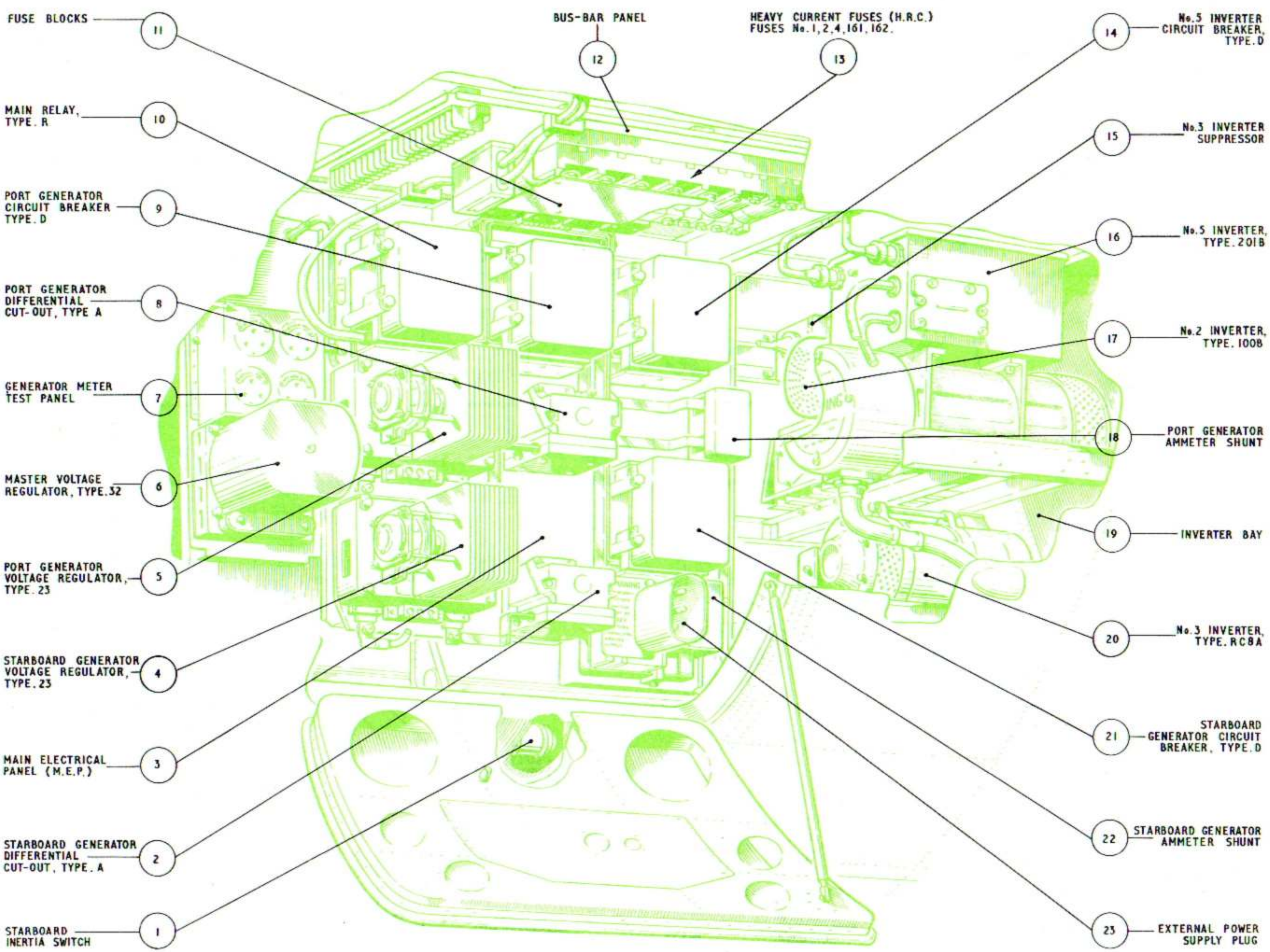


Fig. 16. Electrical installation – starboard equipment compartment (aircraft pre Mod.2155 (or 2393) and 1420)

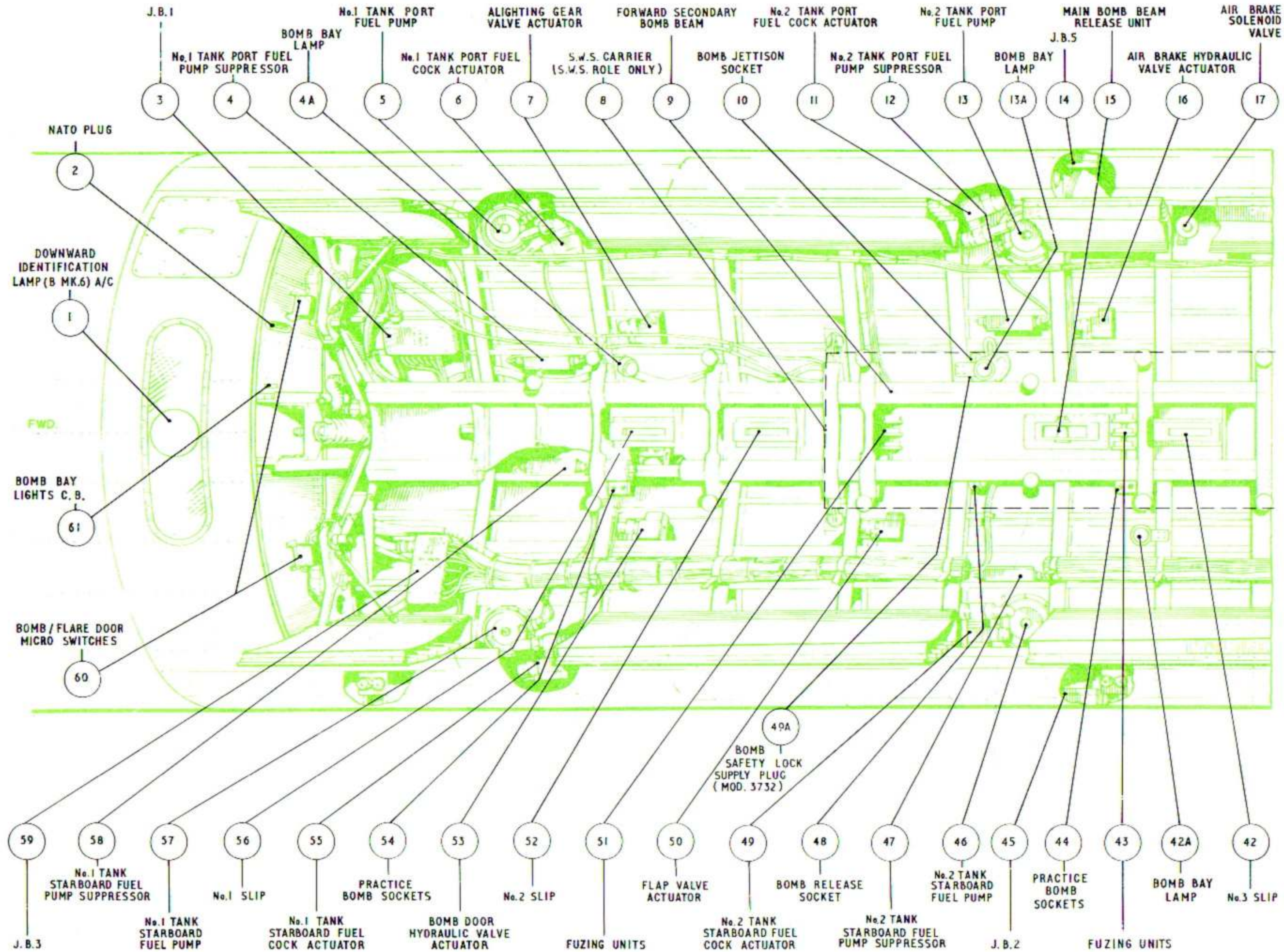


Fig. 17. Electrical installation – bomb bay

◀ *(Mod. 4162 and 4345 embodied)* ▶

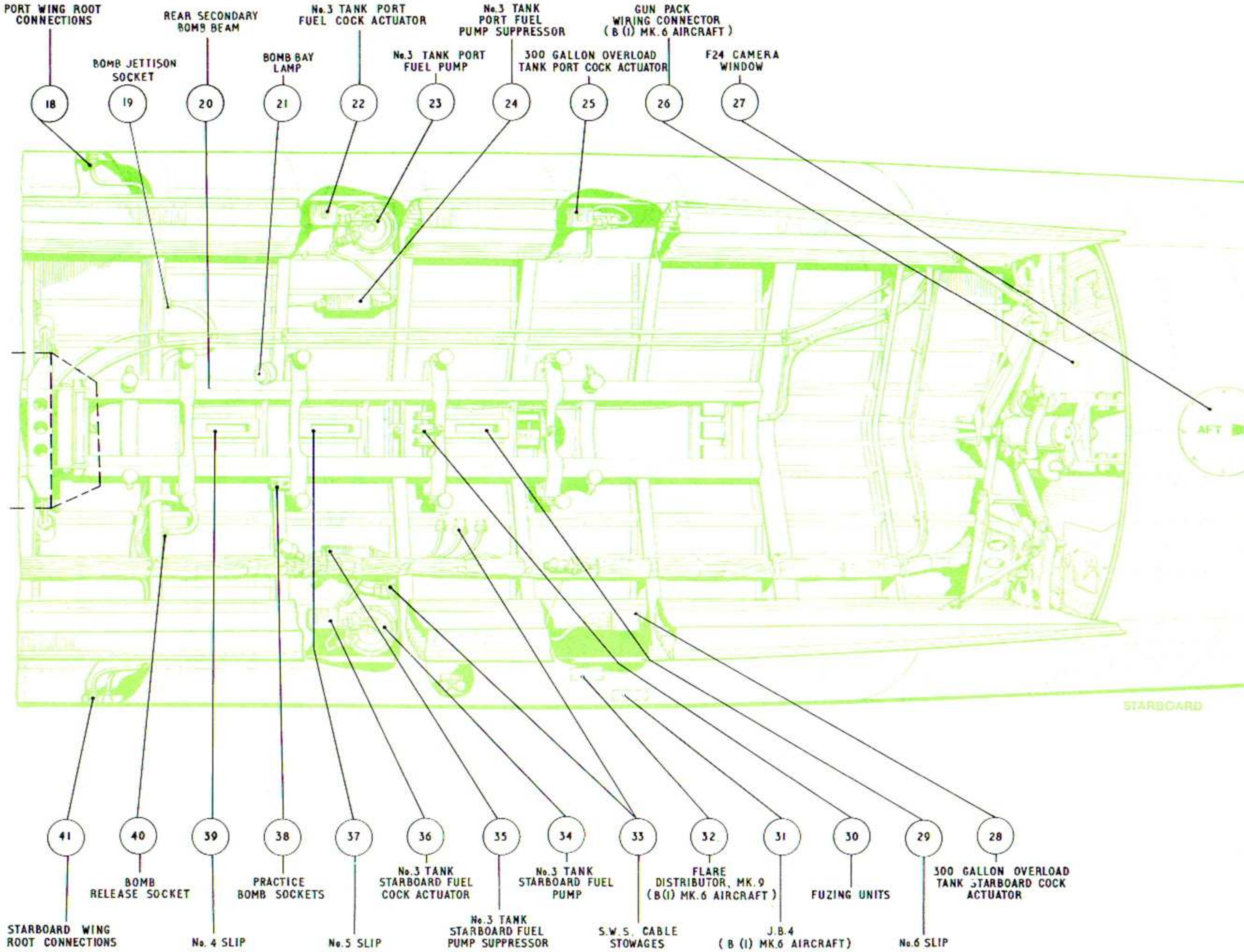
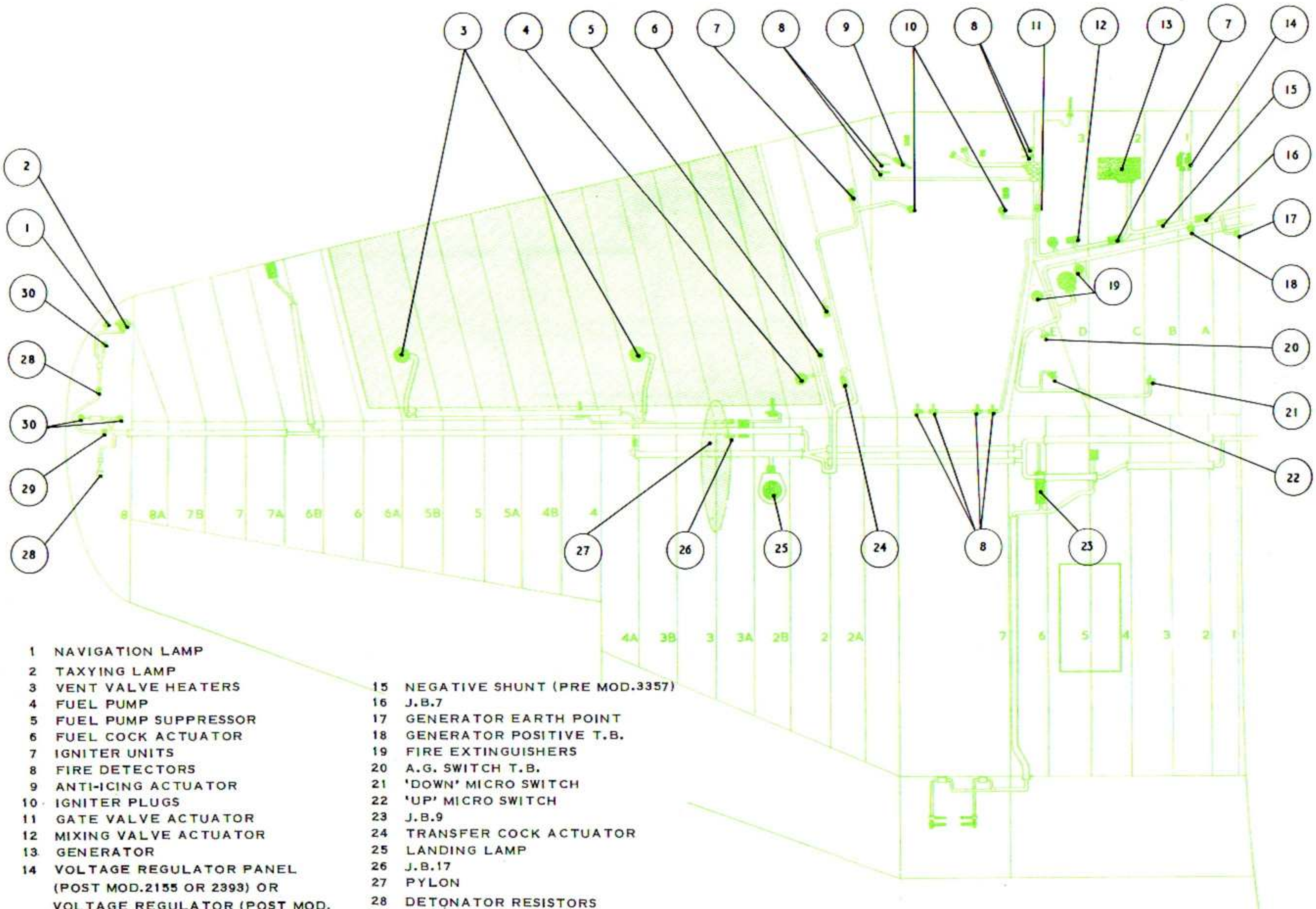


Fig. 17A. Electrical installation – bomb bay

◀ *(Mod.4162 and 4345 embodied)* ▶

RESTRICTED



1 NAVIGATION LAMP
2 TAXYING LAMP
3 VENT VALVE HEATERS
4 FUEL PUMP
5 FUEL PUMP SUPPRESSOR
6 FUEL COCK ACTUATOR
7 IGNITER UNITS
8 FIRE DETECTORS
9 ANTI-ICING ACTUATOR
10 IGNITER PLUGS
11 GATE VALVE ACTUATOR
12 MIXING VALVE ACTUATOR
13 GENERATOR
14 VOLTAGE REGULATOR PANEL (POST MOD.2155 OR 2393) OR VOLTAGE REGULATOR (POST MOD. MOD.3357) OR TYPE X SUPPRESSOR (PRE MOD. 2155 OR 2393)
15 NEGATIVE SHUNT (PRE MOD.3357)
16 J.B.7
17 GENERATOR EARTH POINT
18 GENERATOR POSITIVE T.B.
19 FIRE EXTINGUISHERS
20 A.G. SWITCH T.B.
21 'DOWN' MICRO SWITCH
22 'UP' MICRO SWITCH
23 J.B.9
24 TRANSFER COCK ACTUATOR
25 LANDING LAMP
26 J.B.17
27 PYLON
28 DETONATOR RESISTORS
29 LAMP CONTACT BLOCK
30 TIP TANK DETONATORS

Fig. 18. Electrical installation – port main plane

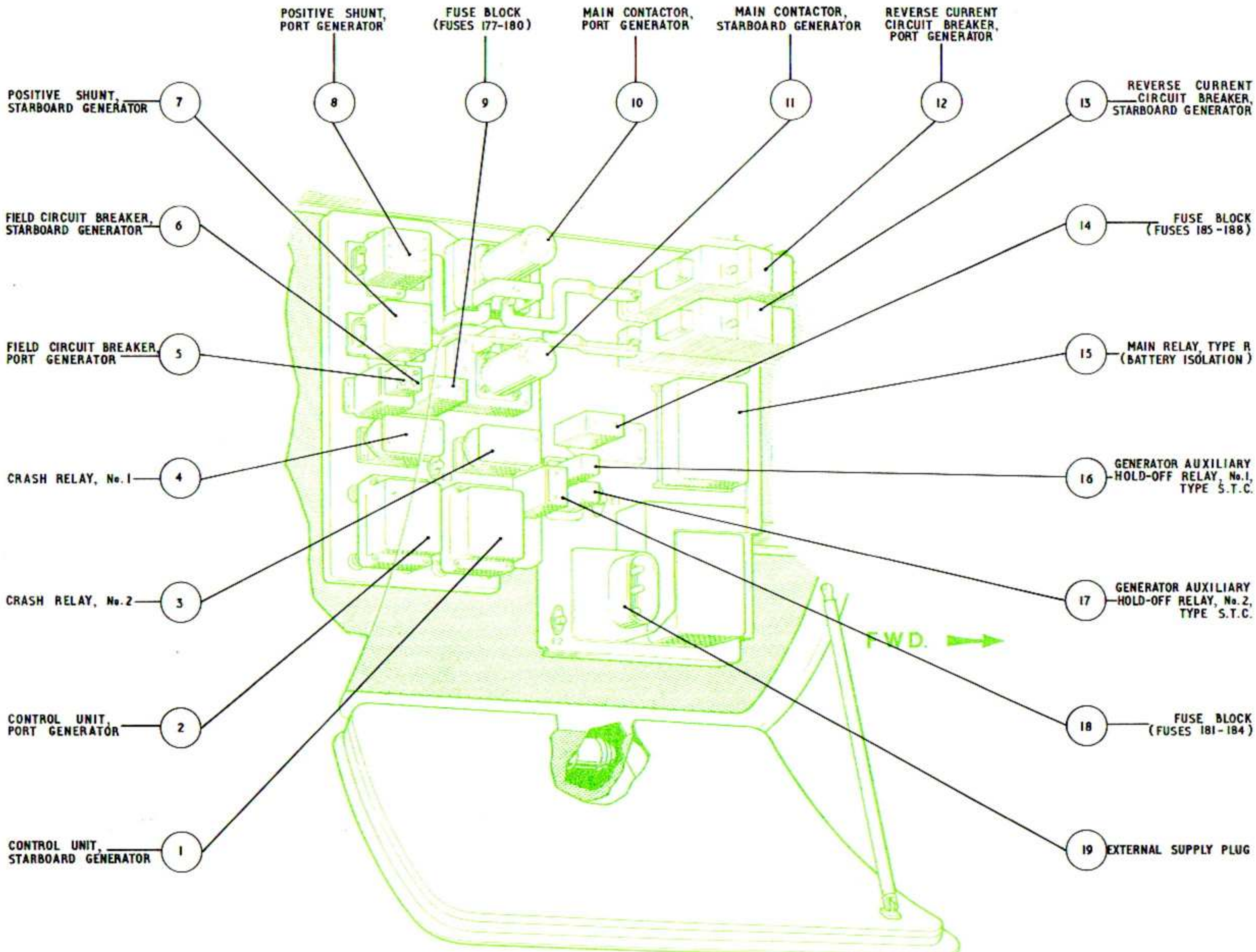
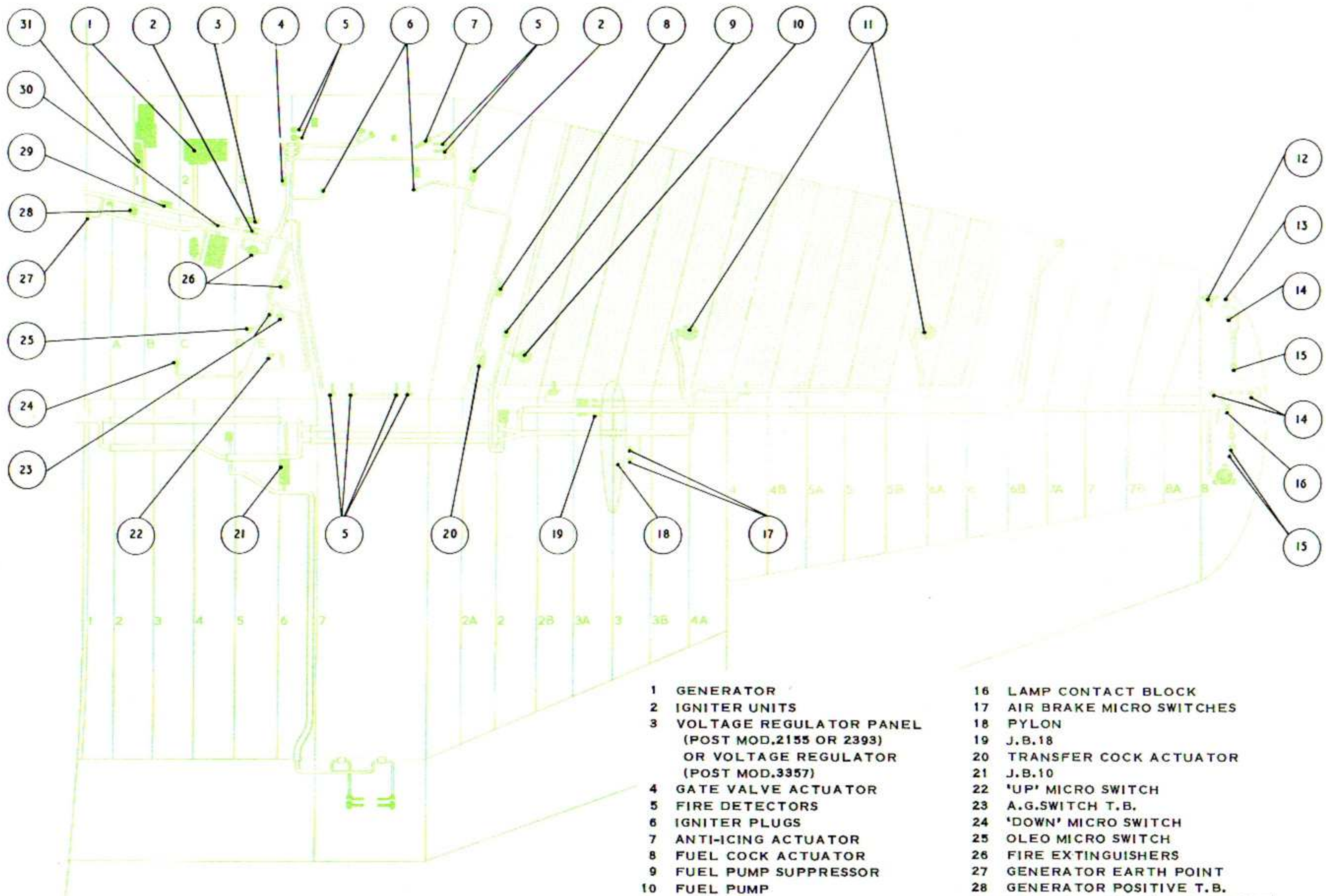


Fig. 15A. Electrical installation – generator control equipment in starboard equipment compartment (pre. Mod.3357)



1 GENERATOR
2 IGNITER UNITS
3 VOLTAGE REGULATOR PANEL (POST MOD.2155 OR 2393) OR VOLTAGE REGULATOR (POST MOD.3357)
4 GATE VALVE ACTUATOR
5 FIRE DETECTORS
6 IGNITER PLUGS
7 ANTI-ICING ACTUATOR
8 FUEL COCK ACTUATOR
9 FUEL PUMP SUPPRESSOR
10 FUEL PUMP
11 VENT VALVE HEATERS
12 TAXYING LAMP
13 NAVIGATION LAMP
14 TIP TANK DETONATORS
15 DETONATOR RESISTORS
16 LAMP CONTACT BLOCK
17 AIR BRAKE MICRO SWITCHES
18 PYLON
19 J.B.18
20 TRANSFER COCK ACTUATOR
21 J.B.10
22 'UP' MICRO SWITCH
23 A.G.SWITCH T.B.
24 'DOWN' MICRO SWITCH
25 OLEO MICRO SWITCH
26 FIRE EXTINGUISHERS
27 GENERATOR EARTH POINT
28 GENERATOR POSITIVE T.B.
29 NEGATIVE SHUNT (PRE MOD.3357)
30 J.B.8
31 TYPE X SUPPRESSOR (AIRCRAFT PRE.MOD.2155 OR 2393)

Fig. 18A. Electrical installation – starboard main plane

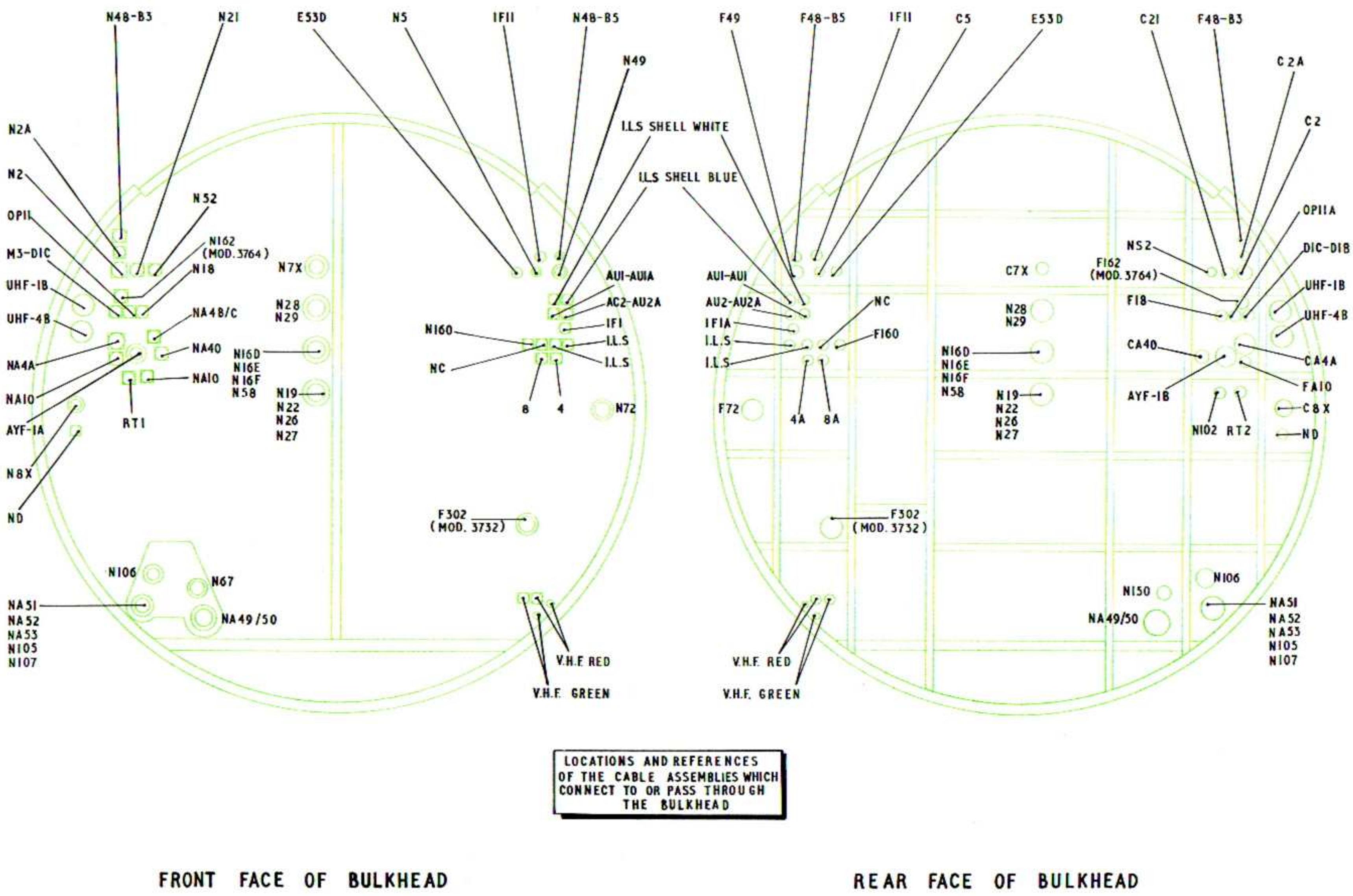


Fig. 19. Electrical installation – pressure bulkhead (B (I) Mk.6 aircraft)

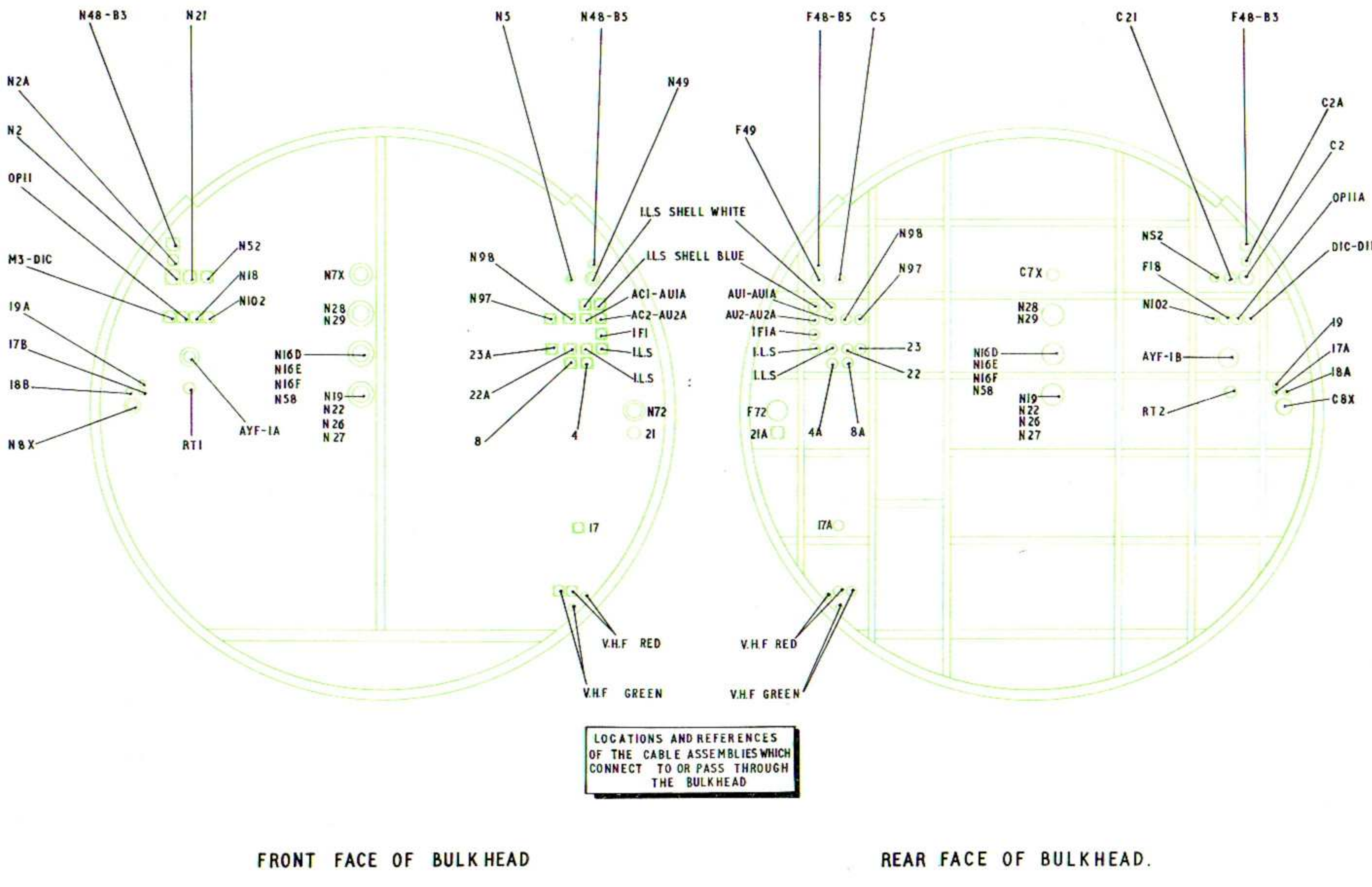


Fig. 20. Electrical installation – pressure bulkhead (B Mk.6 aircraft)

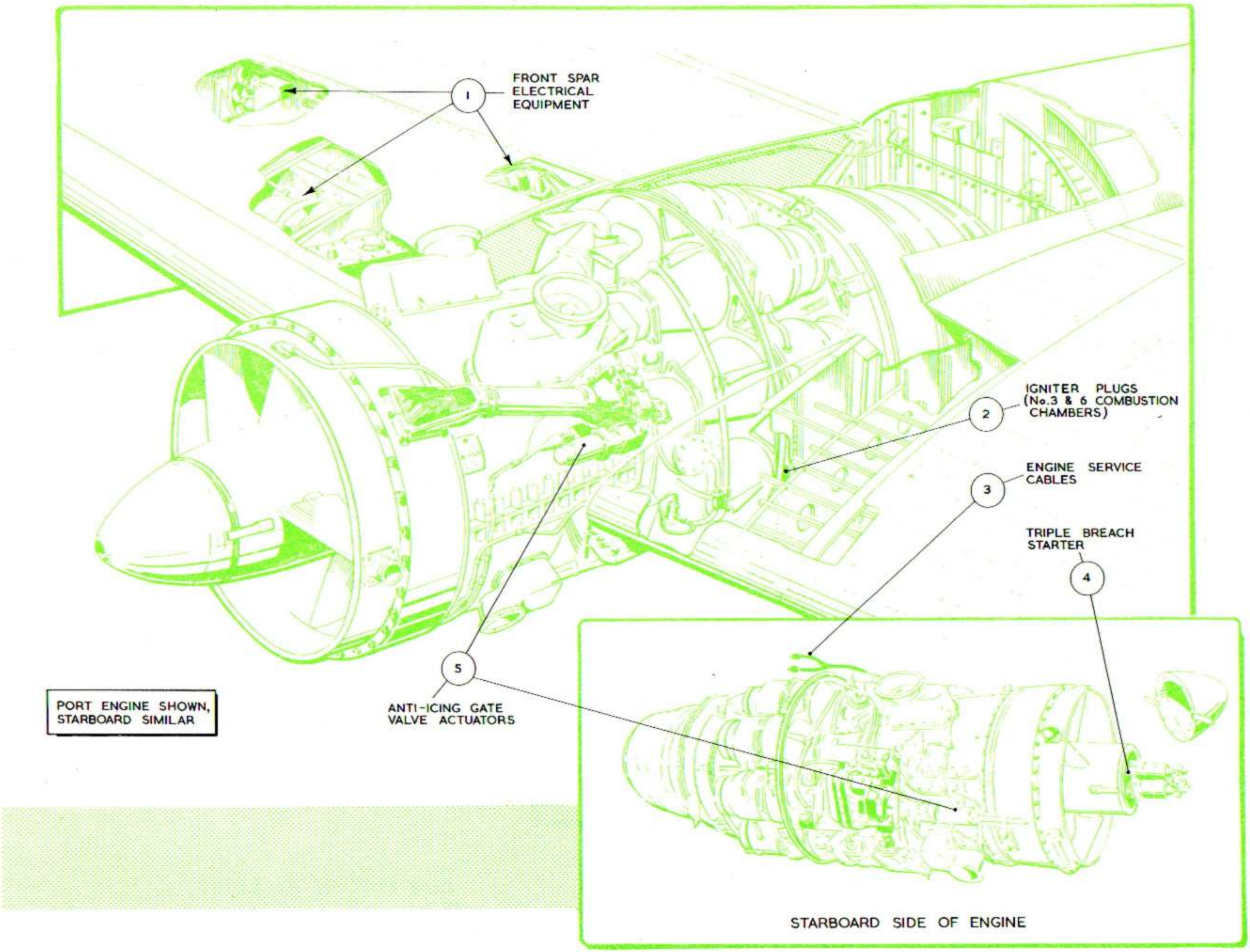


Fig. 21. Electrical installation – engines

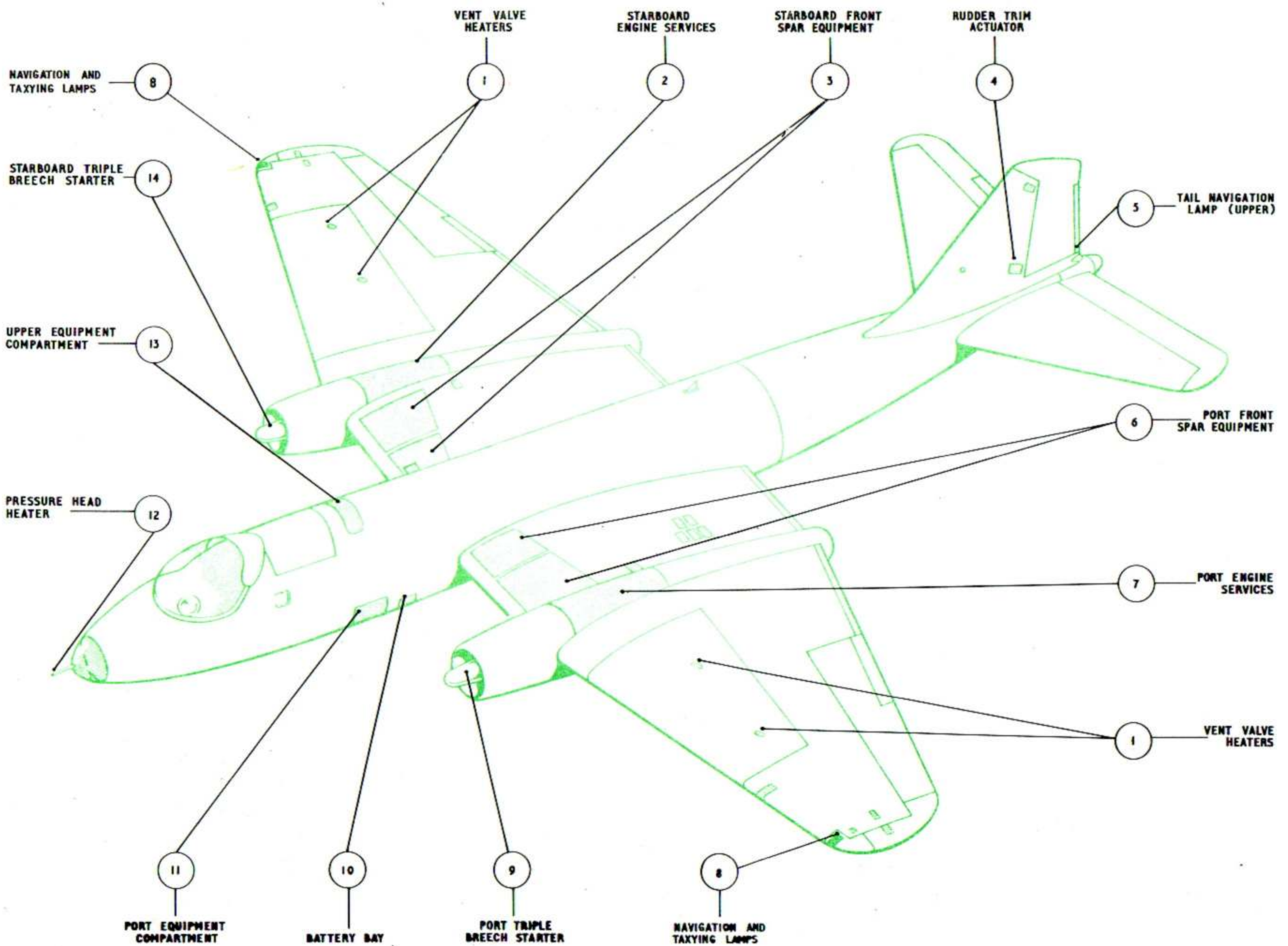


FIG. 22. ELECTRICAL INSTALLATION - ACCESS PANELS, UPPER SURFACE AND PORT SIDE

◀MOD.4152 EMBODIED▶

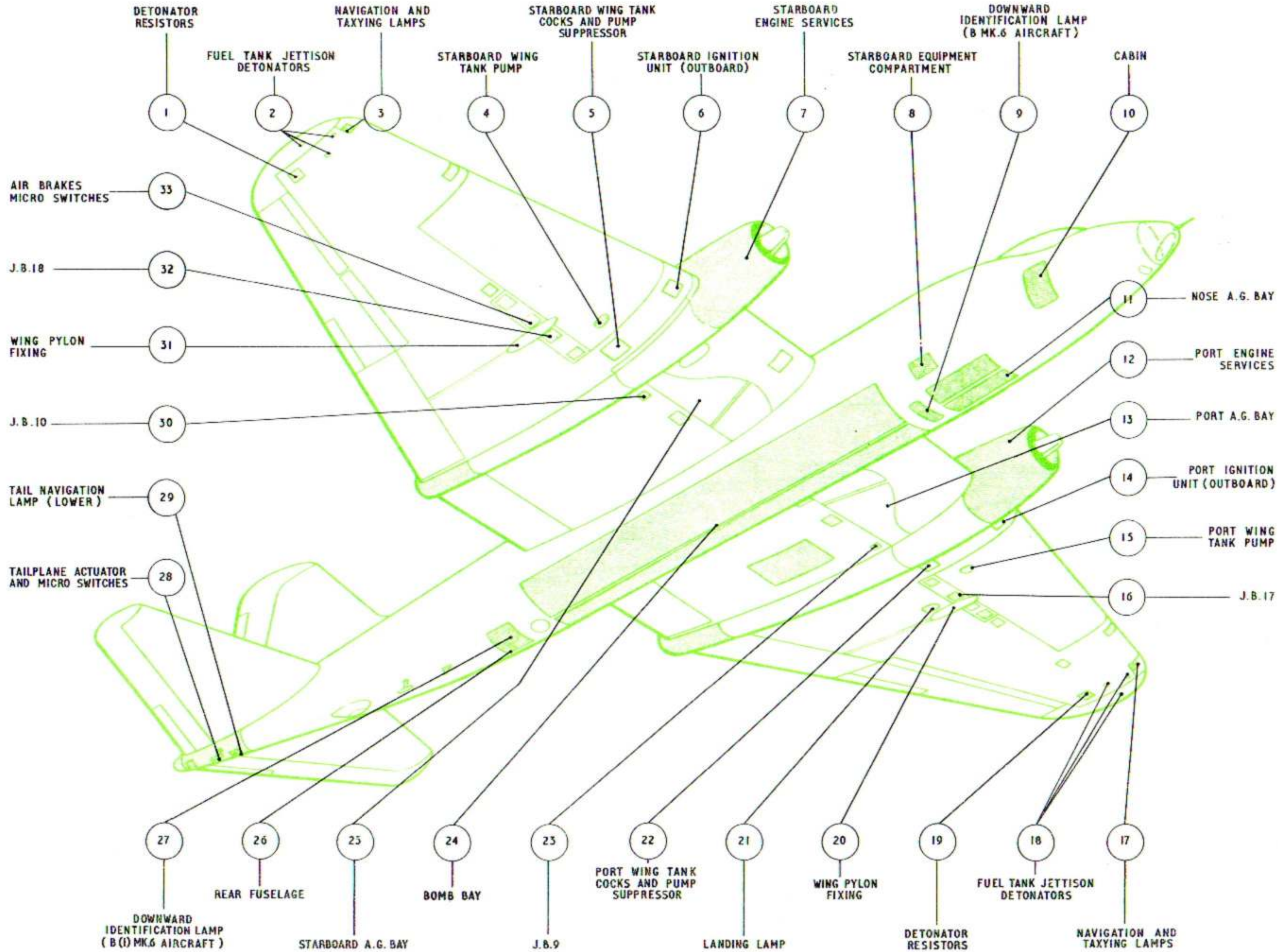


Fig. 23. Electrical installation – access panels, lower surface and starboard side

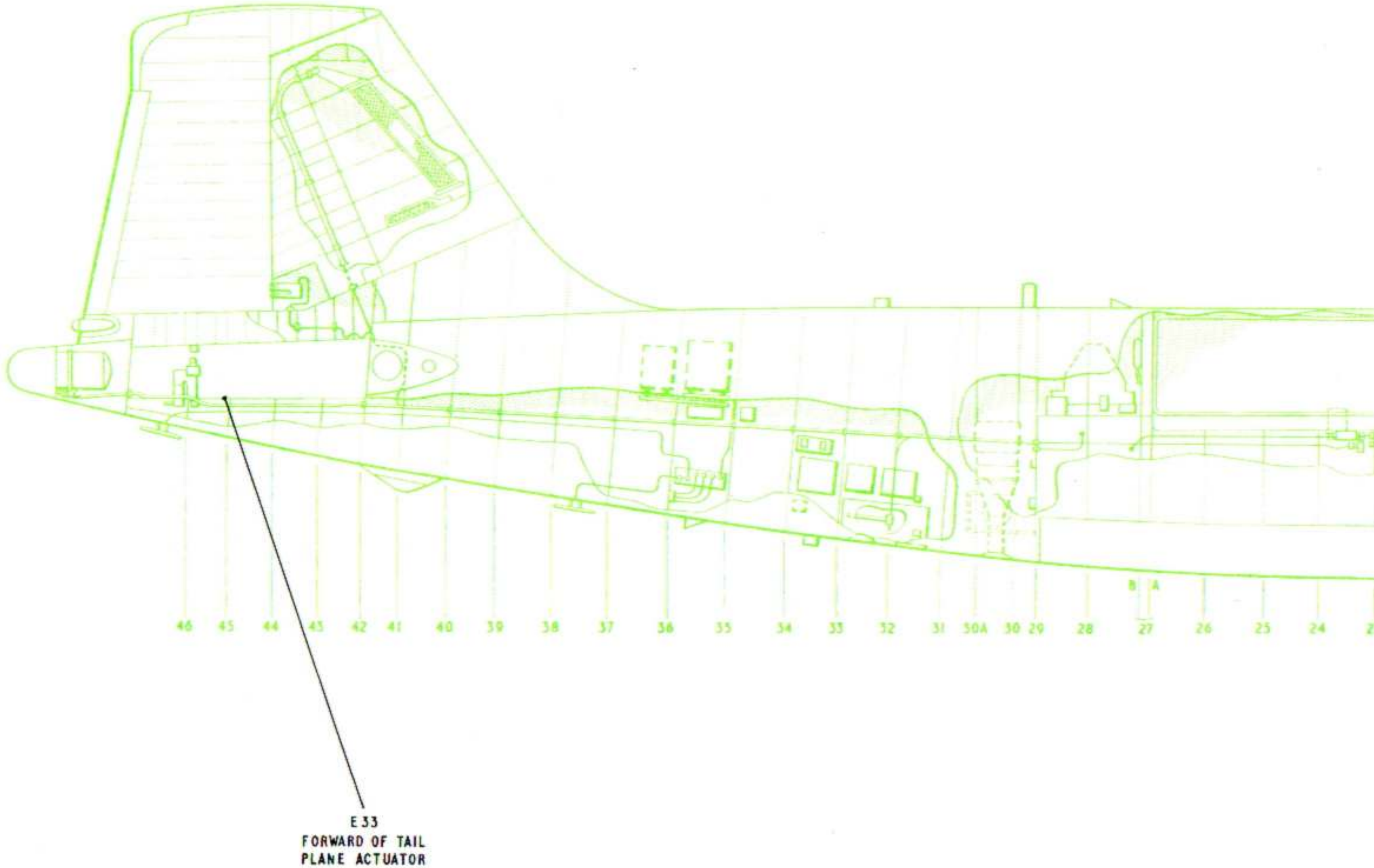


Fig. 24. Electrical installation – location of earth points – port side

◀ *(Mod. 4345 embodied)* ▶

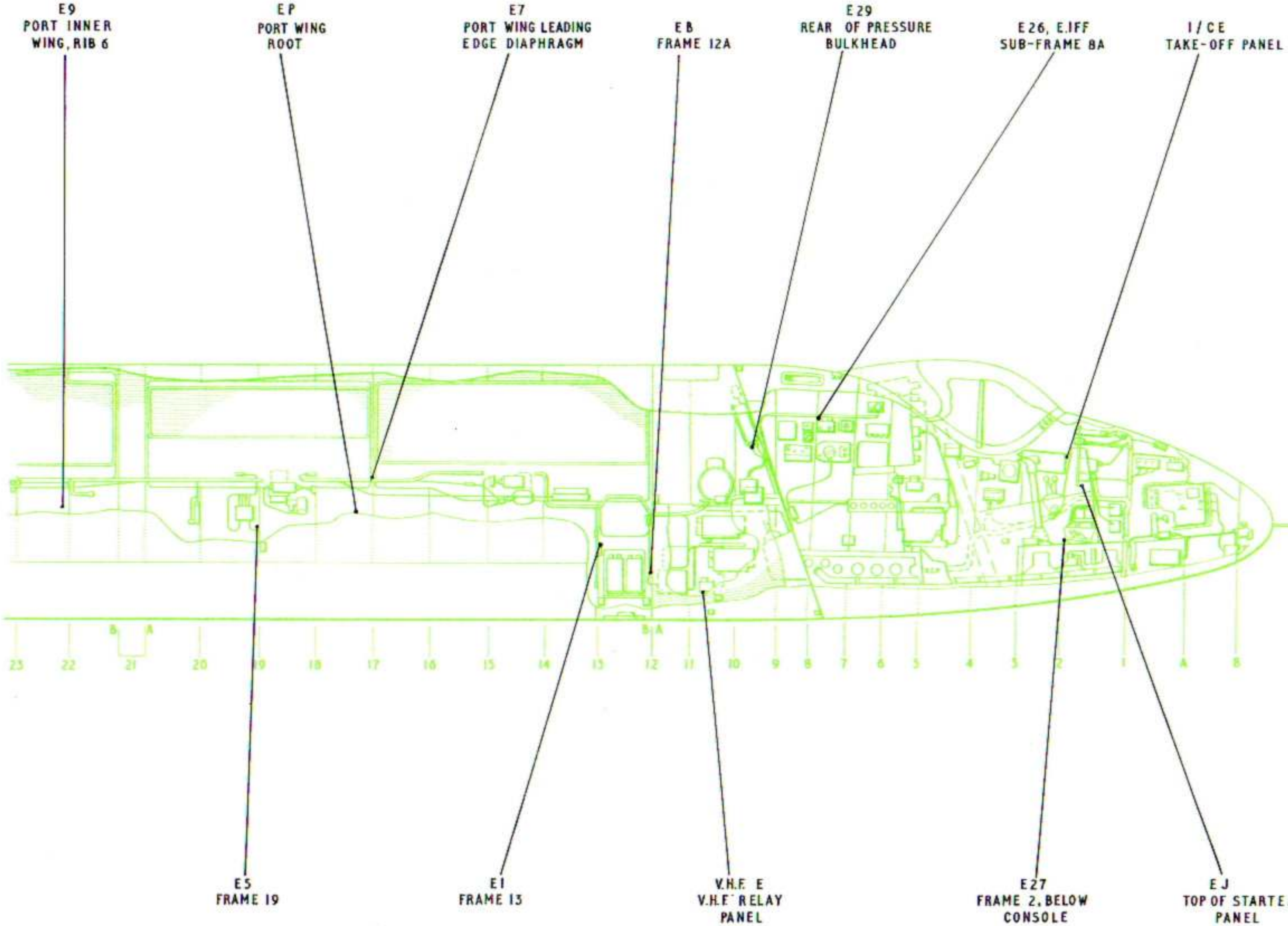


Fig. 24A. Electrical installation – location of earth points – port side

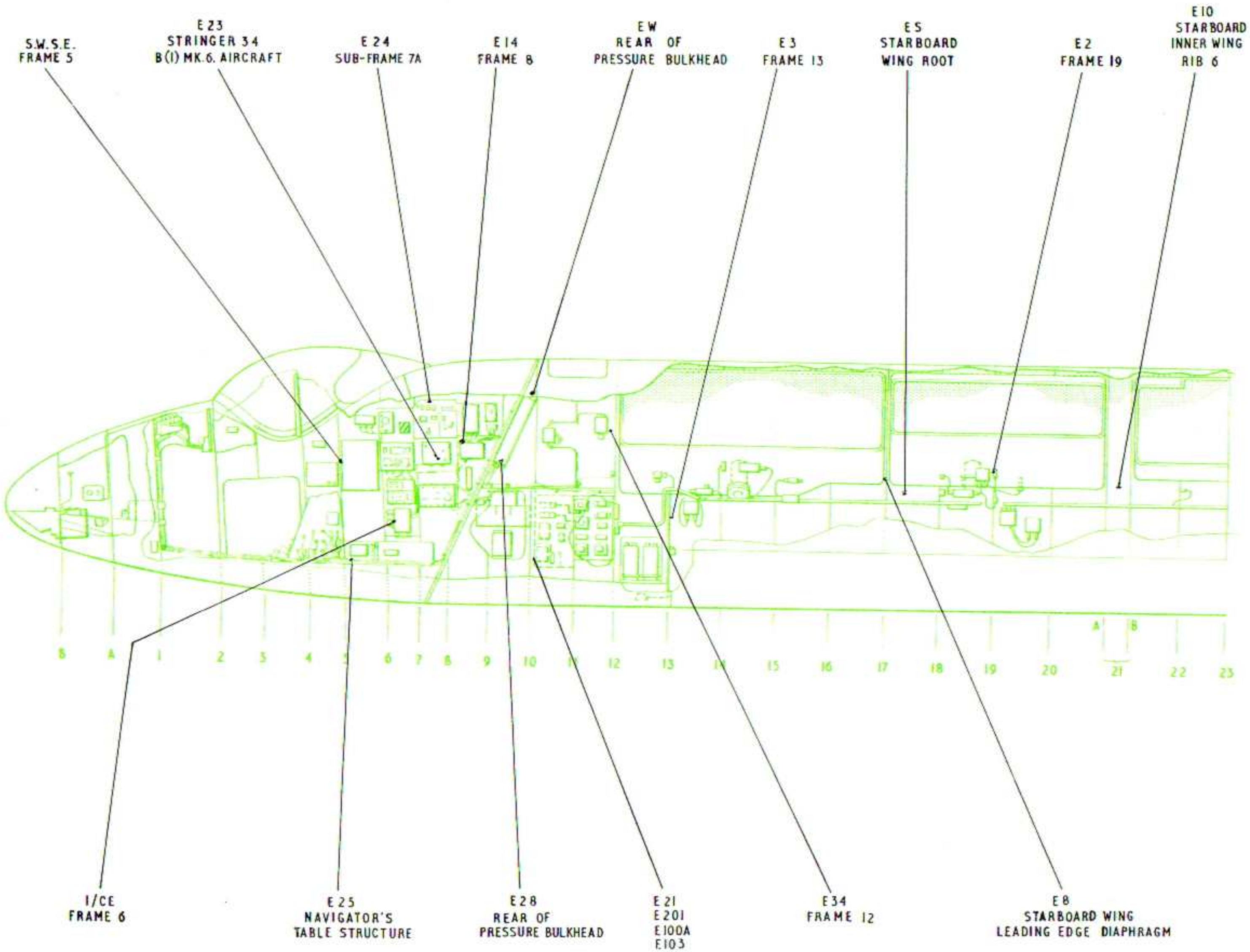


Fig. 25. Electrical installation – location of earth points – starboard side

◀ *(Mod. 4345 embodied)* ▶

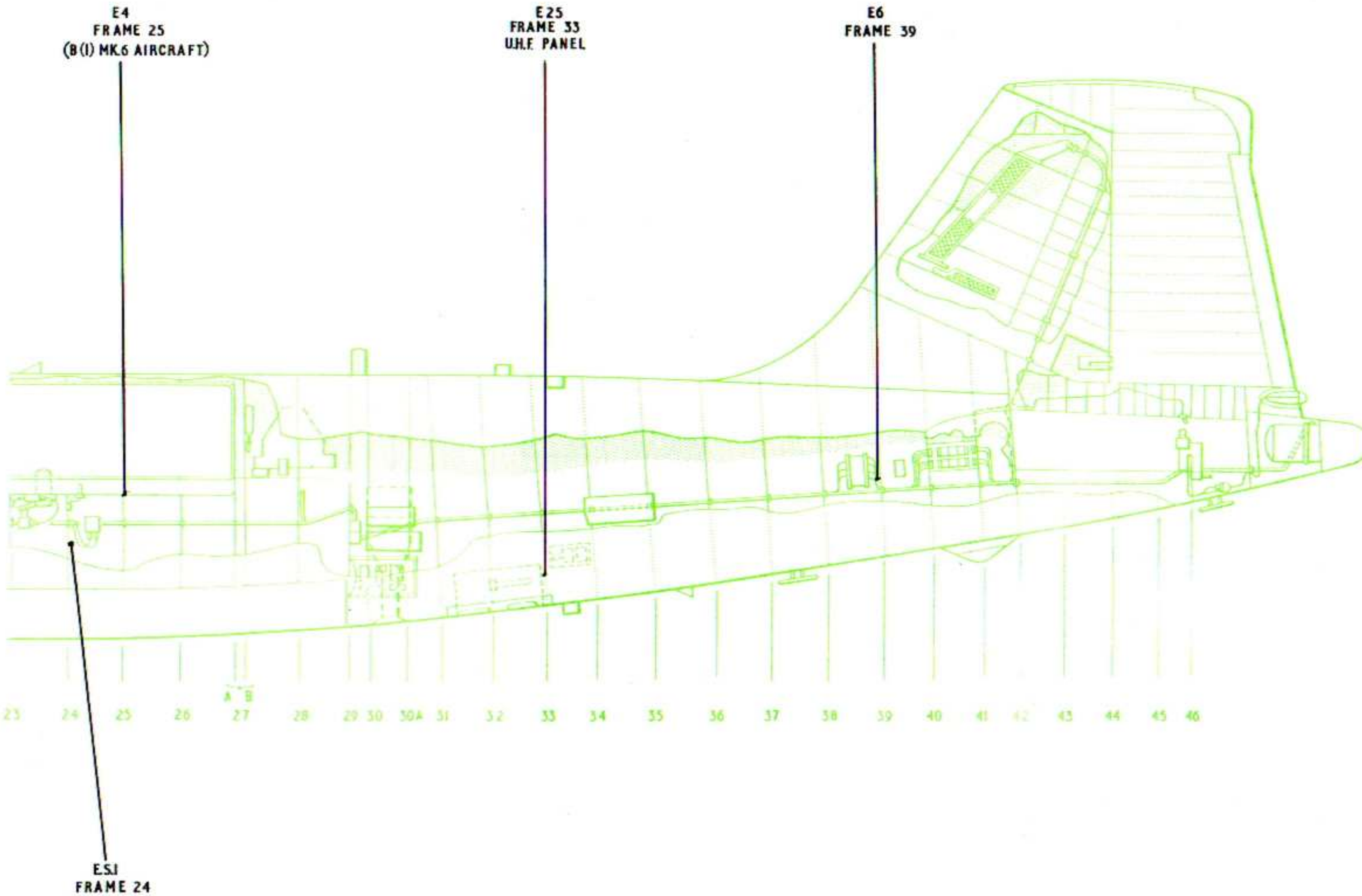


Fig. 25A. Electrical installation – location of earth points – starboard side

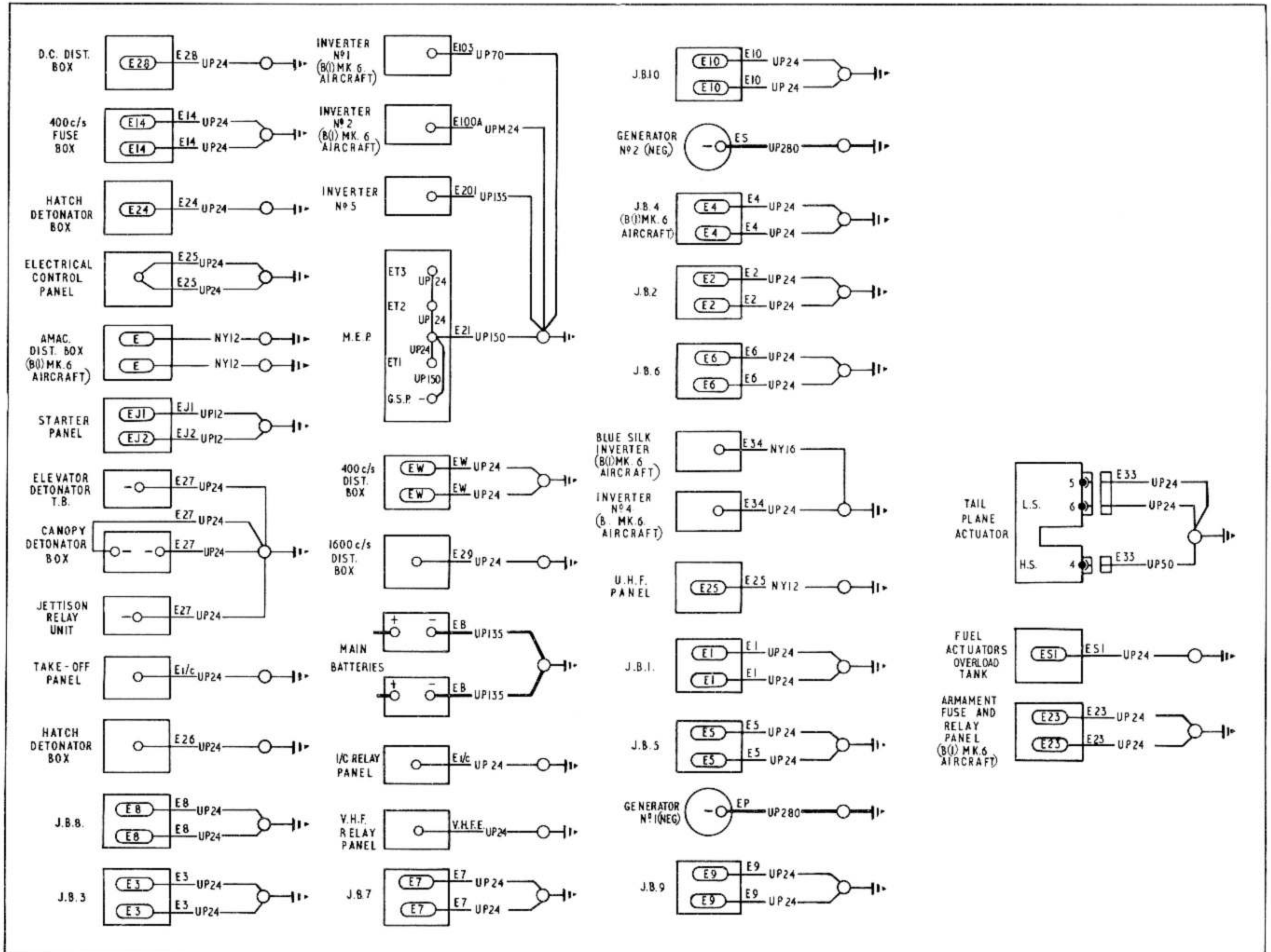


Fig. 26. Electrical installation – circuit earthing details

◀ *(Mod. 4329 embodied)* ▶

LIST OF ILLUSTRATIONS

APPENDIX

Introduction

1. The Canberra B(I)Mk.6 aircraft can be adapted to operate in the following different roles:–

Normal bombing
Special weapon systems (S.W.S.)
Interdictor

Provision is made in the armament system for a change of role to be easily effected by the removal and replacement of certain items of equipment.

2. The normal bombing installation provides for carrying in the bomb bay, a bomb load which may vary from heavy stores to 25 lb practice bombs. For S.W.S. operations, a single weapon is carried on a special beam installed in the bay.

3. When the aircraft is employed in the interdictor role, the bomb bay is used to house a gun pack holding four Hispano, 20 mm guns and a carrier which takes sixteen 4.5 in flares. Pylons, fitted one to each wing, may be used to accommodate wing bombs or rocket launchers containing thirty-seven 2 in rockets, according to operational requirements.

4. Provision is made for the installation of three cameras; a Type F24 which may operate in either the normal bombing or interdictor roles, a Type G90 which is provided for use with guns or rockets, and a Type F95 used with the S.W.S.

Armament safety break

5. As a safety precaution to prevent the guns or rockets being fired or any loaded store being released while the aircraft is on the ground, provision is made to disconnect the armament circuit power supply cable NA1 by breaking the plug and socket coupling on the armament fuse and relay panel *(fig.1)*, mounted aft of the cabin entrance door. A red pennant, bearing the words ARMAMENT SAFE, is attached to cable NA1 and when the cable is disconnected the pennant is clearly visible at the entrance door.

Nose-wheel 'up' microswitch

6. As an additional safety precaution to prevent the guns or rockets being fired while the aircraft is on the ground or in flight with the nose-wheel down or unlocked, the control circuits for the guns and rockets are fed through the nose-wheel 'up' microswitch, the firing circuits being broken when the nose-wheel is extended.

Note...
The pilot's bomb firing, S.W.S. and the G90 gun camera circuits are also controlled through the nose-wheel 'up' microswitch.

ARMAMENT AND PHOTOGRAPHIC – GROUP A & B

(Part 1) B(I)Mk.6 AIRCRAFT

(Completely revised)

Note... *Part 1 of this group deals exclusively with B(I)Mk.6 aircraft – For details of B Mk.6 aircraft refer to Part 2.*

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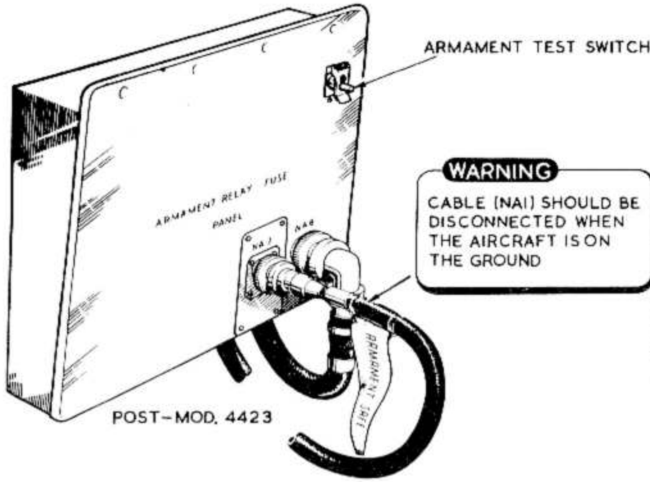

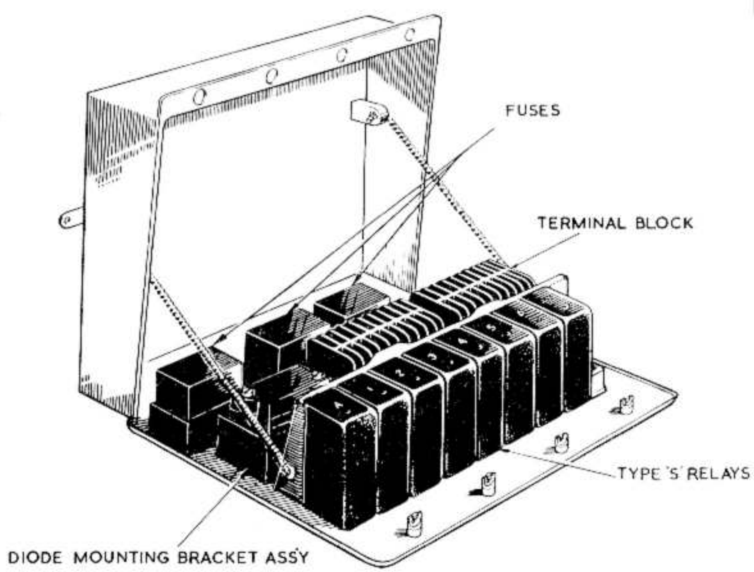

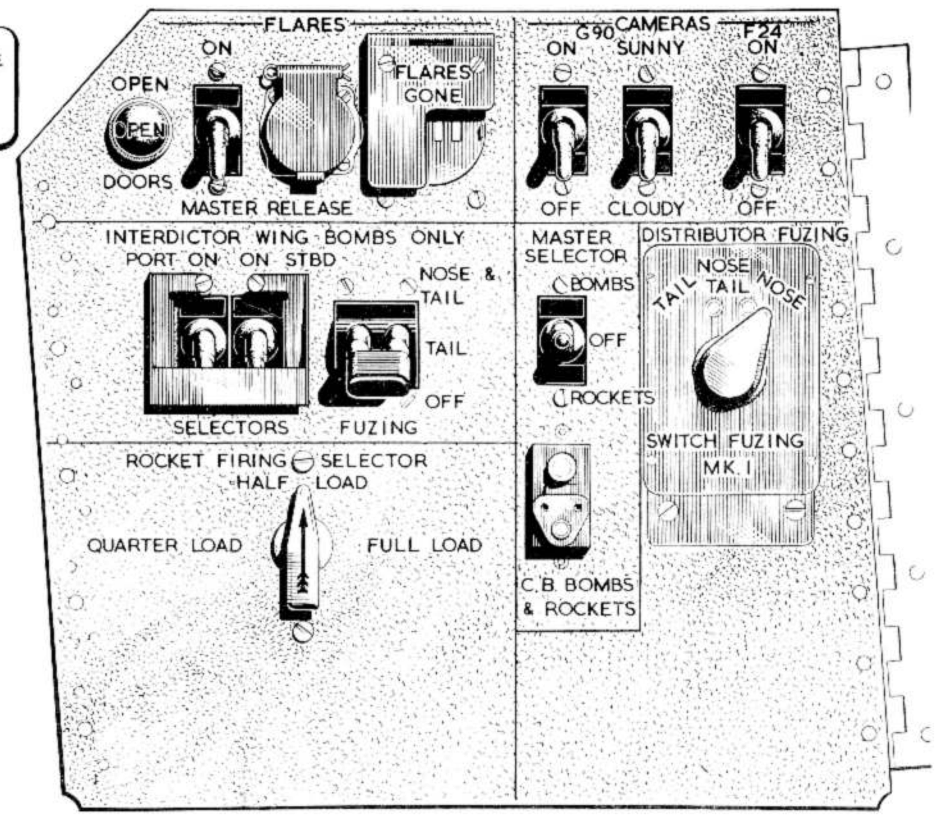

NOTE:

PRE-MOD. 4423 ARMAMENT SAFETY BREAK IS PLESSEY MK.6 FIXED PLUG AND SOCKET.

POST-MOD. 4423 (ILLUSTRATED) HELLERMAN-DEUTSCH 460 SERIES FIXED PLUG AND SOCKET.

Fig. 1. Armament fuse and relay panel and air bomber's control panel

Armament test switch

7. An armament test switch, located on the armament fuse and relay panel *(para.8)*, is connected in parallel with the nose-wheel 'up' microswitch *(para.6)* and when the latter is open *(nose-wheel extended)*, the armament control circuits referred to in para.6 can be made operative for test purposes by closing the test switch. It should be noted that the armament safety break cable NA1 *(para.5)* must be connected to the armament fuse and relay panel to complete the armament circuits.

WARNING,

The armament test switch must not be used for butt testing the guns whilst the nose-wheel is extended.

Armament fuse and relay panel *(fig. 1)*

8. A shallow rectangular box with a hinged lid, which forms the armament fuse and relay panel, is mounted on the starboard side of the fuselage aft of the cabin entrance door. Mounted on the inner face of the panel is an assembly of eight relays, three fuse blocks, two terminal blocks, three diodes and an armament test switch. When Mod.3921 is embodied, the armament test switch is repositioned on the face of the panel so that it can be used without having to lower the panel. When the panel is secured in the normal position by quick-release fasteners, the components are totally enclosed. The relays, three of which are Type S1 *(or S7)*, the remainder Type S3 *(or S9)*, provide electrical interlocking between the various armament circuits; connection to these circuits is made through a 25-way plug/socket connector, mounted on the outside of the panel. The 6-way plug/socket, referred to as the armament safety break *(para.5)* is adjacently positioned.

Note...

Pre-Mod.4423, the armament safety break consists of a Plessey Mk.6 fixed plug and socket. Post Mod.4423 a Hellermann-Deutsch – 460 series fixed plug and socket is fitted.

Air bomber's control panel *(fig.1)*

9. The controls and switches on this panel, located on the starboard wall of the cabin alongside the air bomber's rear station, are for the normal bombing and/or interdictor roles. On the panel are the master switches for the F24 and G90 cameras and the flares release, together with several control and selector switches, and a circuit breaker which protects the bombs/R.P. circuits.

Note...

When the aircraft is used in the S.W.S. role the BOMBS/ROCKETS MASTER SELECTOR switch must be selected to BOMBS and the BOMBS AND ROCKETS circuit breaker must be closed.

Bomb/flare door operation

10. The bomb/flare doors are hydraulically operated and controlled by a Type 206 valve actuator, situated between frames 15 and 16 at the starboard side in the roof of the bomb bay, in conjunction with a three-position switch, labelled FLARE/BOMB DOORS OPEN-SHUT-AUTO, on the console. When the switch is set to SHUT, a supply is fed from the circuit B3 *(fuse 24)* to B33, via a pair of normally-closed contacts of a Type S3 *(or S9)* relay *(No.1)* in the jettison relay unit, located in the console, to B35 and the close terminal of the valve actuator. With the switch set to OPEN, the supply from B3 is fed to B34 and directly to the 'open' terminal of the valve actuator, causing the doors to open. The AUTO position of the switch, used in the S.W.S. role only, feeds a supply from B3, B31 to contacts of a miniature sealed relay in the A.M.A.C. distribution box. When de-energized, the relay completes circuit B3, B31, B34 to the 'open' terminal of the actuator, and when energized completes circuit B3, B31, B33, the normally-closed contacts of No.1 relay, and B35 to the 'close' terminal of the actuator.

Bomb/flare door emergency operation

11. Should the bomb/flare doors electrical circuit fail while the hydraulic services are still functioning, the doors can be opened by operating the yellow and black painted handle positioned on the fuselage wall above the console. The handle is coupled by cable to the manual lever on the valve actuator assembly and will, when operated, open the hydraulic valve irrespective of the actuator motor mechanism.

Bomb/flare door microswitches

12. Three pairs of microswitches are mounted on brackets positioned on the bomb bay forward bulkhead. One pair of switches, the contacts of which close when the bomb/flare doors are fully closed, are connected in the gun firing circuits *(para.47)*. The other two pairs of switches are operated *(contacts closed)* when the bomb/flare doors are fully open, and are used in the normal bomb/flare release, emergency bomb/flare jettison, and bomb/flare doors 'open' indicator circuits.

Bomb/flare doors position indicators

13. Two magnetic indicators operating in parallel, located one on the pilot's console and the other on the air bomber's control panel, are used to indicate the position of the bomb/flare doors. Opening of the doors operates two microswitches which completes circuit B1 *(fuse 22)*, B11 and B12 and energize the indicators which

display a white disc. With the doors closed the circuit is broken and the de-energized indicators show black.

NORMAL BOMBING ROLE

General

14. The normal bombing installation provides carriage and release equipment for a wide range of stores accommodated in the bomb bay. The stores are attached to forward and rear secondary bomb beams by Avro triple carriers, Bristol adapters, light series bomb carriers etc., as required. The system is controlled by equipment located at the pilot's and the air bomber's forward and rear stations.

Operational controls

Air bomber's rear station

15. In addition to the control and selector switches on the air bomber's panel *(para.9)*, a Mk.2 12/24-way distributor and a bomb control unit are adjacently positioned below the control panel on the starboard wall.

Note...
When the aircraft is used in the S.W.S. role, the distributor and control unit are removed and the vacant space is occupied by the S.W.S. control panel and a practice bomb facility control box respectively (Sect.5, Chap.1, G.1., fig.7A).

Air bomber's forward station

16. Installed at this station are a Type T2 computor and sighting head, a bomb firing switch on a flexible lead, and SAFE and LIVE bomb jettison switches.

Pilot's station

17. On the console at the port side of the pilot's seat are mounted the FLARE/BOMB DOORS, OPEN-SHUT-AUTO control switch *(the AUTO position is used in the S.W.S. role only)*, bomb flare doors OPEN indicator lamp, and PILOT'S EMERGY ON/OFF JETTISON switch. A bomb releáse/rocket firing push switch is embodied in the control column right handgrip.

Note...
An EMERGENCY WING STORES JETTISON switch, located on the console, is used in the interdictor role only.

Main bomb beam

18. The main bomb beam, installed in the roof of the bomb bay between frames 17 and 21, is used to carry a single heavy store. It is permanently wired into the aircraft bombing system and incorporates nose and tail fuzing units, a release unit housing and a cocking test socket.

Secondary bomb beams

19. Forward and rear secondary Mk.1 bomb beams are utilised to carry all stores used in the normal bombing roles. The secondary bomb beams, which are fully described in A.P.1664A, Vol.1, Book 2, Sect.3, Chap.6, are fitted in the roof of the bomb bay and connected to the aircraft electrical system by cable looms from J.B.2 and J.B.5, located respectively starboard and port at the forward end of the bomb bay. The release circuits are served by cables 2F and 2H which connect to Plessey plugs at the starboard side of the forward and rear beams respectively. The emergency jettison circuits are similarly served by cables 5F and 5H which connect to Plessey plugs on the port side of the beams.

20. Three housings to carry No.3 E.M. release units are fitted to each beam and numbered 1 to 6 from the forward end. Only three release units are installed at one time, two on the forward beam and one on the rear beam. To facilitate normal release and emergency jettison, both secondary bomb beams are permamently wired and fitted with 5 and 7-pin clipper-sockets at each station.

21. When the secondary beams are removed from the aircraft, their supply cables are connected to stowage plugs situated on the aft face of frame 18 and 22 in the roof of the bomb bay.

Bomb control system

22. The bomb control unit, 12/24-way distributor and fuzing selector switch, all located at the air bomber's rear station, comprise the bomb control system which provides for the release and jettison of the stores. The following paragraphs give a general description, but for more detailed information reference should be made to A.P.4343X, Vol.1, Sect.1, Chap.3.

Bomb control unit

23. This item of equipment generates, for normal or jettison release, electrical impulses which are fed to bomb stations in sequence at preset time intervals. It controls bomb fuzing in conjunction with the fuzing selector switch, and arranges live or safe jettison as selected.

24. External controls on the unit consist of a reset jettison warning lamp and time delay selector and master switches. As the time-delay facility is not used on this aircraft, the time delay selector is inoperative and therefore the master switch should be left in the OFF position.

25. The reset jettison red warning lamp, when alight, indicates that jettisoning is in progress or that the mechanism in the unit has failed to return to the home position. The mechanism can be reset by

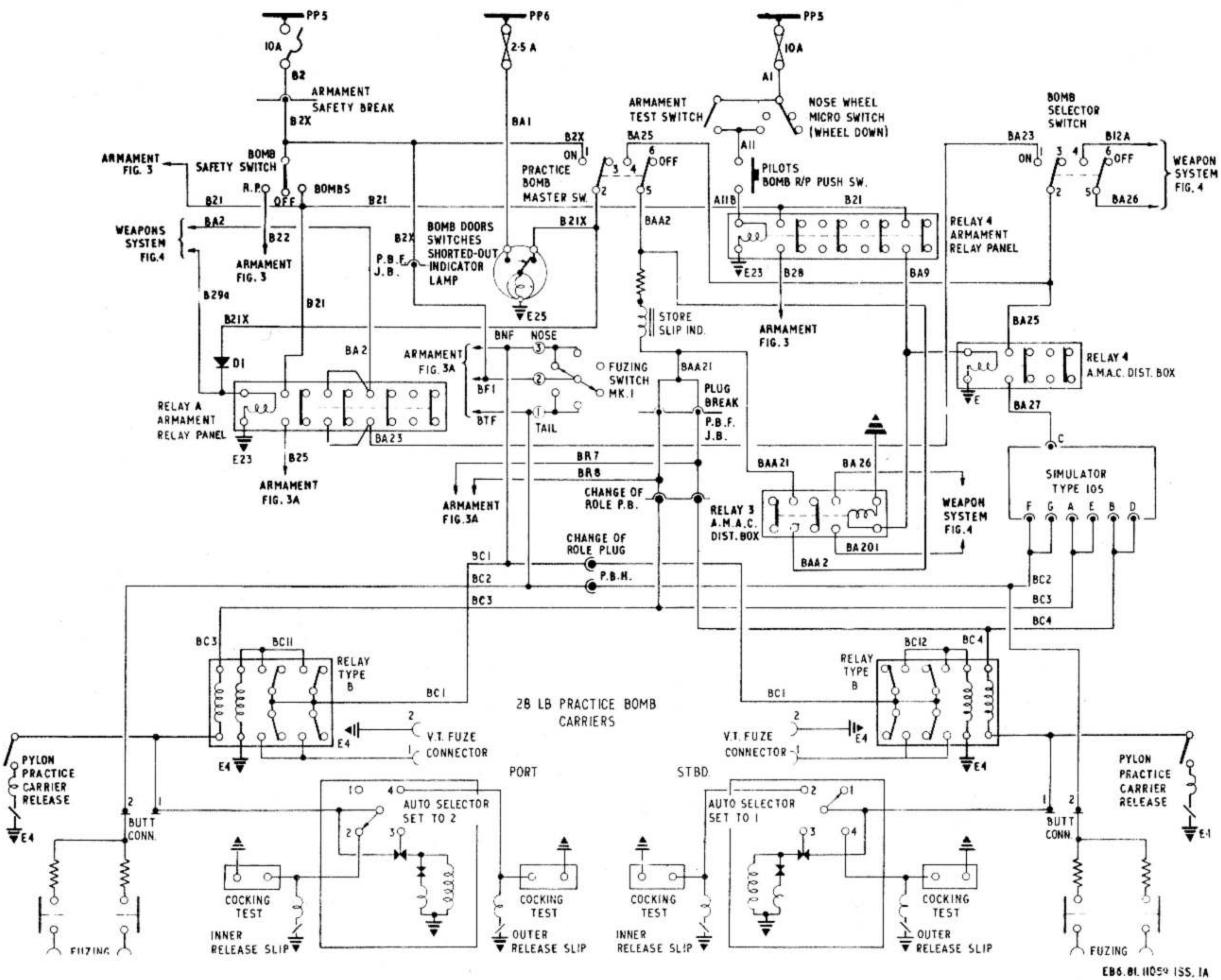

Fig. 2. Practice bomb facility

operating any of the jettison controls, should the lamp remain on after jettisoning is completed.

WARNING

This action must not be carried out with the aircraft on the ground unless it is permissible to release any loaded bomb stores.

12/24-way distributor

26. This unit provides constant control and indication of the functioning of the bombing installation. Selectors and push-switches on the front panel of the unit control the release, spacing and jettison of the stores carried. Twenty-four shutter type magnetic indicators, of which only eight are used, also fitted on the front panel, show the condition of the stores carried in the bomb bay by presenting a grid of alternate black and white stripes when energized, and by remaining black when unenergized. The eight indicators used, correspond to the positions numbered 1 to 8 on the STOP-START selector switch, and to the bomb release circuits BR1 to BR8.

Note...

Care should be taken not to confuse the circuit identifications with the release station numbers on the secondary bomb beams. The relationship between circuit identifications and bomb locations in the aircraft may be found by referring to routeing diagrams in this group and the wiring of the appropriate carriers.

Fuzing selector switch

27. This unit controls selection of the required mode of fuzing. It comprises a three-position rotary switch, labelled NOSE, NOSE-TAIL, TAIL, which controls fuzing of the stores in conjunction with the bomb control unit.

Operation

28. The operation of the 12/24-way bombing system is described in A.P.4343X, Vol.1, Sect.1, Chap.3. Briefly, the system functions as follows:–

(1) The stores to be released and the time interval between them are selected from the 12/24-way distributor. Fuzing is automatic when the stores are selected for release and may be either nose, tail, or nose and tail according to the position of the fuzing selector switch.

(2) When either the air bomber's or pilot's bomb release switch is operated, the bomb control unit starts to generate electrical impulses. These impulses are transmitted to actuate the release units at the selected bomb stations in the correct sequence, and at the intervals selected on the 12/24-way distributor.

(3) When any one of the jettison switches is operated, the action is similar to that described in sub-para.(2), except that the bomb control unit now transmits electrical impulses to all bomb stations in sequence and at fixed intervals. The fuzing is automatically adjusted according to whether live or safe jettison is selected.

(4) Selection of the MASTER SELECTOR switch to BOMBS connects a supply from circuit B2, B2X to B21 at the air bomber's firing switch and two contacts of No.4 relay in the armament fuse and relay panel. Operation of the air bomber's release switch completes circuit B21-B28 to energize a Type Q relay, located adjacent to J.B.14 on the starboard wall at the air bomber's rear station. A circuit to the bomb control unit is completed through the relay contacts and provisions for bomb release. When the bomb doors are open the circuit B21-B23-B29 is completed via the bomb doors micro-switches and energizes relay 'A' via diode D3 and B29a. Circuit B21-B25, completed via the relay contacts, completes a circuit to the bomb distributor unit and initiates bomb release.

(5) In addition to completing the circuit to the bomb control unit, the Type Q relay, when energized, also completes the pulsing circuit to the F24 camera Type 48 control and, providing the camera master switch is ON, the camera begins to function in conjunction with the bomb release *(Chap.2, Group A & B)*.

(6) The supply to the pilot's bombs/R.P. release switch in the control column right handgrip is fed from circuit A1-A11 which is controlled by the nose-wheel 'up' micro-switch *(para.6)*. Operation of the pilot's release switch connects circuit A11-A11B to energize No.4 relay in the armament fuse and relay panel. Circuit B21-B28 completed through one pair of the relay contacts, provides the bomb release sequence in a manner similar to that of the air bomber's release switch. Circuit B21-BA9, completed through the second pair of relay contacts, is used to energize No.3 and No.4 relays in the A.M.A.C. distribution box to release the weapon when the aircraft is operating in the S.W.S. role.

Emergency bomb jettison

29. Operation of the PILOT'S EMERGY JETTISON switch on the console connects a supply from circuit B4 *(fuse 7 at the M.E.P.)* to B48 which energizes No.1 relay in the jettison relay unit, located in the

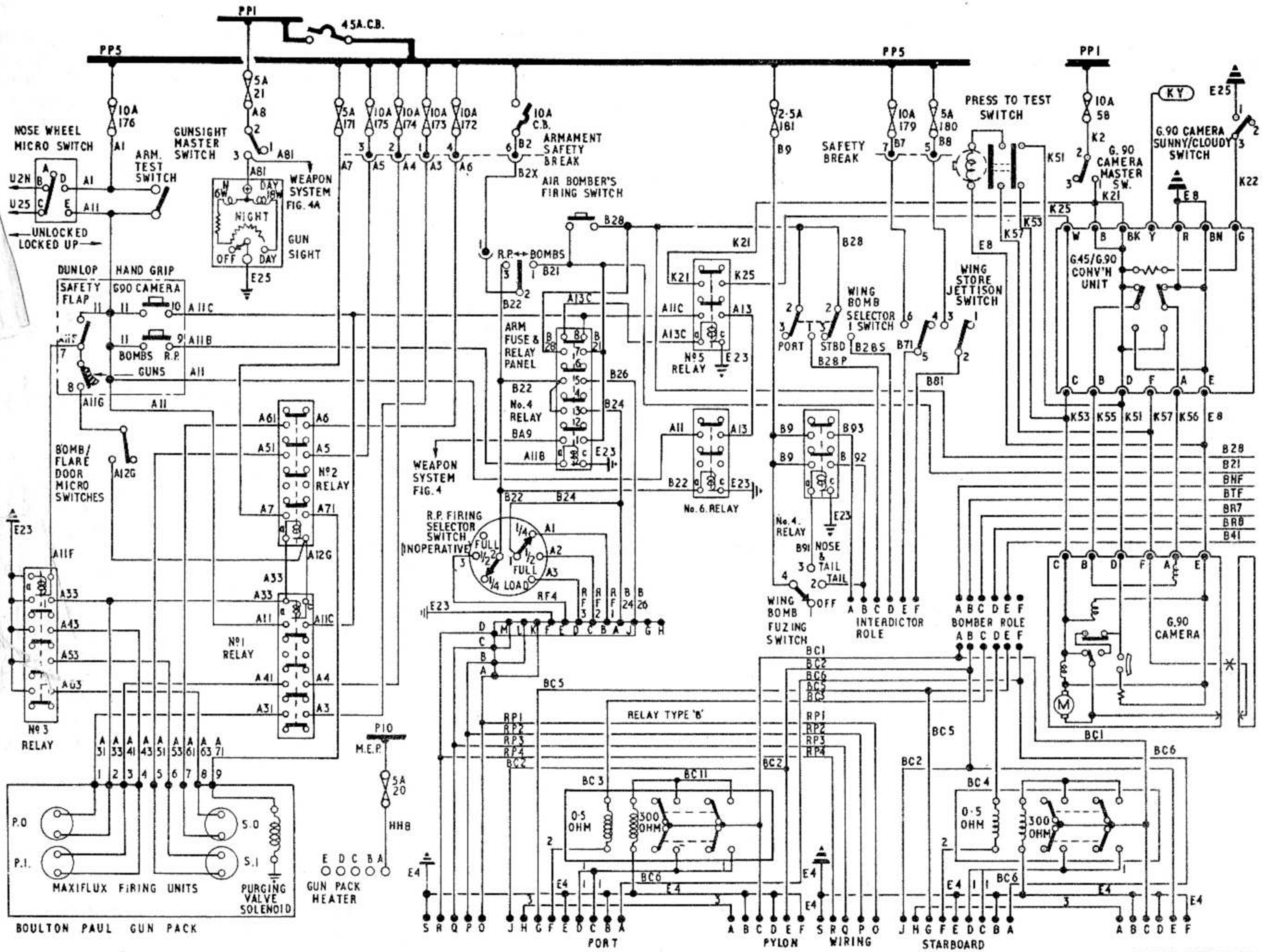

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Fig. 3. Armament normal bombing and interdictor roles

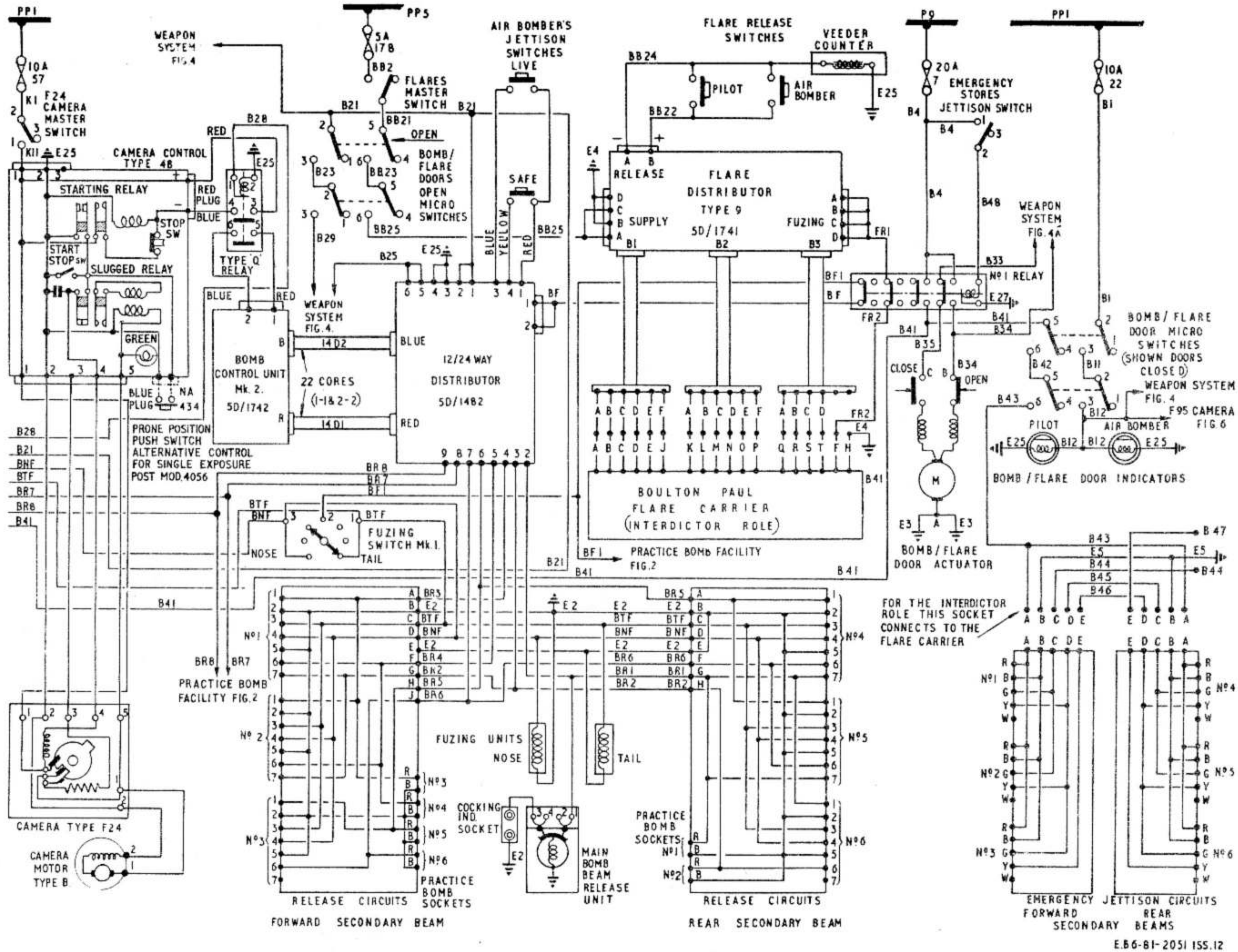


Fig. 3A. Armament normal bombing and interdictor roles

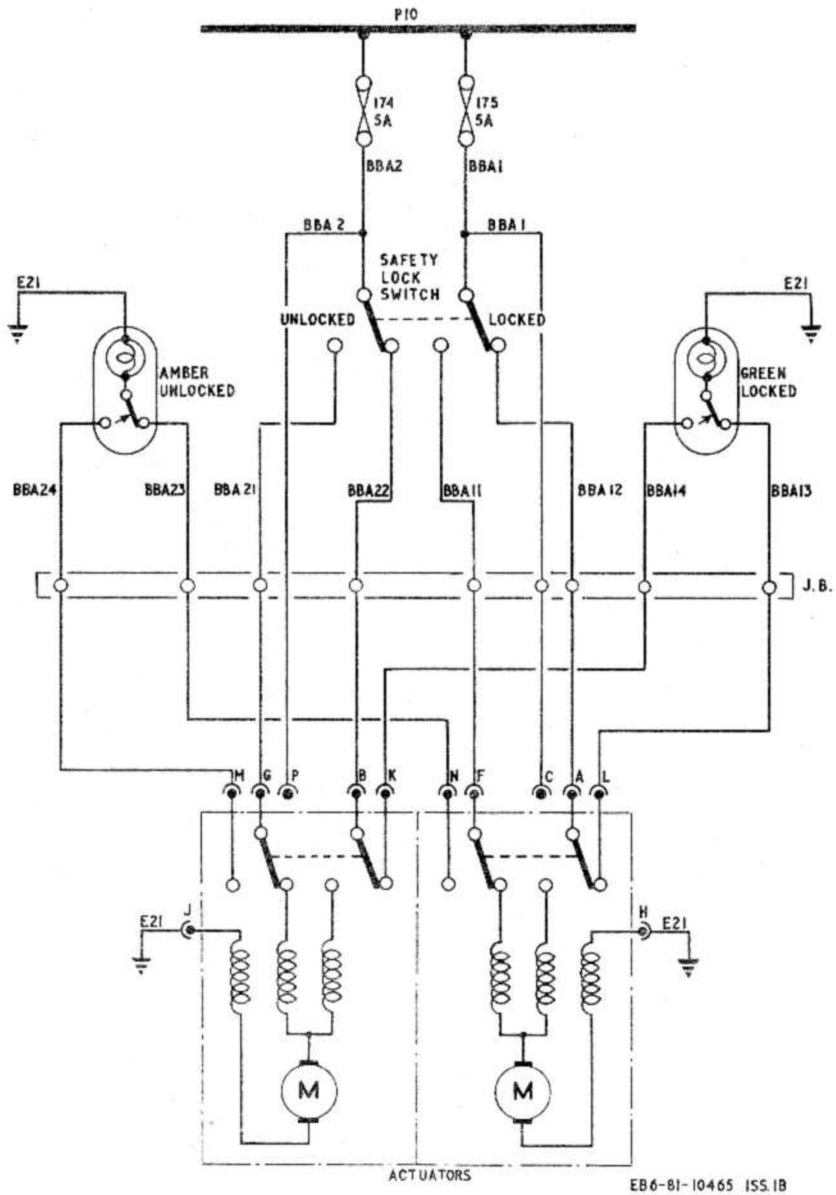


Fig. 3B. Bomb safety lock

console. With the relay contacts closed, circuit B4-B41 jettisons the wing stores and circuit B4-B34 connects a supply to the doors valve actuator, which opens the doors. The doors, when fully open, actuate the door microswitches to complete circuit B4-B41-B42-B43 and jettison all stores normally jettisonable from the secondary bomb beams.

Note...

When bombs carried by Bristol adapters are selected for jettison both the bombs and the adapters will be released. 25 lb practice bombs on light series carriers cannot be jettisoned by this method.

SPECIAL WEAPONS SYSTEM ROLE

General

30. The special weapons system *(S.W.S.)* comprises fixed wiring and fittings *(Mod. 4345)* and removable fittings *(Mod.4411)* installed when the aircraft is intended to function in the S.W.S. role. For a full description of the system reference should be made to the relevant Publication. Practice bomb facilities are afforded by the S.W.S. after slight wiring and equipment changes.

Bomb safety lock *(post Mod.3732)*

31. To prevent inadvertent release of the S.W.S. weapon, an electrically-operated bomb safety lock is embodied in the store carrier. Control and indication of the safety lock circuit is provided by a wire-locked switch and two warning lamps fitted on the console. A safety lock junction box installed in the battery bay at frame 12, provides for connecting and distributing the power supplies to the components. A supply plug facilitates connection between the aircraft wiring and the store carrier and is retained in a stowage on the aft face of frame 18 in the roof of the bomb bay when the carrier is removed.

Power supplies

32. A power supply of 28-volt d.c. is required to operate this system. Circuit and routeing diagrams in this group cover the system whilst the power source is covered in Group P.

Location of fixed and removable fittings

Pilot's station

33. The equipment at the pilot's station consists of the following:—

(1) Reflector gunsight fitted in the pilot's forward line of sight on the cockpit coaming tube.

(2) The switch and indicator panel mounted to the right of the gunsight; this switch and indicator panel is part of the L.A.B.S. equipment and is now inoperative.

(3) The gun firing trigger switch *(PICKLE SWITCH)*, safety flap switch and bombs/R.P. push switch on the control column right handgrip.

(4) The FLARE/BOMB DOORS AUTO/SHUT/OPEN, GUNSIGHT MASTER *(Mod. 2692)*, pilot's EMERGENCY JETTISON switches and bomb/flare doors OPEN indicator, together with the BOMB RELEASE SAFETY LOCK switches and LOCKED and UNLOCKED warning lamps, on the console panel.

Note...

(1) The S.W.S. automatically controls the opening of the bomb doors when the control switch is in the AUTO position.

(2) The GUNSIGHT MASTER switch is to be in the OFF position in the S.W.S. role.

Navigator's station

34. The L.A.B.S. power supply switches and indicators, located on the E.C.P. at the navigator's position, are part of the L.A.B.S. unused equipment and are now inoperative.

Air bomber's rear station

35. Items of equipment at this station include the following:—

(1) S.W.S. *(WEAPON)* control panel *(fitted in the position normally occupied by the 12/24-way bomb distributor)* on which is fitted a DCU.9/A control unit, a bomb slip indicator, and three switches labelled SECONDARY RELEASE, BOMB SELECTOR and T.A./T.B. respectively.

(2) A.M.A.C. distribution box.

(3) Armament panel *(S.W.S. practice bomb facility box)*, housing a store MASTER SWITCH, a magnetic indicator and a BOMB DOORS MICRO-SWITCHES SHORTED OUT indicator lamp.

Air bomber's forward station

36. At this station, the normal bomb release switch and T2 bombsight are used in the high level role only.

Upper equipment compartment

37. The upper equipment compartment houses cable stowage clamps. Provision remains, although the equipment is no longer in use, to fit a mounting crate complete with the fuze charge unit, protective relay unit and J.B. 'A'.

Bomb bay

38. The S.W.S. store carrier complete with J.B., together with the associated main looms and plug stowage panels, are located in the bomb bay. Two microswitches fitted on the bomb bay forward bulkhead, ensure that the S.W.S. store is not released until the bomb doors are in the open position.

Conversion of aircraft for S.W.S. role

39. The equipment change of role details are given in Sect.2, Chap.5 and the connections into the electrical wiring of the aircraft is shown in fig.4-4A and 10-10A. Fig. 4-4A and 10-10A, which are post Mod.3737, do not show any wiring to the fuze charge unit, protective relay unit or J.B.'A' as these items of equipment are unused, even though provision is still made to fit them in the aircraft, refer to para.37. Alterations are necessary to the aircraft standard wiring at the bomb/flare doors microswitches used in the interdictor *(flare carrier)* role *(see fig.11A)*. To carry out these alterations, refer to fig.10A and proceed as follows:—

(1) Remove the covers from the two 3-way terminal blocks inboard of the microswitches on the aft face of the bomb bay bulkhead at frame 13.

(2) On the starboard *(flare carrier role)* microswitch, disconnect the cable BB25 *(cable assembly 4C)* from terminal 6 and connect it to an empty terminal point in the adjacent 3-way terminal block.

(3) Using a short length of Unipren 6 cable suitably idented BAA211, connect the terminal 6 on the microswitch to the terminal point in the 3-way terminal block which connects to cable BAA211 in cable assembly N107. Refit the terminal block cover.

(4) On the port *(flare carrier role)* microswitch, disconnect the cable BB21 *(cable assembly 4C)* from terminal 5 and connect

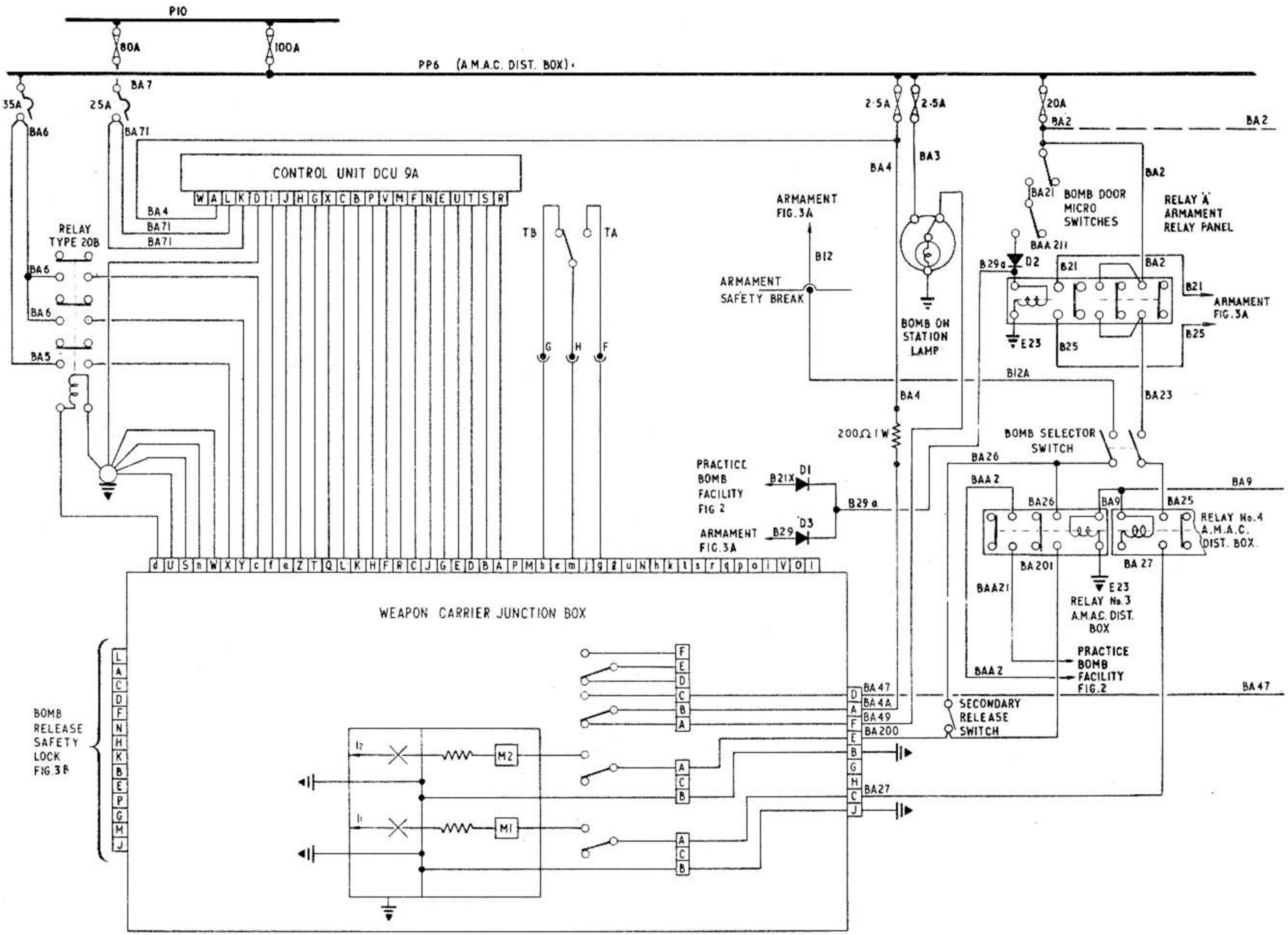
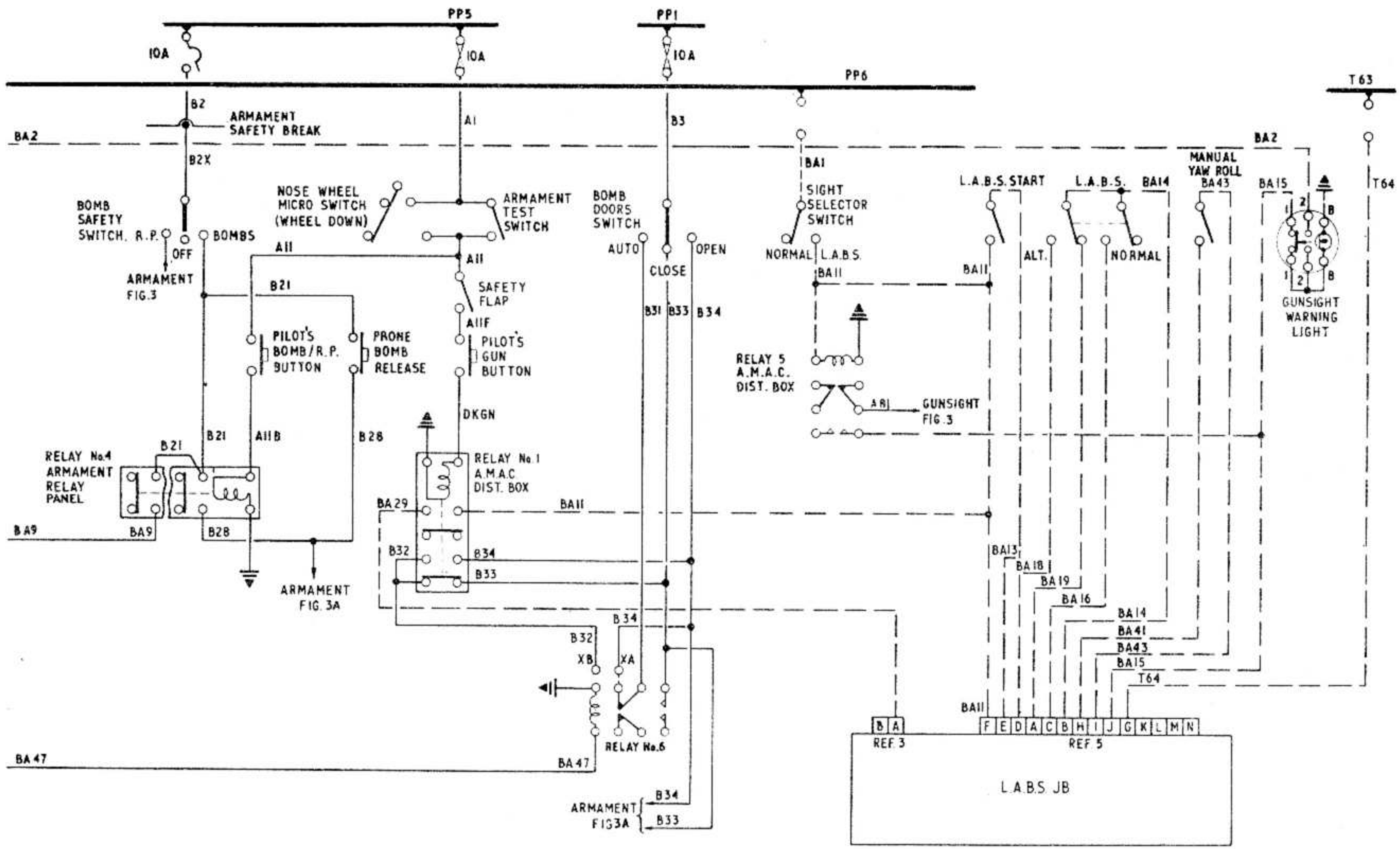


Fig. 4. Special weapon system (post Mod. 3737)



NOTES

1. WIRING SHOWN THUS---IS L.A.B.S. UNUSED WIRING AND IS REFERENCE ONLY.
2. PROVISION IS MADE AT RELAY No. 6 TO CONNECT CABLE IDENTED B32(XB) IN PLACE OF CABLE IDENTED B34 (XA) IF REQUIRED

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Fig. 4A. Special weapon system (post Mod.3737)

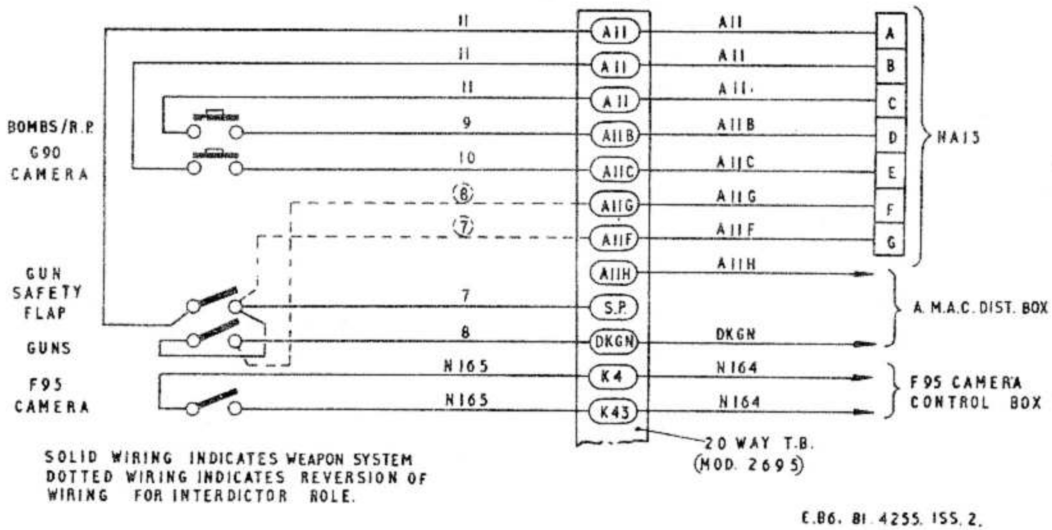


Fig. 5. Control column 20-way T.B. wiring changes for S.W.S. role

it to an empty terminal point in the adjacent 3-way terminal block.

(5) Using a short length of Unipren 6 cable suitably idented BA2, connect the terminal 5 on the microswitch to the terminal point in the 3-way terminal block which connects cable BA2 in cable assembly N107. Refit the terminal block cover.

(6) In cable assembly 2C1, re-ident at both ends the cable BB23, which interconnects terminals 5 and 6 on the starboard and port microswitches respectively, to BA21.

Note...

When reverting the S.W.S. role back to interdictor (flare carrier) role, the microswitch wiring must be changed back to the condition shown in fig.11A.

40. Further alterations necessary in the aircraft standard wiring are minor changes at the 20-way terminal block at the base of the control column. These changes are shown in fig.5.

Pylon practice-bomb facility

41. Pylon practice-bomb facilities are afforded in the S.W.S. role after changes in the wiring and equipment. These changes entail fitment of external practice-bomb carriers to both wing pylons and the practice-bomb facility box in the position normally occupied by the bomb control unit. Cable looms N121 and N121E must be connected to the practice-bomb facility box. When a simulator, Type 105 is installed in the bomb bay, cable loom N121E must be disconnected from the practice-bomb facility box and stowed in the dummy socket provided.

(1) With the simulator fitted and the bomb doors closed, relay A is energized by a supply from the BOMBS and ROCKETS circuit-breaker *(C.B.)* on the air bomber's control panel, via the circuit B2-B2X, the closed contacts of the practice-bomb MASTER SWITCH, B21X, diode D1 and B29a, thus by-passing the bomb doors microswitches. Simultaneously circuit B21X illuminates the BOMB DOOR MICRO-SWITCHES SHORTED-OUT indicator lamp on the practice-bomb facility box. The closed contacts of relay A complete the circuit from fuse A8 in the A.M.A.C. distribution box to the wing pylons via the closed contacts of the BOMB SELECTOR switch, relay No.4, in the A.M.A.C. distribution box, and the simulator.

(2) Without the simulator, the circuit from fuse A8, in the A.M.A.C. distribution box, to the wing pylons is completed via circuit BA2, the contacts of relay 'A', the BOMB SELECTOR switch, the practice bomb MASTER SWITCH, relay No.3 in the A.M.A.C. distribution box and BC3 and BC4 which are connected to the port and starboard wing pylons respectively. The magnetic indicator on the practice-bomb facility box is also energized when the MASTER SWITCH is selected to ON.

F95 camera

42. Mod.2695 introduces an F95 camera for use in the S.W.S. role. Circuit and routeing diagrams are included within this group but reference should be made to Chap.2, Group A & B for a description on installation details and camera operation.

INTERDICTOR ROLE

General

43. When the aircraft is employed in the interdictor role, the bomb doors are replaced with special flare doors, the standard secondary bomb beams are removed and replaced by a gun pack holding four Hispano guns, and a flare carrier for housing sixteen 4.5 flares. Alternatively, a

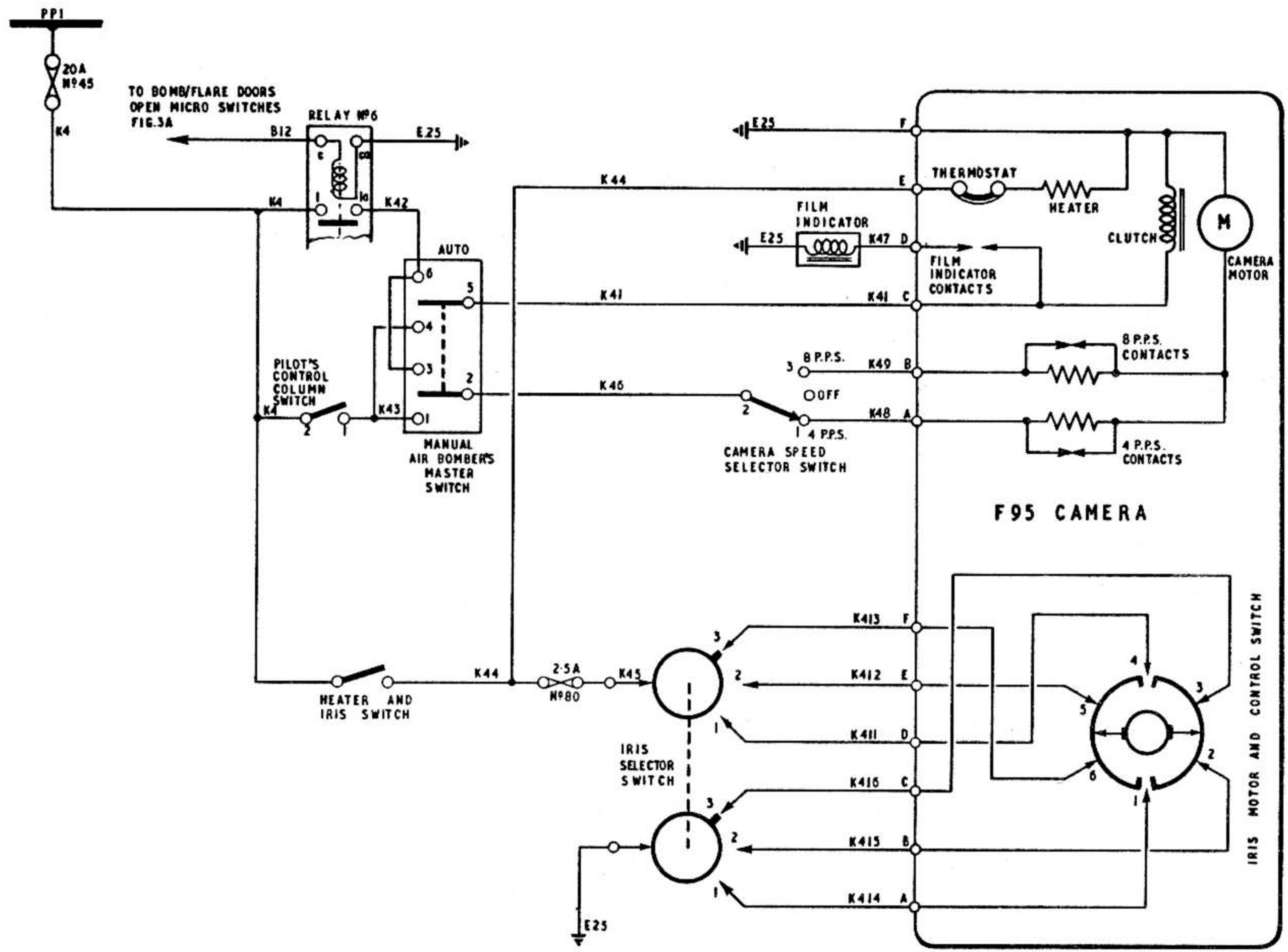


Fig. 6. F.95 camera

Mk.2 secondary bomb beam *(A.P.1664A, Vol.1, Book 2, Sect.3, Chap.6)* can be fitted in lieu of the flare carrier in the forward end of the bomb bay to house an Avro triple carrier. Rockets or bombs, according to operational requirements, may be carried on pylons mounted on the underside of the wings at rib 3. The pylons *(A.P.1664A (2nd Edn.), Vol.1, Book 1, Sect.1, Chap.18)* are fitted with a screw-jack assembly for bombs, or an ejector release unit when rocket launchers are carried *(A.P.2802A (revised edition), Vol. 1)*. A G90 camera is installed in the leading-edge of the starboard main plane between the engine and fuselage and is arranged to function when the guns or rockets are fired. Provision is also made for the F24 camera to operate as in the normal bombing role.

Operational controls

Pilot's station

44. Operational controls at the pilot's station consists of:–

(1) Reflector gunsight fitted in the pilot's forward line of sight on the cockpit coaming tube.

(2) FLARE RELEASE push-switch mounted to the port side of the gunsight.

(3) The gun firing trigger switch *(PICKLE SWITCH)* and safety flap switch, bombs/R.P. and G90 camera push-switches on the control column right handgrip.

(4) The FLARE/BOMB DOORS AUTO-SHUT-OPEN, GUNSIGHT MASTER *(Mod. 2692)*, PILOT'S EMERGY JETTISON *(bomb bay)* and WING STORE JETTISON switches, together with the bomb/flare doors OPEN indicator on the console panel.

Note...

(1) The AUTO position of the FLARE/BOMB DOORS switch is inoperative in this role.

(2) The GUNSIGHT MASTER switch is to be in the ON position in the interdictor role.

Air bomber's rear station

45. Control equipment related to the interdictor role at this station is fitted on the armament control panel *(para.9)*.

Conversion of aircraft to interdictor role from S.W.S. role

46. The equipment change of role details are given in Sect.2, Chap.5. Alterations are necessary in the aircraft wiring to change from S.W.S. to interdictor role. These changes take place at the 20-way terminal block at the base of the control column *(fig.5)* and the bomb/flare door microswitches on the bomb bay forward bulkhead, from that shown in fig.10A to that shown in fig.11A.

Gun firing

General

47. Four Hispano 20 mm guns are housed in a gun pack located in the rear portion of the bomb bay. The pack is coupled to the aircraft wiring by a cable assembly which connects to a Plessey plug mounted on the forward face of the bomb bay aft bulkhead. Aircraft installation details are given in Sect.2, Chap.5, and a brief description of the pack is given in Sect.7, Chap.3. Detailed information on the pack is given in A.P.1641F, Vol.1, Part 1, Chap.7A.

48. Gun firing is controlled by the guns safety flap and trigger switch in the control column right handgrip in conjunction with the use of the reflector gunsight. A solenoid operated valve, directly supplied from fuse 20 at the M.E.P., controls hot-air from the air conditioning system *(Sect.3, Chap.8A)* for gun heating purposes.

Operation

49. The gun firing circuits fed from A1 *(fuse 176 in the armament fuse and relay panel)* are isolated by the nose-wheel 'up' microswitch *(para.6)* while the nose-wheel is down or unlocked. Providing that the microswitch contacts are closed, a supply is fed to A11 at the safety flap switch. Operation of the safety flap switch connects a supply to the gun firing trigger and completes circuit A11-A11F to energize No.1 relay in the armament fuse and relay panel and results in the earthing of the four Maxiflux firing units in the gun pack. With the trigger switch depressed the supply is connected from A11 to A11G at the bomb/flare door microswitches and, providing the flare doors are closed *(microswitch contacts closed)*, through A12G and A13G to energize No.2 and 3 relays in the armament fuse and relay panel. The earthing point for the solenoid coil of the two relays is taken from A33 when No.1 relay is energized. Closing of No.2 and 3 relays completes circuits A3-A31, A4-A41, A5-A51 and A6-A61, fed respectively from fuses 175, 174, 173 and 172 *(armament fuse and relay panel)* to fire the guns. Additionally when No.3 relay is closed, circuit A7 *(fuse 171)* is connected to A71 to the gun purging valve solenoid in the gun pack.

Note...

An armament test switch (para.7) is used to by-pass the nose-wheel 'up' microswitch for ground test purposes.

Gunsight

50. A switch labelled GUNSIGHT MASTER, mounted on the console, controls the gunsight power supply circuit A8 *(fuse 21)*-A81.

Gun camera

51. The G90 gun camera operates automatically during gun firing or may be controlled independently by a push-switch on the control column right handgrip. Circuit and routeing diagrams are included within this group but reference should be made to Chap.2, Group A & B for a description on installation details and camera operation.

Flares installation

General

52. When flares are to be carried, sixteen are accommodated on a flare carrier support assembly *(A.P.1664A, Vol.1, Book 2, Sect.3, Chap.21)* installed at the forward end of the bomb bay. The flare release circuits are primarily controlled by the FLARES MASTER switch on the air bomber's control panel, and then subsequently released by either the pilot's FLARE RELEASE push-switch on the coaming tube or the air bomber's FLARE RELEASE push-switch on his control panel. Other items of equipment in the release circuits comprise a Type 9 distributor, situated between frames 25 and 26 at the starboard side of the bomb bay, bomb/flare door microswitches on the bomb bay forward bulkhead, and a FLARES GONE counter on the air bomber's control panel.

Operation

53. Operation of the FLARES MASTER switch to ON connects a supply from circuit BB2 *(fuse 178 in the armament fuse and relay panel)* to BB21 at the bomb/flare doors microswitches. With the microswitches closed *(flare doors open)* circuit BB21 connects BB23-BB25 to the Type 9 distributor in preparation for the release of flares. When either the pilot's or air bomber's FLARE RELEASE switch is depressed, circuit BB22-BB24 is completed via the Type 9 distributor to the flare carrier to initiate the release of flares. The FLARES GONE counter operates in conjunction with the Type 9 distributor during the flare release sequence.

Flare fuzing

54. The flares are automatically fuzed during release by circuit FR1-FR2 which interconnects, via normally-closed contacts of No.1 relay in the jettison relay box, the flare carrier and the Type 9 distributor.

Flare jettison

55. Operation of the PILOT'S EMERGY JETTISON switch on the console passes a supply from circuit B4 *(fuse 7)* to B48 which energizes and closes No.1 relay in the jettison relay box and results in the following action. Circuit B4-B34 is completed and a supply is fed from fuse 7 to the flare doors valve actuator which operates to open the doors; the latter, when fully open, actuate the bomb/flare door microswitches to complete circuit B4-B41-B42-B43 which gives a positive supply to the flare carrier jettison circuits. Closing of No.1 relay also breaks the flare fuzing circuit FR1-FR2 to ensure that the flares are jettisoned safe.

Wing bomb release

General

56. Wing bombs may be released either by the pilot using the bombs/R.P. push-switch on the control column right handgrip, or by the air bomber using the bomb release push-switch at his forward station in the nose. Selector and fuzing switches are fitted on the armament control panel at the air bomber's rear station, whilst a jettison switch is fitted on the pilot's console.

Operation

57. Selection of the MASTER SELECTOR switch to BOMBS connects a supply from circuit B2X to B21 at the air bomber's firing switch and to two contacts of No.4 relay in the armament fuse and relay panel. Operation of the air bomber's release switch completes circuits B21-B28 to the WING BOMBS selector switches. With the wing bombs selected, circuits B28P-BC3 and B28S-BC4, which respectively feed the pull-in coils of the Type B relays in J.B.17 and J.B.18 are connected to the pylon release unit to initiate the release of wing bombs.

58. Additionally, operation of the air bomber's release switch energizes the Type Q relay, on the starboard wall at the air bomber's rear station, to complete the F24 camera control pulsing circuit and, providing that the F24 CAMERA master switch is ON, the camera begins to function *(Chap.2, Group A & B)*.

59. The supply to the pilot's bomb/R.P. release push-switch on the control column is fed from circuit A1-A11 which is controlled by the nose-wheel 'up' microswitch *(para.6)*. Depressing the release switch completes circuit A1-A11-A11B to energize No.4 relay in the armament fuse and relay panel to complete circuits B21-B28 through normally-open contacts of No.4 relay and initiate wing bombs release in a similar manner to that of the air bomber's release circuit, and B21-BA9 to energize relays No.3 and No.4 in the A.M.A.C. distribution box.

Wing bomb fuzing

60. The WING BOMBS FUZING switch, located on the air bomber's control panel, enables both wing bombs to be fuzed simultaneously. When TAIL fuzing is selected, a supply from circuit B9 *(fuse 181 in the armament fuse and relay panel)* is connected, via the fuzing switch, to B92 which energizes the tail fuzing units in both pylons. Selecting the switch to NOSE AND TAIL, energizes No.7 relay, in the armament fuse and relay panel, which on closing, connects B9 to B93-BC1 and B92-BC2 to energize both the nose and tail fuzing units in the pylons. Circuit BC1 is also connected to the two Type B relays located one in J.B.17 and the other in J.B.18.

61. The Type B relays are used in the variable time fuzing circuits for the pylons and each comprises a series pull-in coil, which is energized when the energizing current for the bomb release units passes through it, a series of four switches and a shunt solenoid coil. The purpose of the relays is to give a fuzing supply to the V.T. fuze circuits only from the moment of release of the stores. The initial energization of the relay closes all four switches, two of which are connected to BC1-BC11 *(J.B.17)* and BC12 *(J.B.18)* to energize the hold-in coil, and two connect a supply from BC1 to the V.T. fuse connector on the pylon.

Wing bomb jettison

62. See para.67.

Rocket firing

General

63. When rocket launchers are to be attached to the wing pylons, the bomb screw jack assemblies must be replaced with ejector release units and the cable harnesses changed. Plugs are fitted on both types of harness to mate with sockets at J.B.17 *(port)* and J.B.18 *(starboard)*, enabling the change to be easily effected. Details covering the installation of screw jack and ejector release unit assemblies will be found in the relevant Air Publication detailed in para.43.

64. Rocket firing is controlled by the pilot's bombs/R.P. switch on the right handgrip of the control column, in conjunction with the MASTER SELECTOR switch on the air bomber's control panel.

Note...

The ROCKET FIRING selector switch on the air bomber's control panel is inoperative.

Rocket launcher

65. Each rocket launcher is of fibre glass construction fitted with a frangible nose. It is designed to accommodate thirty-seven 2in rockets in four banks, which are fired in a single salvo. Fitted beneath an access panel on the launcher is a ripple salvo unit used to control the firing order of the rockets during salvo. Miniature plugs, embodied in the upper surface serve to connect the unit to the electrical system via a Mk.2 snatch plug assembly.

Operation

66. Selection of the STORE SELECTOR switch to ROCKETS connects a supply from circuit B2 to B22 at normally-open contacts of No.4 relay in the armament fuse and relay panel. Operation of the pilot's firing switch connects A11-A11B to energize No.4 relay. Circuit B22-B26, completed through the normally-open contacts of the relay, initiates the release of rockets. Additionally, selection of the STORE SELECTOR switch to ROCKETS energizes No.6 relay which is used in the G90 camera control described in Chap.2, Group A & B.

Emergency wing-store jettison

67. The EMERGENCY WING STORES JETTISON switch on the console, used in the interdictor role only, controls the jettisoning of the wing stores whether bombs or rockets. When the stores carried are bombs, closing the switch completes circuit B7 *(fuse 179 in the armament fuse and relay panel)* -B71-BC5 to the jettison solenoid in the pylons. When rockets are carried, closing the switch completes circuit B8 *(fuse 180 in the armament fuse and relay panel)* B81-BC6 to the ejector gun head break in each pylon.

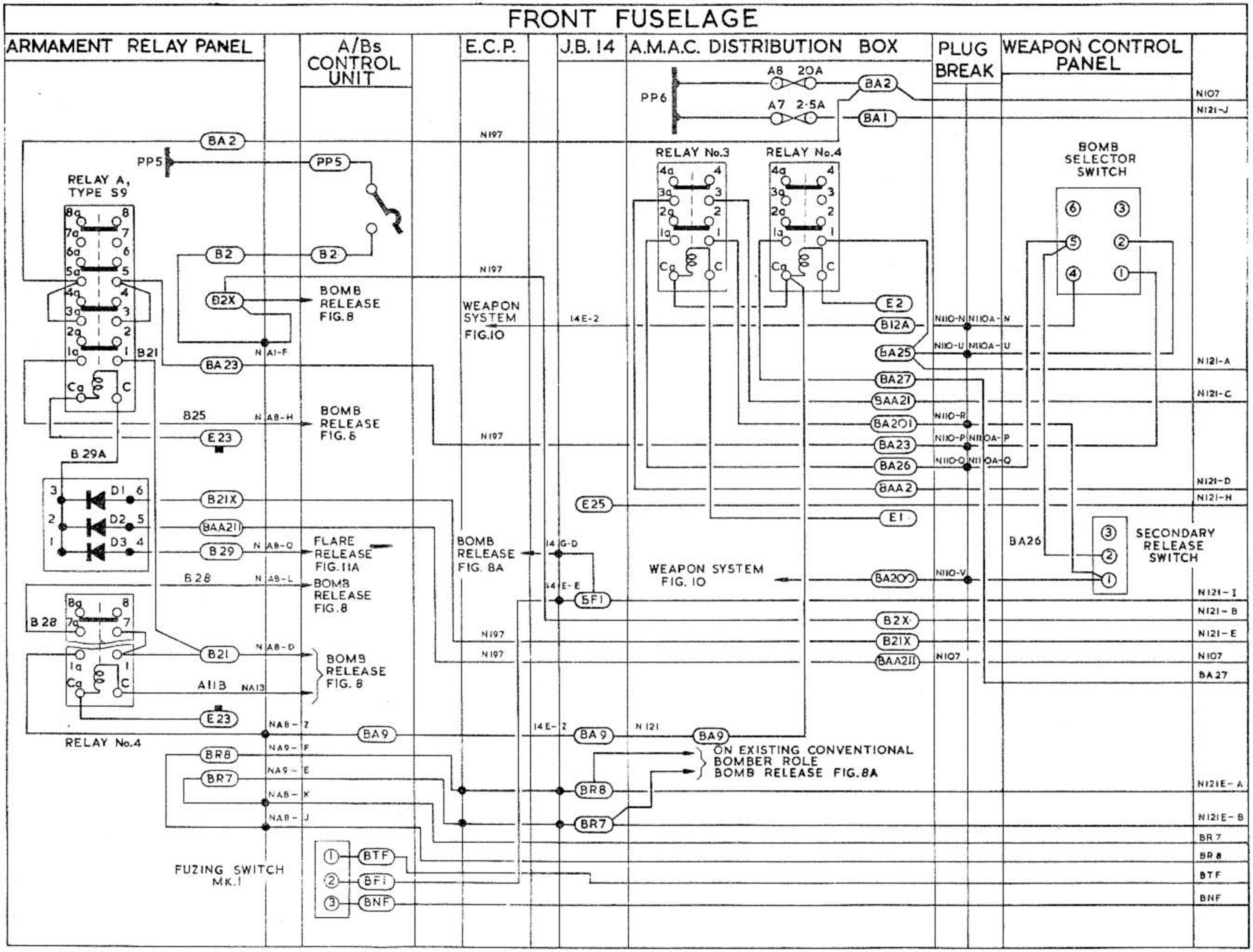


Fig. 7. Practice bomb facility

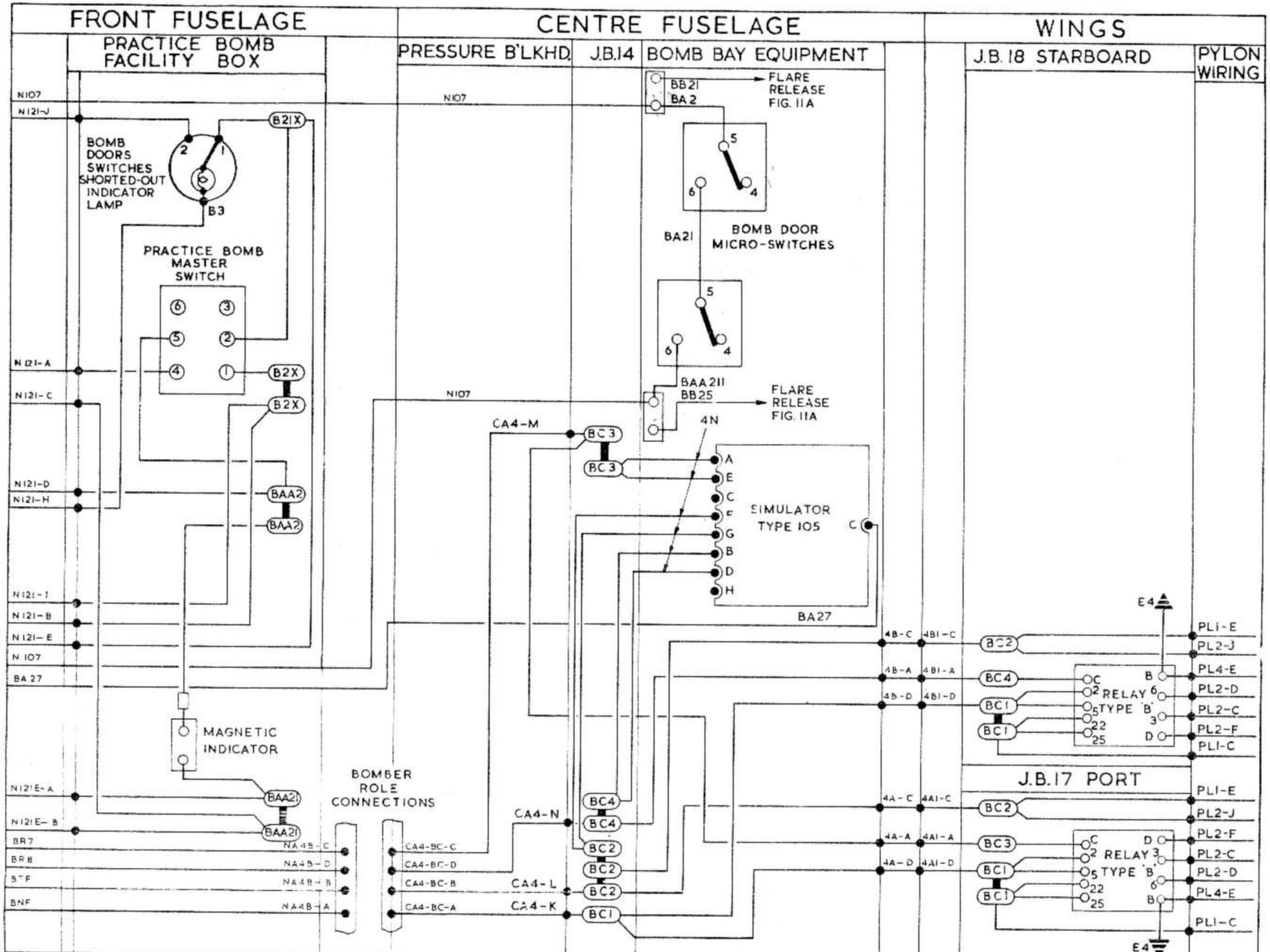


Fig. 7A. Practice bomb facility

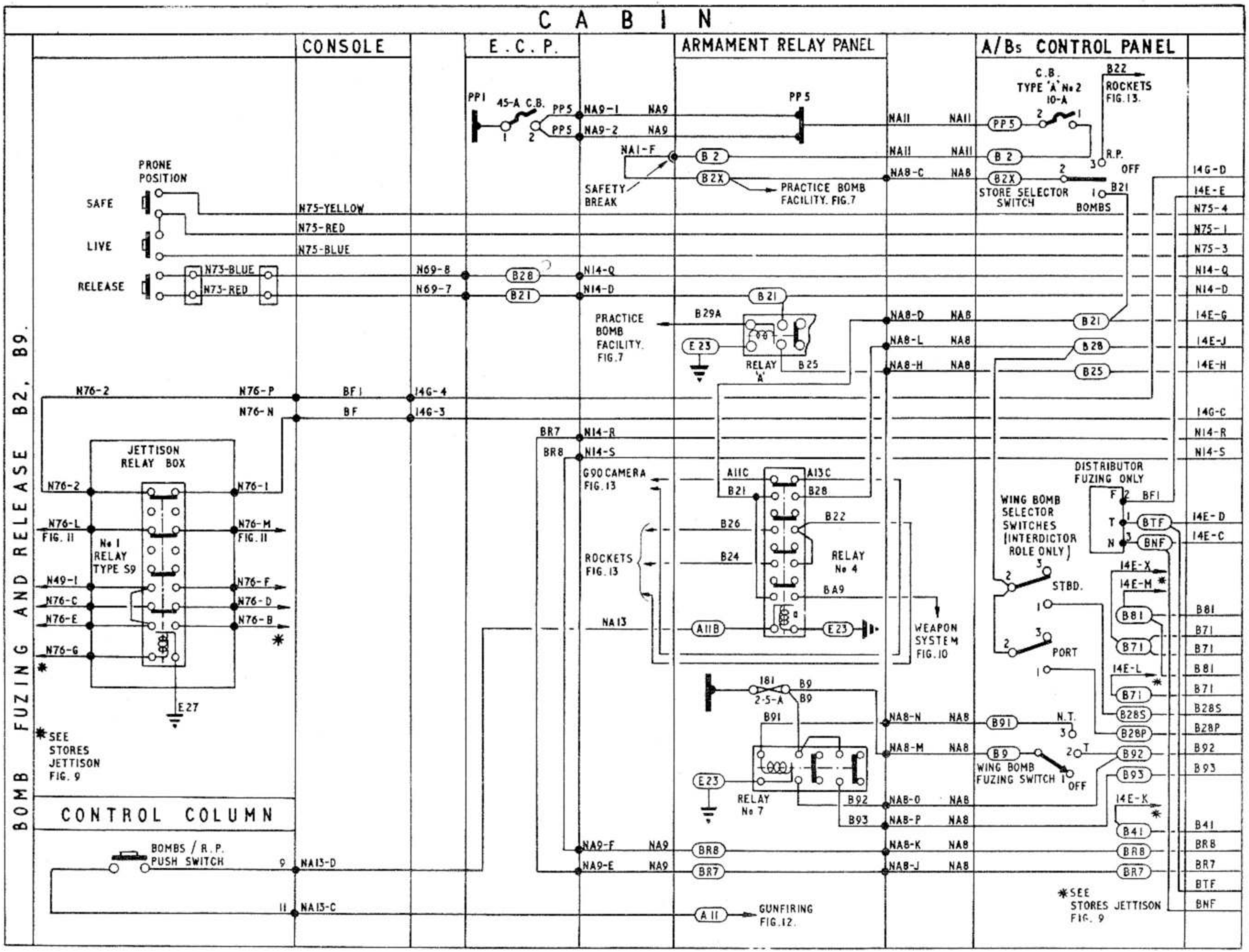


Fig. 8. Armament normal bombing and interdictor roles

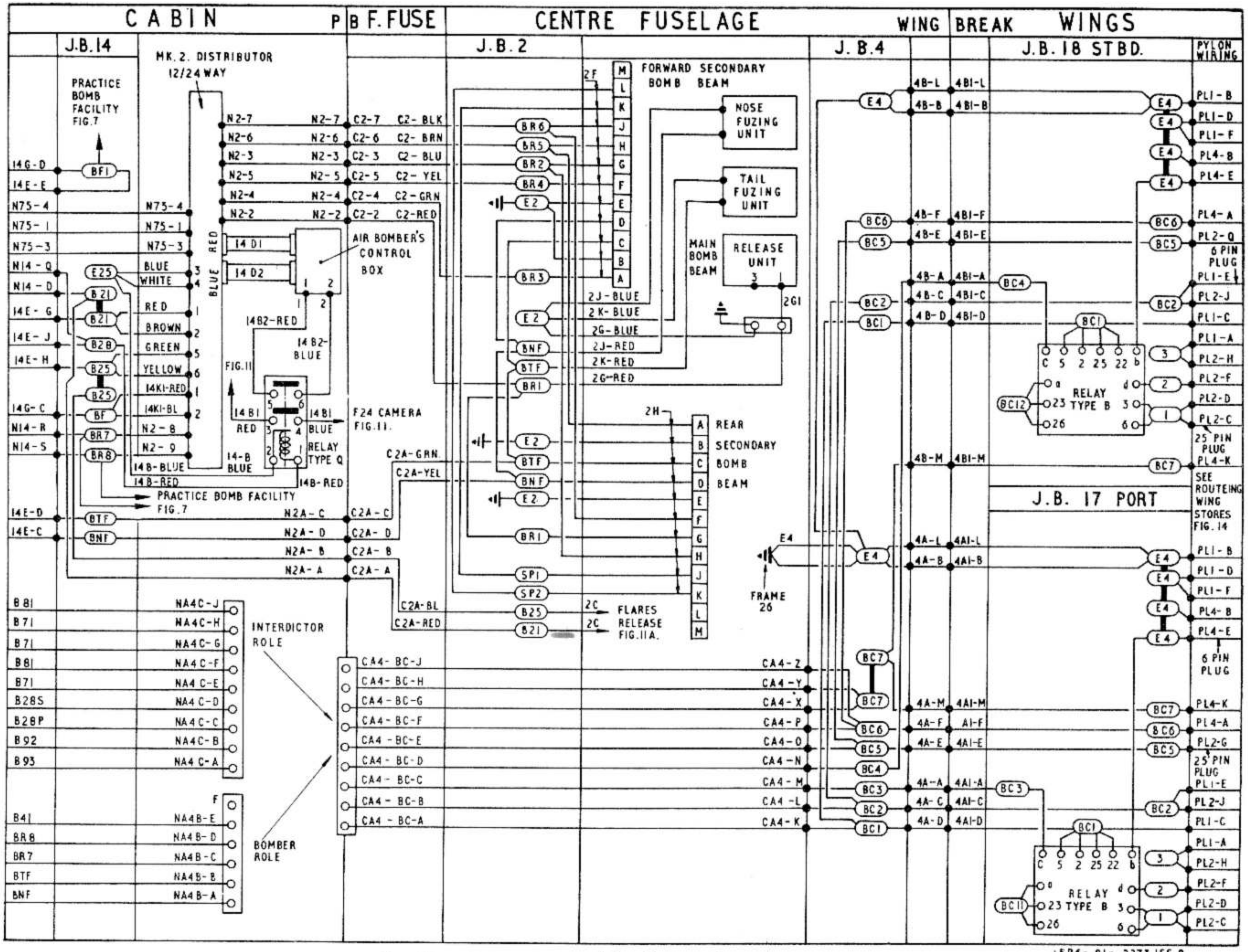


Fig. 8A. Armament normal bombing and interdictor roles

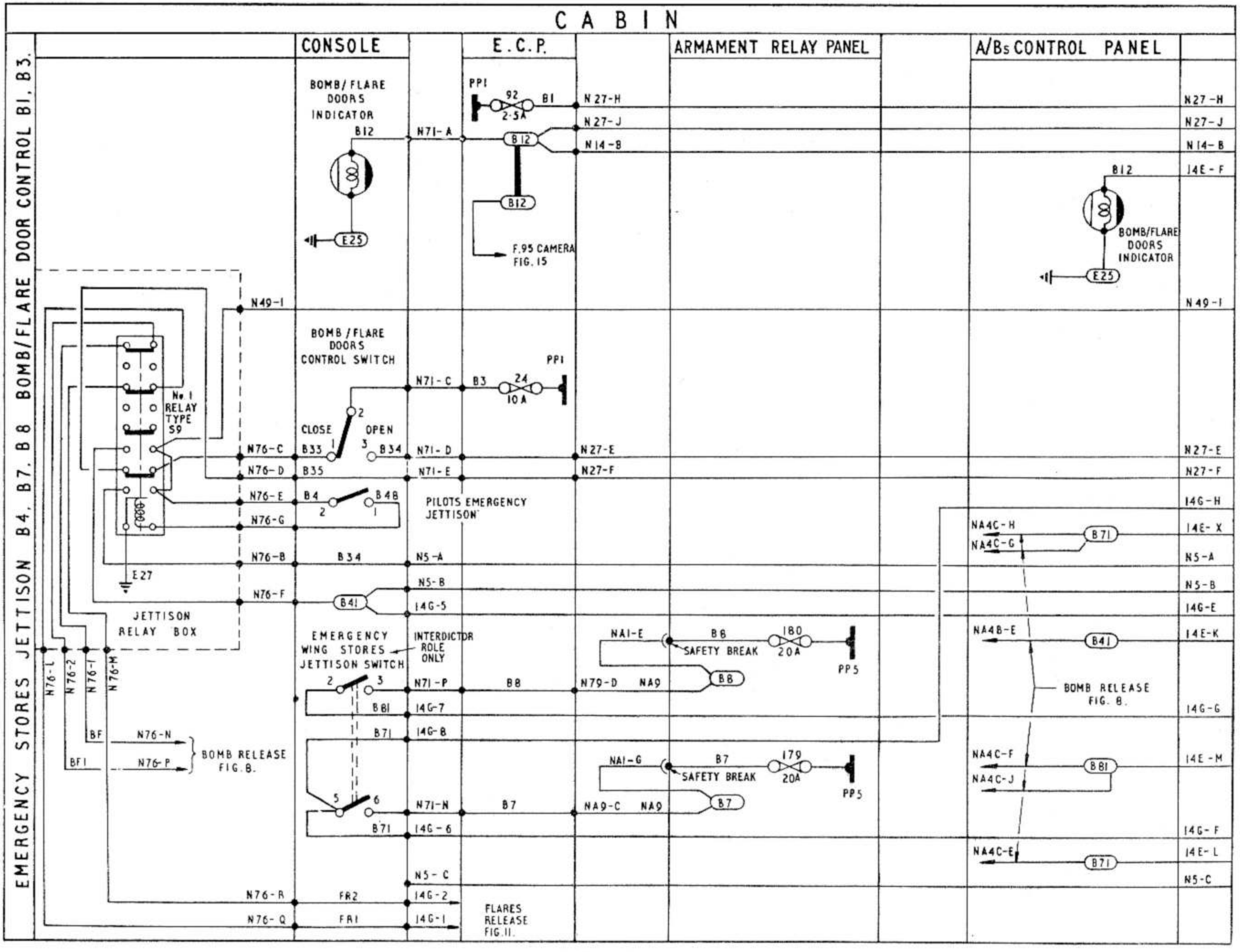


Fig. 9. Bomb/flare door control jettison

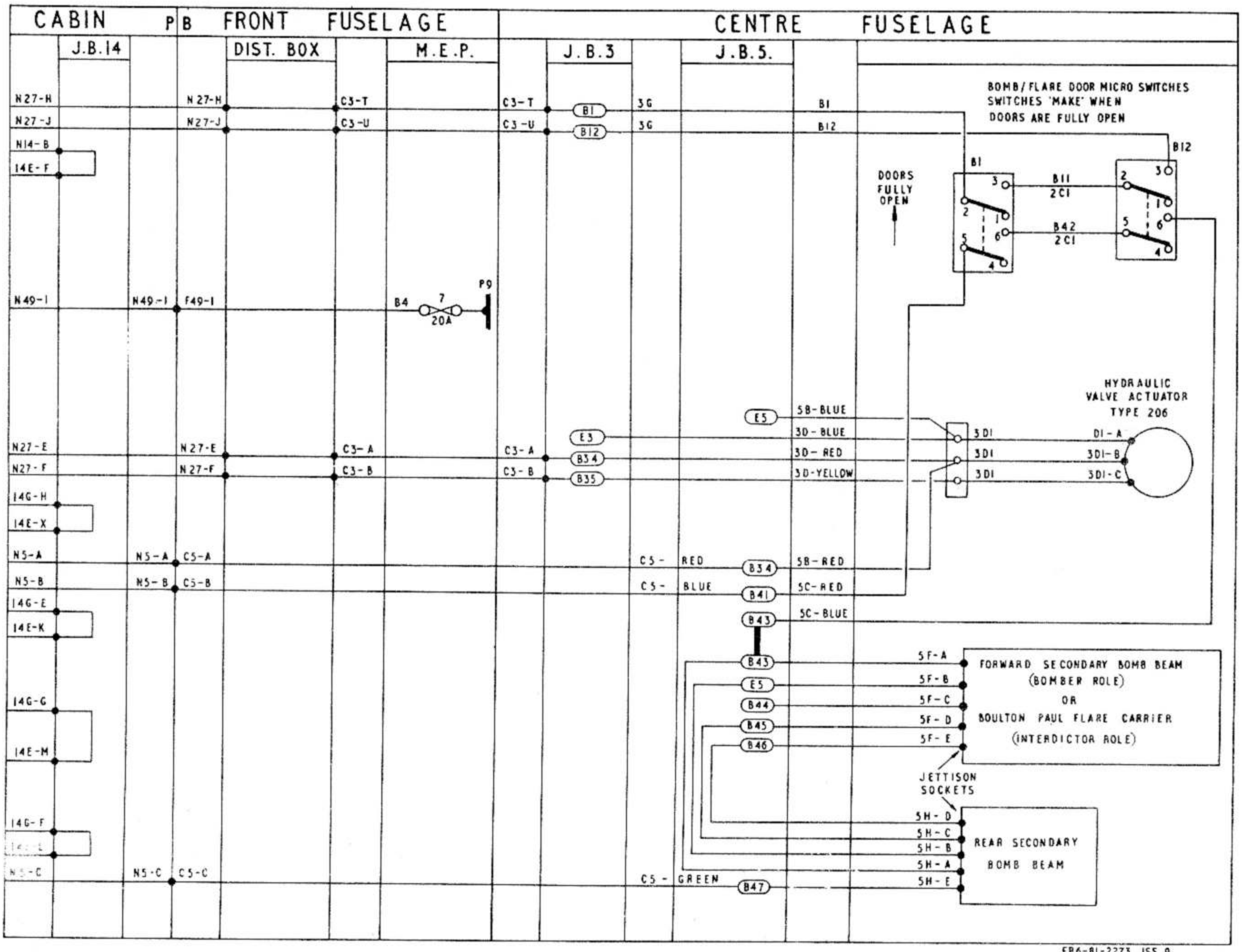


Fig. 9A. Bomb/flare door control jettison

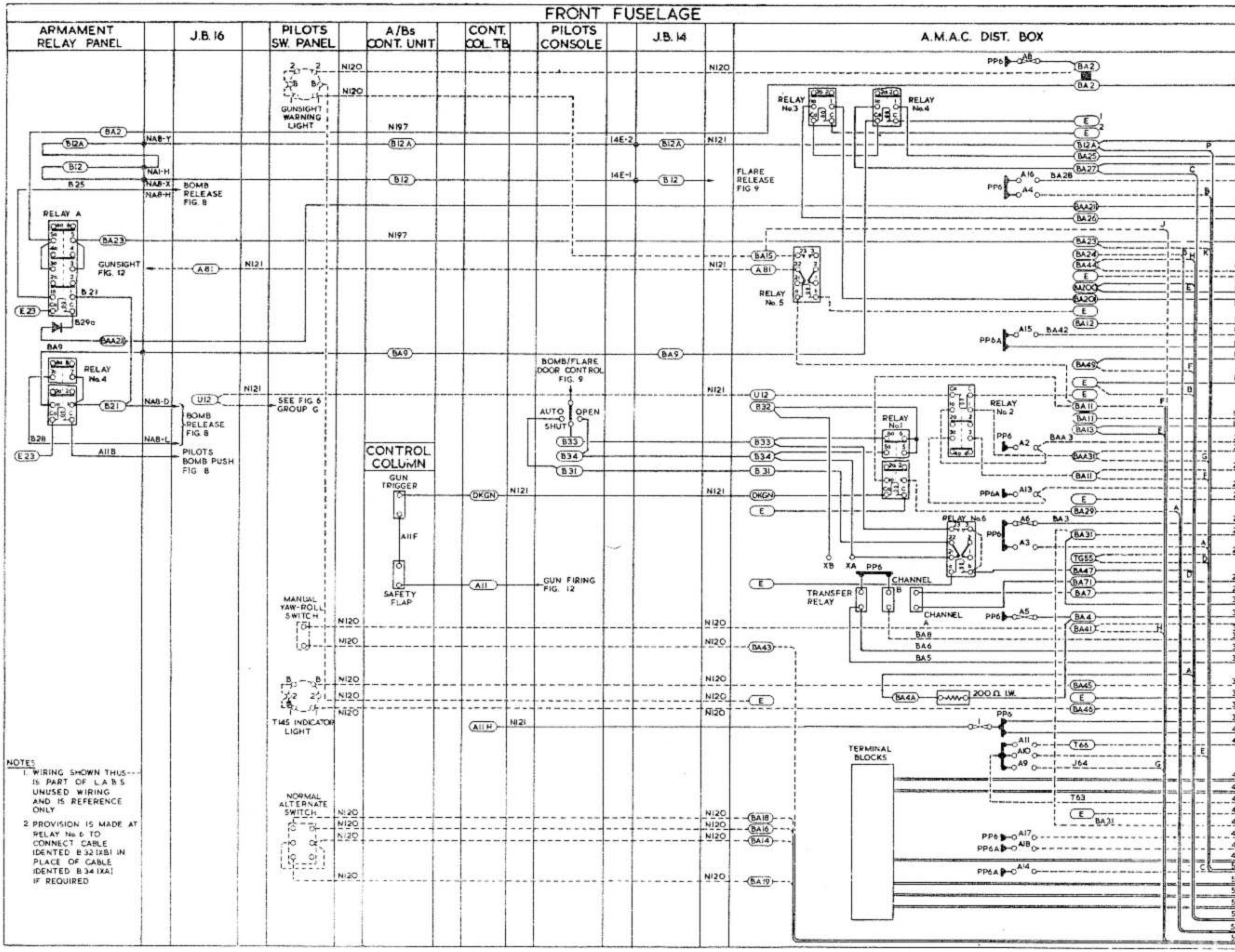


Fig. 10. Special weapon system (post Mod. 3737)

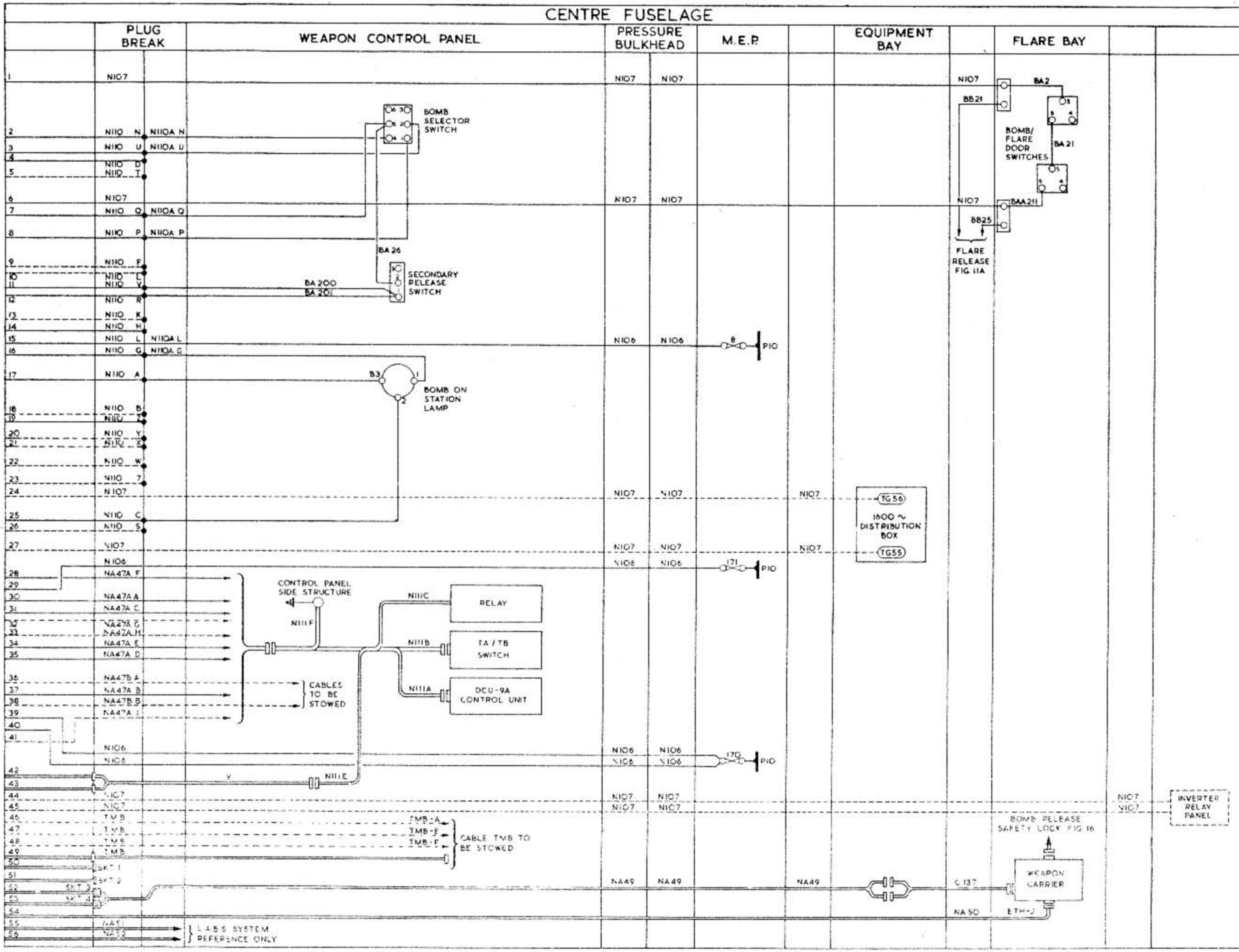


Fig. 10A. Special weapon system (post Mod.3737)

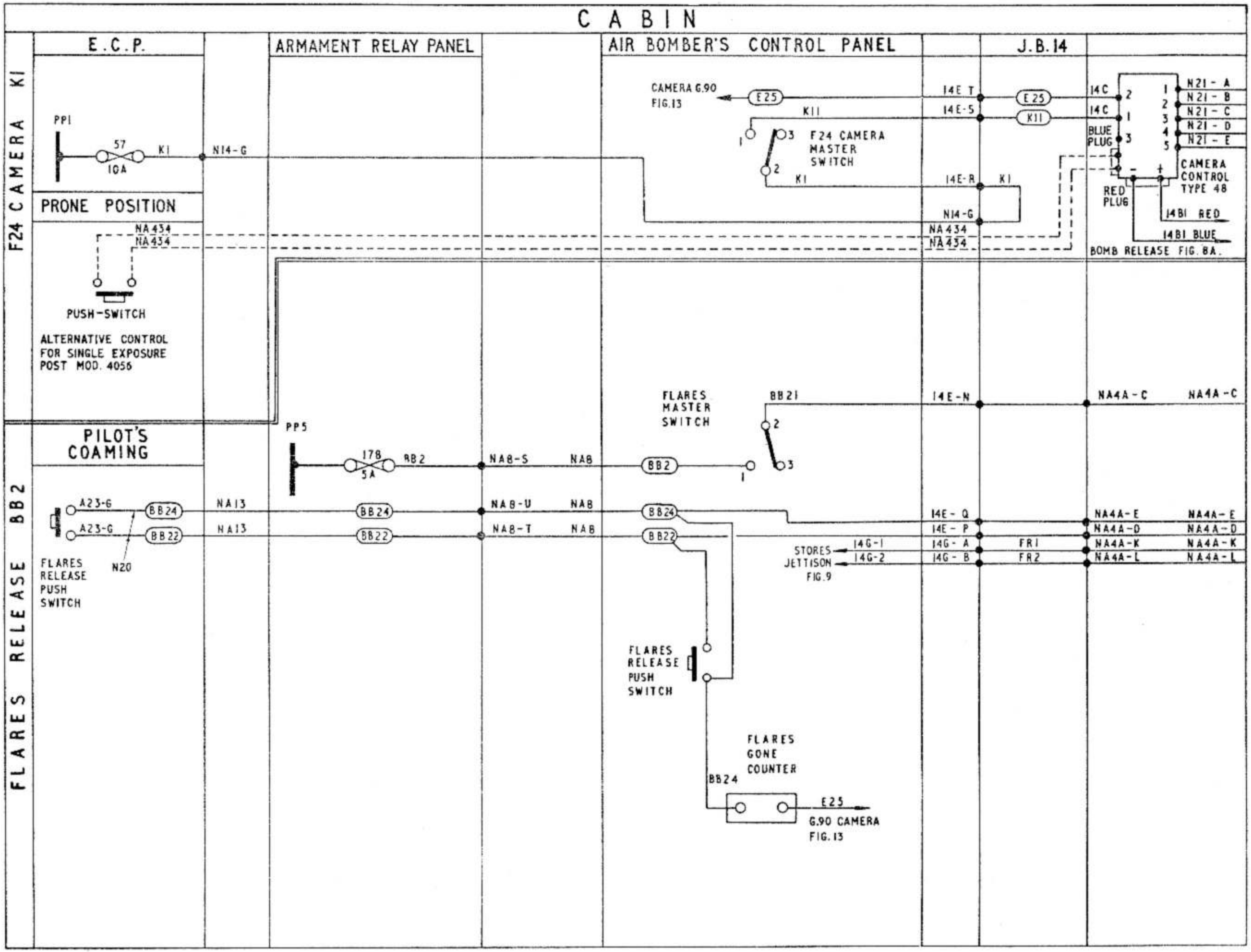


Fig. 11. Flares release – F.24 camera

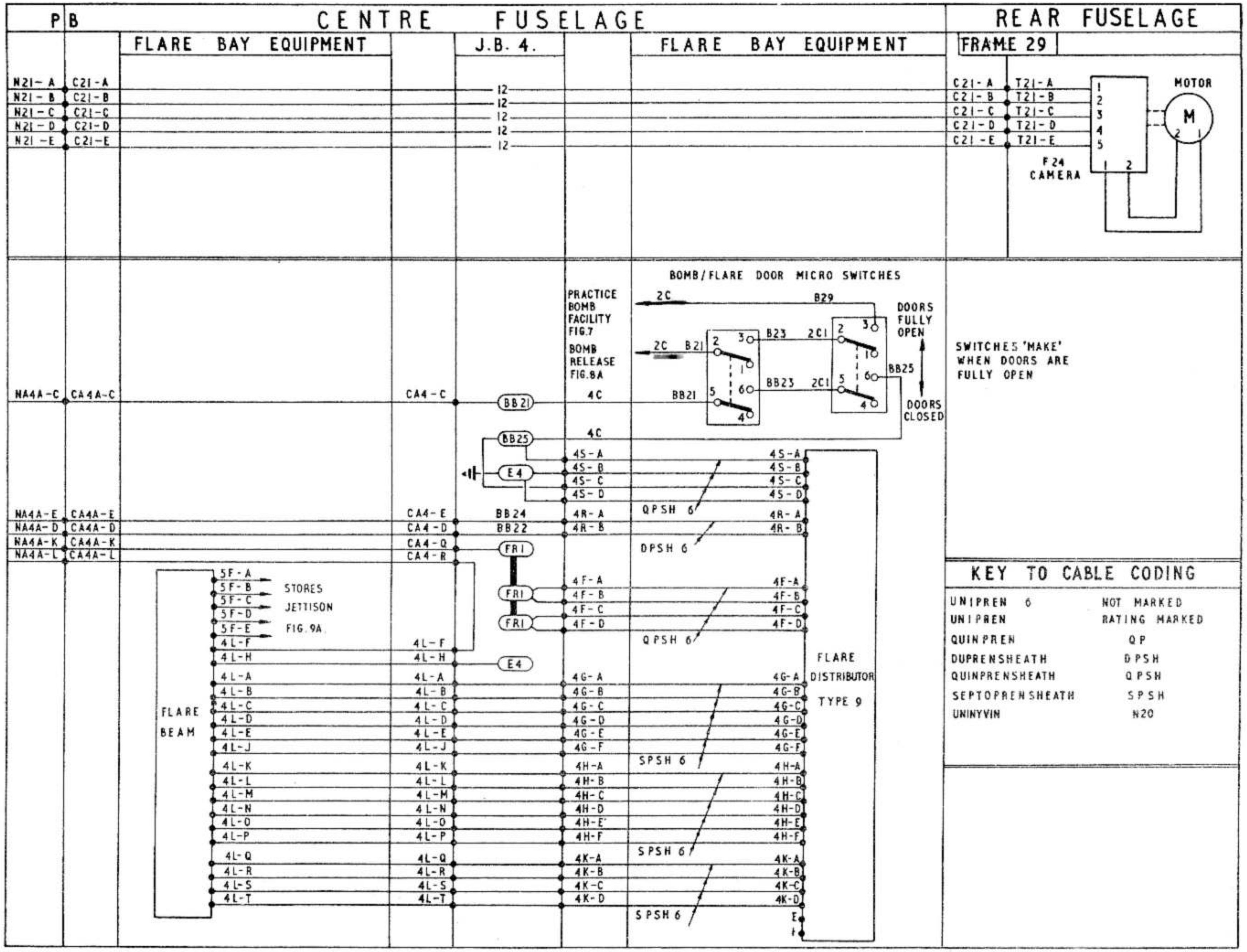


Fig. 11A. Flares release – F.24 camera

E.86 .81. 2273. ISS.9.

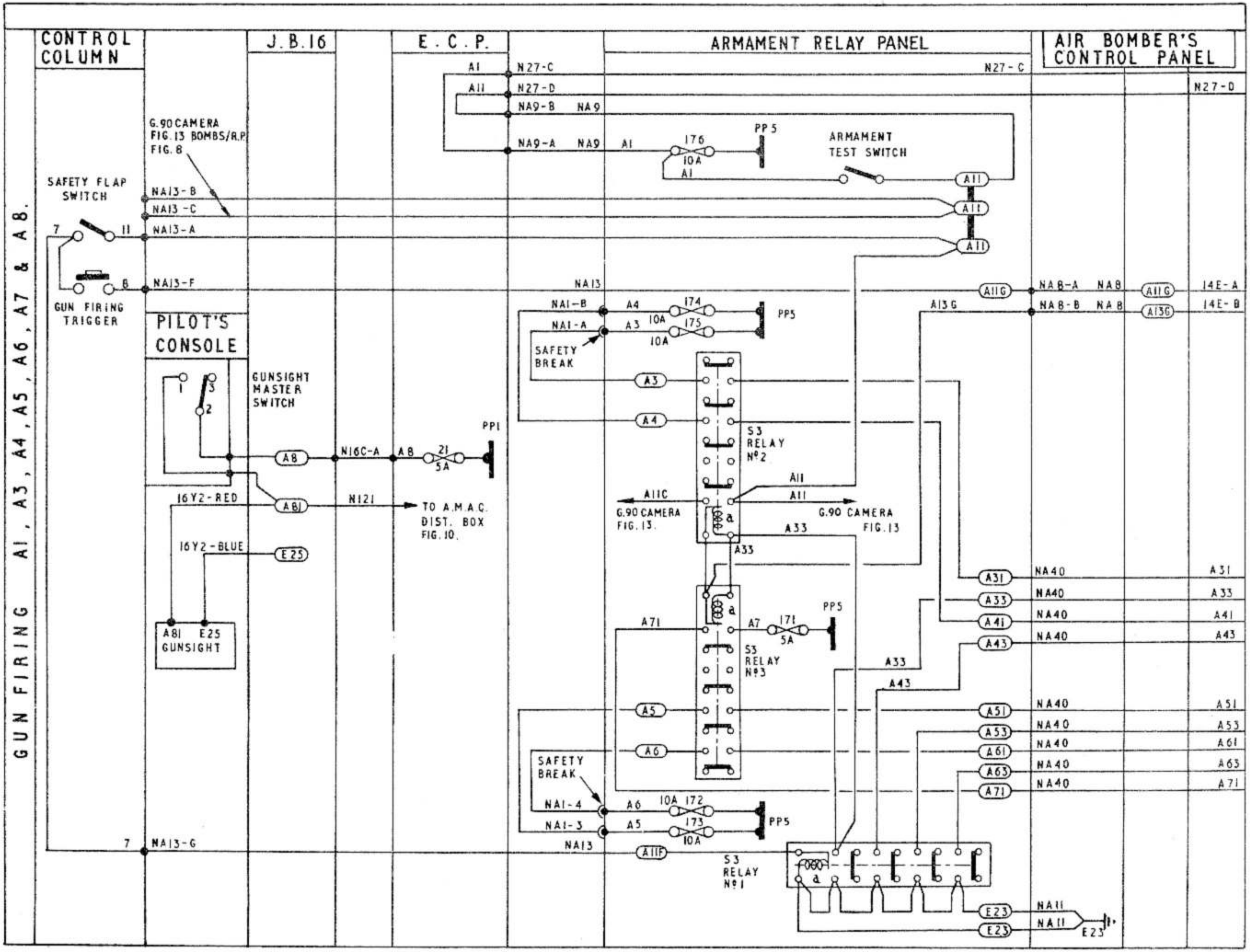


Fig. 12. Gun firing

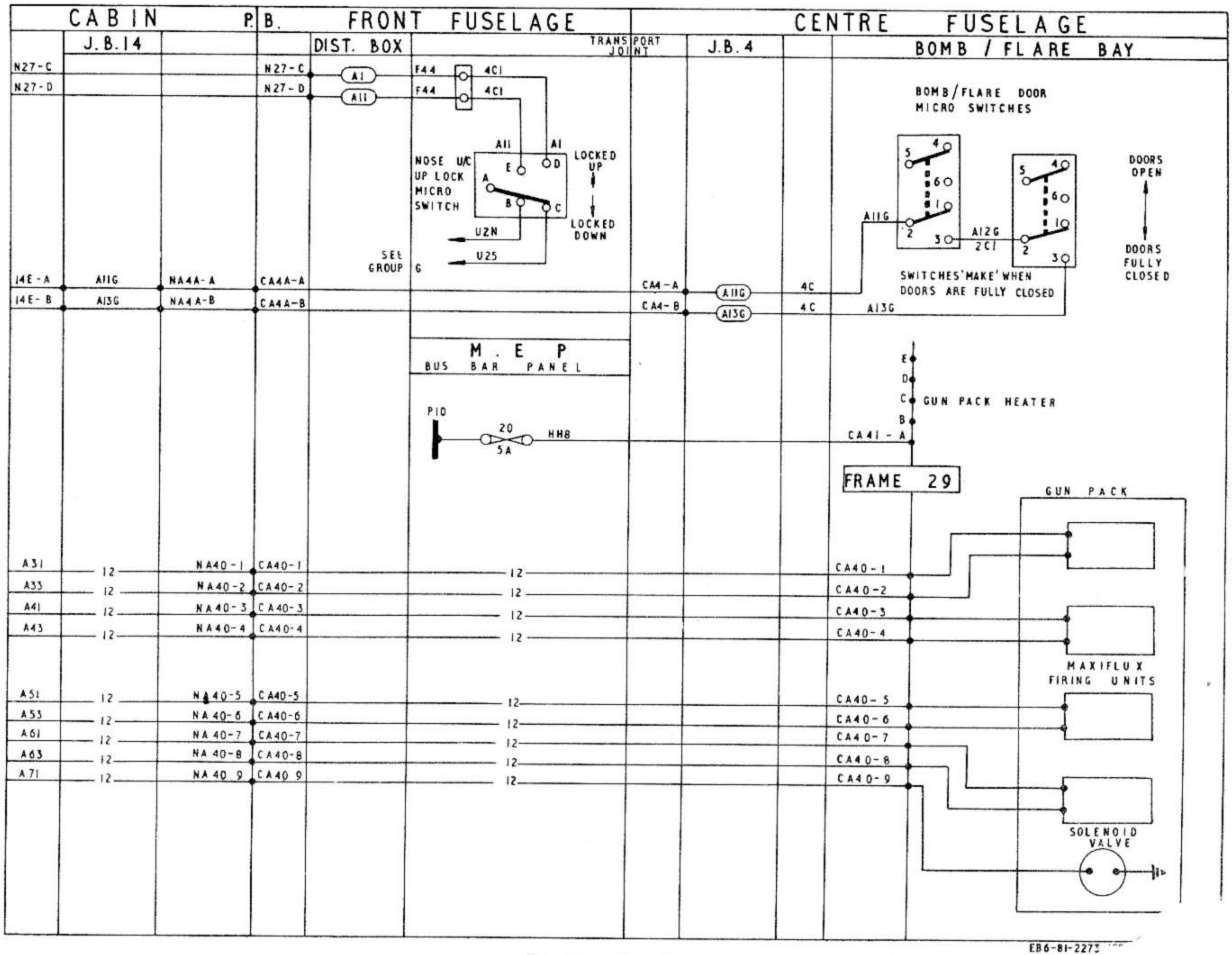


Fig. 12A. Gun firing

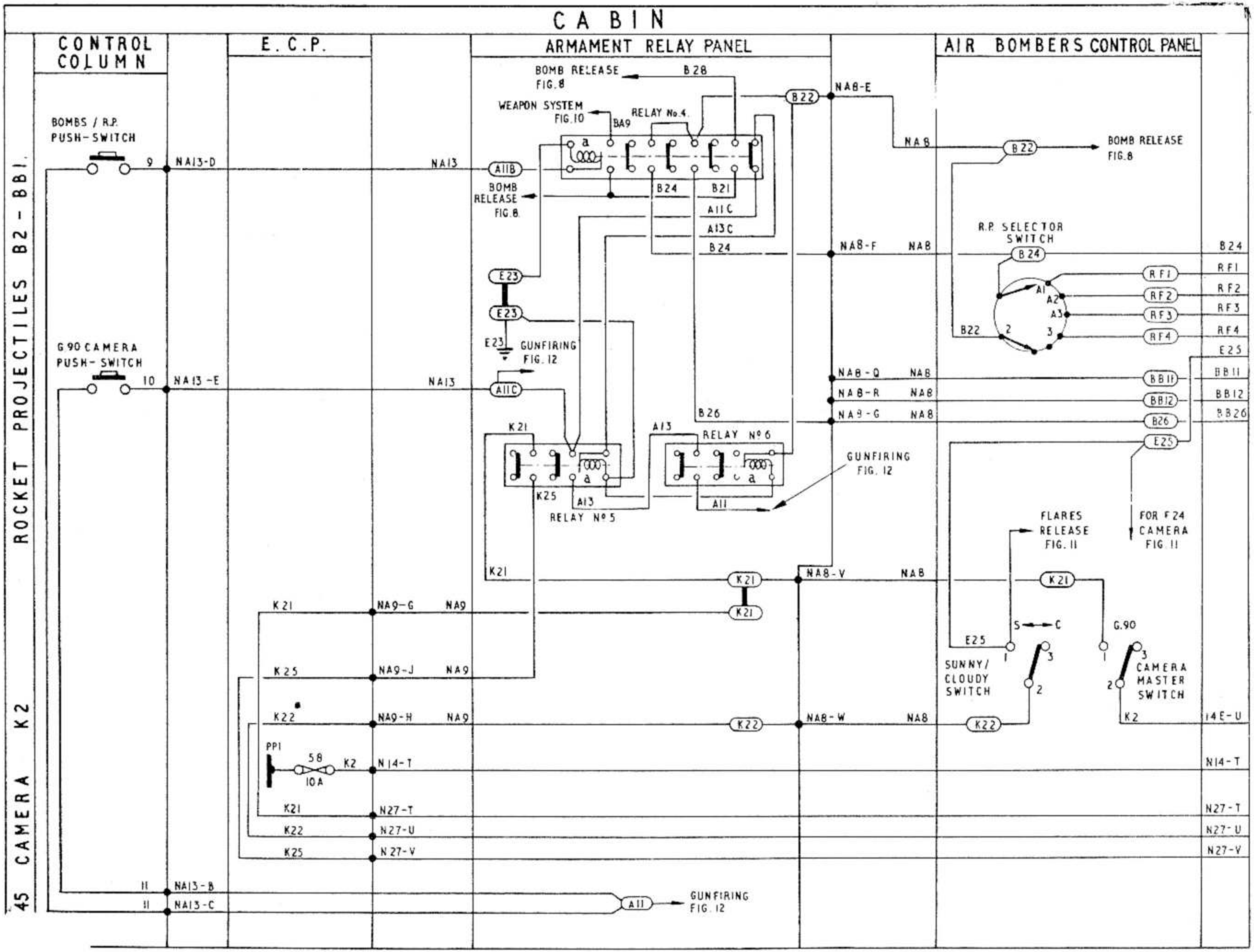


Fig. 13. Gun camera – rocket projectile firing

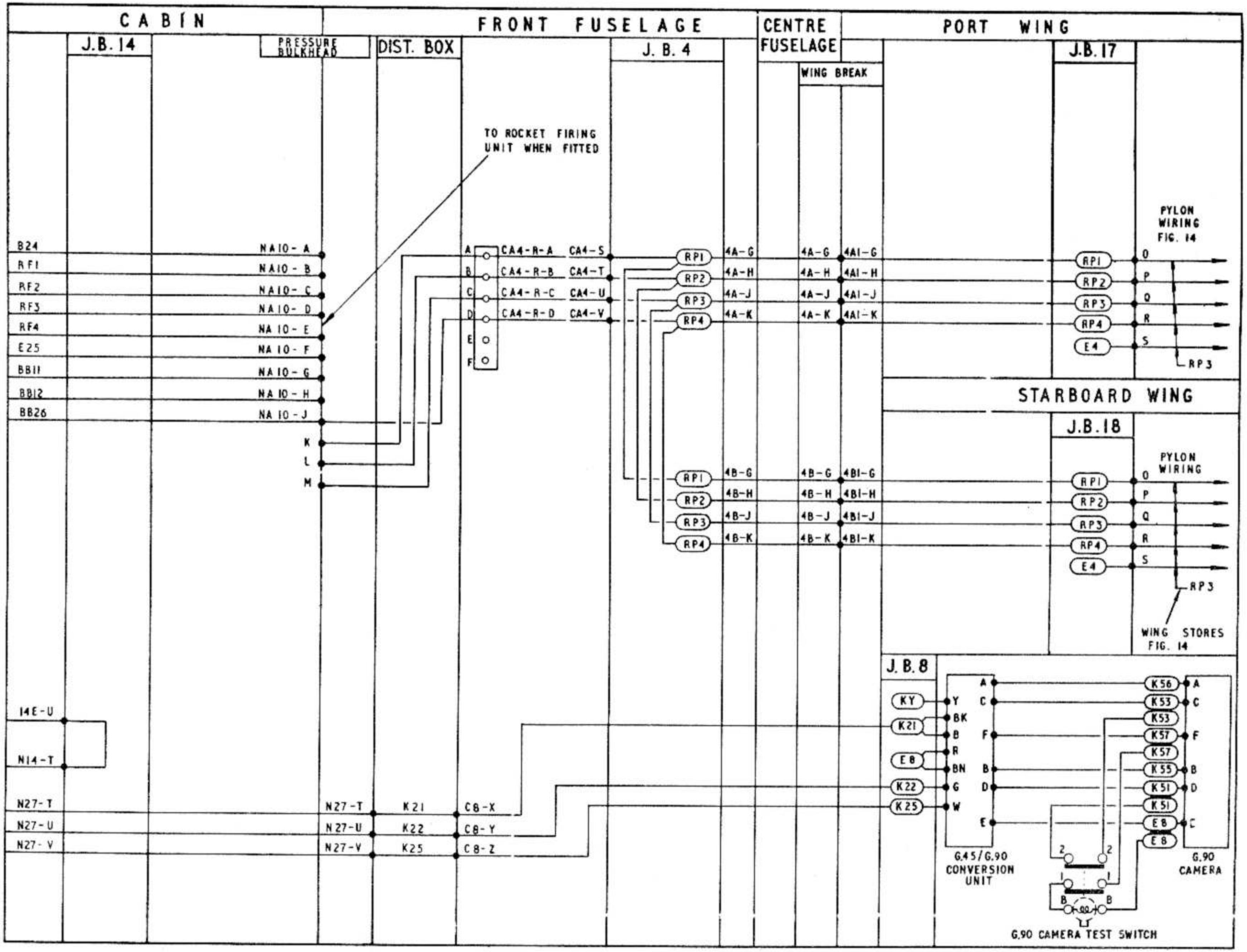
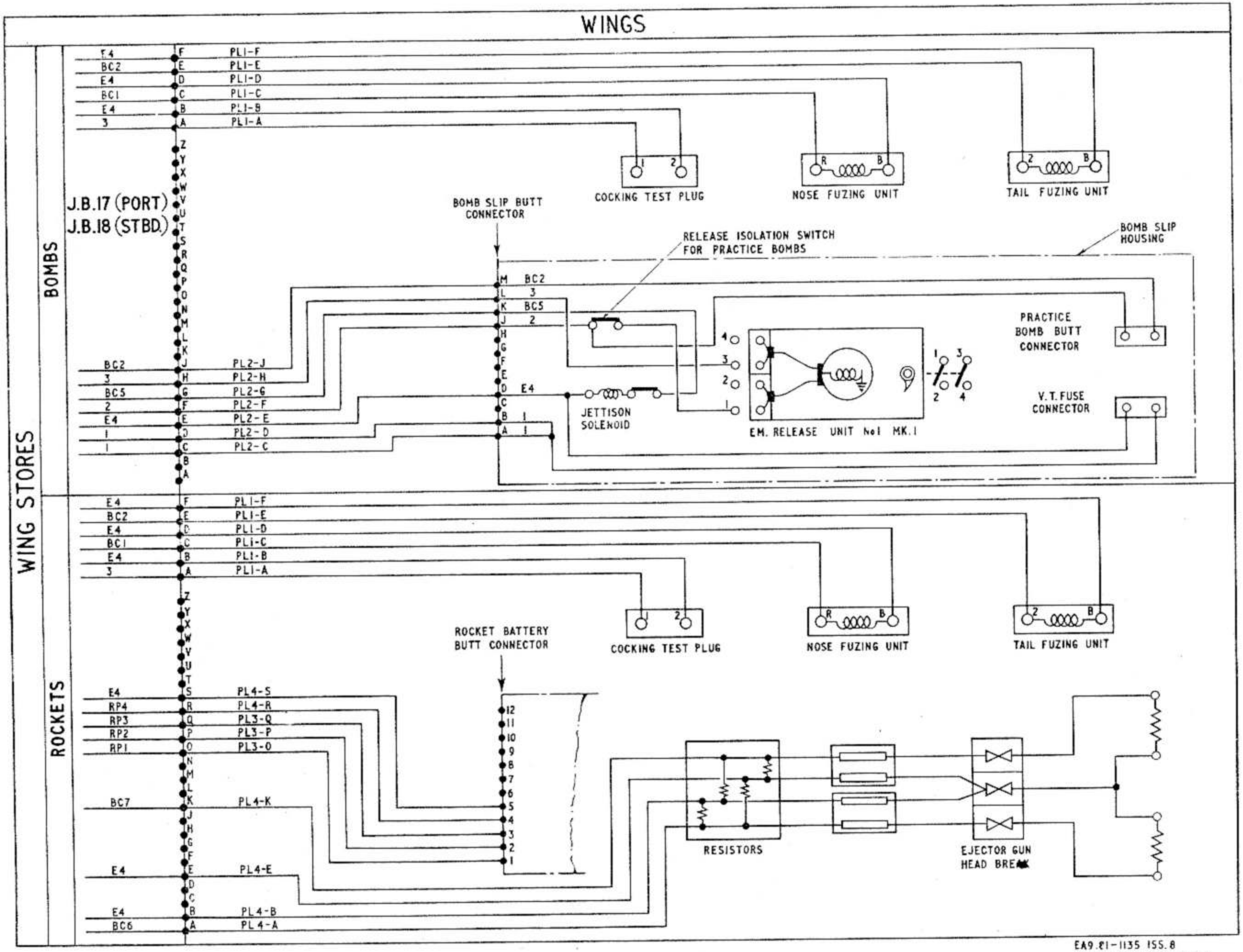


Fig. 13A. Gun camera – rocket projectile firing



EA9.81-1135 ISS.8
EA9.81-3001 SHT.2 ISS.4

Fig. 14. Wing stores

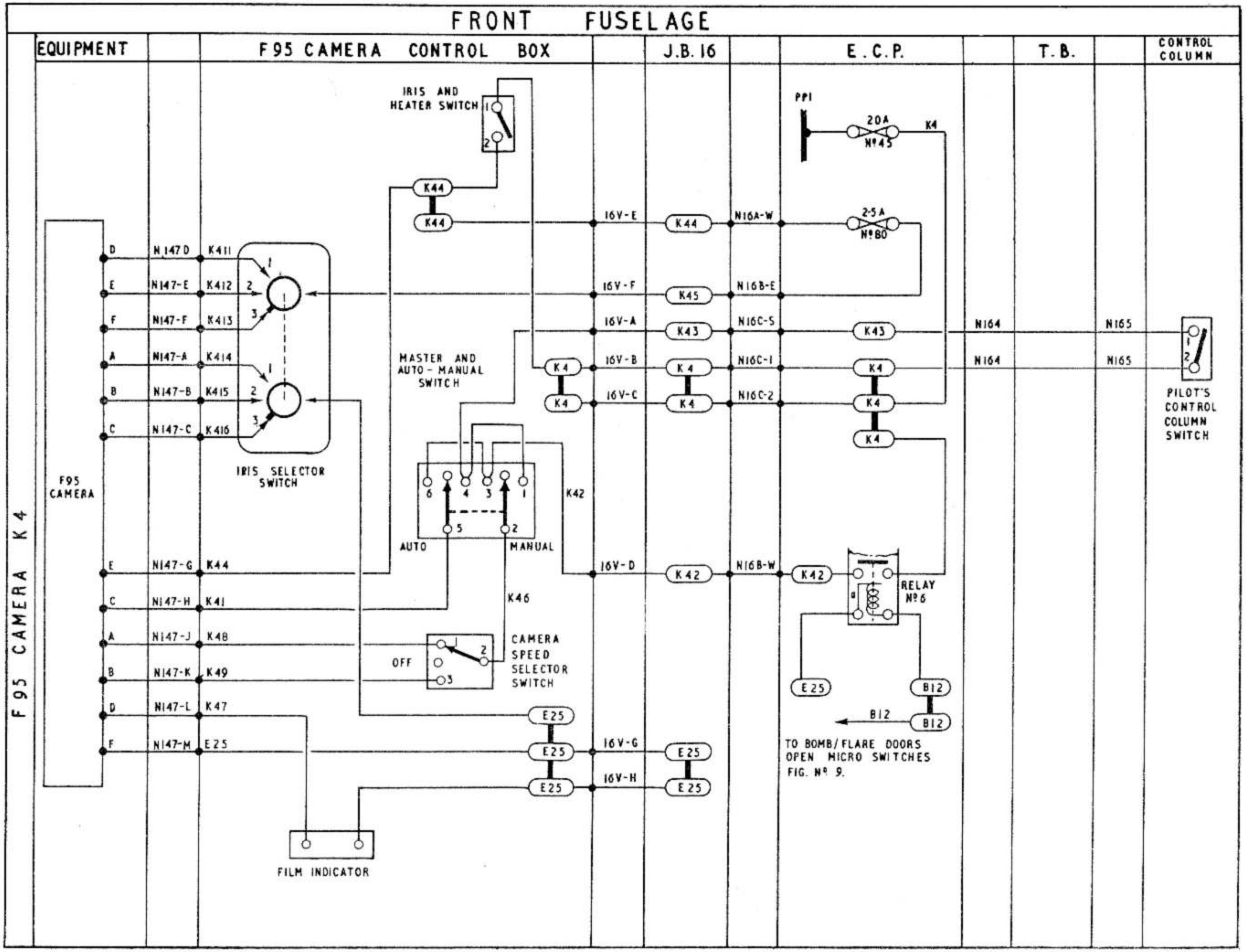
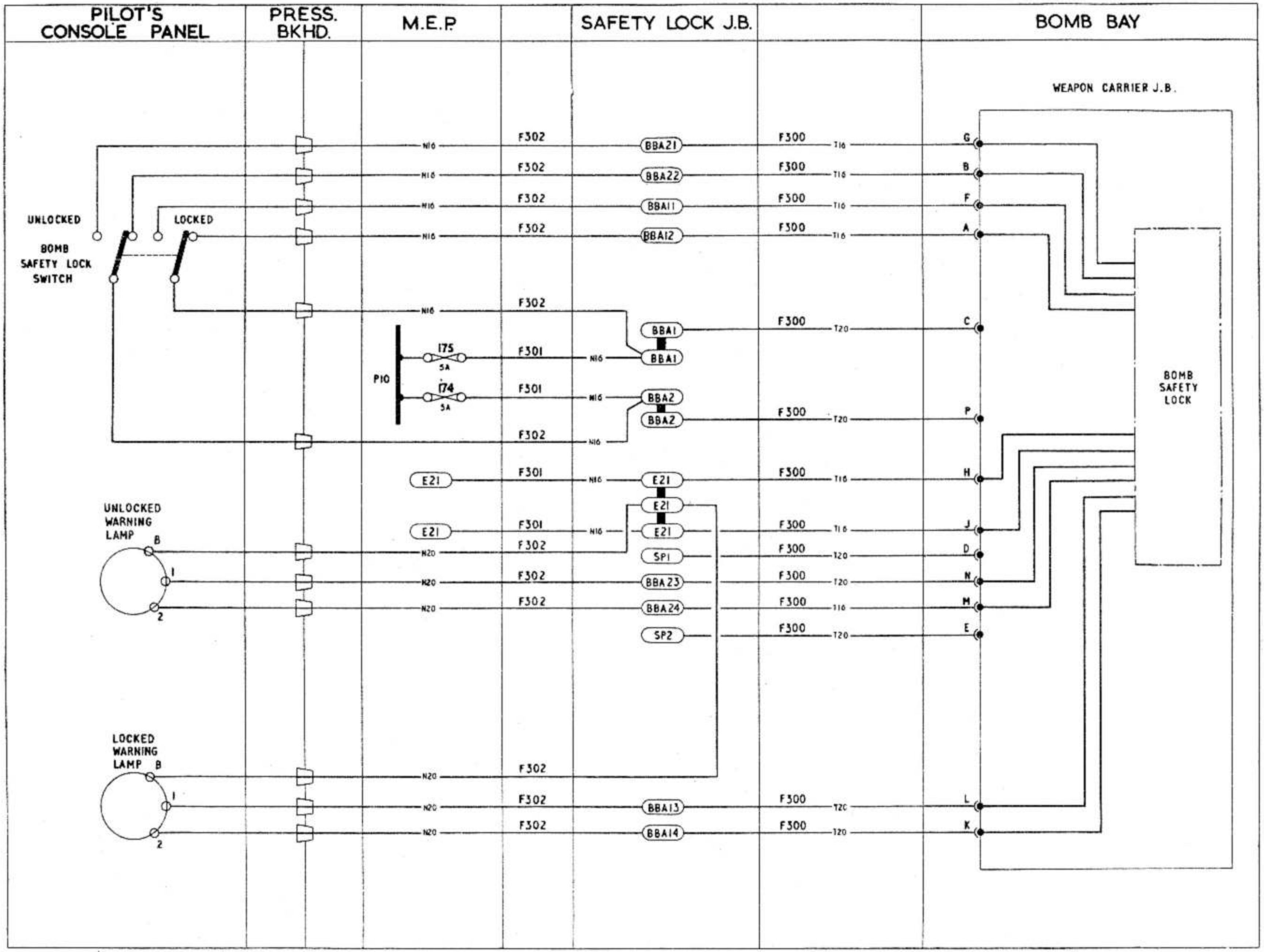


Fig. 15. F.95 camera



(B(I)Mk6) EB6-81-10451 ISS. 2

Fig. 16. Bomb safety lock

ARMAMENT AND PHOTOGRAPHIC – GROUP A & B (PART 1)

◄ APPENDIX 1 ►

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LIST OF ILLUSTRATIONS

AIR SAMPLING ROLE *(Post Mod.3525)*

General

1. On the introduction of Mod.3525, air sampler ducts may be attached to the wing pylons to enable assessment being made of radio-active fall-out density in the atmosphere. Each torpedo-shaped duct contains an electrical actuator coupled to a mechanism arranged to operate shutters at both front and rear of the unit, permitting the duct to be opened and closed by remote control. With the shutters open during flight, slip-stream air passes through the duct, subsequently depositing any radio-active particles on a disposable filter-pad located in the air passage. Analysis of the filter, when considered in conjunction with other factors such as aircraft heading, altitude, and period for which the duct was opened, will reveal the intensity and location of any fall-out collected.

2. The system utilises fixed fittings and wiring included in the aircraft basic design and removable equipment installed when the aircraft is intended to operate in the air sampling role. In addition to the air sampler ducts the removable equipment includes a bomb panel *(fig.1)* which occupies the space normally used for the bomber interdictor panel, and J.B.4 *(Pt.No.EB6.81.10259)* which replaces the existing J.B.4. Power supplies to operate the system are obtained by utilising the supplies normally used to operate the F24 and G45 cameras. Also included on the armament panel is a bomb fuzing switch, bomb master switch, bomb control circuit breaker and a bomb doors indicator to enable the aircraft to function in the bomber role using bomb bay stores only.

Bomb panel – air sampler control *(fig.1)*

3. This panel, located on the starboard side at the air bomber's rear station, provides independent control and indication for both port and starboard sampler duct circuits. Items included on the panel are two fuses, one for each circuit, together with a spare fuse, control switches, and two 3-position magnetic indicators. The indicators show the actuator positions and provide monitoring facilities for the appropriate circuit by returning to the neutral position in the event of failure. In addition to the air sampler duct equipment on the panel a bomb fuzing switch, bomb master switch, bombs control circuit breaker and a bomb doors indicator are fitted, thus enabling normal bombing sorties to be made using bomb bay stores only.

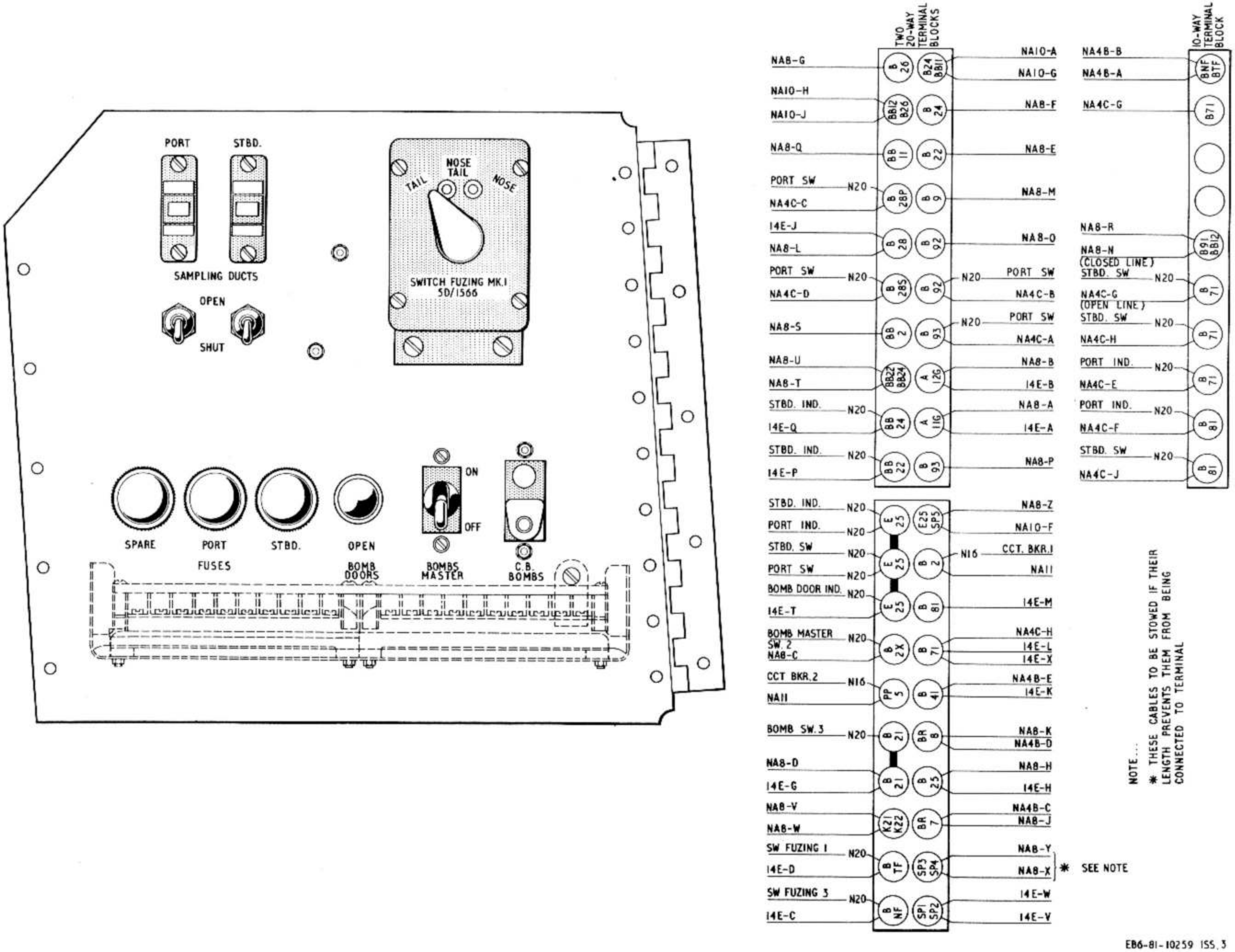
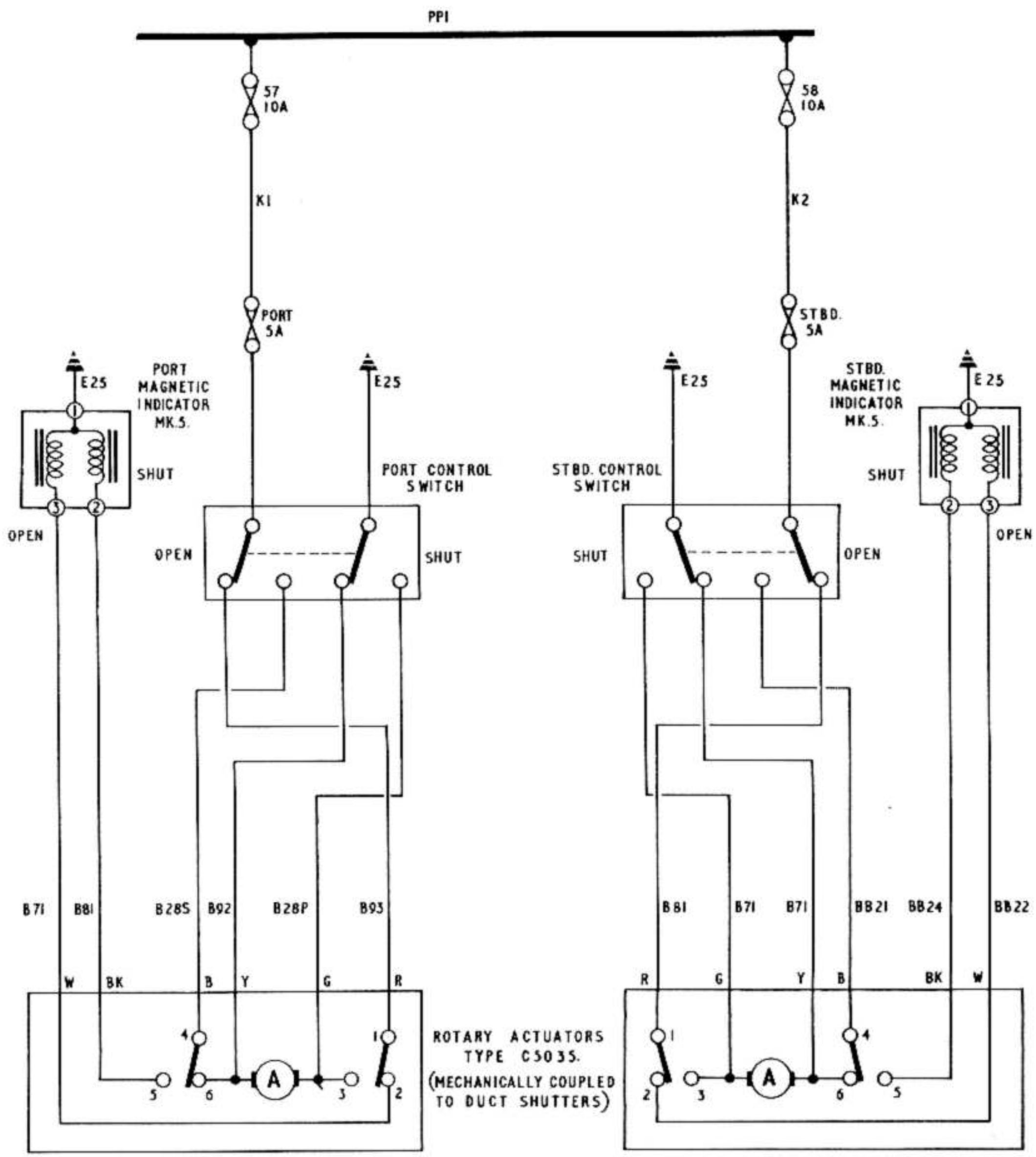


Fig. 1. Armament panel



EB6-81-10273 ISS.2

Fig.2. Air sampling duct – theoretical

Sampler duct operation

4. Selecting a duct control switch to OPEN completes a circuit from fuse 57 K1 *(port duct)*, or fuse 58, K2 *(starboard duct)*, a 5-amp cartridge fuse on the control panel to drive the respective actuator to the open position. At the limit of its travel a micro-switch is operated which interrupts the actuator supply and simultaneously completes a circuit to energize the appropriate magnetic indicator which then shows OPEN. With the control switch selected to SHUT, current flow through the actuator is changed resulting in a reversal of operation. When the duct is fully closed a further micro-switch operates to disconnect the actuator supply and also complete a circuit to the indicator which shows SHUT.

Aircraft preparation

5. To prepare an aircraft for use with air sampler ducts, wiring and component changes must be made as follows:–

(1) Disconnect cables and remove the existing bomb panel at the air bomber's rear station and in place fit the sampler duct panel *(Pt.No.EB6.81.10259)*, connecting existing cables to the terminal blocks on the sampler duct panel *(fig. 1)*; secure cables with existing clip.

(2) Disconnect and remove the existing J.B.4, located in the roof of the bomb bay between frames 25 and 26, and fit new J.B.4 *(Pt.No.EB6.81.10269)*, connecting same up to the existing cables.

(3) At J.B.17 in the port wing, disconnect cables PL2 and PL1 if the aircraft is in the bomber role *(Pylons Mk.1, Ref.No.11A/4217 and 4218)*, or cables PL3 and PL1 if the aircraft is in the rocket projectile role *(Arm.Mod.26 embodied)*. Connect new cable assembly *(Pt.No.EA9.81.5343)* to J.B.17,

and fit protective caps *(Pt.No.CZ.51541 and CZ.51543)* to the disconnected cables, stowing them by taping to the existing cable run.

(4) At J.B.18 in the starboard wing repeat as for J.B.17 in operation (4).

(5) Fit the air sampler ducts to the bomb pylons *(Sect.2, Chap.5)*.

(6) On both wings run the cable from each sampler duct up through the pylon and connect to cable assembly *(Pt.No.EA9.81.5343)*. Using nylon strapping and studs secure cables to existing cable runs.

(7) Carry out the necessary functioning tests on completion of the above operation.

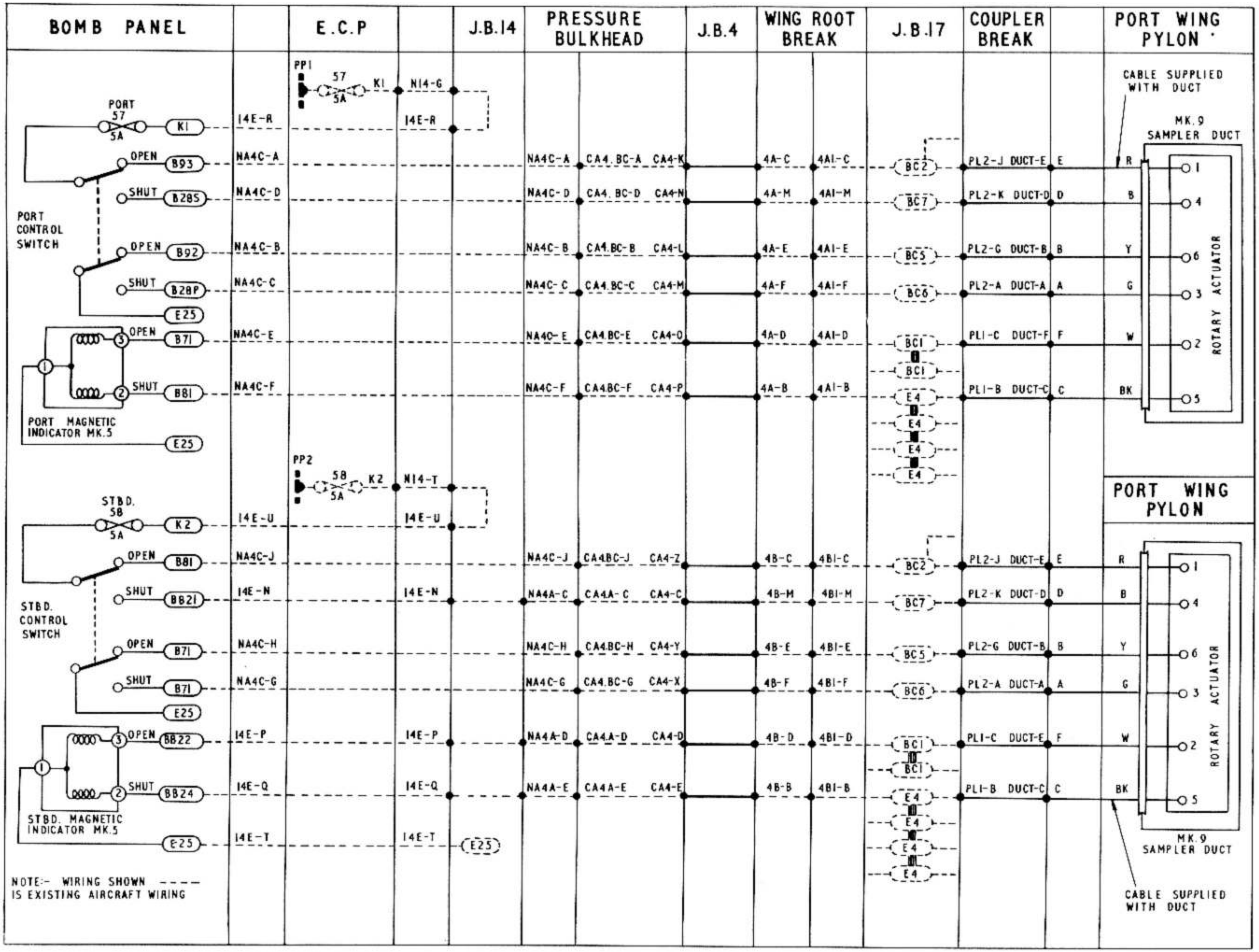


Fig.3. Air sampling duct – routeing

ARMAMENT AND PHOTOGRAPHIC - GROUP A & B

B Mk.6 AIRCRAFT (Part 2)

Note:– *Part 2 of this group deals exclusively with B Mk.6 aircraft – For details on B (I) Mk.6 aircraft refer to Part 1.*

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LIST OF ILLUSTRATIONS

Introduction

1. The Canberra B.Mk.6 aircraft operates in the normal bombing role only, the installation providing for the carriage in the bomb bay of a load which may vary from heavy stores to 25 lb practice bombs. The stores are attached to forward and rear secondary bomb beams by Avro triple carriers. Bristol adapters, light series bomb carriers etc., as required. Provision is made for the installation of a Type F24 camera for use in the bombing role

Operational controls

Air bomber's rear station

2. Control equipment at this station, located on the cabin starboard wall, comprises a Mk.2 12/24-way distributor, bomb control unit, fuzing selector switch, and F24 camera Type 35 control unit and CAMERA MASTER ON/OFF switch.

Air bomber's forward station

3. Installed at this station are a Type T2 computor and sighting head, a bomb firing switch on a flexible lead, and SAFE and LIVE bomb jettison switches.

Pilot's station

4. On the console at the port side of the pilot's seat are mounted the BOMB DOORS, OPEN-SHUT control switch, bomb doors OPEN indicator lamp, and EMERGENCY STORE JETTISON ON/OFF switch. A bomb firing switch is fitted in the top of the control column left handgrip.

Navigator's station

5. A Type 522 Gee control unit (Sect.6, Chap.2) is fitted on the coaming tube above the navigator's instrument panel and is used for radar controlled bombing.

Main and secondary bomb beams

6. The installation of the main and secondary bomb beams is the same as for that on B(I) Mk.6 aircraft *(see Part 1 of this Group).*

Bomb door operation

7. The bomb doors are hydraulically operated and controlled by a Type 206 valve actuator, situated between frames 15 and 16 at the starboard side in the roof of the bomb bay, in conjunction with the BOMB DOORS OPEN-SHUT switch on the console. When the switch is set to SHUT, a supply is fed from circuit B3 (fuse 24) to B35 via a pair of normally-closed contacts of a Type S1 relay (No.1) in the jettison relay unit, located in the console, to the close terminal of the valve actuator. With the switch set to OPEN, the supply from B3 is fed to B34 and directly to the 'open' terminal of the valve actuator, causing the doors to open.

Bomb door emergency operation

8. The emergency operation of the bomb doors is the same as for that on a B(I) Mk.6 aircraft *(see Part 1 of this Group).*

Bomb door microswitches

9. Two pairs of microswitches are mounted on brackets positioned on the bomb bay forward bulkhead. The switches are closed when the bomb doors are fully open and are used in the normal bomb release, emergency bomb jettison and bomb doors 'open' indicator circuits.

Bomb door position indicator

10. A magnetic indicator, located on the pilot's console, is used to indicate the position of the bomb doors. Opening of the doors operates two microswitches which completes circuit B1 (fuse 22), B11 and B12 and energizes the indicator which displays a white disc. With the doors closed the circuit is broken and the de-energized indicator shows black.

Bomb control system

11. The bomb control unit, 12/24 way distributor and fuzing selector switch, all located at the air bomber's rear station, comprise the bomb control system which provides for the release and jettison of the stores. The following paragraphs give a general description, but for more detailed information reference should be made to A.P.4343X, Vol. 1, Sect. 2, Chap. 3.

Bomb control unit

12. This item of equipment generates, for normal or jettison release, electrical impulses which are fed to bomb stations in sequence at pre-set time intervals. It controls bomb fuzing in conjunction with the fuzing selector switch, and arranges live or safe jettison as selected.

13. External controls on the unit consist of a reset jettison warning lamp and time delay selector and master switches. As the time-delay facility is not used on this aircraft, the time delay selector is inoperative and therefore the master switch should be left in the OFF position.

14. The reset jettison red warning lamp, when alight, indicates that jettisoning is in progress or that the mechanism in the unit has failed to return to the home position. The mechanism can be reset by operating any of the jettison controls, should the lamp remain on after jettisoning is completed.

WARNING

This action must not be carried out with the aircraft on the ground unless it is permissable to release any loaded bomb stores.

12/24 way distributor

15. This unit provides constant control and indication of the functioning of the bombing installation. Selectors and push switches on the front panel of the unit control the release, spacing and jettisoning of the stores carried. Twenty-four shutter type magnetic indicators, of which only six are used, also fitted on the front panel, show the condition of the stores carried in the bomb bay by presenting a grid of alternate black and white stripes when energized, and by remaining black when un-energized. The six indicators used, correspond to the positions numbered 1 to 6 on the STOP-START selector switch, and to the bomb release circuits BR1 to BR6.

Note...

Care should be taken not to confuse the circuit identifications with the release station numbers on the secondary bomb beams. The relationship between circuit identifications and bomb locations in the aircraft may be found by referring to routeing diagrams in this group and the wiring of the appropriate carriers.

Fuzing and selector switch

16. This unit controls selection of the required mode of fuzing. It comprises a three-position rotary switch, labelled NOSE, NOSE-TAIL, TAIL, which controls fuzing of the stores in conjunction with the bomb control unit.

Operation

17. The operation of the 12/24 way bombing system is described in A.P.4343X, Vol. 1, Sect. 1, Chap. 3. Briefly, the system functions as follows:—

(1) The stores to be released and the time interval between them are selected from the 12/24-way distributor. Fuzing is automatic when the stores are selected for release and may be either nose, tail, or nose and tail according to the position of the fuzing selector switch.

(2) When either the air bomber's or pilot's bomb release switch is operated, the bomb control unit starts to generate electrical impulses. These impulses are transmitted to actuate the release units at the selected bomb stations in the correct sequence, and at the intervals selected on the 12/24-way distributor.

(3) When any one of the jettison switches is operated, the action is similar to that described in sub-para (2), except that the bomb control unit now transmits electrical impulses to all bomb stations in sequence and at fixed intervals. The fuzing is automatically adjusted according to whether live or safe jettison is selected.

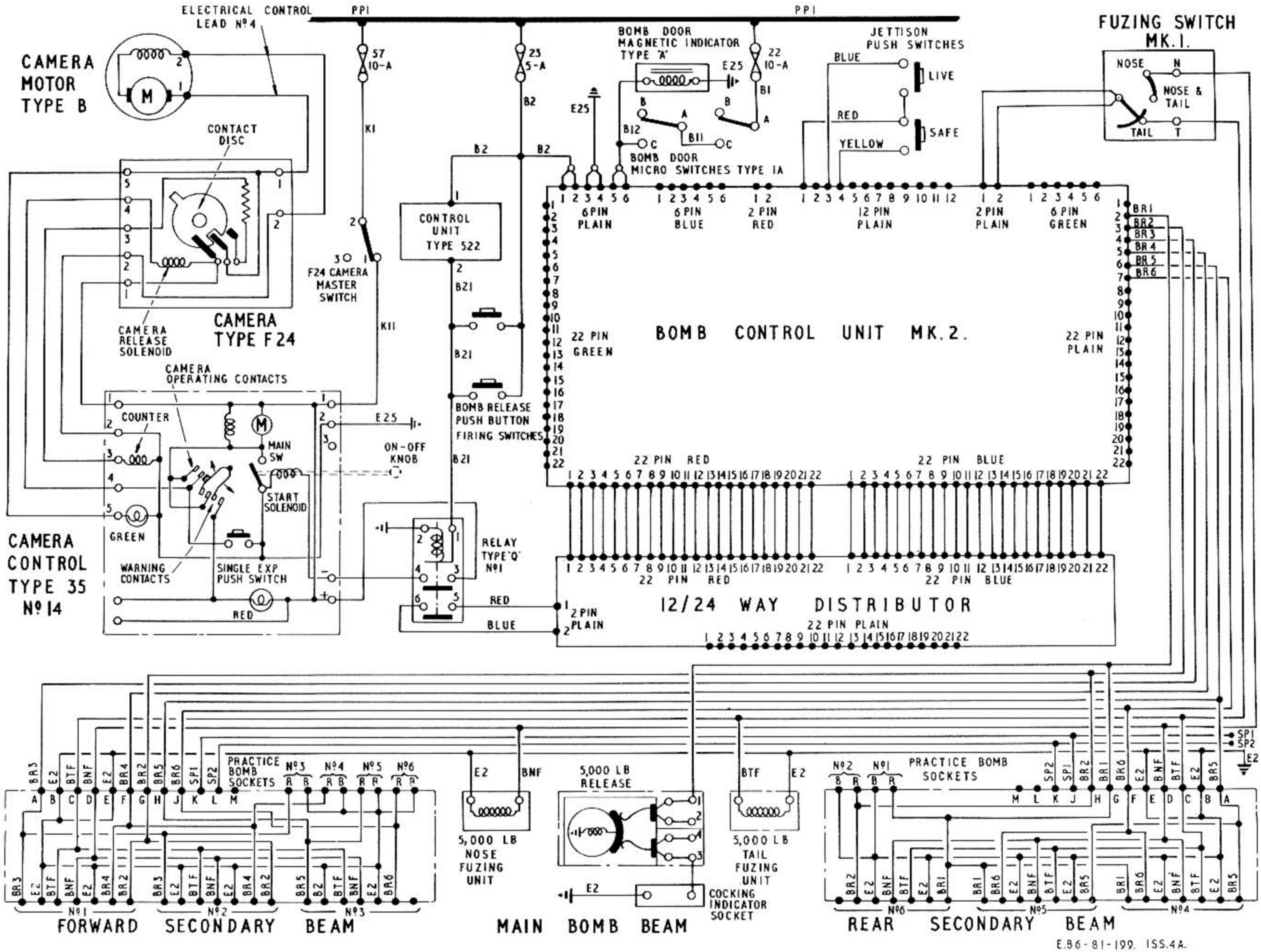

Fig. 1. Bomb release – F24 camera

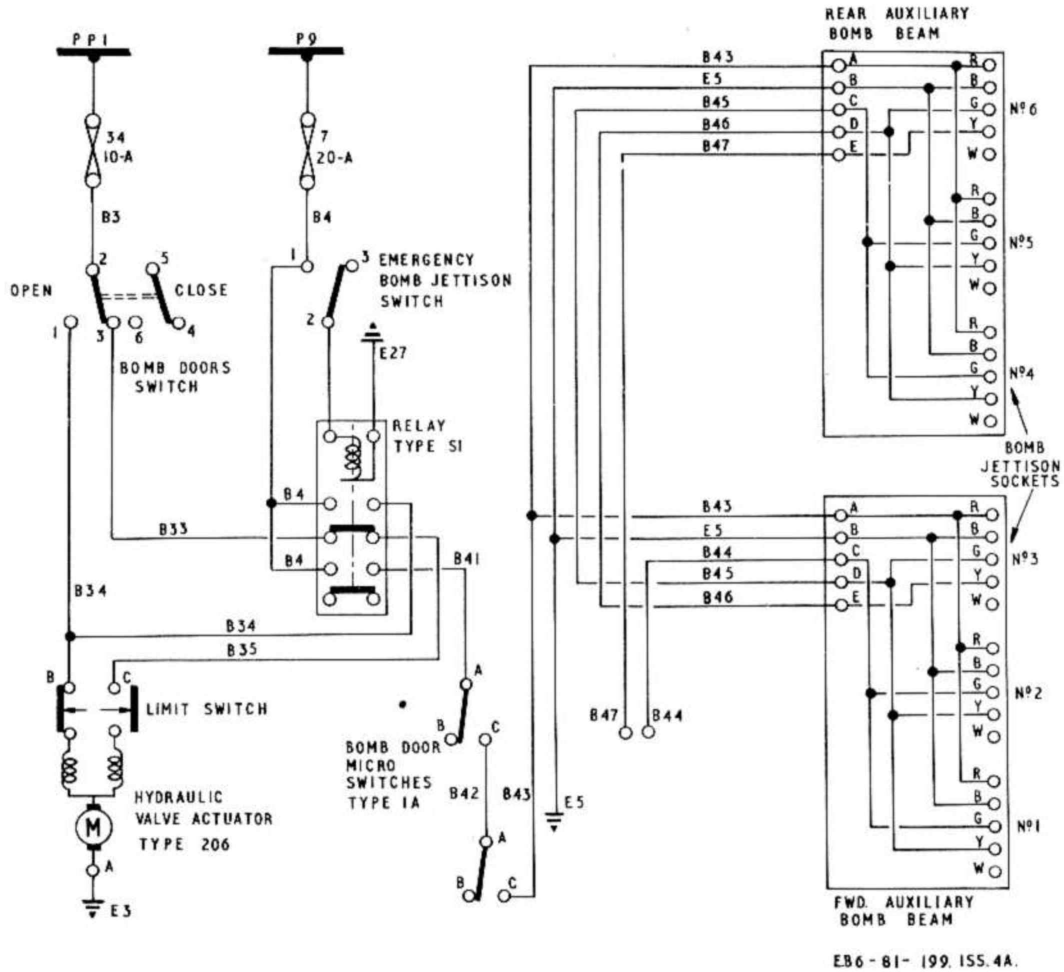

Fig. 2. Bomb door control – emergency bomb jettison

(4) Operation of either the air bomber's or the pilot's firing switch, or alternatively the Type 522 Gee control, when in circuit, completes circuit B2 (fuze 23) - B21 to energize a Type Q relay, located adjacent to J.B.14 on the starboard wall at the air bomber's rear station. A circuit to the bomb control unit is completed through the relay contacts and initiate bomb release operation providing that the bomb door microswitches are closed to complete circuit B1-B11-B12.

(5) In addition to completing the circuit to the bomb control unit, the Type Q relay, when energized, also completes the pulsing circuit to the F24 camera Type 35 control and providing the camera master switch is ON, the camera begins to function in conjunction with the bomb release (Chap. 2, Group A & B).

Emergency bomb jettison

18. Operation of the pilot's EMERGENCY STORE JETTISON switch on the console connects a supply from circuit B4 (fuse 7) to B48 which energizes No. 1 relay in the jettison relay unit, located in the console. With the relay contacts closed, circuit B4-B36 connects a supply to the doors valve actuator, which opens the doors. The doors when fully open actuate the door microswitches to complete circuit B4-B41-B42-B43 and jettison all stores normally jettisonable from the secondary bomb beams.

Note...

When bombs carried by Bristol adapters are selected for jettison both the bombs and the adapter will be released. 25lb practice bombs, on light series carriers cannot be jettisoned by this method.

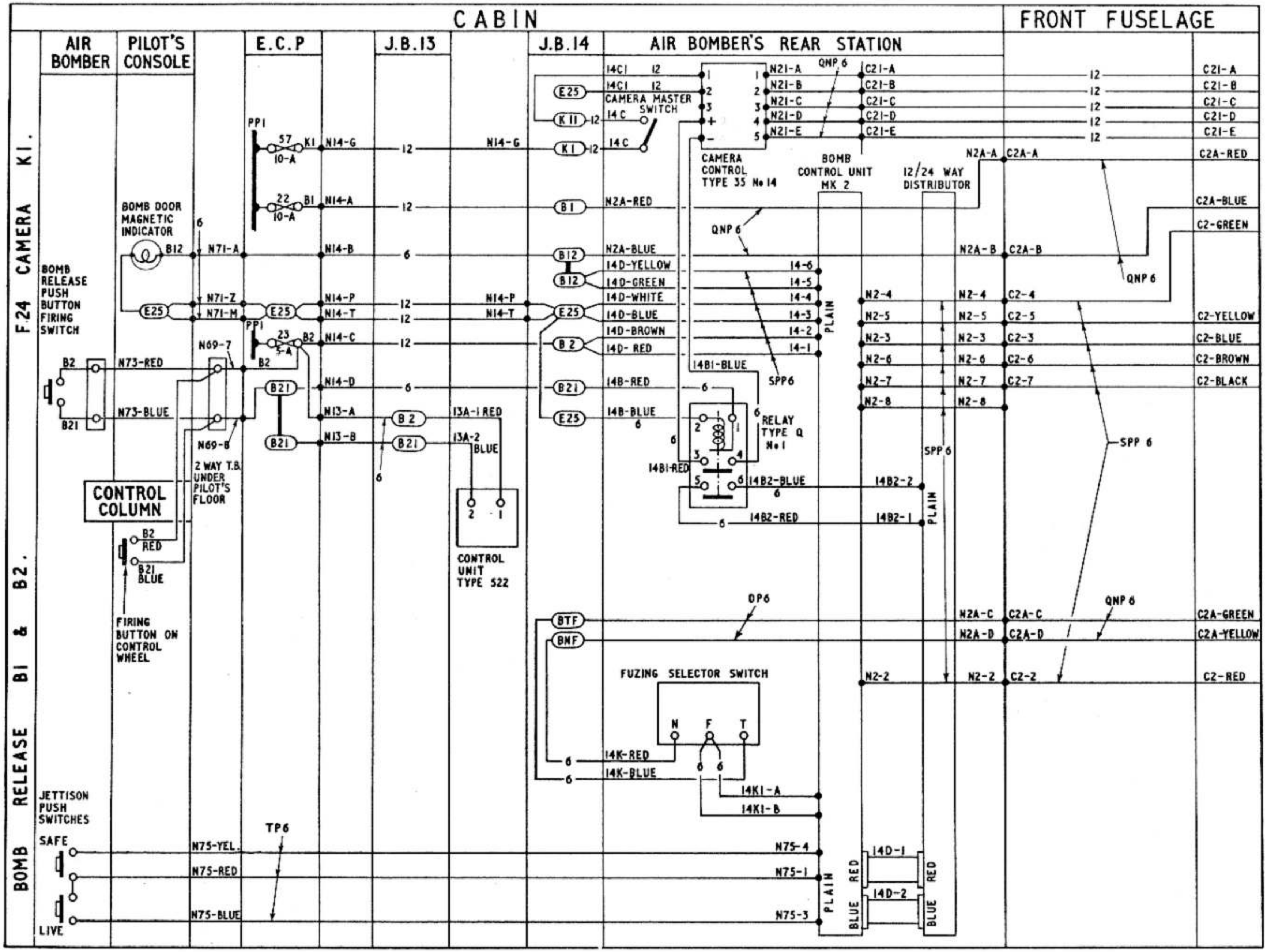

Fig. 3. Bomb release – F24 camera

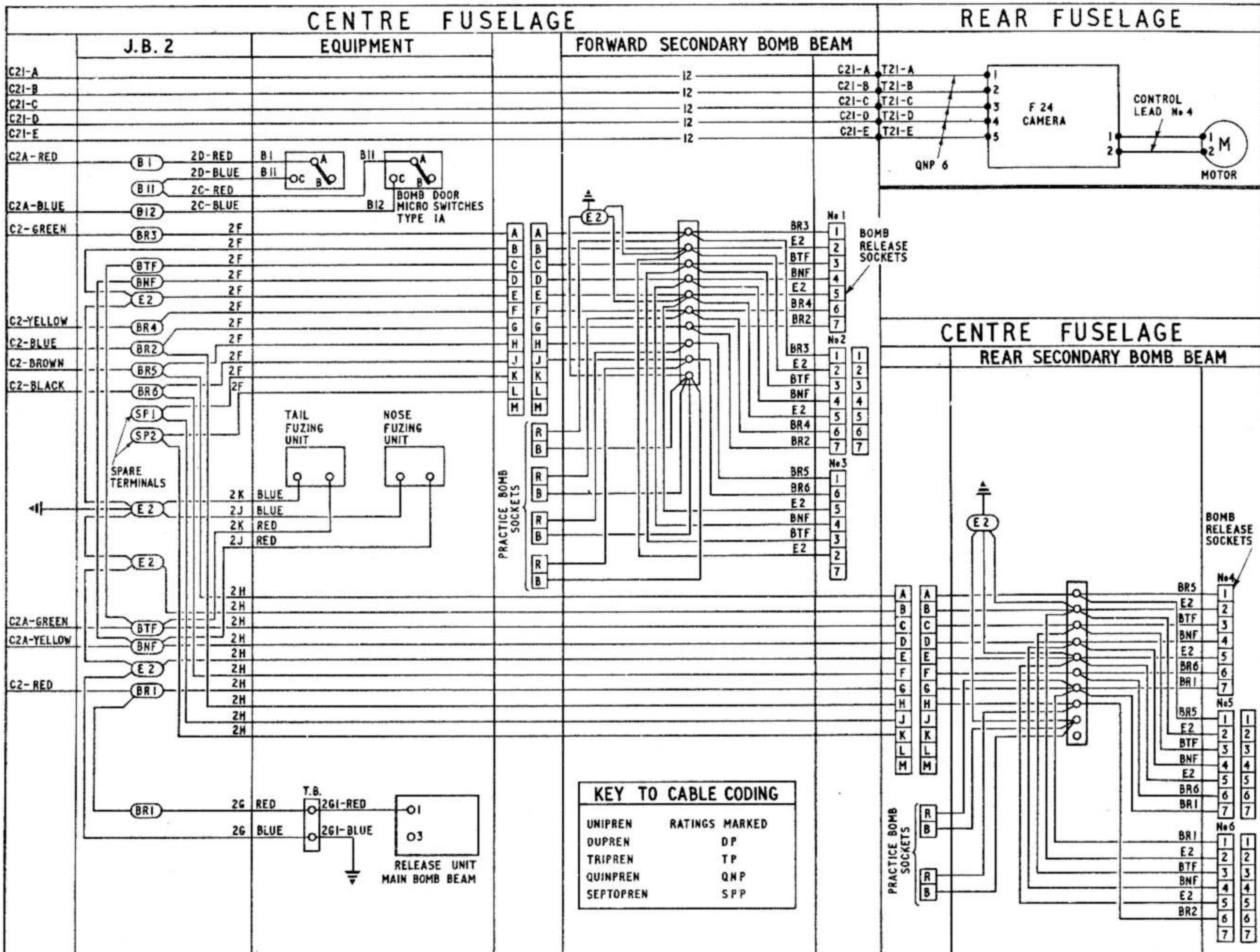

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Fig. 3A. Bomb release – F24 camera

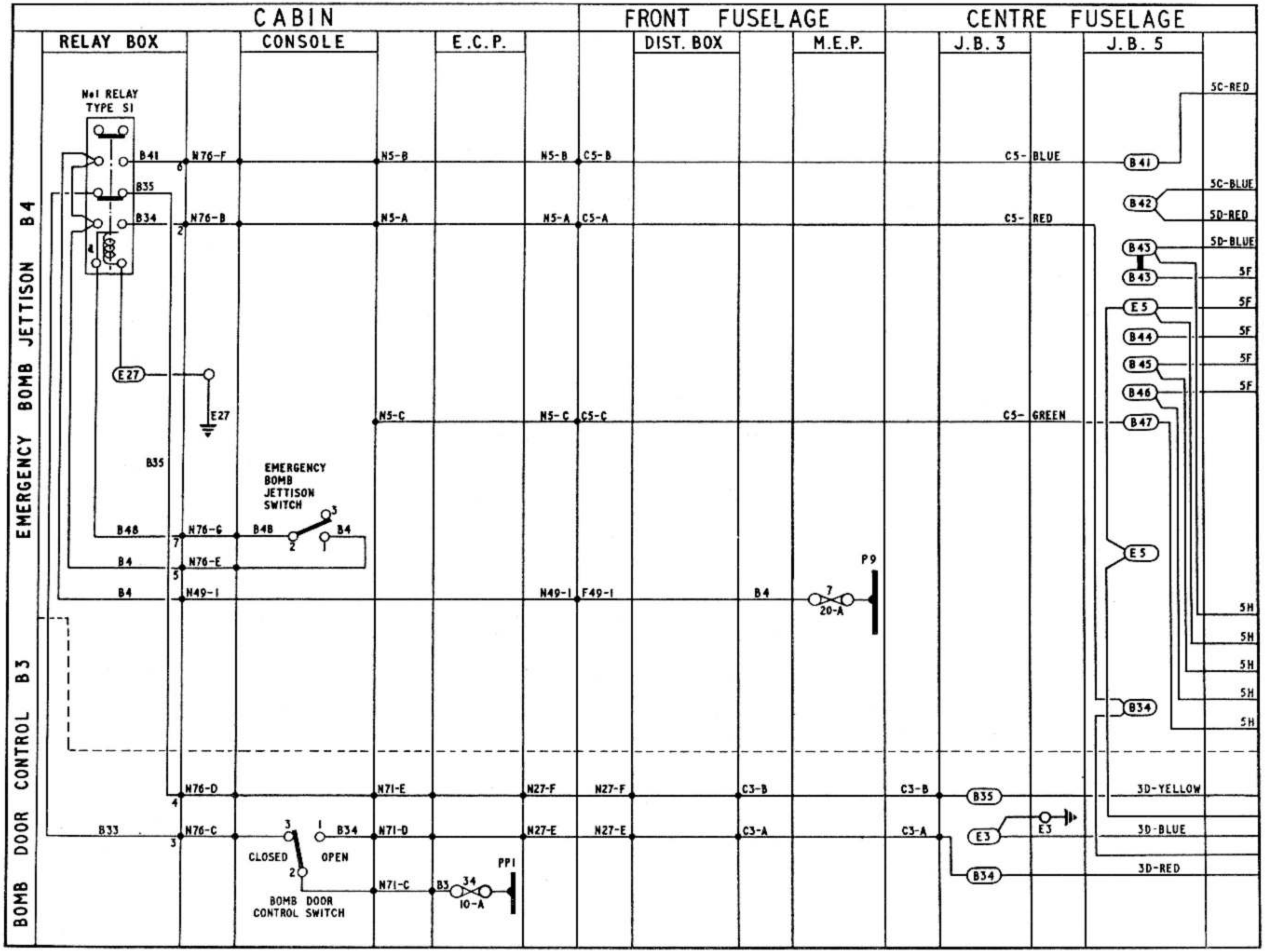

Fig. 4. Bomb door control – emergency bomb jettison

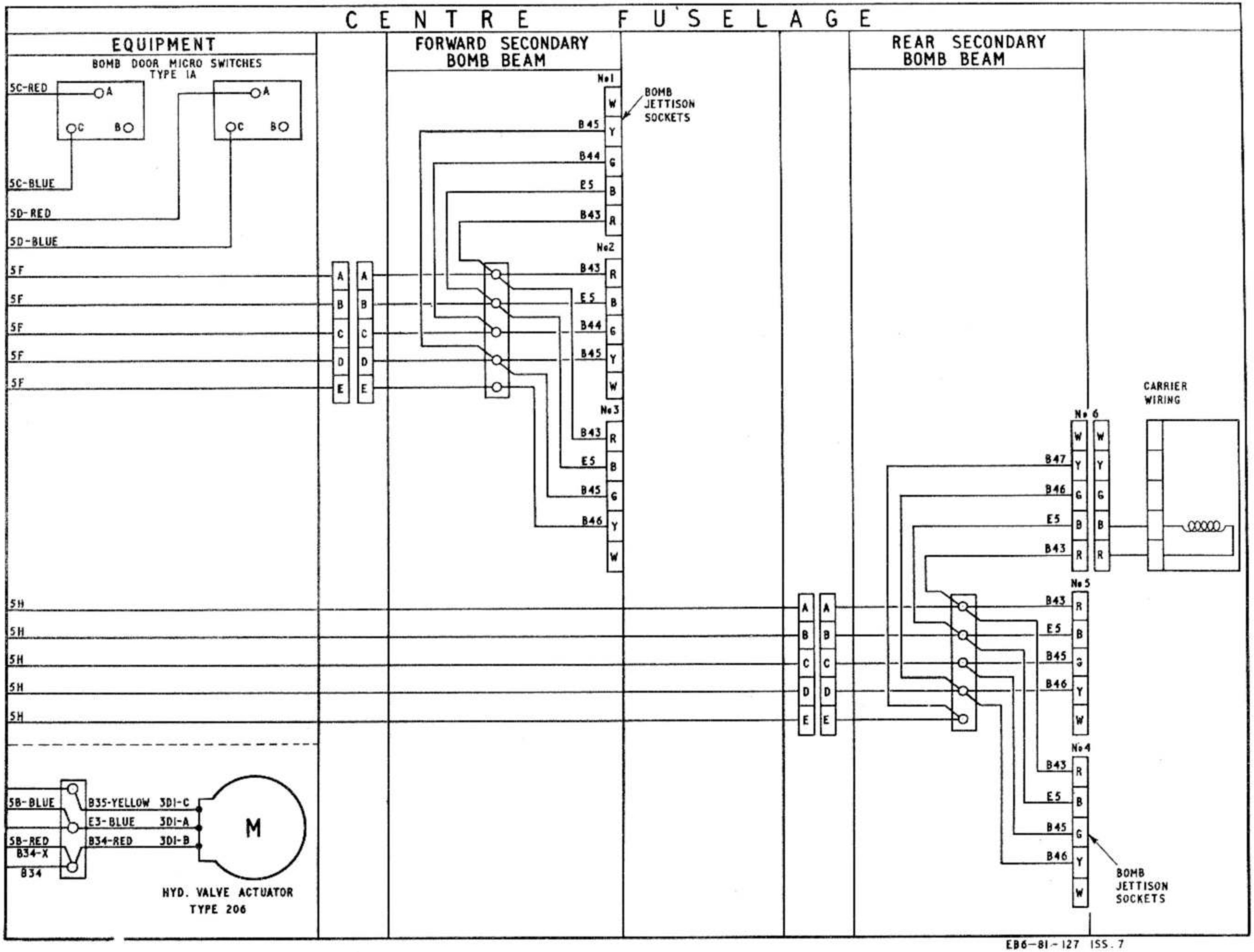

Fig. 4A. Bomb door control – emergency bomb jettison

CONTROL SURFACES - GROUP C

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LIST OF ILLUSTRATIONS

Introduction

1. In this group a description is given of the electrical services concerned with the flying controls; these cover tail-plane control, rudder and aileron trim, air brakes and flaps control.

DESCRIPTION

TAIL-PLANE CONTROL

General

2. Variation of tail-plane incidence is controlled by an electrically-oper◄ated Type 4022 Mk.2, linear actuator,► installed between the fuselage and tail plane. Two motors are incorporated in the actuator; one is a high-speed unit while the other is low speed. The high-speed motor which is designed to give coarse trim is not used; the low-speed motor operates to give fine trim only. A Desynn transmitter embodied in the actuator is arranged to operate a tail plane position indicator on the pilot's instrument flying panel.

3. The actuator is initially controlled by a NOSE UP-NOSE DOWN trim switch and a cut-in switch fitted in the right handle of the pilot's control wheel. The trim switch is of a sliding type and is normally covered by a spring-loaded hinged flap which has to be lifted before the switch can be operated. Raising of the flap above 30 deg moves a plunger which closes the cut-in switch. Both switches operate in conjunction with either two Type S.T.C. relays housed in a box at the base of the control column below the pilot's floor (B Mk.6 aircraft), or two Type S

relays housed in the E.C.P. (B(I) Mk.6 aircraft), a Type 100B isolating relay, one of two reversing relays positioned near frame 40 at the starboard side in the rear fuselage, and two limit micro-switches.

◄Linear actuator, Type 4022 Mk.2►

4. This type of actuator consists of a gear-driven ram assembly which can be operated by either a high-speed or a low-speed integral motor but, as mentioned in para. 2, the low-speed motor only is used. In addition to the shunt and series field coils, the motor has an electro-mechanical brake to prevent rotation of the armature and consequent movement of the ram when no current is flowing in the motor circuit. The electrical connections to the actuator are made by Plessey plugs and sockets, a plug being mounted on each motor unit. Connection to the Desynn transmitter is made by a cable, fitted with a Plessey socket, which is provided as a component of the actuator. The cable socket couples to a plug mounted on a bracket near the actuator unit.

Isolating relay

5. The Type T100B, isolating relay *(A.P.113D-1397-16)* is included in the tail-plane circuit as a safety measure to ensure that the actuator will only function while the cut-in switch is operated simultaneously with the trim switch. On the introduction of Mod.3701 a Type ZR12 diode is connected across the energizing and earth terminals of the relay to prevent overloading on the cut-in switch. The relay controls the heavy current supply between fuse 4 at the M.E.P. and the reversing relay.

Reversing relay

6. The heavy current supply from the isolating relay is controlled by the

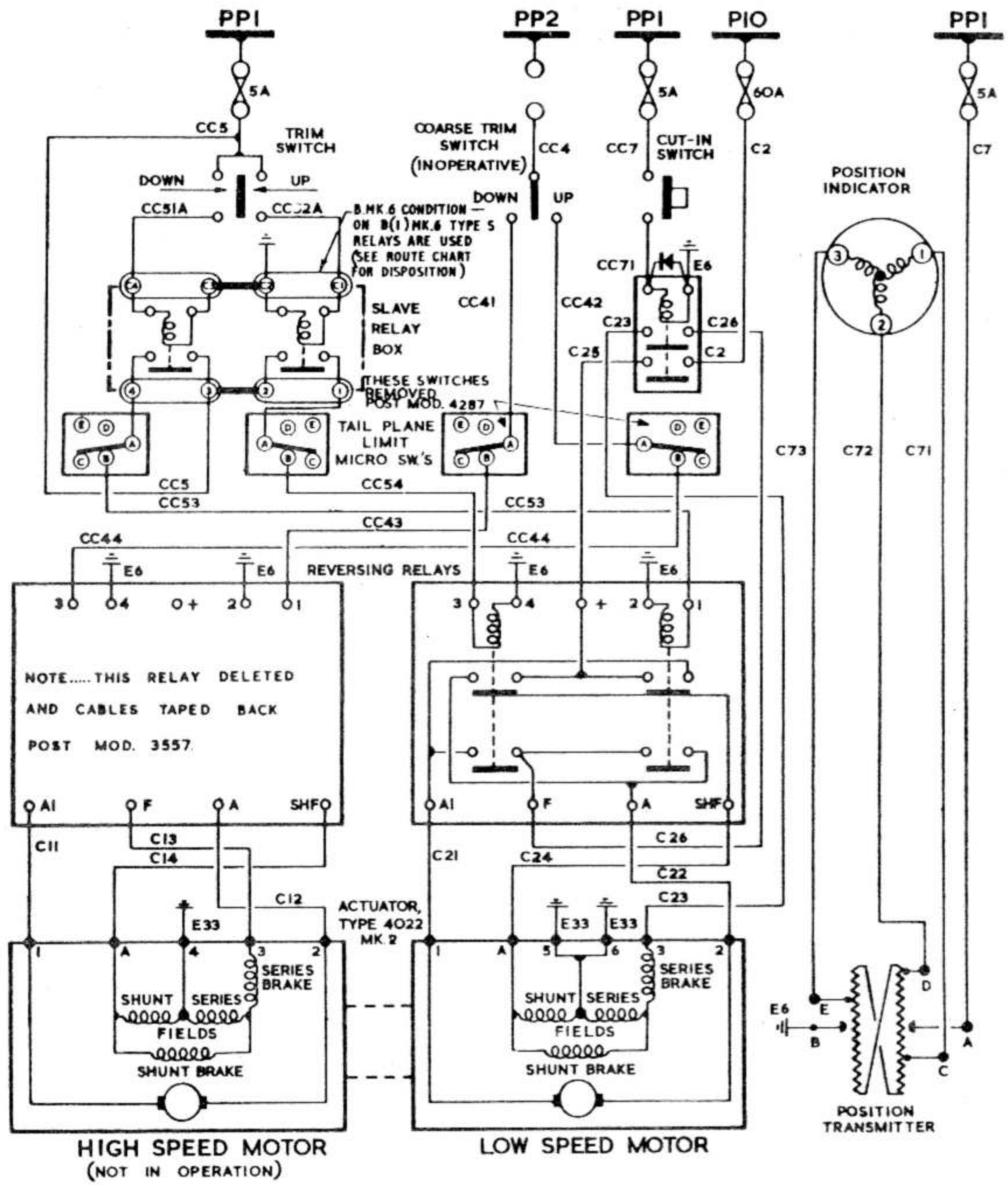

Fig.1. Tail-plane control

◄ MOD.4287 EMBODIED ►

reversing relay. The latter has two sets of contacts and two solenoid coils, one of which is energized when the pilot's trim switch is set to NOSE UP and the other when the switch is set to NOSE DOWN. The change of rotation of the actuator motor is effected by reversing its armature connections.

Limit switches

7. The limit microswitches installed one above and one below the tail plane are mounted on the fuselage structure. They are operated by adjustable tappets, fitted to the tail plane, whenever the tail-plane travel exceeds predetermined limits.

Operation

8. Raising the trim switch safety flap operates the cut-in switch to energize the isolating relay; the latter closes to complete the circuit from fuse 4 (circuit C2) to the positive terminal (C25) of the reversing relay. The circuit is also completed between terminal F (C26) of the reversing relay and terminal 3 (C23) on the low speed motor.

9. The selection of NOSE UP passes a supply from fuse 30 (circuit CC5) to energize one of the S.T.C. relays (B Mk.6), or Type S relays (B(I) Mk.6); the relay closes and completes the circuit from CC5 to CC52 and, via the upper limit microswitch, to terminal 3 (CC54) on the reversing relay; the latter, in closing, causes the actuator to move the tail plane in the direction which gives nose-up trim.

10. Selecting NOSE DOWN connects CC5 to CC55 (B Mk.6), or CC51A (B(I) Mk.6), to energize and close the other S.T.C. relay (B Mk.6), or Type S relay (B(I) Mk.6), which then completes the circuit from CC5 to CC51 and, via the lower limit microswitch, to terminal 1 (CC53) on the reversing relay. The latter then closes to operate the actuator in the nose-down trim direction.

11. If NOSE UP or NOSE DOWN is selected long enough for either of the limit microswitches to operate, the switch affected will break the solenoid circuit of the reversing relay which then opens to cut off the power supply to the actuator motor and prevent any further tail-plane movement.

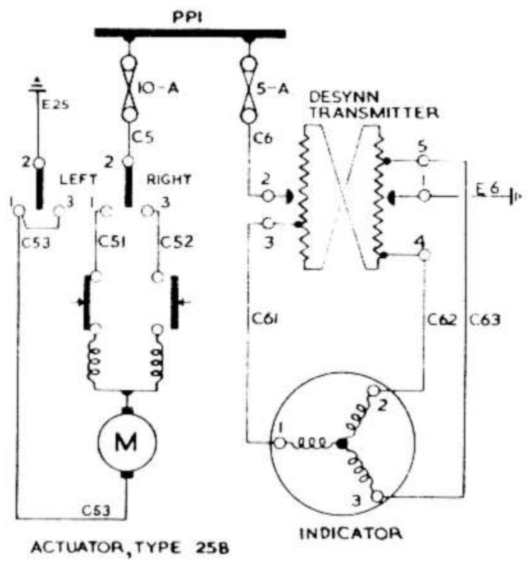

Fig. 2. Rudder trim control

RUDDER TRIM CONTROL

General

12. Rudder trim control is effected by a Type 258 linear actuator situated at the base of the rudder. The actuator is controlled by two independent double pole 3-position switches on the console. These switches must both be operated before the actuator becomes operative.

Position indicator

13. The trim tab position is shown by a Desynn indicator on the instrument flying panel. The indicator is operated by a transmitter embodied in the actuator assembly.

AILERON TRIM CONTROL

General

14. Aileron trim is controlled by a Type 259, linear actuator which is mechanically coupled to the aileron control mechanism at the base of the control column. The actuator operates in conjunction with a 3-position switch mounted on the console.

Position indicator

15. The amount of trim at any time is shown on the instrument flying panel by a Desynn indicator which is operated by a transmitter embodied in the actuator assembly.

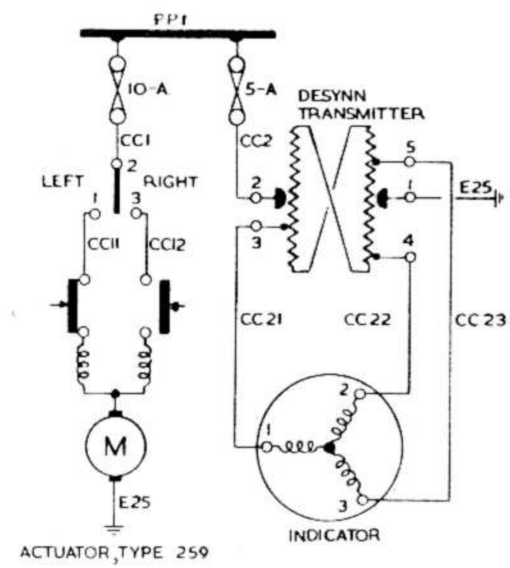

Fig. 3. Aileron trim control

AIR BRAKES

General

16. This installation comprises a hydraulically operated system of brake channels arranged to project above and below the main plane. The system is controlled by an IN-MID-OUT switch fitted on the control column. It works in conjunction with a Type 217 rotary valve actuator and a solenoid-operated cock situated in the bomb bay, a Type S1 relay in the distribution box, and two microswitches mounted on the air brake operating jack in the starboard wing.

17. The microswitches, numbered 1 and 2, are actuated by cams attached to the moving piston rod of the hydraulic jack; switch No. 1 by a short cam and switch No. 2 by a long cam.

Operation

18. With the control switch at the IN position the brake channels are retracted. Setting the switch to MID gives an energizing feed, via the microswitches, to the relay which closes and operates the valve actuator. The jack piston, on reaching the MID position, actuates the microswitches, changing the connections in each from A-B to A-C. This results in the solenoid operated cock being energized and closing the hydraulic circuit to lock the brake channels in the MID position. At the same time the relay is de-energized and opens.

19. Upon selecting OUT, the relay closes and operates the valve actuator to the limit of its travel and takes the brakes to their fully OUT position.

20. Selecting IN de-energizes the relay, which opens and reverses the action of the valve actuator to bring the brakes to the fully IN position.

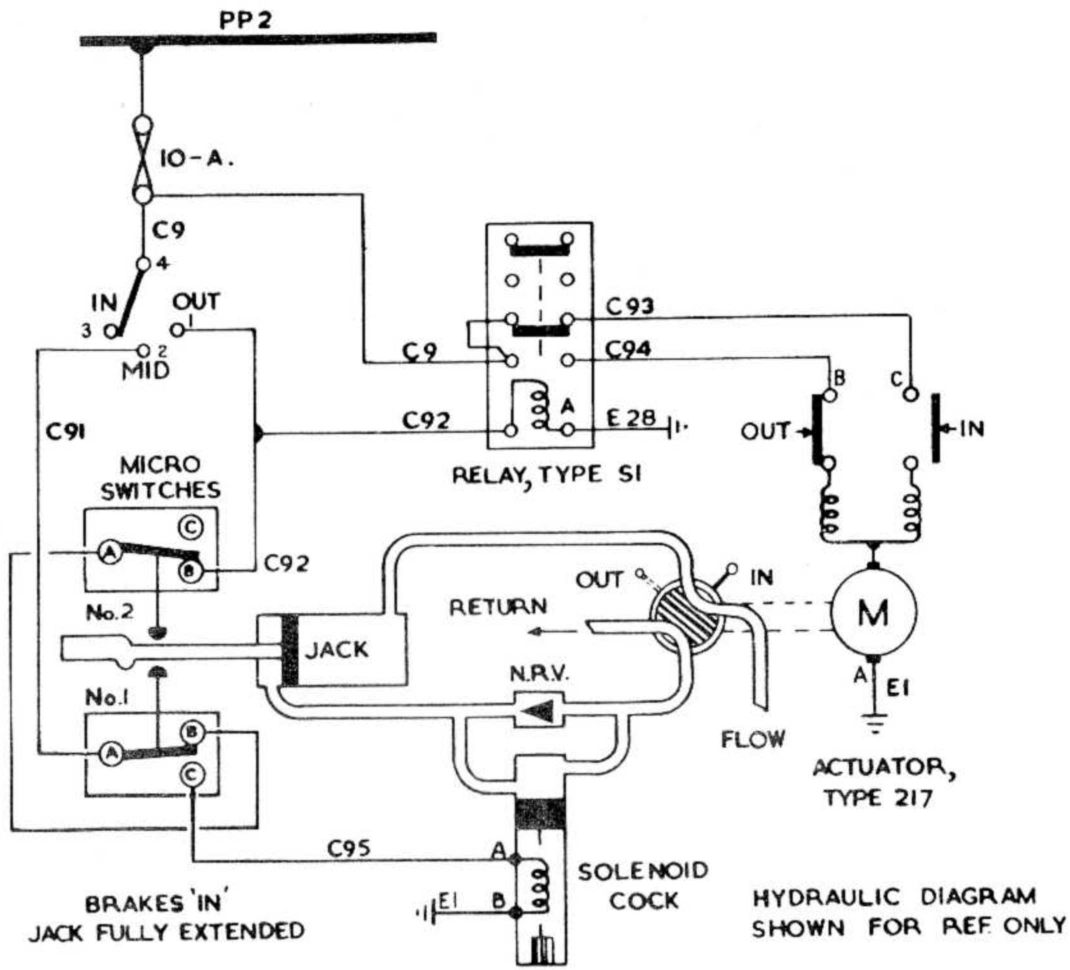

Fig. 4. Air brakes

FLAP CONTROL

General

21. The flaps, installed on the trailing edge of each wing, are hydraulically operated by jacks controlled by a Type 205 rotary valve actuator. The actuator situated in the roof of the bomb bay, is controlled by a 2-position switch on the alighting-gear panel. A Desynn indicator showing the flap position is also fitted on the alighting-gear panel, and is operated by a transmitter linked to the flap actuating mechanism in the inboard trailing edge of the port wing.

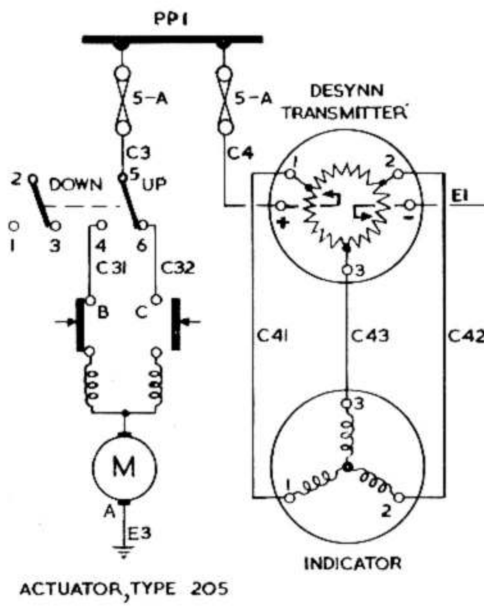

Fig. 5. Flap control

SERVICING

TAIL PLANE CONTROL

Functioning check

22. The following functional check should be made prior to every flight and whenever the control circuit has been broken down in any way. On B(I) Mk.6 aircraft during the following tests it is essential that the trim switch hinged cover is fully up before the cut-in switch is assumed to have closed. When it is desired to operate the trim switch only, the hinged cover can be lifted approximately 30 deg. before the cut-in switch contacts close.

(1) Operate the trim switch only – the tail plane should remain stationary.

(2) Operate the cut-in switch only – the tail plane should remain stationary.

(3) Operate the cut-in switch then select NOSE UP by the trim switch – the tail plane should move in the selected direction.

(4) Repeat check (3) but select NOSE DOWN.

(5) Repeat checks (3) and (4) but operate the trim switch in short 'blips'

(6) The release of the cut-in switch, during checks (3), (4) and (5) should result in the immediate stopping of the actuator and all tail plane movement.

ACTUATORS

General

23. Servicing instructions for the Types 4022, 258 and 259 linear actuators are given in A.P.4343D, Vol.1, Book 3, Sect.14, Chap.89, 20 and 21 respectively. The Type 205 and 217 rotary actuators, in the flaps and air brakes circuits, both utilise a Type 200 rotary actuator to operate the hydraulic valve and servicing instructions for this actuator are given in A.P.4343D Vol.1, Book 3, Sect.16, Chap.11.

REMOVAL AND ASSEMBLY

TAIL PLANE CONTROL

Tail plane control switches – B Mk.6 aircraft *(fig.6)*

Removal

24. To remove the tail plane switches:–

(1) Disconnect the tail plane control cables at the base of the control column and remove the P.V.C. tubing carrying the cables down the column. Remove the lower half of the cable clamp fitted in the right arm of the control wheel.

(2) Remove the three countersunk screws (1) and the top plate (2) and withdraw the switch mounting block (3).

(3) Remove the trim switch (4) by inserting a narrow thin blade down the side of the switch and turning the circlip (6) until it aligns with the key slot (5).

(4) Remove the cut-in switch (7) by driving out the pin (8).

(5) Withdraw the switch cables from the P.V.C. tubing which was bound to the column.

Assembly

25. Assembly of the trim switches is the reverse of the removal procedure, but it is essential that the following precautions should be observed:–

(1) The switches must be a firm fit in the switch mounting block. If for this reason individual switches require packing, it is permissible to bind them with cellulose tape at the position shown. The tape must not cover the locating pip on the trim switch or the circular groove in the body of the cut-in switch.

(2) The switch mounting block must be a firm fit in the control handle and, before the switches are fitted, be cleared of any swarf or other foreign matter.

(3) As the large rubber sleeve which holds the trim switch cables together also serves the purpose of keeping the switch cover close to the switch body, it is important that the sleeve should be pushed as near as possible to the switch to retain the cover in position.

(4) It is essential at all times, either during storage or fitting, that swarf is not allowed ingress to the switch assemblies.

(5) After the switches have been reassembled in accordance with the fore-

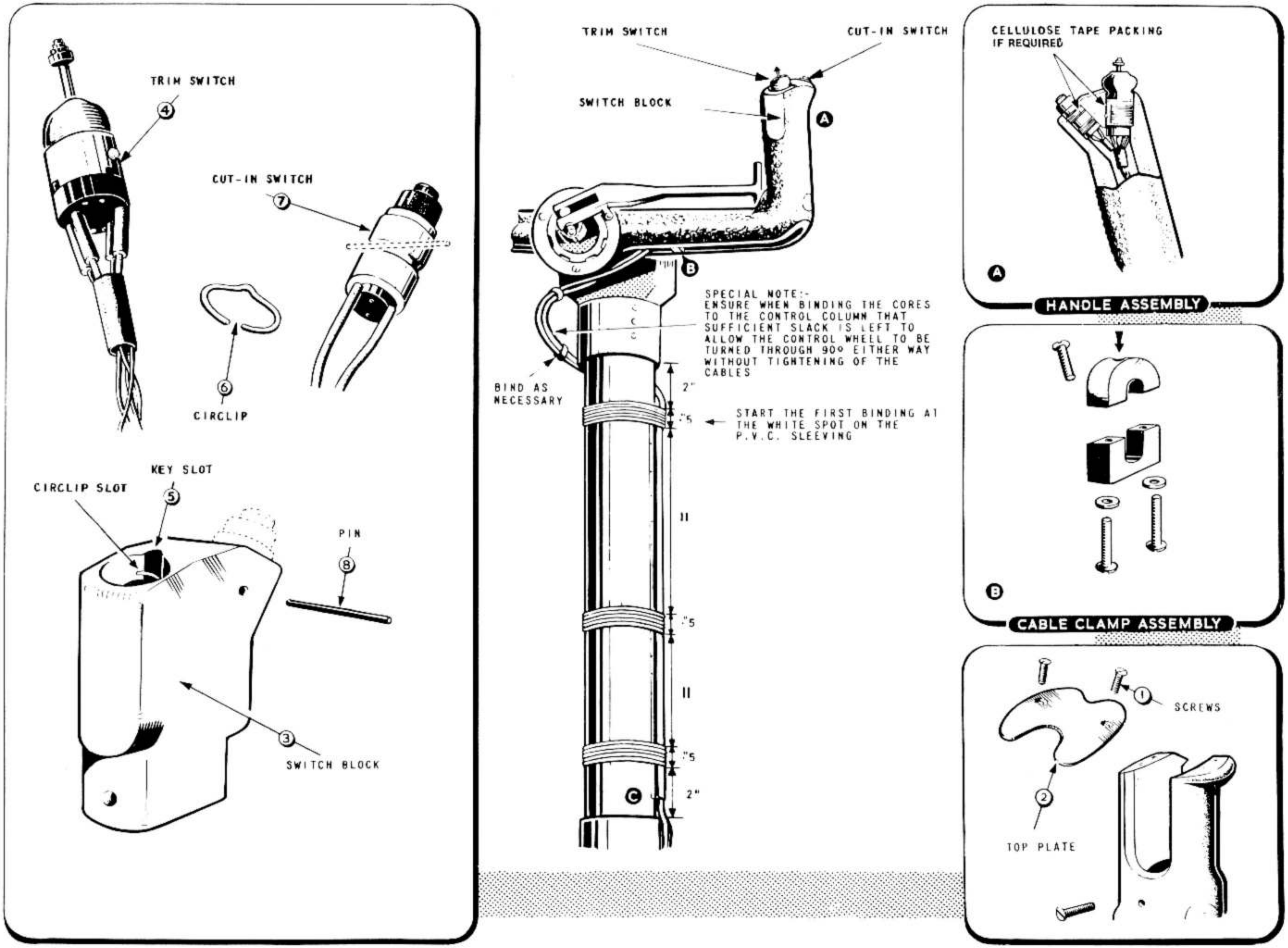

Fig. 6. Control column tail plane switch assembly – B Mk.6 aircraft

going precautions, they must be manually operated approximately 50 times before any electrical loading is applied to them.

(6) On the conclusion of the tests, the switch cables should be run through the P.V.C. tubing and then bound to the control column as shown in fig.6. It is important that, when binding the cables, sufficient slack is left in them to allow a full 90 deg. each-way movement of the control wheel without causing any undue **tightening at** full travel. The P.V.C. tubing is normally marked with a white ring to denote the first binding point near the top of the column. If the marking is not visible, the tubing should be ringed at a point 20 in. from the switch mounting block in the control handle and the binding started at the position shown.

(7) In conjunction with the relevant routeing diagram connect the cables to the terminals at the base of the control column below the pilot's floor.

26. On completion of the above operations, the functioning tests detailed in para.22 should be carried out.

Control handle replacement – B(I) Mk.6 aircraft *(fig.6A)*

27. If either the cut-in or the trim switch becomes unserviceable it must not be rectified in situ or removed from the control handle; instead, the complete handle must be replaced with a new or reconditioned component drawn from Stores. To counter any depreciation of the switches due to storage conditions it is essential that some functioning tests be made on all the switches embodied in the new handle before the latter is fitted to the control wheel. It is recommended that each switch be operated fifty times without any load on its contacts and afterwards another twenty times while passing approximately 0.5 amp. This load can be conveniently made up by connecting the solenoids of two Type S relays in parallel.

28. When a new handle has been satisfactorily tested it should be fitted to the control column after reference to fig.6A. In conjunction with the relevant routeing diagrams, the tail end of the cables should be fitted with identification sleeves bearing their correct circuit markings and, connected to the terminal blocks at the base of the control column. When the work of reconnection has been completed, functioning checks should be made on the various circuits controlled from the handle; one such check for the tail plane circuits is given in para. 22. Functioning tests for the other switches should be made in conjunction with the armament routeing diagrams included in Group A & B.

ACTUATORS

General

29. Information on the removal and assembly of the actuators is contained in Sect.3, Chap.4.

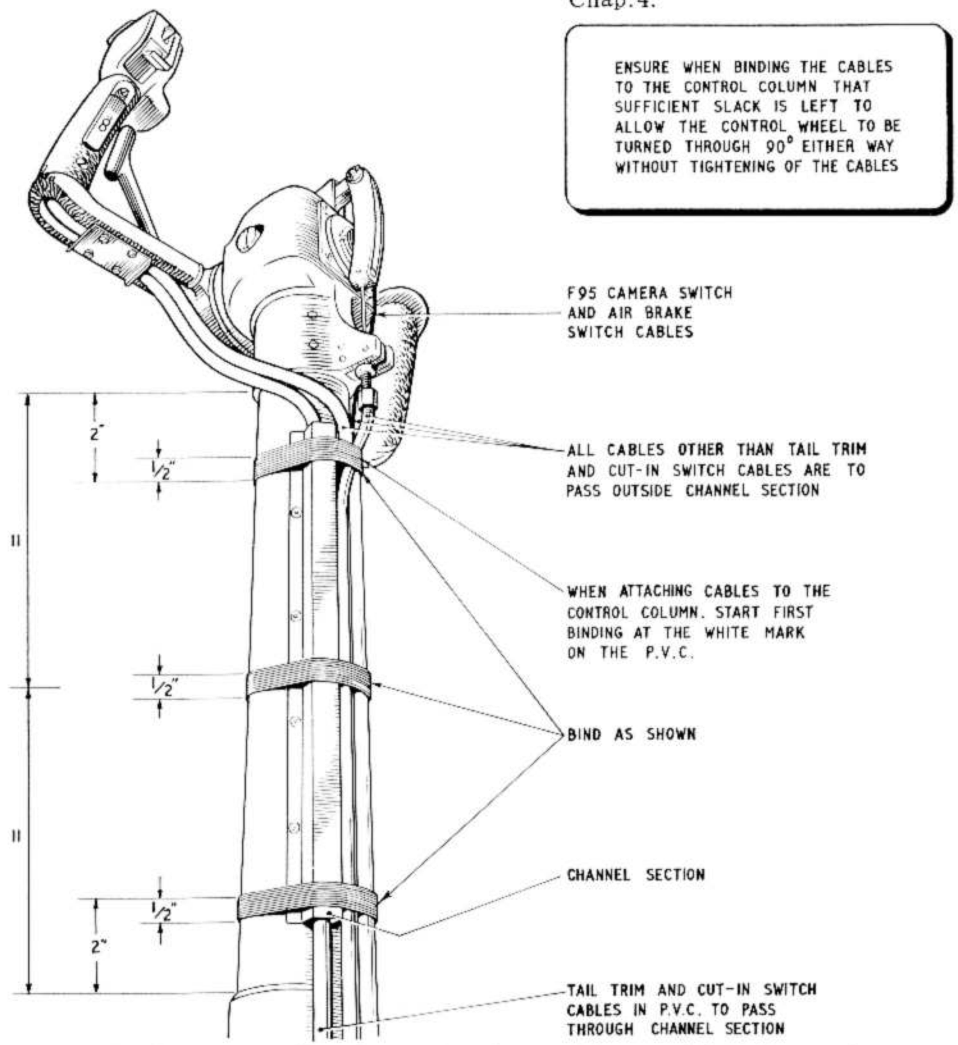

Fig.6A. Assembly of control column cables – B(I)Mk.6 aircraft

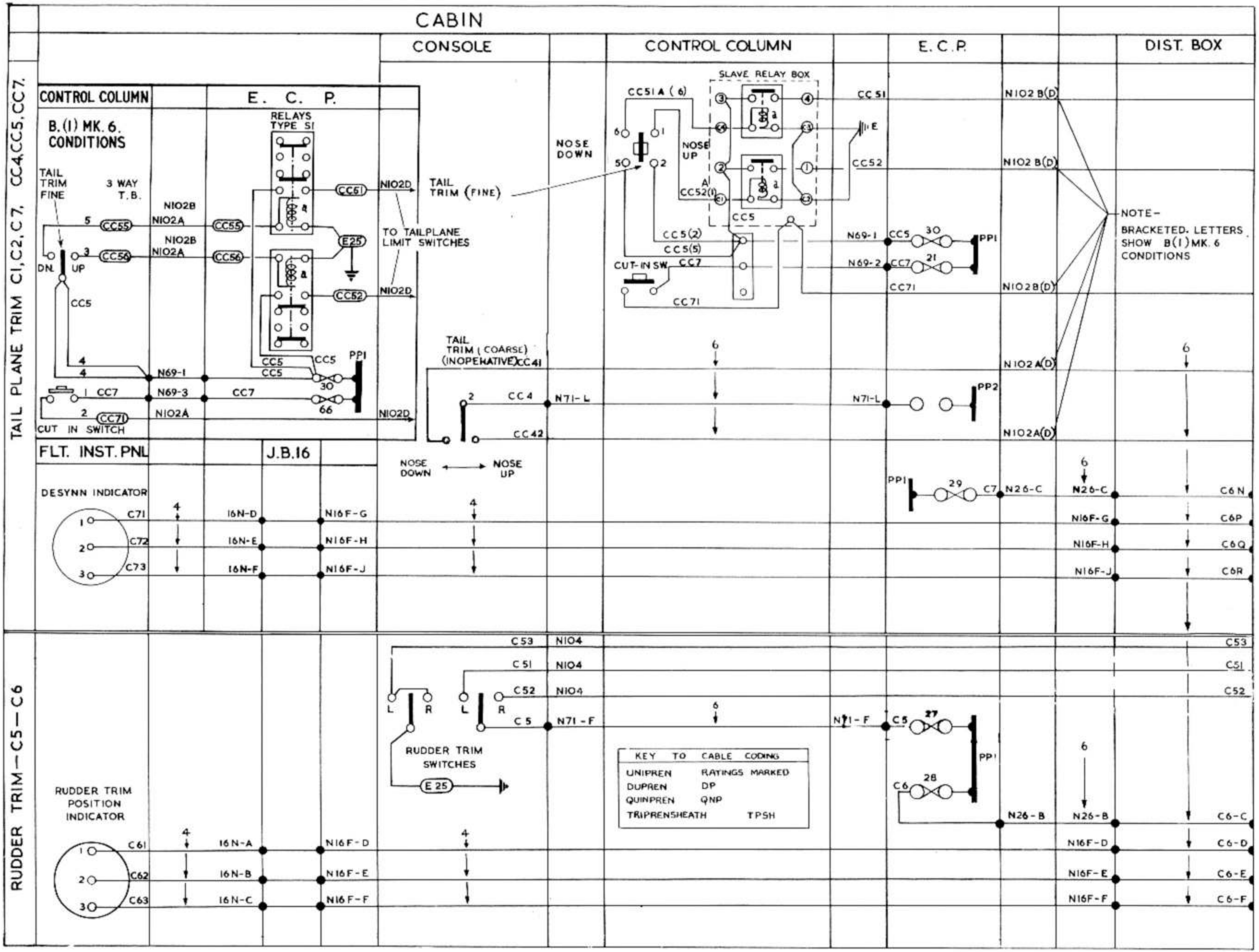

Fig. 7. Tail plane control – rudder trim control

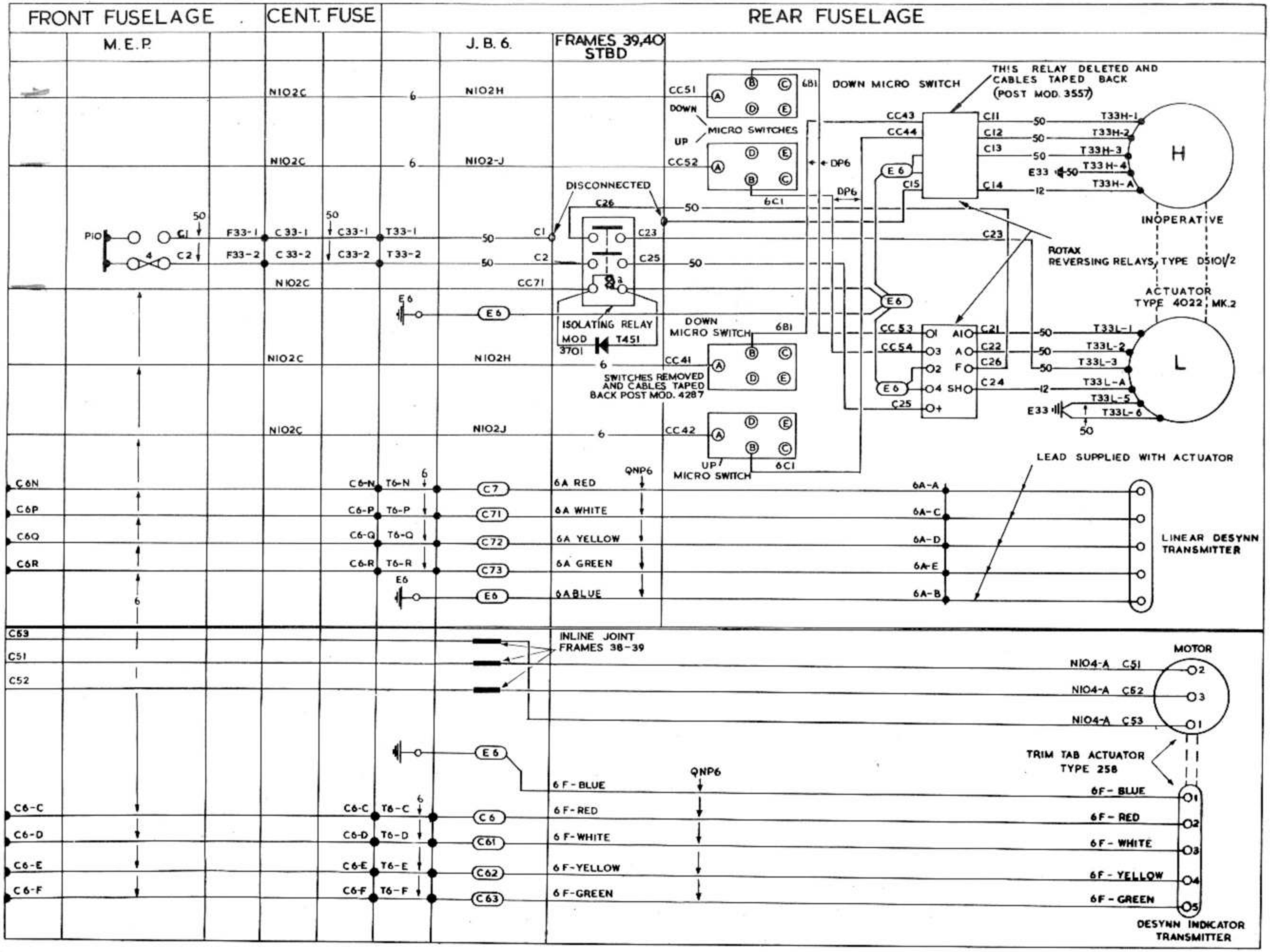

FIG. 7A. TAIL PLANE CONTROL—RUDDER TRIM CONTROL

MOD. 4107 INCORPORATED

9406

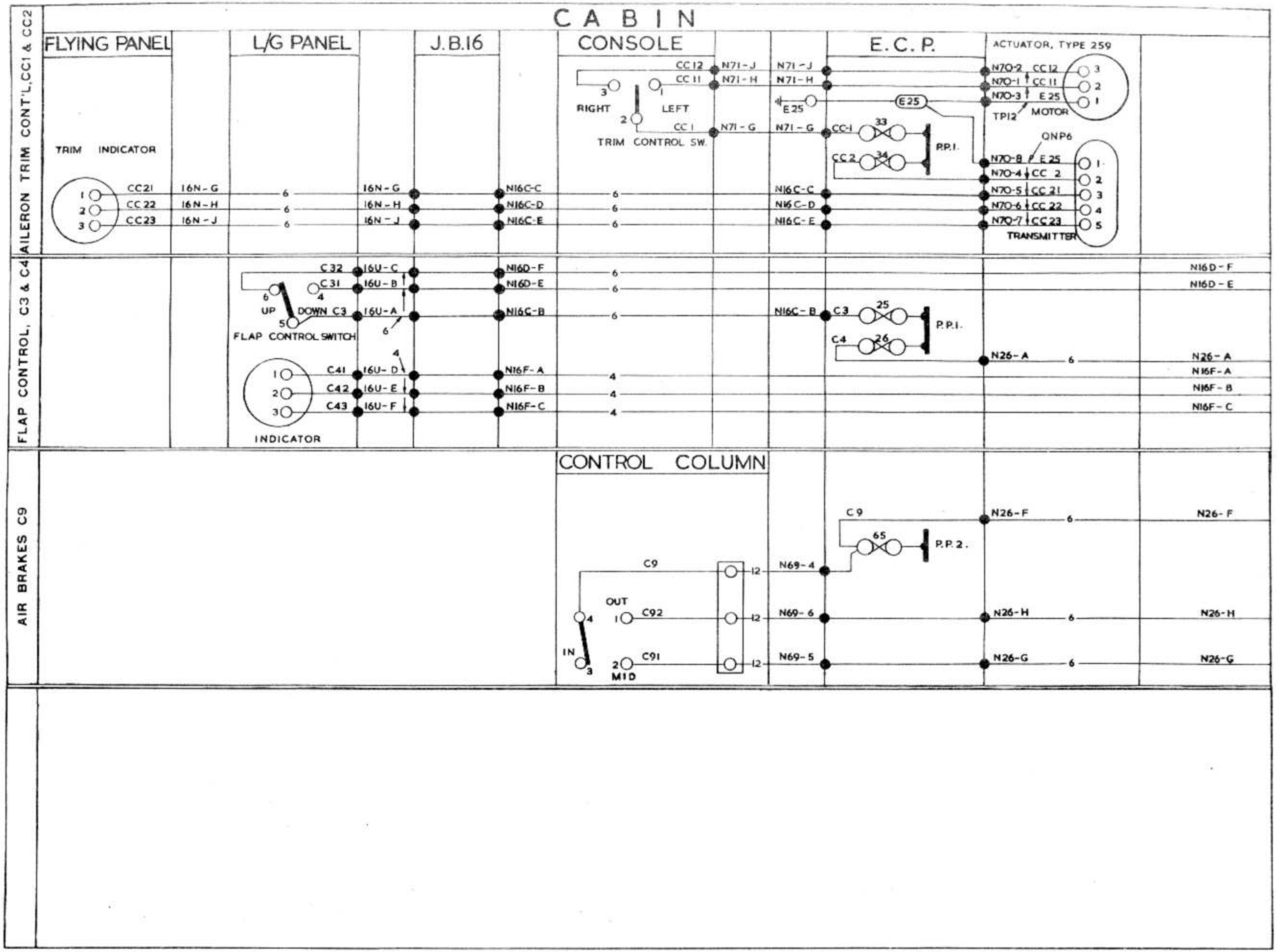

FIG. 8. AILERON TRIM CONTROL - AIR BRAKES - FLAP CONTROL

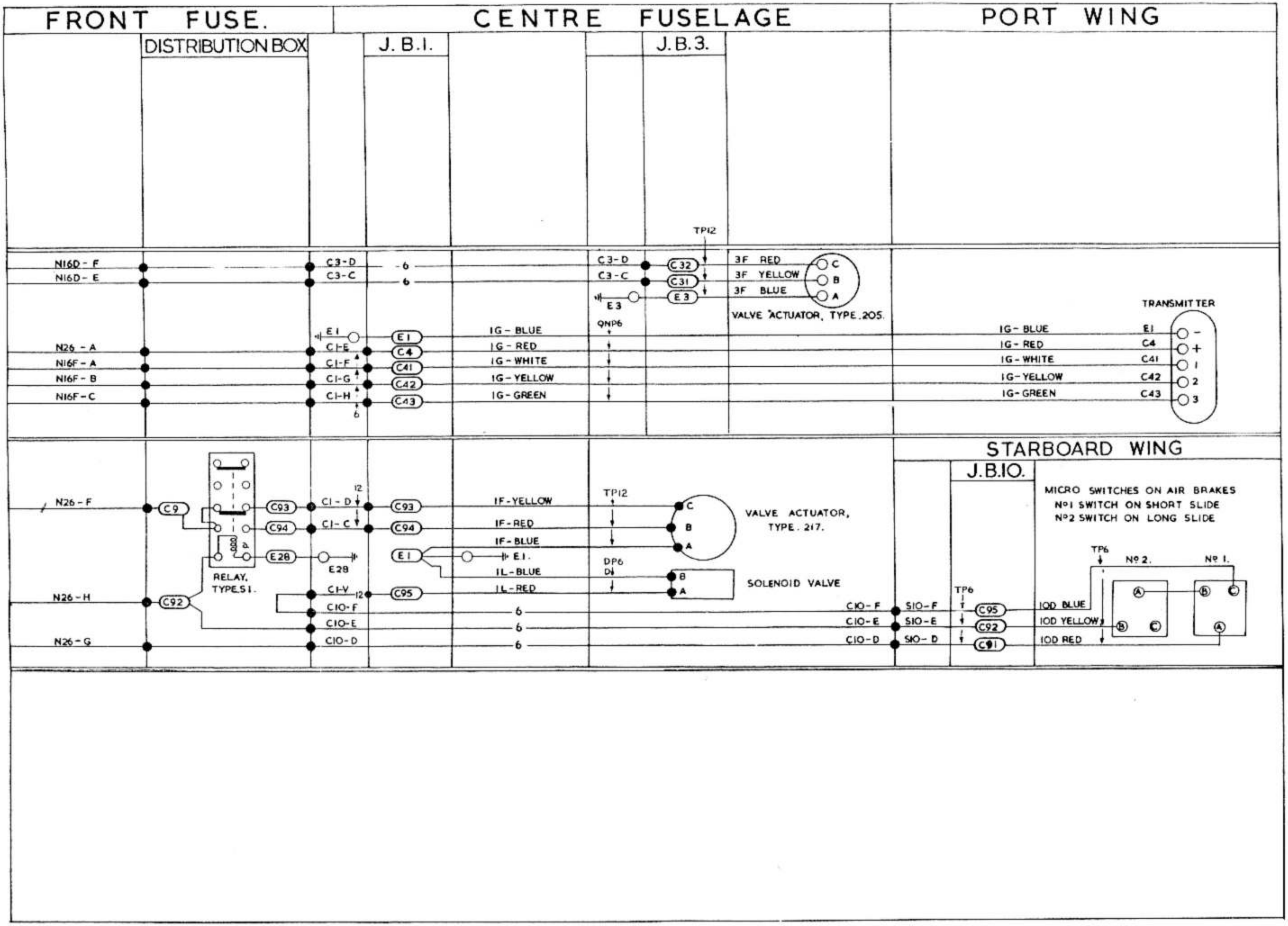

Fig. 8A. Aileron trim control – air brakes – flap control

INSTRUMENT POWER SUPPLIES - GROUP D

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LIST OF ILLUSTRATIONS

APPENDIX

Introduction

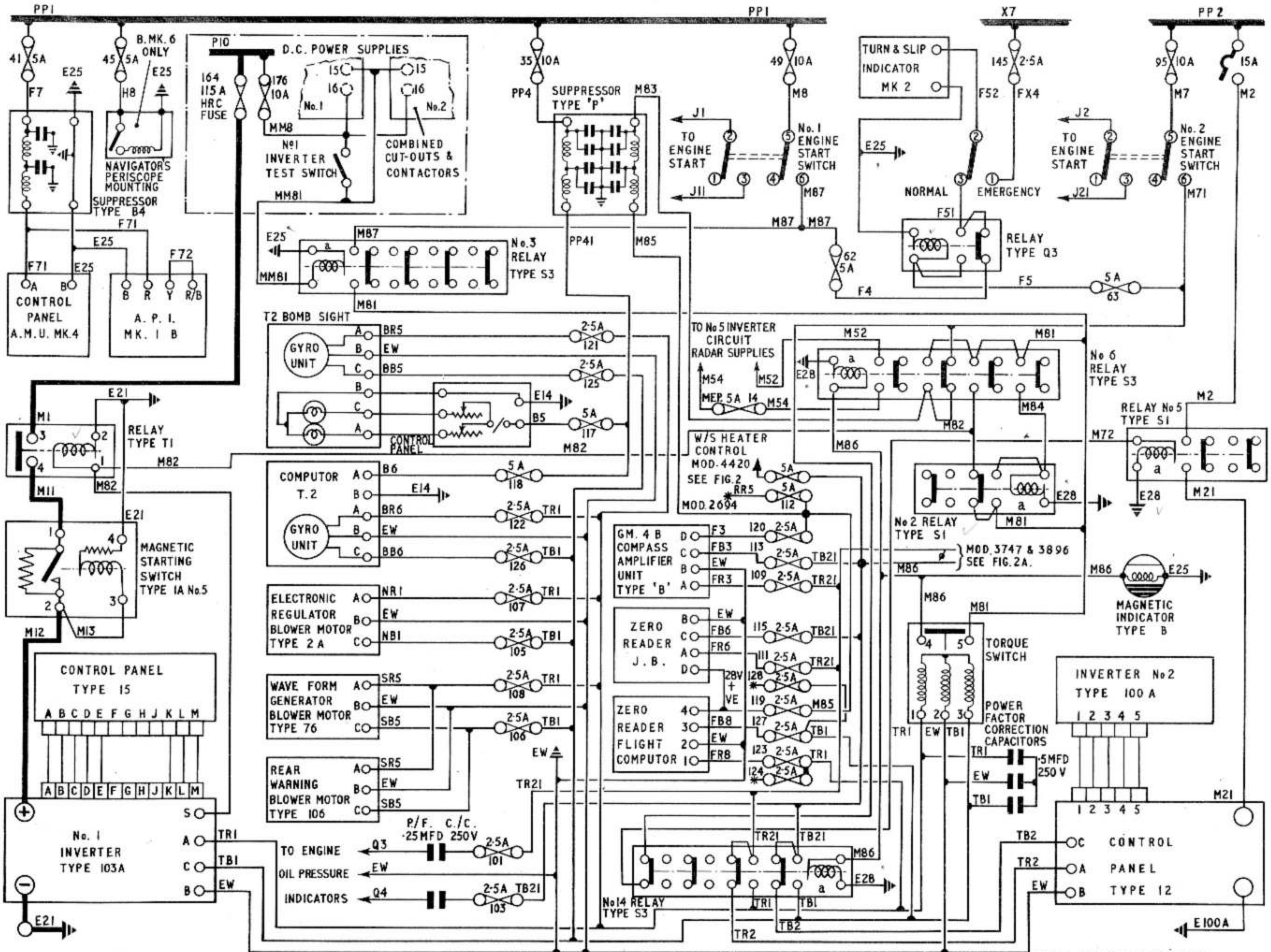
1. This group contains a description of the 28-volt d.c. and 115-volt, 400 c/s, 3-phase a.c. power supplies required to operate the flight instruments, oil pressure gauges, zero reader system, T2 bombsight system and the blower motors for cooling certain units of the radar equipment.

DESCRIPTION

General

2. The 115-volt, 400 c/s, 3-phase a.c. power supplies for operating the flight instruments, oil pressure gauges, zero reader system, T2 bombsight system, Decca roller map *(B(I) Mk.6 aircraft – post Mod.2694)*, and the blower motors in certain radar systems, are provided by two rotary inverters, a Type 103A and a Type 100A numbered 1 and 2 respectively, both located in the starboard equipment compartment. The Type 103A (No.1) inverter provides the normal a.c. power supplies while the Type 100A (No.2) inverter assumes the role of a standby for No.1 inverter but, when called upon, will only operate the flight instruments, the zero reader junction box to supply the horizon gyro unit, and the oil pressure gauges.

3. The instruments start up on standby supply *(No.2 inverter)* when the starboard



NORMAL

B MK.6 EB6-81-157 SHT.2 ISS.6A
B(I)MK.6 EB6-81-10325 ISS.5

FIG. 1. INSTRUMENT POWER SUPPLIES - THEORETICAL

MOD. 4420 INCORPORATED

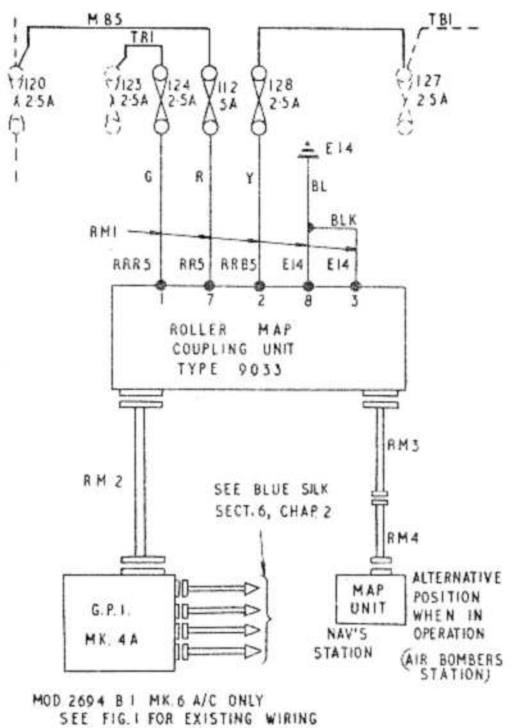


Fig. 2. Decca roller map power supplies (B (I) Mk.6 aircraft) – theoretical

engine MASTER STARTING switch is selected ON; indication of the instruments operating on standby is given by a magnetic indicator on the main instrument panel showing white by day and fluorescent at night. The normal supply *(No.1 inverter)* will take over when the port MASTER STARTING switch is selected ON and when at least one generator is charging and the magnetic indicator will then show black. Should the normal supply fail, the standby supply will automatically take over.

Operation

4. Reference to the circuit diagram *(fig.1)* will show that when the starboard engine MASTER STARTING switch is ON a supply is passed from M7-M71 to, (a) the turn and slip indicator *(para.10)*, (b) the G.M.4B compass and the zero reader junction box and flight computor via a pair of normally-closed contacts of No.6 relay in the D.C. distribution box, M83, one leg of a Type P suppressor and M85; (c) energize No.5 relay in the D.C. distribution box via a pair of normally-closed contacts of No.14 relay in the 400 c/s distribution box, and M72.

5. The energized No.5 relay completes the power input circuit M2-M21 to start up No.2 inverter via its associated Type 12 control panel. The output from the inverter is then fed through the control panel to the oil pressure gauges, the G.M.4B compass and the zero reader junction box, the latter to supply the horizon gyro unit *(H.G.U.)*, via TB2-TR2, the normally-closed contacts of No.14 relay, and TB21-TR21. A single-phase a.c. supply is also fed to the pilot's and the navigator's altimeter vibrator units *(post Mod.3747)*. For the protection of No.2 inverter a 15 amp circuit breaker is fitted on the E.C.P.

Note...
On B(I) Mk.6 aircraft, the Mk.19 altimeter and vibrator unit at the pilot's station are replaced by a Mk.22 altimeter and amplifier unit (post Mod.3896).

6. When the port engine MASTER STARTING switch is selected ON, the No.1 inverter is automatically started when at least one generator starts charging. This is effected by the operation of either generator main contactor feeding a supply from M8-MM8-MM81 to energize No.3 relay in the E.C.P. A supply is then fed from M87, through No.3 relay, M81, a pair of normally-closed contacts of No.2 relay in the D.C. distribution box, and M82 to energize a type T1 relay in the starboard equipment compartment, and also to pass a supply to the shunt winding in No.1 inverter. Closing of the Type T1 relay completes the power input circuit M1, M11, a magnetic start switch in the starboard equipment compartment and M12 to No.1 inverter which then starts running.

7. The output of No.1 inverter is fed via TB1-TR1 to the gyro units in the T2 bombsight and computor, the zero reader flight computor, Decca roller map *(B(I) Mk.6 aircraft – post Mod.2694)*, and the blower motors of the rear warning radar head, waveform generator and electronic regulator. When the inverter output reaches 98 volts it energizes a torque switch in the upper equipment compartment. Closing of the torque switch completes the circuit M81-M86 resulting simultaneously in the following actions:–

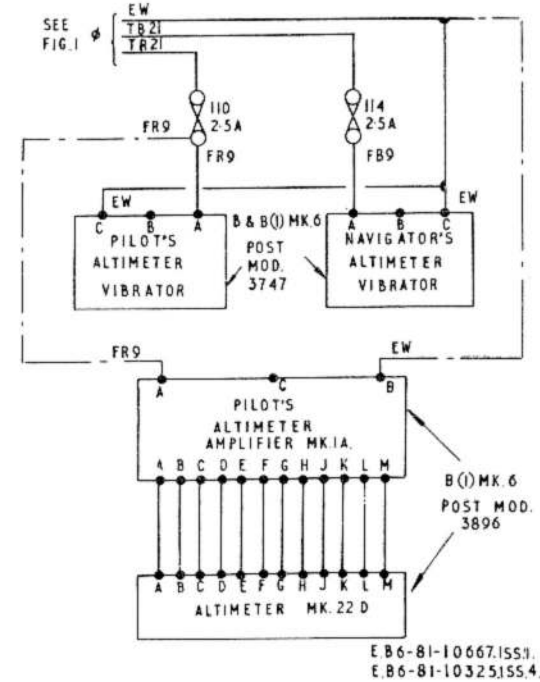


Fig.3. Altimeter vibrator and Mk.22 altimeter A.C. supplies

(1) The No.14 relay is energized via M86 breaking the d.c. supply M71-72 to No.5 relay resulting in the stopping of No.2 inverter by breaking the power input circuit M2-M21.

(2) The a.c. supply to the oil pressure gauges, G.M.4B compass, zero reader junction box and the altimeter vibrator units *(post Mod.3747) (see para.5 – Note)* is changed at No.14 relay from TB2-TR2 to TB1-TR1.

(3) (a) The d.c. supply to the G.M.4B compass amplifier, and the zero-reader junction box and flight computor being changed from M71 to M87-M81; (b) the d.c. supply M52-M54 being completed to permit the operation of No.5 inverter *(Group R & S)*; (c) No .2 relay is energized through M81-M84 and the hold-in circuit M82 to No.1 inverter input supply control relay, Type T1, passes through No.6 relay instead of No.2 relay.

(4) The magnetic indicator is energized and shows black indicating that the services are operating from No.1 inverter.

No.1 inverter failure

8. Should No.1 inverter fail, the torque switch will open and the No.6 and No.14 relays will become de-energized. This will result in the system reverting back to standby supply *(para.4 and 5)*. In this event, however, No.2 relay will remain energized by a self-energizing supply M81 fed through its own contacts. This prevents the continued running of No.1 inverter, which may present a fire risk due to possible burn out. The No.2 relay will automatically become de-energized when the starboard MASTER STARTING switch is switched OFF.

No.1 inverter ground test switch

9. In order that No.1 inverter may be run on the ground without running the engines, a ground test switch is fitted on the E.C.P. This switch when selected and with the port MASTER STARTING switch ON, will complete the circuit between the ground supply and M87-M81.

Turn and slip indicator

General

10. For operation of the indicator three separate sources of d.c. supply are provided; two of these have automatic change over controlled by a Type Q relay fitted in J.B.16. The other supply originates from the emergency battery and is manually controlled by a switch labelled NORMAL-EMERGENCY fitted on the main instrument panel.

Operation

11. The power supplies are initially controlled by the NORMAL-EMERGENCY switch. With the switch set to NORMAL, the indicator operates from the main battery via the engine MASTER STARTING switches and the Type Q relay in J.B.16. Selecting the starboard MASTER STARTING to ON feeds a supply from bus-bar PP2, through M7-M71, fuse 63, and F5 to energize the Type Q relay. The relay closes and completes the supply F5-F51 to the indicator via the NORMAL-EMERGENCY switch and F52. If fuse 63 blows, the relay becomes de-energized and the indicator is then fed from bus-bar PP1 through M8, the port MASTER STARTING switch in the ON position, M87, fuse 62, F4, the normally closed contacts of the Type Q relay and F51 to the indicator via the NORMAL-EMERGENCY switch and F.2. If both normal supplies should fail, the indicator will continue to function from the emergency battery after selecting the NORMAL-EMERGENCY switch to EMERGENCY. This feeds a supply from the emergency battery bus-bar X7 through FX4, the NORMAL-EMERGENCY switch and F52 to the indicator.

F52

Bombing instruments

12. A.C. power supplies are used to run the gyro in the bomb computor and the sighting head; d.c. is used in the instruments for their lighting circuit etc. The d.c. supply is not switched but is fed direct from bus-bar PP1 fuse 35, PP4, through one leg of a Type P suppressor, PP41. through fuse No.117, B5 and a control panel to the sighting head, and through fuse 118 and B6 to the computor.

Engine instruments

Oil pressure gauges

13. These instruments are operated by 26 volts a.c. stepped down from the 115-volt, 400 c/s a.c. supply by two small transformers in the 400 c/s distribution box. The 115-volt a.c. supply is normally taken from No.1 inverter. If No.1 inverter should fail the instrument power supply is automatically transferred to No.2 inverter *(para 4 and 5)*. Two 0.25mF capacitors fitted in the 400 c/s distribution box are wired in the 115-volt a.c. supply for power factor correction.

Tachometers

14. These instruments are operated by small a.c. generators mounted on and driven by their respective engines.

Exhaust gas thermometers

15. The d.c. power supply to these instruments is not switched but fed direct from fuse 50 in the E.C.P. The supply is controlled by a Type A voltage compensator installed on a platform on the floor in the upper equipment compartment.

Fuel pressure warning lamps

16. The lamps used in this circuit are rated at 6 volts and are fed from fuses 54 and 90 in the E.C.P., via 400 ohm resistors in the E.C.P. and the pressure warning switch in each respective bay.

Fuel contents gauges

17. Three separate d.c. power supplies fed from fuses in the E.C.P. are used in the fuel contents gauge circuits; fuse No.85 serves the fuselage tank gauges, and fuses 51 and 86 the port and starboard wing integral tank gauges respectively.

A.P.I. and A.M.U.

18. The d.c. supply for operating these instruments is fed from fuse 41 in the E.C.P. and a Type B4 suppressor.

External air thermometer

19. This d.c. operated circuit is not switched but fed direct from fuse No.38 in the E.C.P.

Fatigue meter *(post Mod.2329)*

20. This instrument is wired in the alighting gear circuit U21 *(Group G)* and is only operative in flight with the alighting gear retracted.

Rear viewing periscope
(Post Mod.2312)

21. The d.c. supply required for the heating and lighting of this instrument is fed from fuse 45 in the E.C.P. and is controlled by a

SERVICING

Inverters

22. Information on the servicing of inverters will be found in A.P.4343B, Vol.1, Book 3.

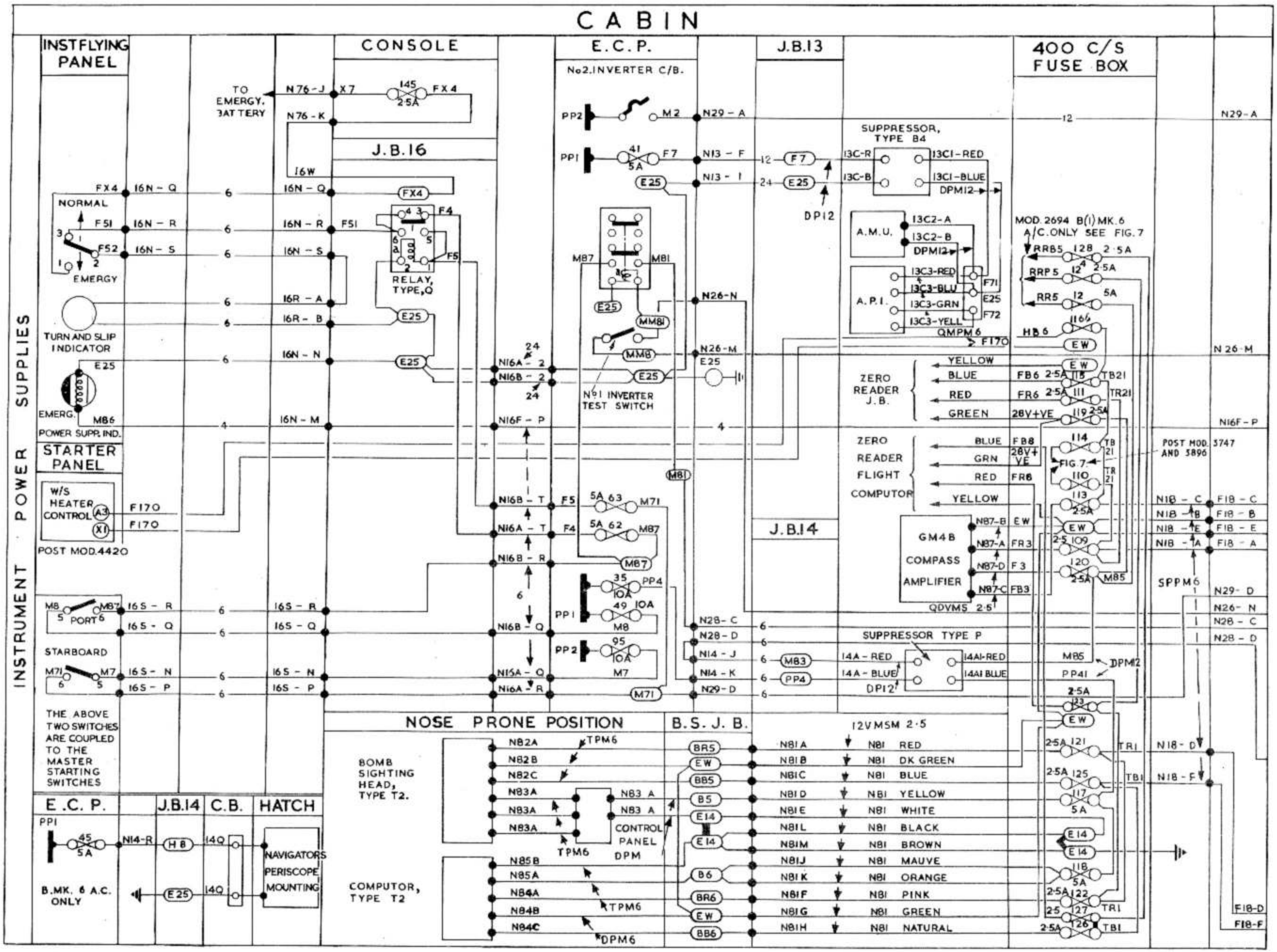


FIG. 4. INSTRUMENT POWER SUPPLIES

◀MOD. 4420 INCORPORATED▶

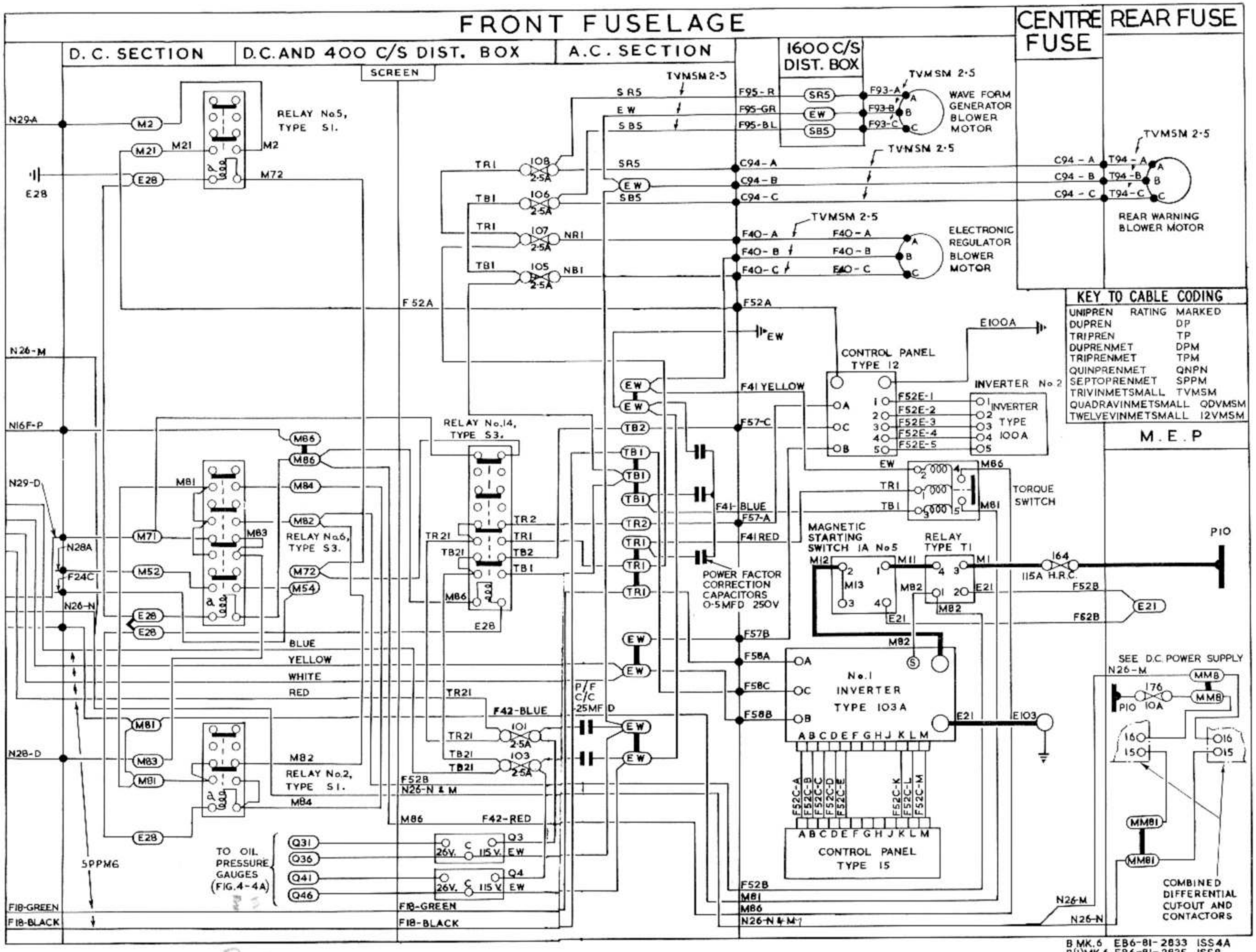


Fig. 4A. Instrument power supplies

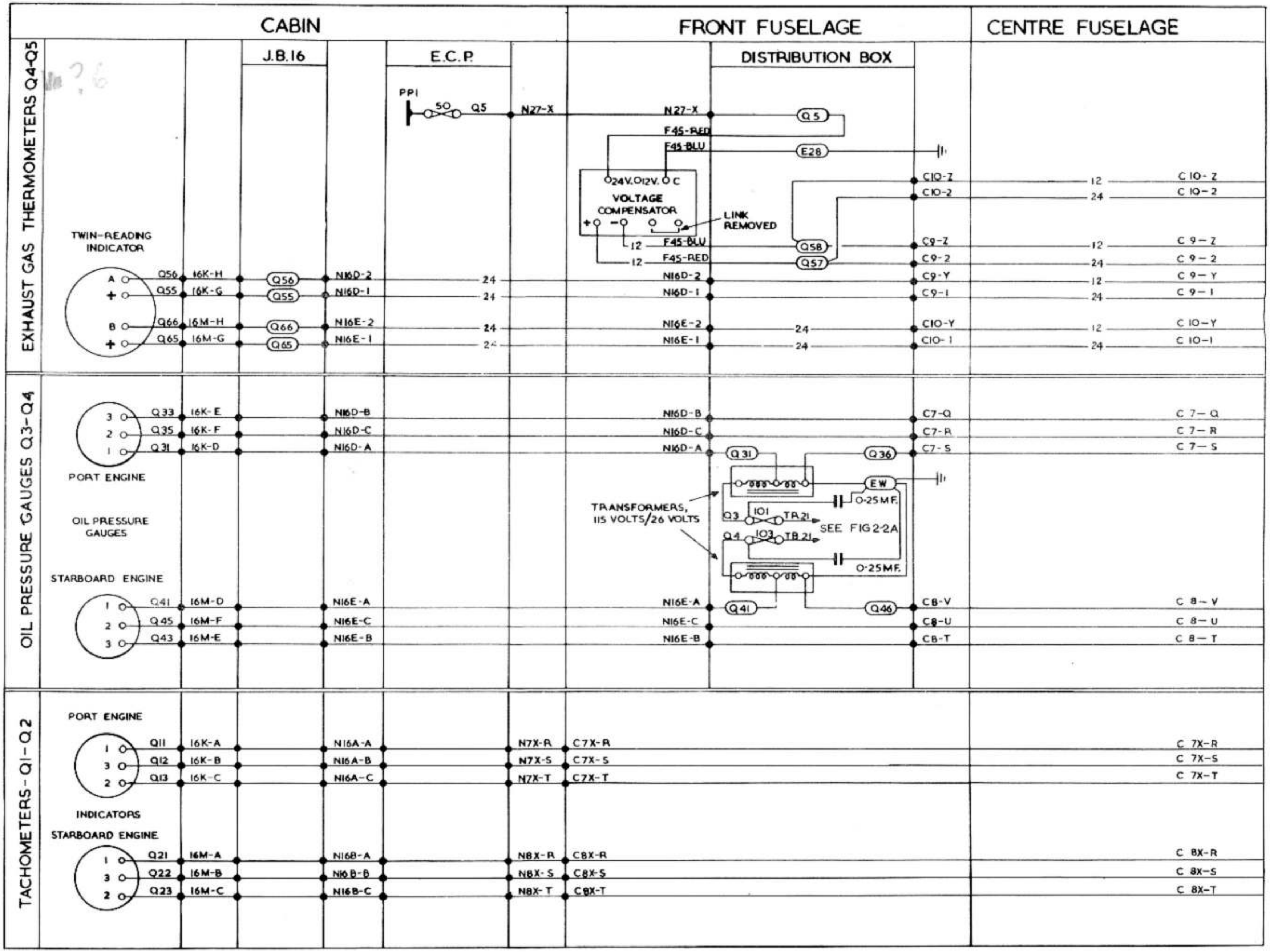


Fig. 5. Oil pressure gauges – Tachometers – Exhaust gas thermometers

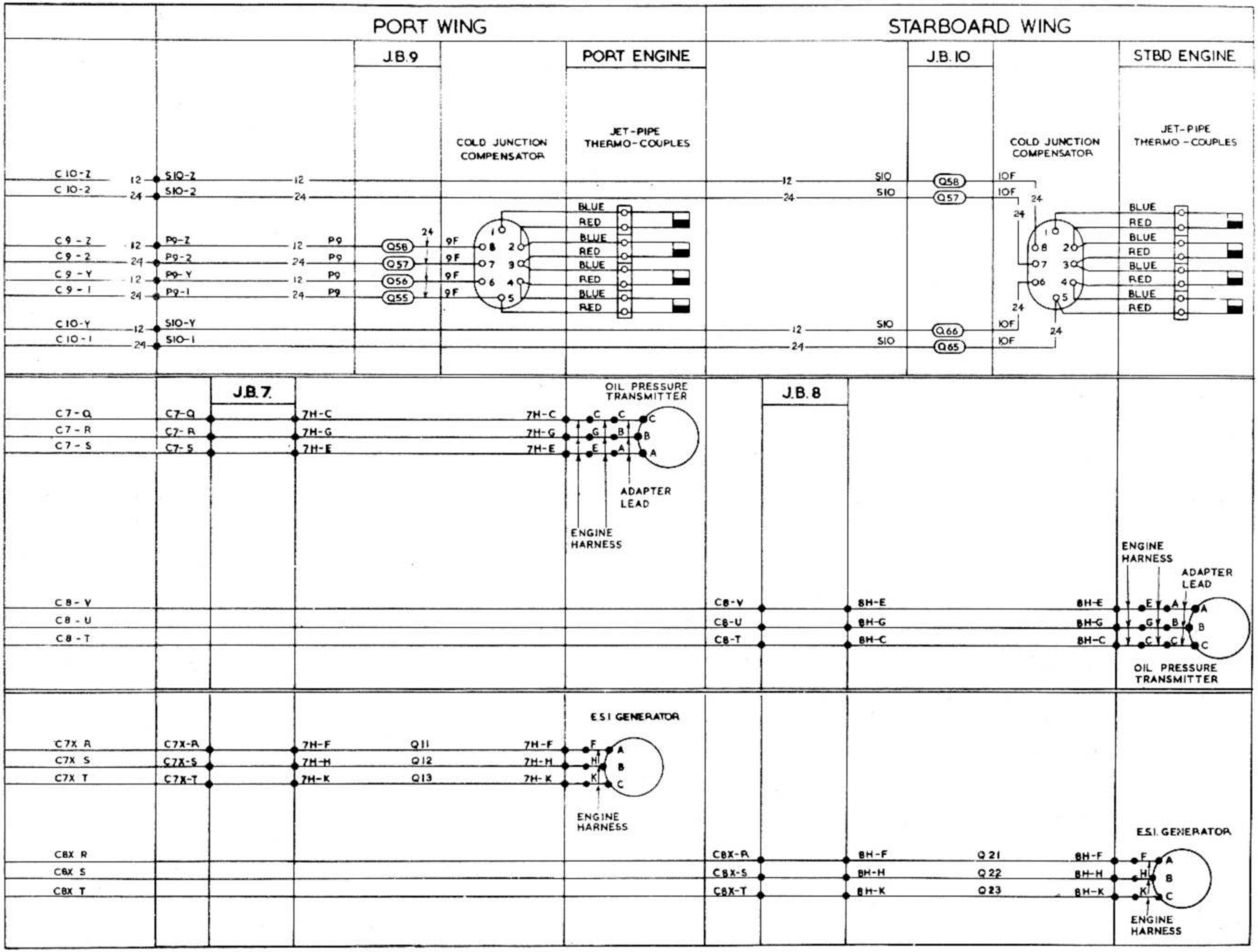


Fig. 5A. Oil pressure gauges – Tachometers – Exhaust gas thermometers

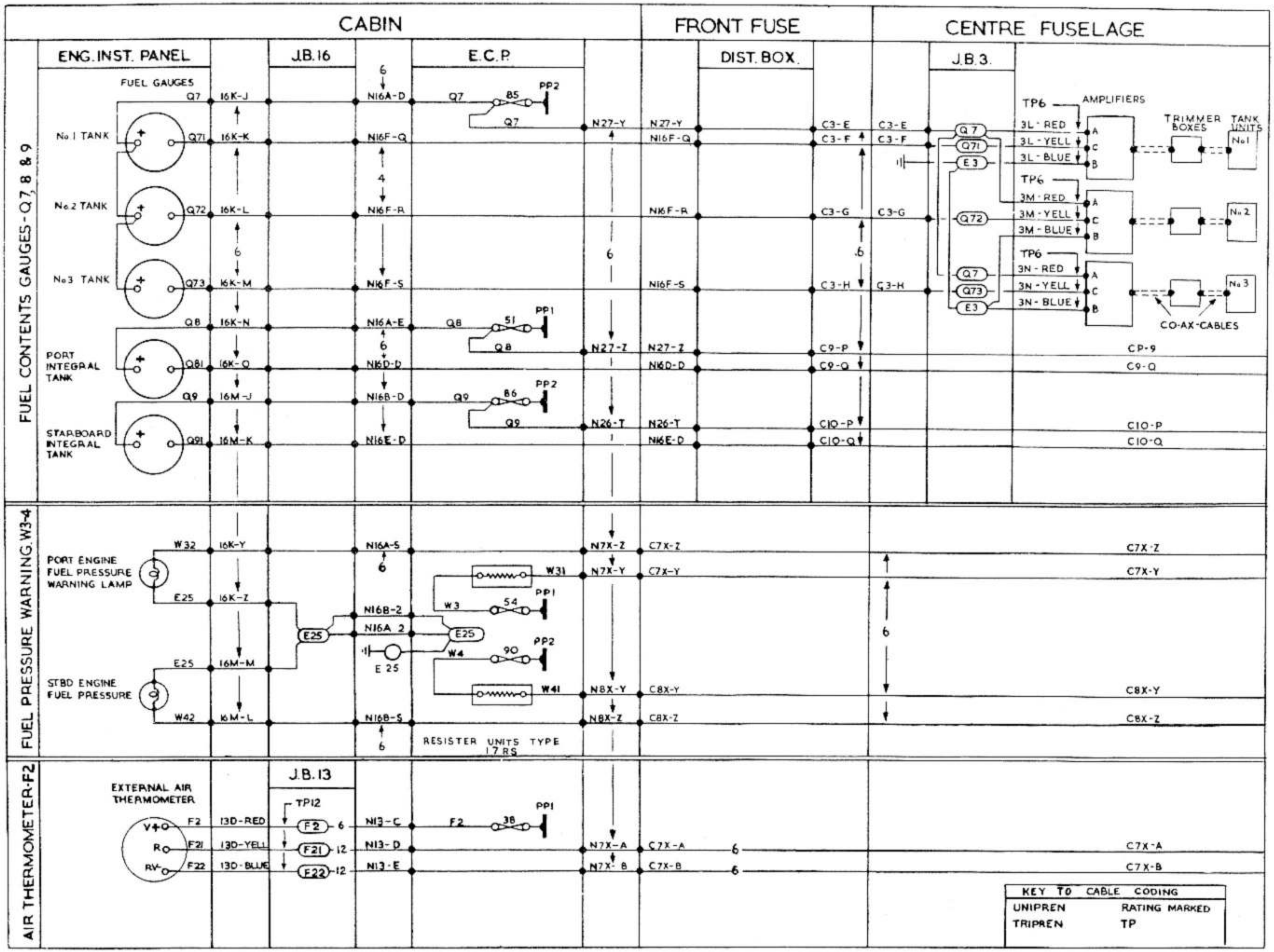


Fig. 6. Fuel pressure warning – fuel contents gauges – External air thermometers

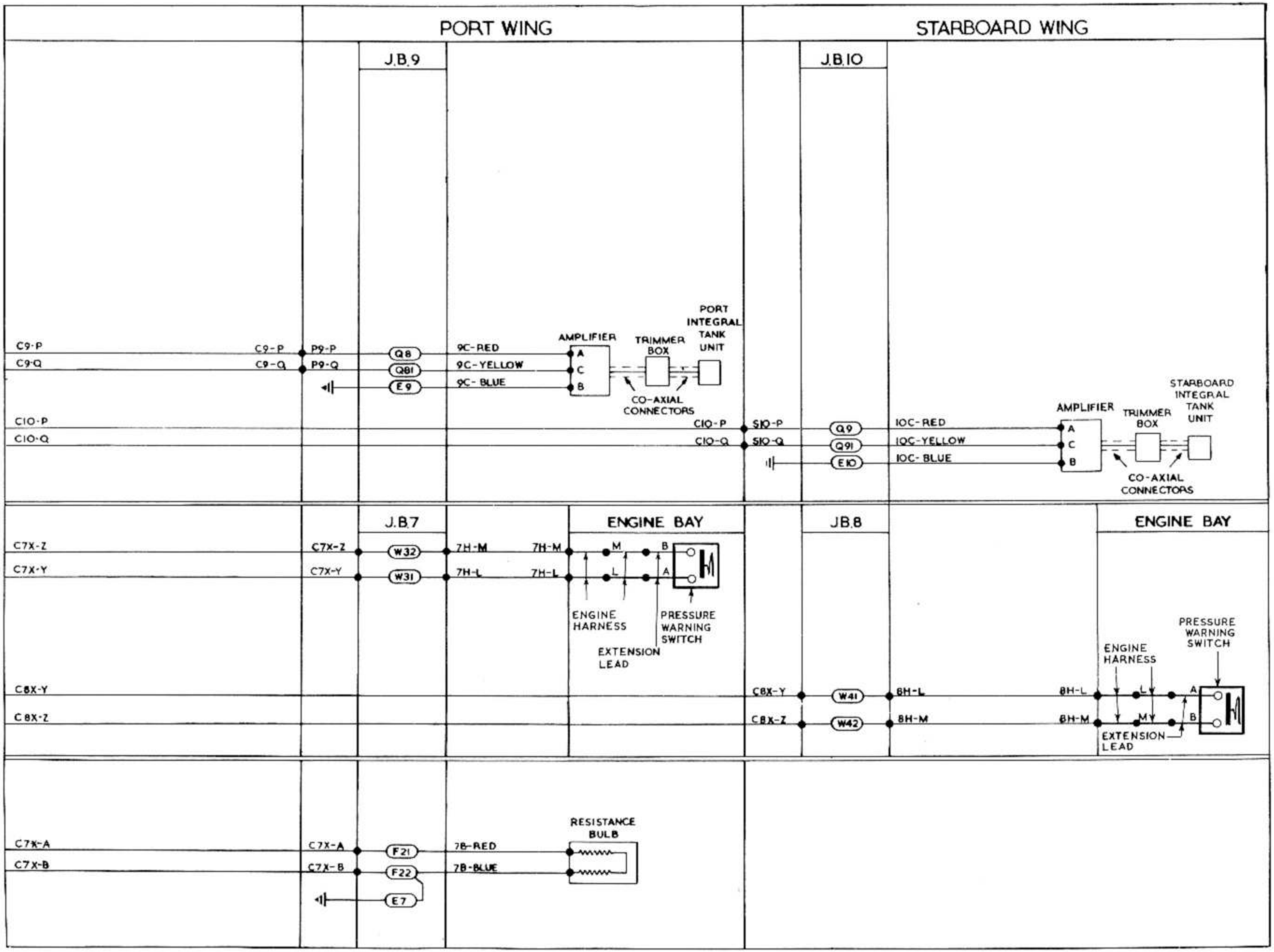


Fig. 6A. Fuel pressure warning – fuel contents gauges – External air thermometers

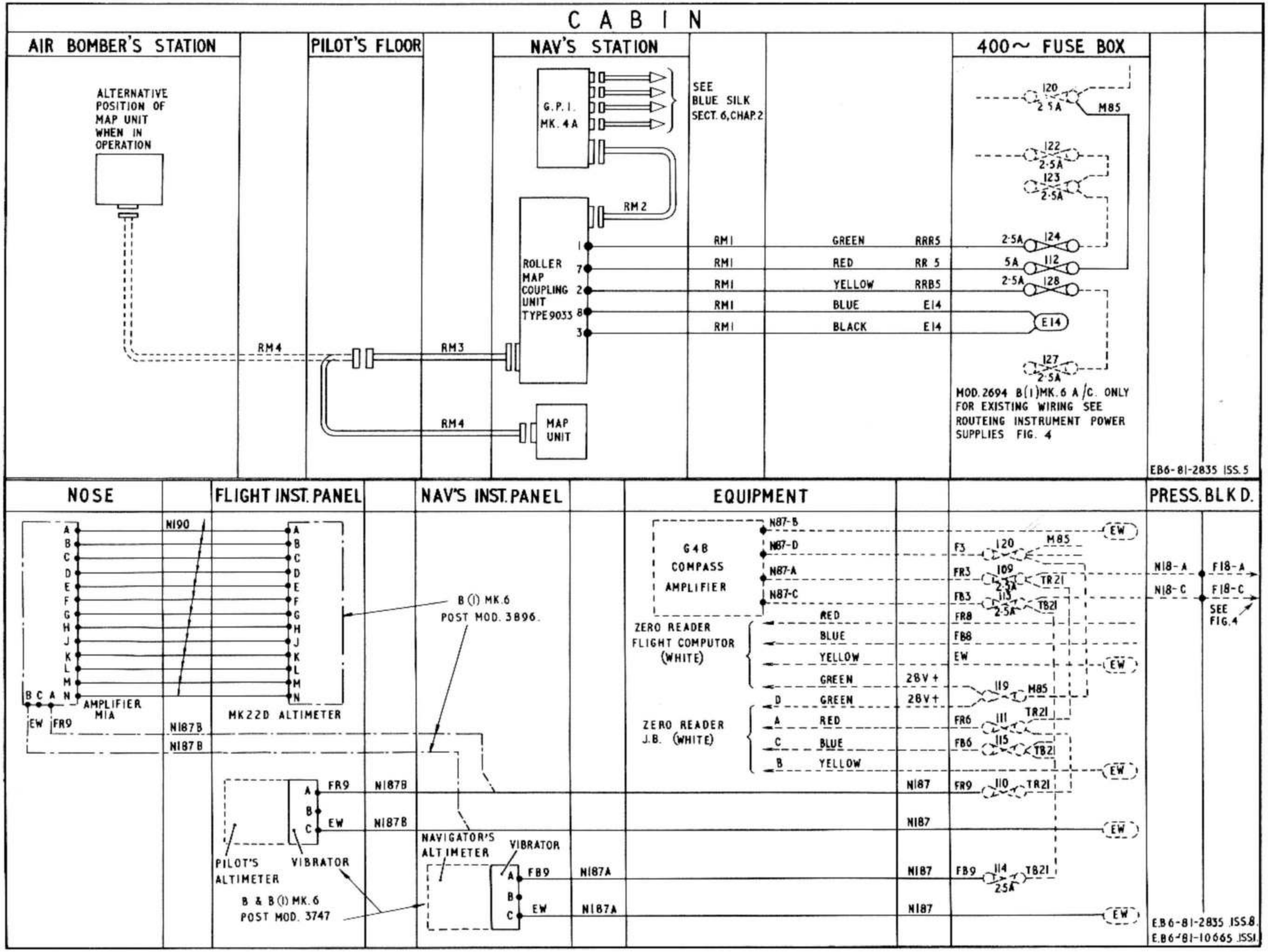


Fig. 7. Decca roller map power supplies (B (I) Mk.6 aircraft – altimeter vibrator and Mk.22 altimeter A.C. supplies

INSTRUMENT POWER SUPPLIES - GROUP D

APPENDIX 1

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LIST OF ILLUSTRATIONS

115-volts, 400 c/s, 3-phase a.c. supplies *(pre Mod.1420)*

General

1. On aircraft pre Mod.1420 the 400 c/s, 3-phase a.c. supplies are obtained from two inverters, one a Type 100B and the other a Type R.C.8A, numbered 2 and 3 respectively, both located in the starboard equipment compartment. The flight instruments and oil pressure gauges normally operate from No.2 inverter while the T2 bombsight system and the blower motors that cool certain radar units are supplied from No.3 inverter, the latter also acting as a standby supply for the flight instruments and oil pressure gauges should No.2 inverter fail.

2. The No.2 and 3 inverters are initially controlled by the starboard and port engine MASTER STARTING switches respectively and are always running when these switches are ON. The input to the inverters is protected by circuit breakers mounted on the E.C.P. In the event of No.2 inverter becoming unserviceable, the flight instruments and oil pressure gauges are automatically transferred to No.3 inverter circuits. Indication of failure of No.2 inverter is given by a magnetic indicator on the main instrument panel showing white by day and fluorescent by night.

Operation

3. Reference to the circuit diagram *(fig.1)* will show that when the port engine MASTER STARTING switch is ON a supply is passed from M8-M81 to, (a) the turn and slip indicator *(para.7)*; (b) energize No.4 relay which through normally-open contacts completes circuit M3-M31 and M32, via one leg of a Type 02 suppressor, to start up No.3 inverter; (c) circuits M82 and M83-M85, via normally-closed contacts of No.6 relay which, respectively energizes the magnetic indicator to indicate No.3 inverter is running and feeds a supply to the G.M.4B compass amplifier.

4. When the starboard engine MASTER SWITCH is selected ON a supply is passed from M7-M71 and, via normally-closed contacts of No.2 relay, M72 to energize No.5 relay which completes the power input circuit M2-M21 to start up No.2 inverter. The output of the inverter, upon reaching

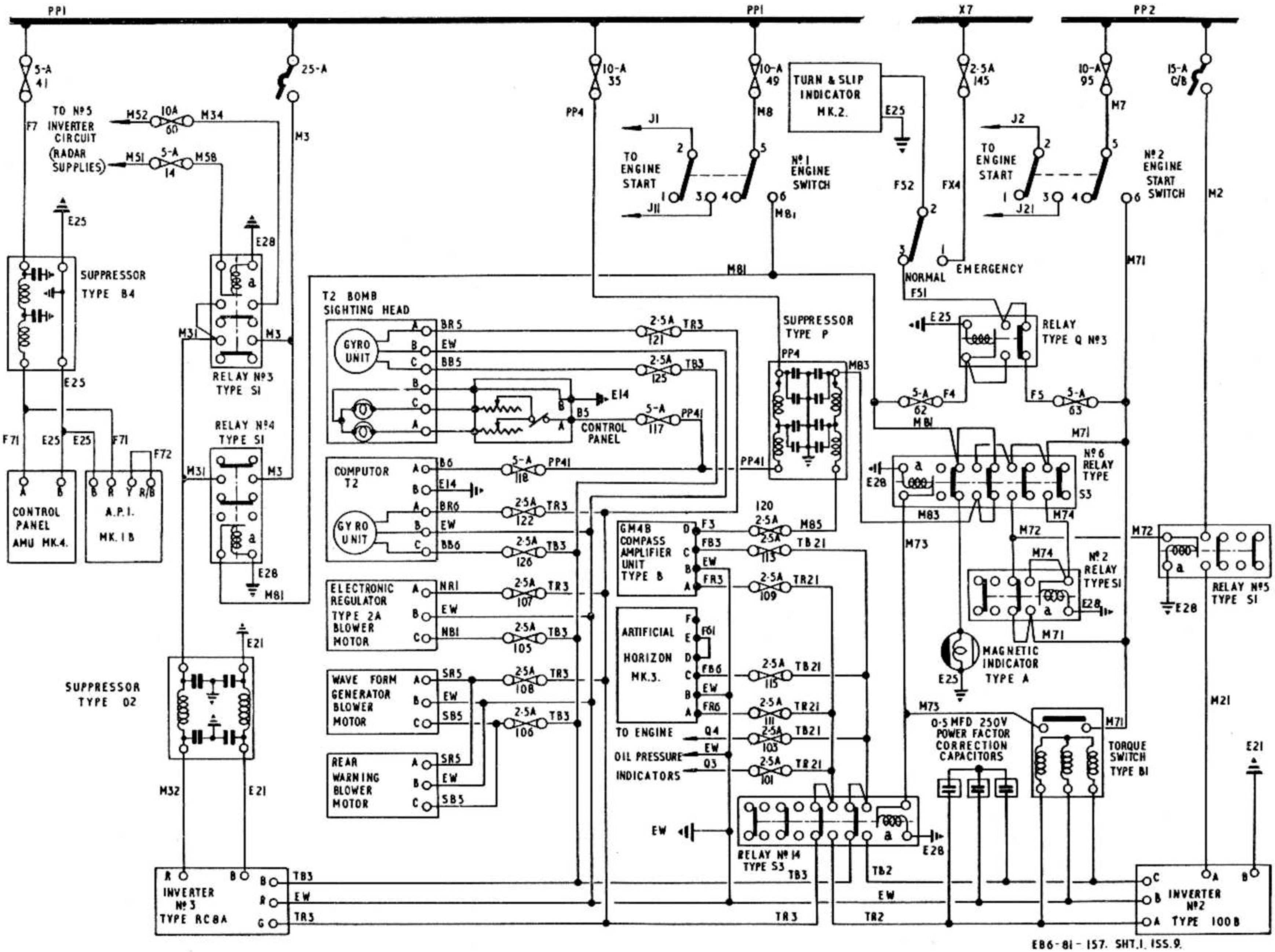

Fig. 1. Instrument Power supplies (pre Mod.1420)

approximately 98 volts, energizes a torque switch in the upper equipment compartment to complete circuit M71-M73 which energizes No.2, 6 and 14 relays, the latter via normally open contacts of No.6 relay and M74. This action results in the following:–

(1) The changeover, via No.14 relay, of the a.c. supplies to the flight instruments and oil pressure gauges from No.3 inverter to No.2 inverter.

(2) The de-energizing of the magnetic indicator to indicate that No.2 inverter is running and supplying the flight instruments and oil pressure gauges.

(3) The changeover of the d.c. supply to the flight instruments from circuit M81-M83-M85 to M71-M83-M85.

No.2 inverter failure

5. Should No.2 inverter fail, the torque switch will open and the No.6 and 14 relays will become de-energized. This will result in the system reverting back to the supplies from No.3 inverter *(para.3)*. In this event, however, No.2 relay will remain energized by a self-energizing supply M71 fed through its own contacts. This prevents the continued running of No.2 inverter, which may present a fire risk due to the possible burn-out. The No.2 relay will automatically become de-energized when the starboard engine MASTER STARTING switch is switched OFF.

No.3 and No.5 inverter interlock

6. To ensure that an a.c. supply is available to the blower motors of the radar systems when No.5 inverter is running on the ground, No.3 inverter is automatically started, irrespective of the position of the port engine MASTER STARTING switch, by No.3 relay being energized through circuit M51 which is fed from the Type D circuit breaker when this closes to start up No.5 inverter.

Turn and slip indicator *(pre Mod.1420)*

7. In principle the operation of the turn and slip indicator on aircraft pre Mod. 1420 is the same as that described in the main Group. Differences do occur, however, in the supply circuits which include the engine MASTER STARTING control switches *(see fig.1)*.

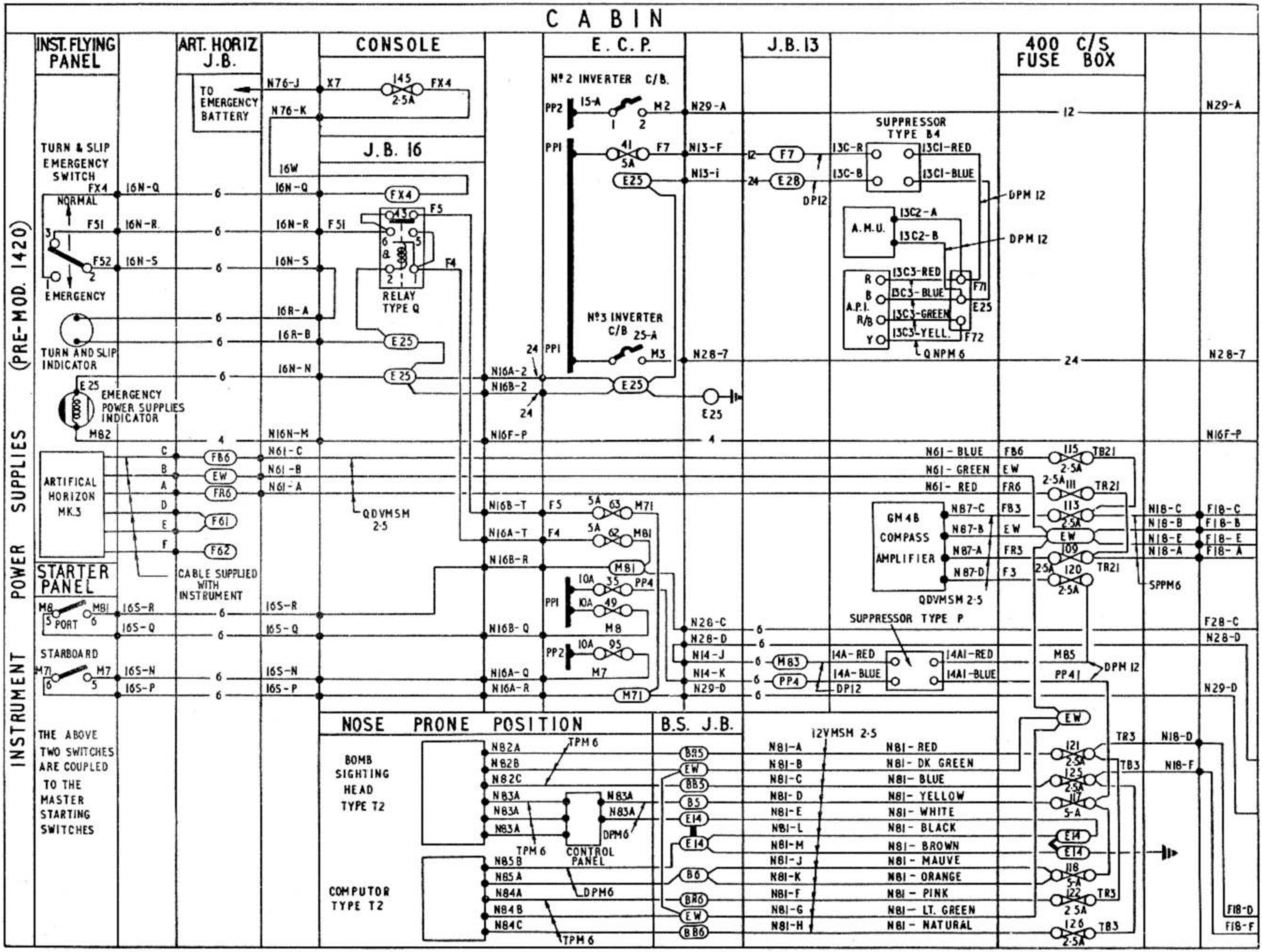

Fig. 2. Instrument Power supplies (pre Mod. 1420)

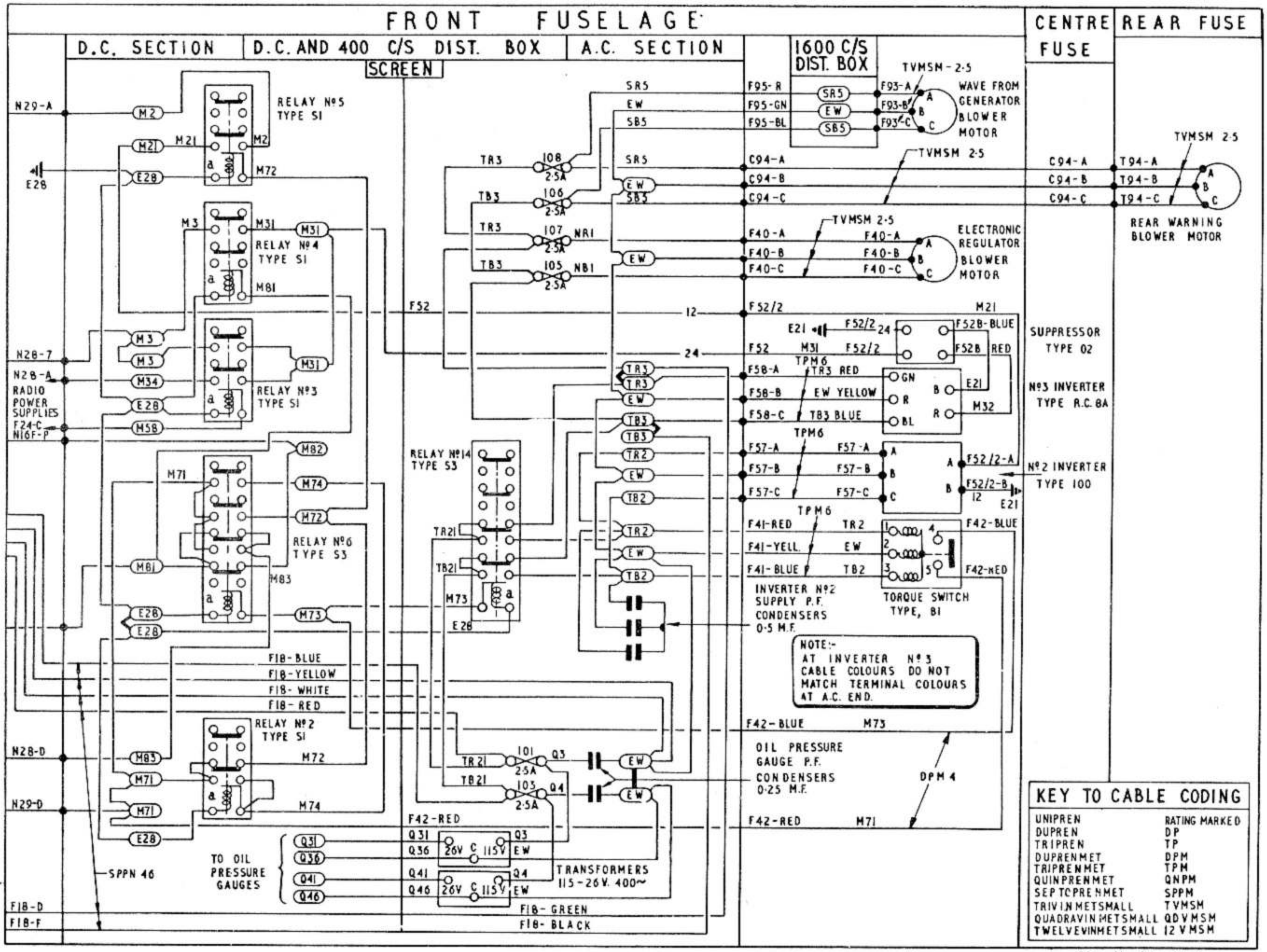

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Fig. 2A. Instrument Power supplies (pre Mod. 1420)

ALIGHTING GEAR - GROUP G

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LIST OF ILLUSTRATIONS

DESCRIPTION

General

1. The alighting gear is hydraulically-operated and electrically-controlled. A Type C2824Y alighting gear selector switch unit controls a Type 204 rotary actuator and hydraulic valve installed in the roof of the bomb bay. A master safety switch *(Mod. 2364)* is incorporated in the control circuit to prevent inadyertent retraction on the ground.

Selector switch unit

2. The selector switch unit *(A.P.4343C, Vol.1, Sect.1, Chap.26)* is fitted on a sloping panel forward of the throttle levers. The UP and DOWN selector buttons are spring-loaded, pressure on one releasing the other. To prevent accidental operation of the UP button on the ground, a solenoid in the unit prevents the buttons being operated while the main wheel legs are compressed. When the legs extend on the aircraft becoming airborne or being jacked up, a microswitch fitted on the starboard leg torque link closes and completes the circuit to the solenoid locking coil. This releases a mechanical lock to allow UP to be selected.

Emergency UP selection

3. The UP mechanical lock can be overridden in an emergency, or if required during servicing, by operating the knobbed ring which encircles the UP button. Turning the ring until the knobs are above and below the button allows UP to be selected in the normal manner. If the UP button is operated in this way it will be necessary to reset it, using a Dowty resetting tool *(Part No. ST1567)*. Inserting the tool in the small hole at the centre of the button and depressing the internal spring allows the lock ring to be returned to its normal position with its knobs at either side of the button.

Master safety switch *(Mod.2364)*

4. The master safety switch fitted adjacent to the selector switch unit prevents inadvertent retraction of the alighting gear by operation of the UP button while its mechanical lock is overridden. The switch is connected in series with the power supply and the control circuit, and has two positions : LIVE and SAFE. On the ground the switch must be at SAFE at all times except when retraction tests are being made with

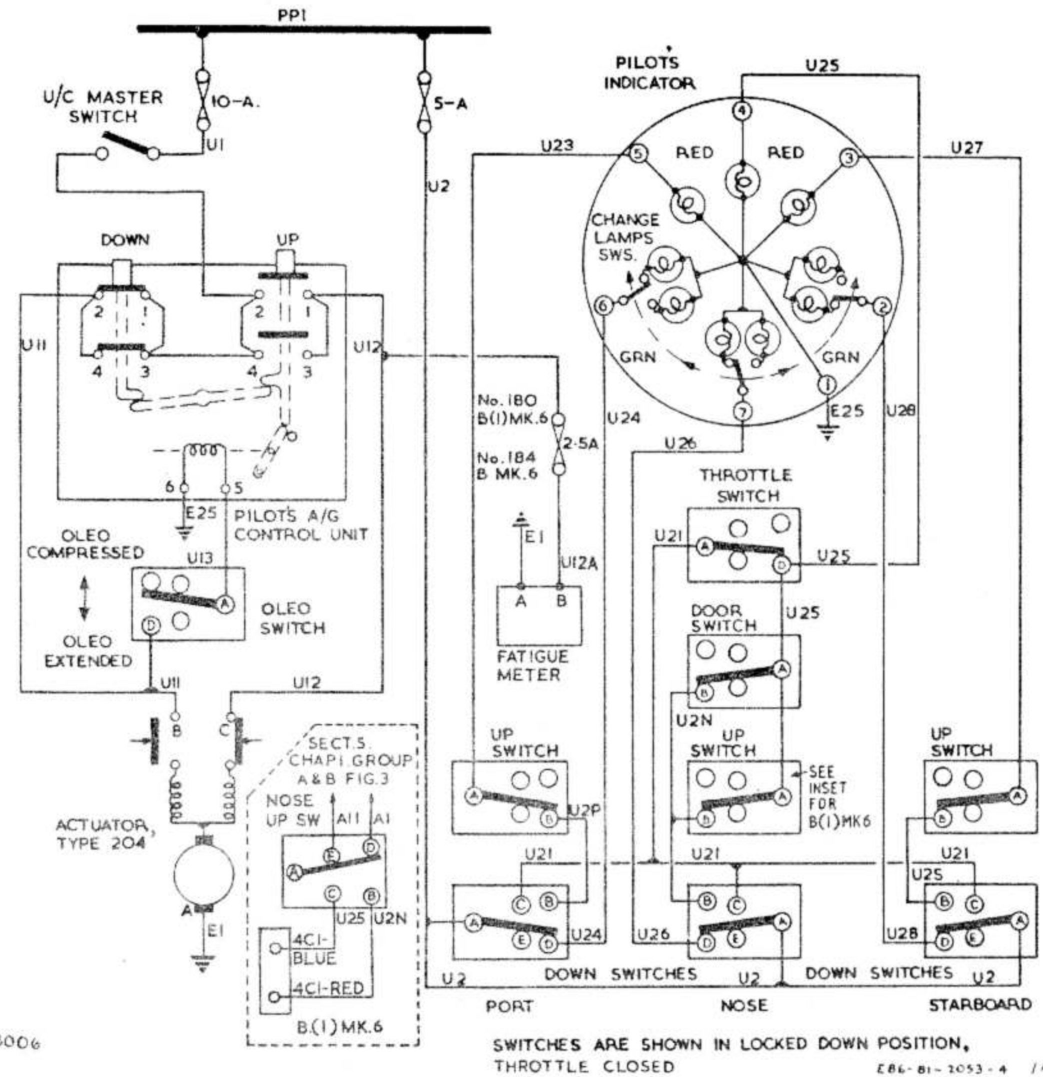


Fig. 1. Alighting gear control and indicator – theoretical

(Minor alterations only)

the aircraft jacked up.

Position indicator and microswitches

5. A Type D or D1 alighting gear indicator *(A.P.4343E, Vol.1, Sect.18, Chap.4 or Chap.20)* is mounted alongside the selector switch unit and operated by microswitches installed in the nose and main wheel bays. A microswitch fitted forward of the nose wheel leg is actuated by the nose wheel door and connected in parallel with the nose wheel UP switch. Door-operated microswitches are not installed in the main wheel bays but in some aircraft it may be found that a spare cable for use with a door switch is fitted and taped up in each bay. These cables are referenced 7A4 *(port)* and 8A6 *(starboard)*. Another microswitch, fitted in the throttle box, brings on the nose wheel red light if the throttle levers of either or both engines are set below a safe minimum with the alighting gear retracted. Cams on the throttle lever shafts are arranged to close the microswitch contacts when the levers are less than one third open. Microswitch actuation is adjusted by varying the switch position in relation to the cam by utilising the elongated holes in the attachment bracket. Adjustment and location details for all the microswitches in the position indicator circuit are given in fig.2, 3 and 3A.

6. When a fatigue meter *(Mod.2329)* is introduced *(Sect.5, Chap.2, Group D)*, the DOWN switches are used to control the power supply to the instrument to ensure that it will only operate in flight. On aircraft pre Mod.3883 the supply is fed from U21 which is connected to the positive supply U2 when the DOWN switch contacts A and C are closed. With Mod.3883 embodied the alighting gear UP circuit U12 is used for operating the fatigue meter via fuse 180 (B(I) Mk.6 aircraft) or fuse 184 (B Mk.6 aircraft) on the M.E.P., and U12A.

7. On B(I) Mk.6 aircraft the nose wheel up microswitch is also used as a safety switch in the armament circuits to prevent firing of the guns and the release of any wing stores on the ground. The firing circuits A11 take a positive supply from A1 only when the switch contacts D and E are connected by closing of the nose wheel doors.

SERVICING

Circuit checks

Indicator circuit

8. The alighting gear indicator circuits are not switched but fed direct from bus-bar PP1 which is controlled by the BATTERY ISOLATION switch. The functioning of the circuits may be checked as follows:–

(1) Set the throttle levers fully open.

(2) Switch on the BATTERY ISOLATION switch, and check that all three green DOWN lights are on.

(3) Break each DOWN switch in turn; the respective green light should go out and the red light come on.

(4) At each main wheel in turn, break the UP switch while keeping the DOWN switch broken; the red light should go out each time.

(5) With the nose wheel DOWN switch broken and the red light on, break both the UP switch and the door switch; the red light should go out.

(6) With both the UP and DOWN switches broken in either main wheel circuit and no lights on, move the throttle levers, in turn, to less than one third open; the nose wheel red light should come on each time.

Control circuit check

9. Due to the safety precautions necessary when the aircraft is on the ground *(para.2)* an electrical functioning check on this circuit can only take place with the weight of the aircraft removed from its main wheels. this allows the safety lock micro switch to operate and energize the locking coil in the selector switch unit and release the mechanical lock.

Actuator

10. Servicing of the actuator will normally be confined to checking the length of the brushes and removing carbon dust, two operations which require the removal of the motor end cover. Further information on servicing the actuator will be found in A.P. 4343D, Vol.1, Sect.16.

REMOVAL AND ASSEMBLY

Actuator

Removal

11. To remove the actuator:–

(1) Disconnect the electrical plug and socket at the motor.

(2) Unscrew the bolts attaching the actuator to the selector valve, and separate the two units.

(3) Remove the actuator.

Assembly

12. To assemble the actuator:–

(1) Ensure that the actuator and the selector valve are both at the same selection setting.

(2) Fit the actuator to the selector valve, and secure the attachment bolts.

(3) Reconnect the electrical plug and socket at the motor.

(4) Carry out a retraction test *(Sect.3, Chap.6)*.

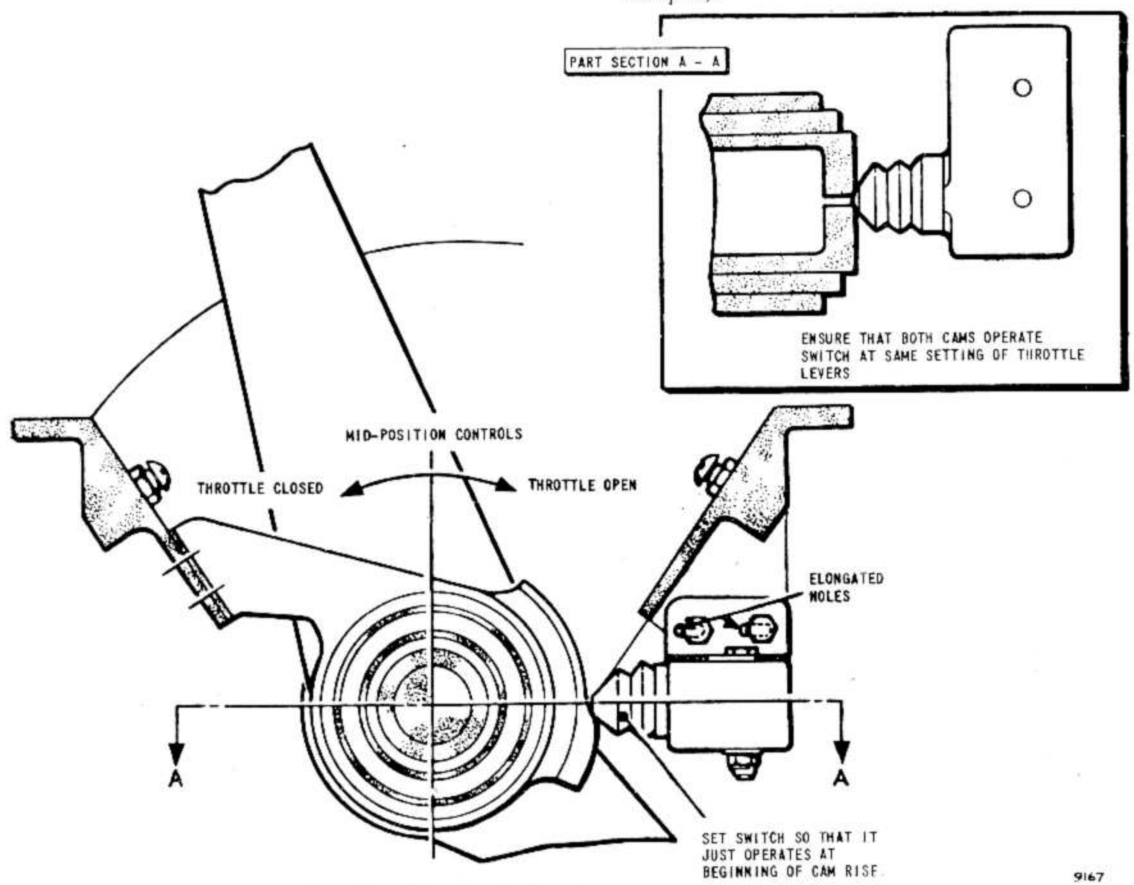
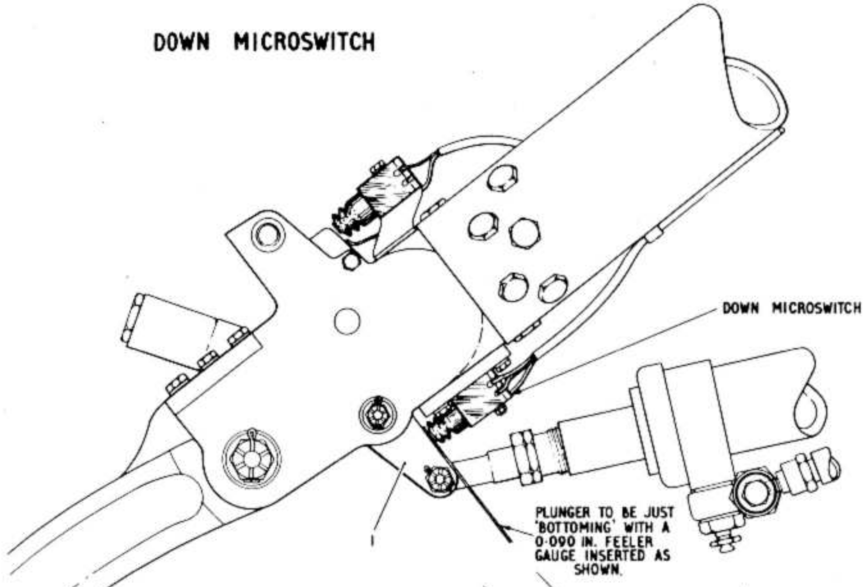
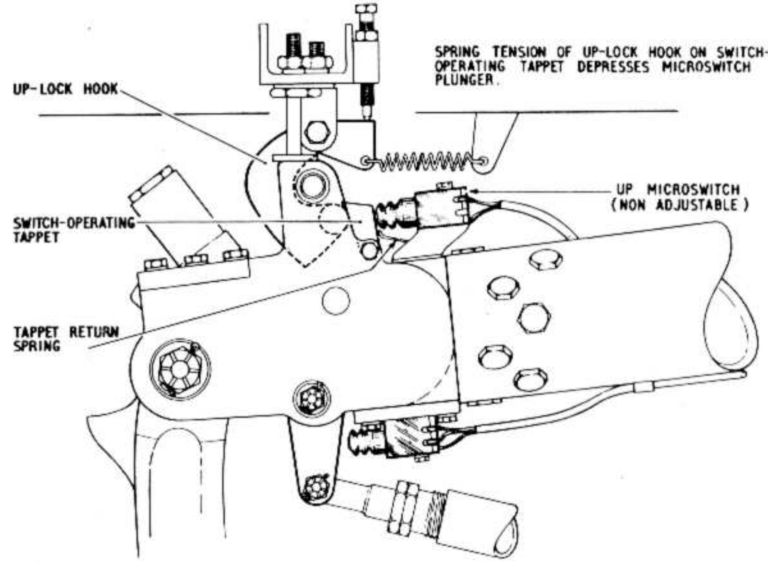


Fig.2. Microswitch adjustment – throttle box

◄ ANNOTATIONS CORRECTED ►

DOWN MICROSWITCH





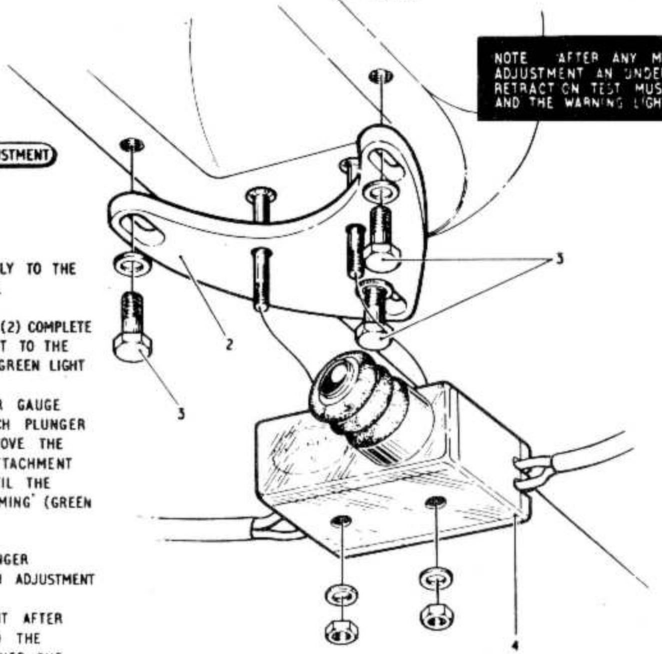
NO PROVISION IS MADE FOR ADJUSTING THE UP MICROSWITCH. IF SATISFACTORY OPERATION IS NOT OBTAINED WHEN THE UP-LOCK HOOK IS CORRECTLY ADJUSTED (PARAGRAPH 22), THE SWITCH MUST BE REPLACED WITH ONE OF KNOWN SERVICEABILITY.

UP MICROSWITCH

NOTE: AFTER ANY MICROSWITCH ADJUSTMENT AN UNDERCARRIAGE RETRACTION TEST MUST BE MADE AND THE WARNING LIGHTS CHECKED

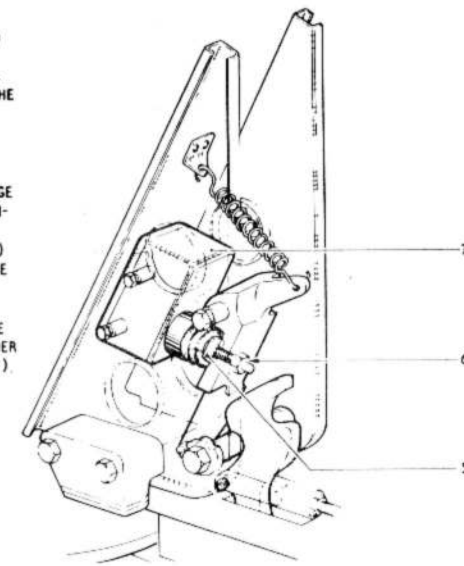
DOWN MICROSWITCH ADJUSTMENT

1 CONNECT A 24 VOLT SUPPLY TO THE EXTERNAL SUPPLY SOCKET.
2 SLACKEN THE BOLTS (3)
3 MOVE ATTACHMENT PLATE (2) COMPLETE WITH MICROSWITCH (4) AFT TO THE LIMIT OF ITS TRAVEL. (GREEN LIGHT OFF)
4 INSERT A 0·090 IN. FEELER GAUGE BETWEEN THE MICROSWITCH PLUNGER AND LOCK LEVER (1): MOVE THE MICROSWITCH (4) AND ATTACHMENT PLATE (2) FORWARD UNTIL THE PLUNGER IS JUST 'BOTTOMING' (GREEN LIGHT ON).
5 TIGHTEN THE BOLTS (3)
6 ENSURE THAT SOME PLUNGER MOVEMENT REMAINS WHEN ADJUSTMENT IS FINALISED.
7 RE-CHECK THE ADJUSTMENT AFTER HAVING FINALLY REFITTED THE MICROSWITCH AND TIGHTENED THE SECURING BOLTS



DOOR MICROSWITCH ADJUSTMENT

1 JACK THE NOSE (SECT. 2, CHAP. 4).
2 CONNECT A 24 VOLT SUPPLY TO THE EXTERNAL SUPPLY SOCKET.
3 DISCONNECT THE PORT DOOR ACTUATING ROD.
4 RAISE THE NOSE WHEEL (SECT. 3, CHAP. 6). TAKE CARE THAT DAMAGE IS NOT CAUSED BY THE DISCONNECTED ACTUATING ROD.
5 SLACKEN THE TAPPET LOCKNUT (6)
6 SCREW TAPPET (5) AWAY FROM THE MICROSWITCH (7) (RED LIGHT ON).
7 SCREW TAPPET (5) TOWARDS THE MICROSWITCH (7) UNTIL A DEFINITE CLICK IS HEARD AND GIVE ANOTHER COMPLETE TURN. (RED LIGHT OFF).
8 TIGHTEN THE LOCKNUT (6) AND ENSURE THAT SOME PLUNGER MOVEMENT STILL REMAINS.
9 RECONNECT THE PORT DOOR ACTUATING ROD.

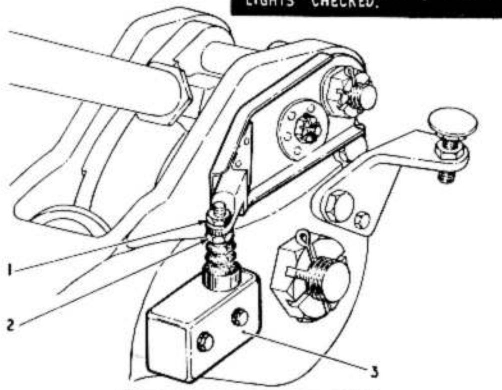


DOOR MICROSWITCH

Fig. 3. Microswitch adjustment – nose wheel

DOWN MICROSWITCH

NOTE... AFTER ANY ADJUSTMENT OF THE UP OR DOWN MICROSWITCHES AN UNDERCARRIAGE RETRACTION TEST MUST BE MADE AND THE WARNING LIGHTS CHECKED.

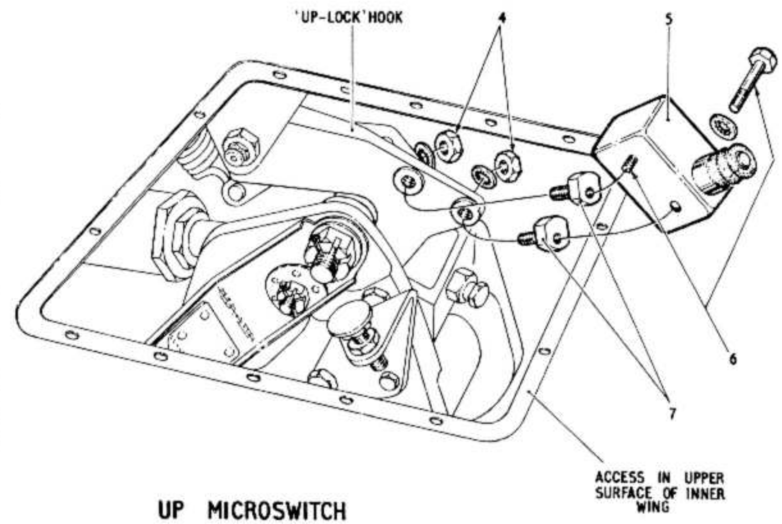


DOWN MICROSWITCH ADJUSTMENT

1 CONNECT A 24 VOLT POWER SUPPLY TO THE EXTERNAL SUPPLY SOCKET.
2 SLACKEN LOCKNUT (1)
3 SCREW STRIKER BOLT (2) AWAY FROM MICRO-SWITCH (3) (GREEN LIGHT OFF).
4 SCREW STRIKER BOLT (2) TOWARDS MICROSWITCH (3) UNTIL A DEFINITE CLICK IS HEARD (GREEN LIGHT ON) AND GIVE ANOTHER COMPLETE TURN.
5 TIGHTEN LOCKNUT (1) AND ENSURE THAT SOME PLUNGER MOVEMENT REMAINS.

UP MICROSWITCH ADJUSTMENT

1 JACK AND TRESTLE THE AIRCRAFT WITH THE WHEELS CLEAR OF THE GROUND (SECT.2, CHAP.4).
2 CONNECT A 24 VOLT POWER SUPPLY TO THE EXTERNAL SUPPLY SOCKET.
3 REMOVE THE APPROPRIATE ACCESS PANEL FROM THE UPPER SURFACE OF THE MAINPLANE INNER WING (SECT.2, CHAP.4).
4 RAISE THE ALIGHTING GEAR (SECT.3, CHAP.6).
5 SLACKEN THE NUTS (4) AND MICROSWITCH ATTACHMENT BOLTS (6)
6 TURN THE HEADS OF THE ECCENTRIC BOLTS (7) TOGETHER IN AN ANTI-CLOCKWISE DIRECTION (RED LIGHT WILL COME ON).
7 TURN THE HEADS OF THE ECCENTRIC BOLTS IN THE OPPOSITE DIRECTION UNTIL A DEFINITE CLICK IS HEARD (RED LIGHT OFF).
8 DO NOT ALLOW THE MICROSWITCH TO MOVE AND TIGHTEN ITS ATTACHMENT BOLTS (6) AND NUTS (4)
9 ENSURE THAT SOME PLUNGER MOVEMENT STILL REMAINS.



UP MICROSWITCH

STARBOARD OLEO LEG MICROSWITCH ADJUSTMENT

1 JACK AND TRESTLE THE AIRCRAFT WITH THE WHEELS CLEAR OF THE GROUND (SECT.2, CHAP.4)
2 INSERT A 0·090 IN. FEELER GAUGE BETWEEN THE MICROSWITCH PLUNGER AND THE OLEO STRIKER PIN. THE PLUNGER SHOULD JUST BE 'BOTTOMING'.
3 IF THE ADJUSTMENT (OP.2) IS INCORRECT PROCEED AS FOLLOWS:
   (a) REMOVE THE MICROSWITCH ATTACHMENT NUTS (8) AND WASHERS, AND WITHDRAW THE MICROSWITCH TOGETHER WITH LAMINATED PACKING PLATE (9)
   (b) BY PEELING A NEW LAMINATED PACKING PLATE (PT. No. EA1-40-335) ADJUST THE MICROSWITCH TO OBTAIN THE CONDITION DESCRIBED IN OP.2.
4 RE-CHECK THE ADJUSTMENT AFTER HAVING FINALLY RE-FITTED THE MICROSWITCH AND TIGHTENED THE SECURING NUTS.

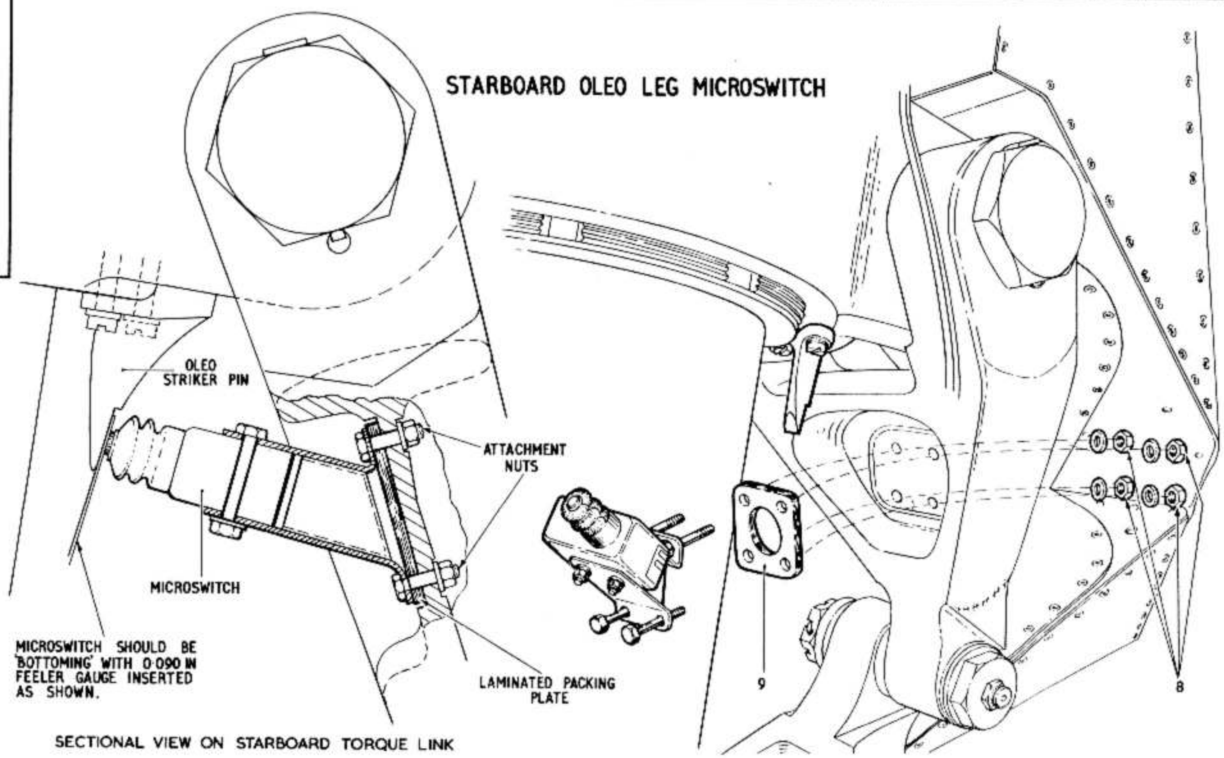
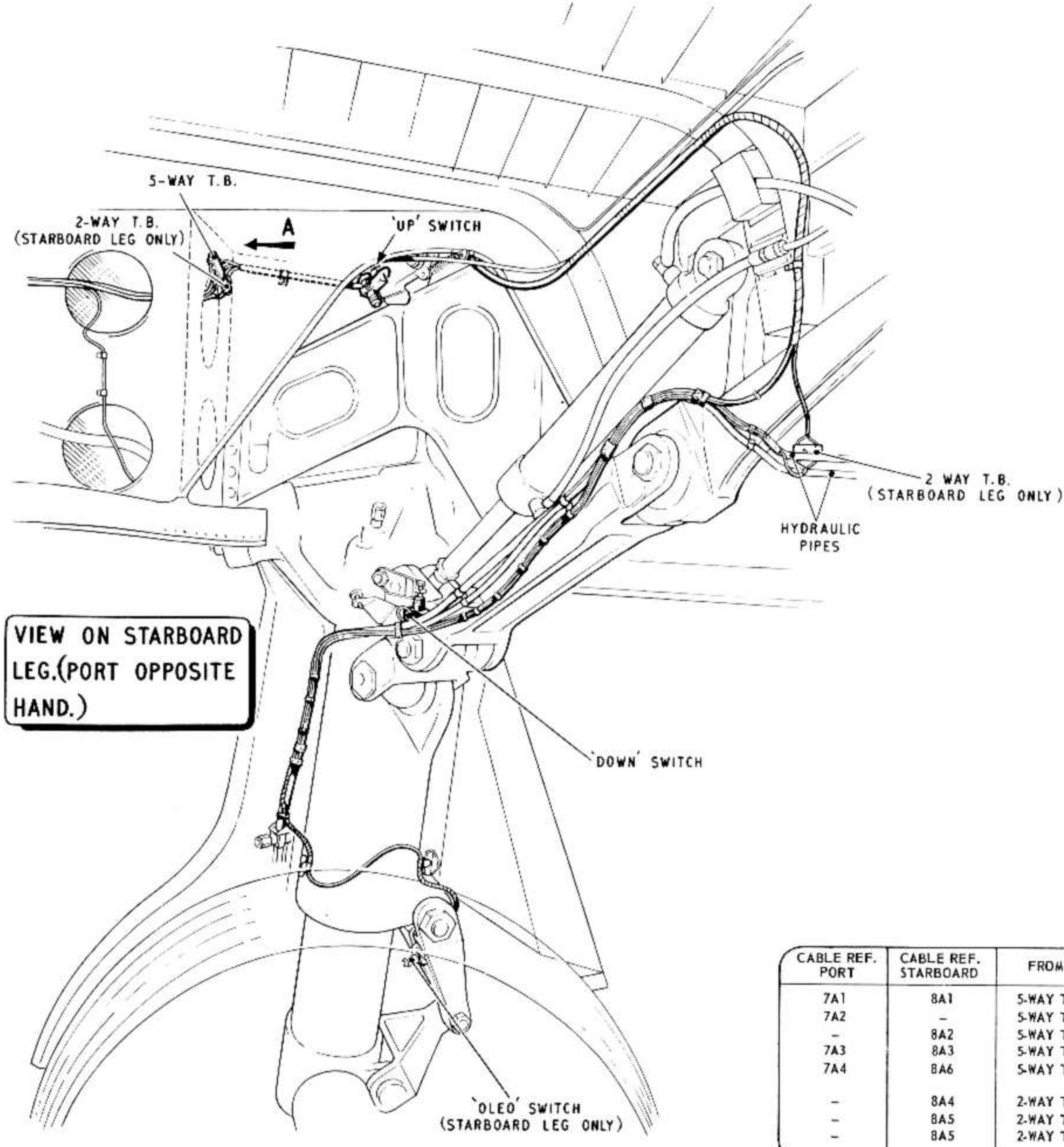
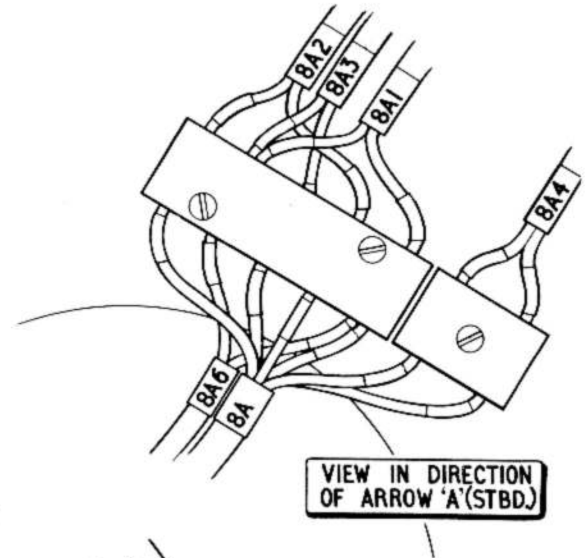
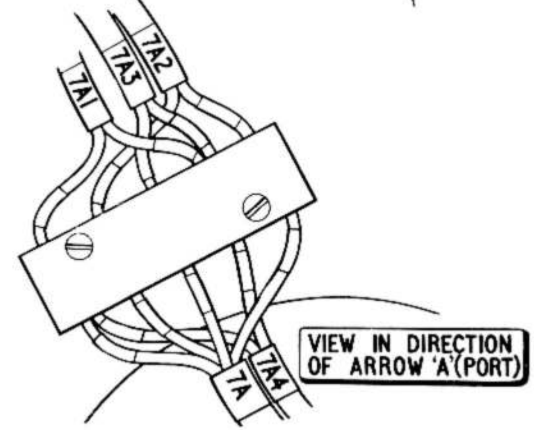


Fig.3A. Microswitch adjustment – main wheels







CABLE REF. PORT	CABLE REF. STARBOARD	FROM	TO	RATING	LENGTH
7A1	8A1	5-WAY T.B.	'UP' SWITCH	DUPRENSHEATH 6 (CIRCULAR)	2' 9"
7A2	–	5-WAY T.B.	'DOWN' SWITCH	DUPRENSHEATH 6 (CIRCULAR)	10' 3"
–	8A2	5-WAY T.B.	'DOWN' SWITCH	DUPRENSHEATH 6 (CIRCULAR)	10' 0"
7A3	8A3	5-WAY T.B.	'DOWN' SWITCH	DUPRENSHEATH 6 (CIRCULAR)	9' 9"
7A4	8A6	5-WAY T.B.	DOOR SWITCH (IF FITTED)	DUPREN 6	6' 9"
–	8A4	2-WAY T.B.	2-WAY T.B.	DUPREN 6	7' 0"
–	8A5	2-WAY T.B.	'OLEO' SWITCH	DUPREN 6 (PRE MOD.1497)	8' 6"
–	8A5	2-WAY T.B.	'OLEO' SWITCH	DUPRENSHEATH 6 (CIRCULAR) (POST MOD.1497)	8' 6"

Fig. 4. Main wheels – wiring installation

◀ *(Wiring details corrected)* ▶

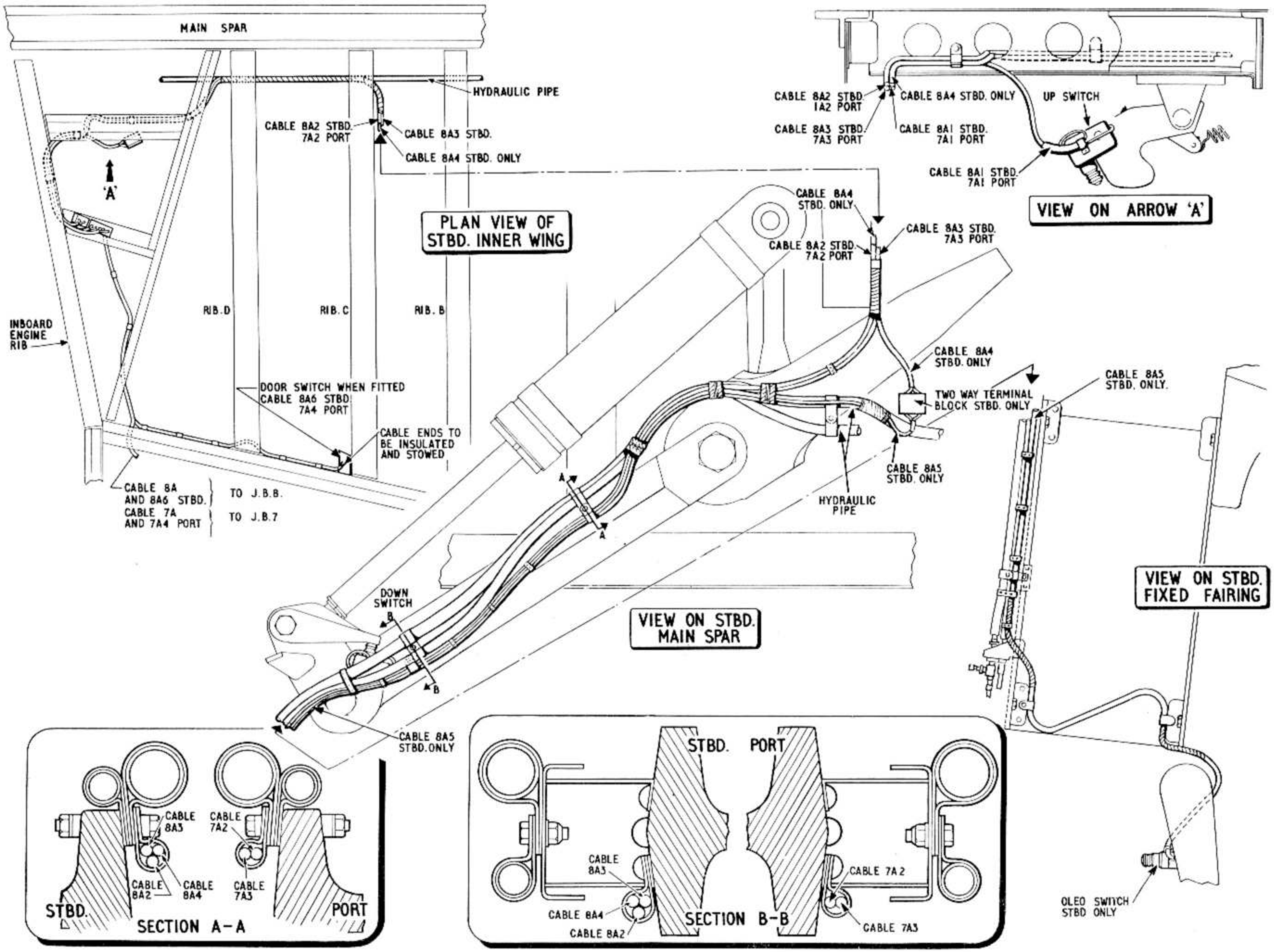


Fig. 4A. Main wheels – wiring installation

◀ *(Wiring details corrected)* ▶

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NOTE...

IF THE ALIGHTING GEAR WIRING INSTALLATION IS DISTURBED OR REWIRED THE FOLLOWING MUST BE OBSERVED.

ON COMPLETION OF WIRING AND BEFORE FINAL TIGHTENING OF THE CABLE SECURING CLIPS:-

1 JACK AND TRESTLE THE AIRCRAFT (SECT.2, CHAP.4).

2 PREPARE THE ALIGHTING GEAR FOR HAND PUMP OPERATION (SECT.3, CHAP.6).

3 MANUALLY OPERATE THE ALIGHTING GEAR TO ITS FULL EXTENT UP AND DOWN.

4 ENSURE THAT AT ALL POINTS OF TRAVEL, AND WITH THE ALIGHTING GEAR LOCKED UP AND DOWN, THAT ALL CABLES ARE SAFELY ROUTED, DO NOT CHAFE AND ARE NOT TRAPPED OR STRETCHED.

5 TIGHTEN ALL SECURING CLIPS.

6 POWER OPERATE THE ALIGHTING GEAR AND ENSURE THAT IT IS LOCKED DOWN; REMOVE THE JACKS AND TRESTLES (SECT.3, CHAP.5).

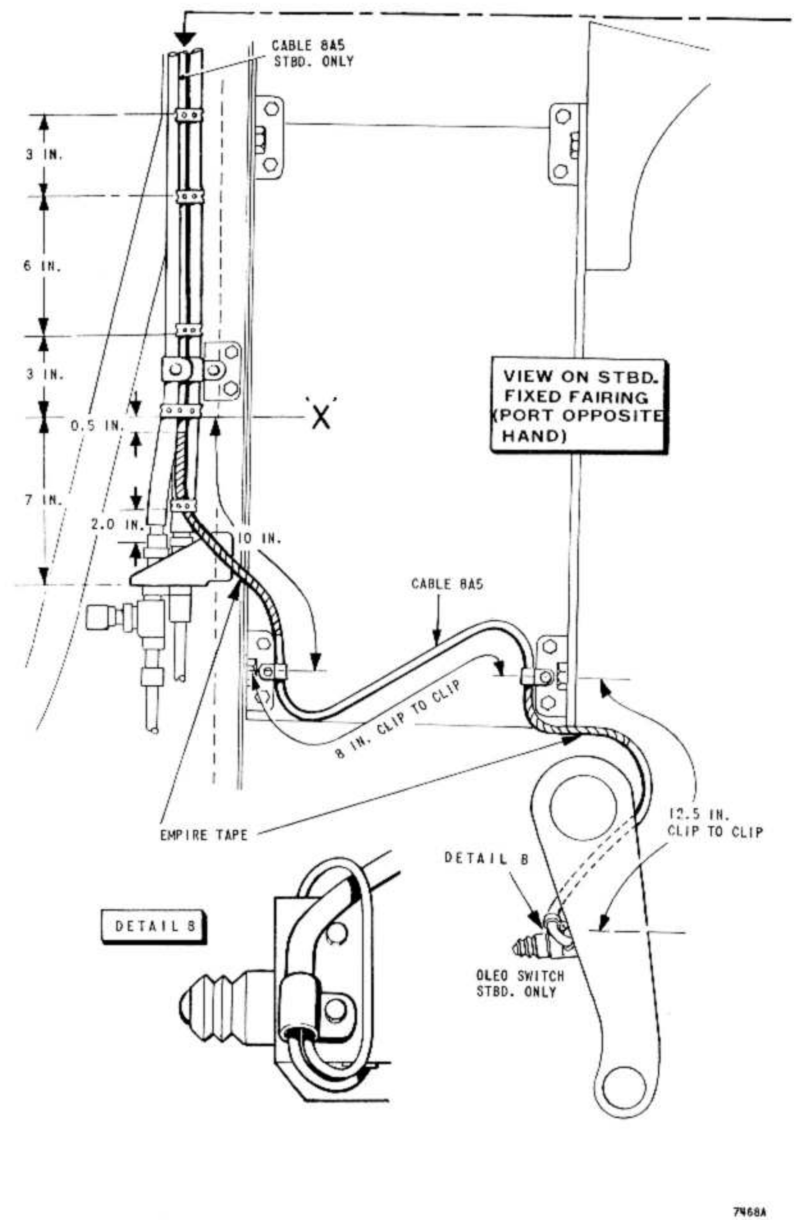


Fig. 4B. Main wheels – wiring installation

(Wiring details corrected)

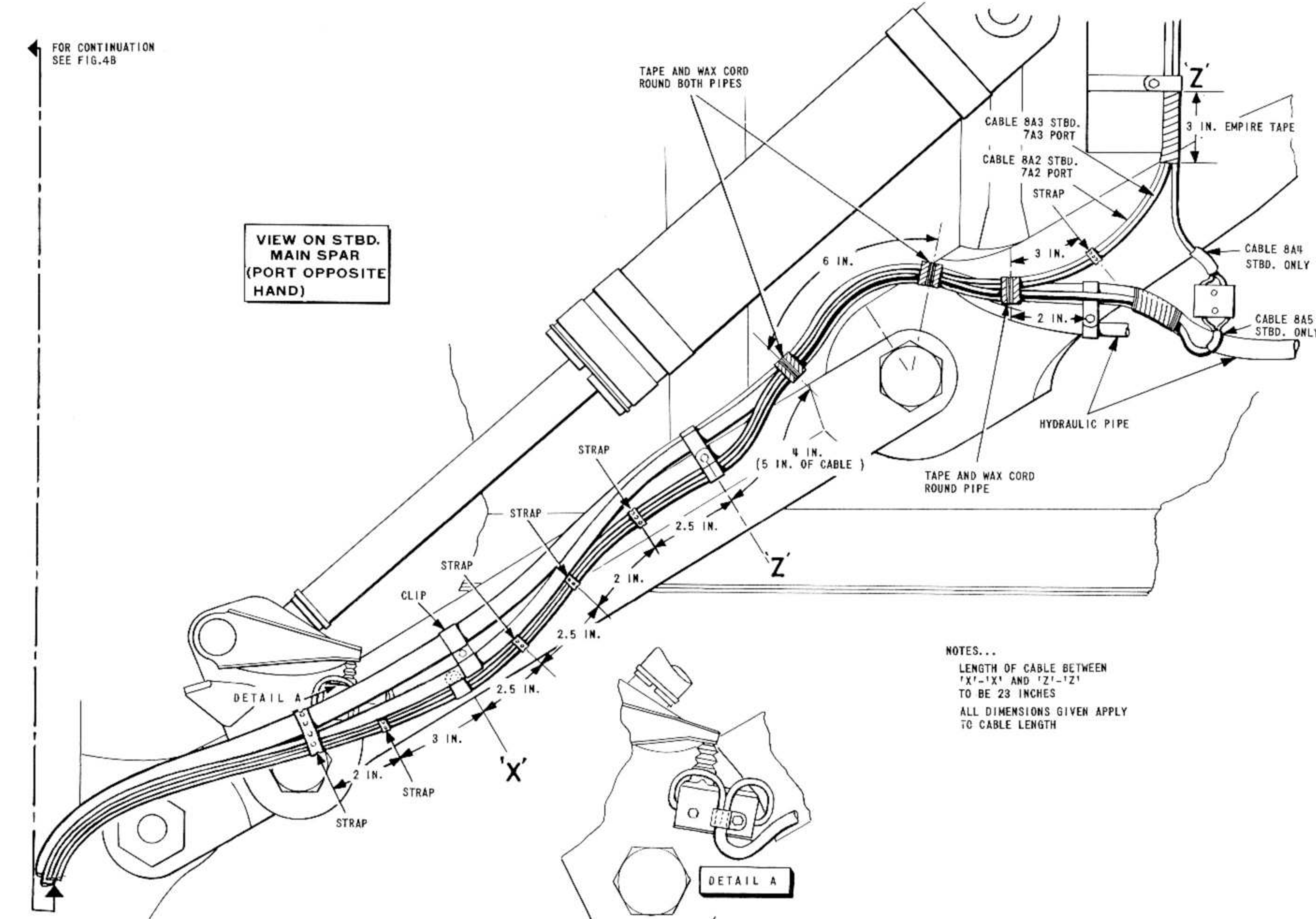
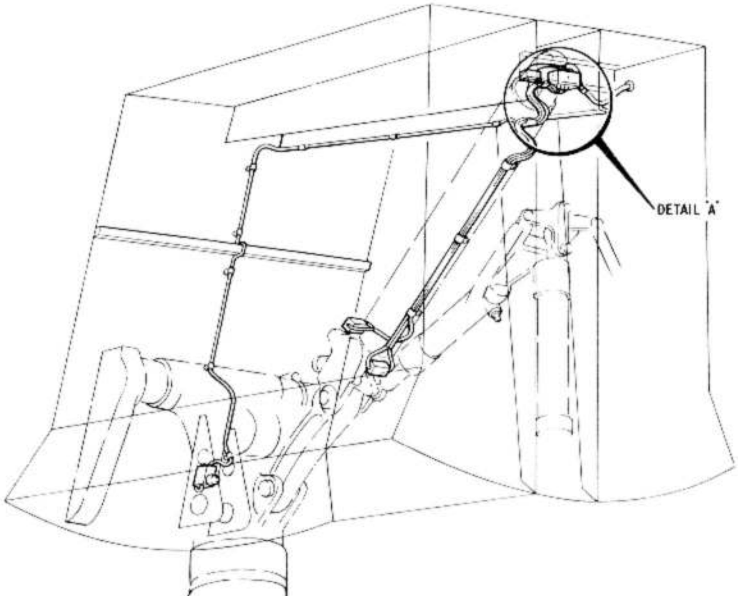
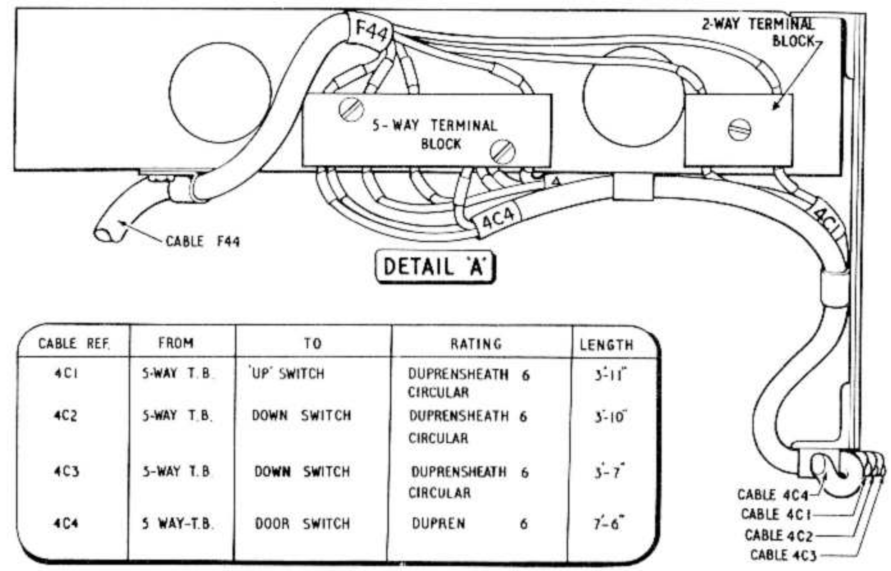


Fig. 4C. Main wheels – wiring installation

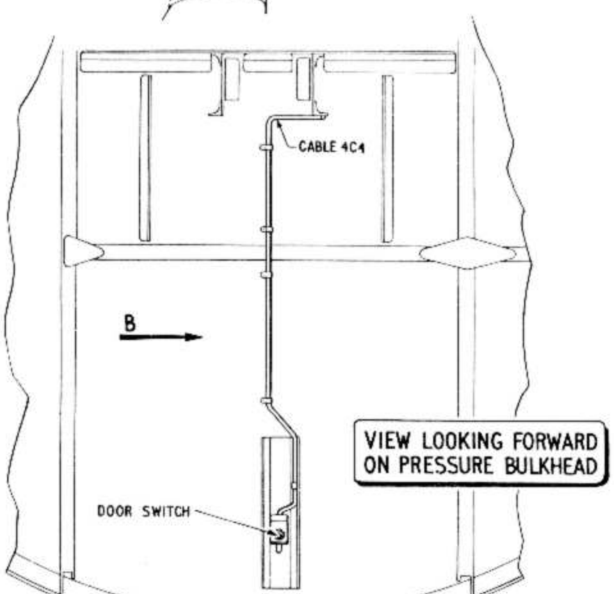
◀ *(Wiring details corrected)* ▶



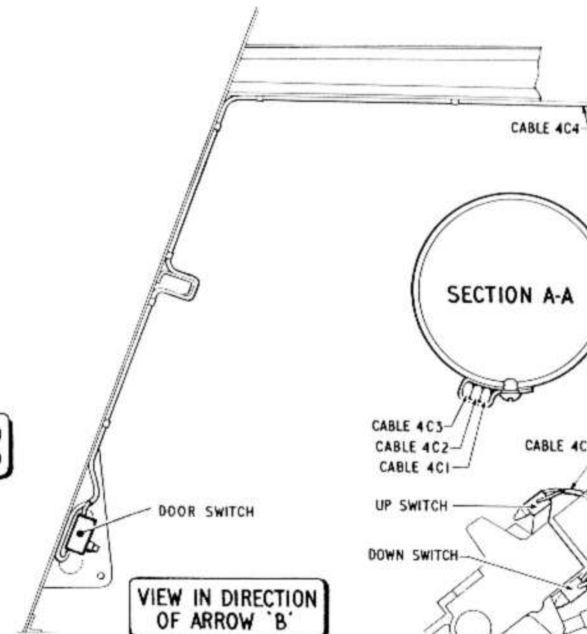


DETAIL 'A'

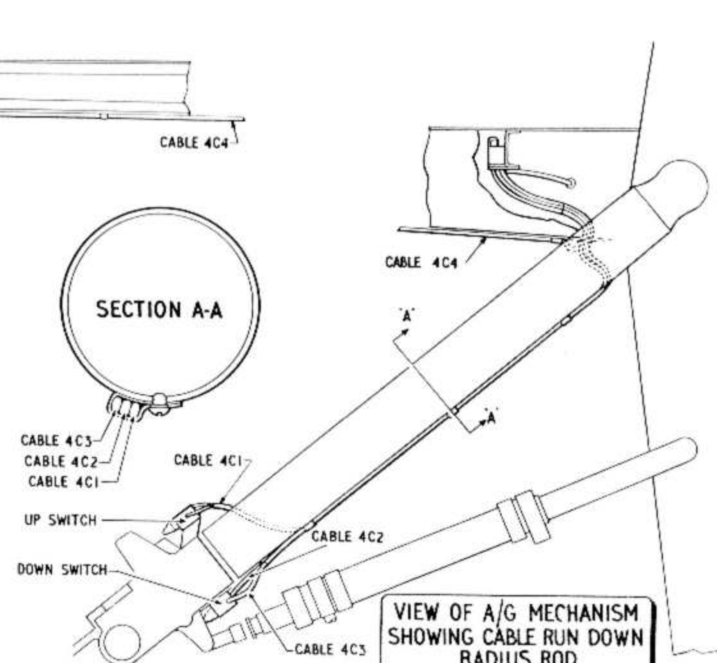
CABLE REF.	FROM	TO	RATING	LENGTH
4C1	5-WAY T.B.	'UP' SWITCH	DUPRENSHEATH 6 CIRCULAR	3'-11"
4C2	5-WAY T.B.	DOWN SWITCH	DUPRENSHEATH 6 CIRCULAR	3'-10"
4C3	5-WAY T.B	DOWN SWITCH	DUPRENSHEATH 6 CIRCULAR	3'-7"
4C4	5 WAY-T.B.	DOOR SWITCH	DUPREN 6	7'-6"



VIEW LOOKING FORWARD ON PRESSURE BULKHEAD



VIEW IN DIRECTION OF ARROW 'B'



VIEW OF A/G MECHANISM SHOWING CABLE RUN DOWN RADIUS ROD

Fig. 5. Nose wheel – wiring installation

◀ *(Wiring details corrected)* ▶

RESTRICTED

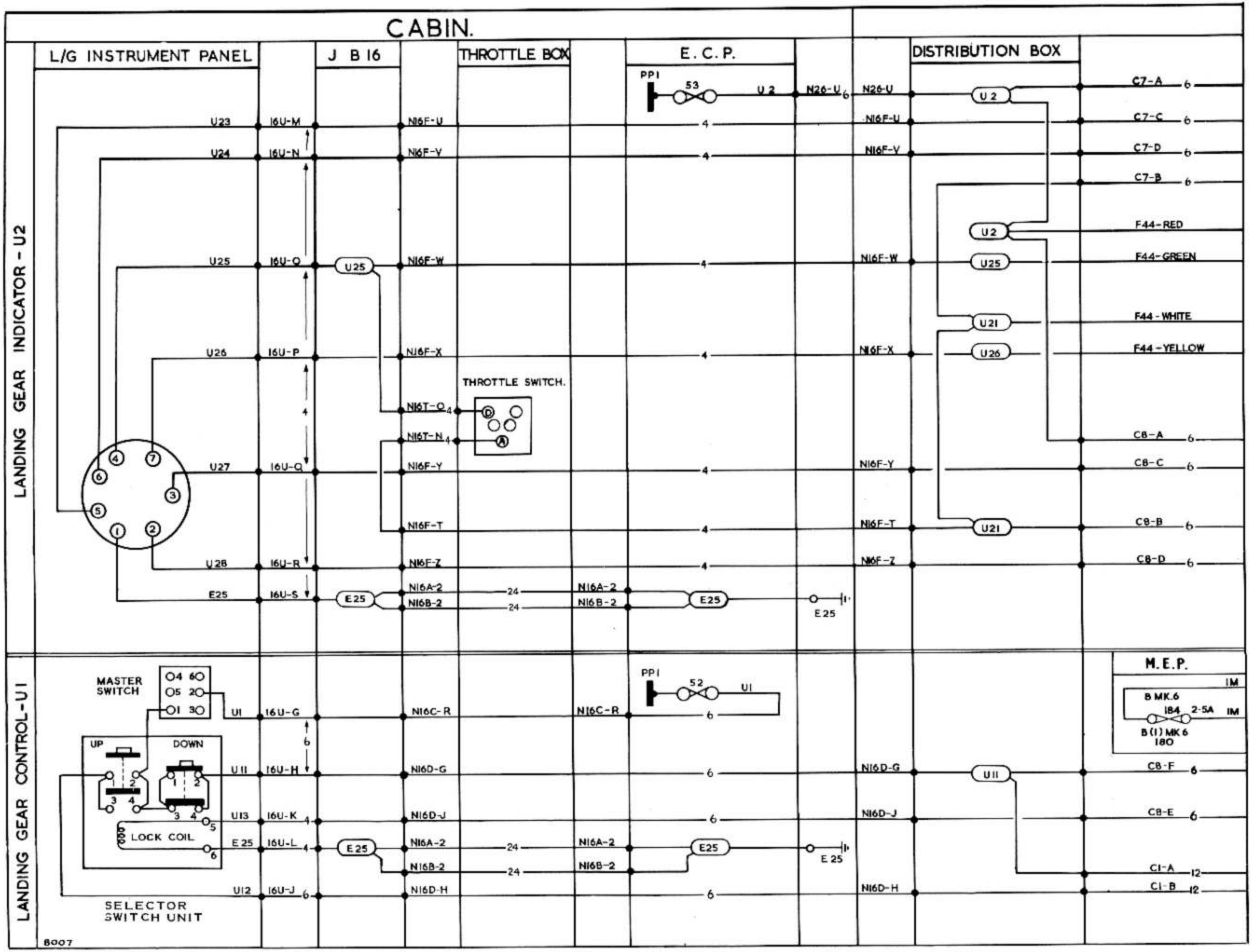


Fig. 6. Alighting gear control and indicator

(Mod. 4080 incorporated)

RESTRICTED

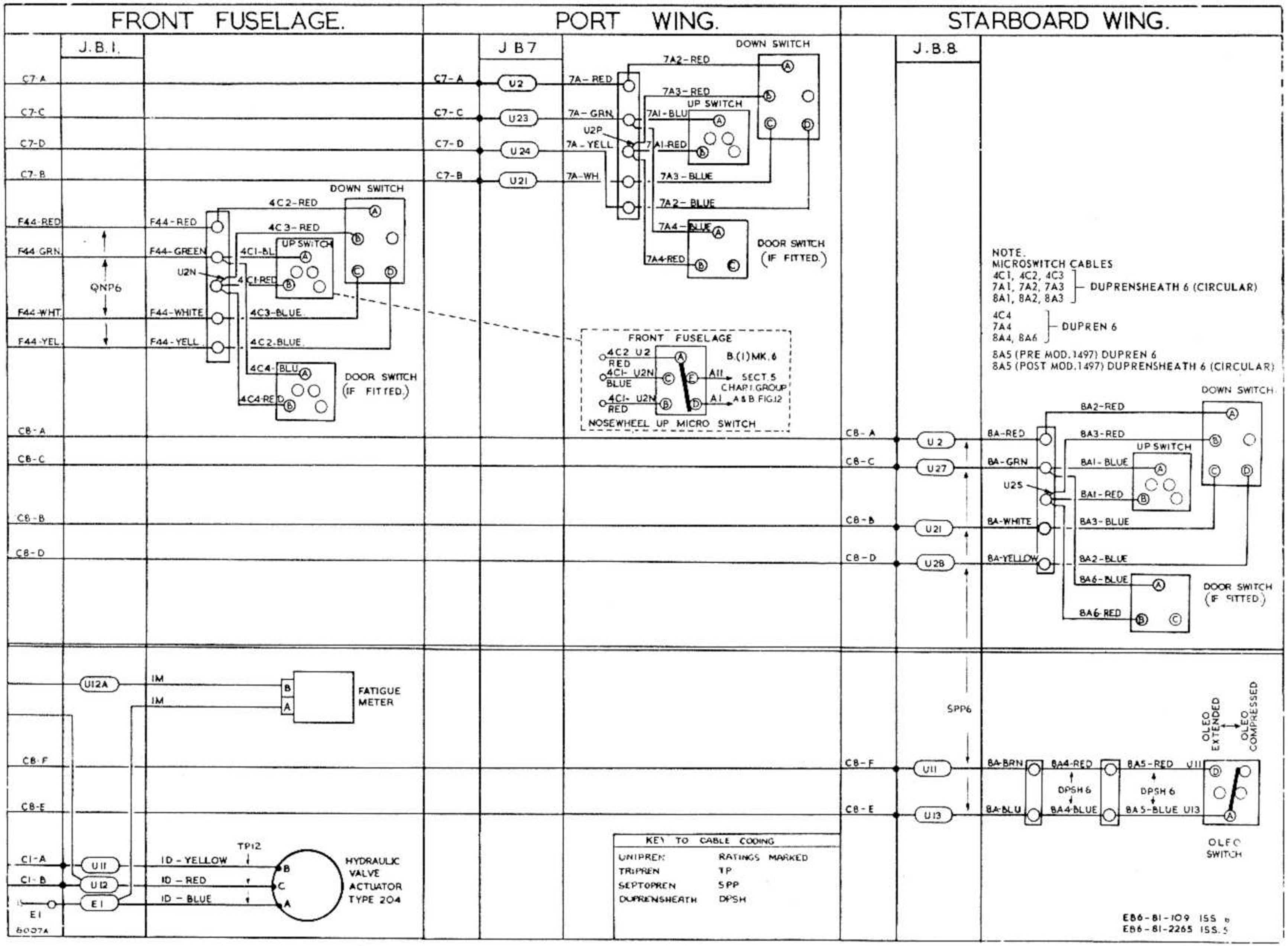


Fig. 6A. Alighting gear control and indicator

◀ *(Minor alterations only)* ▶

CABIN AIR SYSTEM, HEATERS, DE-MISTING, AND ENGINE ANTI-ICING - GROUP H

(completely revised)

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LIST OF ILLUSTRATIONS

DESCRIPTION

CABIN AIR SYSTEM

General

1. A complete installation is provided for the maintenance of pressurized hot or cold air in the cabin. The hot air originates from the engine compressor and passes through a mixing valve in the port inner wing leading edge. The mixing valve is operated by a Type 233 rotary actuator and controlled by a switch labelled HOT-OFF-COLD fitted on the miscellaneous instrument panel. On this panel is also mounted a cabin temperature gauge graduated from HOT to COLD. It is a Desynn-type indicator operated by a transmitter unit linked to the mixing valve mechanism. Pressure in the cabin is maintained by a pressure controller fitted on the pressure bulkhead. A warning circuit is provided to ensure that the crew receive an audible

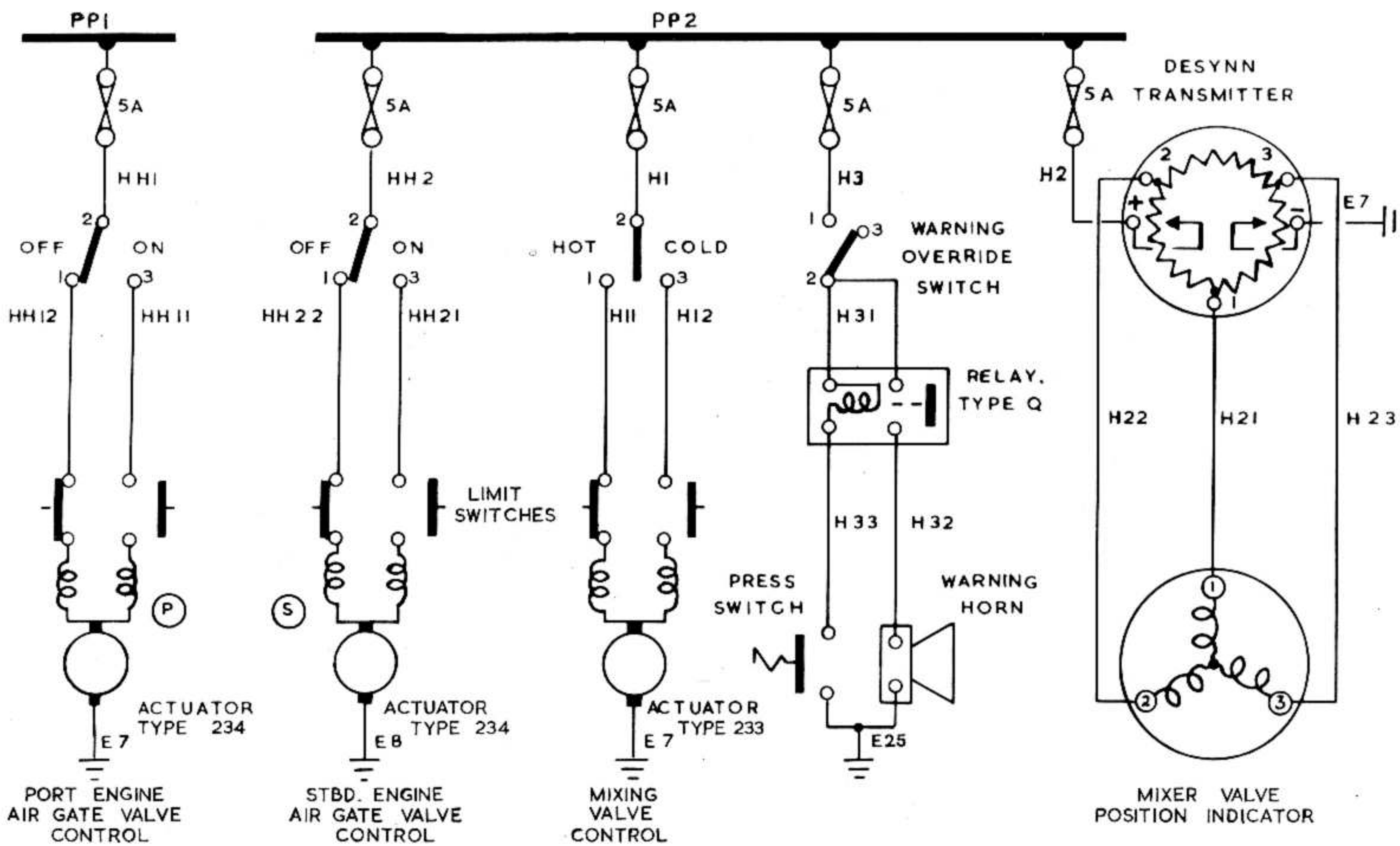

Fig. 1. Cabin air system

warning should the pressure fall to a dangerous level. Further information on the air conditioning and air pressurization will be found in Sect.3, Chap.8.

Gate valves

2. Hot air from the engine compressor is controlled by two gate valves, one for each engine. These gate valves are operated by Type 234 rotary actuators and controlled from the miscellaneous instrument panel by two switches labelled No.1 and No.2. Switch No.1 operates the port engine gate valve and switch No.2 the starboard engine gate valve.

Low pressure warning

3. A switch incorporated in the pressure controller operates a warning device whenever there is a serious loss of pressure. The closing of the switch contacts is arranged to energize a Type Q relay which in turn closes and provides a supply to a warning horn. Both the relay and the horn are mounted on the fuselage skin at the starboard side of the navigator's station. The pilot may switch off the warning horn by a switch, labelled CABIN PRESS, WARNING HORN-ON/OFF, located on the miscellaneous instrument panel.

Pressure controller

4. A pressure controller is mounted on the forward face of the pressure bulkhead. It has a connection to the pitot system and contains a bellows to which is attached the warning circuit contacts. Full information covering this unit will be found in A.P.1275A, Vol.1, Sect.20.

CANOPY DE-MISTING

General

5. Misting of the canopy sandwich is prevented by circulating dry air between its inner surfaces. For this purpose a motor driven blower is mounted at the forward edge of the navigator's table. The power supply to the motor is fed through a suppressor and controlled by the CANOPY DE-MISTING switch on the take-off panel. The air is maintained in a dry condition by passing through a drier containing silica-gel crystals. The de-misting installation is fully described in Sect.3, Chap.8.

ENGINE ANTI-ICING

General

6. Icing of the engine intakes and the engine cowling is prevented by ducting into these regions a supply of hot air tapped from the engine compressor stages. The engine intake hot air supply is controlled by two gate valves which are operated by Type FK-H-A1 Teddington actuators. The hot air supply to the engine cowlings is controlled by two gate valves which are operated by Type 234 English Electric actuators. The control switches are located on the console.

7. Fitted to each engine is a Teddington thermostatic control unit; these are inoperative but are still connected in circuit. Reference to the theoretical and routeing diagrams will show that the connecting plug pins are internally linked.

8. Aircraft post Mod.1293 have two-position control switches marked OFF-ON; in addition, two magnetic indicators which show white when energized, are also fitted on the console to show that the system is operating.

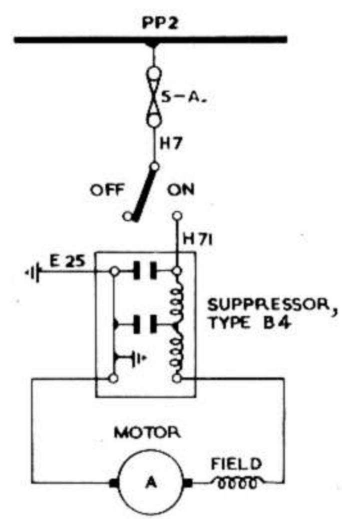

Fig.2. Canopy de-misting

HEATER CIRCUITS

Direct vision window

9. The pilot's D.V. window panel is electrically heated by an almost invisible nichrome-wire heating element sandwiched between the glass laminations; post Mod.4333 the panel is heated by a gold-film heating element. Also incorporated in the panel is a sensing control element which operates in conjunction with a control unit - windscreen heater box (pre Mod.4420) or Plessey controller Type 4, Mk.1 (post Mod.4420) - situated on the engine start panel

structure. Power supplies to the heater are controlled by a switch, labelled WINDSCREEN, on the console top panel. Connections to the elements are made by non-interchangeable 2-pin plugs and sockets below the canopy coaming.

Control unit, windscreen heater box, pre Mod.4420

10. The control unit incorporates a Type S relay, a miniature polarized relay, and four series-connected resistors, one of which is variable. When a drop in window temperature causes the resistance of the control element to fall below a pre-determined value, the polarized relay will close and operate the Type S relay. The operation of the Type S relay completes the supply to the heater element. As the temperature of the window rises the resistance of the control element increases. When its resistance reaches a pre-determined value the polarized and Type S relays open, breaking the supply to the heater element.

Control unit, Plessey Type 4, Mk.1, post Mod.4420

11. On aircraft post Mod.4420, the windscreen heater boxes are replaced by Plessey controllers Type 4, Mk.1 and Diamond H Type B.S. relays. Control of the electrical supply to the heater element in the D.V. panel is achieved by energizing and de-energizing the coil of each Diamond H relay. Transductors in the controllers provide the necessary output current to operate incorporated slave relays which energizes the coil of each Diamond H relay. The operation of the transductors is dependent upon the resistance of the temperature-sensing element incorporated in the window and since the resistance varies with the temperature, complete control is obtainable. The controller is fully described in A.P.4343F, Sect.21.

Pressure head

12. A heating element is embodied in the pressure head to prevent icing. The supply to the element, fed from busbar PP2 through a fuse in the E.C.P., is controlled by the PRESSURE HEAD switch on the take-off panel.

Wing integral fuel tanks vent valve heaters

13. Icing of the two vent valves fitted in each wing integral fuel tank is prevented by the use of heater elements built into the valve assemblies. The heaters are controlled by the VENT VALVE switch on the take-off panel and protected by a fuse in the E.C.P.

SERVICING

CABIN AIR SYSTEM

Valve actuators

14. Normal servicing of the valve actua-

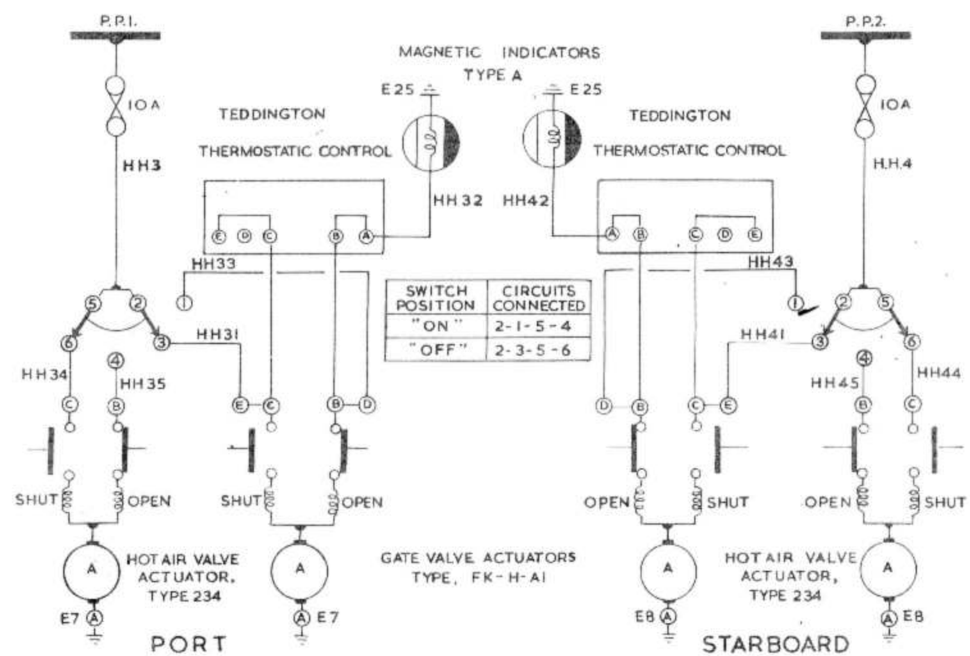

Fig.3. Engine anti-icing

tors is confined to checking brush length, examination of the commutator, and removal of any accumulated carbon dust, which can be accomplished by removing the motor cover. Access to both mixing and gate valve actuators is through the leading edge panels inboard of each engine.

Desynn indicator and transmitter unit

15. Faulty indicators or unserviceable transmitter units should be removed and replaced by new items.

Low pressure warning

16. The warning circuit should be tested by removing the terminal cover of the pressure controller and short-circuiting the two terminals and provided that the override switch is set to ON the warning horn should function.

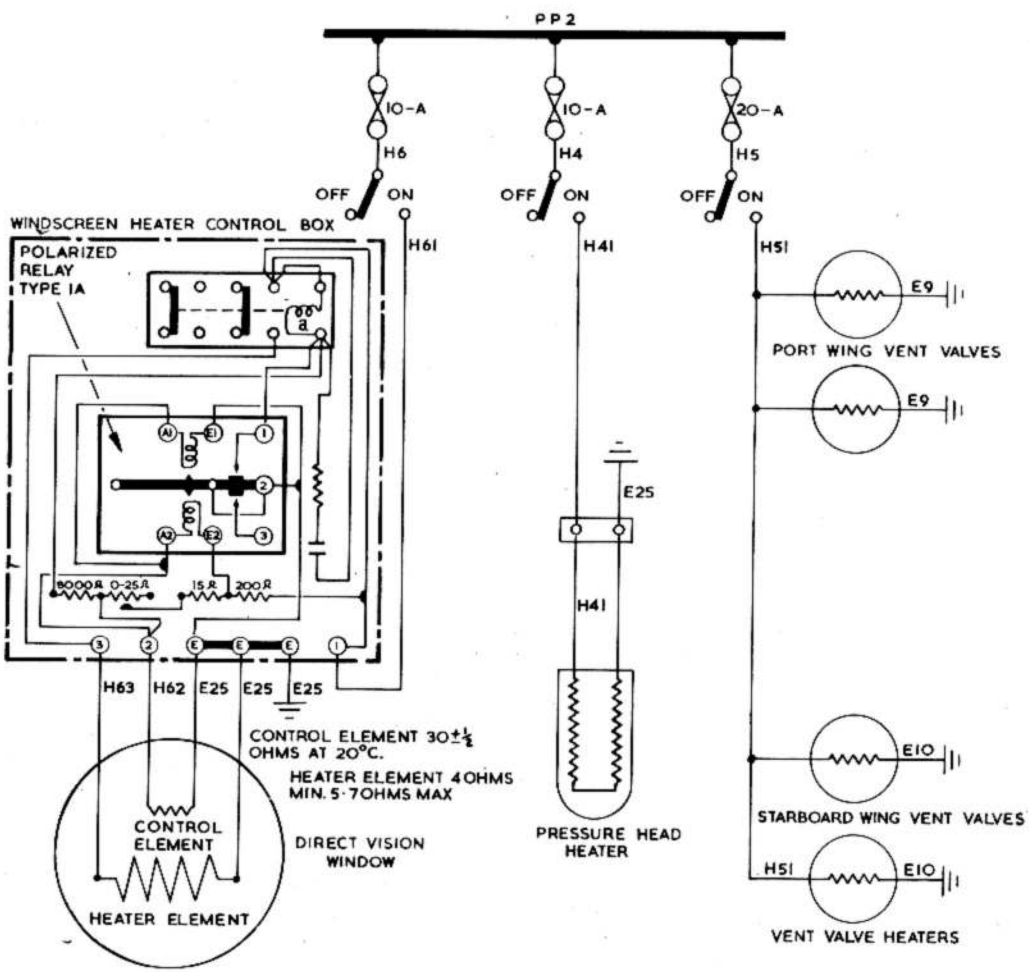

Fig.4. Heater circuits (pre Mod.4420)

CANOPY DE-MISTING

Blower motor

17. Servicing of the blower motor is confined to checking brushes, inspecting the commutator, and the removal of carbon dust. Access to the brushes is accomplished by the removal of the end cover from the motor.

ENGINE ANTI-ICING

Valve actuators

18. Normal servicing of the valve actuators is confined to checking brush length, examination of the commutator, and removal of any accumulated carbon dust, which can be accomplished by removing the motor end cover. Access to the gate valve actuators is by removing the engine cowling, the actuators being outboard on each engine.

HEATER CIRCUITS

D.V. window checks

19. At normal ground level the resistance of the control element should be 30 ± 0.5 ohms at 20 deg C. The heater element may be considered to be serviceable if, with 24 volts across its terminals it will pass a current, (pre Mod.4333) not more than 6 amp and not less than 4.2 amp, or (post Mod.4333) not more than 3 amp and not less than 2.5 amp. This check can be made by con-

necting a suitable ammeter into the plug and socket connection near the window assembly.

Note...

During the above test the current applied to the heater must not flow continuously for more than 15 seconds unless a temperature control unit is used.

Replacement windows

20. It is advisable to carry out a bench test on any replacement window that has been in store. As the internal connections in the window rely on intimate contact between the elements and the window busbars the panel should be first heated to a temperature not exceeding 40 deg C and allowed to cool off before applying the test current.

Control unit check (pre Mod.4420)

21. The correct functioning of the control unit may be checked by substituting a variable resistance for the control element and a test lamp for the heater element. This can be done at the plug and socket connections below the canopy coaming. Operate the variable resistor until the unit cuts in and the test lamp lights. Disconnect the variable resistor and measure its resistance with a suitable ohmmeter; it should be between 29 and 29.5 ohms. Reconnect the resistor and operate until the unit cuts out and the test lamp is extinguished. Disconnect the resistor again and measure its resistance; it should be between 30 and 30.5 ohms. The difference between cut-in and cut-out readings must not be less than 0.7 ohms.

Control unit check (post Mod.4420)

22. Remove fuses 74 and 116, and disconnect plugs and sockets (N.74) at the window. Connect a decade box, set at 28 ohms, in place of the sensing control element and a 28-volt test-lamp in place of the heater element; check and refit fuses 74 and 116. Switch on the instruments 400 c/s supply and the control switch; the test-lamp should illuminate. Increase the decade resistance setting until the test-lamp extinguishes, note the resistance which should be between 30.0 to 30.5 ohms. Decrease the decade resistance setting until the test-lamp illuminates, note the resistance which should be 0.3 to 0.8 below the previously noted value at which the lamp was extinguished. Switch off the 400 c/s supply and the control switch and reconnect the plugs and sockets (N.74) at the window. Check that the heater functions by switching on the 400 c/s supply and the control switch and note that the window heats up.

Note...

If the ambient temperature (above 20 deg C) prevents the heater switching on, connect a decade box set at 400 ohms across terminals A1 and A2 of the Plessey controller. Do not leave connected for more than 15 seconds and do not disturb the sensing control element connections.

Pressure head heater

23. Minimum maintenance is required on the pressure head. In the event of unserviceability a new head should be fitted.

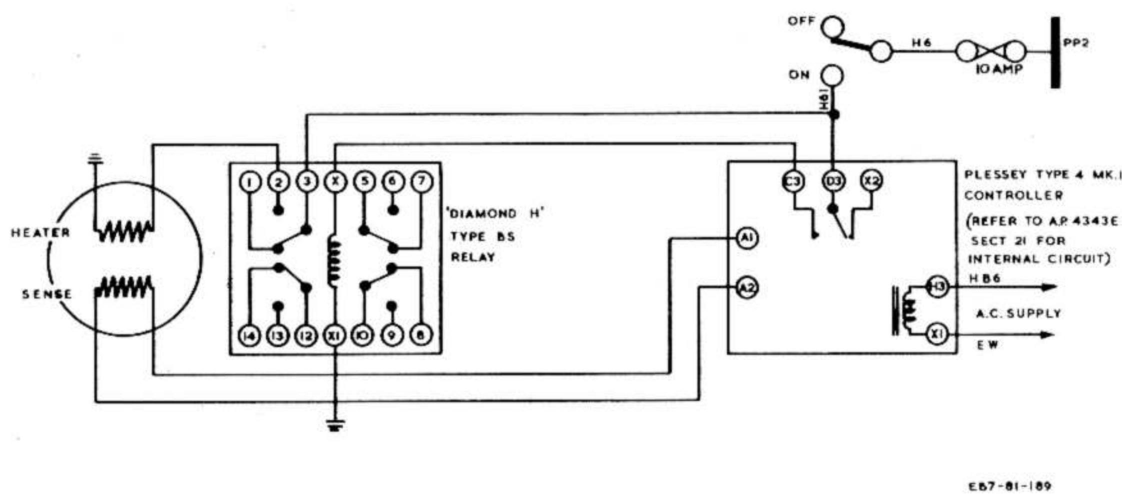

Fig.5. D.V. window heater circuit (post Mod.4420)

REMOVAL AND ASSEMBLY

CABIN AIR SYSTEM

General
24. The removal of any actuator, the Desynn transmitter, or the pressure controller is described in Sect.3, Chap.8.

HEATER CIRCUITS

Direct vision window
25. Care must be taken on the removal of the window to ensure that the fragile connecting wires of the two elements are not damaged. Only the heating panel part of the window need be removed by taking out the bolt which acts as a hinge pin.

Pressure head heater
Removal
26. To remove the pressure head:-

(1) Disconnect the electrical supply at the terminal block adjacent to the pressure head.

(2) Unscrew the gland nut at the rear of the pressure head and remove the pitot pipe.

(3) Remove the fixing nut and sealing washer from the rear end of the head.

(4) Remove the pressure head complete with the outside sealing washer.

Assembly
27. Assembly of the unit is the reverse of the removal procedure. After the unit has been installed a pitot system check must be carried out. This test will be found in Sect.5, Chap.2.

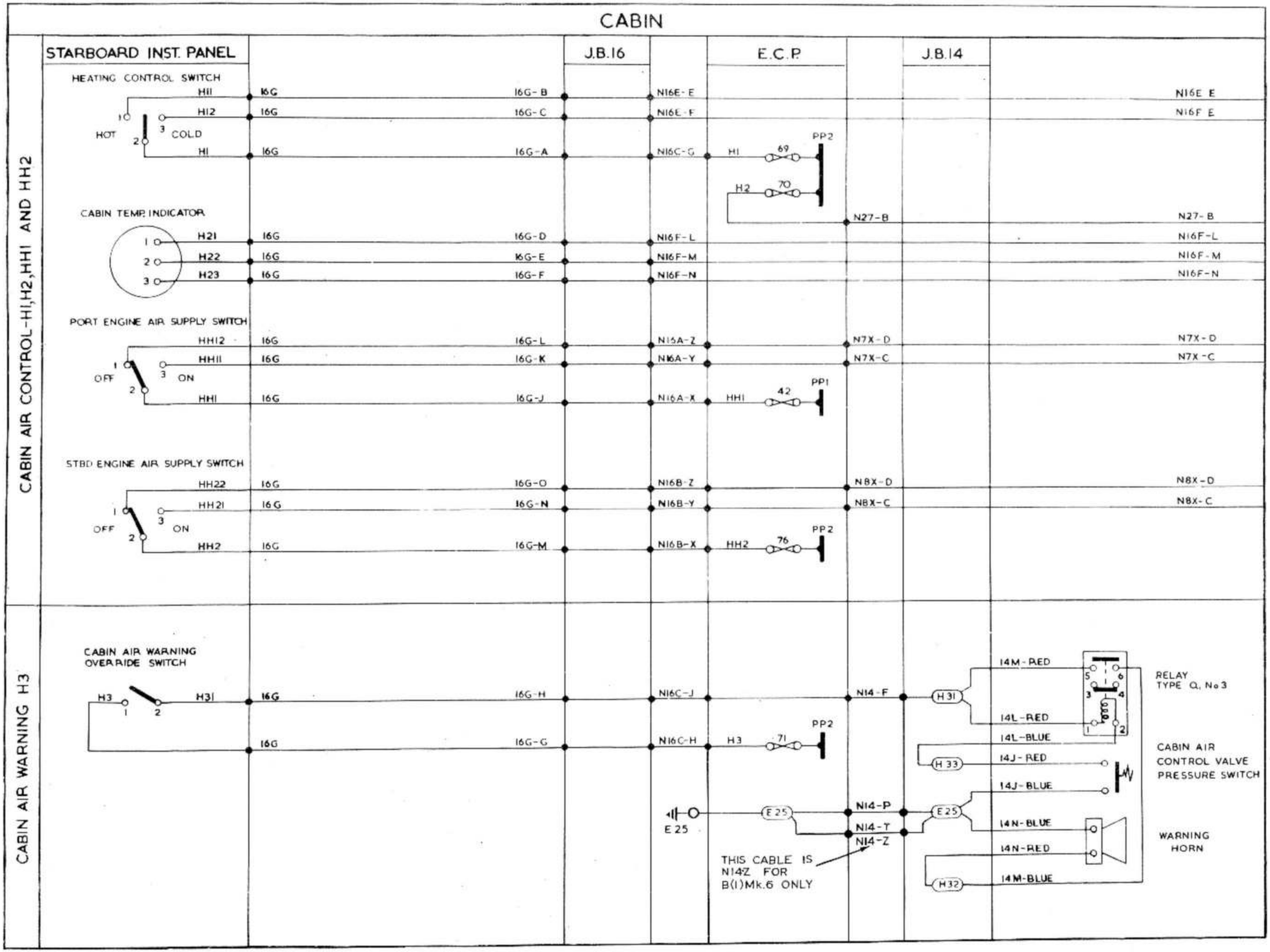

FIG.6. CABIN AIR SYSTEM

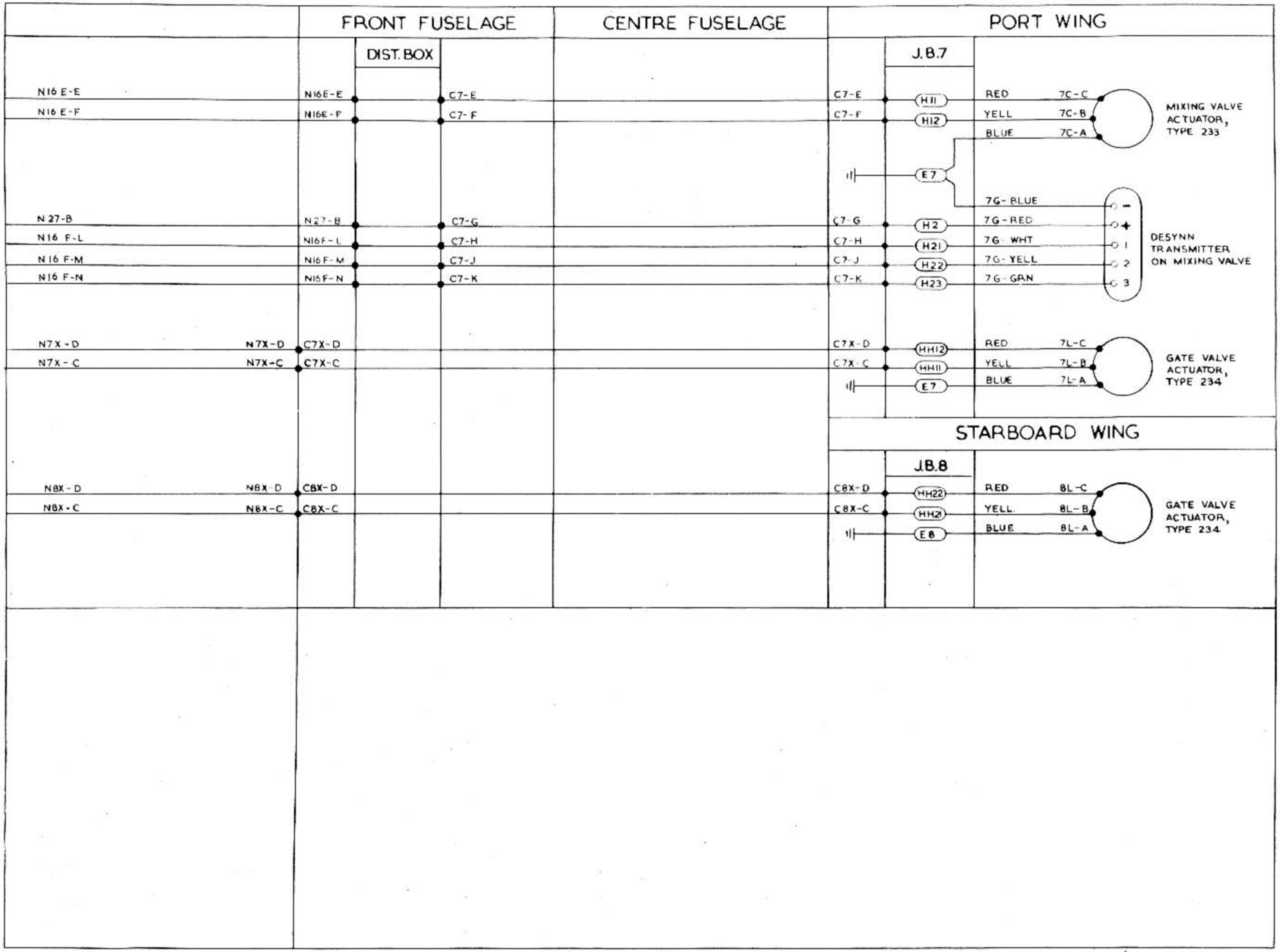

FIG.6A. CABIN AIR SYSTEM

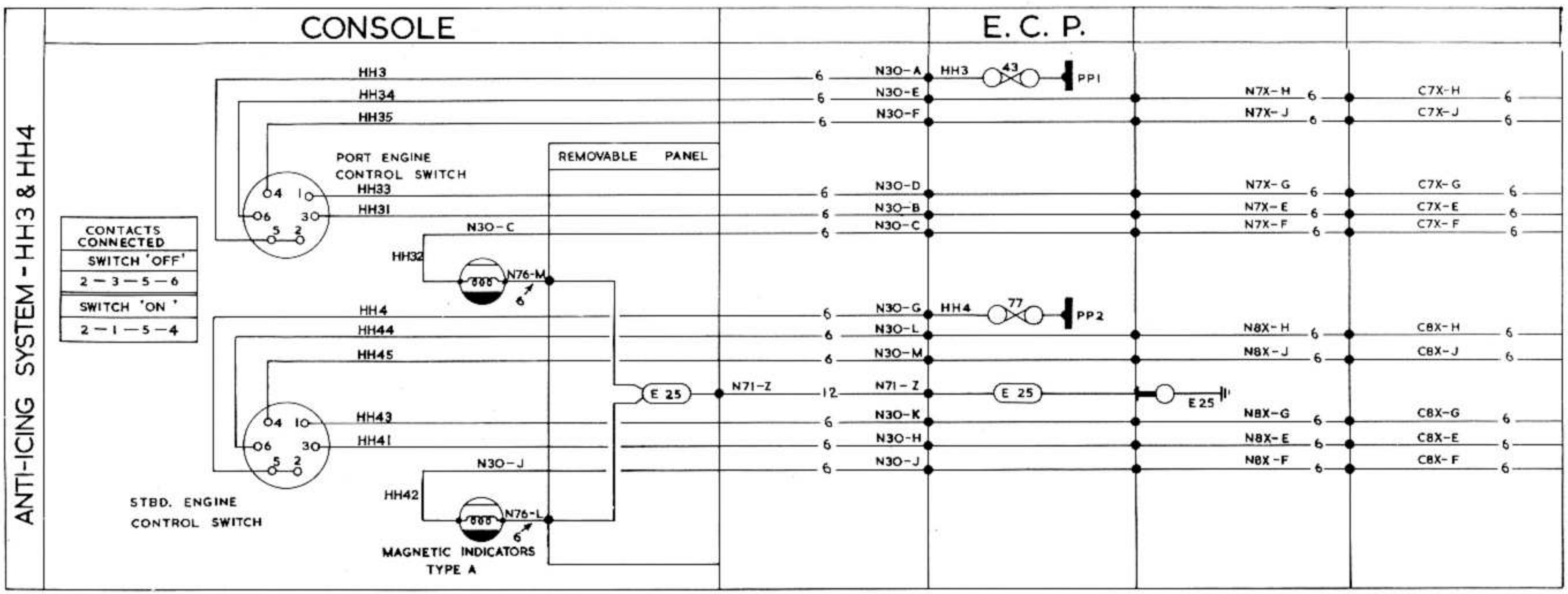

FIG.7. ENGINE ANTI-ICING

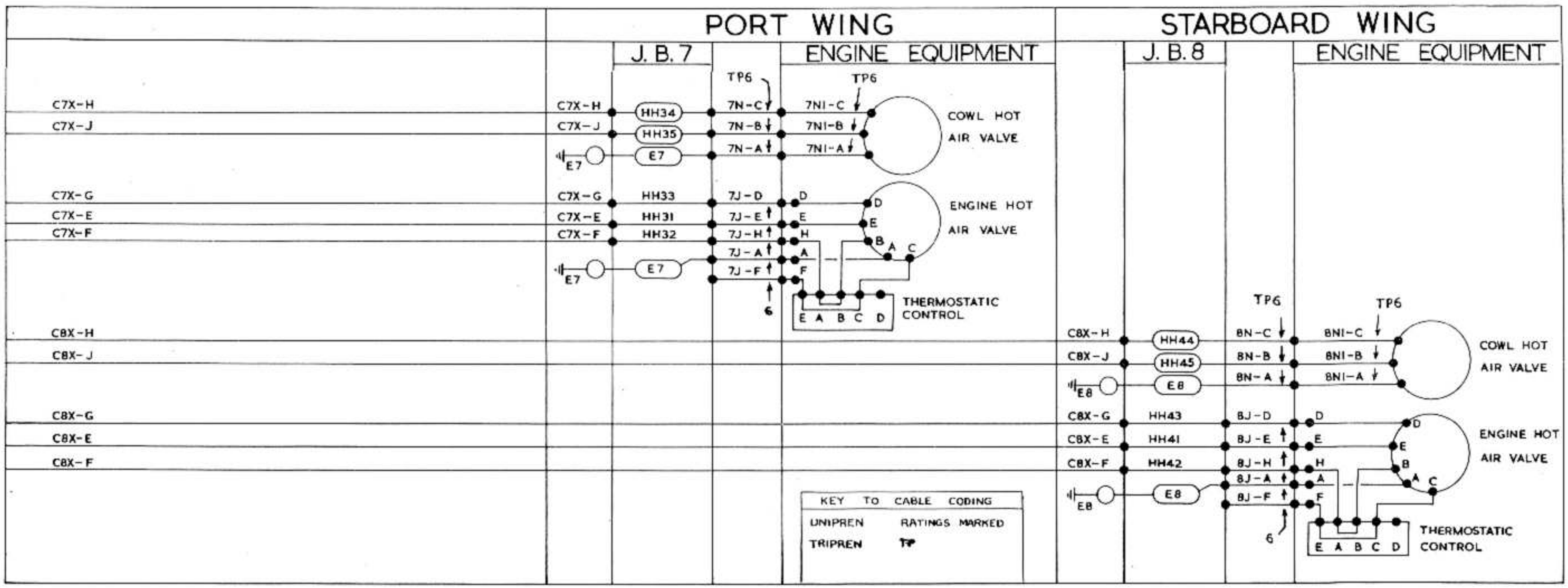

FIG.7A. ENGINE ANTI-ICING

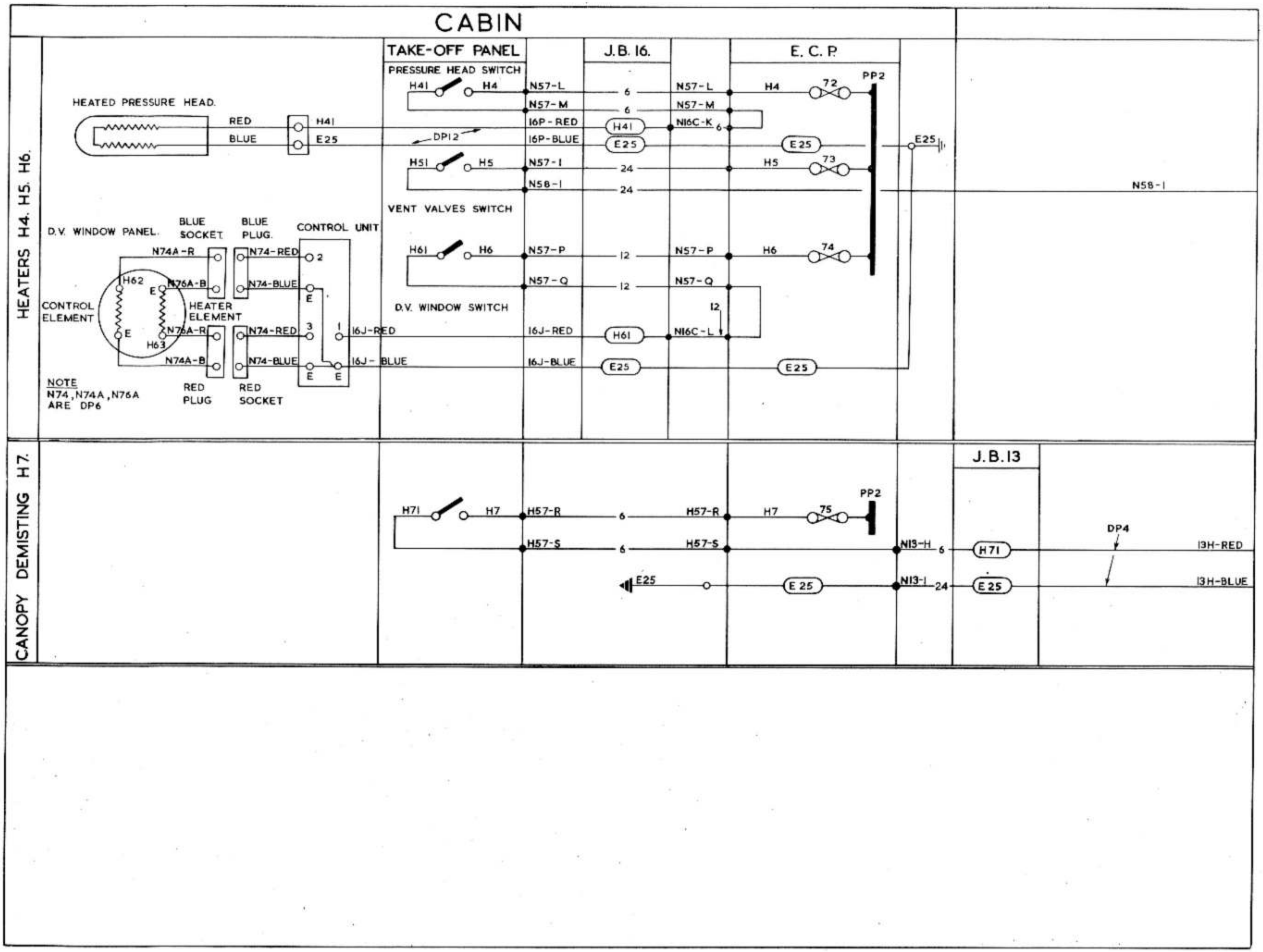

FIG.8. HEATER CIRCUITS - CANOPY DE-MISTING (PRE MOD.4420)

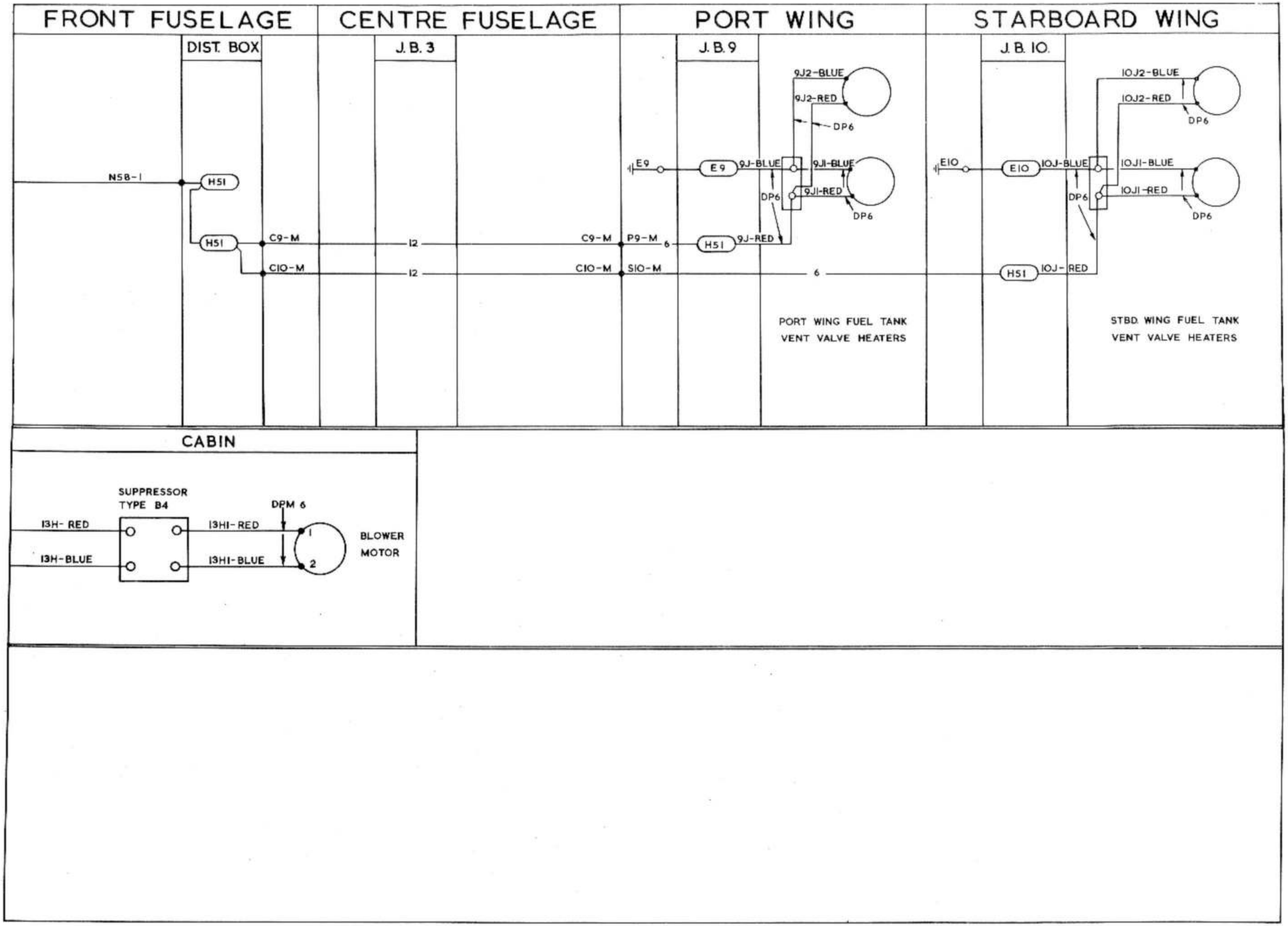

FIG.8A. HEATER CIRCUITS - CANOPY DE-MISTING (PRE MOD.4420)

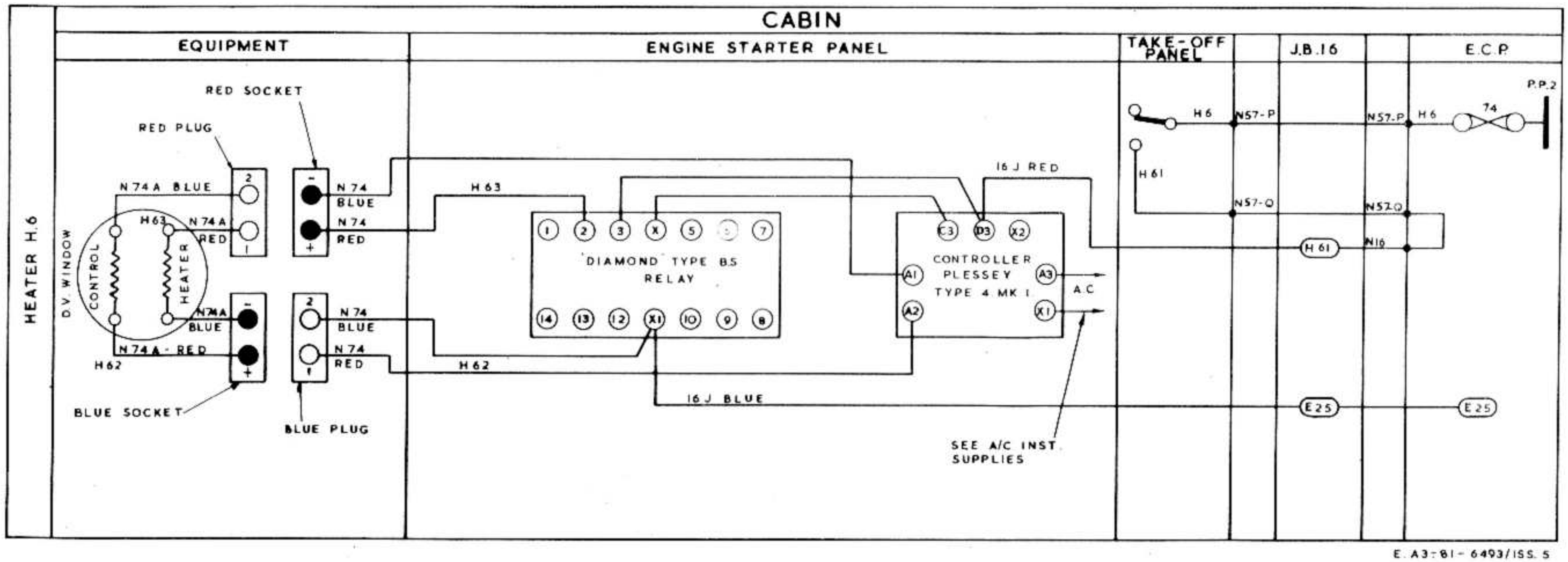

FIG.9. D.V. WINDOW HEATER (POST MOD.4420)

101B-0406-1/139/547304/355/2-69/BAC/1307

ENGINE SERVICES - GROUP J & K

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LIST OF ILLUSTRATIONS

DESCRIPTION

General

1. Each engine starting system comprises a triple-breech starter mounted at the centre of the air intake, two high-energy ignition units, and two igniter plugs which operate in conjunction with an ignition switch on the starter panel, a Type S1 relay in the E.C.P, a cartridge selector switch, and a time-delay switch. The cartridge, when fired, releases gases which, fed to a small turbine in the starter unit, cause the turbine to rotate the engine long enough for light-up to occur.

Cartridge selector switch

2. The engine START switch and the mechanism for selecting the cartridge to be fired are embodied in a selector switch unit mounted on the starter panel. The switch fitted may be either a Type FJB/A/3 or Type FJB/A/5. The START switch push-button is linked by a push-rod to a rotary switch that selects the cartridge to be fired and, as a safety measure, earths the firing circuit of the other two cartridges at the same time. The push-button, after being pressed, is held in the ON position until the functioning sequence of the time-delay switch is completed by a solenoid energized by a positive feed from contacts 'B' in the time-delay switch.

Time-delay switch

3. After the START switch push-button is pressed, engine starting is automatically controlled by a time-delay switch, Type FHM/A/25, *(A.P.4343C, Vol.1, Sect.3, Chap.22)* located in the nose forward of the rudder pedals. The switch embodies a magnetic clutch and a motor-driven switch mechanism designed to open and close a series of contacts, referenced A, B, C and D, in a set sequence.

High-energy ignition units

4. Two of these units are used in each engine circuit. One is mounted in the wing leading edge and access to it is obtained by taking off the wing top panel which is normally removed for servicing the generators. The other unit is mounted on the outboard engine rib and is accessible after the removal of a detachable panel on the underside of the wing.

OPERATION

WARNING

Before entering the cabin the relevant

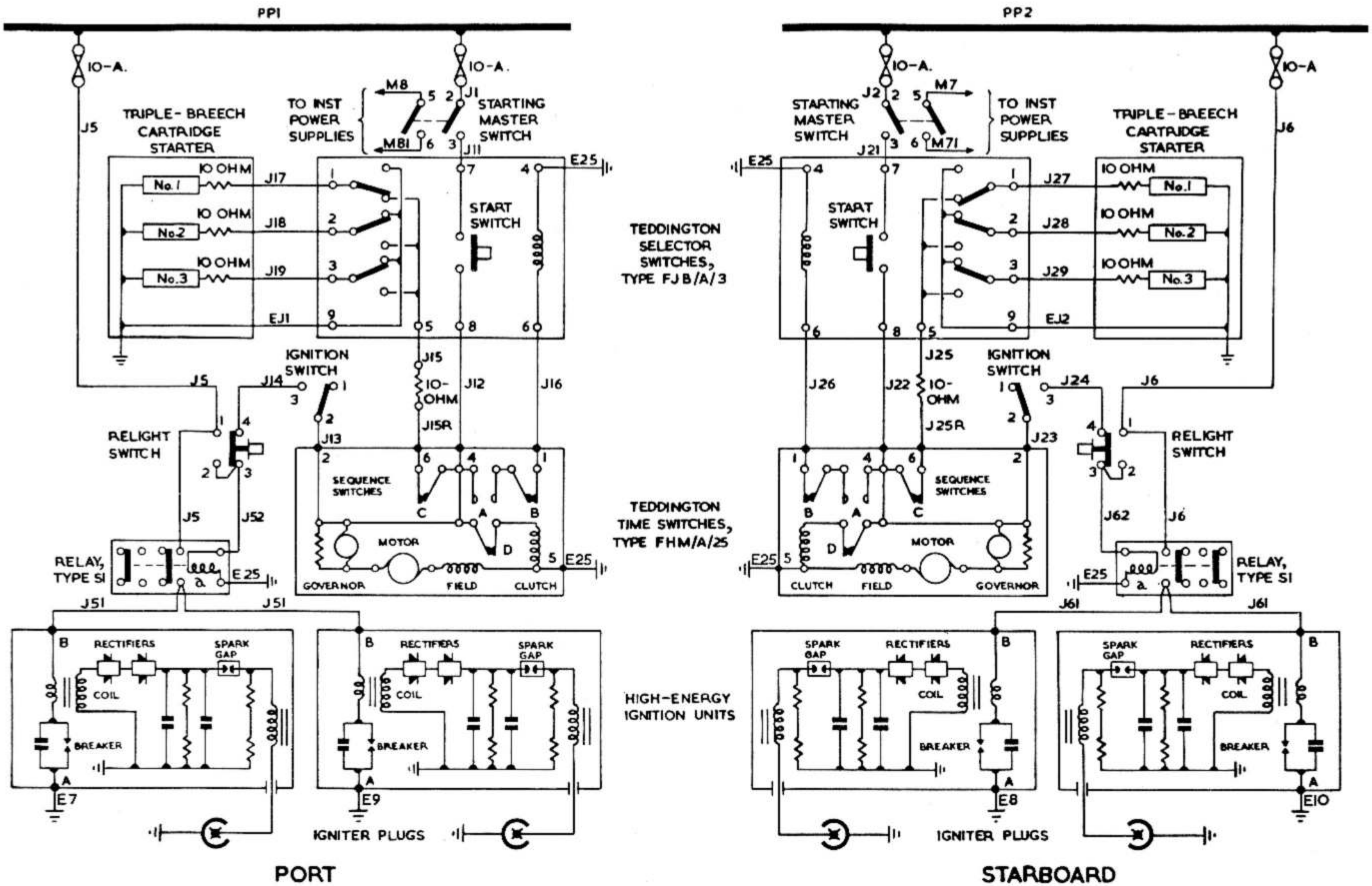

Fig. 1. Starting and ignition – Theoretical

instructions detailed on the LETHAL WARNING marker card must be observed.

Engine starting

5. Pressing the START switch push-button initiates the functioning of the time-delay switch as follows:

(1) The magnetic clutch is energized and contacts 'A' close.

(2) Contacts 'C', closed at start, open 5^{+2}_{-0} seconds later.

(3) Contacts 'B', closed at start, open 29 ± 2 seconds later.

(4) The over-run contacts 'D', closed at start, open 1.0 second *(minimum)* after contacts 'B' open.

6. Providing that the MASTER STARTING and IGNITION switches are ON, the above cycle of operations will result in the following action:

(1) The selected cartridge is fired.

(2) The START switch push-button hold-in coil is energized.

(3) The Type S1 relay in the E.C.P. closes to actuate the H.E. ignition units.

(4) The engine should start up.

Engine relighting

7. Under suitable conditions, an engine can be relighted in flight by using the relight switch embodied in its H.P. fuel cock lever. Reference to fig. 1 will show that the operation of the relight switches by-passes the time-delay switches and feeds a direct supply, to energize and close the Type S1 relays and operate the H.E. ignition units.

SERVICING

WARNING

Before entering the cabin the relevant instructions detailed on the LETHAL WARNING marker card must be observed.

General

8. After all cartridges have been removed from the starter unit, and the H.E. ignition units have been disconnected, functioning tests, using test lamps, may be made on the installation

WARNING

In certain circumstances, the energy stored in the capacitors embodied in the H.E. ignition units may be of a lethal nature. As a safety precaution, it is essential that after disconnecting the Plessey plug from its socket, at least one minute should elapse before further handling the unit.

Ignition supply circuits

9. The operation of the ignition supply circuits can be checked by the following procedure:

(1) Disconnect cables 7Q and 9L which couple to the port engine H.E. ignition units, and cables 8Q and 10L which couple to the starboard engine ignition units.

(2) Switch ON the MASTER STARTING and IGNITION switches.

(3) Connect test lamps to pins A and B of the Plessey sockets on cables 7 and 9L in the port wing.

(4) Press the START switch push-button. The test lamps should light up for a period of 29 ± 2 seconds.

(5) Repeat (3) and (4) with cables 8Q and 10L in the starboard wing.

Cartridge starter circuits

10. After disconnecting cable 7H to the port engine, and cable 8H to the starboard engine, check the operation of the circuits as follows:

(1) Switch on the MASTER STARTING and IGNITION switches.

(2) Using an assembly of three test lamps, connect one lead from each lamp to pin 1 on cable 7H, and the other lamp leads to pins A, B, and J, respectively.

(3) Press the port START switch push-button. One lamp should light for approximately 5 seconds.

(4) After at least 30 seconds, press the push-button again – another of the three lamps should light for approximately 5 seconds.

(5) Repeat (4) to complete the check on all three cartridge circuits.

(6) Repeat (2) but with the test lamps changed over to cable 8H.

(7) Repeat (3), (4), and (5), but now operating the starboard START switch.

11. Suspected faults in the wiring should be investigated with the aid of the theoretical and routing diagrams included in the group.

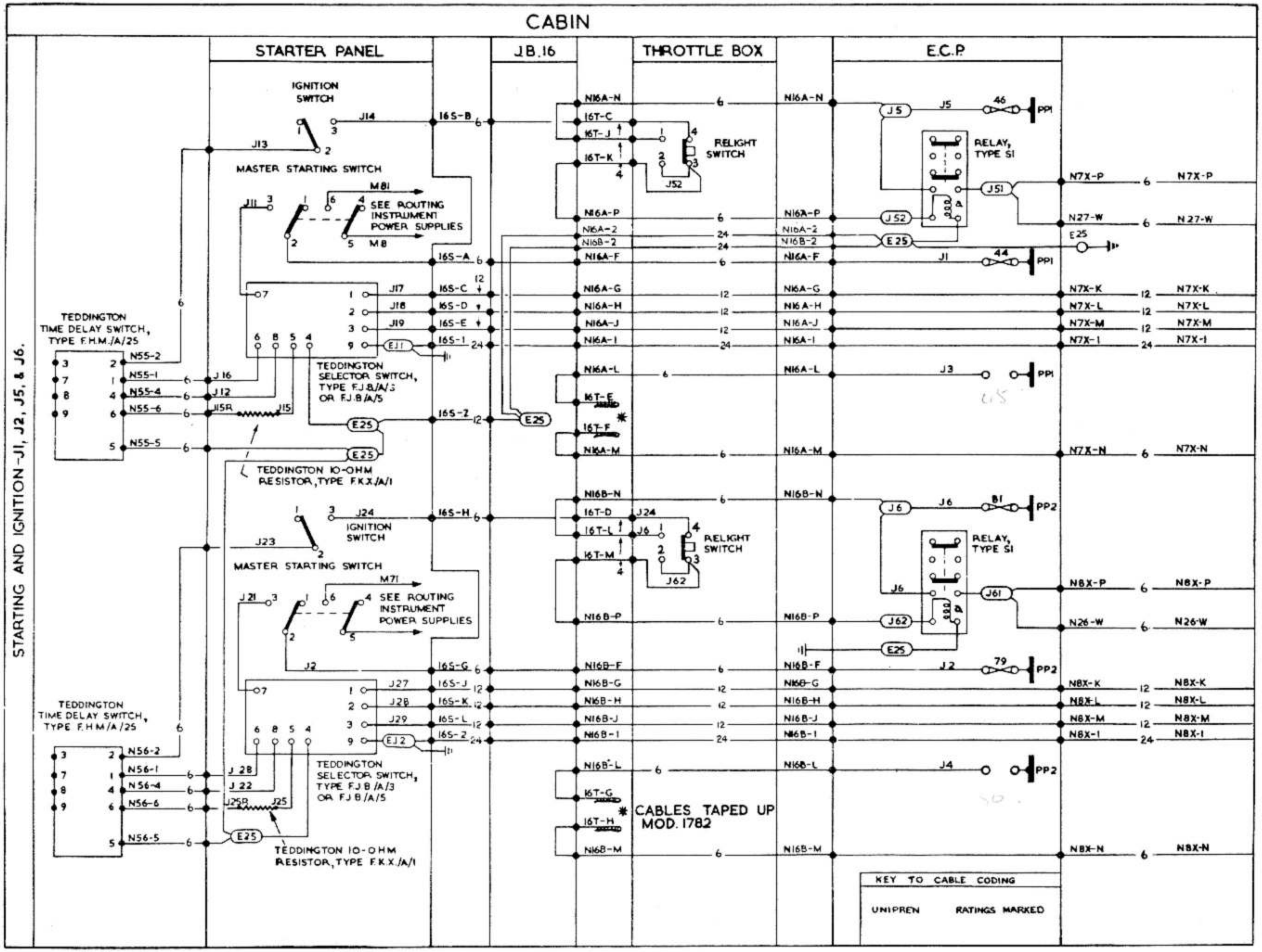

Fig. 2. Starting and ignition

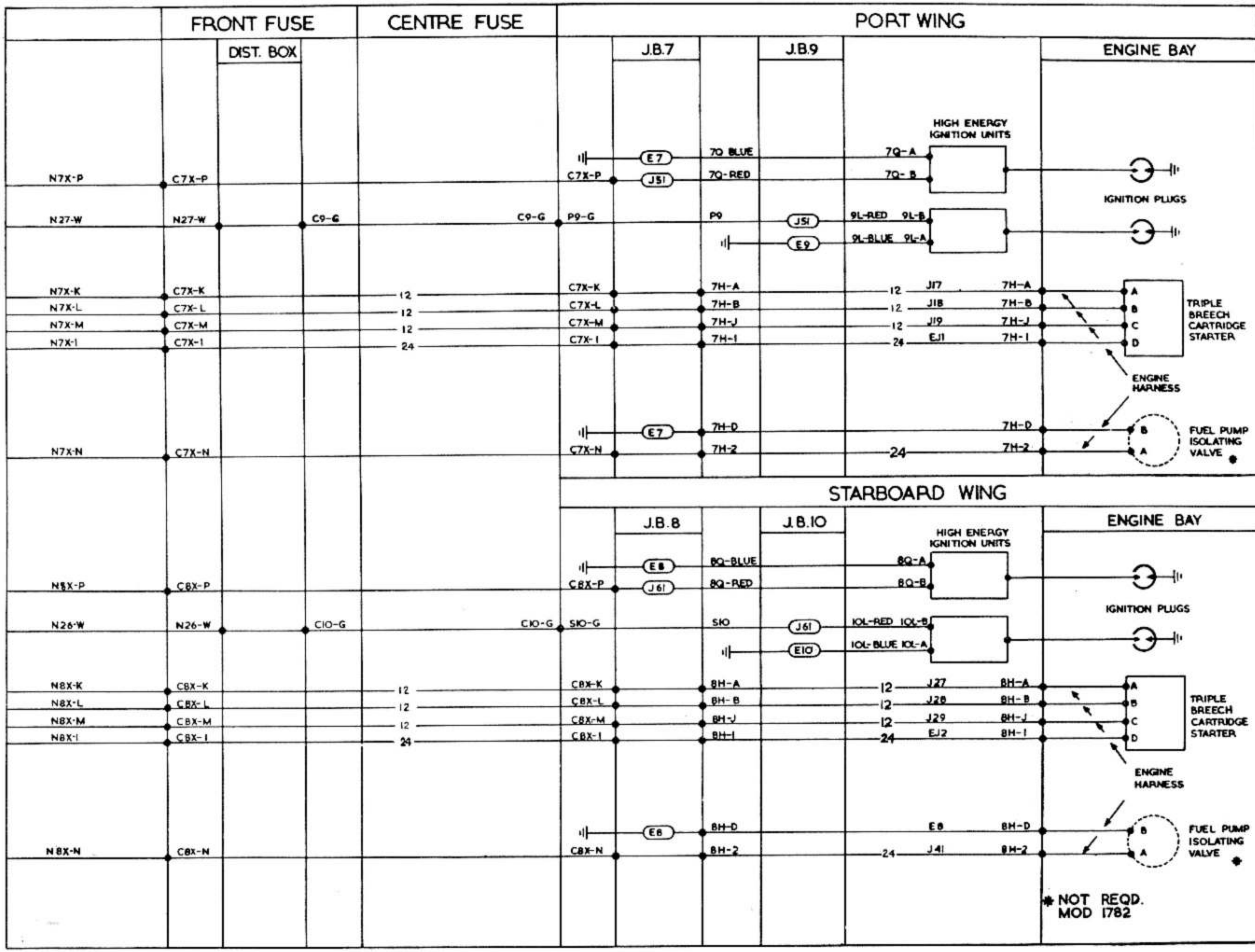

Fig. 2A. Starting and ignition

LIGHTING - GROUP L

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LIST OF ILLUSTRATIONS

EXTERNAL LIGHTING

General

1. All lighting circuits are controlled from the console by individual switches and an 'EXTERNAL LIGHTS MASTER SWITCH'. The lamp circuits are protected by a 'PILOT'S SERVICES' circuit breaker mounted on the sloping face of the E.C.P. A complete list of the lamp filaments used is included in Table 3 in the General Information group at the beginning of the chapter.

Navigation lamps

2. Four navigation lamps, one on each wing tip and two at the tail, are installed in the aircraft. One tail lamp is mounted below the rudder and the other fitted behind a transparent window under the tail structure.

Wing tip fuel tank lamps

3. As the normal wing tip lamps are obscured when jettisonable fuel tanks are carried, the nose of each tank is fitted with an extra navigation lamp which is connected into the normal lamp circuit by means of a spring contact block. If the tanks have to be jettisoned at night the extra lamps are lost and the wing tip lamps, then being visible, assume their normal function.

Identification lamp

4. A downward identification lamp, Type C, is installed on the underside of the fuselage just forward of the bomb bay on B Mk.6 aircraft and on the underside of the rear fuselage hatch on B (I) Mk.6 aircraft. The lamp is operated by two switches on the console, one a two-position switch giving STEADY and OFF, the other having a spring return OFF action for signalling.

Landing lamp

5. A retractable landing lamp, Type J, is installed on the underside of the port wing. The lamp is controlled from the console by a 3-position switch labelled 'OFF LOW-HIGH'. Setting the switch to 'LOW' operates the lamp to the half-extended position, at which point the filament is automatically switched on.

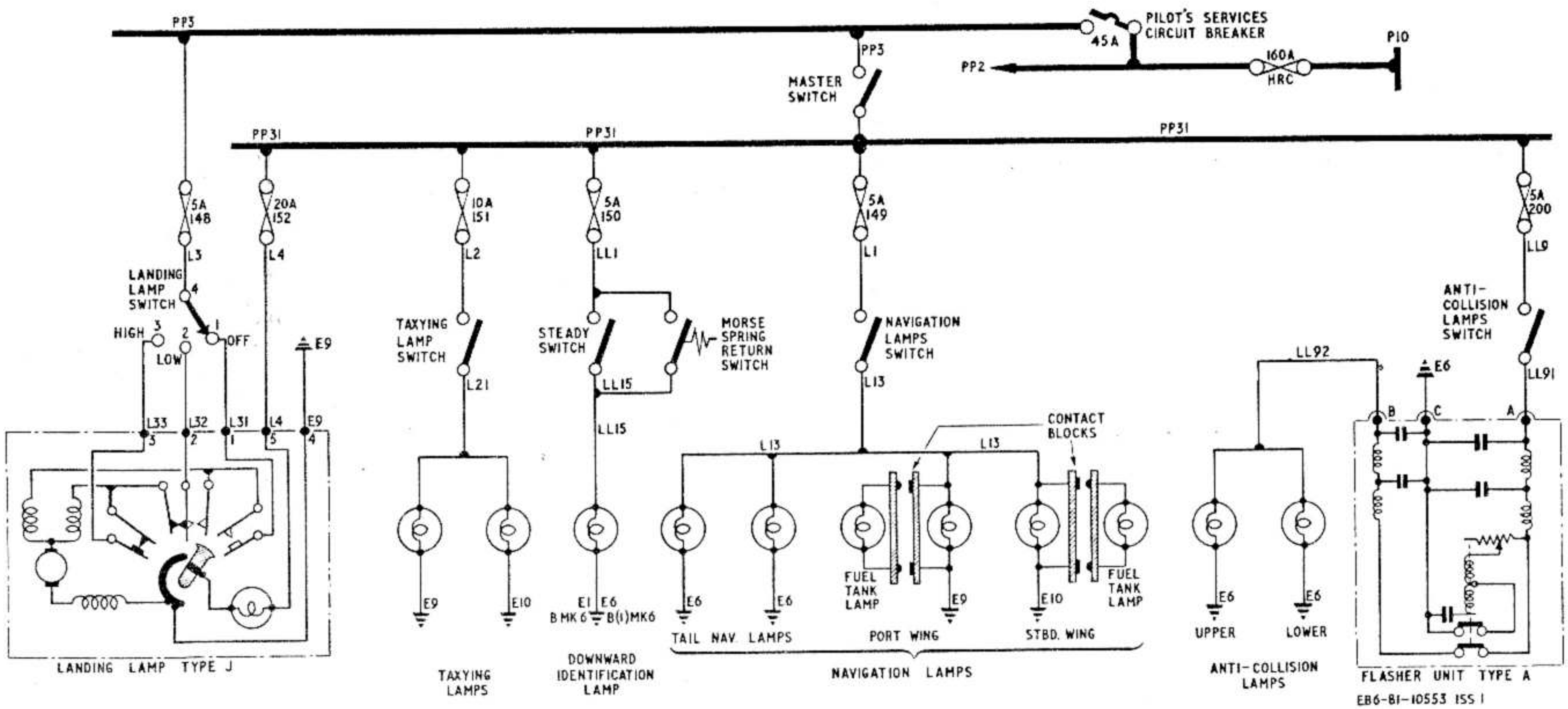

Fig. 1. External lighting – theoretical

Taxying lamps

6. Taxying lamps fitted near the navigation lamp in each wing tip are jointly controlled by a 2-position switch on the console.

Anti-collision lamps *(post Mod.3355)*

7. On aircraft post Mod.3355 two anti-collision *(flashing)* lamps are fitted one above and one below the rear fuselage between frames 32 and 34. An ON/OFF switch, labelled ANTI-COLLISION, is fitted on the console and when switched ON connects a supply to the lamps via a Type A flasher unit mounted in the roof of the rear fuselage aft of frame 33. Should the pulsating supply from the flasher unit fail, a direct supply is maintained and the lamp will remain on. Detailed information on the flasher unit is contained in A.P.4343C, Vol.1, Book 2, Sect.3, Chap.86.

INTERNAL LIGHTING

Air bomber's forward station lighting

8. General lighting at the prone position is provided by a Mk.1A lamp, having an integral switch and 2-pin socket in the base for use with an inspection lamp. Illumination of the bombing equipment is provided by a Type C red floodlamp, fitted with a wander lead, and controlled by a dimmer switch mounted on top of the oxygen regulator.

Cockpit lighting – instrument panels *(B Mk. 6 aircraft)*

9. Illumination of the pilot's instrument panels is provided by four U/V and seven red floodlamps positioned below the canopy coaming. The lamps are controlled by four dimmer switches mounted on the coaming panel; one red floodlamps switch and one U/V lamps switch located port; and the other two switches located starboard of the aircraft centre line. The starboard red floodlamps switch also controls a Type 462 lamp used for illumination of the E2A emergency compass.

Cockpit lighting – instrument panels *(B(I) Mk.6 aircraft)*

10. On B(I) Mk.6 aircraft pre Mod.4002, illumination of the pilot's instrument panels is provided by four U/V and seven red floodlamps positioned below the canopy

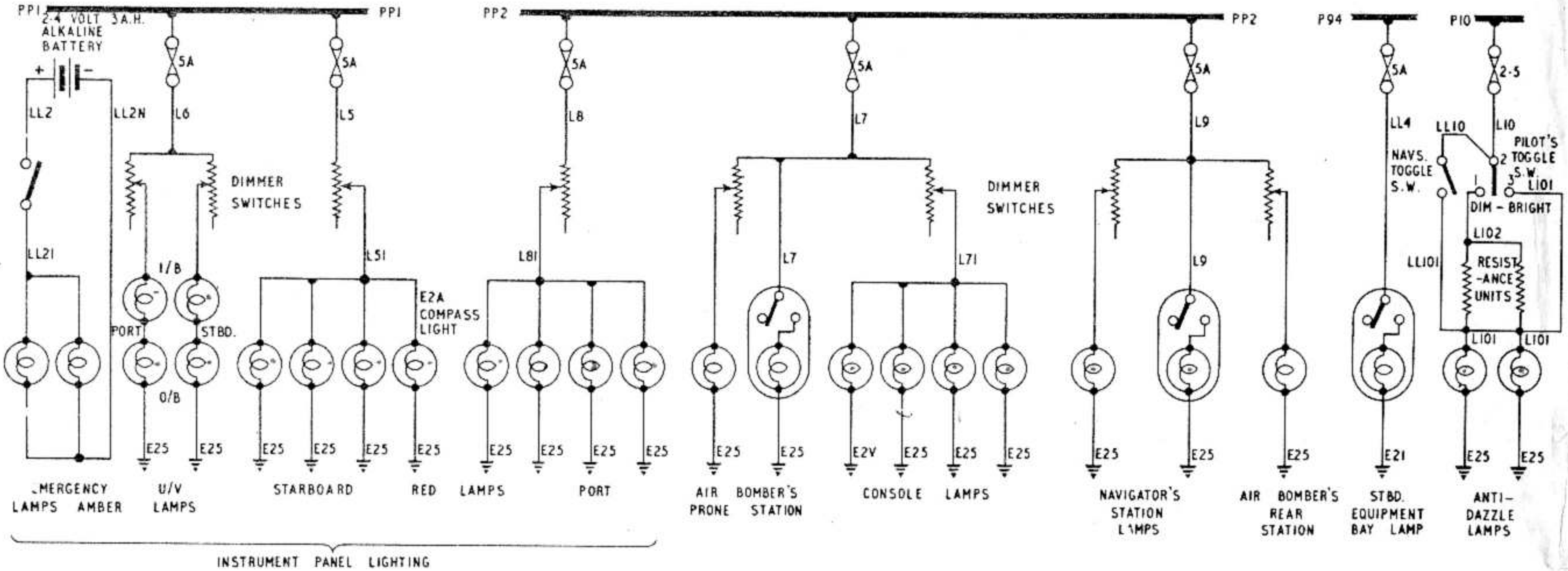

Fig. 2. Internal lighting (B Mk.6 aircraft) – theoretical

coaming. The lamps are controlled by four dimmer switches mounted on two panel assemblies which are attached one to the canopy coaming at the starboard side, and the other on the top of the console *(post Mod. 3518)*. The panel assemblies, each carry one U/V and one red floodlamps dimmer switch; the red floodlamps switch on the console also controls the Type 462 lamp used for the illumination of the E2A emergency compass. On aircraft post Mod. 4002, illumination of the starboard instrument panel is improved by the replacement of one of the red floodlamps with two U/V lamps which are controlled by the starboard U/V lamps dimmer switch. On aircraft fitted with U.H.F. *(post Mod.3403)*, the starboard red floodlamps dimmer switch also controls the lamp in the U.H.F. control unit on the starboard instrument panel. With a Mk.22 altimeter fitted on the main instrument panel *(post Mod.3896)*, two miniature pillar lamps are fitted above the instrument and are controlled by the port red floodlamps dimmer switch on the console.

Take-off and console panel lighting

11. The take-off and console panels are illuminated by five red floodlamps. The lighting intensity is controlled by two dimmer switches, one fitted on a panel under the coaming tube at the port side and the other immediately above the oxygen regulator.

Anti-dazzle lighting

12. Certain stores which may be carried by the aircraft produce an intensely bright flash when detonated. This flash may be so bright that the pilot's vision is reduced to such an extent that he may not be able to see the instruments. To obviate this, two high intensity lamps are focused on the main instrument panels so that the instruments may be seen during and after the flash.

13. The two high intensity lamps, having 12-watt filaments, are located one port and one starboard on the coaming tube. The lamps are connected in parallel and controlled by two switches, one a 3-position switch labelled OFF-DIM-BRIGHT, fitted adjacent to the emergency lighting switch on the starboard canopy coaming panel, and the other, a 2-position switch labelled OFF-BRIGHT, fitted on the navigator's instrument panel. Dimming of the lights is obtained by two parallel connected resistance units, installed below the coaming tube at the port side, which are in series with the lamps when the pilot's switch is selected to DIM. It should be noted that selecting BRIGHT

on the navigator's switch overrides DIM selection by the pilot's switch.

Note...
The pilot's switch dolly is diamond shaped to enable the switch to be located by touch either at night or during the flash period following the explosion of the store.

Emergency lighting

14. Illumination of the pilot's instrument panels in an emergency is provided by two amber floodlamps positioned one at each side of the cockpit. The lamps are controlled by a switch mounted on the coaming tube. On B(I) Mk.6 aircraft incorporating Mod. 1263, the switch is mounted adjacent to the anti-dazzle lights switch on the starboard coaming panel. The switch mounting plate has a luminous spot to facilitate its identification in the dark. Power for operating the lamps is provided by a 2.4 volt alkaline battery installed in the floor well forward of the rudder pedals.

Navigator's station lighting *(B Mk.6 aircraft)*

15. General lighting at the navigator's station is provided by a Mk.1A lamp, positioned above and to port of the navigator's table, which has an integral switch and a 2-pin socket in the base for use with an inspection lamp. Lighting of the navigator's instrument panel is served by an adjustable lamp, mounted above the table in the roof between frames 6 and 7, controlled by a dimmer switch mounted adjacent to the Mk.1A lamp.

Navigator's station lighting *(B(I)Mk.6 aircraft)*

16. General lighting at the navigator's station is provided by a Mk.1A lamp, positioned above and to port of the navigator's table, which has an integral switch and a 2-pin socket in the base for use with an inspection lamp. Lighting of the navigator's instrument panel is provided by ten miniature pillar lamps controlled by two dimmer switches located at the port side of the navigator's instrument panel. One of these switches also controls a red floodlamp mounted on the coaming panel above the electrical indicator. A red floodlamp, provided for the illumination of the navigator's oxygen regulator, is mounted on frame 6 at the side of the regulater and is controlled by a dimmer switch mounted adjacent to the Mk.1A lamp.

Air bomber's rear station lighting

17. Illumination of the air bomber's equipment at his rear station is provided by an adjustable lamp mounted on a bracket at the starboard side of the aircraft in the roof between frames 6 and 7. The lamp is controlled by a dimmer switch mounted adjacent to it.

◀ Bomb bay lighting *(post Mod.4162)*

18. Bomb bay lighting is provided by four Mk.1A cockpit lamps, one positioned at each of frames 15, 18, 20 and 23, adjacent to the centre line of the bomb bay roof. An external power supply is required to operate the lamps and a N.A.T.O. plug, mounted on the port side of bulkhead 13, provides the connection to the power source. Illumination of the lamps is controlled by a circuit-breaker positioned adjacent to the plug. ▶

M.E.P. servicing lamp

19. A Mk.1A lamp is mounted above the starboard equipment compartment access door for use during servicing of the generator control equipment.

20. As a safeguard against the aircraft taking off with the lamp illuminated, the power supply for the lamp is taken from circuit P94 via fuse No.13 in the M.E.P. Circuit P94 is fed from the third *(small)* pin of the external supply plug and is only 'live' when an external power socket is connected. Under this condition the small pin is connected to the large positive pin.

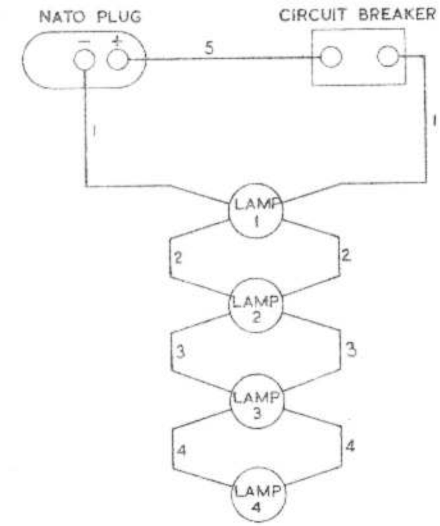

Fig. 2A. Bomb bay lighting
(B (I) Mk.6 aircraft)
◀ *(post Mod.4162)* ▶

21. If a conversion plug/socket adapter *(Ref.No.105G/11)* is used to make the connections between a standard 2-pin supply plug and the aircraft 3-pin external supply plug, it is essential to check, before take-off that the adapter is not left in situ on the external supply plug.

Inspection lamp

22. An inspection lamp which can be plugged into any of the Mk.1A lamp sockets is carried in a stowage bag located near the floor of the starboard side of the cabin. An extension lead for the lamp is carried in another bay near the lamp stowage.

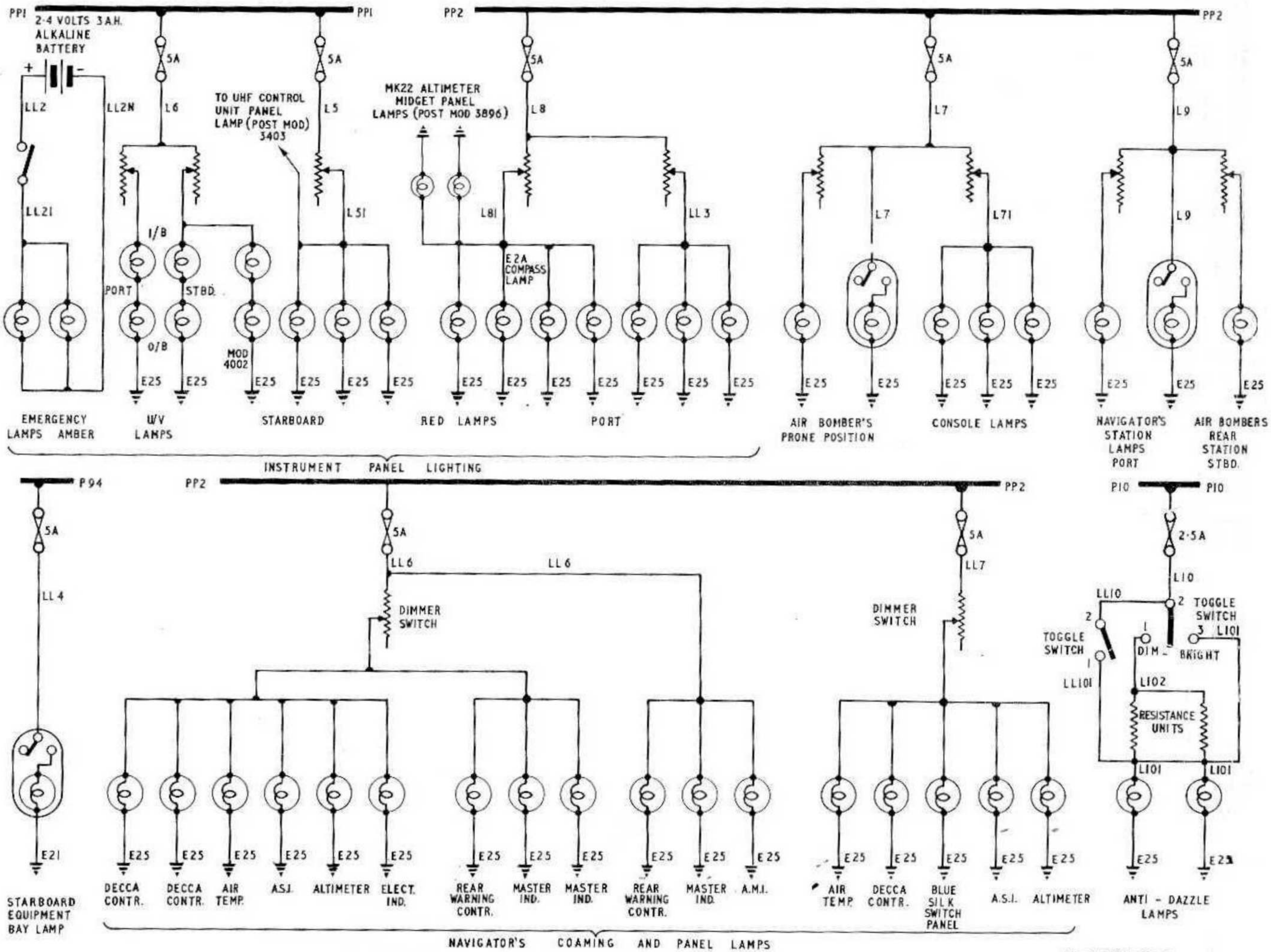

Fig. 3. Internal lighting (B(I)Mk.6 aircraft) – theoretical

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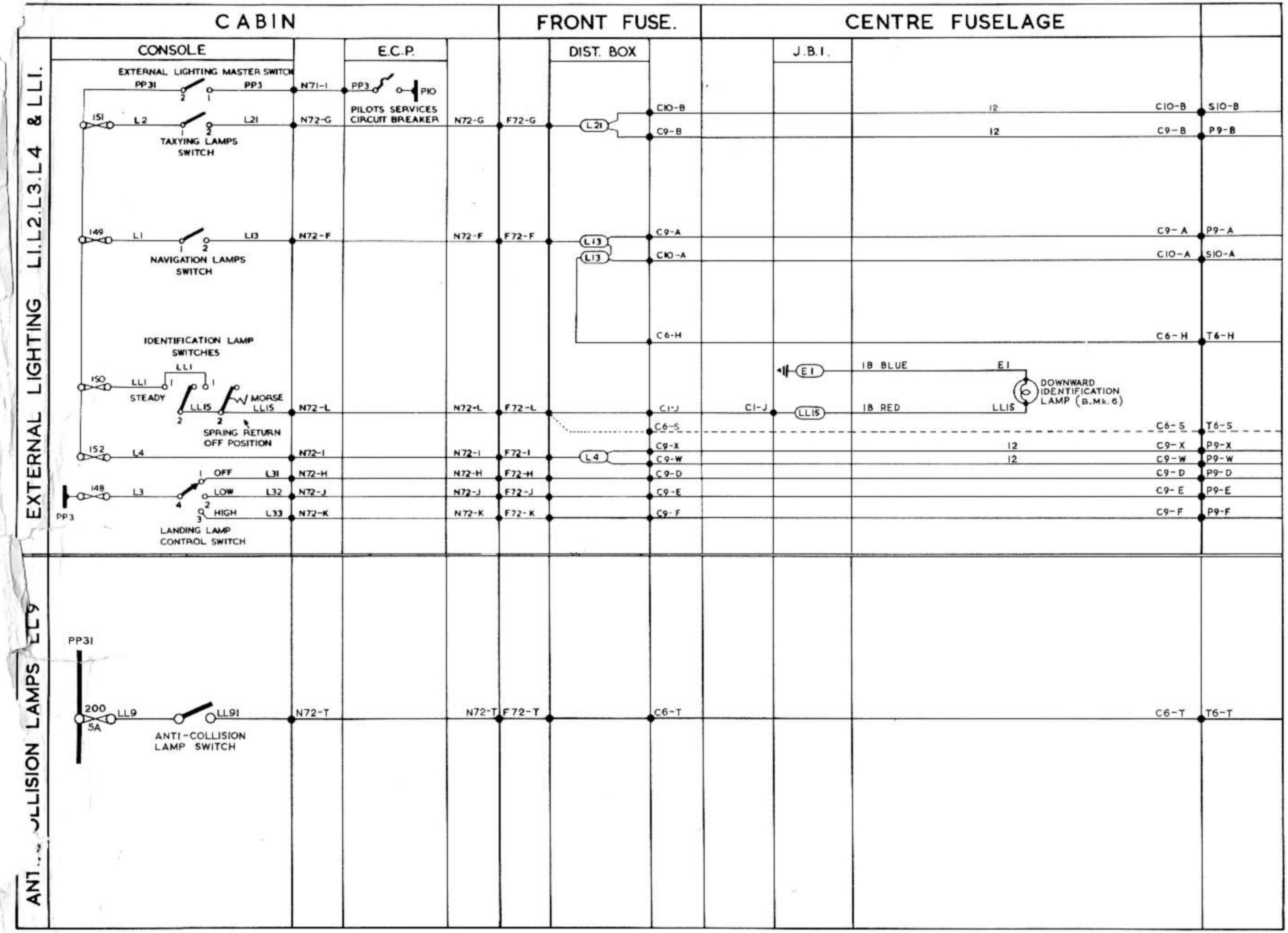

Fig. 4. External lighting – routeing

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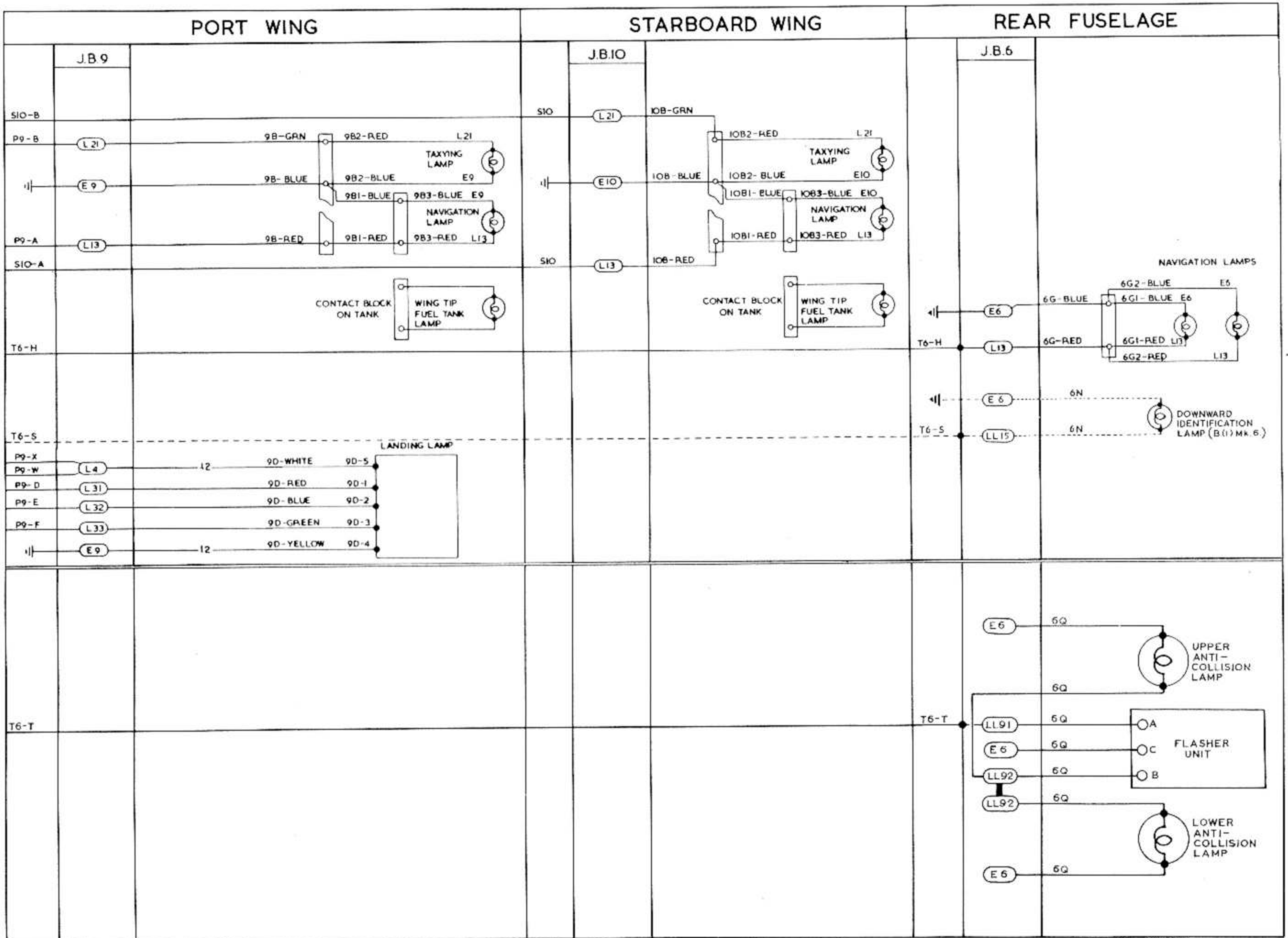

Fig. 4A. External lighting – routeing

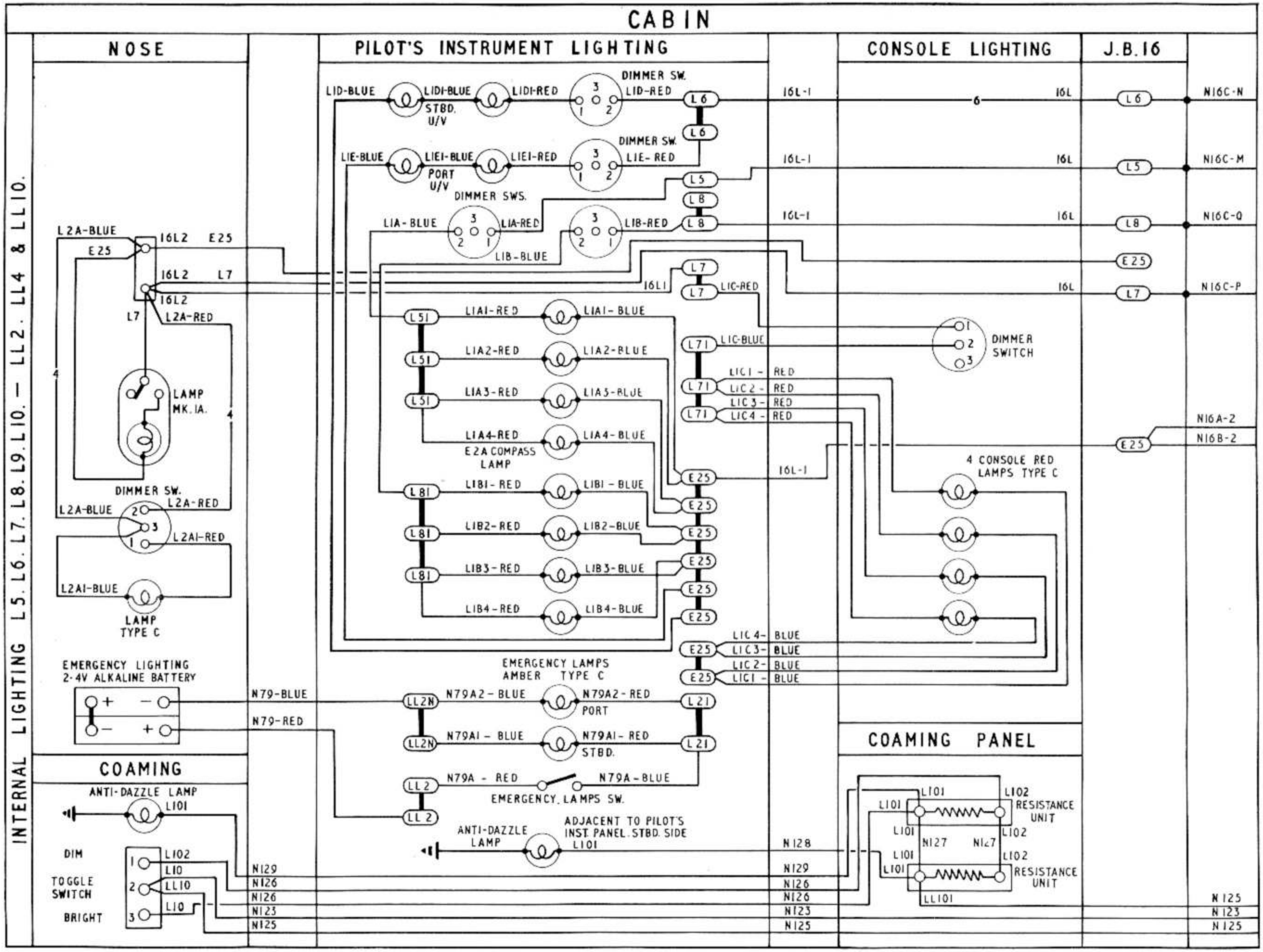

Fig. 5. Internal lighting (B Mk.6 aircraft) — routeing

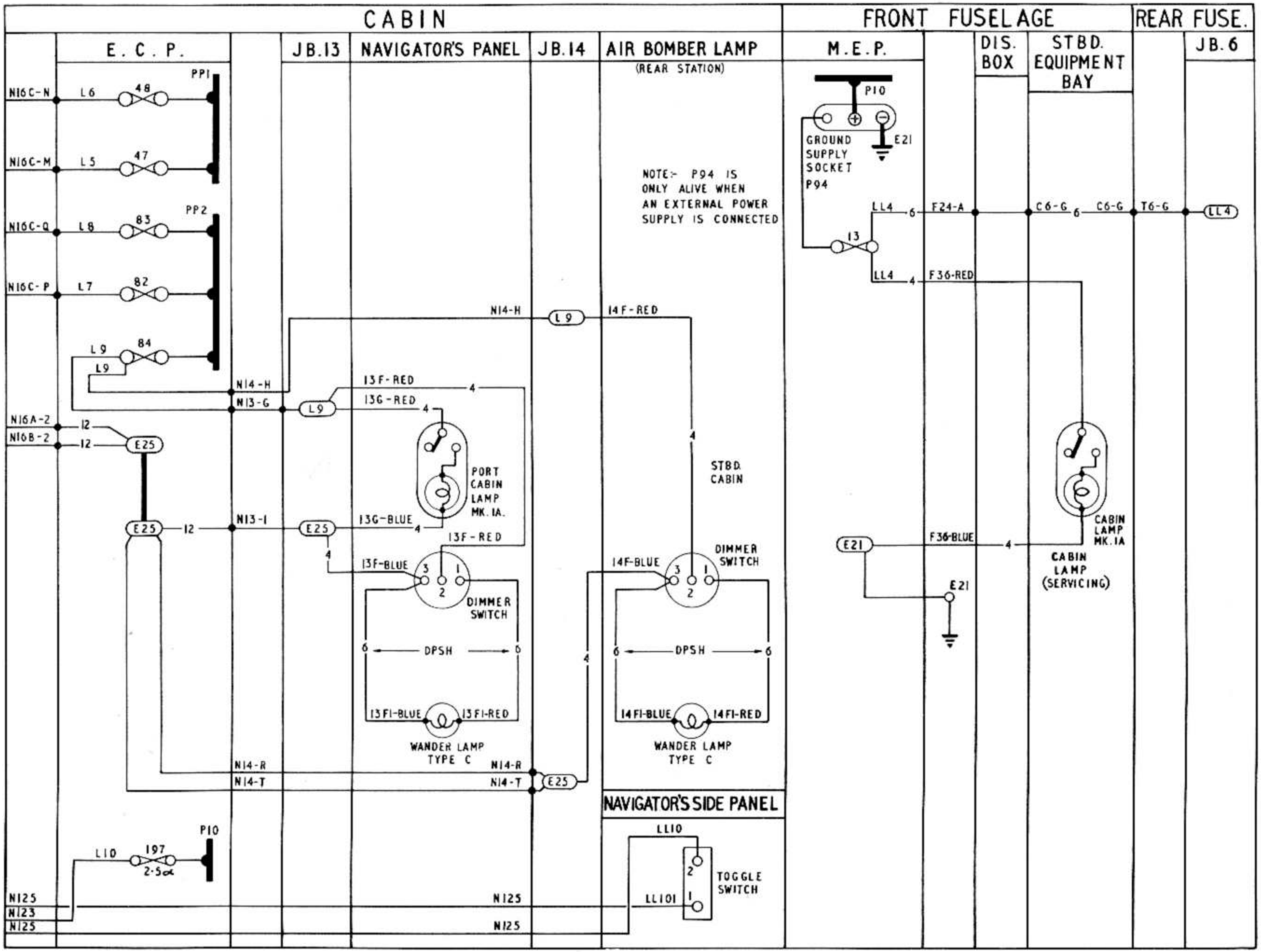

Fig. 5A. Internal lighting (B Mk.6 aircraft) – routeing

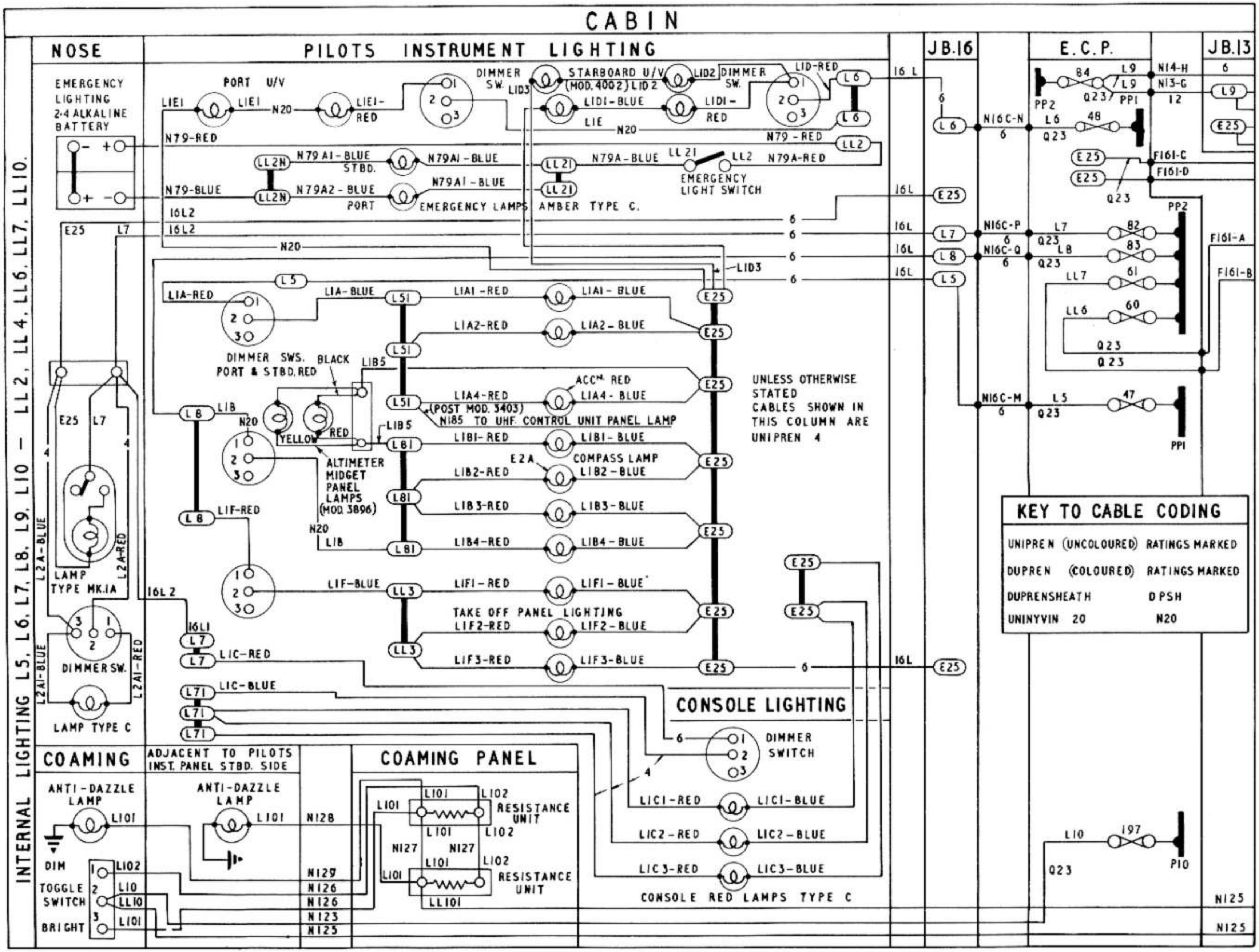

Fig. 6. Internal lighting (B(I)Mk.6 aircraft) – routeing

◀*(Mod.3518 embodied)*▶

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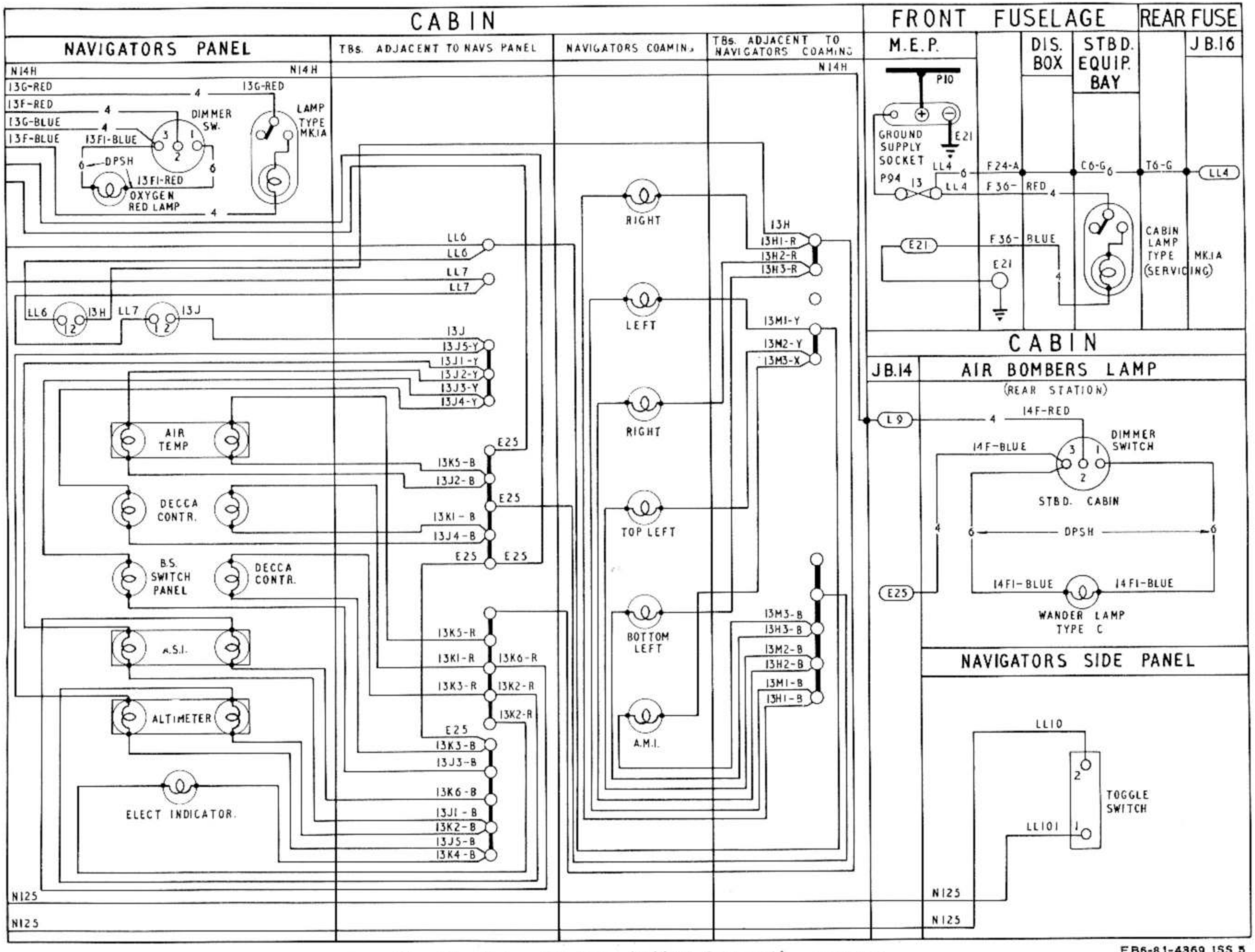

Fig. 6A. Internal lighting (B (I) Mk.6 aircraft) – routeing

D.C. POWER SUPPLIES GROUP – P

(Completely revised)

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Introduction

1. This group contains a description of the d.c. power supplies for aircraft post Mod.3357. Information on the d.c. power supplies for aircraft pre Mod.2155 (or 2393) and post Mod.2155 (or 2393) is given in Appendix 1 and 2 of this group respectively. Circuit and routeing diagrams are included in this group whilst the location of the main items of equipment is given in the General Information at the beginning of this chapter.

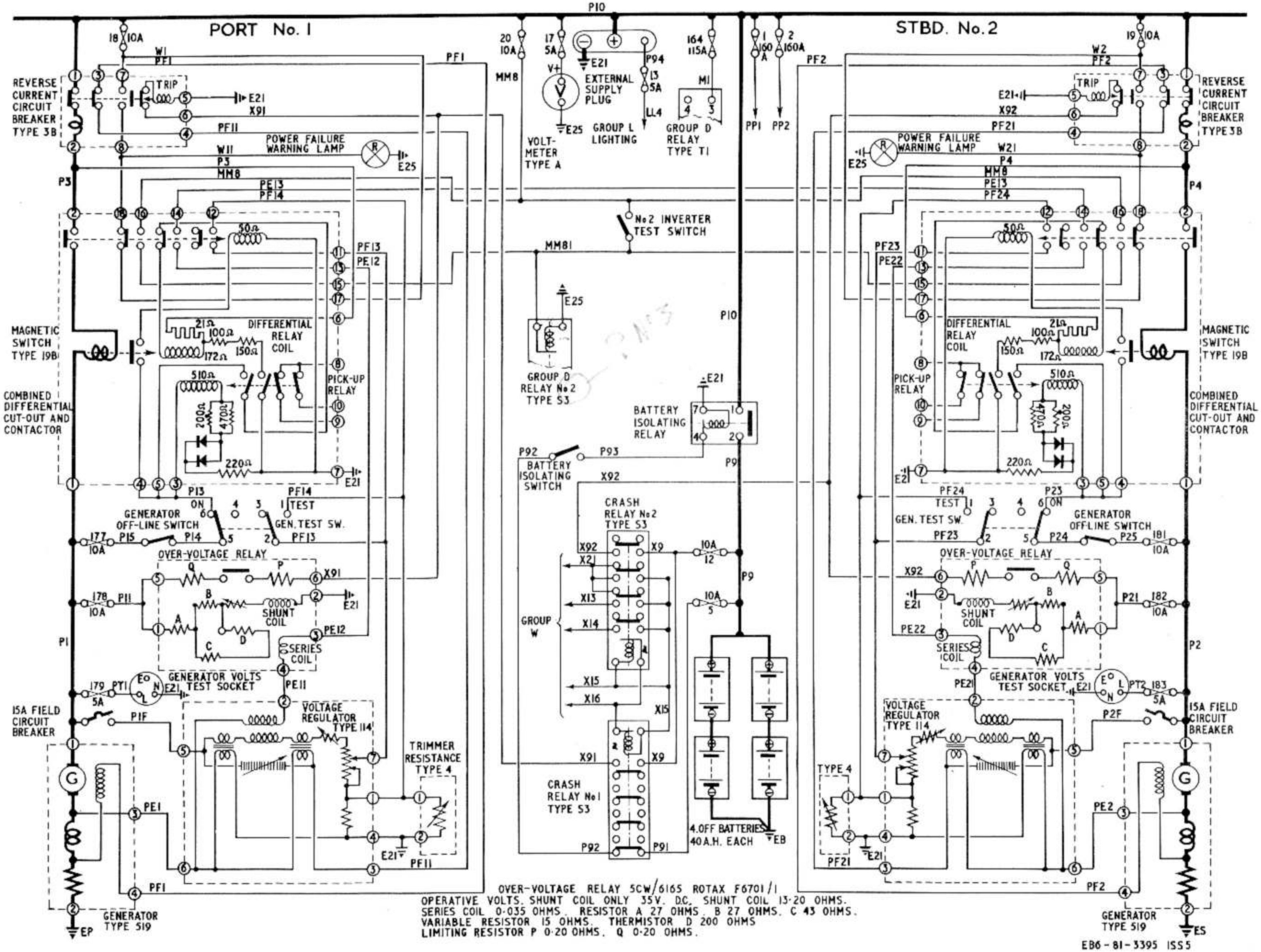

Fig. 1. D.C. power supplies (post Mod. 3357)

DESCRIPTION

General

2. Power for the electrical services and battery charging is provided by two Type 519, 300-amp generators operating in parallel with an output voltage automatically controlled at 28 volts. Each generator is installed in the leading edge of the main plane and driven from the accessory gearbox of its respective engine. The positive terminal of each generator is connected to busbar P10 via a Type 19B magnetic switch and a reverse-current circuit breaker, whilst the negative terminal connects to the main plane earth point. Also used in each generator circuit is a Type 18B overvoltage relay. Unipren 280 amp cable is used for the generator main cables and heavy duty terminals are provided at the wing breaks for connecting the wing and fuselage sections of the main positive leads. The magnetic switches and the reverse-current circuit breakers are fitted on the main electrical panel *(M.E.P.)* together with the overvoltage relays and other ancillary equipment.

Generator, Type 519

3. The Type 519 generator is a six pole, shunt-wound machine incorporating interpole and compensating windings. A resistance comprising two parallel-connected rings of resistance strip is connected in series with the compensating windings and earth; when the generator is developing its full output of 300-amp a drop of 2 volts occurs between the negative terminal (2) and the negative brush terminal (3). This voltage is proportional to the output current of the generator and is used to maintain a balanced output from the two generators during parallel operation. Detailed information on the Type 519 generator will be found in A.P.4343A, Vol.1, Sect.3, Chap.21.

Voltage regulator, Type 114

4. Output of each generator is maintained at 28 $^{+0.75}_{-0.5}$ volts throughout variations of generator speed and load by a Type 114 regulator which automatically controls the shunt field current. The regulator is mounted on a panel fitted adjacent to its respective generator.

Reverse-current circuit breaker, Type 1B No.6

5. This unit is a high-rupturing-capacity switch capable of breaking a current of several thousand amp. It is set manually and may be tripped either electrically or manually. In the event of a direct failure to earth at a point between the generator positive terminal and terminal 2 of the reverse-current circuit breaker, both the associated generator and the remainder of the system feed into the fault. The resulting surge of current immediately trips the circuit breaker, thus isolating the fault from the busbar system. At the same time, auxiliary contacts on the circuit breaker isolate the trip coil, complete the circuit of the generator warning lamp, and interrupt the shunt field circuit, rendering the generator inoperative. The reverse-current circuit breaker is described in A.P.4343B, Vol.1, Sect.10.

Switch magnetic, Type 19B

6. This unit is designed to connect a generator to a busbar when the generator voltage exceeds the busbar voltage by a predetermined value, and to disconnect the generator when its voltage is sufficiently reduced to cause a reverse current to flow.

7. When the generator output reaches 20 to 22 volts, a pick-up relay operates and closes two pairs of contacts, through one pair of which the generator voltage is applied to a polarized differential relay coil. When the generator voltage exceeds the battery voltage by 0.3 to 1.0 volt the differential relay operates and closes contacts carried on an armature within the field of a permanent magnet. The influence of the magnet holds the armature stable to the side to which it was last operated. The contacts, when closed, connect the generator voltage to the operating coil of the contactor which, when energized, causes its main contacts to close, thus connecting the generator to the busbar via the reverse-current circuit breaker contacts. The contactor carries three pairs of auxiliary contacts which, when the contactor is energized, close to complete three circuits. One set of contacts provides an interlock between the generators and the No.1 inverter *(instruments normal supply)*, thus ensuring that the inverter does not start until one generator is charging; the other two pairs of contacts complete the equalising and voltage regulator circuits respectively.

8. A series-current coil fitted in the generator positive line is wound around the differential relay coil and assists the permanent magnet in holding the differential relay contacts closed. When the generator output falls below that of the battery, a reverse current flows from the busbar to the generator. When this current reaches a value of between 20 and 30 amps, it op-

poses the permanent magnet sufficiently to reverse the flux in the armature of the differential relay, thus opening the contacts and breaking the circuit to the contactor coil. The main contacts then open and the generator is disconnected from the busbar.

Overvoltage relay, Type 18B

9. In the event of excessive voltage being generated due to faulty voltage regulation, the overvoltage relay and its associated circuits will isolate the affected generator from the system.

10. The Type 18B relay is designed to operate when the generator voltage rises above its 125 per cent of normal value. When overvoltage is applied to a shunt coil the resulting rise in load-sharing current is applied to a series coil. The energization of both coils causes the contacts between two resistors, Q and P to close. Closure of the contacts connects the generator output to the trip coil of the reverse-current circuit breaker and results in disconnection of the generator from the busbar.

Supply voltmeter

11. Continuous indication of the supply voltage at busbar P10 is given by a voltmeter on the pilot's starboard instrument panel. The voltmeter indicates irrespective of whether the internal battery or an external supply is connected to busbar P10.

Generator failure warning lamps

12. Two generator failure warning lamps are fitted on the pilot's starboard instrument panel. The tripping of either generator circuit lights its respective red warning lamp.

Generator OFF-LINE switches

13. Port and starboard generator OFF-LINE switches for the pilot's use are fitted on the take-off panel. The switches, labelled NORMAL and EMERGENCY and normally set to the NORMAL position, are connected in series with the ON circuit of the generator test switches described in para. 14.

Generator test panel

14. Each generator circuit includes a switch having a TEST position and a spring-loaded ON position, a test voltmeter socket, and a Type 4 voltage regulator trimmer resistance, all of which are mounted on the M.E.P. The TEST position is selected when it is necessary to isolate the generator from busbar P10 during ground servicing. With the switch at TEST, a section of the ballast resistance of the respective voltage regulator is short circuited to simulate the 'on load' condition while a voltage check is made. Voltage adjustment is effected by rotating the trimmer spindle in the appropriate direction with a screwdriver.

Field circuit breakers

15. Two shunt field circuit breakers are mounted on the M.E.P. and normally set to the 'closed' position.

Main relay, Type R

16. Connection between the main battery busbar P9 and the generator busbar P10 is made via a Type R relay on the M.E.P. The relay is normally controlled by the BATTERY ISOLATING switch on the take-off panel. In a crash landing the relay is automatically opened by the operation of the inertia switch system which isolates the battery supply from all services except the ◀ fire extinguisher, detonator *(pre Mod.4072)* ▶ and bomb jettison circuits.

Inertia switch circuit

17. Two inertia switches are fitted on the forward face of frame 21, a starboard switch below the M.E.P. and a port switch in the V.H.F. compartment. The switches control the operation of two crash relays, numbered 1 and 2, mounted on the M.E.P. In the event of a crash landing, the No.1 relay de-energizes the Type R relay which opens to isolate the battery from the P10 busbar and simultaneously energizes the trip coil of the port generator reverse-current circuit breaker. Operation of the No. 2 relay energizes the fire extinguisher circuits and the trip coil of the starboard generator reverse-current circuit breaker. Opening of the reverse-current circuit breakers isolates the generators from P10 busbar and breaks their shunt field circuits.

External power supply

18. An external supply of 24 volts may be connected to the aircraft via a three-pole plug on the M.E.P. To permit the use of a ground supply cable fitted with a two-pole plug, an adapter *(Ref.No. 105G/11)* is available. The third *(small)* pin on the aircraft plug receives a positive feed whenever an external supply socket or socket/plug adapter is connected to it. This feed, P94, after passing through fuse 13, becomes LL4 which is the supply to the Mk.1A lamp fitted above the hatch to the starboard equipment compartment. It is important that if a socket/plug adapter is used, it should be removed before flight.

Main batteries

19. Four Type C lead-acid batteries are installed at the port side in the fuselage, aft of the pressure bulkhead. Each battery is rated at 12 volts, 40-amp hours and all four are connected in series/parallel to give 24 volts, 80-amp hour. The batteries

are mounted on a sliding tray carried on rollers and are accessible through the fuselage access door forward of the port wing.

24 volt emergency batteries

20. Two series-connected lead-acid batteries rated at 12 volts, 4-amp hour are mounted on a tray in the pilot's console and are accessible after the removal of the pilot's map stowage secured to the inboard side of the console structure. The emergency batteries are provided for the emergency operation of the turn and slip indicator and the detonator circuits.

2.4 volt emergency lighting battery

21. A 2.4 volt alkaline battery, located on a diaphragm below and forward of the rudder pedals, is provided for the pilot's instrument panel emergency lighting.

SERVICING

General

22. Whilst the generator system continues to function satisfactorily, no attention is required in service other than ground running tests and routine examination of the components and connecting cables for security, cleanliness, and freedom from corrosion or damage. Information covering ground running tests and fault location will be found in A.P.4343, Vol.1, Sect.2, Chap.5.

Generator, Type 519

23. General information applicable to all types of generators is contained in A.P. 4343, Vol.1, Sect.2, Chap.1. Servicing of the Type 519 generator is covered in A.P. 4343A, Vol.1, Sect.3, Chap.21

Voltage regulator, Type 114

24. Servicing information applicable to carbon pile regulators generally is given in A.P.4343, Vol.1, Sect.6, Chap.1. Descriptive and servicing information for the Type 114 voltage regulator will be found in A.P.4343, Vol.1, Book 1, Sect.1, Chap.41.

Reverse-current circuit breaker

25. Whilst operating satisfactorily this unit requires no attention. When faulty it should be returned to a Maintenance Unit for repair.

Switch magnetic, Type 19B

26. Servicing information on this unit will be found in A.P.4343C, Vol.1, Book.2, Sect.3, Chap.123.

Overvoltage relay, Type 18B

27. Detailed information on the construction, operation and servicing of this unit will be found in A.P.4343C, Vol.1, Book 2, Sect.3, Chap.113.

Main batteries

28. The batteries must be removed and serviced in accordance with the aircraft servicing schedule. During removal or replacement, the four batteries must not be placed on the access door simultaneously or damage to the door support members may result. When the batteries have been removed, the battery cables should be stowed on the terminals provided

Emergency batteries

29. These batteries are anchored to a tray by rubber bungees fitted with quick-release clips. Two insulated terminals are provided below the tray for stowing the battery cables when the batteries are removed from the aircraft.

30. The batteries should be removed for servicing and charged at the rate shown on the battery label in accordance with the aircraft Servicing Schedule. It is essential that the battery tray and adjacent structure be kept clean and free from any trace of electrolyte which would cause corrosion.

31. During servicing it will be found easier to remove the forward battery first and replace it last.

2.4 volt emergency lighting battery

32. The battery should be removed from the aircraft periodically for servicing and charging in accordance with the aircraft Servicing Schedule.

33. If it is necessary to top up the electrolyte add distilled water only. On no account is lead-acid battery electrolyte to be used. The terminals and the tops of the cells should be kept clean and lightly coated with vaseline.

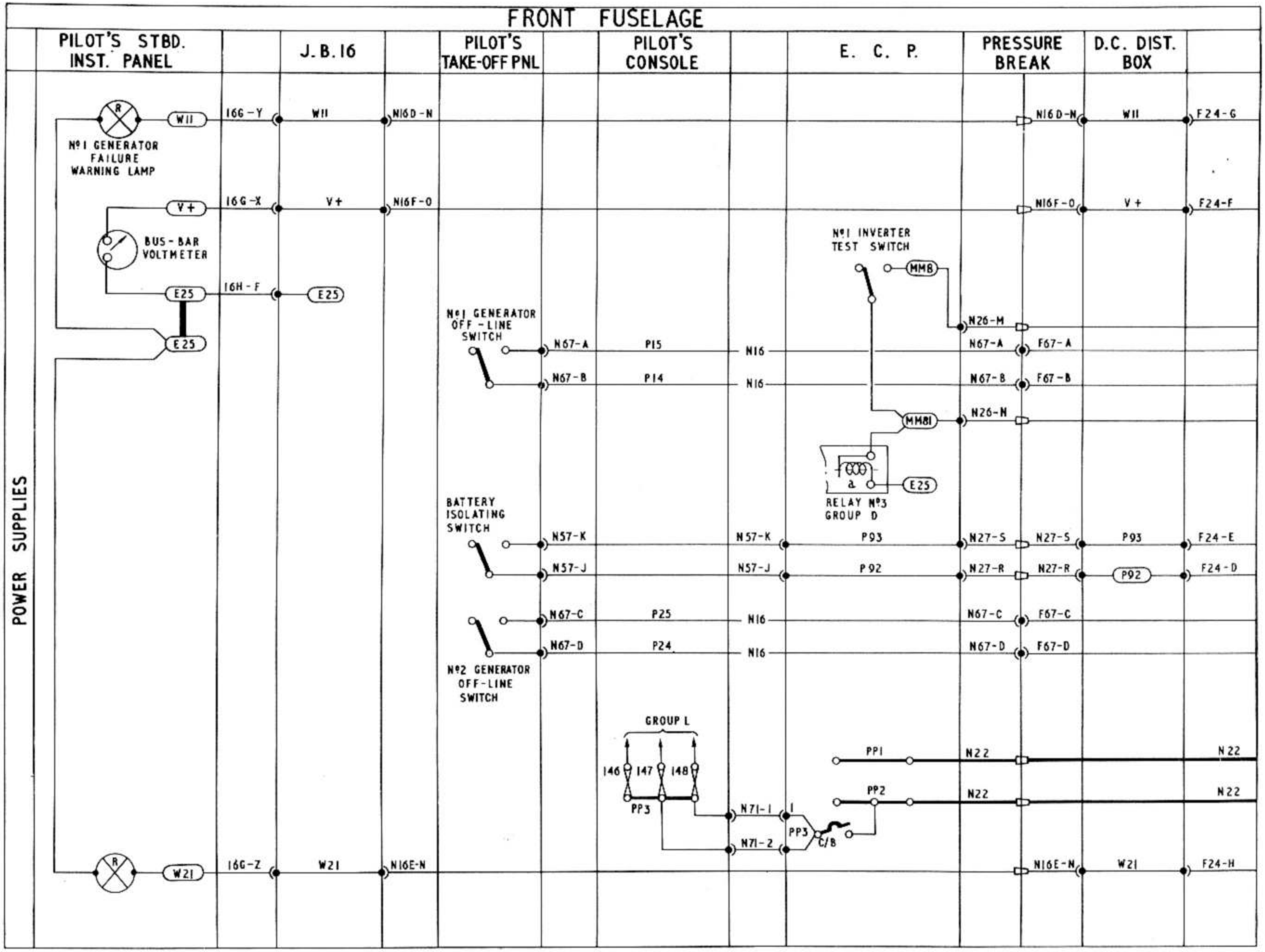

Fig. 2. D.C. power supplies (post Mod. 3357)

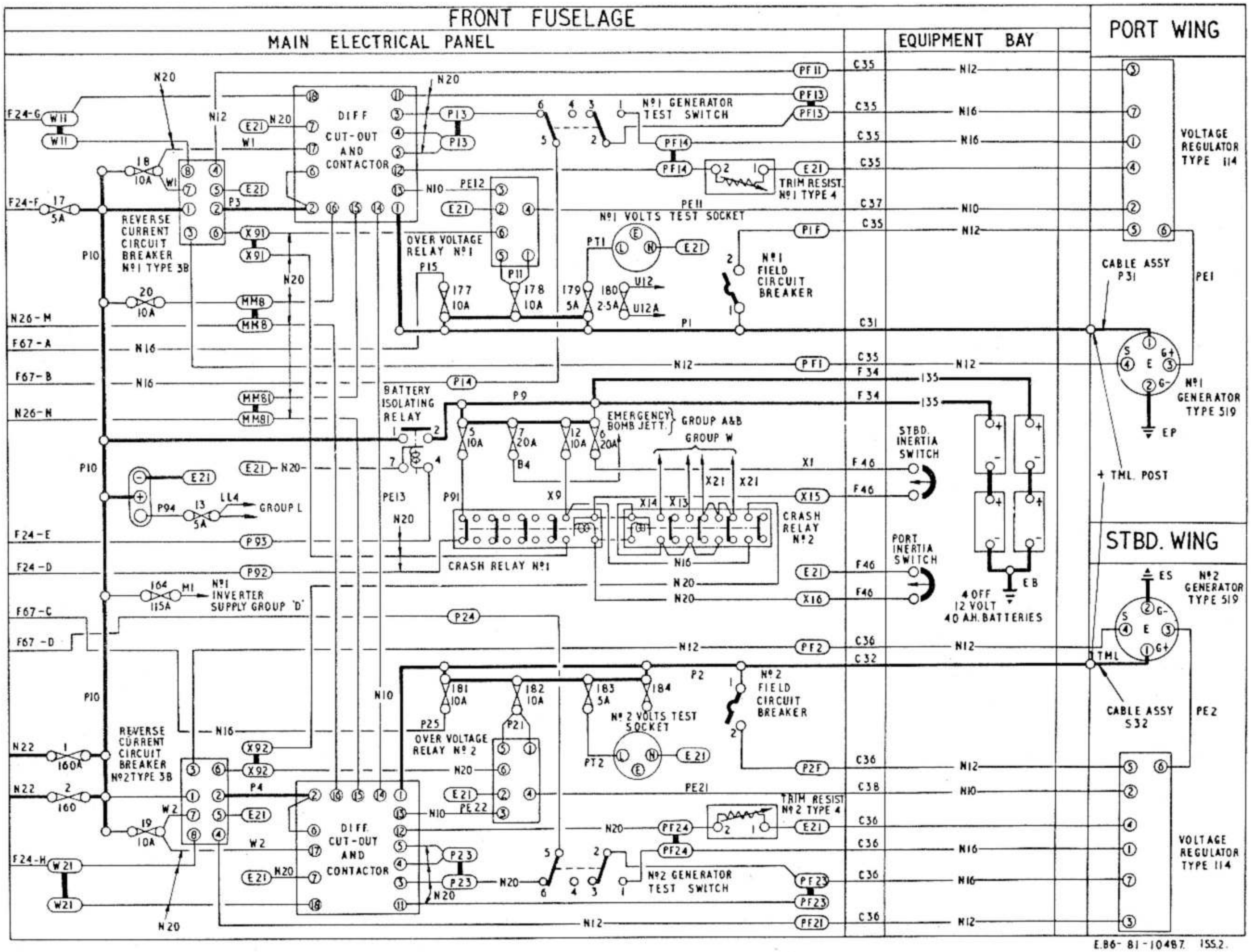

Fig. 2A. D.C. power supplies (post Mod.3357)

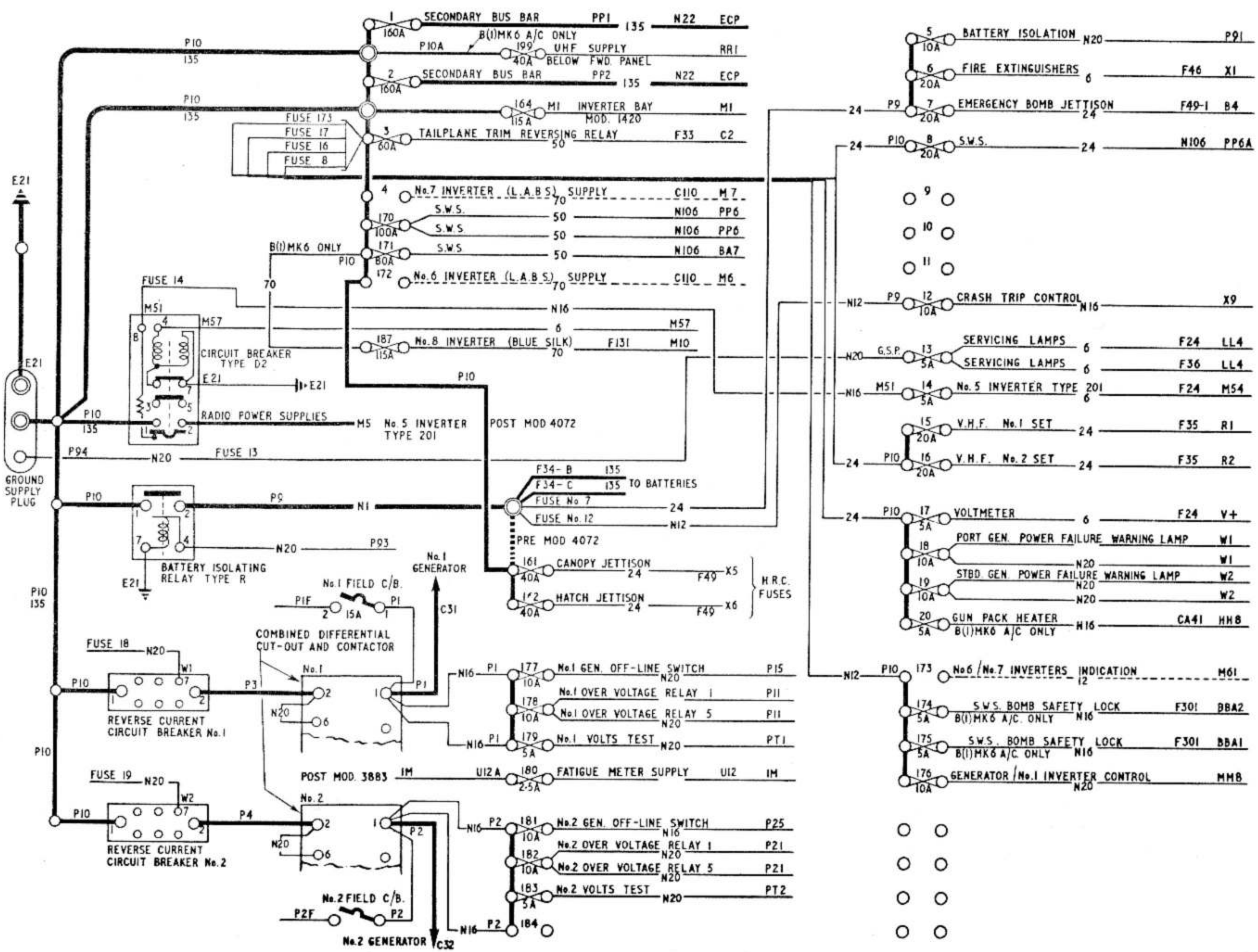

Fig. 3. Power supplies distribution (M.E.P.)

◀ *(Mod. 4329 and 4345 embodied)* ▶

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D. C. POWER SUPPLIES - GROUP P

◄ APPENDIX 1 ►

(Aircraft Pre. Mod.2155 or 2393)

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LIST OF ILLUSTRATIONS

DESCRIPTION

General

1. On aircraft pre Mod.2155 or 2393, power for the electrical services and battery charging is provided by two 200 amp, Type P3 generators, operating in parallel. The output voltage of each generator is automatically controlled at 28 volts. Each generator is driven through a 2-speed gearbox which, in turn is coupled to the accessory gearbox. The 2-speed gearbox provides that a high output is available from a generator at low engine r.p.m. The gear change is automatic and controlled by a centrifugal clutch mechanism when this is subjected to a variation, within limits, of engine r.p.m. At low speeds the clutch is IN and high gear is engaged with the result that the generator is driven 1.1072 times the engine speed. When engine r.p.m. rises to between 5930 and 6890, the high gear is automatically disengaged and the generator

is then driven at 0.64 engine speed. On a reduction of engine r.p.m. to between 5900 and 5150, high gear is re-engaged and results in an increased generator output relative to engine speed. The Type P3 generator is described in A.P.4343A, Vol.1, Sect.3, Chap.8.

Generator control system

2. The equipment used to control each generator comprises a Type 23 voltage regulator, a Type A differential cut-out, and a Type D circuit breaker installed on the M.E.P., a generator switch and field circuit breaker on the E.CP., and a Type X3 suppressor located in the inboard leading edge of the main plane. A Type 32 voltage regulator, also on the M.E.P., is used to balance the output from both generators and maintain it at a steady figure. Voltmeter and ammeter test sockets for checking generator operation are fitted on the M.E.P. and connected to shunts in series with the Type A cut-outs and Type D circuit breakers. Generator failure is indicated by red warning lamps adjacent to a voltmeter above the entrance door. The voltmeter provides a continuous indication of the supply voltage at busbar P10.

Operation

3. Each generator is initially controlled by its switch and field circuit breaker on the E.C.P. The paralleled output from both generators is connected to busbar P10 and fed to the aircraft battery via a Type R relay on the M.E.P. *(The function of the Type R relay is described in the main Group).* The failure warning lamp for either generator comes on if its associated Type D circuit breaker opens as a result of a fault in the generator unit or generator circuit.

Inertia switch circuit

4. Two inertia switches are fitted on the forward face of frame 11, the starboard switch below the M.E.P., and the port switch in the V.H.F. compartment. The switches control the operation of a Type S relay in the distribution box. The relay, when energized through the operation of the inertia switches, completes the circuits to operate the fire extinguisher and breaks the energizing circuit to the Type R relay which in consequence, isolates the main battery from all services except the fire extinguishers, bomb jettison and detonator circuits.

Batteries

5. The battery systems are the same as that described in the main group.

SERVICING

Charging circuit failure

6. On indication of a failure being given by a generator failure warning lamp, an examination should be made of the connections, etc., to the main components in the suspect system. If the failure indication be given during or after prolonged periods of high-altitude flying it is advisable to check the generator brushes as under these operating conditions abnormal brush wear can take place and cause a generator to quickly become unserviceable. The finding of worn brushes in one generator should lead to an examination of the other, although that unit may apparently be operating satisfactorily. Brushes should be renewed if found to be less than 0.42 in. in length or if their condition suggests that they will wear below that minimum before the next servicing examination is due. New brushes should be an easy sliding fit in their holders and bedded over their full thickness and at least 80 per cent of their axial length. Brush spring pressure should be maintained between 17 and 19 oz. After a visual examination of a suspected generator, its insulation should be tested to the figure given in A.P.4343A, Vol.1, Sect.3, Chap.8. If after test it is considered serviceable, it should be run to enable voltage regulator checks to be made in accordance with the instructions given in the following paragraphs.

Voltage regulator setting

7. (1) Switch OFF the battery isolation switch on the take-off panel.

(2) Connect a ground supply to the external power plug.

(3) Switch OFF the generator switches on the E.C.P.

(4) Close both field circuit breakers on the E.C.P.

(5) Connect a testmeter, Type D *(set to the 30 volt d.c. range)* to No.1 voltmeter socket on the M.E.P.

(6) Start No.1 *(port)* engine and run up to approximately 3500 r.p.m. and by adjusting the trimmer on the port voltage

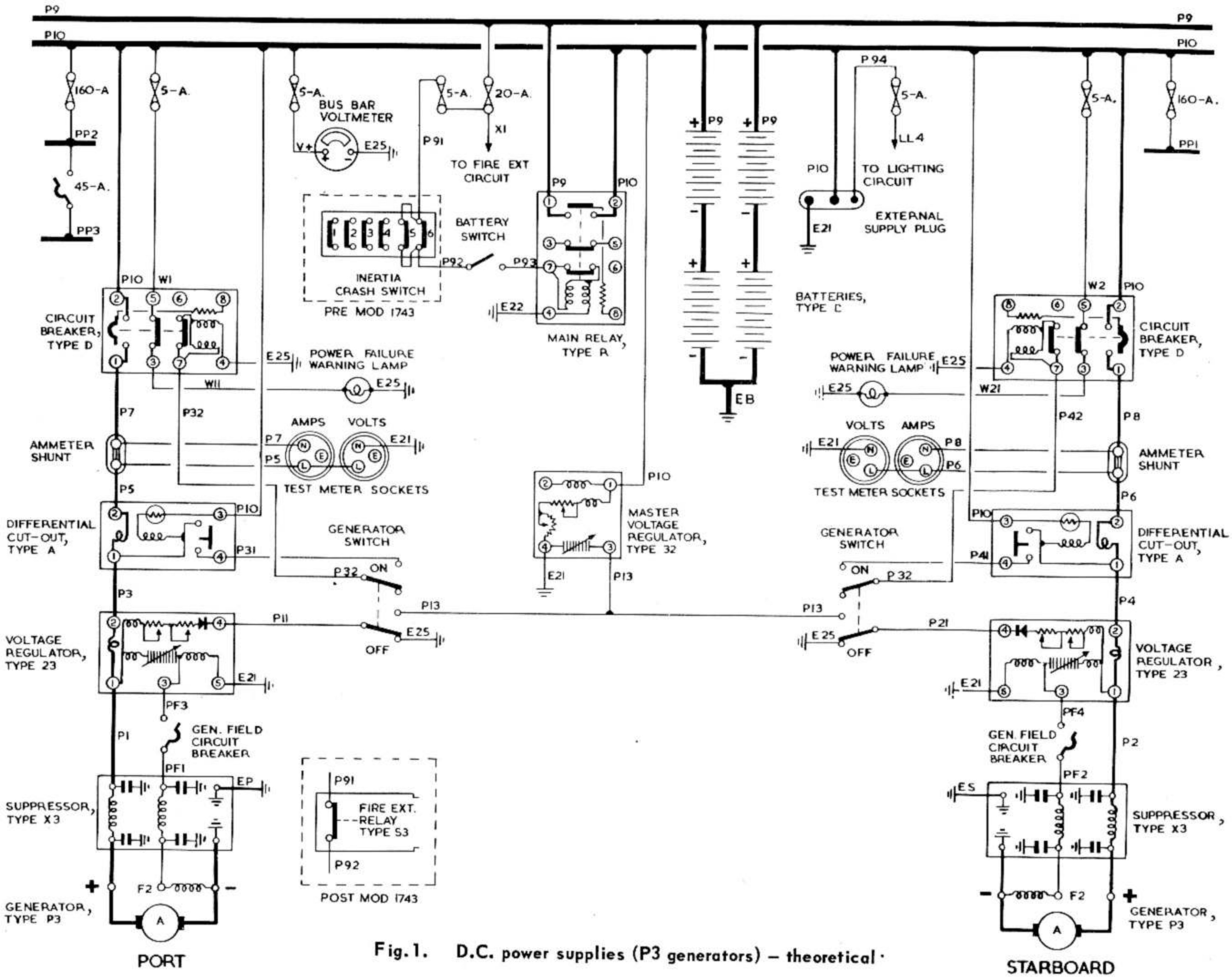

Fig. 1. D.C. power supplies (P3 generators) – theoretical

regulator, Type 23, obtain a meter reading of 24 volts. Vary the engine speed over a wide range and verify that the meter reading remains steady at 24 volts ± 0.5 volt.

(7) Leaving No.1 engine idling, change over the testmeter connection to No.2 voltmeter socket.

(8) Start No.2 engine and run up to approximately 3500 r.p.m. and repeat the procedure (6) with the starboard voltage regulator, Type 23, again setting to 24 volts ± 0.5 volt.

(9) Switch ON both generator switches.

(10) Run up both engines together to approximately 3500 r.p.m. and adjust the trimmer of the master voltage regulator, Type 32, until a steady reading of 27.5 volts is obtained. Check that this figure does not vary more than 0.5 volt either way over the normal engine speed range. During this check the voltmeter may be connected to either meter socket.

Load balancing tests

8. Provided that the voltage regulators have been adjusted in the manner described in para.6, it should not be necessary to make load-balancing tests between the generator circuits.

Check for Type A differential cut-outs

9. These units can be checked by the following procedure:—

(1) Connect a sensitive 0-3 voltmeter across terminal No.1 of the cut-out being checked and terminal No.2 of its associated Type D circuit breaker.

(2) Start the engine and slowly increase its speed until the differential cut-out contacts close. This should take place when the generator voltage is between 0.35-0.75 volts above the battery bus-bar voltage. *(No action need be taken if the differential voltage is slightly above the top limit of 0.75 volt).*

(3) Slowly decrease the engine speed until sufficient current flows from the battery to the generator to open the differential cut-out contacts. This should occur at a reverse current of between 15 and 25 amp., but no action need be taken if the upper limit is slightly exceeded.

10. The Type A differential cut-out is fully described in A.P.4343B, Vol.1, Book.2, Sect.10, Chap.5.

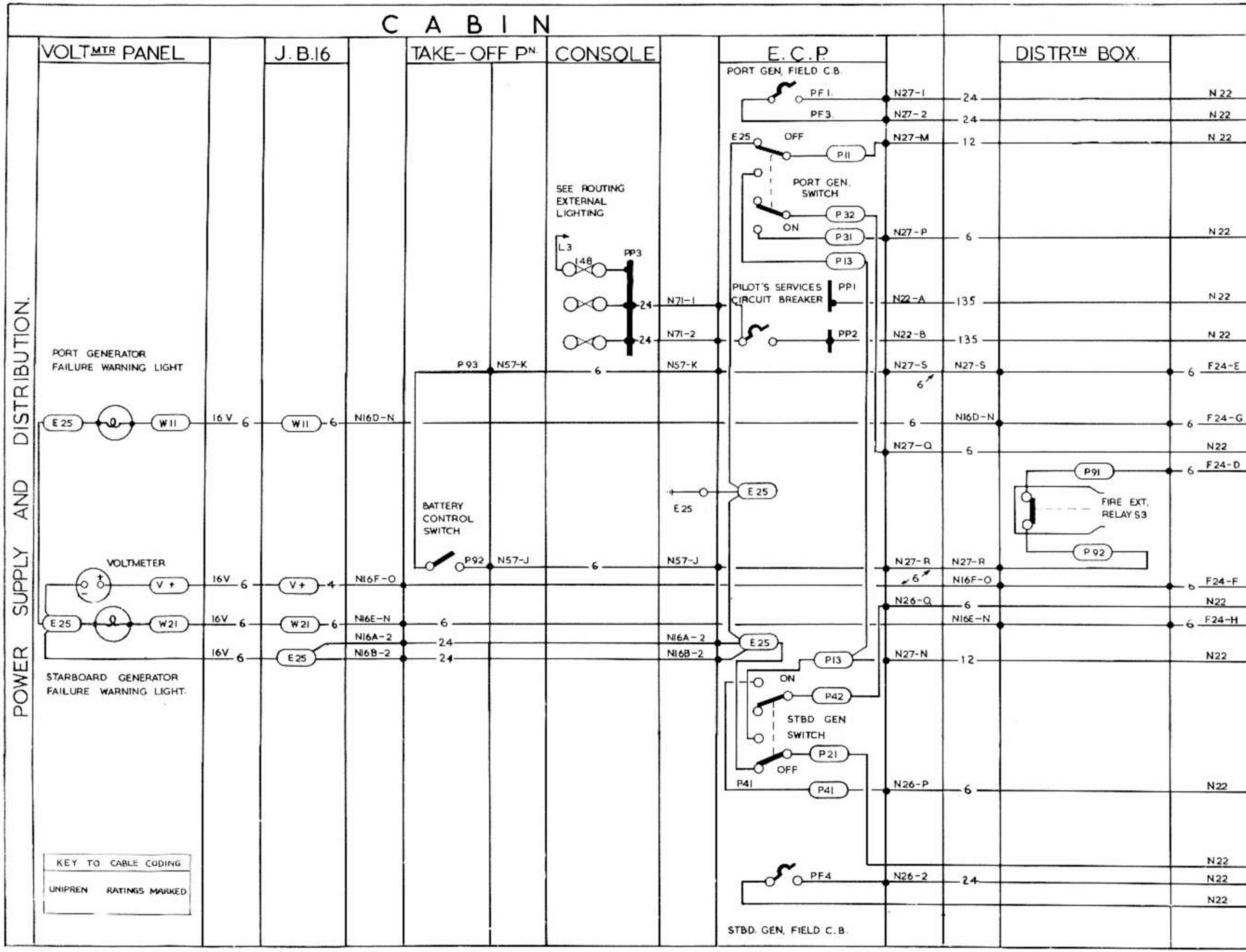

Fig. 2. D.C. power supplies (P3 generators)

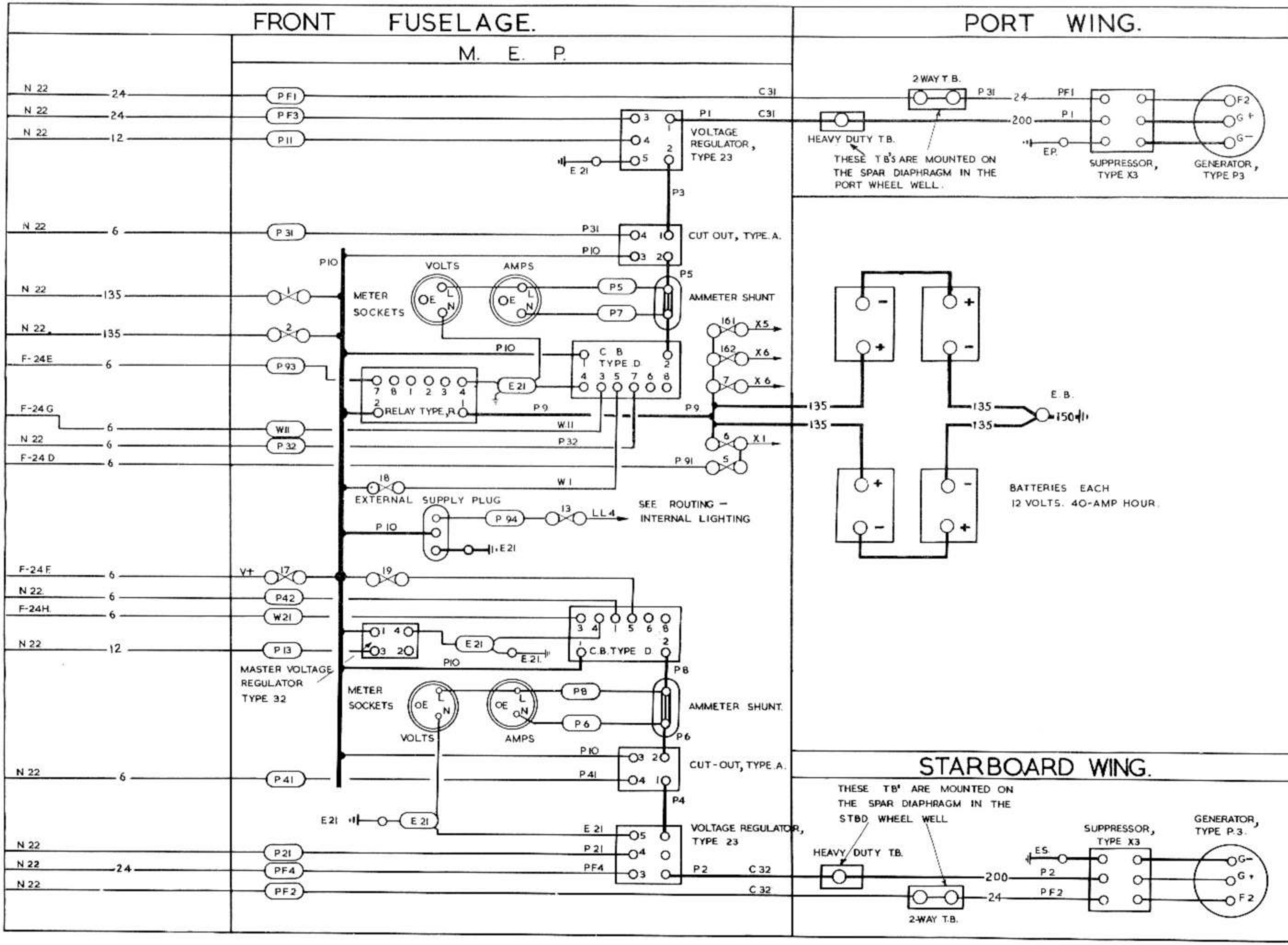

Fig. 2A. D.C. power supplies (P3 generators)

D. C. POWER SUPPLIES - GROUP P

◀ APPENDIX 2 ▶

(Aircraft Post Mod.2155 or 2393)

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LIST OF ILLUSTRATIONS

DESCRIPTION

General

1. On aircraft post Mod.2155 or 2393 power for the electrical services and battery charging is provided by two Type 512 or, post Mod.2355, Type 519 300 amp wide-speed generators, operating in parallel. The output voltage of each generator is automatically controlled at 28 volts. Each generator is located in the leading edge of the wing and driven from the accessory gearbox of the respective engine. The positive terminal of each generator is connected to the supply busbar, P10, via a positive shunt, main contactor, and reverse-current circuit-breaker, whilst each negative terminal is connected to the main earth in the respective wing via a negative shunt adjacent to the generator. All connecting links are of unipren 280-amp cable. Heavy-duty terminals at the wing breaks provide connection between the wing and fuselage sections of each positive lead. The positive shunts, main contactors, and reverse-current circuit-breakers are mounted on the M.E.P.

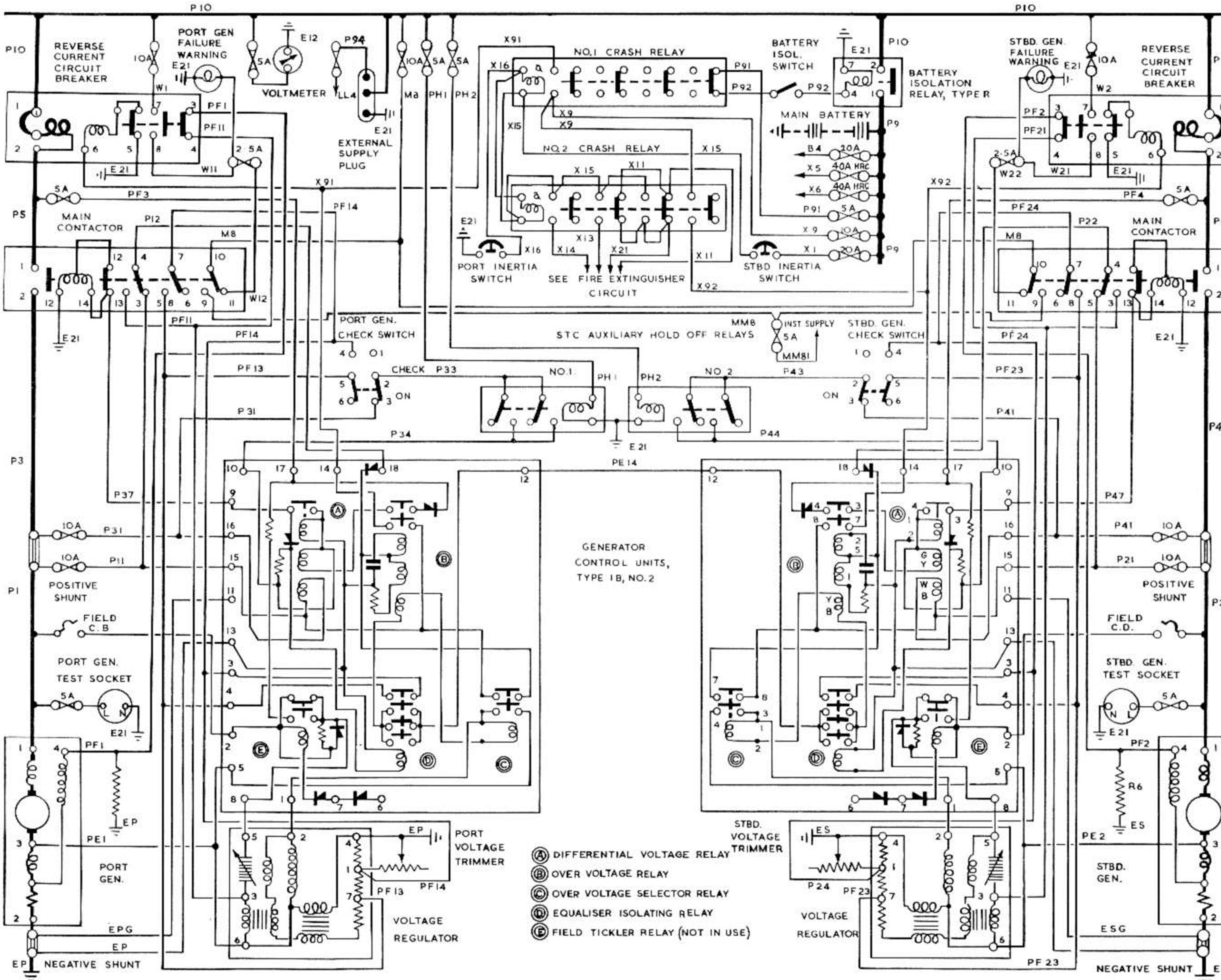

Fig. 1. D.C. power supplies (Post Mod. 2155 or 2393)

together with the generator control units and ancillary control equipment.

Generator, Type 512 or 519

2. The generators, Type 512 *(Ref.No. 5UA/6005)* or 519 *(Ref.No.5UA/6446)* are both shunt wound, with interpole and compensating windings. A ring of nickel-copper resistance material is connected in series with the main interpole windings and when the generator is developing its full output of 300-amp a drop of 2-volts occurs between the negative terminal (2) of the generator and the negative brush terminal (3). This voltage, which is proportional to the output current of the generator, is used to maintain a balanced output from the two generators during parallel operation. A complete description of both types of generator is given in A.P.4343A, Vol.1, Sect.3.

Voltage regulator panels

3. Each generator circuit includes a Type 114 voltage regulator *(Ref.No.5UC/6360)* which is mounted on a panel adjacent to the generator. Also fitted on each panel is a field discharge unit, the function of which is described in para.7.

Voltage regulator, Type 114

4. The output of each generator is maintained constant throughout variations of generator speed and load by a Type 114 carbon pile regulator, which automatically controls the shunt field current. The regulators operate in conjunction with the generator control units to establish correct parallel operation and effect stability of this condition. Further information on the control and regulation of wide-speed generator systems is given in A.P.4343, Vol.1, Sect.2, Chap.5.

Generator control unit, Type 1B, No2

5. Included in each generator circuit is a Type 1B, No.2, control unit which incorporates five relays, a number of resistors, five germanium junction-type rectifiers and a 55 mF electrolyte capacitor. Three of the five relays, the differential-voltage relay, over-voltage relay, and over-voltage selector relay, are polarized, and therefore require a particular polarity of applied voltage to operate them. The control units operate in conjunction with the main contactors, reverse-current circuit breakers, and voltage regulators to maintain automatic control and protection of the generator system.

Reverse-current circuit breaker, Type 1B, No.4

6. This is a high rupturing-capacity switch capable of breaking a current of several thousand amp. It is set manually and may be tripped either electrically or manually. In the event of a direct failure to earth at a point between the generator positive terminal and terminal 2 of the circuit-breaker, both the associated generator and the remainder of the system feed into the fault. The resulting surge of reverse-current immediately trips the circuit-breaker, isolating the fault from the busbar system. At the same time, auxiliary contacts on the circuit-breaker isolate the trip coil, complete the circuit of the generator failure warning lamp, and interrupt the shunt field circuit, rendering the generator inoperative. The field discharge resistor R6 reduces the inductive arc produced by the collapse of the shunt field flux. The reverse-current circuit-breaker is described in A.P.4343B, Vol.1, Book. 2, Sect.10, Chap.10.

Main contactor

7. The main contactor is capable of carrying heavy currents but has a comparatively low rupturing-capacity. It is protected against heavy reverse currents by the reverse current circuit-breaker. The unit incorporates an electro-magnet with the armature operating in a vertical plane. When the coil becomes energized, the armature is drawn up making the two main contacts and four sets of auxiliary contacts. Three sets of the latter are for external control or indicating purposes while the fourth set controls the economy winding in the solenoid circuit. A pair of normally open contacts provide an interlock between the generators and the No.1 inverter *(instruments normal supply)*, this ensures that the inverter does not start up until at least one generator is charging. Overtravel is allowed for on both the main and auxiliary contactors, to compensate for contact wear.

Supply voltmeter

8. Continuous indication of the supply voltage at busbar P10 is given by a Type A voltmeter mounted on the starboard instrument panel. The voltmeter indicates irrespective of whether the main battery or an external supply is connected to P10.

Generator failure warning lamps

9. Two generator failure warning lamps are installed on the starboard instrument panel. If the main contactor or reverse-current circuit-breaker of either generator should trip, the relevant warning circuit is completed and the lamp becomes illuminated.

Generator test panel

10. Each generator circuit includes a switch, marked ON/CHECK, a test voltmeter socket, and a Type 4 voltage regulator trimmer resistance. These components are mounted on a test panel, situated to port of

the aircraft centre line near frame B in the roof of the nose. The switch and trimmers are under a detachable cover and the only visible items on the panel are the voltmeter test socket. The switches are normally left in the ON position since generator operation is automatically controlled. The CHECK position is used to isolate the generator from busbar P10 when necessary. With the test switch in this position a section of the ballast resistance of the respective voltage regulator is short-circuited, thus simulating the 'on-load' condition of the regulator whilst the voltage check is made. Voltage adjustment is effected by rotating the trimmer spindle in the appropriate direction by means of a screw-driver.

Field circuit breakers

11. Two shunt field circuit-breakers, mounted on the M.E.P., are normally left in the ON position.

Main relay, Type R

12. Connection between the main battery busbar, P9, and the generator busbar, P10, is made via a Type R relay mounted on the M.E.P. The relay is normally controlled by the BATTERY ISOL switch on the take-off panel. During a crash landing the relay is automatically opened by operation of the inertia switch system, which isolates the battery supply from all services except the fire extinguisher, detonator, and bomb flare jettison circuits.

Inertia switch circuit

13. Two inertia switches are fitted on the forward face of frame 11, the starboard switch below the M.E.P., and the port switch in the V.H.F. compartment. The switches control the operation of two crash relays, numbered 1 and 2, mounted on the M.E.P. In the event of a crash landing the No.1 relay breaks the solenoid circuit of the Type R relay which opens to isolate the battery from P10, and also energizes the trip coil of the port generator reverse-current circuit-breaker. Operation of the No.2 relay energizes the fire extinguisher circuits and also the trip coil of the starboard generator reverse-current circuit-breaker. Opening of the reverse-current circuit-breakers isolates the generators from P10 and breaks their shunt field circuits.

External power supply

14. A 24-volt external supply can be fed to the aircraft system via a 3-pole plug on the M.E.P. To cater for the use of ground supply having a 2-pole plug, an adapter *(Ref.No. 105G/11)* is available. The third small pin on the external supply plug takes a positive feed whenever an external socket or socket/plug adapter is connected to it. This feed is used as the supply for the Mk.1A servicing lamp fitted above the access door of the starboard equipment compartment.

Auxiliary hold-off relays

15. Two auxiliary hold-off relays, which prevent connection of the generators to busbar P10 when the aircraft main battery is isolated or removed from the aircraft, are mounted on the M.E.P. These relays become energized and close whenever a supply is connected to busbar P10.

Batteries

16. The battery systems are the same as that described in the main group.

SERVICING

General

17. The generators are accessible after the removal of the large detachable panel secured by screws to the upper surface of the main plane, inboard of each engine. The removal and assembly of the generators is described and illustrated in Sect.4, Chap.1. Suspected wiring faults should be investigated, using the theoretical and routeing diagrams included in this group and making point-to-point checks where necessary.

Generators, Type 512 or 519

18. General information on all types of generators is contained in A.P.4343, Vol.1, Sect.2, Chap.1. The Type 512 and 519 generators are fully described in A.P.4343A, Vol.1, Sect.3, Chap.15 and 21 respectively.

Control unit, Type 1B, No.2

19. Descriptive and servicing information for these units is given in A.P.4343C, Vol.1, Book 3, Sect. 10, Chap.3.

Voltage regulator, Type 114

20. Servicing information applicable to carbon-pile regulators generally is contained in A.P.4343, Vol.1, Sect.6, Chap.1. Descriptive and servicing information for the Type 114 voltage regulator will be found in A.P.4343B, Vol.1, Book 1, Sect. 1, Chap.41.

Reverse-current circuit breaker

21. This unit, described in A.P.4343B, Vol.1, Book 2, Sect.10, Chap.10, requires no attention whilst operating satisfactorily. When faulty, it should be returned to a maintenance unit for repairs.

Main contactor

22. Remove the main cover and wipe off any metallic deposits from the insulated parts near the main contacts. Check that the mouldings are not cracked and that there are no loose parts or connections. The ventilation gauzes in the cover must be clean and unobstructed. Operate the switch by hand and ensure that the main auxiliary contacts open and close satisfactorily.

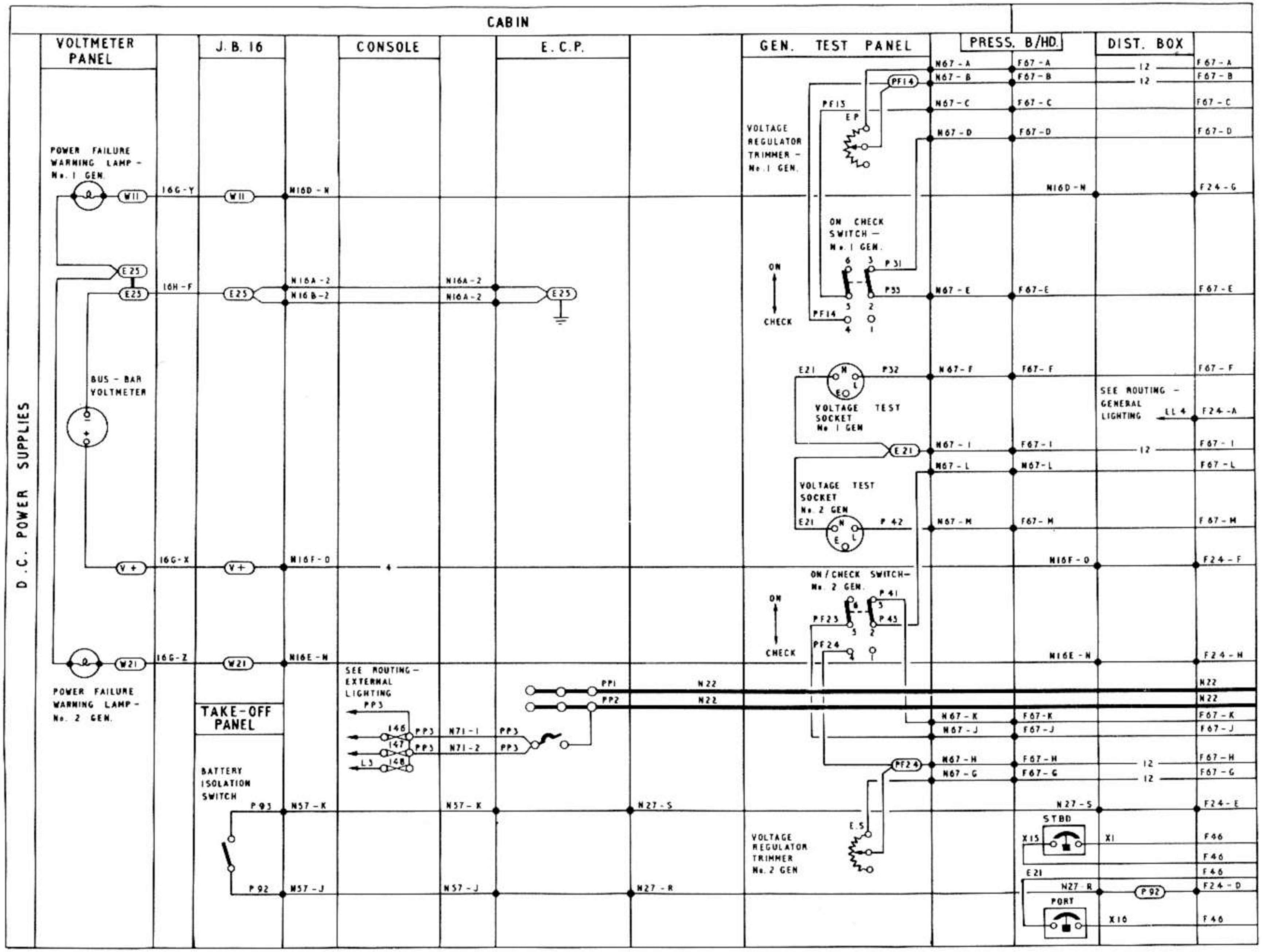

Fig. 2. D.C. power supplies (Post Mod. 2155 or 2393)

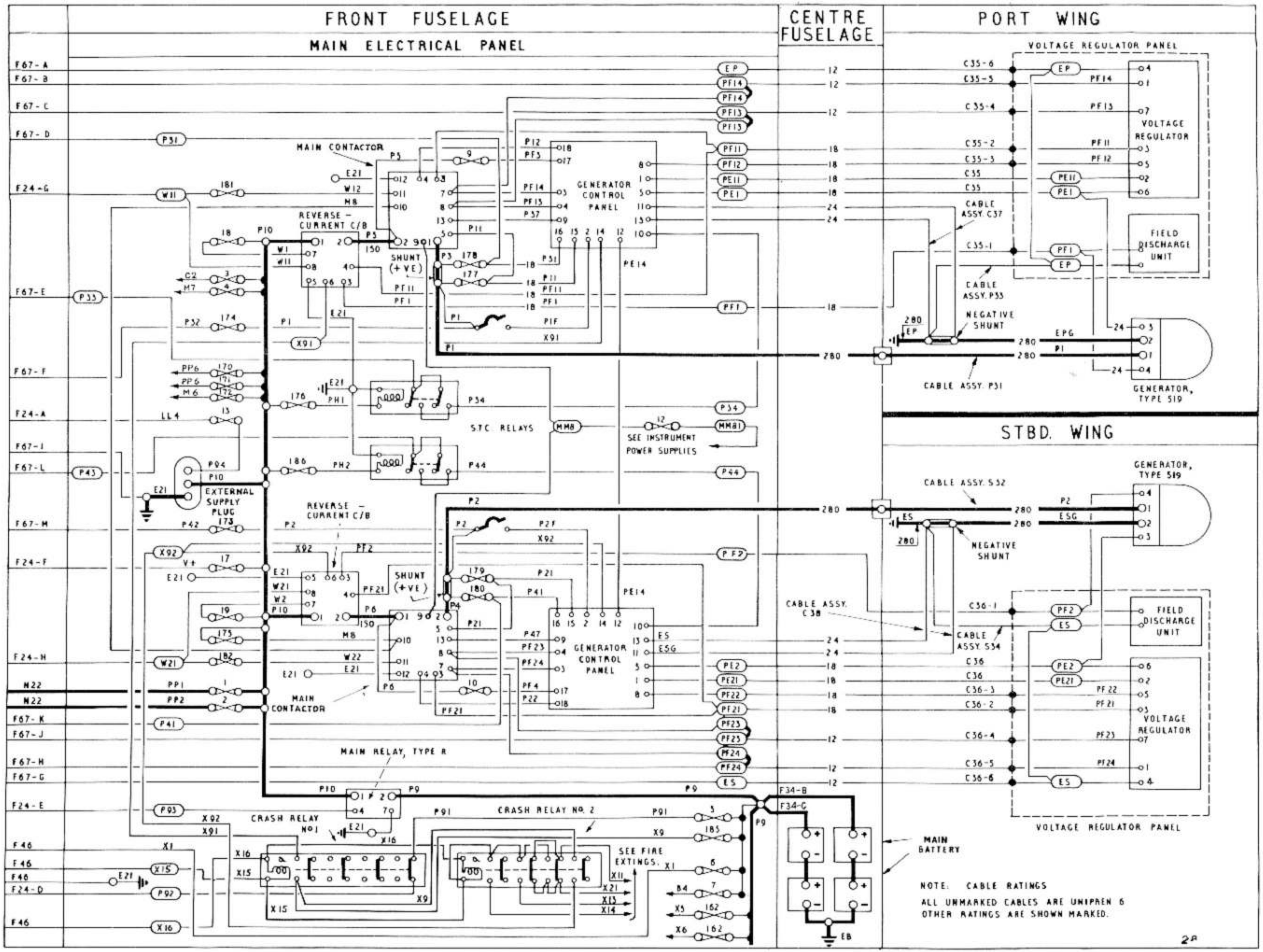

Fig. 2A. D.C. power supplies (Post Mod. 2155 or 2393)

FUEL PUMPS AND COCKS - GROUP Q

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LIST OF ILLUSTRATIONS

DESCRIPTION

General

1. Five fuel tanks are permanently installed in the aircraft, three of which are housed in the compartment above the bomb bay and one in each wing. On aircraft embodying Mod.715, provision is made for the installation of an overload fuel tank in the rear of the bomb bay. The tanks are fitted with electrically-driven immersed fuel pumps. The power supply to each pump passes through a Type 02 suppressor, positioned near to its associated pump unit. Fuel delivery from the pumps is controlled by electrically-actuated cocks. Provision is also made to mount a jettisonable fuel tank below each wing tip but these tanks are without pumps or cocks.

Fuselage tanks

2. The fuselage tanks, numbered 1 to 3 from the forward end, each have fitted two Type S.P.E.1003 pumps, which project into the base of the tank through adapter plates in the roof of the bomb bay. The pumps are positioned port and starboard and near to each is a fuel cock which is operated by a Type 201 rotary actuator.

Wing integral tanks

3. Each integral tank is fitted with one Type PUL907 fuel pump, and two Type 219 cock actuators. One cock controls fuel delivery to the engine supply line and the other transfers the supply to No.3 fuselage tank.

Overload tank *(Mod.715)*

4. Two Type S.P.E.1003 pumps, one forward and one aft, are fitted to this tank. Two cocks, operated by Type 219 rotary actuators control the fuel delivery from the pump supply line. The suppressors serving the pumps are part of the fuel tank assembly. The cocks are fixtures in the bomb bay.

Control switches

5. The fuselage and the wing integral tanks fuel pumps are controlled by switches on the engine instrument panel; the fuel cock control switches for these tanks are fitted on the take-off panel. The switches controlling the overload tank fuel pumps and cocks are fitted on the starboard instrument panel. The switches which control the cocks serving the fuselage tanks and the overload tank have two positions, OPEN/SHUT. Two switches are used to control the cocks on each wing integral tank, one labelled OPEN/SHUT and the other NORMAL/EMERGENCY. With the latter set to the NORMAL position, the cock which controls the fuel supply to the engine line is then operated by the OPEN/SHUT switch. Placing the NORMAL/EMERGENCY switch to EMERGENCY

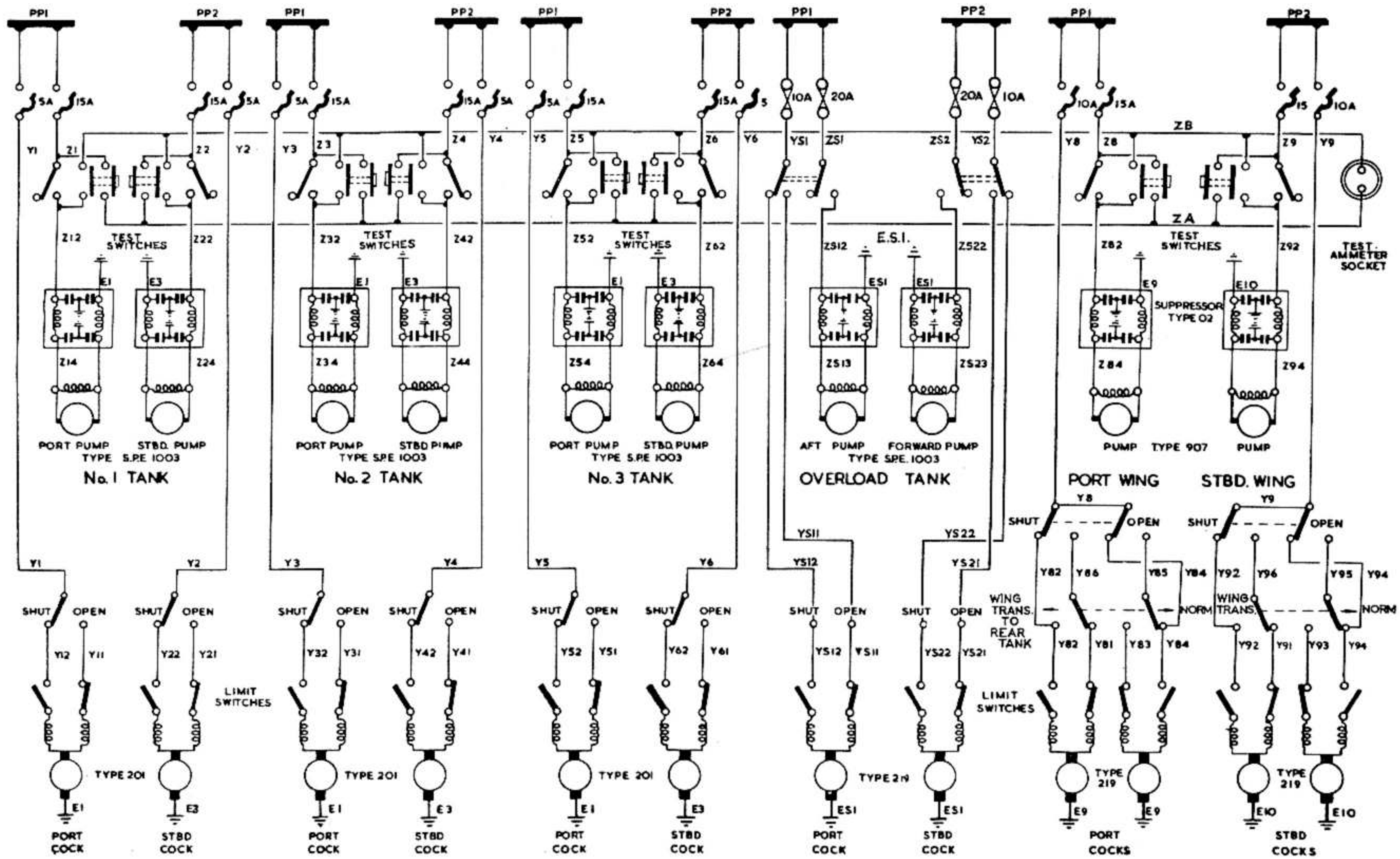

Fig. 1. Fuel pumps and cocks – theoretical

closes the engine supply cock and opens the transfer cock to direct the fuel supply to No. 3 fuel tank. The OPEN/SHUT switch controls whichever cock is selected by the position of the NORMAL/EMERGENCY switch.

Circuit breakers

6. With the exception of the overload tank fuel pump and cock circuits which are protected by fuses in the E.C.P., each pump and cock circuit is protected by a circuit breaker mounted on the forward face of the E.C.P. The circuit breakers serving the pump circuits are rated at 15 amp and those for the fuselage and wing integral cocks, 5 amp. and 10 amp. respectively.

Test panel

7. A set of push-button switches and a socket for use with a plug-in type ammeter for checking the operation and current consumption of each pump are fitted on a test panel in the E.C.P. They are accessible upon removing the detachable cover at the starboard side of the E.C.P.

SERVICING

8. The following paragraphs describe the procedure for checking the Types PUL907 and S.P.E.1003 fuel pumps. The tests are made with pumps immersed in fuel and operating under no-flow conditions.

(1) Check that all pumps and cock switches are OFF.

(2) Close the fuel pump circuit breakers on the E.C.P.

(3) Connect a Type D, testmeter, set to the 0-30 amp. range, or a suitable ammeter, to the socket on the test panel in the E.C.P.

(4) Operate each pump test switch, in turn, for at least half a minute.

Pump, Type PUL907

9. When operating with 24 volts at its terminals each Type PUL907 pump should take a maximum current of 10.25 amps. when sustaining a no-flow pressure of 15.75 lb/in^2.

Pump, Type S.P.E. 1003

10. Each Type S.P.E.1003 pump, when operating with 24 volts at its terminals, should take a maximum current of 11.5 amps. when ◀ sustaining a no-flow pressure of 14.5 lb/in^2. ▶

Interpretation of testmeter readings

11. (1) A steady reading not exceeding the current consumption figures given above with their relevent test voltages, will indicate that a pump is serviceable. Pumps showing appreciably higher current figures than these are suspect and should be replaced with new or reconditioned units.

(2) A fluctuating reading indicates either faulty brushes, commutator, or internal connections.

(3) A zero reading indicates an open circuit due to either a blown fuse, faulty wiring, or complete motor failure.

Voltage drop

12. The test voltage given above as 24 is that which should be available at the pump terminals and does not take into consideration the voltage drop between the bus-bar supply and the pump units when on load. The drop between the bus-bar and the pumps in the fuselage tanks numbered 1, 2 and 3, is approximately 1.25 volts, 1.75 volts and 2 volts respectively, and between the bus-bar and the wing tank pumps, 3.62 volts. This voltage drop should be allowed for when making the tests.

Cock actuators

13. Servicing of cock actuators will normally be confined to checking brush length and removing carbon dust. These operations will require the removal of the end cover from the motor. Full information on servicing and overhaul of the actuator unit will be found in A.P.4343D, Vol.1.

REMOVAL AND ASSEMBLY

Fuel pumps

14. A fault on the pump motor necessitates the removal of the complete pump assembly. Instructions covering this procedure are given in Sect.4, Chap.2.

Actuators

Removal

15. (1) Disconnect the electrical plug and socket from the motor.

(2) Undo the bolts attaching the actuator to the body of the cock and separate the two units.

(3) Remove the actuator.

Assembly

16. (1) Ensure that the actuator and the cock are both at the same selection setting.

(2) Fit the actuator to the cock and secure the attachment bolts.

(3) Reconnect the electrical plug and socket to the motor.

(4) Carry out a functioning test of the cock actuator.

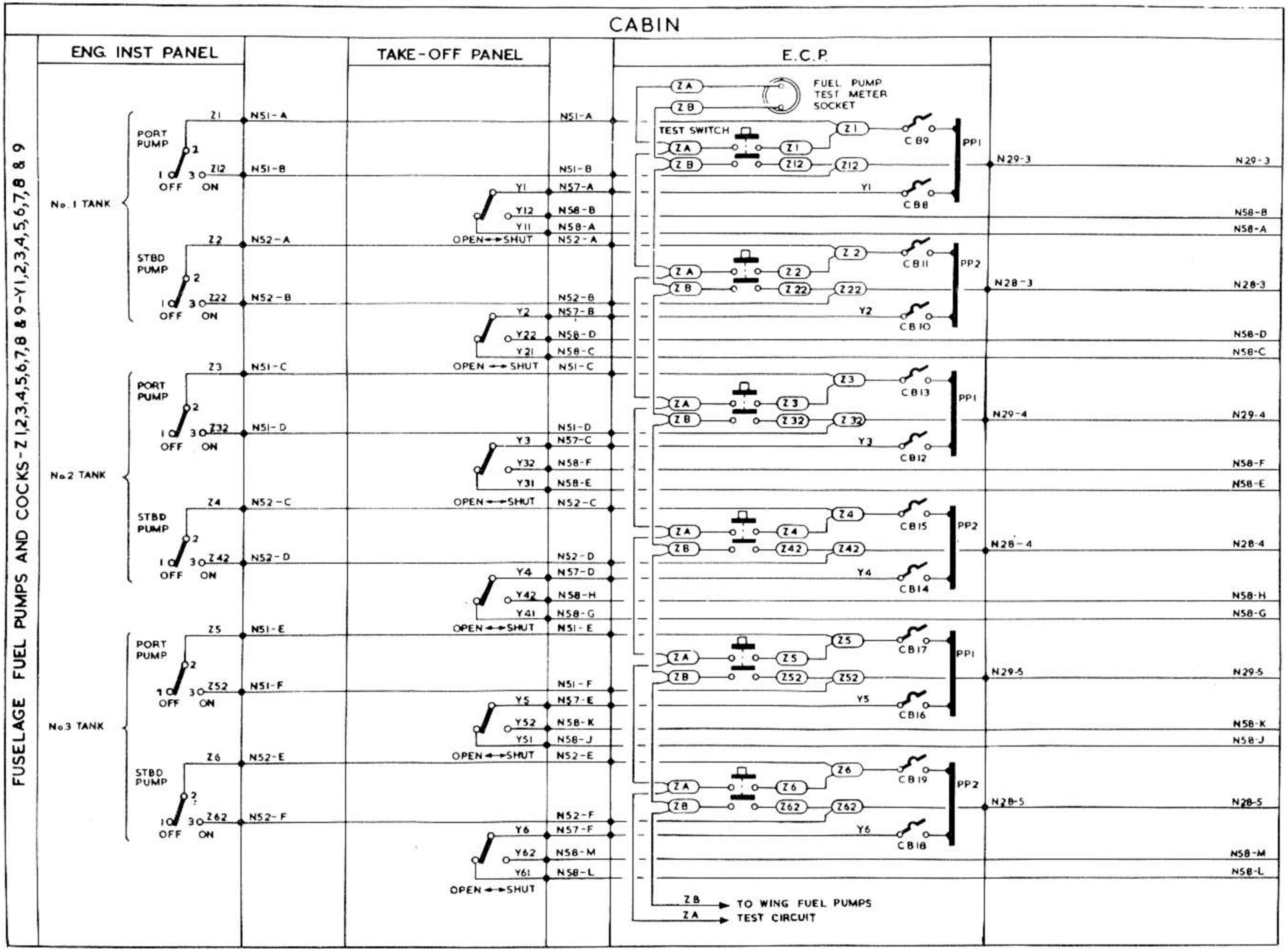

Fig. 2. Fuselage fuel pumps and cocks

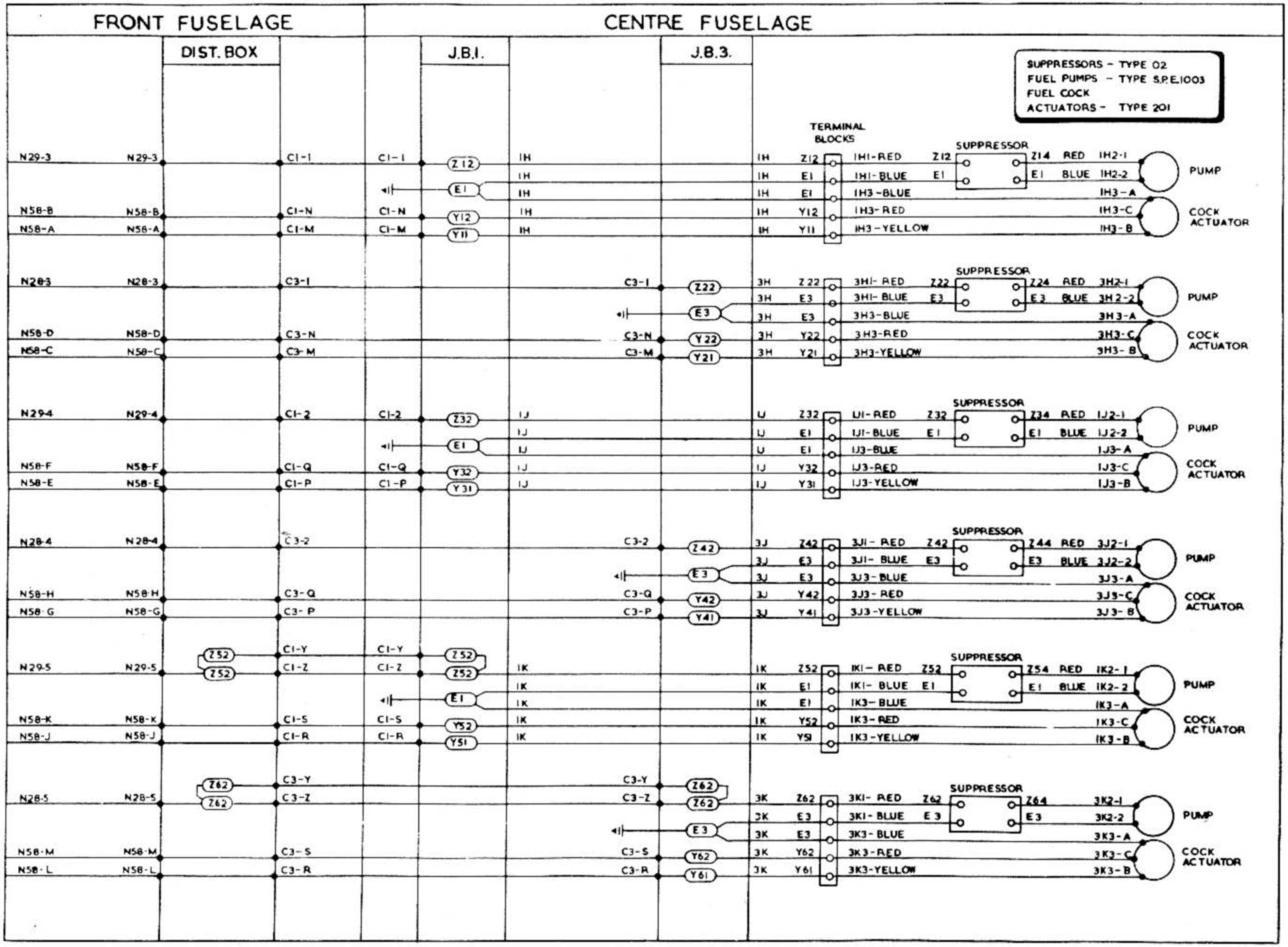

Fig. 2A. Fuselage fuel pumps and cocks

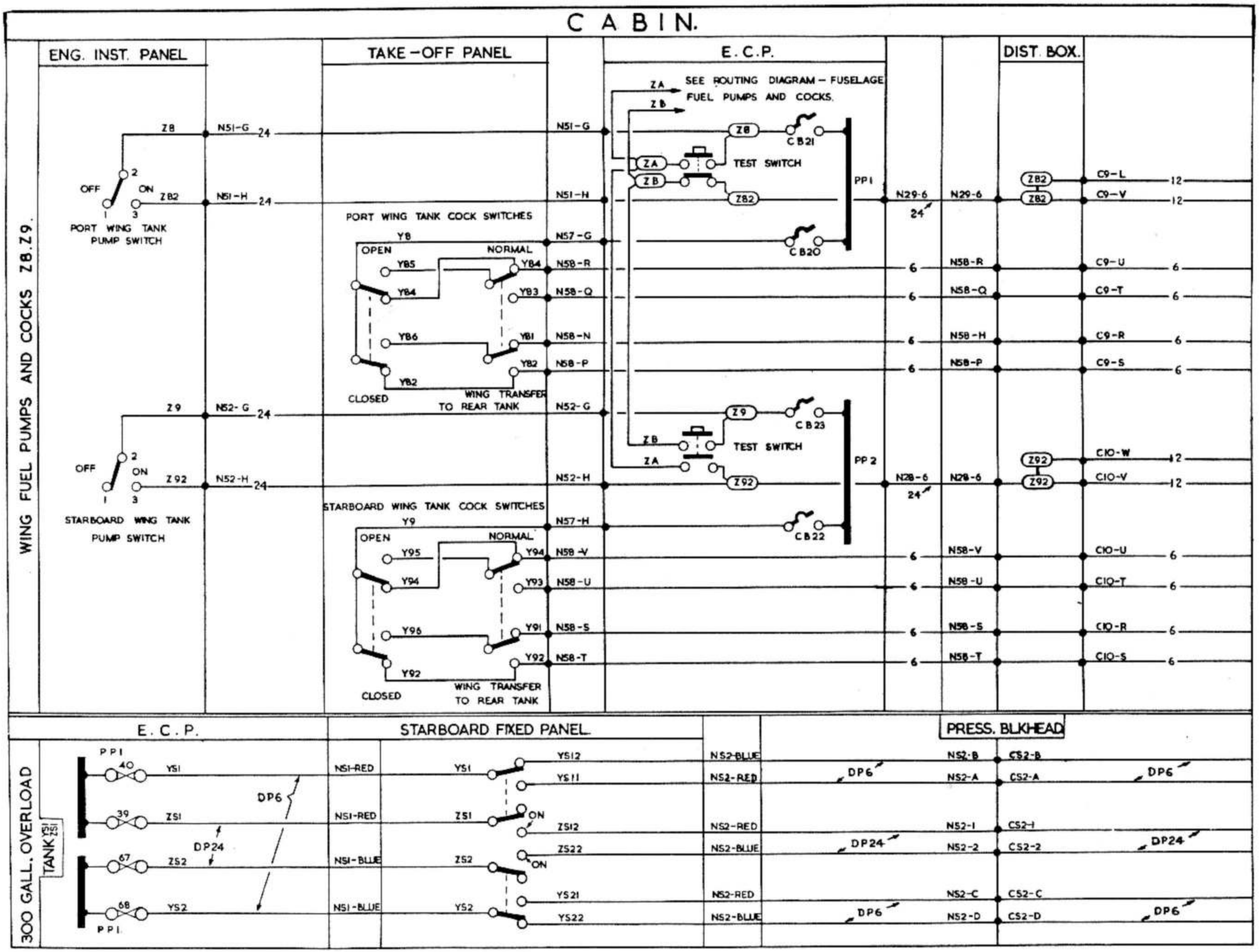

Fig. 3. Wing tank fuel pumps and cocks – 300 gallon overload tank

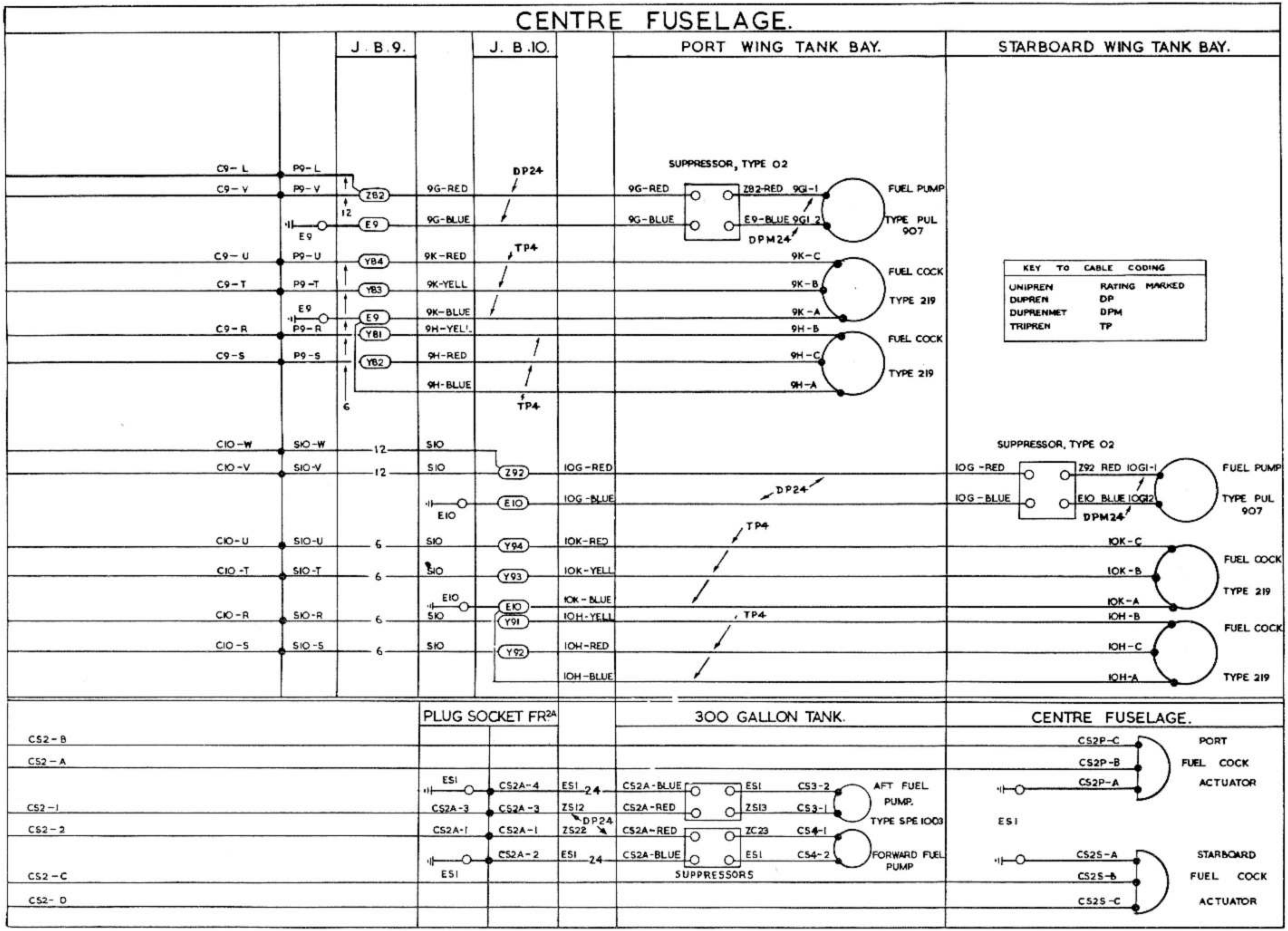

Fig. 3A. Wing tank fuel pumps and cocks – 300 gallon overload tank

RADIO AND RADAR POWER SUPPLIES - GROUP R & S

(completely revised)

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LIST OF ILLUSTRATIONS

Introduction

1. Power supplies of 28-volts d.c., 115 volts, 1600 c/s single-phase a.c. and 400 c/s 3-phase a.c. are used to operate the wireless and radar systems. The a.c. supplies are obtained from two inverters, a Type 200 and a Type 201, numbered 4 and 5 respectively. No.4 inverter is installed on the rear wall in the upper equipment compartment whilst No.5 inverter is located in the starboard equipment compartment forward of the M.E.P. No.5 inverter provides the 115-volt, 1600 c/s single-phase a.c. for the I.F.F. Mk.10 (A.R.I.5848), Rear warning (A.R.I.5800), Rebecca Mk.4 (A.R.I.5610) and Gee-H (A.R.I.5829) if fitted. No.4 inverter serves as a stand-by for No.5 inverter and provides a supply of limited power, for the Rebecca or Gee-H systems should No.5 inverter fail. The output of No.4 inverter is regulated automatically by an integral control panel whilst No.5 inverter is controlled by a Type 2B electronic regulator located in the upper equipment compartment.

B(I) Mk.6 aircraft embodying Mod.2622 and 2623

2. On B(I) Mk.6 aircraft only, Mod. 2622 and 2623 when embodied, introduce Decca and Blue Silk (A.R.I.5885) systems respectively. Power supplies of 28-volts d.c. operate the Decca system and for the Blue Silk system 28-volts d.c. and

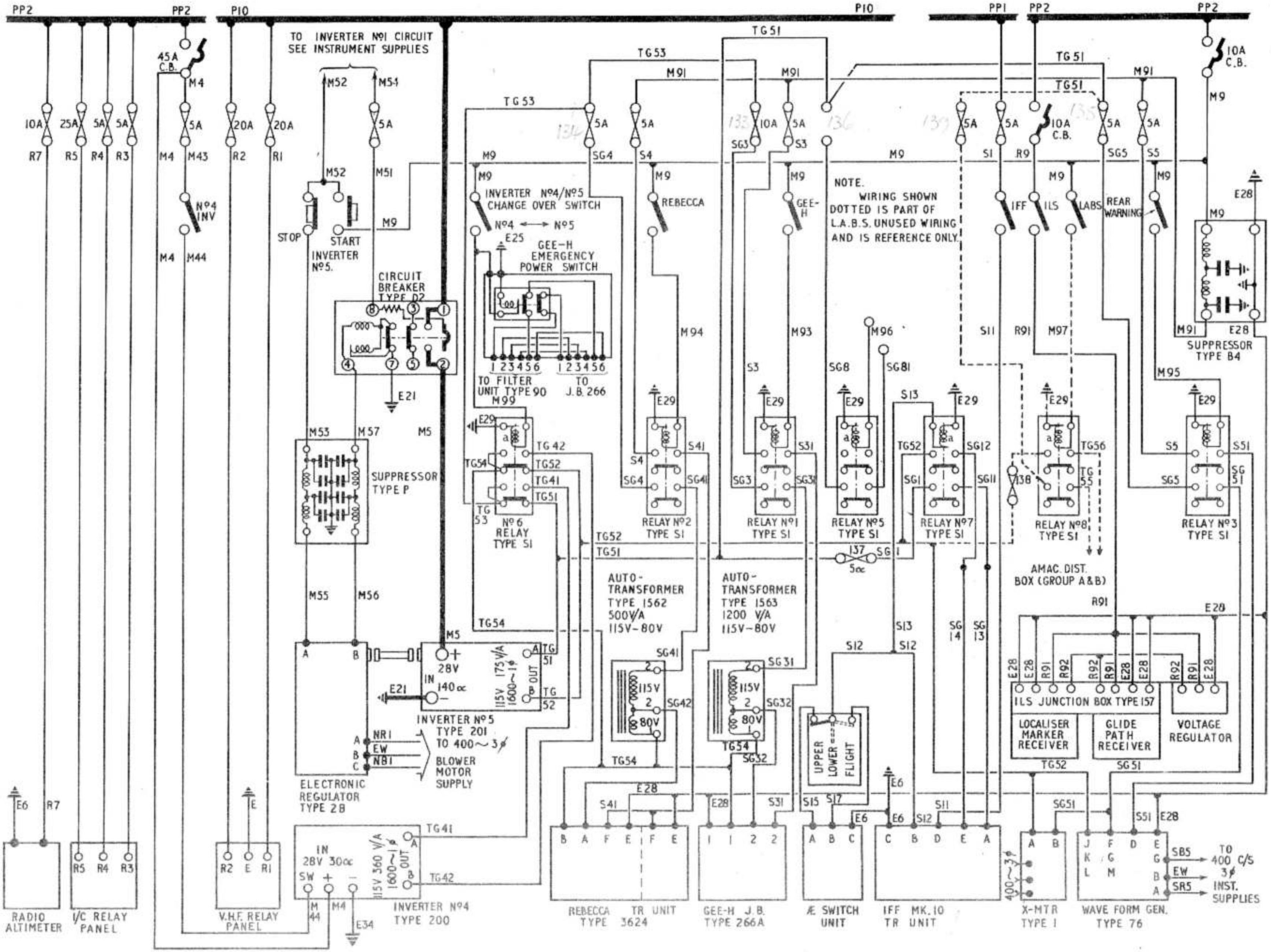

FIG. 1. RADIO AND RADAR POWER SUPPLIES (B MK. 6 AIRCRAFT)

115-volts, 400 c/s, 3-phase are used, the a.c. supply being obtainable from a Type 103A inverter installed in the upper equipment compartment. With Blue Silk embodied, the Rebecca and Gee-H systems together with the Type 200 (stand-by) No.4 inverter *(para.1)* are removed.

B(I) Mk.6 aircraft embodying Mod.4319

3. On B(I) Mk.6 aircraft only, the embodiment of Mod.4319 introduces U/V.H.F. (A.R.I.23143/1) and stand-by U.H.F. (A.R.I.23057) in place of the previous U.H.F. (A.R.I.18124/1) and V.H.F. (A.R.I.18064) installations.

DESCRIPTION

No.5 inverter

4. No.5 inverter is initially controlled by two switches on the E.C.P., one labelled START and the other STOP. Provision is made in the circuit to ensure that No.5 inverter cannot be started up unless No.1 inverter *(refer to Group D)* is running to operate the motor driven blowers that cool the electronic regulator and units of the rear warning radar system. With a circuit breaker labelled 1600 c/s CONTROL, on the E.C.P. closed, pressing the START switch feeds a supply from M9 to energize a Type D2 circuit breaker on the M.E.P. via M52, through the START and STOP switches, M53, one leg of a Type P suppressor, M55, through pins A and B on the electronic regulator, M56, back through the second leg of the suppressor, and M57. The Type D2 circuit breaker, upon closing, completes the input feed P10 and M5 to start up No.5 inverter. It also completes a self-energizing feed from P10, through its main contact, M51, fuse 14, M54, a pair of normally open contacts in No.6 relay (providing No.1 inverter is running), M52 and the STOP switch where it is linked into the circuit breaker starting circuit M53 to M57. Pressing the STOP switch breaks the self-energizing circuit to the circuit breaker causing the inverter to close down.

Electronic regulator, Type 2B

General

5. To ensure that the voltage and frequency of the output of No.5 inverter are maintained within predetermined limits, the inverter is designed to function in conjunction with a Type 2B electronic regulator, and for this reason the driving motor and alternator of the inverter are fitted with auxiliary high-impedance windings. The combination of regulator and inverter ensures that the voltage and frequency of the inverter output keeps to within ± 1 per cent under normal operating conditions. The voltage is variable over a small range about 115 volts and the frequency setting infinitely variable over a range of 1472 to 1728 c/s, the adjustments being made by externally accessible trimmers at the base of the regulator. A protective relay fitted in the unit is set to trip whenever the voltage or frequency rise in excess of 25 per cent above normal. The protective circuit is connected to pins A and B (M55-M56) of a 4-pin plug at the base of the unit. If the inverter voltage or frequency should vary sufficiently to operate the protective relay, the normally-closed circuits MM55-MM56 open to break the solenoid circuit of the Type D2 circuit breaker which opens and stops No.5 inverter.

Desiccator unit

6. Provision is made to absorb any moisture which may seep into the regulator interior by a desiccator containing silica gel crystals. The colour of the crystals, which should be blue when dry or pink when damp, can be inspected through a small window.

Pressure section

7. The lower section of the regulator unit operates under pressure of approximately 5 lb/in^2, the pressure being maintained by the periodical use of a handpump which may be connected to a Schrader-type air valve on the base of the unit. The pressure in the section is kept tight by internal sealing and a special roller chain which is tightened or released by a single screw on the outside of the unit.

Cooling

8. For cooling purposes, a 400 c/s, a.c. operated blower motor is installed in the upper section of the regulator, the connection to it being made by a Plessey plug at the top of the cover.

No.4 inverter (Rebecca and Gee-H stand-by) - B Mk.6 aircraft only

9. If No.5 inverter becomes unserviceable, No.4 inverter may be brought into operation by closing the No.4 INVERTER circuit breaker, the No.4 INVERTER switch and selecting No.4 position on the No.4/No.5 inverter CHANGE OVER

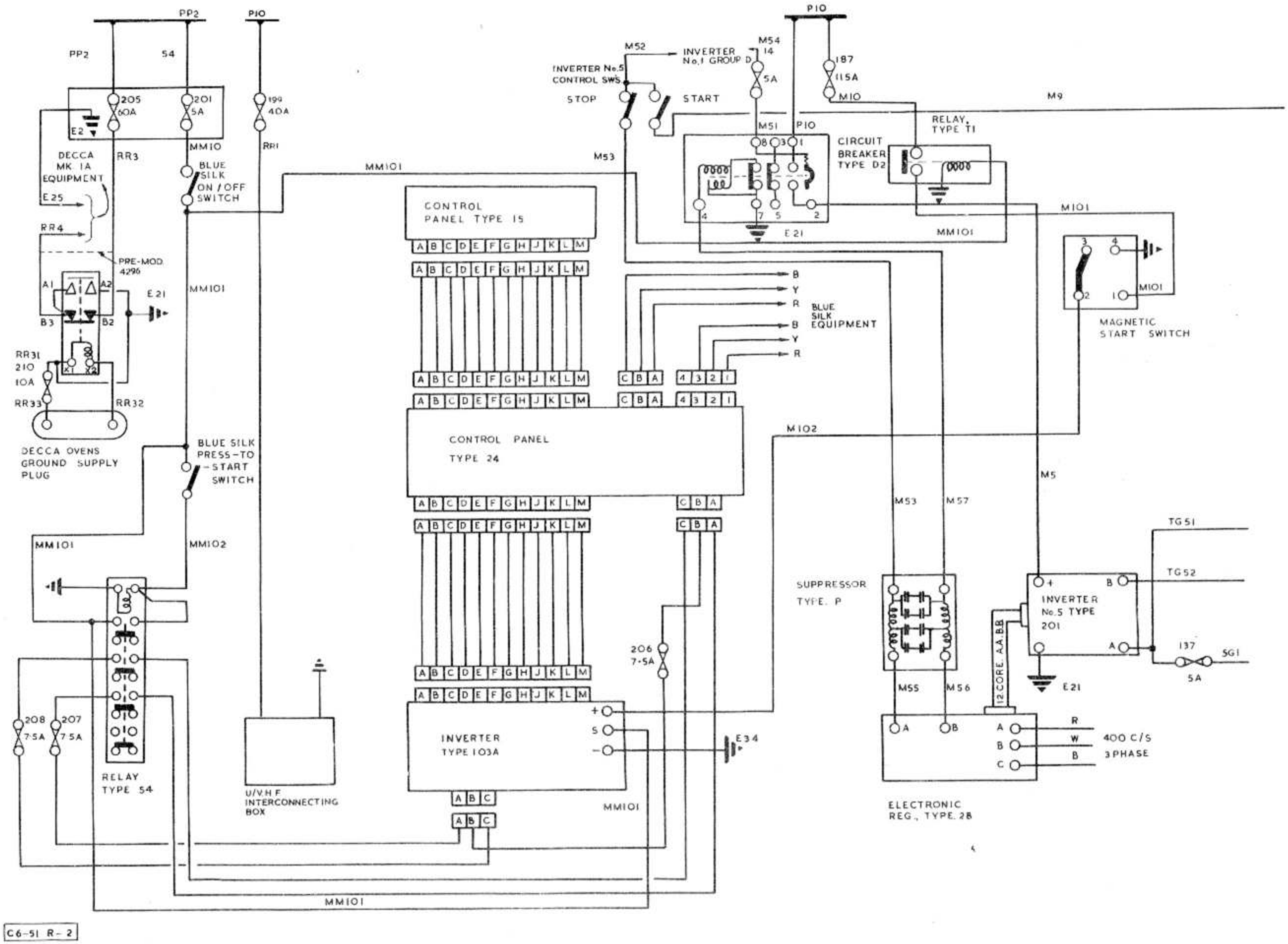

FIG. 2. RADIO AND RADAR POWER SUPPLIES (B (I) MK. 6 AIRCRAFT)

MOD.4296, 4319 & 4462 EMBODIED

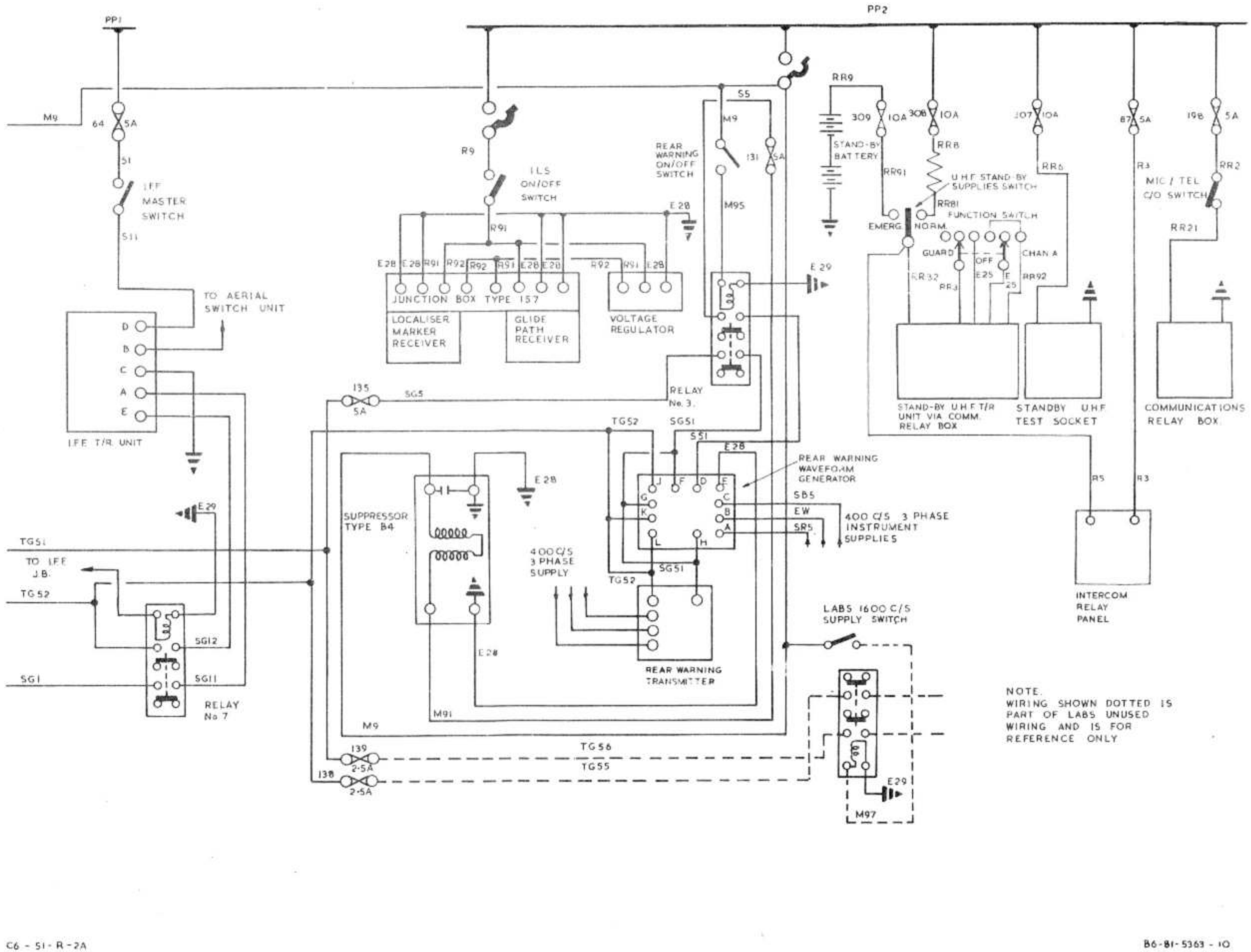

FIG. 2A. RADIO AND RADAR POWER SUPPLIES (B (I) MK. 6 AIRCRAFT)

MOD.4296, 4319 & 4462 EMBODIED

switch, on the E.C.P. The selection of No.4 at the No.4/No.5 switch completes circuit M9-M99 to energize No.6 relay and a relay in the Gee-H emergency power switch unit installed below and forward of the navigator's table. Closing of No.6 relay changes over the power supply from No.5 inverter circuit TG51-TG52 to No.4 inverter circuit TG41-TG42. The operation of the relay in the Gee-H emergency power switch unit breaks the power supply to the Gee-H transmitter to prevent overloading of No.4 inverter. The power supply from No.4 inverter is provided to maintain the navigational facilities given by the alternative use of the Rebecca system or the Gee-H receiver only, and when changing over from one to the other, that in use must first be switched off before bringing the other into operation. It should be noted that there is no stand-by for Rear warning, I.F.F. Mk.10 and L.A.B.S. installations which are normally supplied from No.5 inverter.

Rebecca and Gee-H supplies (B Mk.6 aircraft only)

10. Both the Rebecca and Gee-H systems operate from 28-volts d.c. and 80-volts a.c. obtained from the 115-volt supply by step-down transformers installed in the upper equipment compartment. The larger transformer, rated at 1200 V.A., supplies the Gee-H system, and the smaller, rated at 500 V.A., the Rebecca system. Both supplies are controlled by switches on the E.C.P. Operating the Rebecca switch energizes No.2 relay in the 1600 c/s distribution box, via M9-M94 to complete the d.c. circuit S4-S41, fed from fuse 130, and the a.c. circuit SG4-SG41, fed from fuse 134. Operating the Gee-H switch completes M9-M93 to energize No.1 relay which in closing completes the d.c. circuit S3-S31 from fuse 129, and the a.c. circuit SG3-SG31 from fuse 133.

Rear warning supplies

11. Supplies of 28-volts d.c. and 115-volts a.c. are required to operate the rear warning system. Operating the A.R.I.5800 ORANGE PUTTER switch on the E.C.P. energizes No.3 relay in the 1600 c/s distribution box, via M9-M95, to complete the d.c. circuit S5-S51, fed from fuse 131, and the a.c. circuit SG5-SG51, fed from fuse 135.

I.F.F. Mk.10 supplies

12. The I.F.F. Mk.10 system, introduced by Mod.1435, operates on 28-volts d.c. and 115-volts a.c. Operating the I.F.F. Mk.10 ON/OFF switch on the navigator's switch panel connects the d.c. circuit S1-S11, from fuse 64, to the I.F.F. T/R unit in the rear fuselage. A d.c. supply S12-S13 from the T/R unit is fed to the aerial switch unit via the altitude switch, and also to energize No.7 relay which through its contacts completes the a.c. supply TG52-SG12 and SG1-SG11 to the T/R unit; the latter supply is fed from TG51 via fuse 137.

Blue Silk power supplies (B(I) Mk.6 aircraft - post Mod.2623)

13. The power supply of 115-volts, 400 c/s 3-phase a.c. required to operate the Blue Silk system, is provided by the Type 103A inverter, installed in the upper equipment compartment in conjunction with a Type 24 control panel also in the upper equipment compartment, and a Type 15 control panel on the rear wall of frame 12. The inverter operates from a 28-volt supply primarily controlled by a switch, labelled INVERTER BLUE SILK ON/OFF, mounted on the navigator's switch panel. Another switch, on the navigator's switch panel, labelled BLUE SILK EQUIPMENT - PRESS TO START, provides that the inverter can be started 'off-load' and run to operational speed before the equipment is switched ON.

14. Selecting the INVERTER BLUE SILK switch to ON energizes the coil of a Type T1 relay, via MM10 and MM101, to complete the inverter input circuit from fuse 187, through M10, M101, a magnetic start switch and M102. Circuit MM10-MM101 also completes the field circuit to the inverter. The red and blue output phases from the inverter are each taken to normally open contacts of a Type S4 relay via fuses 207 and 208; the white phase is fed via fuse 206 direct to the Type 24 control panel. Operating the BLUE SILK EQUIPMENT - PRESS TO START switch initially energizes the Type S4 relay to complete the red and blue phase outputs to the Type 24 control panel which connects into the Blue Silk system. The Type S4 relay remains energized by a hold-in circuit MM10-MM102 after the BLUE SILK EQUIPMENT switch has been released. This hold-in circuit is only broken when the INVERTER BLUE SILK switch is selected to OFF.

Note...

1. *The Blue Silk inverter and the*

No.5 inverter must not be run simultaneously unless both generators are charging. The inverters must not be started simultaneously: having started one inverter a short period must be allowed before starting the other.

2. The BLUE SILK EQUIPMENT switch should not be operated until a short period has elapsed from the closing of the INVERTER BLUE SILK switch. This allows the speed of the inverter to build up to its operating rev/min.

V.H.F. supplies (B Mk.6 aircraft)

15. 28-volts d.c. power supplies for operating the V.H.F. system are taken from fuses 15 and 16 on the M.E.P. to the V.H.F. relay panel in the equipment compartment on the port side of the fuselage aft of the pressure bulkhead.

I/C supplies

16. The intercomm. supplies are taken from fuses 87, 88 and 89 on B Mk.6 aircraft and from fuses 87 and 88 on B(I) Mk.6 aircraft. The fuses are mounted inside the E.C.P.

Radio altimeter (A.Y.F.) supplies

17. The 28-volts d.c. supply to the system is fed from fuse 78 in the E.C.P. to the transmitter receiver unit via terminals in J.B.6 in the rear fuselage.

I.L.S. supplies

18. The 28-volts d.c. supply which operates this system is protected by a 10 amp circuit breaker on the E.C.P. and controlled by the I.L.S. switch on the starboard instrument panel. The supply which is fed into the I.L.S. Type 157 junction box is controlled by a Type 60 voltage regulator situated adjacent to the I.L.S. junction box in the upper equipment compartment.

Decca Mk.1 power supplies (B(I) Mk.6 aircraft - post Mod.2622 and 4038)

19. A 28-volt d.c. supply to the system is fed from fuse 205 in the d.c. fusebox.

U/V.H.F. supplies (B(I) Mk.6 aircraft)

20. The 28-volts d.c. supply to the U/V.H.F. equipment is fed from fuse 199 on the M.E.P., via a terminal block and the interconnecting box.

Stand-by U.H.F. supplies

21. The stand-by U.H.F. T/R unit operates from a 24-volt supply which is normally taken via a volts drop resistor from fuse 308 in the E.C.P. A 24-volt emergency battery, situated in the port equipment bay, provides an alternative supply if the normal supplies fail. Transfer to the battery supplies is effected by selecting EMERGY on the U.H.F. STANDBY SUPPLIES switch mounted on the miscellaneous instrument panel. A function switch, also mounted on this panel, is marked GUARD - OFF - CHAN A and is used to select the mode of operation of the T/R unit.

SERVICING

WARNING

The relevant safety precautions detailed on the LETHAL WARNING marker card must always be observed before entering the cabin or performing any operations upon the aircraft.

General

22. Faults in the power supplies should be investigated with the aid of the relevant routeing and circuit diagrams together with the associated Air Publications covering any suspected equipment.

Inverters

23. Information on the servicing of inverters will be found in A.P.4343B, Vol.1, Book 3.

Magnetic starting switches

24. Details of the servicing of magnetic starting switches will be found in A.P. 4343B, Vol.1, Sect.11, Chap.9.

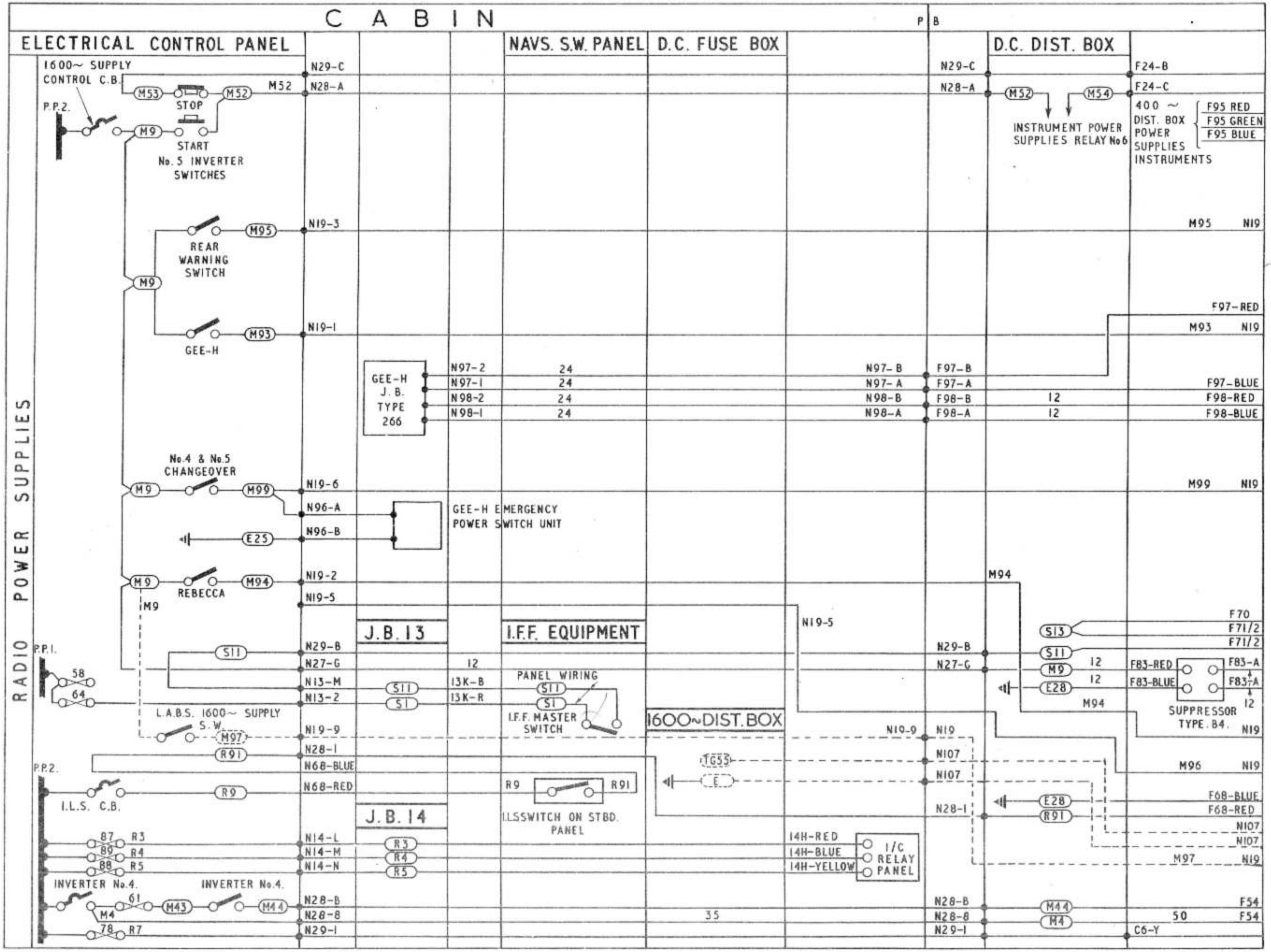

FIG. 3. RADIO AND RADAR POWER SUPPLIES (B MK. 6 AIRCRAFT)

No.5 inverter must not be run simultaneously unless both generators are charging. The inverters must not be started simultaneously: having started one inverter a short period must be allowed before starting the other.

2. The BLUE SILK EQUIPMENT switch should not be operated until a short period has elapsed from the closing of the INVERTER BLUE SILK switch. This allows the speed of the inverter to build up to its operating rev/min.

V.H.F. supplies (B Mk.6 aircraft)

15. 28-volts d.c. power supplies for operating the V.H.F. system are taken from fuses 15 and 16 on the M.E.P. to the V.H.F. relay panel in the equipment compartment on the port side of the fuselage aft of the pressure bulkhead.

I/C supplies

16. The intercomm. supplies are taken from fuses 87, 88 and 89 on B Mk.6 aircraft and from fuses 87 and 88 on B(I) Mk.6 aircraft. The fuses are mounted inside the E.C.P.

Radio altimeter (A.Y.F.) supplies

17. The 28-volts d.c. supply to the system is fed from fuse 78 in the E.C.P. to the transmitter receiver unit via terminals in J.B.6 in the rear fuselage.

I.L.S. supplies

18. The 28-volts d.c. supply which operates this system is protected by a 10 amp circuit breaker on the E.C.P. and controlled by the I.L.S. switch on the starboard instrument panel. The supply which is fed into the I.L.S. Type 157 junction box is controlled by a Type 60 voltage regulator situated adjacent to the I.L.S. junction box in the upper equipment compartment.

Decca Mk.1 power supplies (B(I) Mk.6 aircraft - post Mod.2622 and 4038)

19. A 28-volt d.c. supply to the system is fed from fuse 205 in the d.c. fusebox.

U/V.H.F. supplies (B(I) Mk.6 aircraft)

20. The 28-volts d.c. supply to the U/V.H.F. equipment is fed from fuse 199 on the M.E.P., via a terminal block and the interconnecting box.

Stand-by U.H.F. supplies

21. The stand-by U.H.F. T/R unit operates from a 24-volt supply which is normally taken via a volts drop resistor from fuse 308 in the E.C.P. A 24-volt emergency battery, situated in the port equipment bay, provides an alternative supply if the normal supplies fail. Transfer to the battery supplies is effected by selecting EMERGY on the U.H.F. STANDBY SUPPLIES switch mounted on the miscellaneous instrument panel. A function switch, also mounted on this panel, is marked GUARD - OFF - CHAN A and is used to select the mode of operation of the T/R unit.

SERVICING

WARNING

The relevant safety precautions detailed on the LETHAL WARNING marker card must always be observed before entering the cabin or performing any operations upon the aircraft.

General

22. Faults in the power supplies should be investigated with the aid of the relevant routeing and circuit diagrams together with the associated Air Publications covering any suspected equipment.

Inverters

23. Information on the servicing of inverters will be found in A.P. 4343B, Vol.1, Book 3.

Magnetic starting switches

24. Details of the servicing of magnetic starting switches will be found in A.P. 4343B, Vol.1, Sect.11, Chap.9.

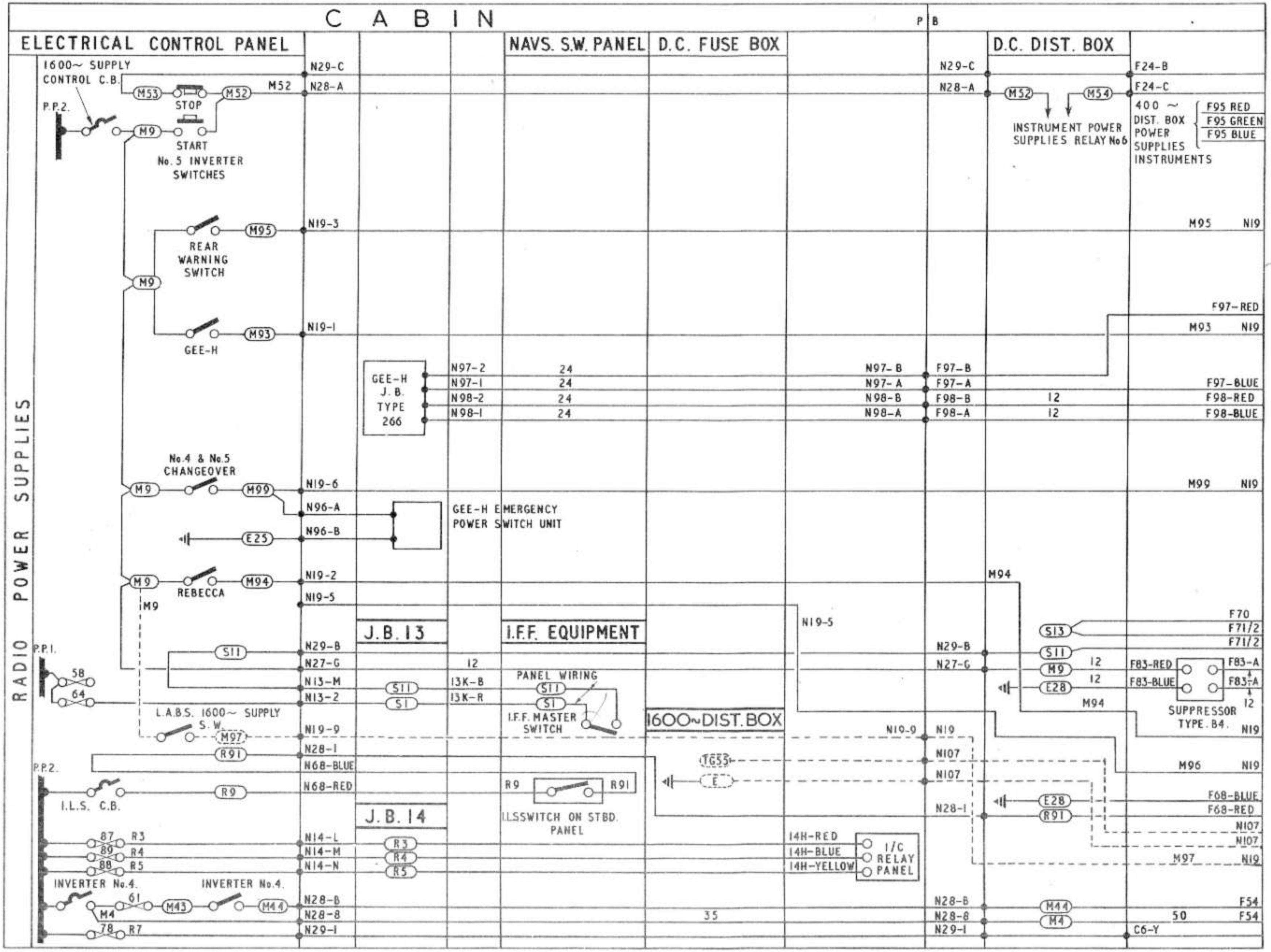

FIG. 3. RADIO AND RADAR POWER SUPPLIES (B MK. 6 AIRCRAFT)

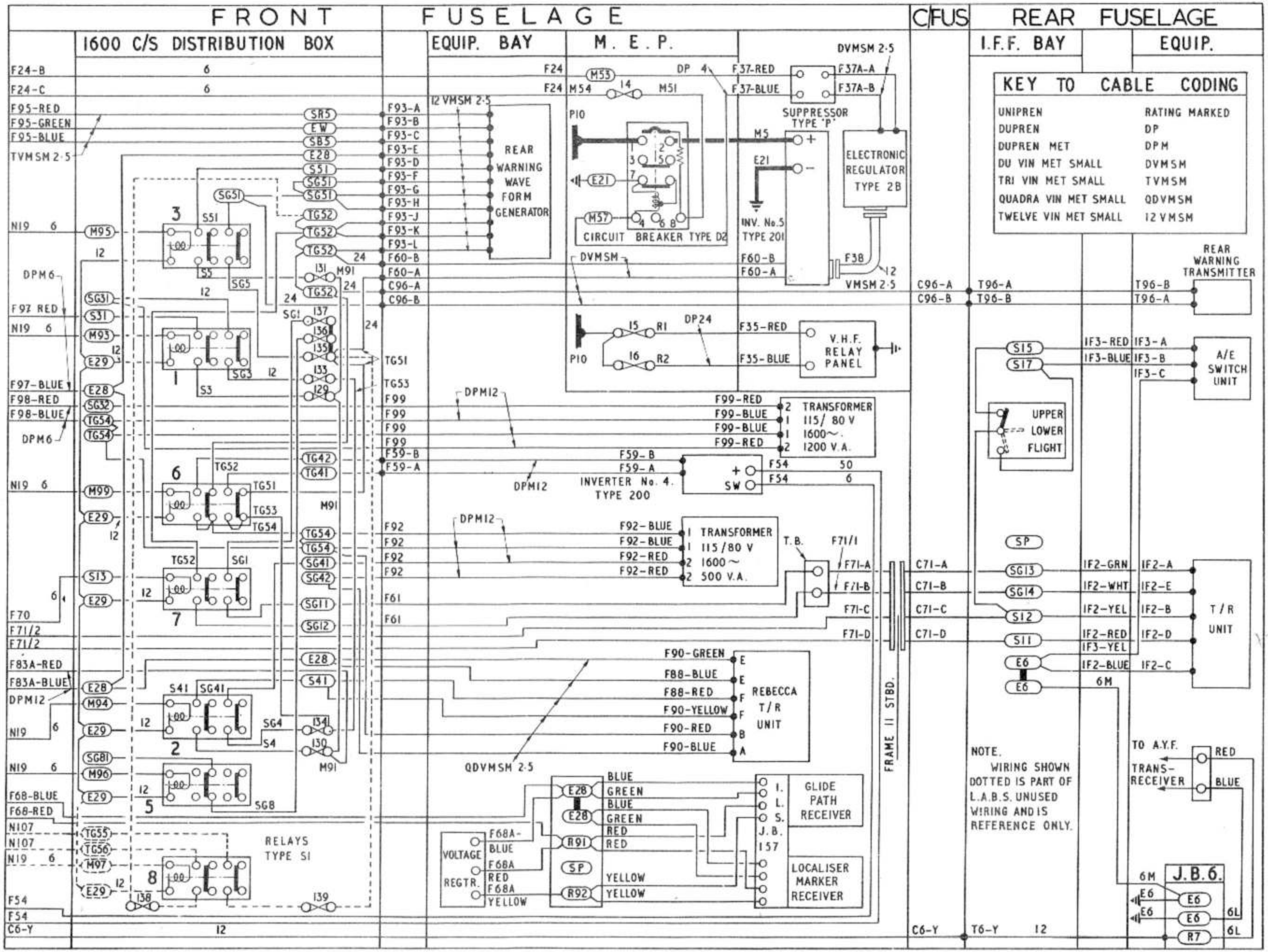

FIG. 3A. RADIO AND RADAR POWER SUPPLIES (B MK. 6 AIRCRAFT)

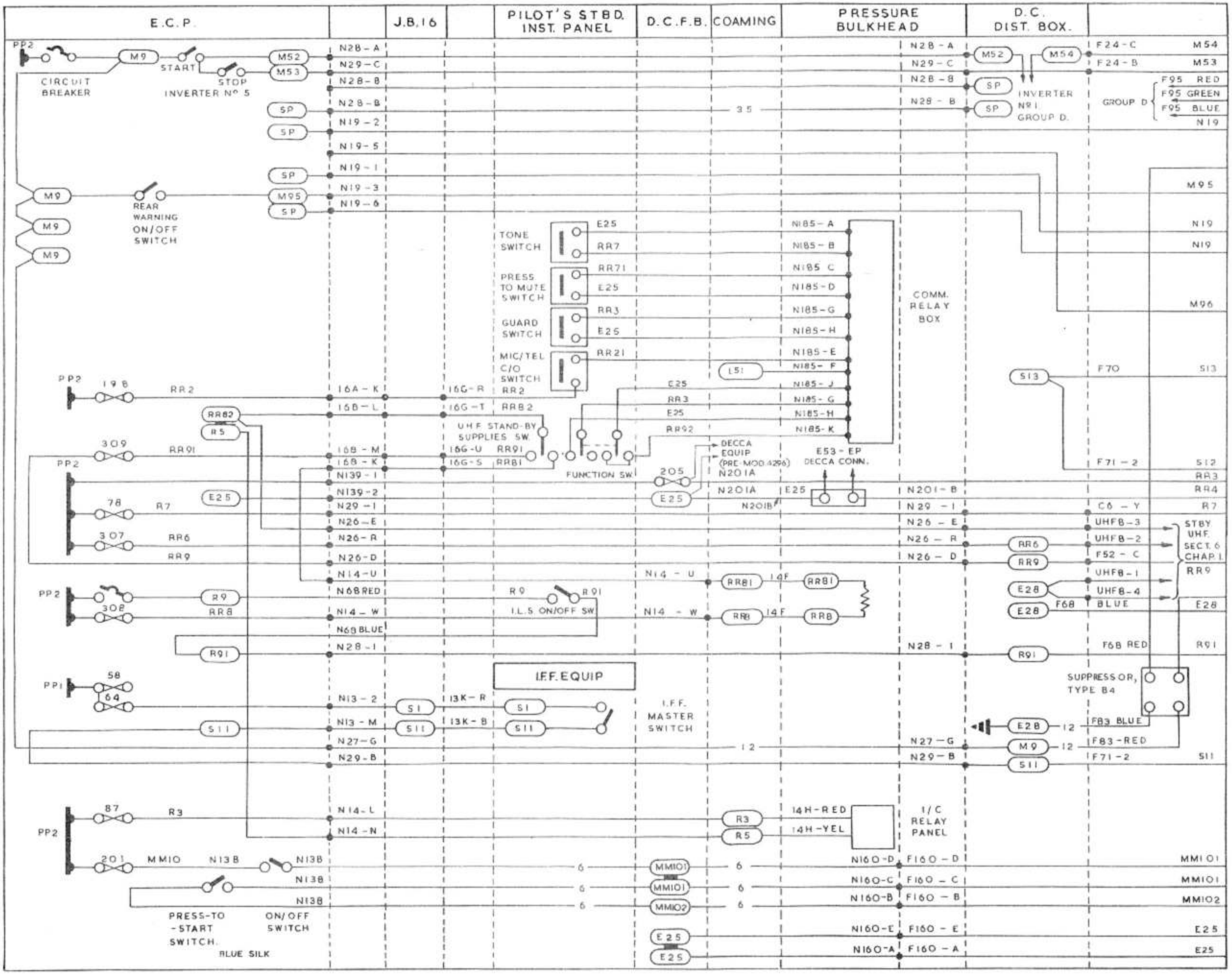

FIG. 4. RADIO AND RADAR POWER SUPPLIES (B (I) MK. 6 AIRCRAFT)

MOD. 4296, 4319 & 4462 EMBODIED

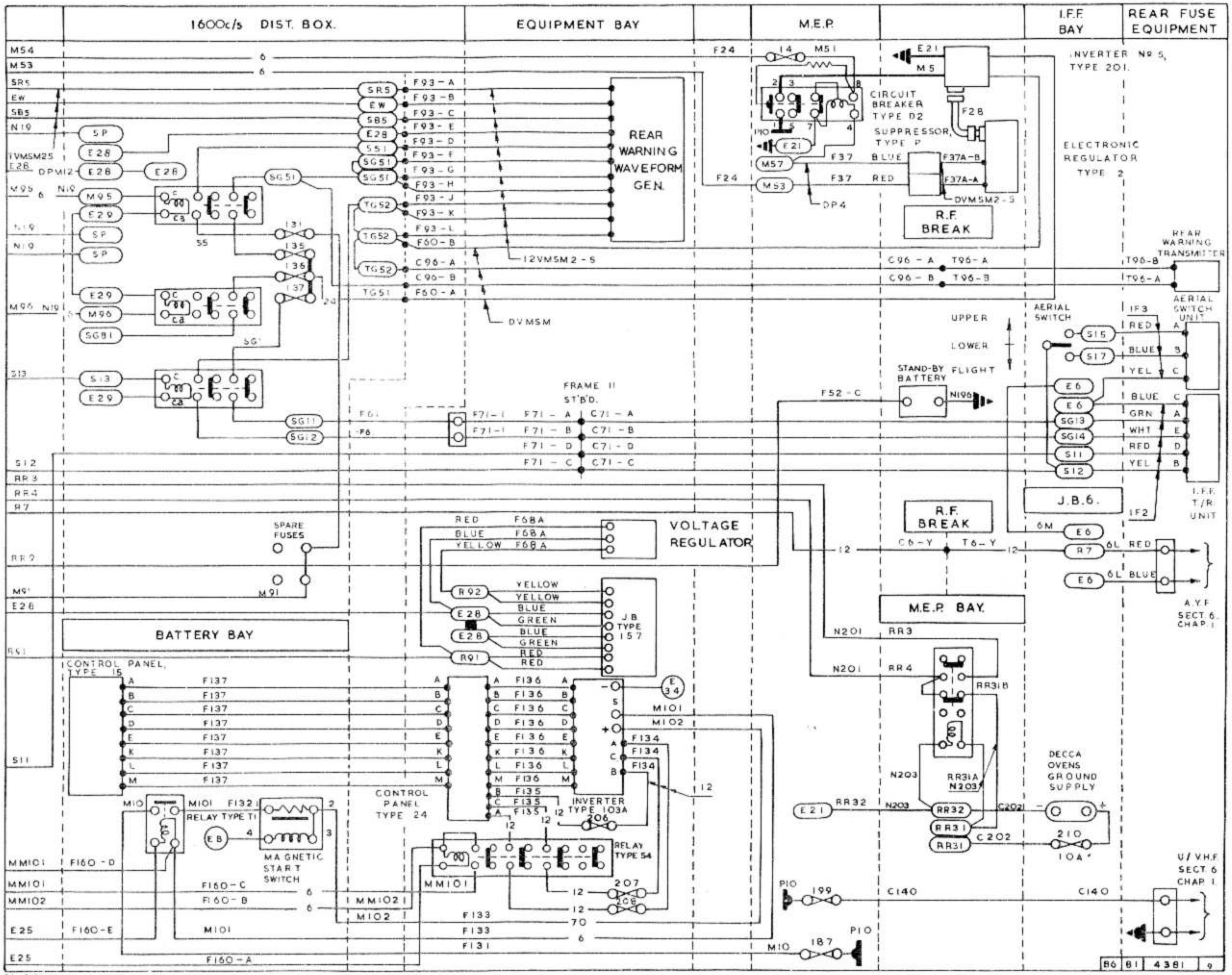

FIG. 4A. RADIO AND RADAR POWER SUPPLIES (B (I) MK. 6 AIRCRAFT)

MOD. 4296, 4319 & 4962 EMBODIED

WARNING AND EMERGENCY - GROUP W

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LIST OF ILLUSTRATIONS

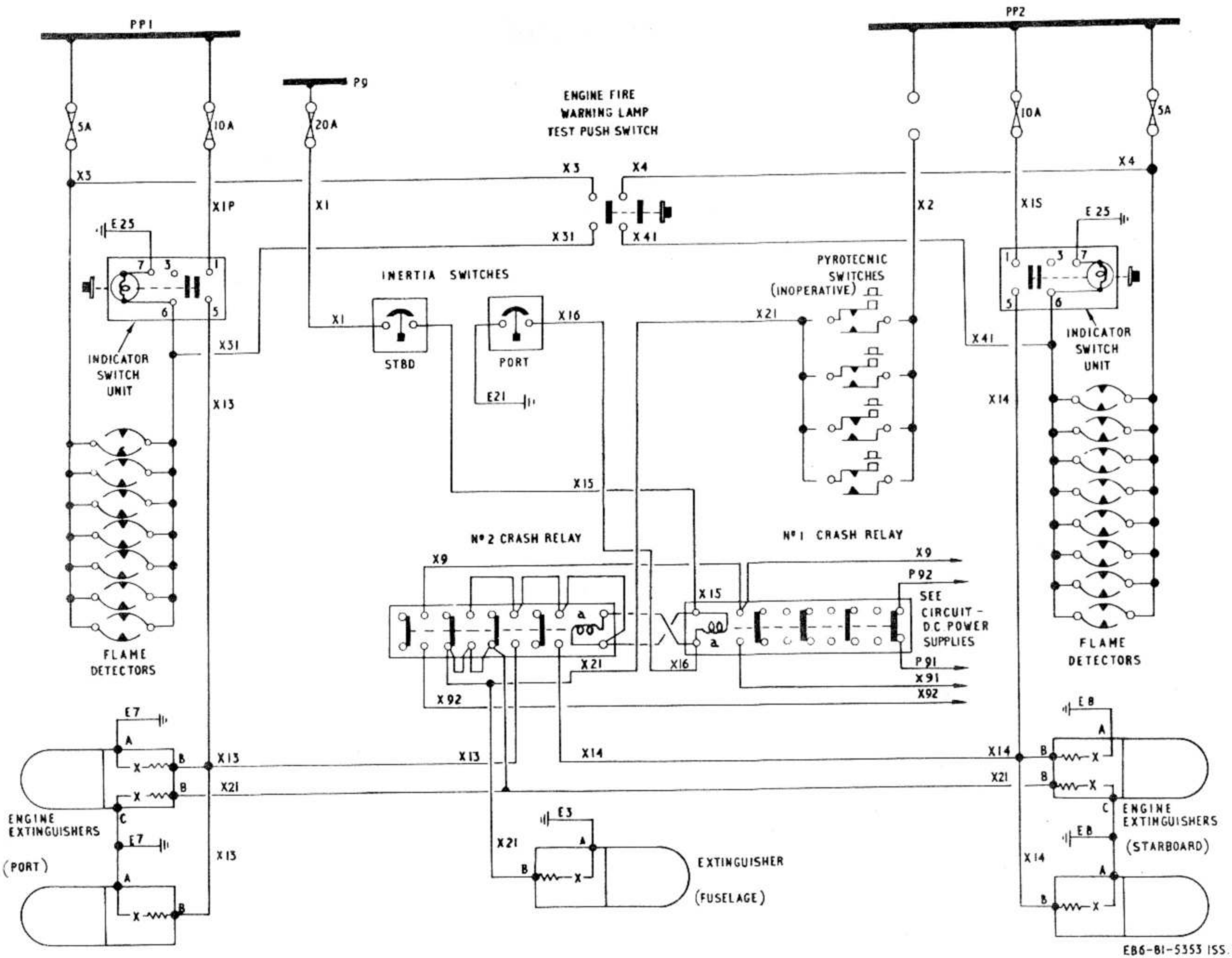

Fig. 1. Fire detectors and extinguishers

DESCRIPTION

FIRE EXTINGUISHER SYSTEM

General

1. A fire extinguisher system is provided for the protection of the engines and, in the event of a crash landing, also the fuselage fuel tanks. Two Type 14A (or Type 8AX) extinguishers, are installed one in each main wheel well. These extinguishers are fitted with dual operating heads, one connecting to the engine-spray rings and the other to the fuselage fuel tank spray pipeline. On aircraft post Mod.3773, the operating head serving the fuselage fuel tank spray pipeline is operative only under crash landing conditions. Three Type 12A (or Type 4AX) extinguishers with single operating heads are also installed. One of these, used only under crash landing conditions, is located on the aft face of frame 27A in the rear fuselage. The others are installed one in each wing between rib E and the inboard engine rib. Indication of fire in the engine bays is given by warning lamps integral with the extinguisher ◂push-button switches on the miscellaneous instrument panel. The warning▸ lamps are operated by fire detectors fitted in the engine bays. An inertia switch circuit provides that all the extinguishers are automatically discharged upon a crash landing.

Fuselage fire protection

2. Prior to S.T.I./Canberra/142 the fuselage fuel tanks were protected by pyrotechnic detectors and the extinguisher on frame 27A. The S.T.I. disconnects the pyrotechnic capillaries from their switch units which are left in situ but inoperative, so that the extinguisher only operates after the inertia switches have tripped in a crash landing. When S.T.I./Canberra/170 is satisfied the fuse, No.92 in the E.C.P., which controls the circuit is removed.

Engine fire protection

◂3. Fifteen Series 5 resetting-type▸ detectors *(A.P.107E-0105-1)* are used for engine fire protection, seven being installed in the port engine bay and eight in the starboard bay. The detectors in each group are connected in parallel. This type of detector comprises a base in which is fitted a terminal block, and an alloy steel barrel housing a spring bow assembly carrying a pair of switch contacts connected in the warning lamp circuit of the appropriate engine. When subject to a temperature of 300 deg C or above, the barrel expands and causes the switch contacts to close and operate the warning lamp. When the temperature falls, and the barrel contracts the switch contacts automatically reopen and extinguish the warning light.

Inertia switches

4. Two Mk.1 piston-type inertia switches *(A.P.113D-1206-1)* are embodied in the fire circuits; one is installed in the equipment compartment at the port side of the fuselage aft of the pressure bulkhead and the other below the M.E.P. in the starboard equipment compartment. The switches are connected in series and are arranged to actuate two Type S relays numbered 1 and 2, mounted on the M.E.P.

Test switch

5. A test switch, which when operated tests both warning lamps simultaneously, is fitted adjacent to the fire extin◂guisher buttons on the miscellaneous▸ instrument panel.

Engine fires - operation

6. The engine fire warning lamps embodied in the switch unit knobs light if any of the resetting detectors in their associated circuits should operate. A fire in the port engine bay which results in operation of one or more of the resetting switches completes the circuit between X3 (fuse 56) and X31, causing the port engine fire warning lamp to light. Similarly if the starboard detector switches should operate, the circuit X4 (fuse 93) and X41 is completed, causing the starboard engine fire warning lamp to light. If indication of fire is given by the lamp in the port engine fire switch, pushing the switch knob IN will pass a supply from circuit X1P (fuse 55) to X13 and discharge both the port Type 14A and Type 12A extinguishers into the port engine bay. On similar indication being given by the starboard engine fire warning lamp, the operation of the starboard switch knob completes the circuit X1S (fuse 91) and X14 to discharge the starboard Type 14A and Type 12A extinguishers into the starboard engine bay.

Inertia switches - operation

7. If both inertia switches trip during a crash landing, a supply is fed from X1 (fuse 6) to X15 and X16 which energize the No.1 and No.2 crash relays. The closing of No.2 relay connects the

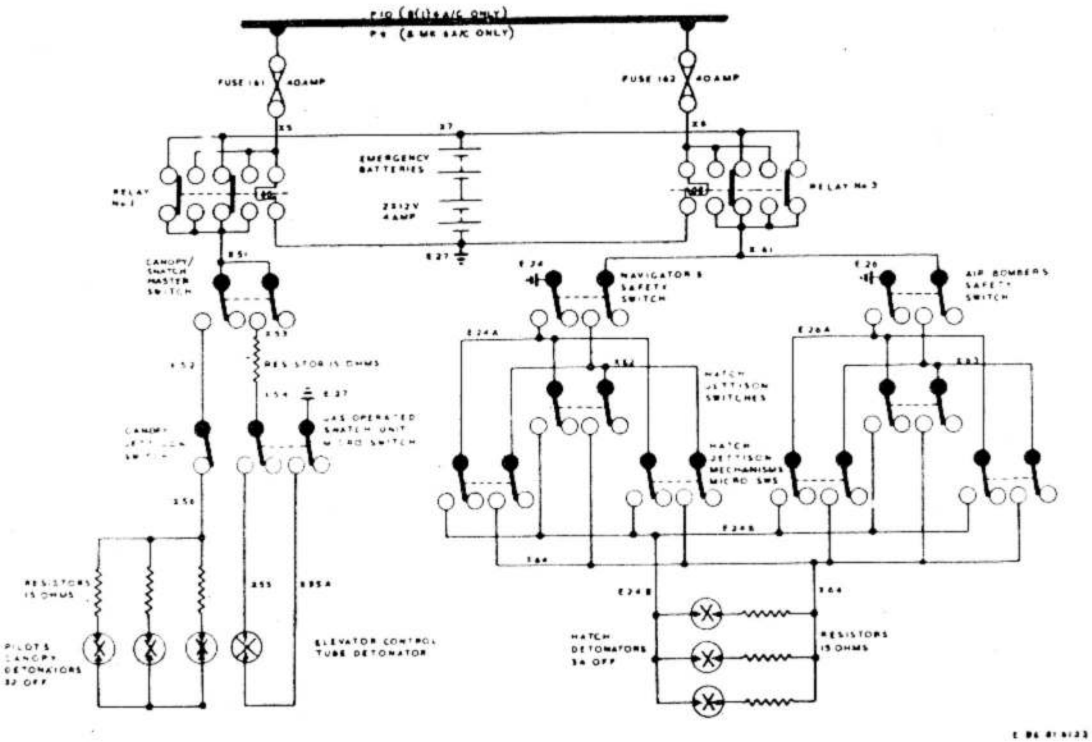

Fig. 2. **Canopy and hatch jettison**

(MOD. 4435 EMBODIED)

circuit X1 and X15 to circuits X13, X14, and X21 with the result that the Type 12A extinguisher at frame 27A discharges into the fuselage, and the Type 12A and 14A extinguishers in the wings discharge into their respective engine bays. On aircraft post Mod. 3773 the Type 14A extinguishers also discharge into the fuselage. The closing of No. 1 crash relay completes circuit X9 (fuse 185), X91 and X92 which closes down both generators, trips the reverse current circuit breakers, and breaks the circuit P91 (fuse 5) P92 to open the battery isolation relay, Type R. This disconnects the service batteries from all aircraft circuits except those for bomb jettison, canopy and hatch jettison, and the fire extinguishers.

DETONATOR CIRCUITS

General

8. A complete system is installed in the aircraft for the emergency jettisoning of the pilot's canopy and the crew members roof hatch and also two wing fuel tanks if these should be fitted. The system operates by exploding electrically fired detonators which are housed in the attachment bolts of the jettisonable components. The canopy is secured by 32 explosive bolts and the crew members roof hatch by 34 similar bolts. When installed at the wing tips, each jettisonable fuel tank is attached by three bolts containing an explosive detonator. Provision is also made, by means of an explosive charge, to cut the elevator control tube at a point near the aft end of the console.

9. Canopy jettison is controlled from the CANOPY/SNATCH MASTER switch on the take-off panel and a CANOPY JETTISON switch on the console. The detonator in the elevator control severance unit is also controlled by the CANOPY/SNATCH MASTER switch together with a micro-switch mounted on the snatch unit. The switch is operated by a gas-operated piston when the ejection seat face-

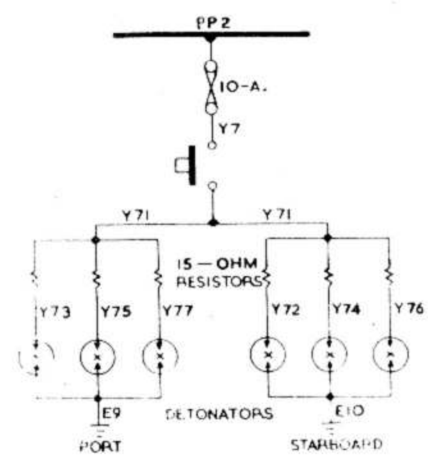

Fig. 3. **Wing tip fuel tank jettison**

screen or seat-pan firing handle is operated. Hatch jettison is controlled by either the navigator's HATCH JETTISON and SAFETY switches at the port side of navigator's seat or the air-bomber's HATCH JETTISON and SAFETY switches at the starboard side of the air-bomber's seat. Additional microswitches accommodated in hatch jettison mechanisms situated on the rear of the pressure bulkhead, provide for automatic hatch jettison when the ejection seat firing cable is operated. The appropriate SAFETY switch must be in the ON position before the corresponding JETTISON switch or hatch mechanism switches become operative.

Resistors

10. Each detonator circuit is fed through a 15 ohm resistor. Those serving the canopy and hatch are carried in boxes holding a maximum of eight. Four boxes used for the canopy circuits are situated two at each side of the cockpit below the coaming tube. Five boxes are used for the hatch circuits, three in the aft end of the cabin and two in the upper equipment compartment aft of the pressure bulkhead. A resistor in circuit with the elevator tube detonator is fitted in the jettison relay unit located in the console structure. Three resistors are permanently fitted in each wing tip for use with the explosive attachment bolts for the wing tip fuel tanks when these are installed.

Power supplies

11. The normal power supply for operating the canopy, elevator snatch unit, and hatch detonator circuits is taken from the service battery busbar P9 or P10 (post Mod.4072). In the event of failure of the normal supply the above detonator circuits are automatically transferred to the emergency battery circuit X7, the transfer being achieved by the functioning of two Type S relays housed in the jettison relay unit located in the console. During normal operation the change-over relays are held in the closed position by an energizing ◀ feed from circuit P9 (B Mk.6) or P10 (B(I) Mk.6); if this feed is broken the ▶ relays open and the circuit supply is transferred to busbar X7 via the contacts of the relays in the de-energized position.

Canopy jettisoning and elevator snatch unit operation

◀ **12**. The 2-pole CANOPY/SNATCH MASTER ▶ switch controls both the normal and emergency power supplies to the canopy jettison and elevator snatch unit cir- ◀ cuits. With the CANOPY/SNATCH MASTER ▶ switch ON, the closing of the CANOPY JETTISON switch completes the circuit X52 and X53 to fire the canopy detonators. The operation of the ejection seat face-screen or seat-pan firing ◀ handle closes the snatch unit micro- ▶ switch to complete the circuit X54 and X55 to fire the elevator control detonator. In addition to closing the switch, operation of the ejection seat face-screen or seat-pan firing handle operates the snatch unit *(Sect.3, Chap.11)* which results in the control column being jerked forward against the instrument panel to give the pilot ejection clearance.

Hatch jettison operation

13. Provided that the appropriate SAFETY switch is in the ON position, selection of the corresponding JETTISON switch completes the circuit X61 through X62 or X63 to X64 to fire the hatch detonators. Operation of either ejection seat face-screen or seat-pan firing handle will cause the microswitches in the appropriate hatch jettison mechanism to be operated *(fig.2)* and provided that the SAFETY switches are in the ON position *(Sect.3, Chap.11)*, complete the circuit X61 through X62 or X63 to X64 to fire the hatch detonators. Selection of either jettison switch will also complete the circuit to jettison the hatch without seat ejection *(Sect.3, Chap.11)*.

Wing-tip fuel tank jettisoning

14. These tanks, when carried at each wing tip, can be jettisoned by operating a shielded push-switch, labelled FUEL TANK JETTISON, at the top of the alighting-gear panel forward of the console. The tanks are not normally expendable and are only jettisoned in an emergency.

OXYGEN WARNING SYSTEM

Oxygen indicators

15. The Mk.17D, E or F regulators used by the pilot, the navigator, and the air bomber at both his take-off and prone stations are fitted with magnetic indicators which operate when oxygen is flowing through the regulators. The indicators are energized and de-energized by the movement of a diaphragm within the regulators making and breaking electrical contacts in series with the indicators. At the pilot's station and the air bomber's prone station the regulators are not in direct frontal vision. Provision is made therefore, to indicate the oxygen flow by remote magnetic indicators, these being in parallel with the indicators on the regulators at these stations. On B Mk.6 aircraft the remote magnetic indicator for the pilot is on the instrument flying panel, and that for the air bomber is at the starboard side of his take-off station. On B(I) Mk.6 aircraft, both indicators are fitted on the pilot's instrument flying panel.

Power supply

16. The power supply for the system is not switched, but fed direct from fuses 36 and 96 in the E.C.P. Fuse 36 protects the navigator's and air bomber's regulators and fuse 96 the pilot's regulator.

SERVICING

WARNING

> **The relevant safety precautions detailed on the LETHAL WARNING marker card must always be observed before entering the cabin or performing any operations upon the aircraft.**

FIRE EXTINGUISHER SYSTEM

General

17. Before any functional tests on the fire extinguisher circuits are commenced, all fire extinguishers must be disconnected. Ensure that fuses 55, 56, 91 and 93 are fitted in the E.C.P. and fuse 6 at the M.E.P.

Engine fire circuits

Flame detectors

18. Functioning tests should be made periodically on the installed engine flame detectors, using a battery-operated muff-type heater, Ref.No.5G/566 which should be placed on the barrel of each detector in turn. When the temperature of the barrel reaches approximately 300 deg C the detector switch contacts should close and operate the appropriate warning lamp.

Note...

> *The engine flame detectors are adjusted and set by the manufacturers and do not require any internal servicing.*

19. If a heater unit is not available, the following procedure can be followed, but it must be understood that this test only checks the continuity of the cable run between the first and last switch in each engine fire circuit and does not check the functioning of the detector units.

(1) Remove the attachment bolts of the lower centre detector fitted to each engine firewall, and the top switch at each engine bay outboard rib. Remove the cover plate from the base of each detector to gain access to its terminals.

(2) Connect together, in turn, the

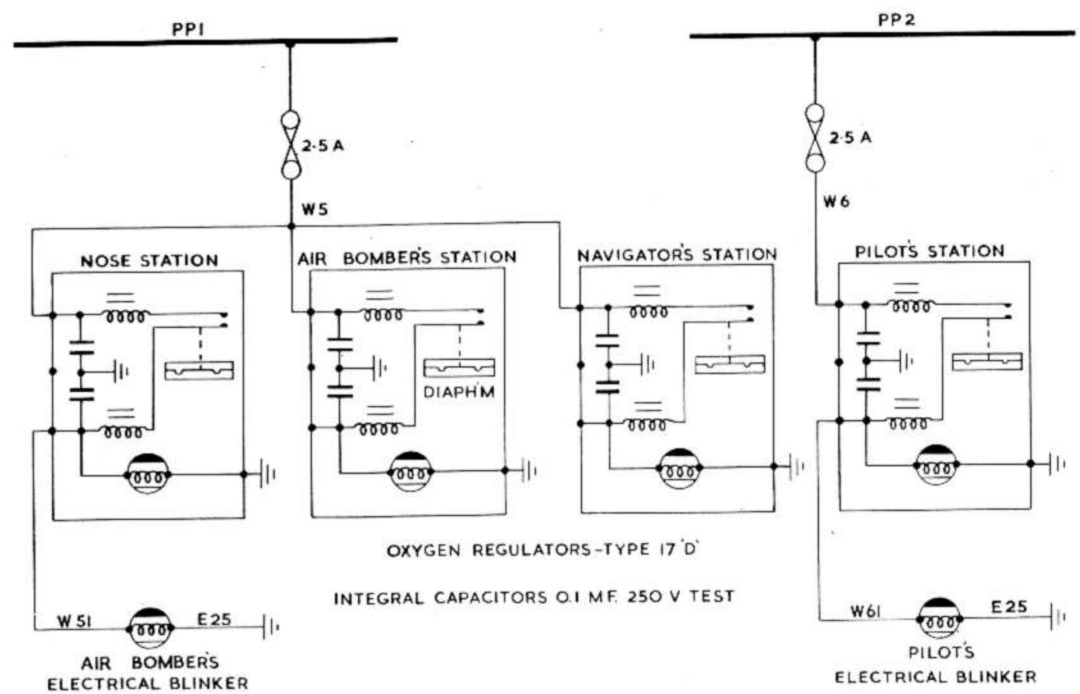

Fig.4. Oxygen warning system

terminals of the partly-dismantled detectors in each engine bay. The appropriate warning lamp should light each time.

Extinguishers

20. The following procedure checks the extinguisher circuits:-

(1) Connect a test lamp to pins A and B of the 2-pin Plessey socket on cables 7F and 8F in the port and starboard wheel wells respectively. (These cables connect to the Type 14A extinguisher head direct to the engine bays.) Connect other test lamps to pins A and B on the 2-pin Plessey socket on cables 7P and 8P. (These cables connect to the Type 12A extinguishers installed between rib E and the inboard engine rib in each wing.)

(2) Press the port and starboard engine fire switches in turn. The appropriate test lamps should light each time.

Inertia switch circuit

21. The circuit should be checked as follows:-

(1) Connect a test lamp to the Plessey socket of cable 3B which has been disconnected from the Type 12A extinguisher at frame 27A.

(2) Connect a test lamp to pins B and A of the Plessey sockets on cables 7F, 7P, and 8F, 8P in the port and starboard wheel well respectively. On aircraft post Mod.3773, also connect test lamps to pins B and C on the Plessey sockets of cables 7D and 8D in the port and starboard wheel wells respectively.

(3) After removing the four screws which secure the covers on the two inertia switches, short together the terminals on each switch at the same time. This action energizes the two crash relays from X1 via X15 and X16 and results in a supply being fed from X1 via the now closed contacts of No.2 crash relay to X13, X14, and X21 to light all seven test lamps.

Extinguisher fuze test

◀**WARNING**

During this test the extinguisher must be securely held in a fixed bracket with its nozzle so directed that its accidental discharge could not result in personal injury or damage to equipment.

22. The resistance of the extinguisher head fuzes should be periodically checked using a Mk.5 or 6 safety ohmmeter in accordance with the instructions laid down in A.P.1661F, Vol.1, Sect.5, Chap.1. ▶

DETONATOR CIRCUITS

WARNING

During servicing involving any interference with the detonator circuits, fuses 161 and 162 at the M.E.P. and fuse 94 at the E.C.P. must be removed. The service batteries, emergency batteries, and any external power supply must be disconnected.

General

23. Electrical tests on the system consist of:-

(1) A circuit test to ensure that a ◀28/24-volt supply is available at all▶ points. Before commencing this test all detonators are to be removed.

(2) A resistance test to ensure continuity of supply through the detonator leads and fuzes. Before commencing this test ensure that all electrical power supplies are disconnected. The approved test instruments are the safety ohmmeter photo-electric Mk.5 Ref.No.5G/1006388, or the safety ohmmeter Mk.6 Ref.No.5G/9018429 and these instruments only are to be used for this test.

Note...

Test (1) is necessary before initial installation and at all subsequent detonator changes.

Test (2) is necessary when detonators are first installed and at each replacement.

Preparation for circuit test

24. Before any tests are made on the detonator circuits the system should be prepared as follows:-

(1) Remove fuses 161 and 162 at the M.E.P. and fuse 94 at the E.C.P. Disconnect the service batteries, emergency batteries and any external power supply. Set the cocking levers of the two hatch jettison mechanisms to the locked position.

(2) Disconnect the 32 canopy detonators at the four resistor boxes in the cockpit and then remove the detonators.

(3) Disconnect the 34 rear hatch detonators at the three resistor boxes in

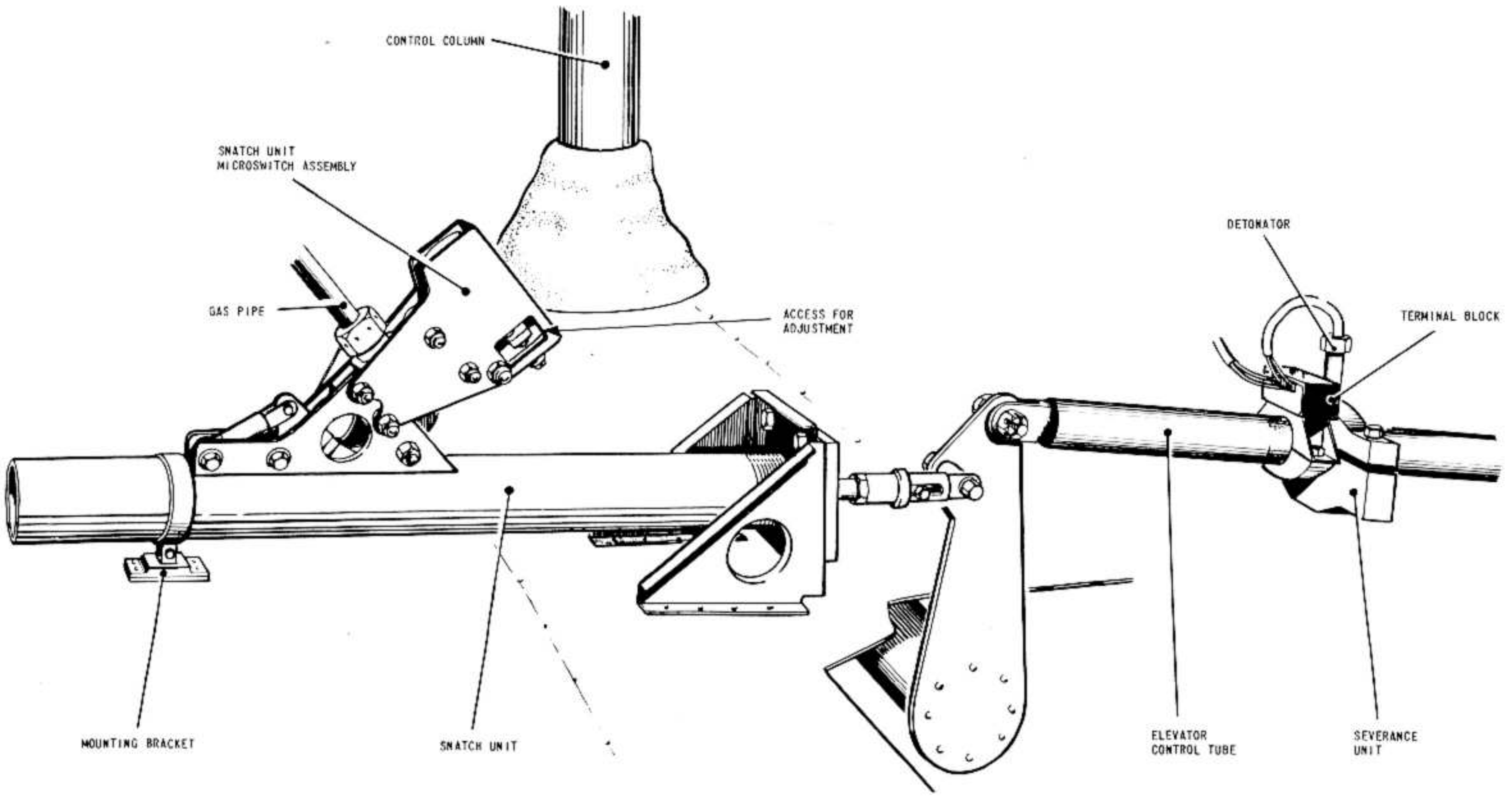

FIG. 5. SNATCH UNIT ASSEMBLY (POST MOD.4435)

the cabin and the two boxes in the upper equipment compartment. Remove the detonators.

(4) Disconnect the single detonator at the terminal block fitted to the elevator control tube and remove the detonator from the elevator control tube severance unit.

(5) If fitted, disconnect and remove the three detonators in each wing tip. These are connected to Plessey 2 and 3-way terminal blocks which are accessible after removing small detachable panels on the top surface of the wings.

◀25. The following is a resume of the tests done by the Contractor. It is included for guidance during servicing and as an aid to fault diagnosis. When the above preparations are completed proceed as follows:-

(1) Refit fuses 161 and 162 at the M.E.P. and fuse 94 in the E.C.P.

(2) Connect a 28V d.c. ground supply and on B Mk.6 aircraft close the battery isolation switch (this can be done by temporarily connecting P9 and P10 busbars).

(3) Reconnect the emergency batteries.

(4) Switch on the CANOPY/SNATCH MASTER switch.

Note...
Before switching on, ensure that all detonators have been removed.

Checking the canopy and elevator control tube detonator circuits

26.

Note...
To ensure that there is no cross connection between the canopy and hatch jettison circuits, it is required that a test lamp be fitted across the input terminals of a hatch jettison resistor box. It is important to ensure that this lamp does not light at any time during the following test procedure.

(1) Switch the CANOPY JETTISON switch to its ON position.

(2) Using a Type D testmeter, check the output currents at each pair of detonator terminals in the four canopy resistor boxes; the testmeter reading should be between 1.7 and 2.0 amp.

(3) Switch OFF the CANOPY/SNATCH MASTER switch or the CANOPY JETTISON switch alternately and ensure that there is no meter reading with either switch OFF.

(4) Switch OFF the CANOPY/SNATCH MASTER switch and disconnect any pair of supply leads from a canopy resistor box.

(5) Return the CANOPY/SNATCH MASTER switch to the ON position and, using the Type D testmeter, check that the voltage across the disconnected leads is 28 volts. Check also across the points of disconnection and ensure that the testmeter again registers 28 volts.

(6) Remove fuse 161 and check that the testmeter now reads 24 volts at both positions. Repeat (3).

(7) Switch OFF the CANOPY/SNATCH MASTER switch, remove the testmeter and reconnect the resistor box supply cables.

(8) Manually operate the snatch unit microswitch.

(9) Connect the testmeter across the elevator control tube severance unit terminal block and, after switching to ON the CANOPY/SNATCH MASTER switch, check that the output current is between 1.4 and 1.7 amp.

(10) Replace fuse 161 and check that the meter now reads between 1.7 and 2.0 amp.

(11) Switch OFF the CANOPY/SNATCH MASTER switch and ensure that the testmeter now reads zero. Return the switch to the ON position.

(12) Test the two poles of the snatch unit microswitch as follows:-

(a) Check the voltage at X55 to E27 the meter should read No volts.

(b) Close the microswitch, the reading should be 28 volts.

(c) Open the microswitch, reading should be No volts.

(d) Ensure that all switches are OFF.

(e) Connect the ohmmeter to X55A and E27 and close the microswitch, ▶

the meter should read approximately zero.

(f) Open the microswitch and the meter should read infinity.

27. On completion of the circuit tests, ensure that the microswitch clearance is as detailed in Sect.3, Chap.11, fig.1.

Checking the hatch detonator circuits

28.

Note...

To ensure that there is no cross connection between the canopy and hatch jettison circuits, it is required that a test lamp be fitted across the input terminals of a canopy jettison resistor box. It is important to ensure that this lamp does not light at any time during the following test procedure.

(1) At the navigator's position, switch to ON the SAFETY SWITCH and hold the JETTISON SWITCH in the ON position. Connect the testmeter across each pair of terminals in the five resistor boxes serving the hatch detonator circuit; the reading must be 1.7 to 2.0 amp. With the testmeter connected to one pair of terminals, switch OFF the SAFETY SWITCH and JETTISON SWITCH alternately and ensure that there is no meter reading with either switch OFF. Switch OFF both switches.

(2) Disconnect any pair of supply leads from a hatch resistor box.

(3) Switch on the navigator's HATCH JETTISON and SAFETY switches and using a Type D testmeter, check that the voltage across the disconnected leads is 28 volts. Check also across the points of disconnection and ensure that the testmeter again registers 28 volts.

(4) Remove fuse 162 and check that the testmeter now reads 24 volts at both positions. Replace fuse 162.

(5) Switch off the navigator's HATCH JETTISON and SAFETY switches, remove the testmeter and reconnect the resistor box supply cables.

(6) Repeat test (1) using the SAFETY switch and JETTISON switch at the air bomber's position. At least one pair of terminals is to be checked.

29. In addition to the tests detailed in para. 28, the single-lever system hatch jettison mechanism is to be tested as follows:-

(1) Close the microswitches in the navigator's hatch jettison mechanism by operating the cocking lever and removing the sear. Switch ON the navigator's SAFETY SWITCH and connect the testmeter across each pair of terminals in the resistor boxes; the reading must be between 1.7 and 2.0 amp. With the testmeter connected to one pair of terminals, switch OFF the SAFETY SWITCH and open the microswitches (by moving the cocking lever to cocked position) alternately; ensure that there is no meter reading with either switch in the OFF position. Re-cock the mechanism and refit the sear. Ensure open end of the sear hook is to starboard.

(2) Repeat test (1) at the air-bomber's position. At least one pair of terminals is to be checked.

30. Connect the emergency batteries and remove fuse 162 at the M.E.P. This action de-energizes the Type S.8, relay on the jettison relay panel and switches the supply from busbar P9 or P10 (post Mod.4072) to the emergency battery supply busbar X7. Repeat the tests detailed in para. 28-29, at least one pair of terminals is to be checked at each operation. Replace fuse 162 and disconnect all sources of supply.

Wing-tip tank detonator circuit test

31. Where applicable, test the circuit as follows:-

(1) Ensure that fuse 94 is refitted in the E.C.P. and switch ON power supply.

(2) Connect the testmeter, in turn, across each pair of terminals in the detonator terminal blocks in each wing tip *(fig.8 and 8A)*. Operate the wing-tip tank jettison push switch for each testmeter connection; the testmeter must read 1.7 to 2.0 amp. Each time the push switch is released ensure that there is no reading on the testmeter.

32. Upon completion of the circuit tests, ensure that all circuit switches are in the OFF position and that the guards for the pilot's, navigator's, and air-bomber's jettison switches are wire-locked with 32 s.w.g. copper wire. Before installing the detonators, ensure that the Warning preceding para.23 has been complied with.

Detonator circuits resistance test

Precautions

33. This test is effected with the detonators installed, therefore, before commencing the test on any of the detonator circuits, the following precautions must be observed:-

(1) Ensure that the aircraft and emergency batteries together with any external power supply are disconnected.

(2) The batteries and external supply must remain disconnected whilst any part of a detonator circuit or its fitting is dismantled.

(3) The approved testmeters are the safety ohmmeter photo-electric Mk.5 Ref.No.5G/1006388 and the safety ohmmeter Mk.6 Ref.No.5G/9018429. Before use, the meters should be tested as detailed in A.P.4343J, Vol.1, Sect.4, Chap.3.

(4) Whilst detonators are installed, no test method other than the following is to be employed.

Pilot's canopy and navigator's hatch circuits

34. Check the resistance at each pair of detonator terminals in the resistor boxes. The ohmmeter should read between 0.8 and 1.6 ohms.

Elevator control tube detonator circuit

35. Check the resistance across the terminals of the detonator terminal block. The ohmmeter should read between 0.8 and 1.6 ohms.

Wing-tip tank detonator circuit

36.

(1) Check the resistance across the terminals in the detonator terminal blocks in each wing tip. The ohmmeter should read between 0.8 and 1.6 ohms.

(2) Check the resistance between terminal Y71, in the d.c. distribution box and earth. The ohmmeter should read approximately 2.6 ohms.

Detonator renewal

WARNING

Do not handle the tube of the detonator. All operations must be done by holding the electrical leads near to where they enter the plug of the detonator assembly. THIS IS MOST IMPORTANT.

37. Detonators are lifed and must be changed at the intervals laid down in the current Servicing Schedule for this class of explosive store.

38. A full description of the canopy, hatch, and snatch unit installations is given in Sect.3, Chap.11. The installation of the wing-tip tank detonators is described in Sect.4, Chap.2.

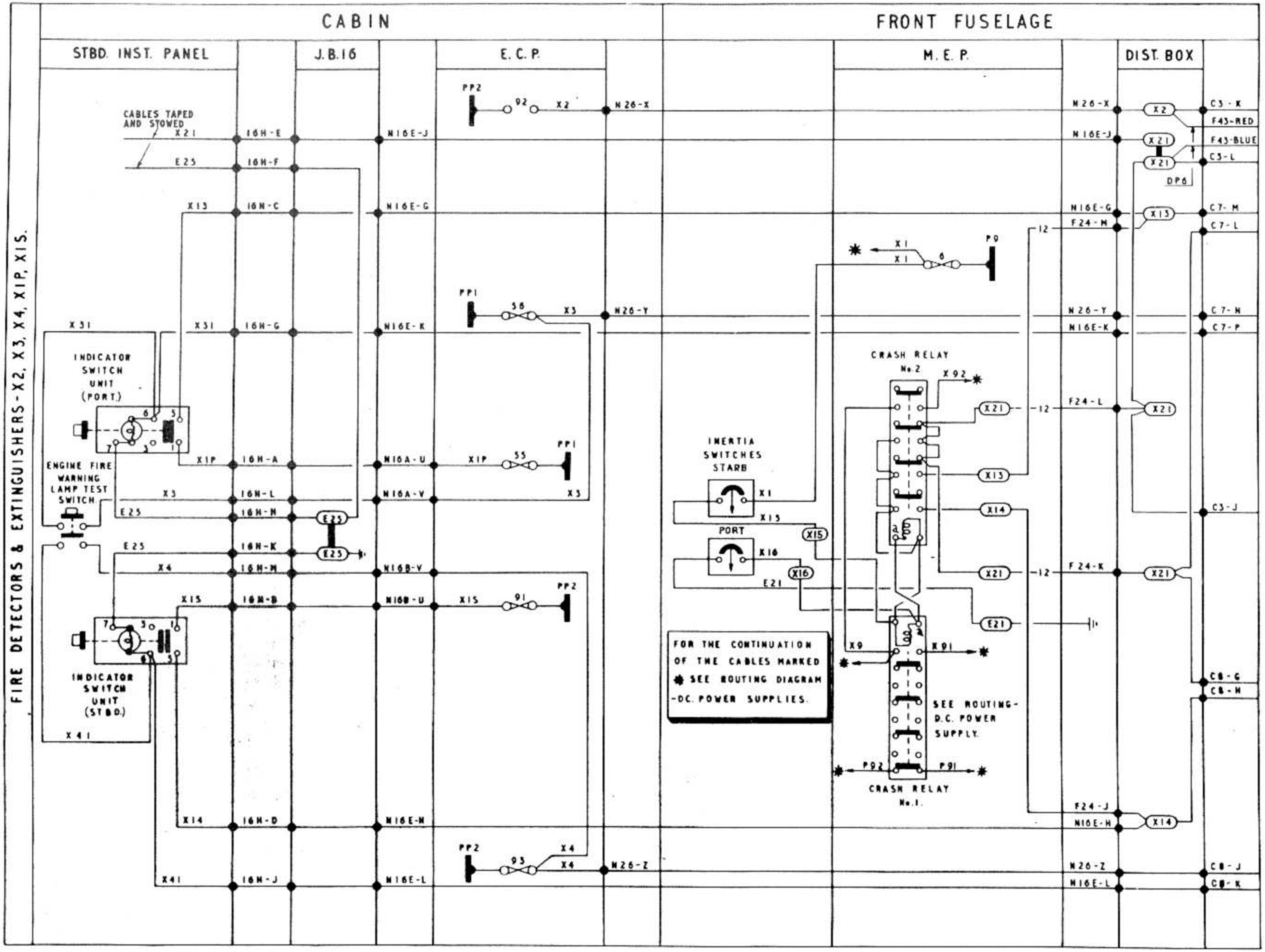

Fig. 6. Fire detectors and extinguishers

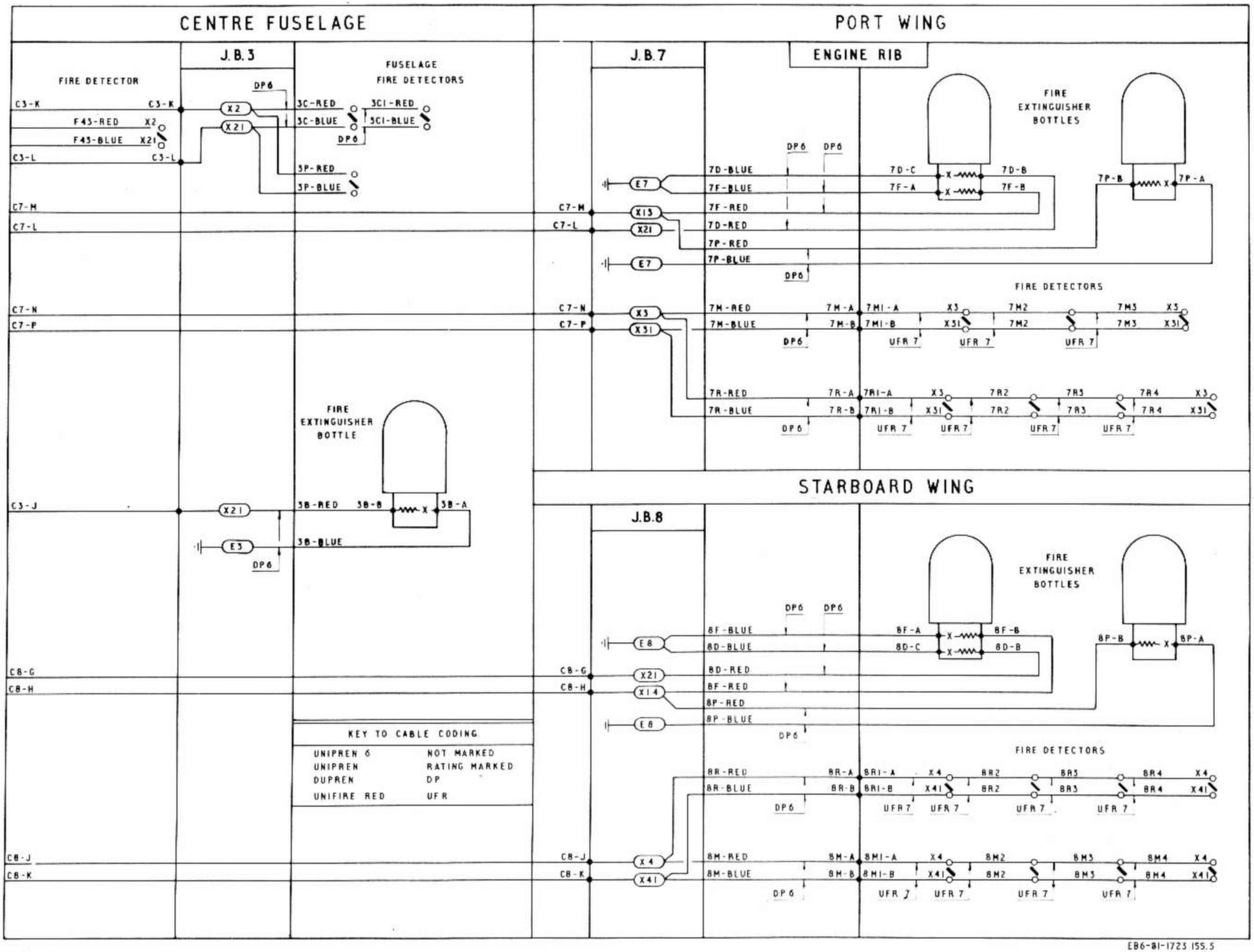

Fig. 6A. Fire detectors and extinguishers

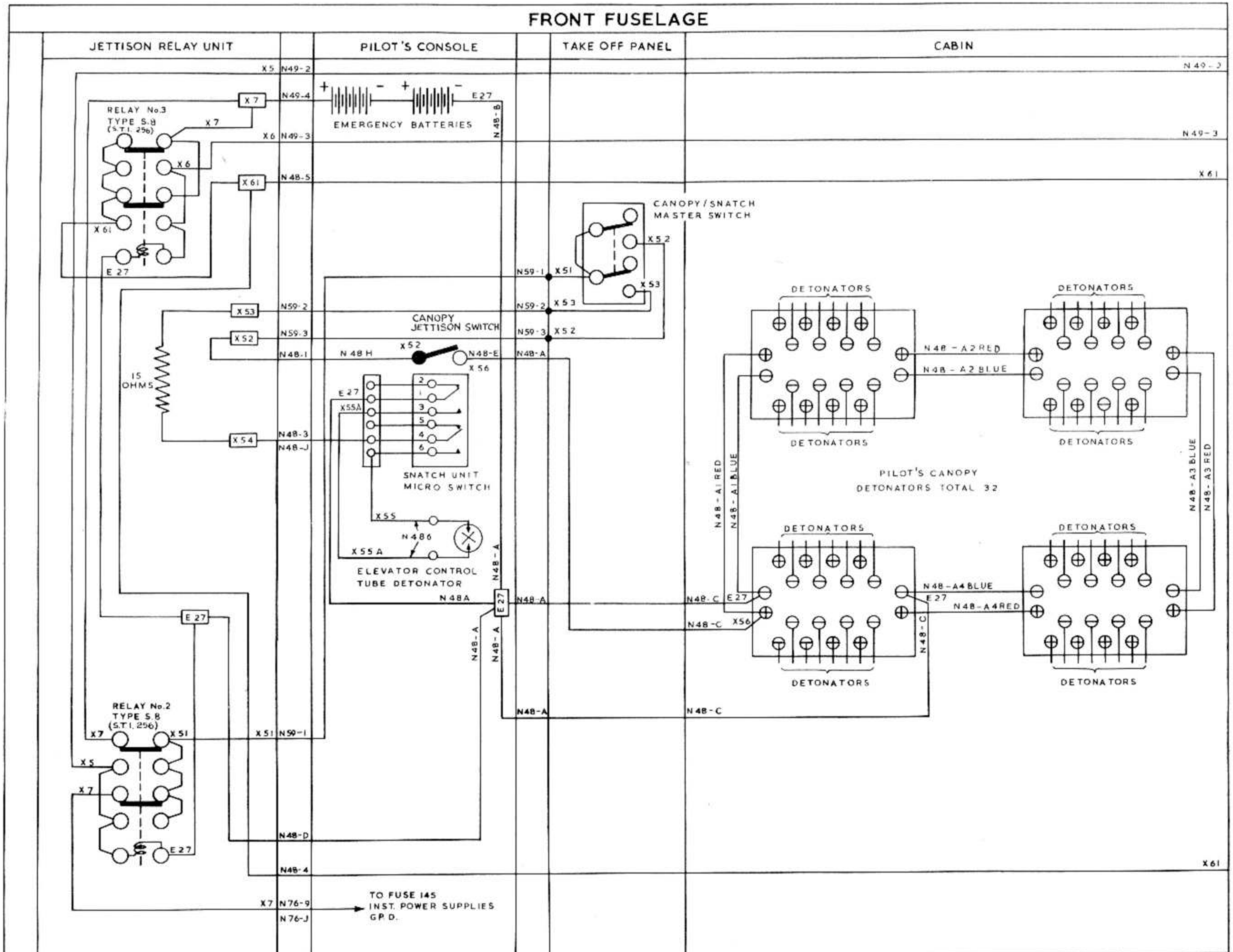

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FIG. 7. CANOPY AND HATCH JETTISON

◀ MOD. 4435 EMBODIED ▶

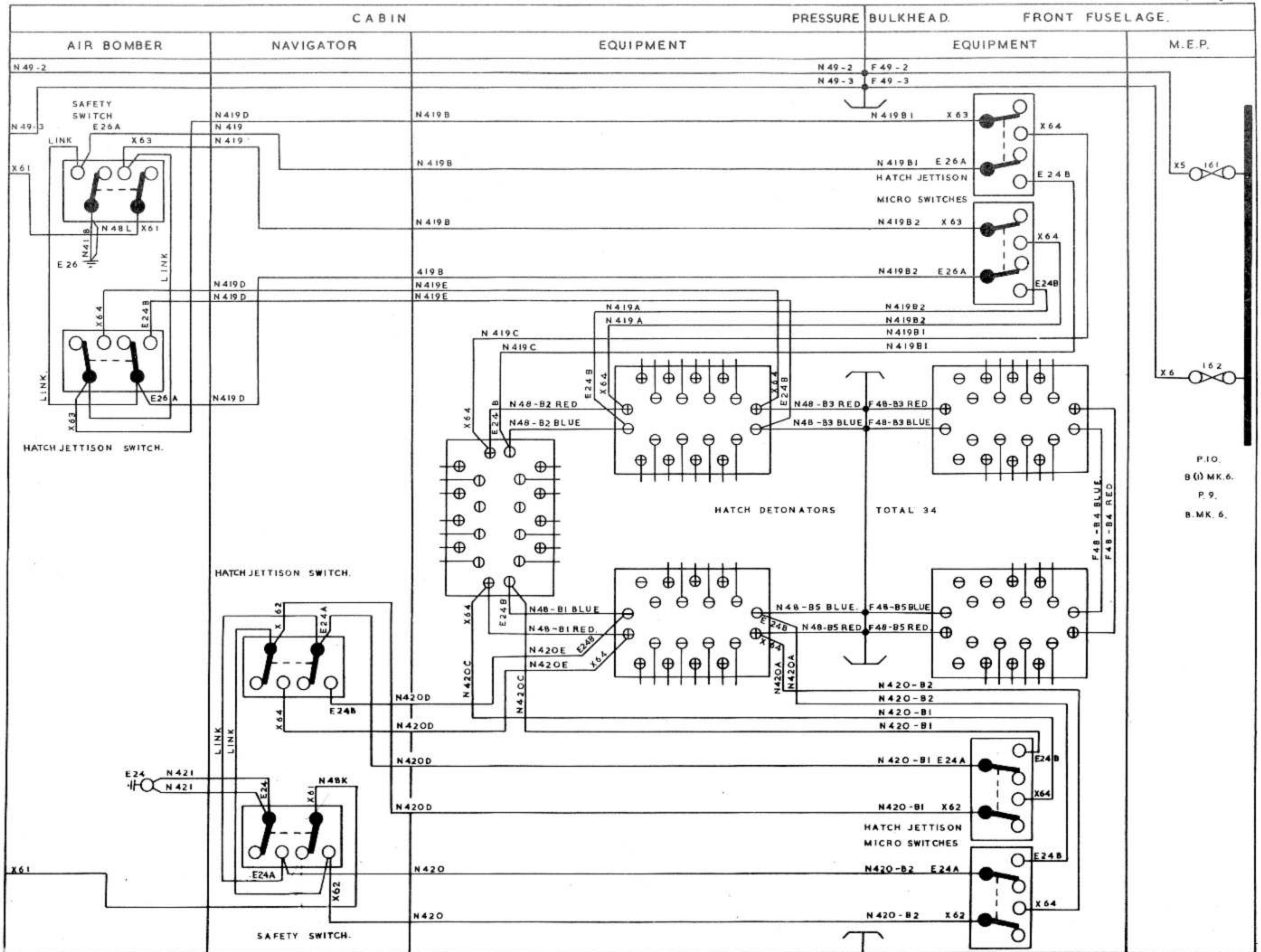

FIG. 7A. CANOPY AND HATCH JETTISON

◀ILLUSTRATION AMENDED▶

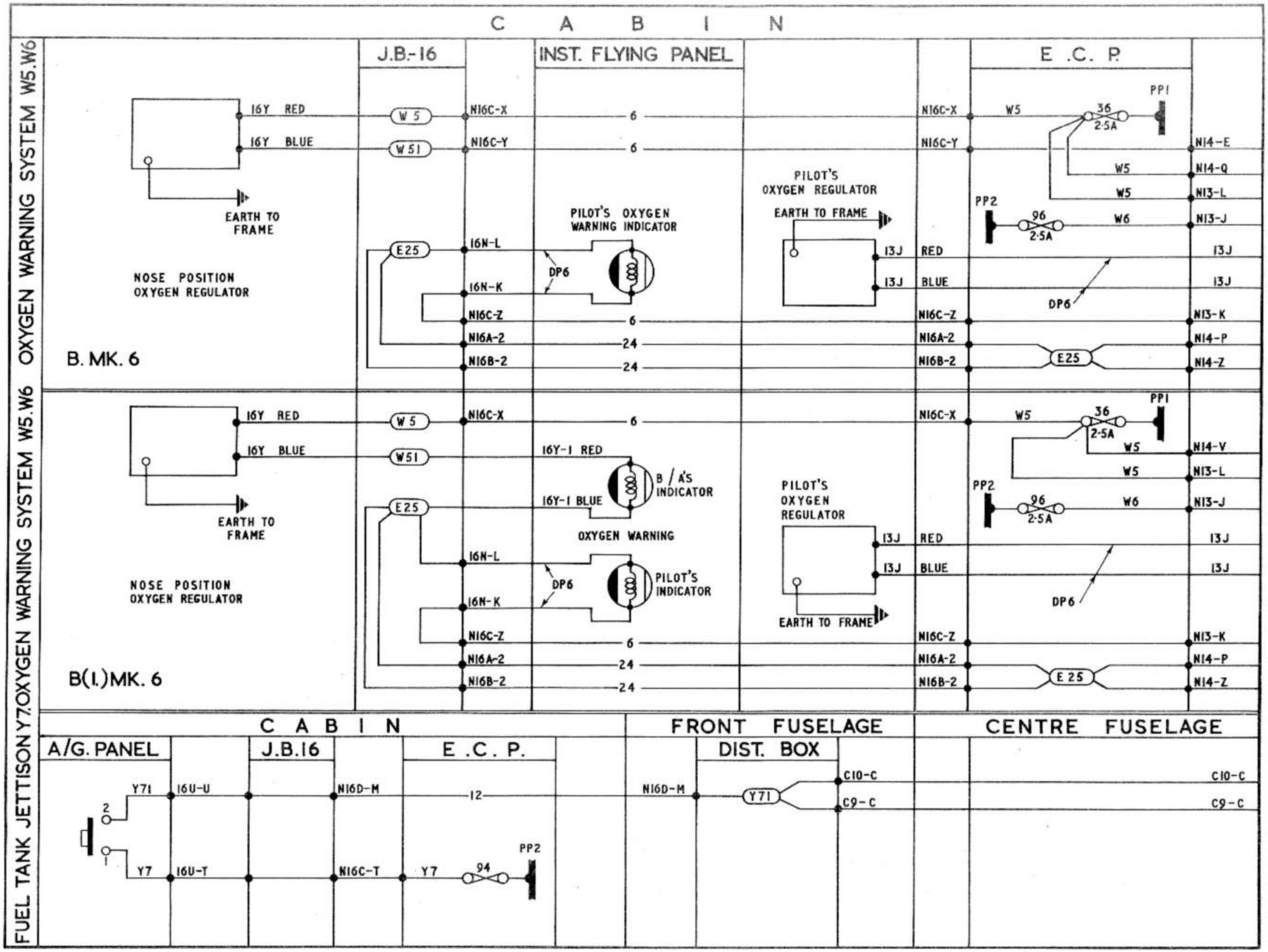

FIG. 8. WING TIP FUEL TANK JETTISON—OXYGEN WARNING SYSTEM

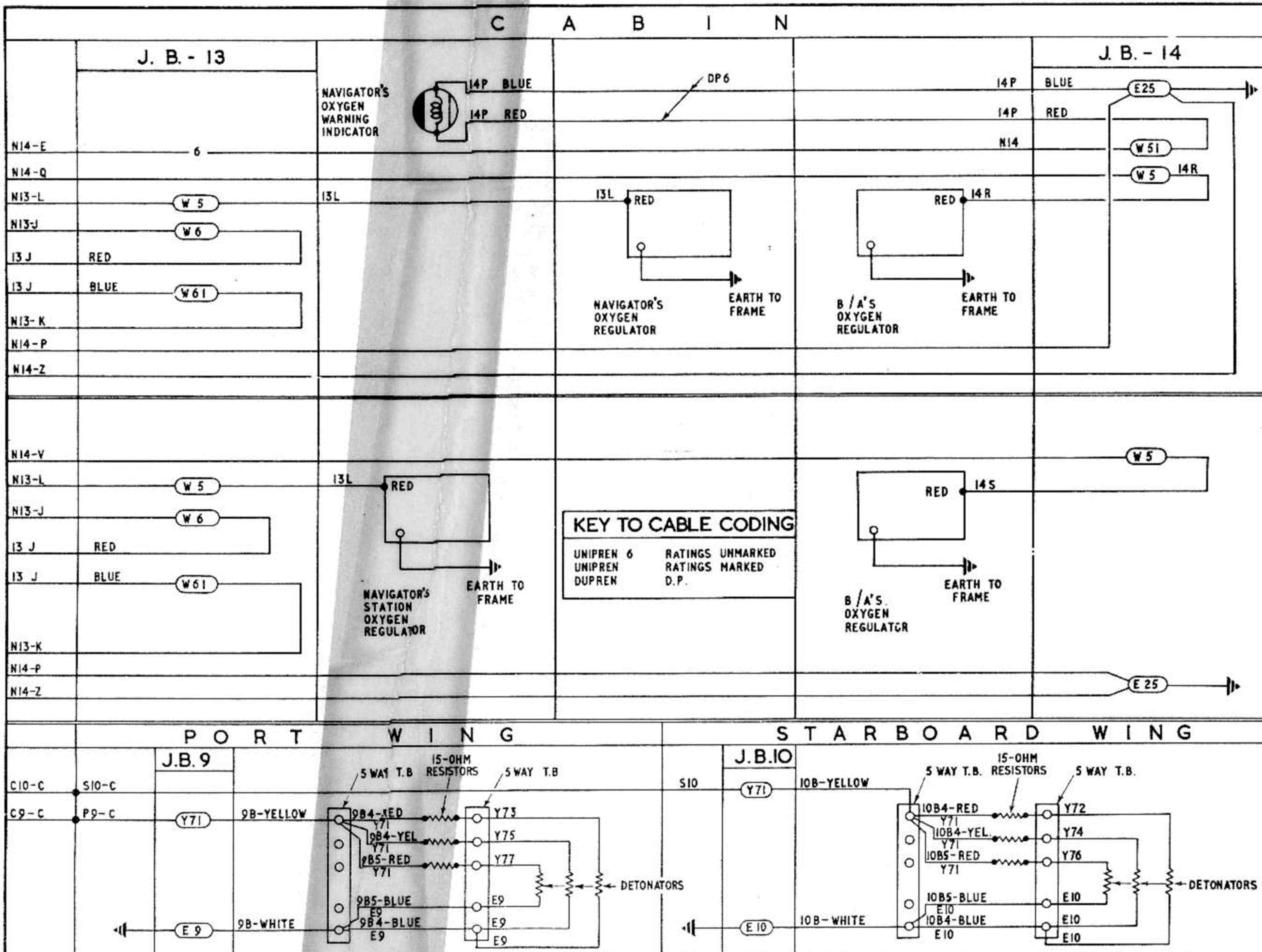

Fig. 8A. Wing tip fuel tank jettison – Oxygen warning system

GENERAL INFORMATION

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General

1. This chapter contains a description of the instrument system and information covering the servicing of the equipment. It is divided into self-contained groups in which the equipment is described under suitable functional headings such as Engine Instruments, Flight Instruments, etc.

2 Schematic wiring diagrams for the electrical instruments accompany the appropriate text. The routeing diagrams and other electrical information appear in the relevant group of Chapter 1.

3. A list of equipment included in each group details the References of the items and the number of the Air Publication in which they are described.

Location of equipment

4. Location of the instruments and of the access panels for servicing them are shown on the location diagrams contained in this group. Reference to Table 1—Master Key to Location Diagrams, enables the position of components and their access panels to be established.

TABLE 1

Master key to location diagrams

Equipment		Location Fig.	Location Item	Group	Access Fig.	Access Item
ARMAMENT AND PHOTOGRAPHIC EQUIPMENT				A & B		
T2 Bombsight equipment						
Sighting head		9	6		14	5
		10	5		14	5
Control panel		9	8		14	5
		10	4		14	5
Computor		9	11		14	5
		10	1		14	5
Junction box		9	12		14	5
		10	2		14	5
Gunsight equipment	B(I) Mk.6 aircraft					
Reflector gunsight	B(I) Mk.6 aircraft	3	17		14	5
Master switch	B(I) Mk.6 aircraft	3	2		14	5
G90 Camera equipment	B(I) Mk.6 aircraft					
Camera	B(I) Mk.6 aircraft	12	1		13	1
Master switch	B(I) Mk.6 aircraft	7	8		14	5
Sunny/Cloudy switch	B(I) Mk.6 aircraft	7	7		14	5
Control switch	B(I) Mk.6 aircraft	3	13		14	5
◀ G45/G90 conversion unit	B(I) Mk.6 aircraft	12	1		13	1
G90 camera press-to-test switch	B(I) Mk.6 aircraft	12	14		13	1 ▶
F95 Camera equipment	B(I) Mk.6 aircraft					
Camera	B(I) Mk.6 aircraft	2	1		14	5
Control box	B(I) Mk.6 aircraft	9	4		14	5
Iris heater switch	B(I) Mk.6 aircraft	9	2		14	5
Iris selector switch	B(I) Mk.6 aircraft	9	10		14	5
Film indicator	B(I) Mk.6 aircraft	9	9		14	5
Master switch	B(I) Mk.6 aircraft	9	1		14	5

TABLE 1 *(continued)*

Equipment	Location Fig.	Location Item	Group	Access Fig.	Access Item
Speed selector switch } B(I) Mk.6 aircraft	9	3	A & B	14	5
Control switch } B(I) Mk.6 aircraft	3	12		14	5
F24 Camera equipment					
Camera	1	2		14	12
Motor	1	4		14	12
Master switch	7	5		14	5
	8	3		14	5
Control, Type 35 (B Mk.6 aircraft)	8	4		14	5
Control, Type 48 (B(I) Mk.6 aircraft — post Mod.4056)	7	6		14	5
Remote pushbutton (B(I) Mk.6 aircraft — post Mod.4056)	9	13		14	5
MISCELLANEOUS INSTRUMENT EQUIPMENT					
Oxygen regulators and pressure gauges			D		
Pilot	3	4		14	5
	4	4		14	5
Navigator	5	3		14	5
	6	6		14	5
Air bomber (rear station)	7	3		14	5
	8	1		14	5
Air bomber (forward station)	9	7		14	5
	10	3		14	5
System pressure gauges	3	22		14	5
	4	20		14	5
Hydraulic pressure gauges					
Main system	3	24		14	5
	4	22		14	5
Brakes	3	23		14	5
	4	21		14	5
Main accumulator	12	12		14	3
Brakes accumulator	1A	10		14	9
Fatigue meter	1A	11		14	9
External air temperature indicator	5	6		14	5
	6	1		14	5
External air temperature bulb	11	5		13	4
Mixing valve position indicator	3	27		14	5
	4	25		14	5
Mixing valve position transmitter	11	10		13	4

TABLE 1 *(continued)*

Equipment		Location Fig.	Location Item	Group	Access Fig.	Access Item
Cabin altimeter		3	25	D	14	5
		4	24	D	14	5
Roller map coupling unit	B(I) Mk.6 aircraft	5	12	D	14	5
Roller map unit	B(I) Mk.6 aircraft	9	5	D	14	5
Roller map unit (alternative position)	B(I) Mk.6 aircraft	5	9	D	14	5
Clock		3	8	D	14	5
		4	9	D	14	5
ENGINE INSTRUMENT EQUIPMENT						
Fuel contents gauges				E		
No. 1 tank		3	37	E	14	5
		4	18	E	14	5
No. 2 tank		3	35	E	14	5
		4	32	E	14	5
No. 3 tank		3	33	E	14	5
		4	30	E	14	5
Port wing tank		3	19	E	14	5
		4	34	E	14	5
Starboard wing tank		3	30	E	14	5
		4	28	E	14	5
Fuel contents amplifiers				E		
No. 1 tank		2	8	E	14	9
No. 2 tank		2	6	E	14	9
No. 3 tank		2A	4	E	14	9
Port wing tank		11	11	E	14	7
Starboard wing tank		12	5	E	14	2
Fuel contents trimmers				E		
No. 1 tank		2	7	E	14	9
No. 2 tank		2	4	E	14	9
No. 3 tank		2A	5	E	14	9
Port wing tank		11	12	E	14	7
Starboard wing tank		12	6	E	14	2
Fuel contents tank units				E		
No. 1 tank		2	3	E	14	9
No. 2 tank		2	5	E	14	9
No. 3 tank		2A	1	E	14	9
Port wing tank		11	1	E	14	7

TABLE 1 *(continued)*

Equipment	Location Fig.	Location Item	Group	Access Fig.	Access Item
Starboard wing tank	12	8		14	2
Fuel pressure warning					
Indicator (port)	3	36		14	5
	4	31		14	5
Indicator (starboard)	3	32		14	5
	4	29		14	5
Pressure switch (port)	11	4		14	4
Pressure switch (starboard)	12	3		14	4
Exhaust gas thermometer					
Indicator	3	31		14	5
	4	19		14	5
Cold-junction compensator (port)	11	8		14	8
Cold-junction compensator (starboard)	12	11		14	15
Thermocouples (port)	11	7	E	14	10
Thermocouples (starboard)	12	10		14	14
Oil pressure gauges					
Indicator (port)	3	20		14	5
	4	15		14	5
Indicator (starboard)	3	29		14	5
	4	27		14	5
Transmitter (port)	11	3		14	4
Transmitter (starboard)	12	2		14	4
Tachometers					
Indicator (port)	3	21		14	5
	4	17		14	5
Indicator (starboard)	3	28		14	5
	4	26		14	5
Generator (port)	11	2		14	4
Generator (starboard)	12	4		14	4
FLIGHT INSTRUMENT EQUIPMENT					
Turn and slip indicator	3	39		14	5
	4	35		14	5
Rate of climb indicator	3	16	F	14	5
	4	14		14	5
Horizontal gyro unit	3	14		14	5
	4	13		14	5

TABLE 1 *(continued)*

Equipment	Location Fig.	Location Item	Group	Access Fig.	Access Item
Air speed indicator (pilot)	3	7		14	5
	4	8		14	5
Air speed indicator (navigator)	5	10		14	5
	6	4		14	5
Machmeter	3	9		14	5
	4	10		14	5
◀ Altimeter Mk.19B, C or F (pilot) (fitted with vibrator unit – post Mod.3747) or	3	41		14	5
	4	2		14	5
Altimeter Mk.22 (post Mod.3896) – B (I) Mk.6 aircraft only					
Mk.22 altimeter amplifier Mk.1A unit (post Mod.3896)	9	5A		14	5
Altimeter (navigator)(fitted with vibrator unit – post Mod.3747)	5	11		14	5 ▶
	6	2		14	5
Accelerometer (B(I) Mk.6 aircraft)	3	34		14	5
Rudder trim indicator	3	1		14	5
	4	3		14	5
Rudder trim transmitter	1	1		13	3
Tail trim indicator	3	6		14	5
	4	7	F	14	5
Tail trim transmitter	1	5		14	13
Aileron trim indicator	3	42		14	5
	4	1		14	5
Aileron trim transmitter	1A	7		14	5
Flap position indicator	3	5		14	5
	4	6		14	5
Flap position transmitter	11	6		14	11
Zero reader					
Indicator	3	11		14	5
	4	12		14	5
Combined course selector and control panel (post Mod.2659)	3	3		14	5
	4	5		14	5
Course selector (pre. Mod.2659)	3	40		14	5
	4	36		14	5
Control panel (pre.Mod.2659)	3	26		14	5
	4	23		14	5
Flight computor	1A	6		14	5
Junction box	1A	4		14	5
Pitot head	1A	5		14	5

TABLE 1 *(continued)*

Equipment	Location Fig.	Location Item	Group	Access Fig.	Access Item
NAVIGATION INSTRUMENT EQUIPMENT			F		
G.M.4B compass					
Master indicator	5	8		14	5
	6	8		14	5
Gyro compass unit	3	10		14	5
	4	11		14	5
Control panel	7	4		14	5
	8	2		14	5
Amplifier	7	2		14	5
	8	5		14	5
Detector	12	7		14	1
Junction box (detector)	12	9		14	16
Compass repeater J.B.	1A	8		14	5
Junction box (Blue Silk interconnection – B(I)Mk.6 aircraft)	1A	9		14	5
Compass/direct gyro switch	3	38		14	5
	4	33		14	5
Air mileage unit (A.M.U.)					
A.M.U. Mk.4	11	9		14	6
Air position indicator (A.P.I.)	5	2		14	5
	6	7		14	5
A.M.U./A.P.I. junction box	1A	3		14	5
A.M.U. control panel	5	4		14	5
	6	3		14	5
A.P.I. repeater unit	5	1		14	5
	6	9		14	5
A.M.I. indicator	5	7		14	5
	6	5		14	5
Ground position indicator (G.P.I.) } Blue Silk system					
G.P.I. Mk.4A } (Sect.6, Chap.2)	5	5		14	5
Amplifier } B(I) Mk.6 aircraft	2	9		14	5
E2A standby compass	3	18		14	5
	4	16		14	5
Rear view periscope mounting } B.Mk.6 aircraft	1A	2		14	5
Rear view periscope stowage } B.Mk.6 aircraft	2	2		14	5

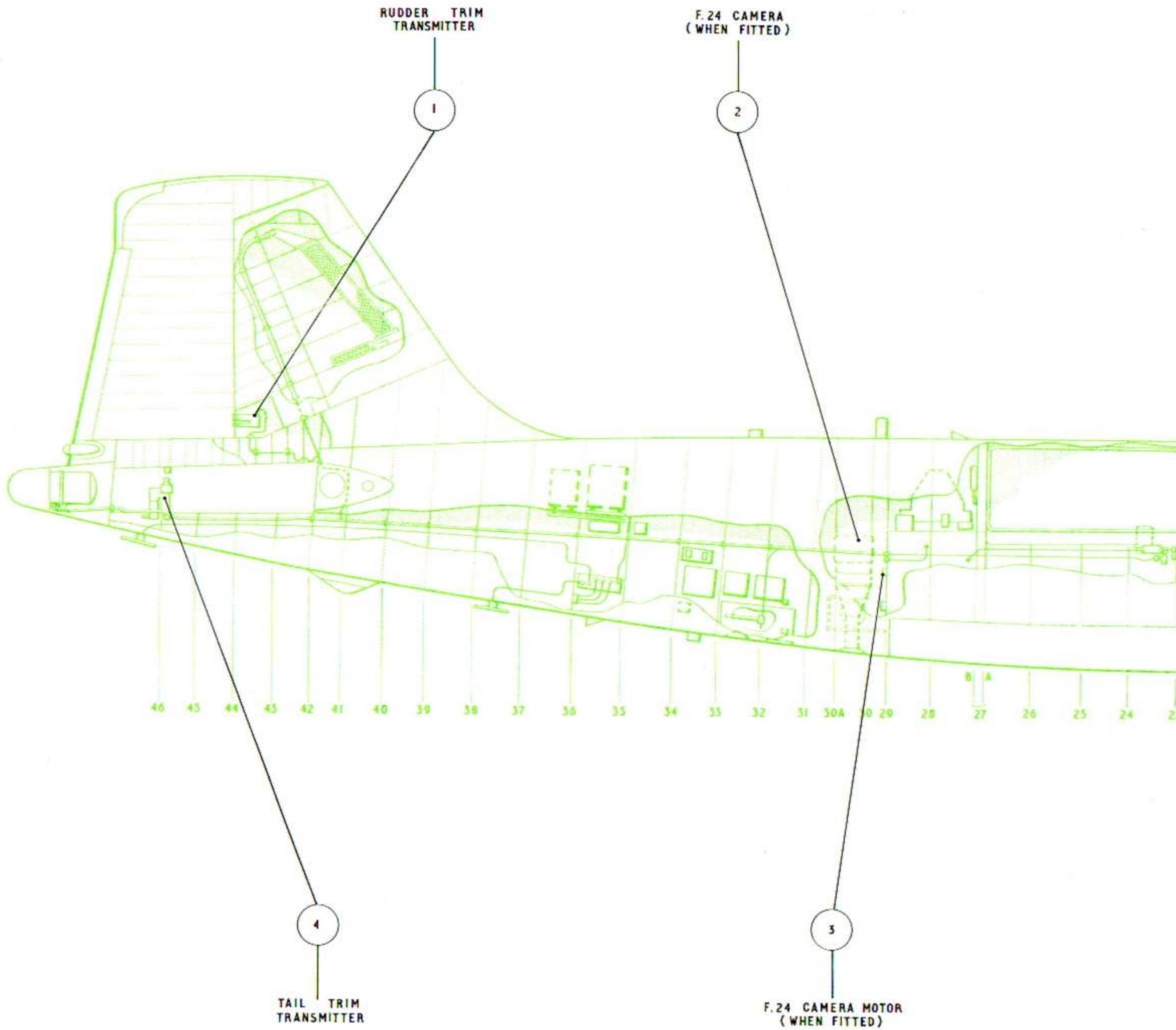

Fig. 1. Instrument installation — port fuselage

◀ *(Mod. 4329 and 4345 embodied)* ▶

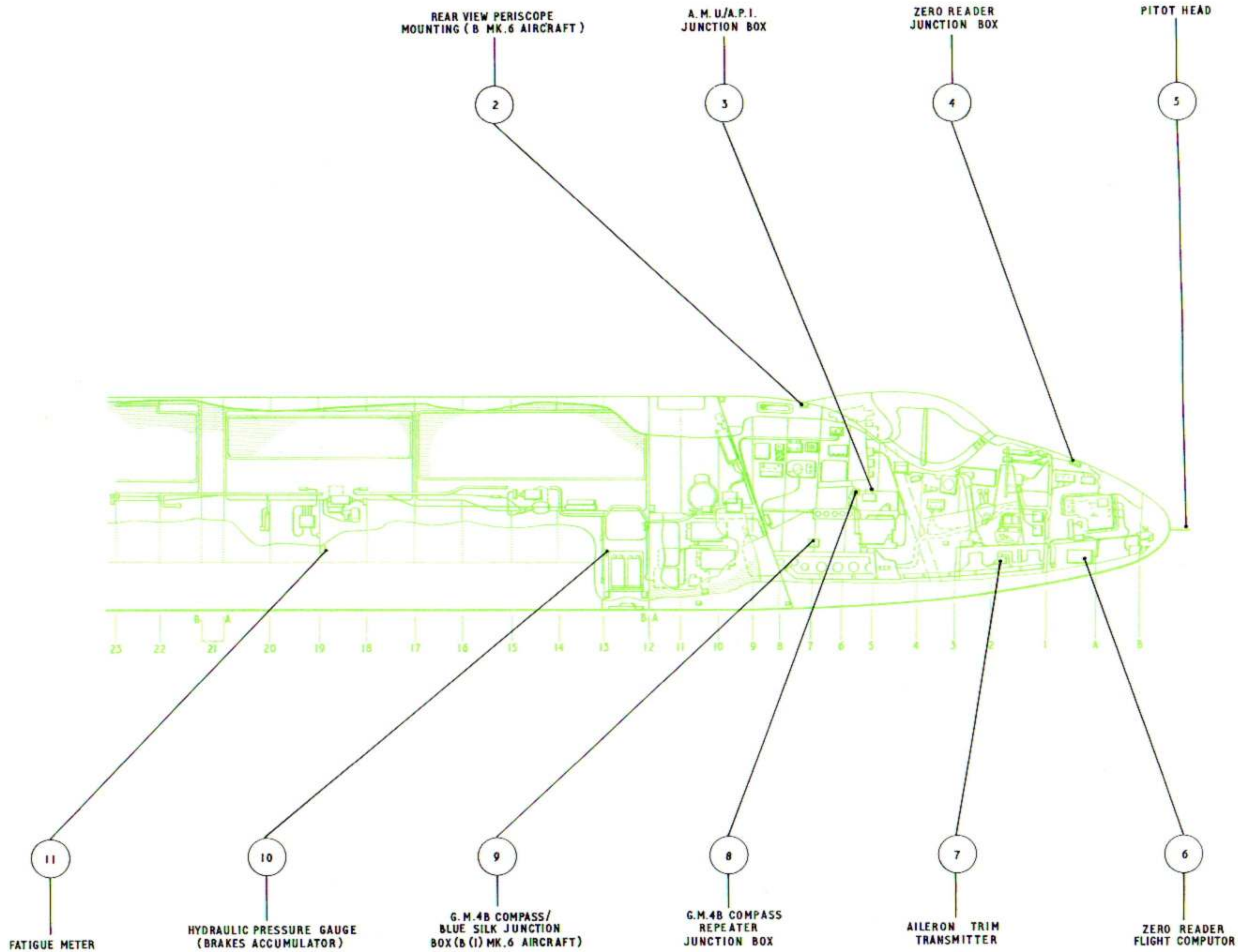

Fig. 1A. Instrument installation – port fuselage

◀ *(Mod. 4329 embodied)* ▶

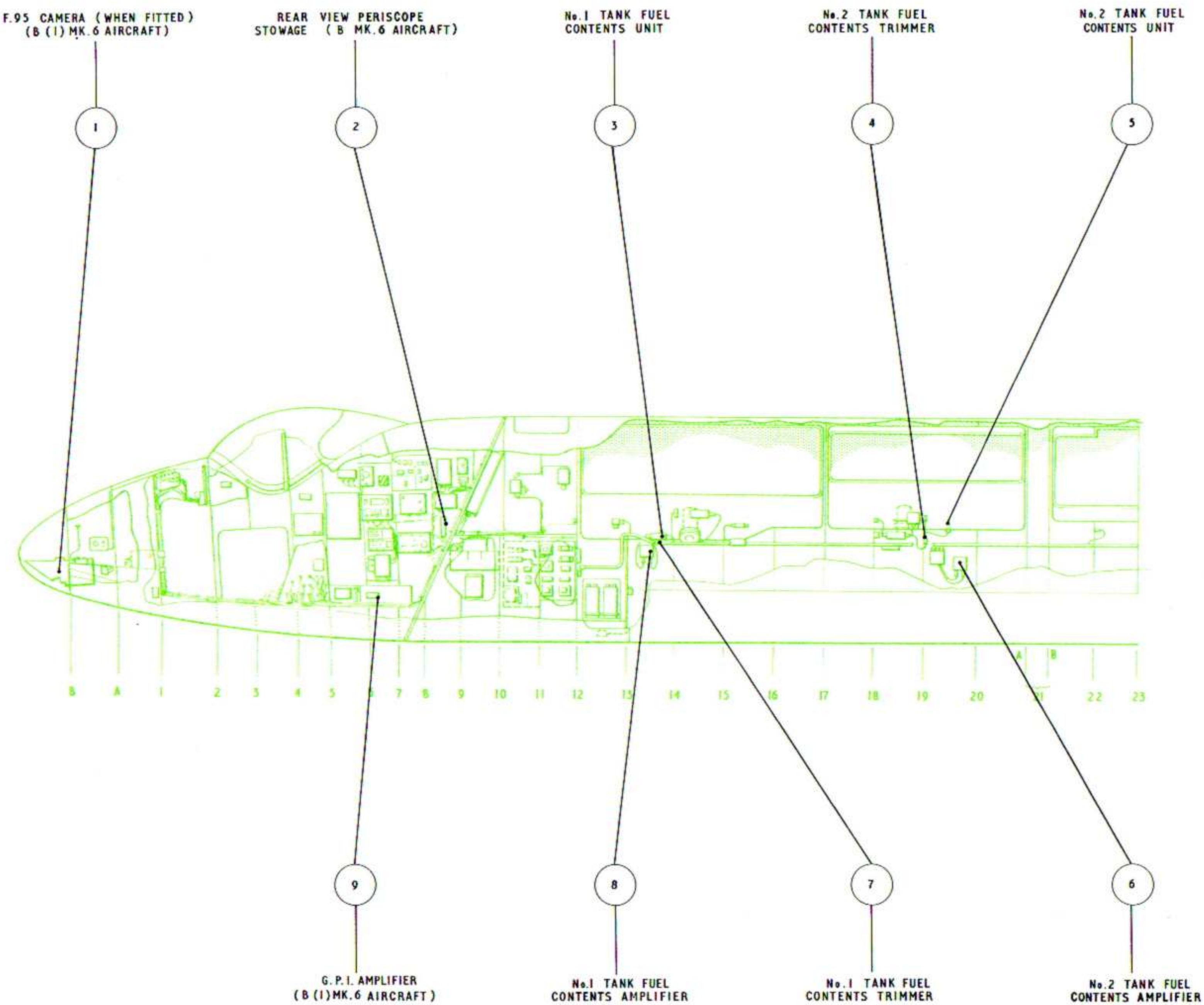

Fig. 2. Instrument installation – starboard fuselage

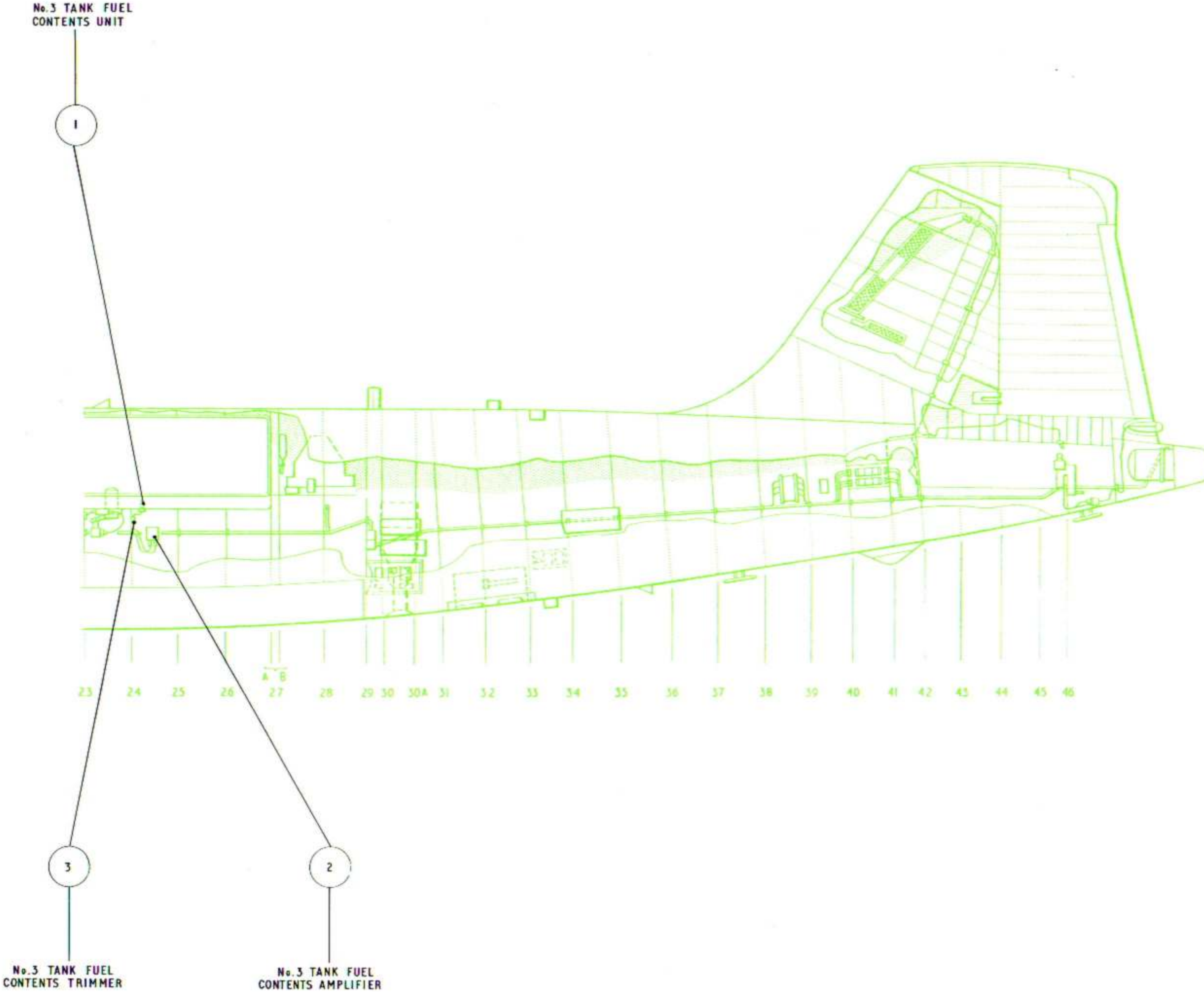

Fig. 2A. Instrument installation – starboard fuselage

◀ *(Mod. 4329 embodied)* ▶

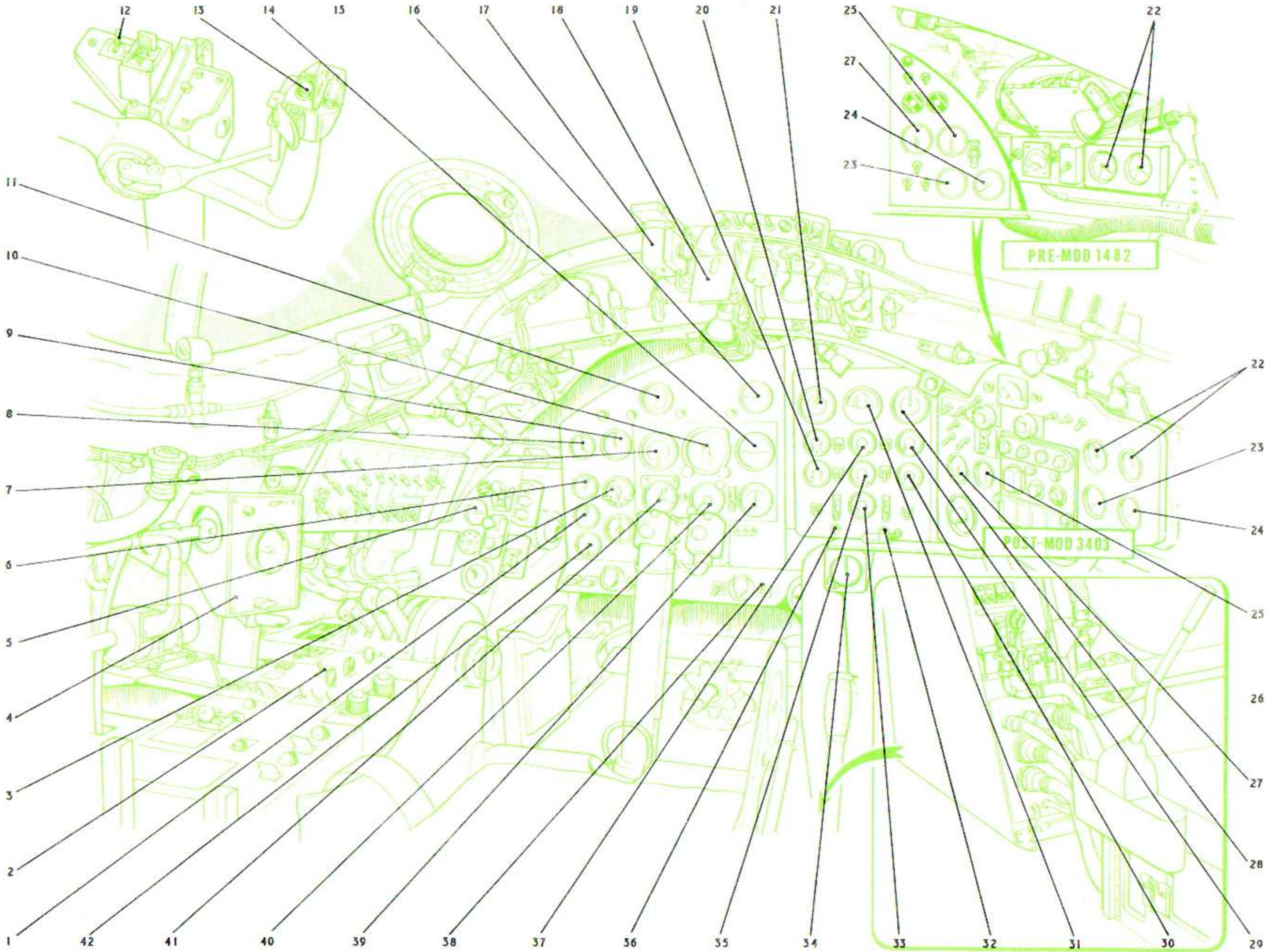

Fig. 3. Instrument installation – cockpit (B(I) Mk.6 aircraft)

◀ *(Mod.4329 embodied)* ▶

KEY TO FIG. 3 (COCKPIT B(I) Mk.6 AIRCRAFT)

1 RUDDER TRIM INDICATOR
2 GUNSIGHT MASTER SWITCH
3 ZERO READER COMBINED HEADING SELECTOR AND CONTROL PANEL (POST MOD.2659)
4 OXYGEN REGULATOR
5 FLAP POSITION INDICATOR
6 TAIL TRIM INDICATOR
7 AIR SPEED INDICATOR
8 CLOCK
9 MACHMETER
10 G.M.4B COMPASS
11 ZERO READER INDICATOR
12 F95 CAMERA CONTROL SWITCH
◀ 13 G90 CAMERA CONTROL SWITCH ▶
14 HORIZONTAL GYRO UNIT
15 ▶◀
16 RATE OF CLIMB INDICATOR
17 GUNSIGHT
18 E2A COMPASS
19 PORT WING FUEL TANK CONTENTS GAUGE
20 OIL PRESSURE GAUGE, PORT ENGINE
21 TACHOMETER, PORT ENGINE
22 OXYGEN PRESSURE GAUGES
23 BRAKES HYDRAULIC PRESSURE GAUGE
24 MAIN SYSTEM HYDRAULIC PRESSURE GAUGE
25 CABIN ALTIMETER
26
27 MIXING VALVE POSITION INDICATOR
28 TACHOMETER, STARBOARD ENGINE
29 OIL PRESSURE GAUGE, STARBOARD ENGINE
30 STARBOARD WING FUEL TANK CONTENTS GAUGE
31 EXHAUST GAS THERMOMETER
32 FUEL PRESSURE WARNING LAMP, STARBOARD ENGINE
33 No.3 TANK FUEL CONTENTS GAUGE
34 ACCELEROMETER
35 No.2 TANK FUEL CONTENTS GAUGE
36 FUEL PRESSURE WARNING LAMP, PORT ENGINE
37 No.1 TANK FUEL CONTENTS GAUGE
38 COMPASS/DIRECT GYRO SWITCH
39 TURN AND SLIP INDICATOR
40 ZERO READER COURSE SELECTOR (PRE.MOD.2659)
41 ALTIMETER Mk.19B, C OR F (VIBRATOR UNIT FITTED TO REAR OF ALTIMETER – POST MOD.3747) – OR POST MOD.3896, Mk.22 ALTIMETER
42 AILERON TRIM INDICATOR

KEY TO FIG. 4 (COCKPIT B Mk.6 AIRCRAFT)

1 AILERON TRIM INDICATOR
2 ALTIMETER (VIBRATOR UNIT FITTED TO REAR OF ALTIMETER – POST MOD.3747)
3 RUDDER TRIM INDICATOR
4 OXYGEN REGULATOR
5 ZERO READER COMBINED HEADING SELECTOR AND CONTROL PANEL (POST MOD. 2659)
6 FLAP POSITION INDICATOR
7 TAIL TRIM INDICATOR
8 AIR SPEED INDICATOR
9 CLOCK
10 MACHMETER
11 G.M.4B COMPASS
12 ZERO READER INDICATOR
13 HORIZONTAL GYRO UNIT
14 RATE OF CLIMB INDICATOR
15 OIL PRESSURE GAUGE, PORT ENGINE
16 E2A COMPASS
17 TACHOMETER, PORT ENGINE
18 No.1 FUEL TANK CONTENTS GAUGE
19 EXHAUST GAS THERMOMETER
20 OXYGEN PRESSURE GAUGES
21 BRAKES HYDRAULIC PRESSURE GAUGE
22 MAIN SYSTEM HYDRAULIC PRESSURE GAUGE
23 ZERO READER CONTROL PANEL (PRE.MOD.2659)
24 CABIN ALTIMETER
25 MIXING VALVE POSITION INDICATOR
26 TACHOMETER, STARBOARD ENGINE
27 OIL PRESSURE GAUGE STARBOARD ENGINE
28 STARBOARD WING FUEL TANK CONTENTS GAUGE
29 FUEL PRESSURE WARNING LAMP, STARBOARD ENGINE
30 No.3 TANK FUEL CONTENTS GAUGE
31 FUEL PRESSURE WARNING LAMP, PORT ENGINE
32 No.2 TANK FUEL CONTENTS GAUGE
33 COMPASS/DIRECT GYRO SWITCH
34 PORT WING TANK FUEL CONTENTS GAUGE
35 TURN AND SLIP INDICATOR
36 ZERO READER COURSE SELECTOR (PRE.MOD.2659)

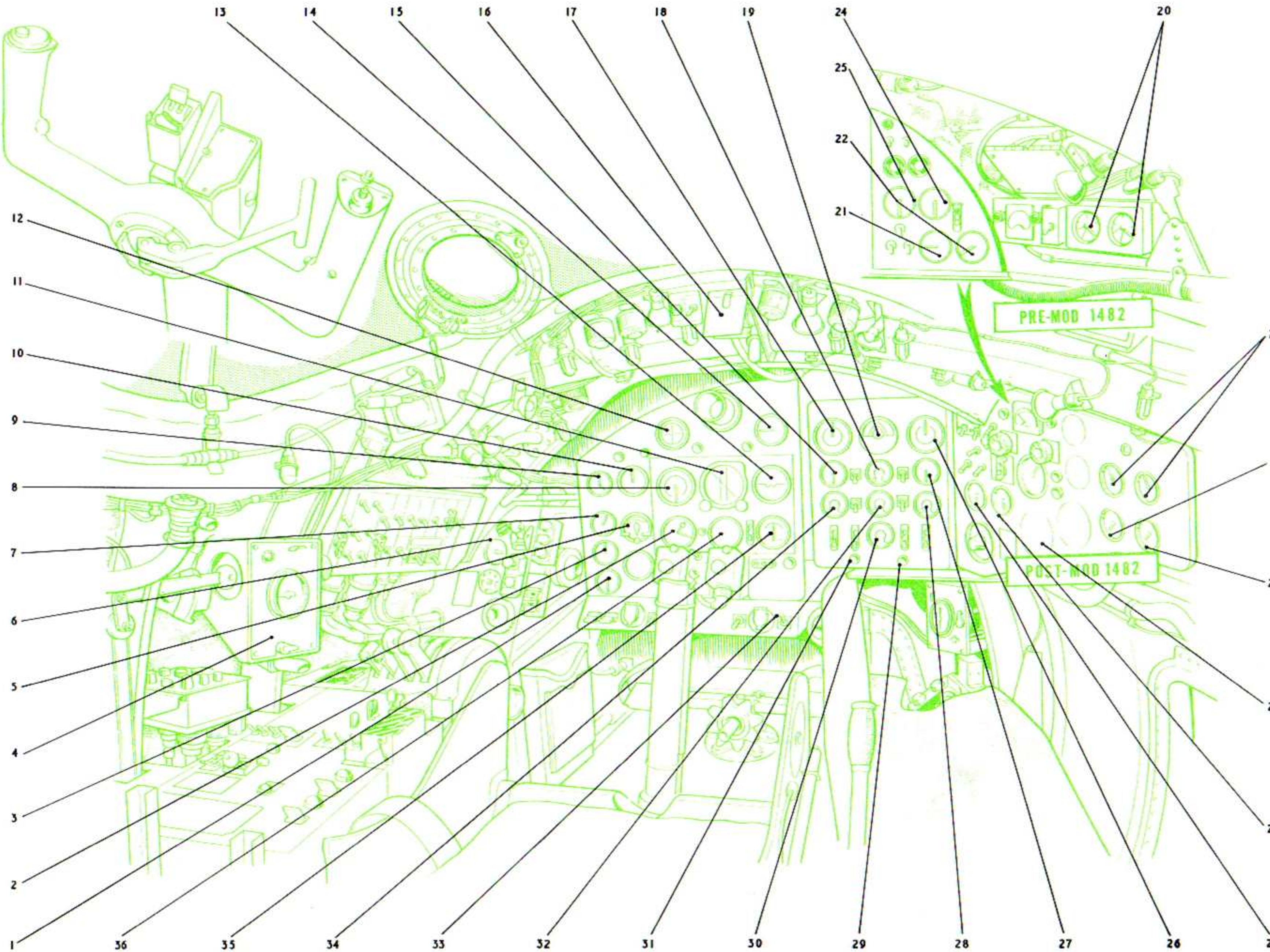

Fig. 4. Instrument installation – cockpit (B Mk.6 aircraft)

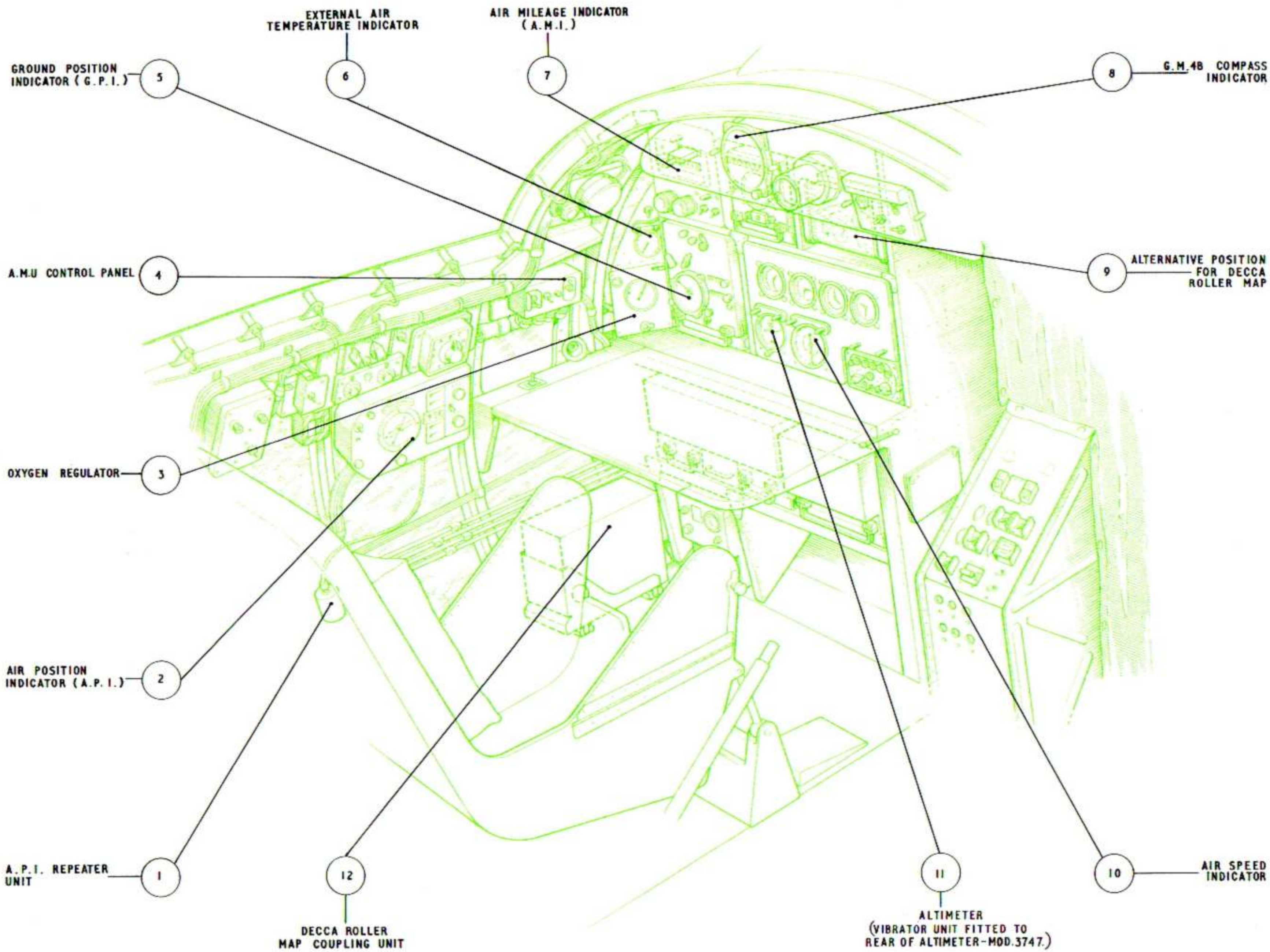

Fig. 5. Instrument installation – navigator's station (B(I)Mk.6 aircraft)

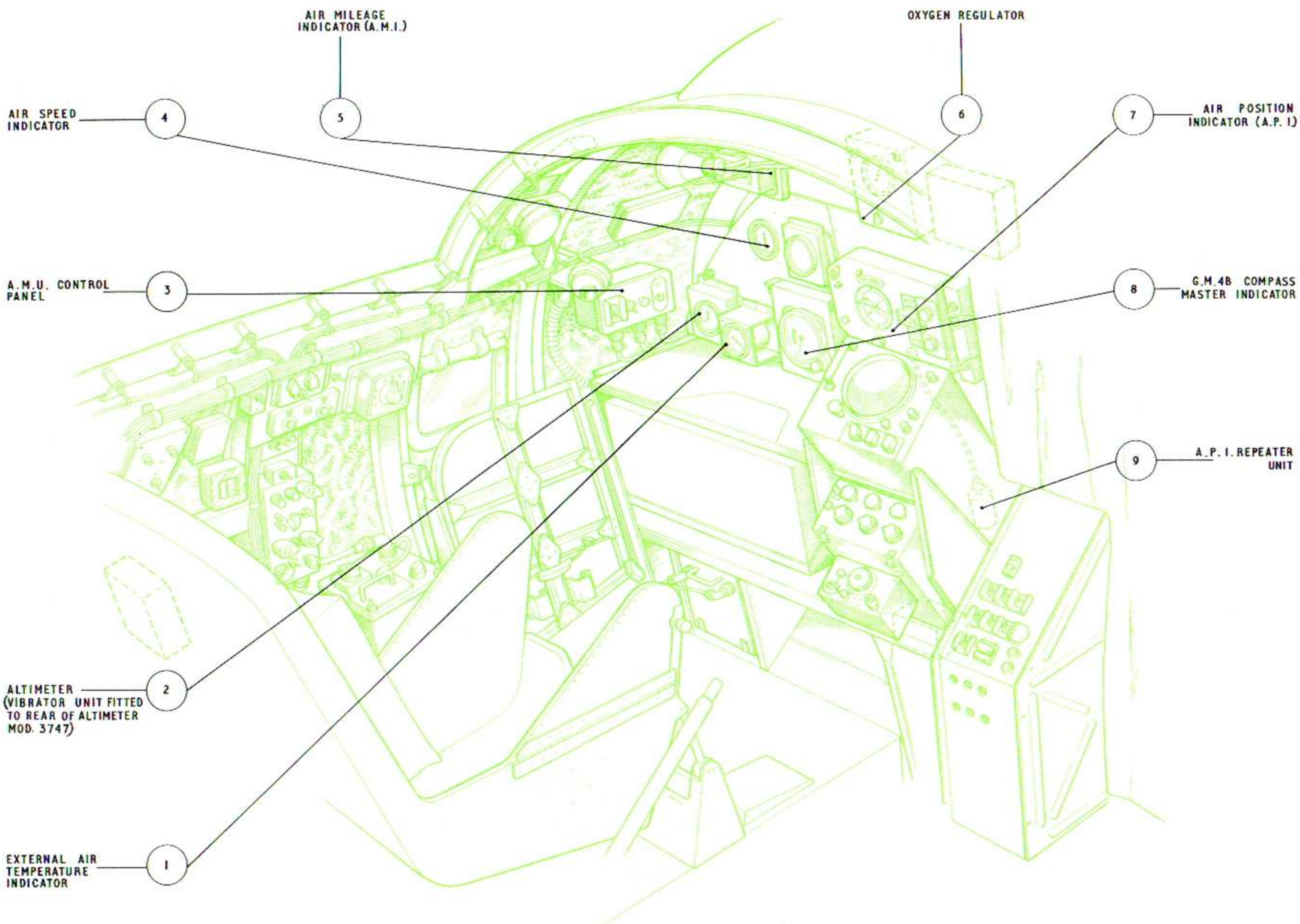

Fig. 6. Instrument installation – navigator's station (B Mk.6 aircraft)

Fig. 7. Instrument installation – air bomber's rear station (B(I)Mk.6 aircraft)
◀ *(Mod. 4329 and 4345 embodied)* ▶

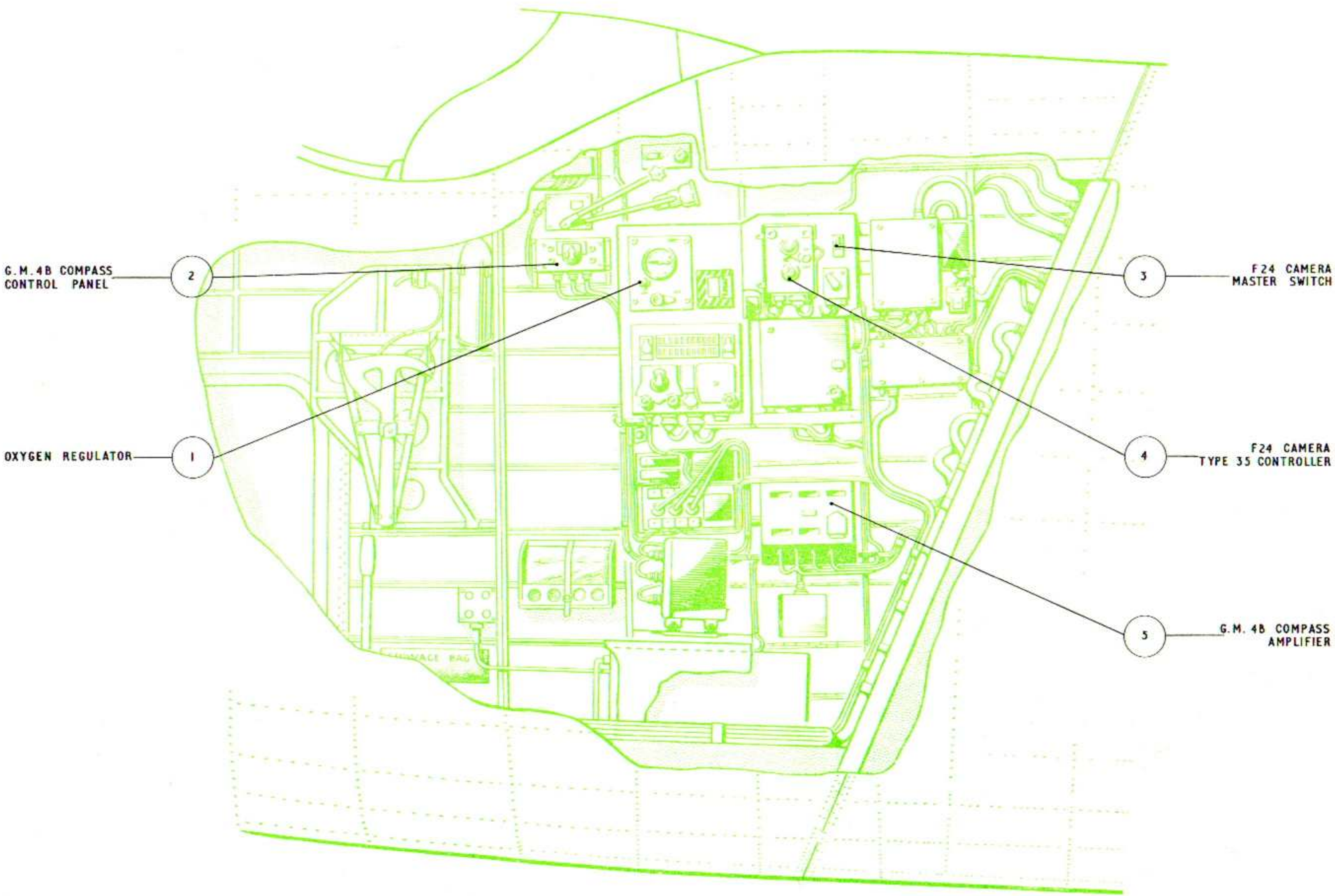

Fig. 8. Instrument installation – air bomber's rear station (B Mk.6 aircraft)

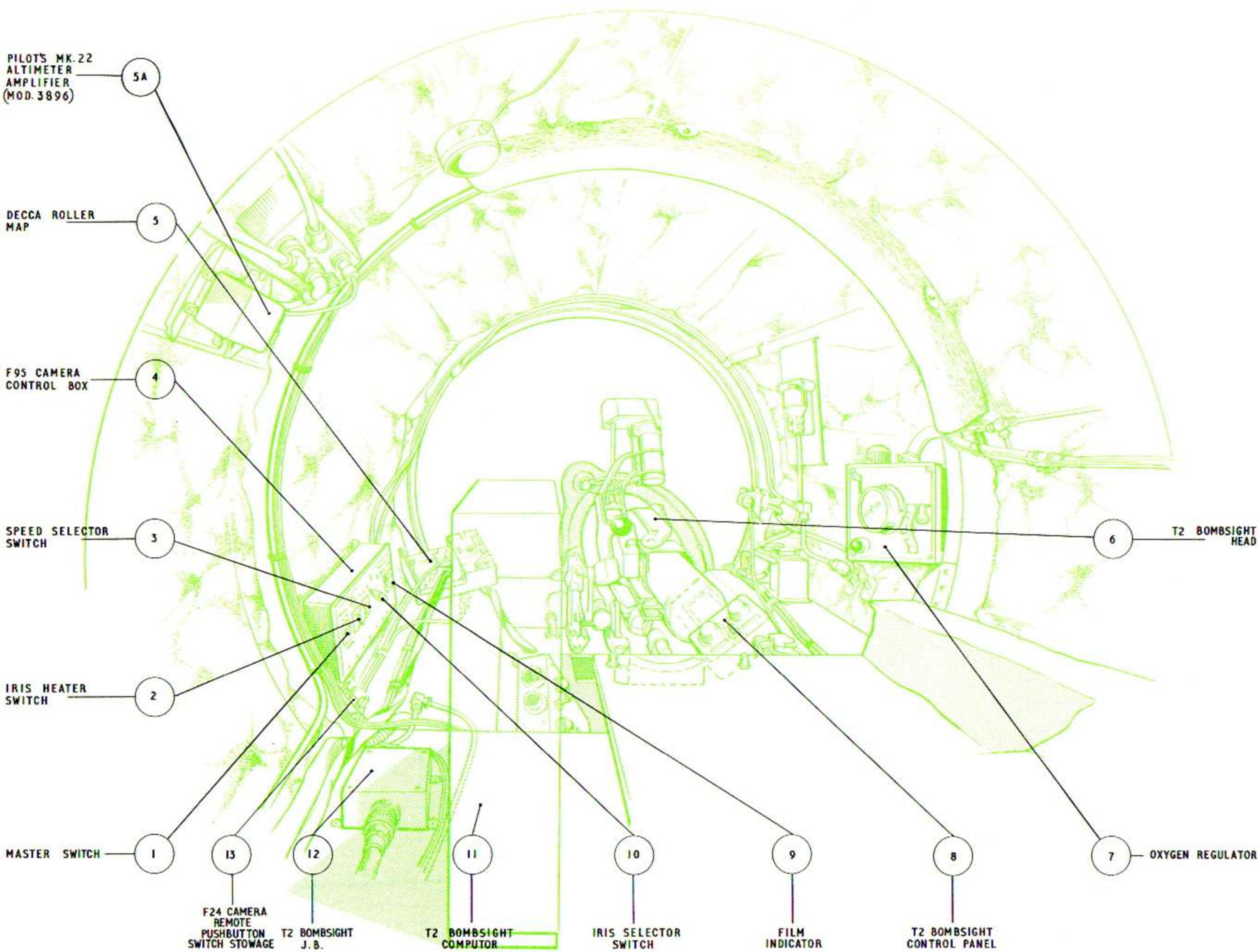

Fig. 9. Instrument installation – air bomber's forward station (B (I) Mk.6 aircraft)

◀ *(Mod.4056 embodied)* ▶

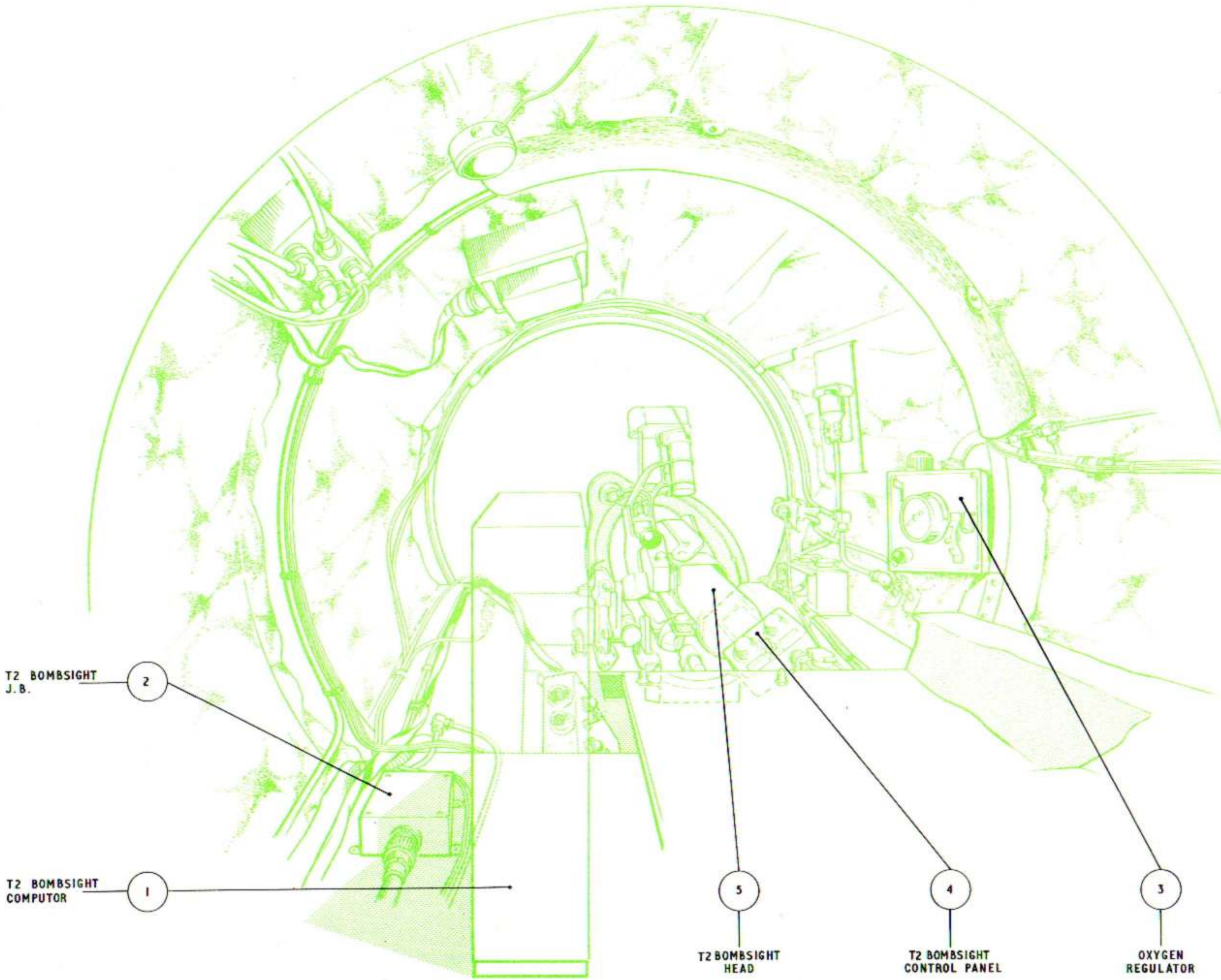

Fig. 10. Instrument installation – air bomber's forward station (B Mk.6 aircraft)

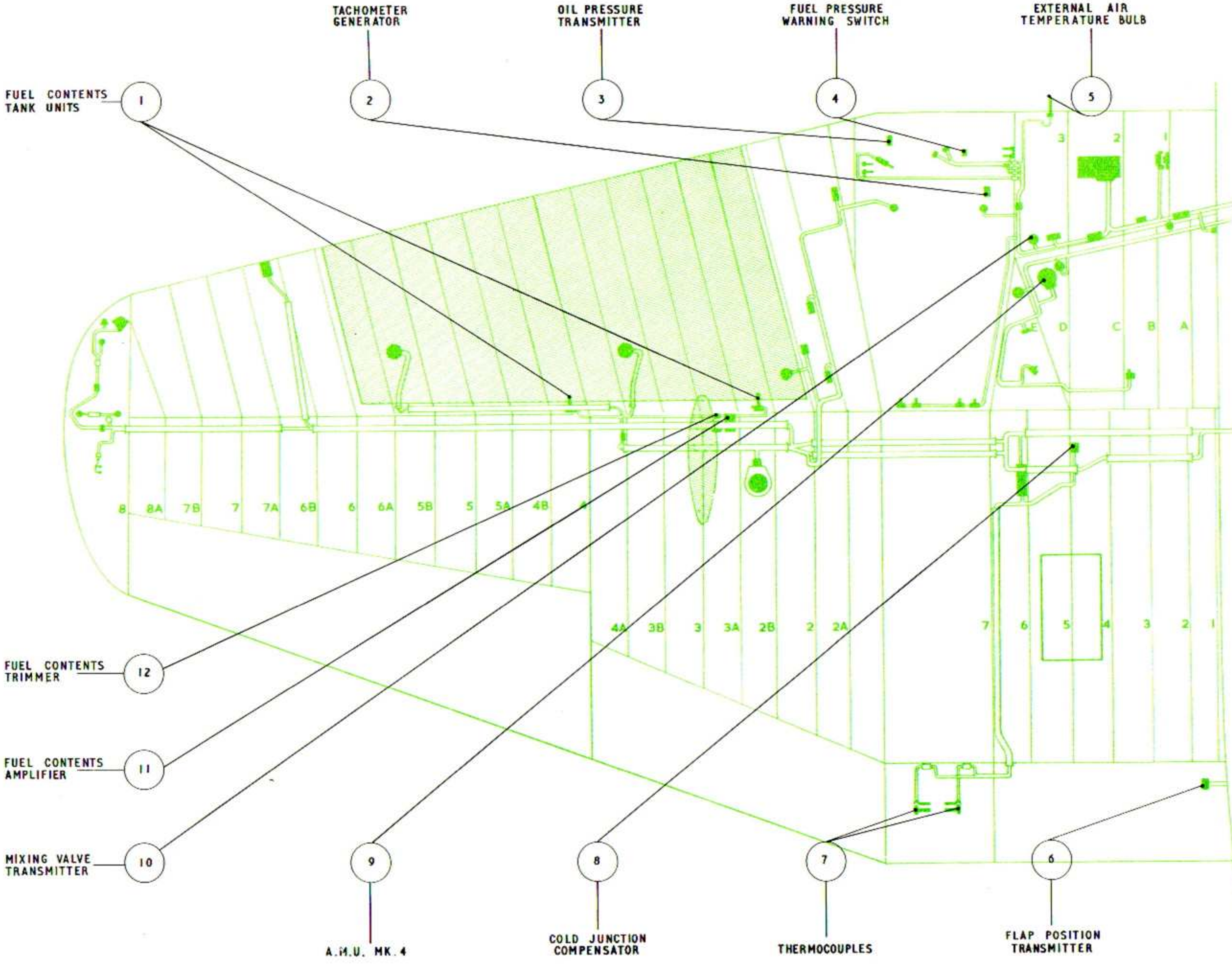

Fig. 11. Instrument installation – port main plane

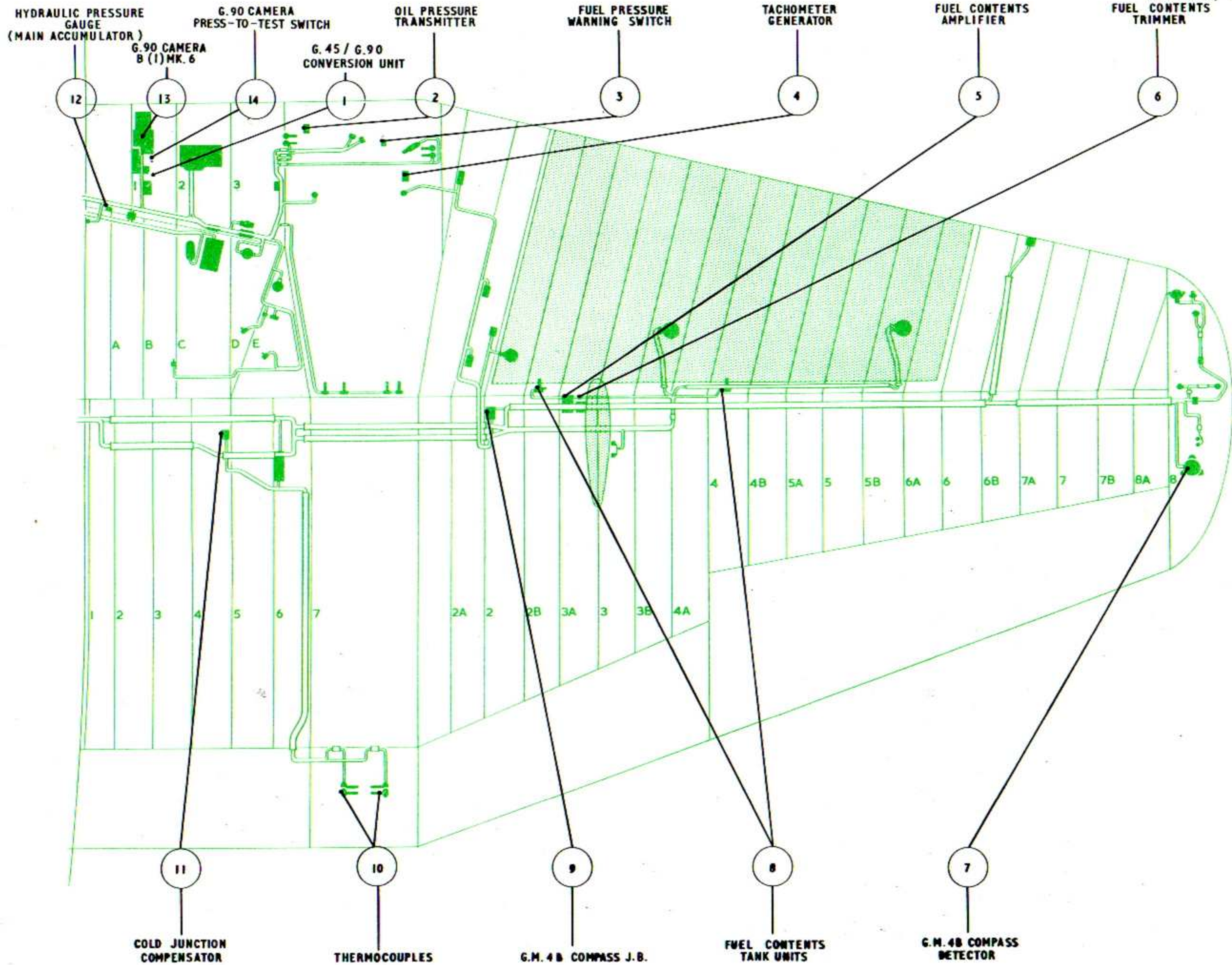

FIG. 12. INSTRUMENT INSTALLATION - STARBOARD MAIN PLANE

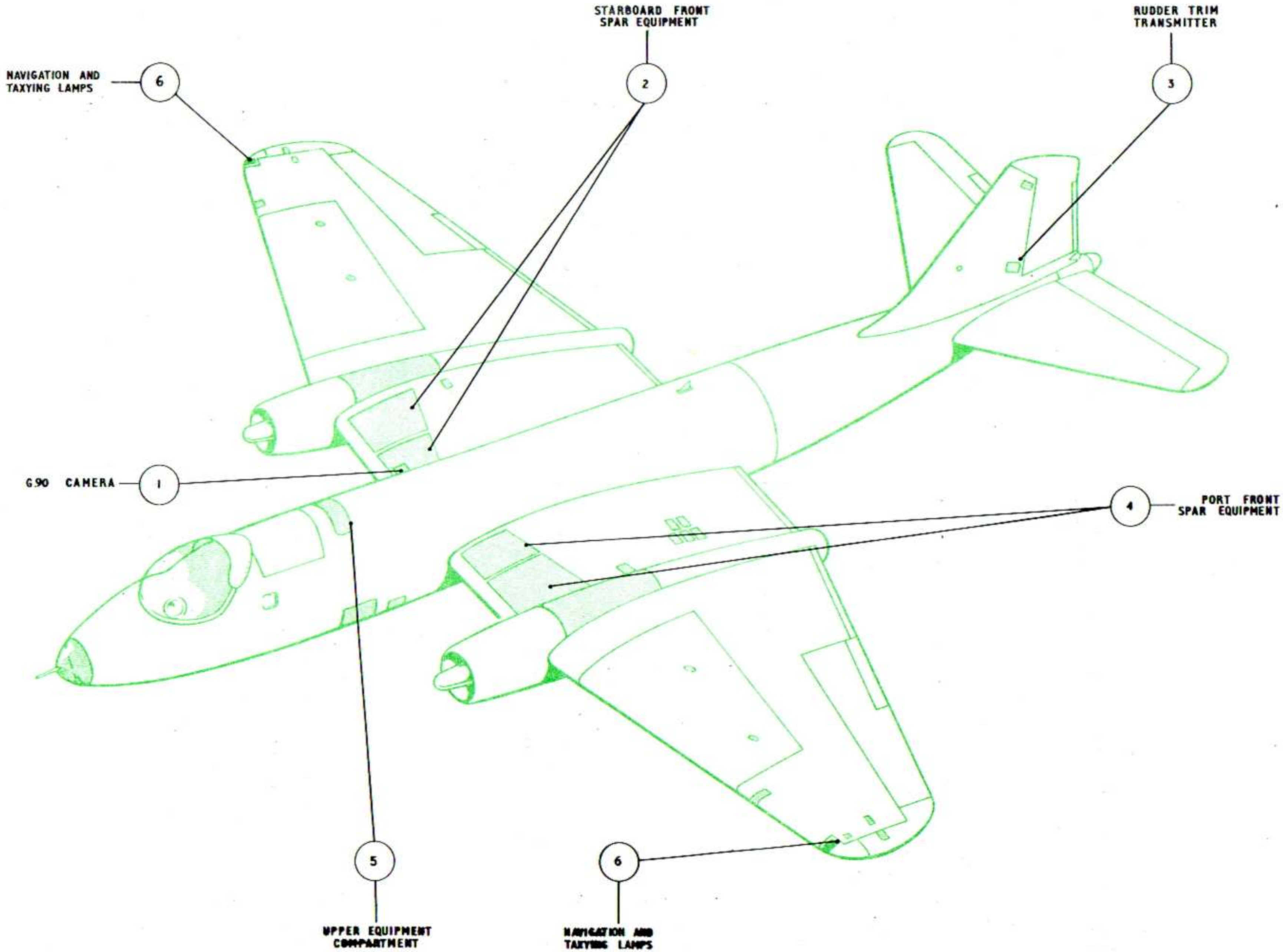

FIG. 13. ACCESS PANELS - UPPER SURFACE AND PORT SIDE

19408

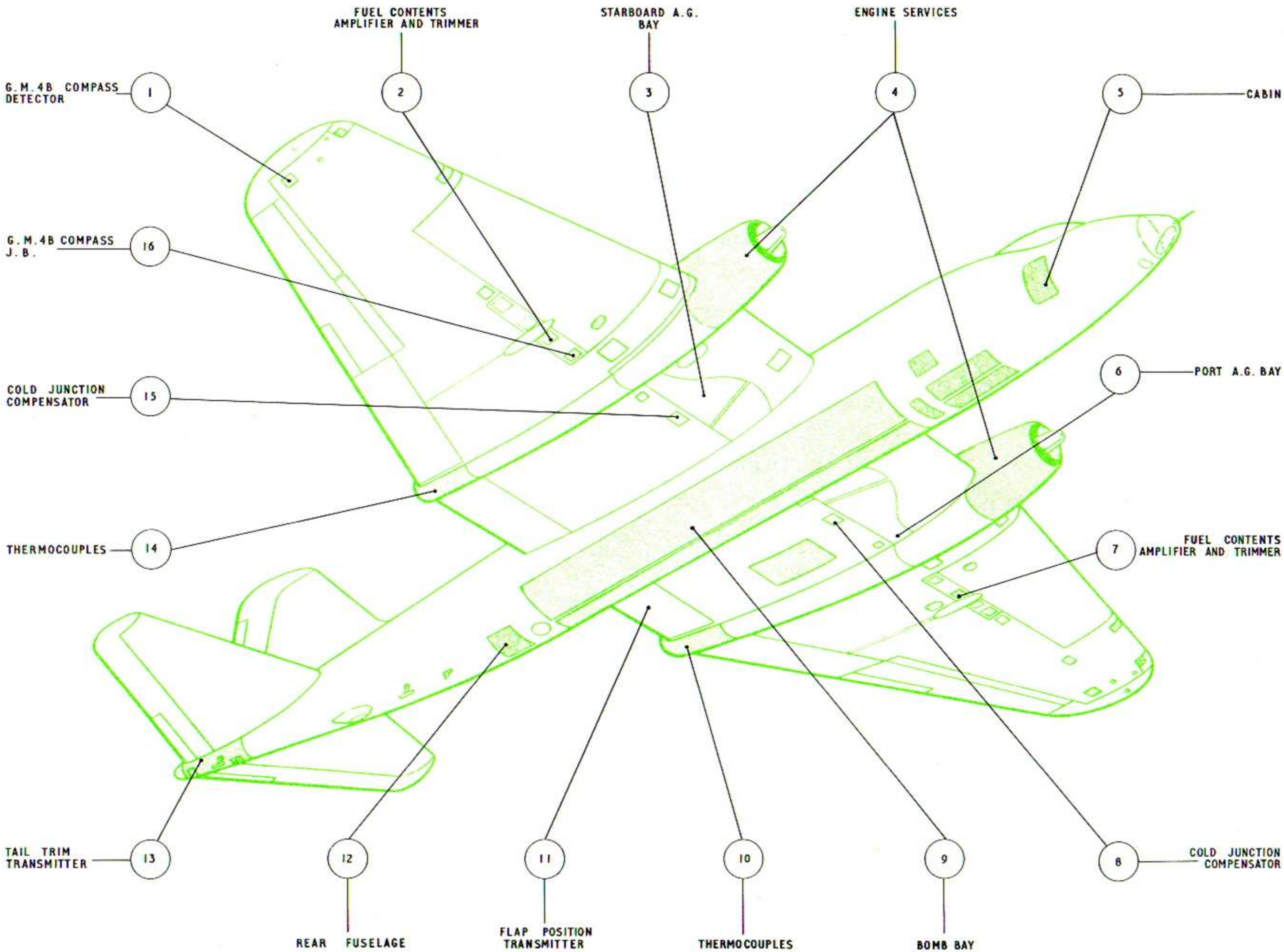

Fig. 14. Access panels, lower surface and starboard side

F15 2135 8233 625 1/63 BPA 1307

ARMAMENT AND PHOTOGRAPHIC - GROUP A & B

(Completely revised)

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Introduction

1. A description of the armament and photographic instruments is given in this group. The main items of equipment together with their relevant A.P. are listed in Tables 1 and 2. Location of the equipment is covered in the General Information at the beginning of the chapter.

ARMAMENT INSTRUMENTS

General

2. The armament instruments comprise a reflector gunsight *(B(I) Mk.6 aircraft only)*, bomb sighting head and bombing computor

Gunsight

3. On B(I) Mk.6 aircraft a Mk.3N gunsight, installed in the centre of the cockpit on the

TABLE 1

Armament Instruments

Ref. No.	Equipment	Quantity	Relevant A.P.
8B/2465	Reflector gunsight, Mk.3N	1	1275E, Vol.1, Sect.3
9/447	Computor, Type T2	1	1275D, Vol.1, Sect.6
9/4472	Sighting head, Type T2	1	1275D, Vol.1, Sect.6
9/3350	Mounting bracket	1	1275D, Vol.1, Sect.6
109/82	Control panel	1	1275D, Vol.1, Sect.6
9/4609	Vertical gyro	1	
9/4610	Horizontal gyro	1	

coaming above the pilot's main instrument panel, is used in the interdictor and S.W.S. roles. This instrument consists of two main items; a Type 1 Mk.1 projector and a Type 2, Mk.2 reflector. The projector section of the sight incorporates a lamp controlled by a dimmer switch labelled OFF/NIGHT/DAY. Post Mod.2692 a switch, labelled GUNSIGHT MASTER, is fitted on the pilot's console and must be ON for interdictor role and OFF for L.A.B.S. role.

Bombing instruments

General

4. Visual bombing is achieved by the use of a Type T2 sighting head, Type T2 bombing computor and a sighting head control panel, all of which are located at the air bomber's forward station in the nose.

Computor, Type T2

5. This unit is carried by four resilient mountings inside a tubular structure secured to a bracket attached to the nose floor. To obviate lateral movement of the structure, a latch plate attached to frame A by a hinge bolt and a quick-release pin, is arranged to engage with one of the tubular frame members. When it is necessary to remove the computor, the latch can be swung away by removing the quick-release pin.

6. The computor mechanism is operated by compressed air fed from the cabin pressurization hot air supply line *(Sect.3, Chap. 8)*. The air is tapped from a union located between frames 15 and 16 in the roof of the bomb bay. From this point a pipeline runs forward, via an air filter situated on frame 12A, to the pressure bulkhead and on to the air bomber's station in the nose. At the latter position the air supply is controlled by a manually-operated cock located between frames A and B adjacent to the computor.

7. Other requirements of the computor are pitot and static pressures for measurement of height and air speed, an a.c. supply for operating the gyros, a 24-volts d.c. for lighting the dial lamps, and a supply from the G.M.4B compass repeater circuit.

8. Pitot and static pressures are taken from the common pipelines used by all instruments operating from these pressures *(Group F)*.

9. The 115-volts 3-phase a.c. supply is taken from No.1 inverter output circuit *(Chap. 1, Group D)* and is fed, via a plug to the gyro at the rear of the instrument unit.

10. Compass readings are obtained from the compass repeater junction box *(Group F)*, situated at the port side of the navigator's table, and fed into the computor by way of a 7-pin plug at the forward end of the unit.

11. A 2-pin plug on the forward end of the computor is the connecting point for the 24-volt d.c. lighting supply *(Chap.1, Group D)* which is controlled by a dimmer switch.

12. Dummy unions and electrical plugs are installed near the computor for stowing all supply pipes and connections when the computor is removed from the aircraft.

13. Electrical supplies to the computor and the sighting head are fed from the bombsight junction box located between the computor and the port side of the fuselage.

Sighting head, Type T2

14. This instrument is situated forward of the computor to the starboard side of the aircraft centre line and secured by a locking catch to the spigot of a mounting bracket. To install or remove the head, the locking catch should be pressed down. The bracket is fitted with an adjustment screw for altering the pitch attitude of the head in relation to the aircraft level.

15. Two electrical plugs are fitted to the head, one being mounted on the gyro to carry the a.c. supply whilst the other is located on the underside and carries the d.c. for operating the drift scale and collimater lamps. The latter are controlled by two dimmer switches mounted on the sighting head unit.

16. Sighting and drift angles are transmitted from the computor to the sighting head by means of two flexible drives.

Removal

Computor, Type T2

17. Before removing the computor, disconnect all electrical cables, pipes and flexible drives and refit them in the stowages provided. The computor is removed by taking out two bolts at each end of the floor bracket which carries it and removing the quick-release pin at the latch plate above the tubular structure within which the unit is installed.

Sighting head, Type T2

18. Prior to removal of the sighting head, disconnect and stow the electrical cables and flexible drives. Remove the head by operating the release catch and sliding the unit off the spigot.

19. Servicing involving interference with the computor and sighting head should only be carried out by authorized personnel. The units are fully described in A.P.1275D, Vol. 1, Sect.6. Faults in the power supplies should be traced by referring to Group D in Chapter 1.

PHOTOGRAPHIC INSTRUMENTS

Introduction

20. An F24 camera is used in the bombing role on the B Mk.6 aircraft. On B(I) Mk.6 aircraft, the cameras which can be fitted according to operational requirements are an F24 camera which may be used in the normal bombing or interdictor role, a G90 camera which is provided for use with guns or rockets in the interdictor role, and an F95 camera *(post Mod.2695)* for use with S.W.S.

F24 camera

General

21. The main components comprising this installation are a Type F24 camera carried by a Type 25, Mk.2 camera mounting located between frames 29 and 30, a Type 35, No. 14 camera control *(B Mk.6 aircraft)* or Type 48 control *(B(I)Mk.6 aircraft – post Mod. 4056)* and an F24 CAMERA MASTER ON/OFF switch on the starboard side at the air bomber's rear station.

22. The camera is electrically driven through a flexible drive by a Type B camera motor positioned on a wedge plate attached to frame 29. Electrical connection between camera and motor is made with a camera electrical lead, No.4.

23. Different operational requirements are served by fitting lenses of different focal length to the camera. The lenses available are as follows – 8 in. lens, F2.9 *(Ref.No. 14A/2602)*, 14 in. lens, F5.6, No.2 *(Ref.No. 14A/3147)*, 14 in. lens, F5.6, No.3 *(Ref.No. 14A/3255)* and a 20 in. lens, F6.3, No.4. Also used when required is a Type 4 filter, *(Ref.No.14A/2615)*. As lenses of long focal length have correspondingly long lens cones, provision is made to vary the height of the camera to suit the lens in use.

24. The camera mounting, Type 25, Mk.2, is clamped to two rails, the height of which can be varied. The rails are arranged to slide in four channels which are part of a box structure attached to frame 29 bulkhead and two sub-frames forward of frame 30. The channels are drilled at suitable positions which locate the camera at the height required for the lens in use. The mounting is provided with a spirit level and means of adjustment of camera angle and tilt. The camera rails are drilled to mate with the holes in the channels and secured by four quick-release pip pins.

Operation

25. Provision is made for the camera to make single exposures or to function in conjunction with the bomb release circuits.

26. On B Mk.6 aircraft, provided that the CAMERA MASTER SWITCH and the integral switch of the camera control are ON, single exposures can be made by depressing the SINGLE EXPOSURE switch on the Type 35 control. On B(I)Mk.6 aircraft *(post Mod. 4056)* single exposures can be made, with the CAMERA MASTER SWITCH ON, by operating the remote pushbutton stowed in a clip on the port wall at the air bomber's prone station. The pushbutton is connected by cable assembly NA.434 to the blue plug on the Type 48 camera control. When being employed in the single exposure role, the red socket connection to the camera control from the bombing system is to be disconnected and securely stowed.

TABLE 2

Photographic instruments

Ref. No.	Equipment	Qty.	Relevant A.P.
14A/4929 OR	Gun camera, Type G90 (1½in lens)	1	1355D, Vol.1 (2nd Edn.)
14A/4981	Gun camera, Type G90 (3in lens)	1	1355D, Vol.1 (2nd Edn.)
14A/4936	Mounting, Type G90	1	1355D, Vol.1 (2nd Edn.)
14A/4937	Cover, waterproof	1	1355D, Vol.1 (2nd Edn.)
14A/4934	Magazine	1	1355D, Vol.1 (2nd Edn.)
N.I.V.	G45/G90 conversion unit, Type 447/1A	1	
14A/4984	Camera, Type F95, Mk.2, 4in lens complete	1	
14A/4611	Control unit, Type 95	1	1355C, Vol.1
14A/2602	Camera, Type F24, c/w 8in F2.9 lens	1	1355C, Vol.1, Sect.1
14A/3147	Lens, 14in, F5.6, No.2 or		
14A/3255	Lens, 14in, F5.6, No.3 or		
14A/4119	Lens, 20in, F6.3, No.4	1	
14A/2615	Filter, Type 4	1	
14A/988	Camera motor, Type B	1	
14A/2988	Control, Type 35, No.14 (B Mk.6)	1	1355C, Vol.1 (2nd Edn.)
14A/3237	Control, Type 48 (B(I) Mk.6 – post Mod.4056)	1	1355C, Vol.1 (2nd Edn.)
14A/3568	Camera drive, Type C	1	
14A/862	Lead, electrical, No.4	1	
14A/4004	Mounting, Type 25, Mk.2	1	1355C, Vol.1, Sect.4

27. When required to function with the bomb release circuits the F24 CAMERA MASTER switch should be set to ON and, with the MASTER SELECTOR switch to BOMBS, the camera will function when either the pilot's or air bomber's firing switch, or the Type 522 Gee control *(B Mk.6 aircraft only)*, is operated.

28. Pressing the pilot's firing switch energizes No.4 relay in the armament relay and fuse panel through circuit A11-A11B. In closing, the relay, through a pair of normally-open contacts, completes circuit B2X-B21-B28 to energize a Type Q relay, located adjacent to J.B.14 on the starboard wall at the air bomber's rear station, which completes the pulsing circuit to the F24 camera control. The operation of the air bomber's firing switch, or on B Mk.6 aircraft the Gee control, completes the energizing circuit B2X-B21-B28 to the Type Q relay resulting in a similar action to that of the pilot's firing circuit.

G90 camera *(B (I) Mk.6 aircraft)*

General

29. The G90 camera, mounted in the starboard main plane inboard of the engine between ribs 1 and 2, operates in conjunction with a master switch on the armament panel and a push-switch in the control column right handgrip. The camera circuit operates from a 28-volt d.c. supply fed from fuse 58 in the E.C.P.

Operation

30. Before the camera can be operated,

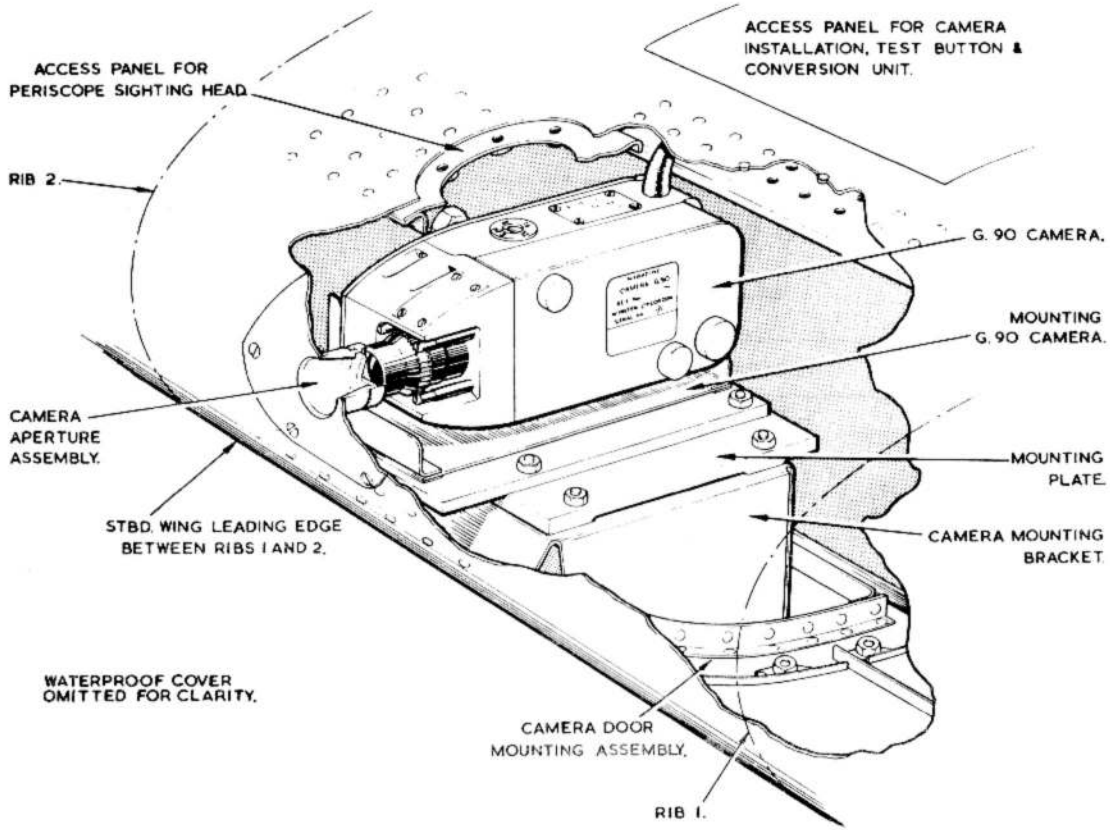

Fig.1. G90 camera installation

the armament test switch must be closed or the undercarriage must be selected UP. This selection is necessary because the supply to the camera push-switch is fed from fuse No.176 in the armament fuse and relay panel via the paralleled circuits of the undercarriage UP button push-switch contacts or the armament test switch contacts.

31. *Camera only* – On closing the camera master switch, supplies are connected via circuit K21 to the camera heaters and contact 3 of relay No.5. Pressing the camera push-switch energizes relay No.5 via contacts 8 and 8a of relay No.4. The closing of No.5 relay contacts 3 and 3a completes a supply to pin C on the camera via pin W of the G45/G90 conversion unit and initiates camera operation. Releasing the camera push-switch de-energizes No.5 relay and also an overrun mechanism within the camera. The overrun mechanism allows the camera to function for a further 1½ seconds and an overrun indication will be visible on the frames of the film exposed during this time, this enables assessors to determine instantly where one attack ended and the next commenced.

32. *R.P. attacks* – When the camera is to be used for recording rocket attacks, the BOMBS/R.P. switch on the armament switch panel is set to R.P., thus connecting a 28 volt d.c. supply to the operating coil of relay No.8 causing its contacts to close. Closure of the relay contacts 3 and 3a completes a 28-volt d.c. supply from fuse No.176 in the armament fuse and relay panel to contact 1a of No.5 relay; when the camera push-switch is operated prior to an R.P. attack relay No.5 is energized, closure of the relay contacts 1 and 1a completes a self-energizing supply to the solenoid of the relay via contacts 8 and 8a of No.4 relay. After the camera push-switch is released, the retaining circuit of No.5 relay allows the camera to continue to run until the BOMB/R.P. push-switch on the right handgrip on the control column is pressed, or the BOMBS/R.P. switch is set to OFF. Pressing the BOMBS/R.P. push-switch energizes relay No.4 causing its contacts 8 and 8a to open. This de-energizes No.5 relay so that its contacts 3 and 3a open and cut the supply to the camera. When the BOMBS/R.P. switch is selected to OFF the coil of relay No.6 is de-energized causing its contacts 3 and 3a to open, therefore cutting off the supply from fuse No.176 to the solenoid retaining circuit of relay No.5. The camera will continue to run for 1½ seconds in the normal overrun manner after the circuit has been de-energized thus recording the result of the R.P. attack. A press-to-test indicator switch is incorporated in the camera circuit for testing purposes and is mounted adjacent to the camera.

33. *Gun firing* – Opening the pilot's gun firing safety flap and then operating the gun firing trigger switch for gun firing, automatically operates the camera. This is effected by circuit A11-A11G-A12G, via the bomb/flare door microswitch, being completed to energize No.1 relay. Circuit A11-A11C, completed through the relay contacts 1 and 1a, energizes No.5 relay via the normally closed contacts 8 and 8a of No.4 relay and circuit A13C. Closure of No.5 relay completes the camera circuit in a similar manner as by operating the CAMERA push-switch.

34. Press-to-test indicator switch is incorporated in the camera circuit for testing purposes and is mounted adjacent to the camera.

Sunny/cloudy switch

35. A SUNNY/CLOUDY switch adjacent to the G90 camera master switch is used to vary the camera aperture according to the light intensity.

Removal (fig.1)

36. (1) *Magazine* – If all the film in the magazine has not been used a short burst should be given to the camera to ensure that the exposed film in the gate has passed to the take-up side. Loosen the large knurled screw retaining the magazine, lift the rear of the magazine outwards to clear the retaining screw threads and withdraw rearwards from the recess around the film gate. After the removal of the magazine fit the waterproof cover to the camera.

(2) *Camera* – Disconnect the electrical socket, remove the hexagon-headed stiffnuts securing the camera to the mounting and lift the camera clear. The camera must be checked for harmonization after refitment.

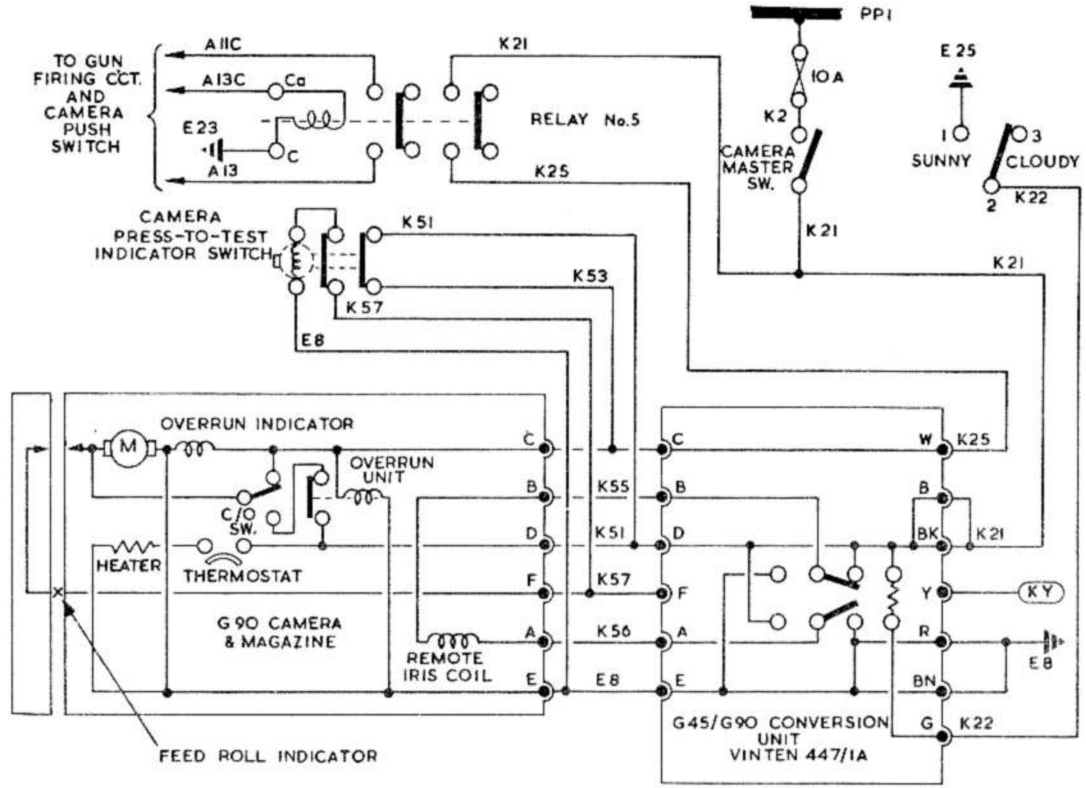

Fig.2. G90 camera and G45/G90 conversion unit – theoretical

F95 camera *(B(I) Mk.6 aircraft post Mod.2695)*

General

37. A Type F95 camera fitted with a 4 in. lens, is mounted in the nose of the aircraft. The camera is situated at frame B adjacent to the bombsight spigot and is aligned to operate through the clear view panel. To minimize the effect of image movement, which may be noticeable in high speed, low altitude oblique photography, alternative shutter speeds of 4 frames per second and 8 frames per second are provided. Functioning of the camera is governed by a F95 camera control unit located at the port side in the nose between frames A and B. Fitted on the F95 camera control unit are four switches labelled as follows:–

MASTER AUTO/MANUAL
IRIS HEATER ON/OFF
SPEED 4PPS/8PPS
IRIS SELECTOR

Also mounted on the camera control unit is a magnetic indicator which gives indication of the film footage used.

Operation

38. The F95 camera circuit is fed from fuse No.45 in the E.C.P. The camera may be operated manually or automatically, manual operation being controlled by selecting the master switch to MANUAL and setting the F95 CAMERA ON/OFF switch to the ON position. The ON/OFF switch is spring-loaded to the OFF position and mounted on top of the control column. When the master switch is selected to AUTO the camera operates in conjunction with the opening of the bomb doors. When the bomb doors open, relay No.6 in the E.C.P. is energized and its contacts close, bypassing the switch on the control column to supply the camera with 28-volts d.c. via contacts 2-3 and 5-6 of the master switch.

39. The HEATER and IRIS switch controls the supply to the camera heater element and the IRIS SELECTOR switch, the latter via fuse No.80 in the E.C.P. The speed at which exposures are made can be selected to either 4 or 8 frames per second by the frame speed switch. The aperture of the camera may be varied accordingly to the light intensity by the three-position iris selector switch. Detailed descriptive and servicing information regarding the F95 camera will be found in A.P.1355C, Vol.1, Sect.1, Chap.5.

MISCELLANEOUS INSTRUMENTS - GROUP D

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LIST OF TABLES

Introduction

1. This group describes the miscellaneous instruments and their location in the aircraft. Table 1 is a list of the instruments together with their reference numbers and the A.P. in which they are described. The oxygen system as a whole is described in Sect.3, Chap. 10.

DESCRIPTION

Cabin air altimeter

2. A Mk.21 altimeter, having an operating range of 8000 to 50,000 ft, is fitted to the starboard instrument panel to indicate the apparent altitude in the cabin due to the operation of the cabin pressurization system.

Hydraulic pressure gauges

3. Four Mk.14LL gauges, calibrated from 0-4000 lb/in^2, register the pressures in the main hydraulic system and the brakes system. Two of these gauges, one for each system, are mounted on the starboard instrument panel and indicate the hydraulic pressures in their respective systems. The air pressures in the main system accumulator and the brakes system accumulator are shown by two other gauges, one in the starboard wheel well for the main system accumulator and the other on the flare bay forward bulkhead for the brakes system accumulator.

Fatigue meter

◄4. A Mk.13 (Mk.16 post Mod.4223) fatigue meter is fitted to the roof of the bomb bay on the port side between frames 18 and 19. It is connected by a 2-way cable, fitted with a Plessey plug at the meter end only, to J.B.1 in the bomb bay. The cable connects to circuit terminals U12 and E1 *(Sect.5, Chap.1, Group G)* which ensures that the meter will only operate when the aircraft is in flight with the alighting gear retracted.►

Oxygen instruments

WARNING

The presence of oil or grease in contact with oxygen at high pressure is extremely dangerous, since it introduces a grave risk of explosion. Every precaution must be taken to avoid contamination of the installation with oil, grease or any other material that is subject to spontaneous combustion, when in contact with oxygen.

General

5. The oxygen system as a whole is

described in Sect. 3, Chap. 10 and the electrical services for the regulators and their associated remote magnetic indicators is given in Sect. 5, Chap. 1, Group W. A brief description of the Mk. 17D regulators and oxygen contents gauges is given in the following paragraphs; for further information reference should be made to A.P. 107D-0201-1 and A.P. 1275G, Part 2, Sect. 2.

Oxygen regulators

6. Four Mk. 17D regulators are fitted in the cabin. One is mounted on the fuselage skin above the pilot's console, one above the navigator's instrument panel, one on the fuselage skin at the starboard side of the air bomber's rear station, and one at the air bomber's forward station on the starboard side.

7. The regulators are designed to automatically mix oxygen with air in suitable ratios for high altitude flying. The oxygen supply to the regulator is controlled by an ON-OFF knob at the bottom of the regulator faceplate. A diluter lever, marked NORMAL OXYGEN - 100% OXYGEN, is fitted at the top of the faceplate. With the lever at NORMAL OXYGEN, the regulator operates automatically and delivers a mixture of oxygen and air to the user's mask. When the diluter lever is changed over to 100% OXYGEN the regulator will deliver undiluted oxygen irrespective of altitude.

8. A pressure gauge and flow indicator are mounted on the face of each regulator. The pressure gauges are calibrated from 0 to 500 lb/in^2 and show the pressures downstream of the reducing valves. They do NOT indicate the pressure in the oxygen cylinders. The flow indicators consist of doll's eye type electro-magnetic indicators which blink when oxygen is supplied to their associated masks; they are operated by the aircraft d.c. supply.

Oxygen contents gauges

9. Two Mk. 4 oxygen contents gauges, on the starboard instrument panel, indicate the amount of oxygen remaining in each bank of cylinders. The instrument dials are marked in fractions from 0 to full, the 1/8 sector being coloured red.

Roller map unit *(B(I) Mk. 6 aircraft)*

10. This instrument introduced by Mod. 2694, provides a clear and immediate indication of the aircraft position on the appropriate map. The roller map operates outside the range of ground-based aids, and allows the user to check the position of the aircraft at a glance without delay or distraction. It combines the advantages of an automatic dead-reckoning navigation system with the precision of visual position fixing. The map over which the aircraft track is to be recorded is fitted prior to flight.

11. The input to the roller map is made up of ground speed and drift angles supplied from the Blue Silk system and heading from the GM4B compass repeater system. The map operates from power supplies of 28-volts d.c. and 115-volts, 3-phase, 400 c/s a.c. fed from fuses in the 400 c/s fusebox *(Chap. 1, Group D)*. A switch on the roller map enables a manually-set ground speed to be fed into the unit should failure of the Blue Silk system occur. The d.c. supply is fed from fuse 112 whilst fuses 124 and 128 provide the a.c. supplied from No. 1 inverter. The roller map unit input is connected via a coupling unit situated on the floor below the navigator's table.

12. The roller map unit may be operated from the navigator's position or from the air bomber's forward station; in both instances a wander lead is used for connection between the roller map and coupling unit.

13. Indication of the aircraft track is made over the vertically moving map by a horizontally moving transparent tape. The tape is marked with an arrow which signifies the aircraft position relative to a track line drawn on the map. Figures on the tape either side of the track line indicate the amplitude of deviation of the aircraft relative to the track line. Descriptive and servicing information on the roller map unit is contained in A.P. 112B-0601-1.

TABLE 1

Miscellaneous instruments

Ref.No.	Equipment	Quantity	Relevant A.P. Vol.1
6A/2693	Pressure gauge, Mk.14LL	4	A.P.112G-0400-1
6A/4245	Altimeter, Mk.21	1	A.P.112G-1022-1
6A/6486	Fatigue meter, Mk.13	1	A.P.112G-0203-1
◄ 6A/9657	Fatigue meter, Mk.16 (post Mod.4223)	1	A.P.112G-0203-1 ►
6D/1966	Oxygen regulator, Mk.17D	4	A.P.107D-0201-1
6D/2237	Oxygen contents gauge, Mk.4	2	A.P.1275G, Part 2, Sect.2
6B/3178	Roller map unit, Type 9033	1	A.P.112B-0601-1
6B/3179	Coupling unit, Type 9233	1	A.P.112B-0601-1

ENGINE INSTRUMENTS – Group E

(Completely revised)

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LIST OF ILLUSTRATIONS

Introduction

1. In this group descriptive and servicing information is given for the engine instruments. Table 1 lists the main components together with their relevant A.P's. The location of the main items of equipment can be found by referring to Table 1 and the location diagrams in the General Information group at the beginning of this chapter.

TABLE 1

ENGINE INSTRUMENTS

Ref.No.	Equipment		Quantity	Relevant A.P.
	Smith Waymouth-type fuel contents gauges			A.P.1275A, Vol.1, Sect.18, Chap.9
6A/3853	Indicator, A.G.26	(No.1 tank)	1	
6A/3854	Indicator, A.G.27	(No.2 tank)	1	
6A/3855	Indicator, A.G.25 (pre Mod.3391)	(No.3 tank)	1	
6A/7516	Indicator, A.G.144 (post Mod.3391)			
6A/3878	Indicator, A.G.28	(P & S wing tanks)	2	
6A/2762	Amplifier, F.A.A.		5	
6A/2763	Cable box, JLA/103/60	(No.1 tank)	1	
6A/2764	Cable box, JLA/103/61	(No.2 tank)	1	
6A/2765	Cable box, JLA/103/J (pre Mod.3391)	(No.3 tank)	1	
6A/7515	Cable box, JY/86 (post Mod.3391)			
6A/3561	Cable box, JLA/123/109	(P & S wing tanks)	2	
6A/2753	Tank unit, TB44A		1	
6A/2754	Tank unit, TB45A	(No.1 tank)	1	
6A/2755	Tank unit, TB46A		1	
6A/2756	Tank unit, TB47A		1	
6A/2757	Tank unit, TB48A		1	
6A/2758	Tank unit, TB49A	(No.2 tank)	1	
6A/2759	Tank unit, TB50A		1	
6A/2760	Tank unit, TB51A		1	
6A/2804	Tank unit, TC17	(No.3 tank)	2	
6A/2805	Tank unit, TC18		2	
6A/3557	Tank unit, TB110	(Wing outer tanks)	2	
6A/3558	Tank unit, TB111		2	
6A/3559	Tank unit, TB112	(Wing inner tanks)	2	
6A/3560	Tank unit, TB113		2	
	Fuel pressure warning			
5C/1553	Warning lamp		2	A.P.1275A, Vol.1, Sect.24, Chap.17
6A/1912	Switch unit		2	
6A/1200	Resistance units		2	

TABLE 1 *(continued)*

ENGINE INSTRUMENTS

Ref.No.	Equipment	Quantity	Relevant A.P.
	Oil pressure gauges		
6A/2714	Indicator, 0 – 40 lb. per sq.in.	2	A.P.1275A, Vol.1, Sect.16, Chap.5
6A/2716	Transmitter	2	
6A/2715	Transformer	2	
	Exhaust gas thermometers		
6A/1674	Indicator, Type B twin pointer	1	A.P.1275A, Vol.1, Sect.17, Chap.9
6A/1677	Cold junction compensator	2	
6A/1678	Voltage compensator, Type B	1	
6A/1942	Extension leads	8	
6A/3811	Thermo-couples B5	8	
	Tachometers		
6A/2801	Indicator, Mk.10A	2	A.P.1275A, Vol.1, Sect.26, Chap.9
166/RV/SB/MOD.1	Generator	2	

DESCRIPTION

FUEL CONTENTS GAUGES

General

2. The fuselage and wing integral tanks are fitted with Smith Waymouth type electrical fuel contents gauges. No gauges are fitted in the jettisonable wing tip tanks nor in any bomb bay overload or auxiliary tanks which may be fitted.

3. The installations operate from the 28-volt d.c. supply and comprise, in effect, five separate fuel gauge systems, each with its own tank *(capacitor)* unit, cable-box, amplifier, and indicator. Coaxial cables are used to connect the capacitance-operated items in each circuit.

Tank units

Fuselage tanks

4. No.1 and No.2 tanks each have four channel-type units parralled in ring circuits. The units in each tank are linked by insulated copper wire and connected to a coaxial terminal in the base of the tank. No.3 tank has four flexible-type units connected by insulated wire *(pre Mod.3391)*, or coaxial cables *(post Mod.3391)*.

Wing integral tanks

5. The integral tanks in the port and starboard wings are identical in that each has two sections in which two channel-type tank units are fitted. Connection between the two units in each section is made by aluminium tubing. The rear unit in each section is connected by flexible cable to a coaxial terminal fitted to the aft face of the tank assembly.

Cable boxes

6. The connection between the tank gauge terminals and their respective amplifiers are made via cable boxes located in the vicinity of the tank terminal assemblies, the cables from the two terminals of each wing integral tank being taken to a common cable box mounted on the aft face of the wing spar. Each cable box has a trimmer capacitor for calibration purposes. The trimmer can be adjusted with a screwdriver after removing the connector box cover.

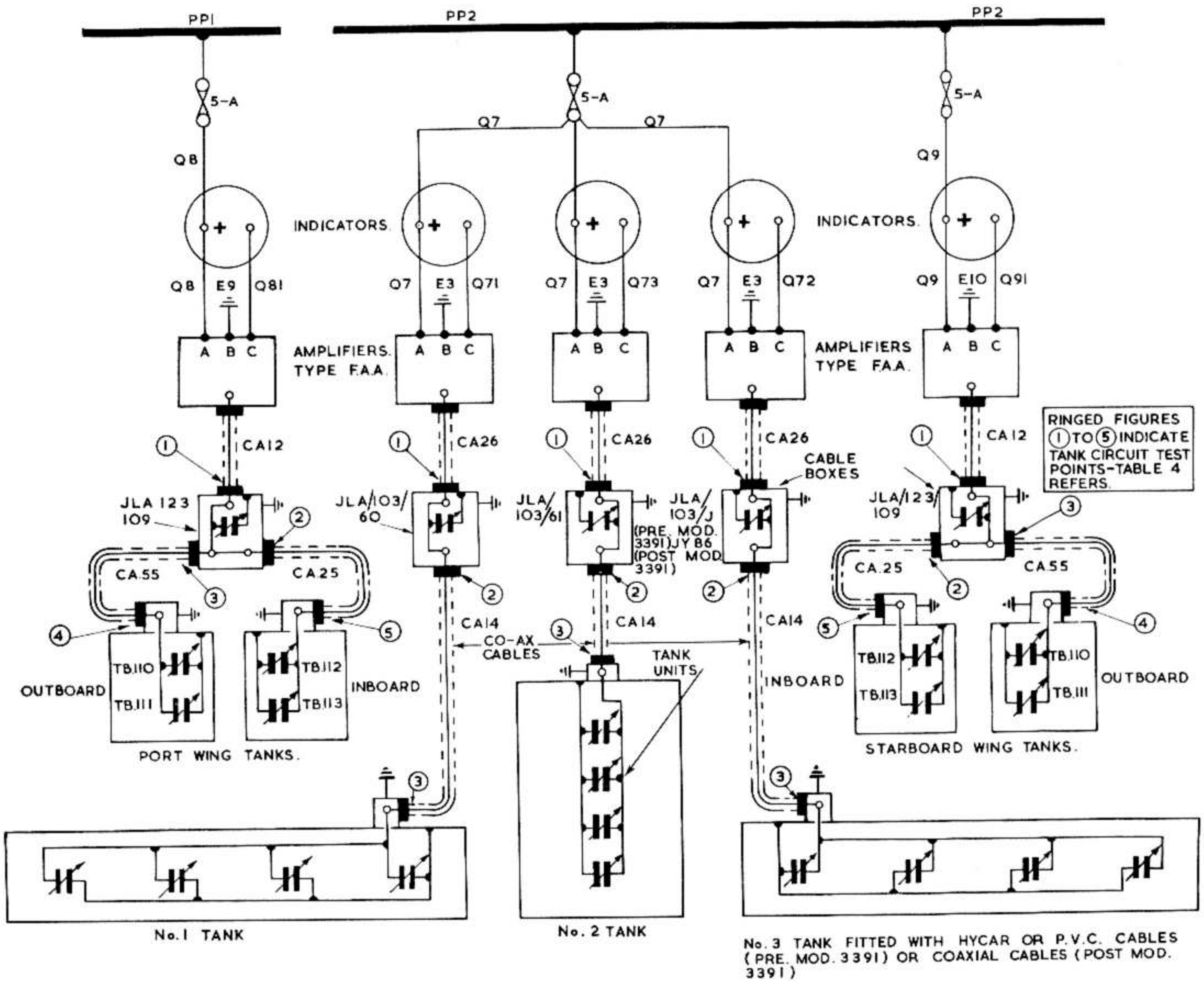

Fig. 1. Fuel contents gauges – theoretical

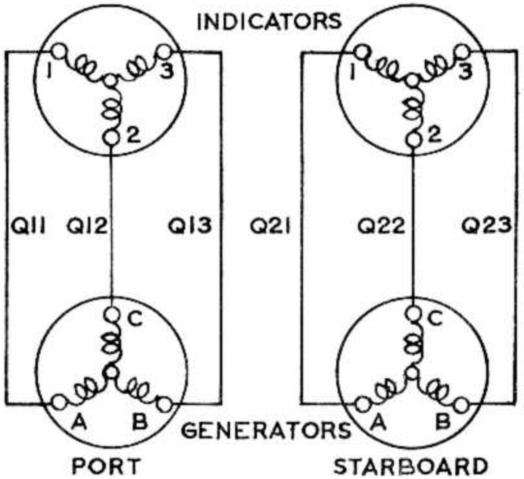

Fig. 2. Tachometers – theoretical

Amplifiers

7. A total of five Type FAA amplifiers are employed in the system. The three serving the fuselage tanks are located along the starboard wall of the bomb bay while those for the wing integral tanks are situated in identical positions between ribs 3 and 3A aft of the main spar in each wing. The amplifier units comprise two 25L6 valves operating in conjunction with an oscillator and rectifier circuit and the variable capacitance of the tank units connected to them. The change induced in the input valve circuit by the variable capacitance is arranged, after rectification, to control the output valve circuit and, consequently, the indicator. The accuracy of the system is dependent on the supply voltage being maintained at the required value, and on the dielectric constant of the fuel.

Indicators

8. Five Type AG indicators, one for each tank system, are installed on the engine instrument panel. The instruments differ only in their calibration markings.

TACHOMETERS

9. Engine speeds are indicated by two Type 10A tachometers mounted on the engine instrument panel. Each instrument has a range of 1200 to 12000 r.p.m. shown on two scales, an inner scale reading thousands of r.p.m. and an outer scale reading hundreds of r.p.m. Basically, each indicator is a 3-phase a.c. motor operating synchronously with a small generator fitted on, and driven by its respective engine.

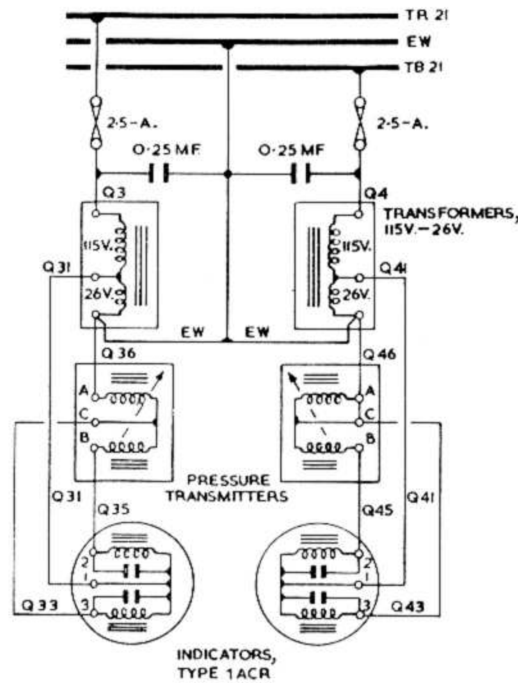

Fig. 3. Oil pressure gauges – theoretical

OIL PRESSURE GAUGES

10. Engine oil pressures are indicated by two gauges mounted on the engine instrument panel. The instruments operate on 26-volts a.c. fed from the 115-volt, 400 c/s. 3-phase supply by means of two small step-down transformers housed in the a.c. fuse-box. Two 0.25 mF capacitors are connected between the input side of the transformers and earth for power factor correction purposes. The initial 115-volts a.c. supply is obtained from the normal flight instruments power supply described in Chap. 1, Group D, of this section.

EXHAUST GAS THERMOMETERS

11. The temperature of the engine exhaust gas is shown by a Type B twin-reading indicator fitted on the engine instrument panel. The thermometers are primarily operated by thermocouples, four of which project into each engine jet pipe.

12. Each group of thermocouples operates in conjunction with a cold junction compensator located on rib 5 aft of each wing main spar. As the operation of the thermometers depends on the operating voltage being maintained at a constant value, a Type A voltage compensator is embodied in the system and installed on the floor of the upper equipment compartment.

13. The thermocouples are connected to terminal blocks positioned on the wing rear spar connector rings which carry the jet pipes. The terminal blocks are connected to the cold junction compensators by cables of fixed length and standard resistance and it may be found that excess cable is coiled up at the rear of the wing spar. This cable must not on any account be shortened as this would affect the functioning of the system.

FUEL PRESSURE WARNING

14. Warning of low pressure in the engine fuel supply lines is given by two red warning lamps mounted on the engine instrument panel. Each lamp is energized by the closing of a pressure-operated switch fitted at the starboard side of its respective engine unit. The switch contacts are set to close whenever the fuel pressure falls below 6 lb/in^2 $+\frac{1}{2}$ lb/in^2 *(post. Mod. 3911)*. The lamp fila- -0 ments, rated at 6 volts are fed from the 28-volt supply via 400 ohm. resistors located in the E.C.P.

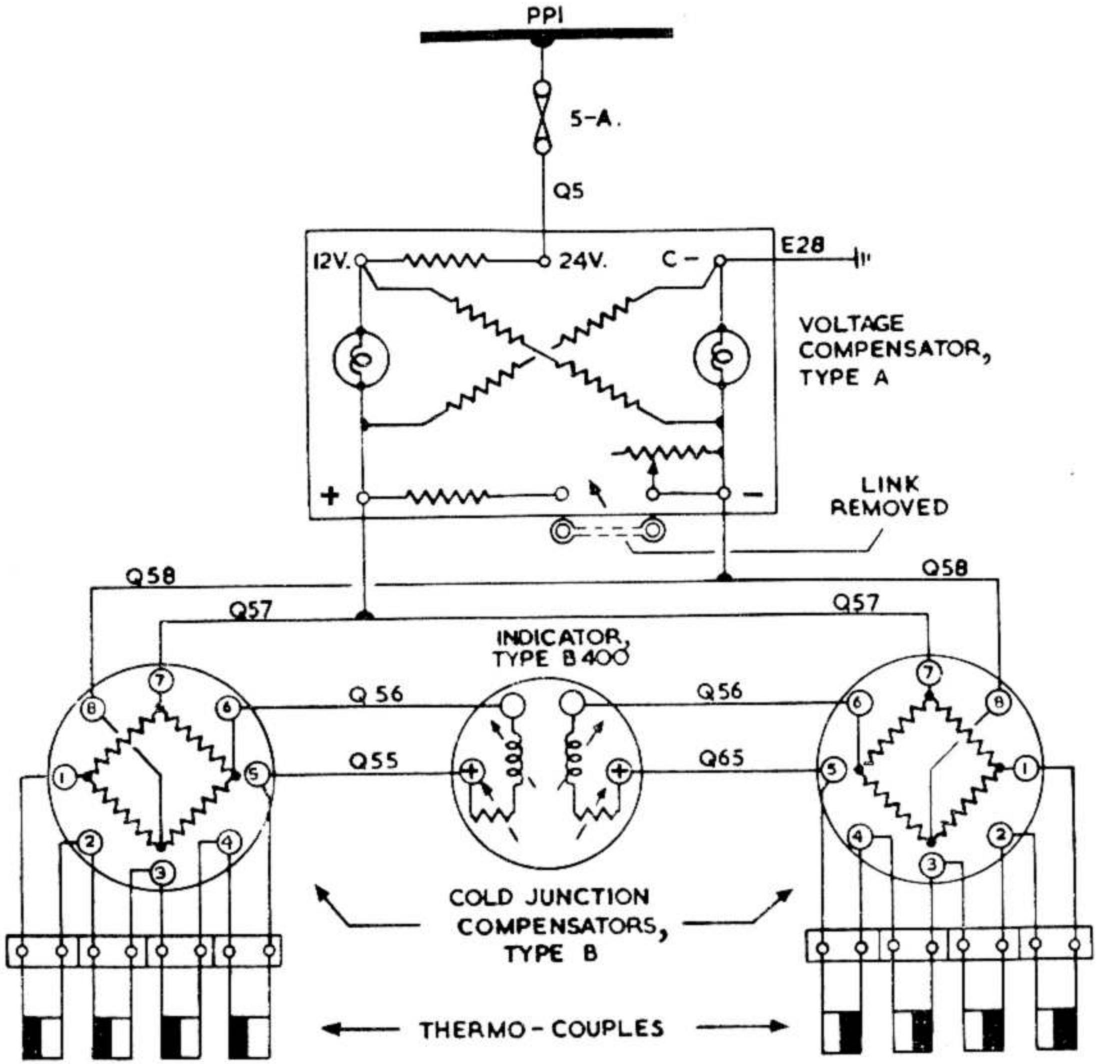

Fig. 4. Exhaust gas thermometers – theoretical

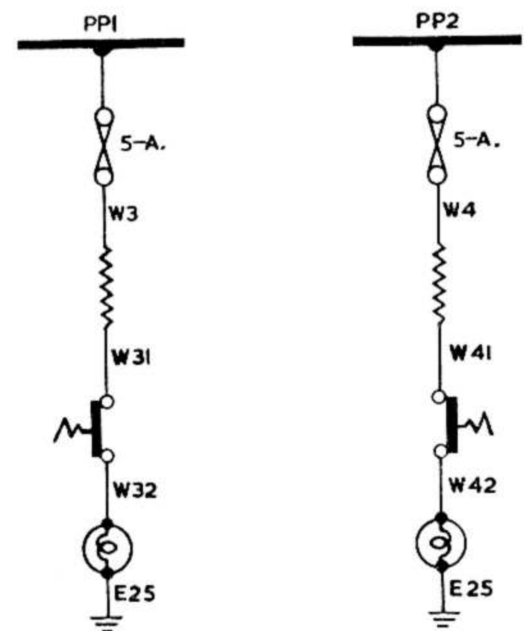

Fig. 5. Fuel pressure warning – theoretical

TABLE 2

Fuel contents gauge capacitance values

A - CONNECTOR BOX CAPACITANCE VALUES

Code	Total capacitance value	
	Trimmer at Max. not more than	*Trimmer at Min. not less than*
JLA/103/60	387pF	477pF
JLA/103/61	387pF	477pF
JLA/123/109	165pF	255pF
JLA/103/J or	110pF	200pF
JLA/103/J/Mod.01 or	75pF	165pF
JY/86	1374pF	1540pF

B - TANK TERMINAL CAPACITANCE VALUES

Code	Capacitance
JCB.A	17 ± 3pF
JKB.Mod.01	17 ± 3pF

C - COAXIAL CABLES CAPACITANCE VALUES

Code		Length (in.)	Capacitance
CA12		12	22 ± 3pF
CA14		14	26 ± 3pF
CA25		25	45 ± 3pF
CA26		26	47 ± 3pF
CA55		55	99 ± 3pF
PR30		30	44 ± 5pF
PS54	No.3 tank	54	83 ± 9pF
PS73	(post Mod.3391)	73	115 ± 12pF

D - TANK UNITS CAPACITANCE VALUES

Unit code	Initial capacitance (pF)	Range (pF)	Tank Ref.
TB44A	230 ± 5	240 ± 3	No.1
TB45A	230 ± 5	237 ± 3	
TB46A	212 ± 5	216 ± 3	
TB47A	212 ± 5	216 ± 3	
TB48A	226 ± 5	231 ± 3	No.2
TB49A	222 ± 5	227 ± 3	
TB50A	230 ± 5	237 ± 3	
TB51A	226 ± 5	230 ± 3	
TC17	230 ± 5	246 ± 3	No.3
TC18	230 ± 5	246 ± 3	
TB110	155 ± 5	152 ± 3	Wing outer
TB111	225 ± 5	222 ± 3	
TB112	240 ± 5	237 ± 3	Wing inner
TB113	378 ± 5	379 ± 3	

E - CAPACITANCE VALUES OF COMPLETE TANK WITH TERMINAL

Tank	Capacitance empty and out of aircraft	Capacitance installed empty and dry	Capacitance installed wet	Unusable fuel
No.1	940 ± 20pF	976 ± 25pF	985 ± 27pF	2 gal
No.2	940 ± 20pF	951 ± 25pF	975 ± 30pF	4 gal
No.3 (P.V.C.) (pre Mod.3391)	1100 ± 23pF	1165 ± 33pF	1265 ± 43pF	5 gal
No.3 (Hycar)	1135 ± 23pF	1207 ± 33pF	1307 ± 43pF	5 gal
No.3 (post Mod.3391)	1377 ± 70pF	1400 ± 70pF	1432 ± 80pF	5 gal
Wing inboard	684 ± 20pF	684 ± 20pF	684 ± 20pF	2 gal
Wing outboard	440 ± 20pF	440 ± 20pF	440 ± 20pF	2 gal

TABLE 3

Fuel contents gauge test values

A - INSULATION RESISTANCE TESTS

Component	Condition	Insulation resistance
Tank unit	New	Not less than 20 megohms
Coaxial cables	New or used	Not less than 20 megohms
Complete tank installation	Tank empty but wetted with fuel	Not less than 1 megohm
Cable boxes	New or used	Not less than 20 megohms
Amplifiers	New or used	As the amplifiers contain items which may be damaged by the application of high voltage, insulation tests using a megger must not be made on these units
Indicators	New or used	Insulation tests must not be made on these instruments. They may be considered serviceable if they conform to the figures given in their calibration tables.

B - CAPACITANCE/INDICATOR VALUES

Amplifier - Code FAA

Power supply – Nominal 28 volts – Current 0.7 amp. approx.

Capacitance figures

Initial (or tanks empty')	1500pF
'Tanks full'	2500pF
Range	1000pF

The relationship between indicator current and capacitance with a power supply of 28 volts is given in the table below:-

Capacitance (pF) (pre Mod. 03)	*Capacitance (pF)* (post Mod. 03 onwards)	*Indicator Current (mA)*
1500	1500	2.00 ± .03
1637	1646	3.00 ± .05
1801	1816	4.00 ± .05
2004	2010	5.00 ± .05
2242	2242	6.00 ± .05
2504	2500	7.00 ± .05

SERVICING

FUEL CONTENTS GAUGES

General

15. Apart from the normal examination of the installation for the security of components and obvious damage, the fuel gauge system requires no routine servicing other than functional tests. If a gauge should give erratic indications, its system should be checked in accordance with the instructions contained in the following paragraphs. For servicing and testing individual components reference should be made to A.P.1275A, Vol.1, Sect.18, Chap.9. Information on the use of the Smith Waymouth test set, Type QAA, is given in A.P.1275T, Vol.1, Sect.5, Chap.2.

16. A functional check should be made on the complete installation in accordance with the current Servicing Schedule, and on individual gauges whenever tanks are drained or major components of the fuel gauge system are changed.

17. Whenever the cable box trimmers are altered, a functional check is to be made immediately afterwards. The tanks contain the following quantities of fuel which cannot be used:-

No.1 tank	2 gallons
No.2 tank	4 gallons
No.3 tank	5 gallons
Wing tanks	2 gallons (each)

18. Before the trimmers are adjusted to obtain a zero reading, five gallons of fuel should be put into each tank and the booster pumps run until no more fuel is delivered.

Functional checks

19. With the BATTERY ISOLATION SWITCH set to the OFF position, connect a 28-volt supply to the external power plug. Allow at least five minutes for the amplifier to warm up and check that the indicator reads zero.

20. Should the indicator show an incorrect reading, remove the cover plate of the relevant cable box and carefully adjust the trimmer with a screwdriver to obtain the correct setting. If, due to a fault in the system, it is found impossible to obtain a zero reading on the indicator, the procedure referred to in para.21 should be followed.

Tanks empty' checks

21. The tanks empty checks are made in conjunction with Table 4 and the diagram, fig.1, which shows the interconnection between the tank gauge installation and amplifiers; the ringed numbers *(1 to 5)* indicate where the systems should be broken down so that the Smith Waymouth test set can be connected into the circuit. The figures shown against the test points 1 to 5 in Table 4 are the values of capacitance that should be fed into the system at these points in order to obtain a zero reading on the gauge being checked and a reading of approximately 2mA on the test set meter.

No.3 tank special check *(pre Mod.3391 only)*

22. Two types of cable, one P.V.C. covered and the other Hycar covered, are now used to connect the tank units in No.3 tank. There is an appreciable capacitance difference between these cables and it is essential to ascertain which type is installed in a particular tank before making capacitance checks on its gauge system. The cables can be identified by colour, Hycar being black. In tanks wired with P.V.C. covered cable, the cable between the tank units and the insulated coaxial terminal in the base of the tank is coloured red whilst the earth cable only is black. Providing the tank is empty of fuel, the colour of the connecting cable can normally be checked through the tank filler aperture by using a suitable lamp. If difficulty is experienced in identifying the cable by this method, the bolts which attach the coaxial terminal to the base of the tank *(these are accessible in the roof of the bomb bay)* should be removed and the assembly pulled down so that the cable connected to its insulated terminal can be seen. To save future checking of the type of cable fitted to a tank before making capacitance checks on its gauge system, it is suggested that after verifying the type of cable the letters P.V.C. or the word Hycar, as applicable, should be stencilled on the coaxial terminal assembly in the bomb bay. If the No.3 tank should be changed at some future date, the cable check should again be made before testing its gauge system, and the terminal box marked to suit.

Checks on fitting new tanks

23. After the installation of any new fuel tanks in the aircraft, special precautions should be taken before making any initial checks on their fuel gauge system. As the tank units in a new tank are in a dry condition they will feed a lower capacitance into their associated amplifier than units that have previously been wetted with fuel. To obviate any discrepancies due to this cause, the units in a new tank should be sprayed with fuel and allowed to drain before making any functional checks.

24. In Tables 2, 3, 4 and 5 are given the capacitance values of the components comprising the fuel gauge system, test values, and indicator calibration current values.

Amplifier removal

Fuselage tanks

25. During servicing involving the removal of the fuselage tank gauge amplifiers, the bomb doors should not be fully open, as then the amplifiers are partly screened. After disconnecting the Plessey plug and socket and the coaxial cable, the amplifiers are instantly removable after undoing the single fastener at the top of the units, and lifting them out of the bottom slot of the brackets that carry them.

Wing integral tanks

26. Servicing of the wing tank amplifiers requires the removal of the access panels between ribs 3 and 3A under each outboard wing.

Changing tank units

Tanks No.1 and 2, and wing tanks

27. If either No.1 or No.2 fuselage tanks or the wing tanks have to be changed because of faulty gauge units, they should be returned to the appropriate manufacturer for servicing.

No.3 tank

28. Instructions for removal, installation, and folding for storage are given in Sect.4, Chap.2, where frequent warnings are given against the danger of damaging flexible tank units in the tanks. To counter possible damage resulting from storage conditions, No.3 tanks are supplied without their tank units fitted. Before installing tank units in a tank it is essential to check that their capacitance agrees with the figures given in Table 2 (D).

29. No.3 fuel tanks are manufactured both by the Marston Excelsior Company and the Fireproof Tank Company. Each made of tank can be recognised by its colour, the 'Marston' tanks being black whilst the 'Fireproof' tanks are green. Although the tanks are interchangeable, the method of fitting their tank units differs. In the 'Marston' tanks each unit is held in position by three rubber straps, with the ends of the units attached to the tank wall by 2 B.A. bolts vulcanised to the inner skin. The units in the 'Fireproof' tank are housed in perforated rubber pockets the same length as the units whilst the ends of the units are secured by rubber studs vulcanized to the tank inner skin. Access to the forward tank units is through the pump apertures, access to the aft tank units is through either the filler neck or through the float valve aperture.

30. The procedure for fitting or changing the tank units in No.3 tank is described under the tank installation *(Sect.4, Chap.2)*.

31. After installation of new tank units, the tank should be partially inflated to remove any folds in the tank skin and then tested in accordance with the information and tables included in this group.

EXHAUST GAS THERMOMETERS

32. Access to each cold junction compensator is obtained by removing a detachable panel on the underside of the wings, aft of each main wheel leg. The voltage compensator is accessible through the hatch of the upper equipment compartment. Servicing of the thermocouples involves the removal of the engine rear cone fairings as described in Sect.4, Chap.1.

FUEL PRESSURE WARNING

33. Except for the renewal of the lamp filaments no servicing is required. Setting of the pressure switches is covered in A.P. 1275A, Vol.1, Sect.24, Chap.17.

TABLE 4

TEST POINT CAPACITANCE VALUES

This table shows the capacitance value that must be fed into each marked test point on fig.1 to obtain a reading of approximately 2mA on the test meter and zero contents on the indicator.

		USING QAA MOD.02 TEST SET		USING QAA MOD.03 OR 04 TEST SET		APPROXIMATE READING ON	
TEST POINT	TEST CAPACITANCE A (pF)	TEST CAPACITANCE B (pF)	ADAPTERS AND CABLES USED	TEST CAPACITANCE B (pF)	ADAPTERS AND CABLES USED	AIRCRAFT INDICATOR	TEST SET METER
			No.1 tank system				
1	1453 ±3	1299 ±8	CE1, CC3	1295 ±8	CE1, CC1	Zero contents	2mA
2	1011 ±30	861 ±33	CE1	861 ±33	CE1	Zero contents	2mA
3	985 ±27	831 ±32	CE1, CC3	827 ±32	CE1, CC1	Zero contents	2mA
			No.2 tank system				
1	1453 ±3	1299 ±8	CE1, CC3	1295 ±8	CE1, CC1	Zero contents	2mA
2	1011 ±30	851 ±36	CE1	861 ±33	CE1	Zero contents	2mA
3	985 ±27	821 ±35	CE1, CC3	827 ±32	CE1, CC1	Zero contents	2mA

TABLE 4 – *continued*

		USING QAA MOD.02 TEST SET		USING QAA MOD.03 OR 04 TEST SET		APPROXIMATE READING ON	
TEST POINT	TEST CAPACITANCE A(pF)	TEST CAPACITANCE B(pF)	ADAPTERS AND CABLES USED	TEST CAPACITANCE B(pF)	ADAPTERS AND CABLES USED	AIRCRAFT INDICATOR	TEST SET METER
			No.3 tank system wired with P.V.C. (pre Mod.3391)				
1	1447 ±3	1293 ±3	CE1, CC3	1289 ±8	CE1, CC1	Zero contents	2mA
2	1291 ±46	1141 ±49	CE1	1141 ±49	CE1	Zero contents	2mA
3	1265 ±43	1111 ±48	CE1, CC3	1107 ±48	CE1, CC1	Zero contents	2mA
			No.3 tank system wired with Hycar (pre Mod.3391)				
1	1447 ±3	1293 ±3	CE1, CC3	1289 ±3	CE1, CC1	Zero contents	2mA
2	1333 ±46	1183 ±49	CE1,	1183 ±49	CE1	Zero contents	2mA
3	1307 ±43	1153 ±48	CE1, CC3	1149 ±48	CE1, CC1	Zero contents	2mA
			No.3 tank system (post Mod.3391)				
1	1447 ±3	–	–	1289 ±8	CE1, CC1	Zero contents	2mA
2	1458 ±83	–	–	1308 ±86	CE1	Zero contents	2mA
3	1432 ±80	–	–	1274 ±85	CE1, CC1	Zero contents	2mA
			Wing tank system				
1	1478 ±3	1324 ±8	CE1, CC3	1320 ±8	CE1, CC1	Zero contents	2mA
2	729 ±23	579 ±26	CE1	579 ±26	CE1	Zero contents	2mA
3	539 ±23	385 ±28	CE1, CC3	381 ±28	CE1, CC1	Zero contents	2mA
4	440 ±20	290 ±23	CE1	290 ±23	CE1	Zero contents	2mA
5	684 ±20	530 ±25	CE1, CC3	526 ±25	CE1, CC1	Zero contents	2mA

The values quoted in column 'A' are the true capacitance to be connected at each point, whilst those in column 'B' are the true capacitance values less the capacitance of the connecting cables and/or sockets. The 'B' values are the actual Test Set variable capacitor settings, and the 'A' values are the theoretical values. Both are given so that allowances may be made if a different method of connected be used.

The standard items of equipment supplied with each type of test set are given overleaf

TABLE 4 – *continued*

QAA MOD.02 TEST SET			QAA MOD.03 OR 04 TEST SET		
Code	Description	Capacitance	Code	Description	Capacitance
CG 144	6-cored cable with plug and socket	Not applicable	CG 144	6-cored cable with plug and socket	Not applicable
CE1	Co-axial cable with plugs	150 ±3 pF	CE1	Co-axial cable with plugs	150 ±3 pF
CC3	Double Waymouth adapter	4 ±2 pF	CC3	Pye-Waymouth adapter	8 ±2 pF

TABLE 5

INDICATOR CALIBRATION/CURRENT VALUES

No.1 Tank		No.2 Tank		No.3 Tank				Wing Tank Systems	
Indicator – Code AG26		Indicator – Code AG27		Indicator – Code AG25 (pre Mod.3391)		Indicator – Code AG144 (post Mod.3391)		Indicator – Code AG28	
Indication pounds	Current (mA)	Indication pounds	Current (mA)	Indication pounds	Current (mA)	Indication pounds	Current (mA)	Indication pounds	Current (mA)
0	2.00	0	2.00	0	2.00	0	2.00	0	2.00
250	2.63	250	2.79	250	2.91	250	2.40	250	2.51
500	3.06	500	3.41	500	3.43	500	2.70	500	2.92
750	3.44	750	3.98	750	3.73	750	2.95	750	3.37
1000	3.73	1000	4.44	1000	3.99	1000	3.20	1000	3.85
1250	3.96	1250	4.82	1250	4.24	1250	3.46	1250	4.23
1500	4.24	1500	5.20	1500	4.49	1500	3.71	1500	4.62
1750	4.26	1750	5.57	1750	4.72	1750	3.96	1750	4.97
2000	4.72	2000	5.95	2000	4.94	2000	4.22	2000	5.29
2250	4.94	2250	6.38	2250	5.20	2250	4.48	2250	5.60
2500	5.15	2480 FULL	6.79	2500	5.42	2500	4.74	2500	5.88
2750	5.38			2750	5.64	2750	5.02	2750	6.20
3000	5.63			3000	5.88	3000	5.30	3000	6.51
3250	5.85			3250	6.15	3250	5.58	3250	6.79
3500	6.11			3500	6.47	3500	5.89	3430 FULL	6.99
3750	6.41			3750	6.75	3750	6.24		
3990 FULL	6.76			4000	7.07	4000	6.62		
				4290 FULL	7.20	4280 FULL	6.90		

Tolerance on all current values 0.05 mA

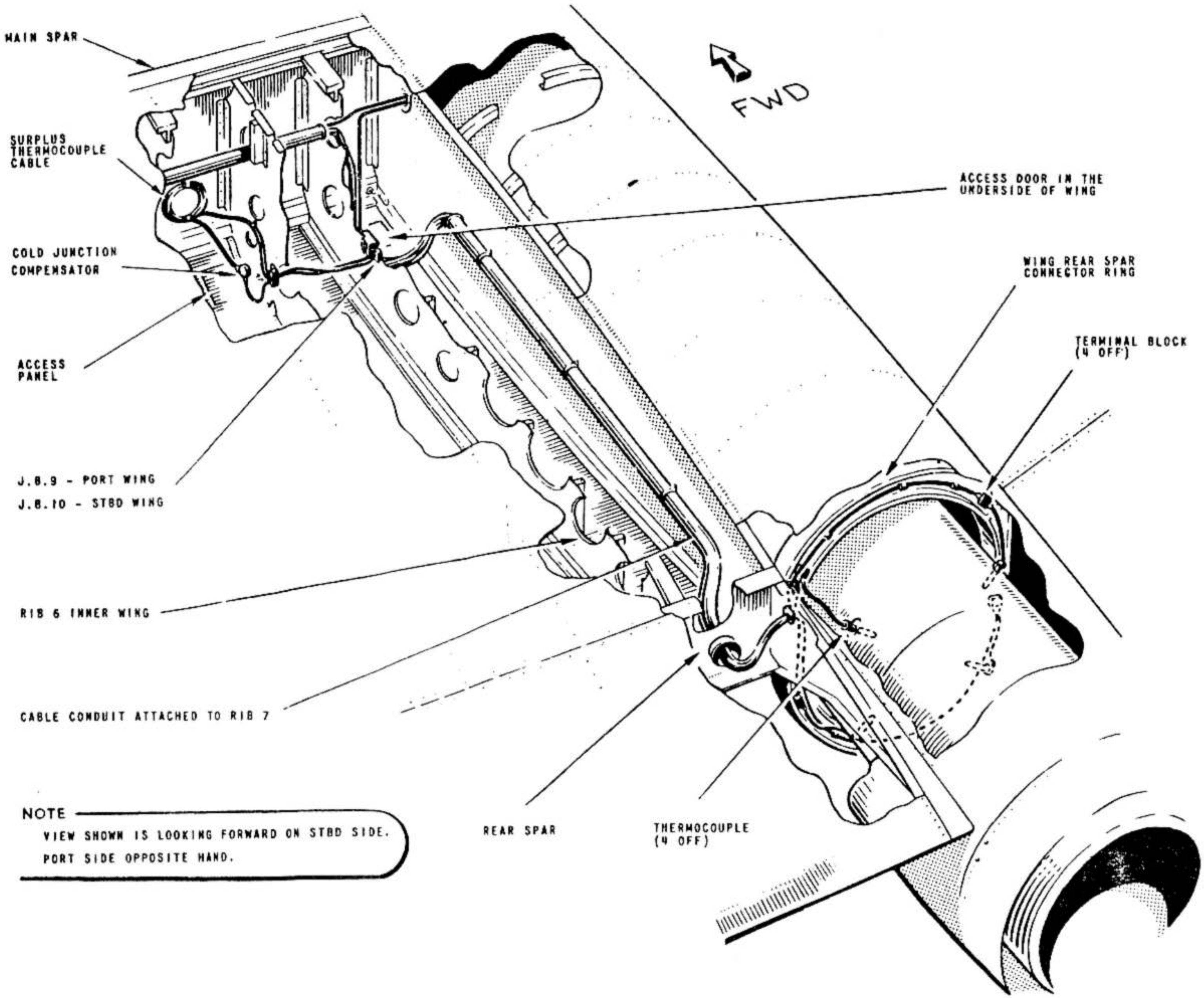

Fig. 6. Thermocouple installation

F21 2189 8236 625 9/63 BPA1307

FLIGHT INSTRUMENTS - GROUP F

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TABLE

LIST OF ILLUSTRATIONS

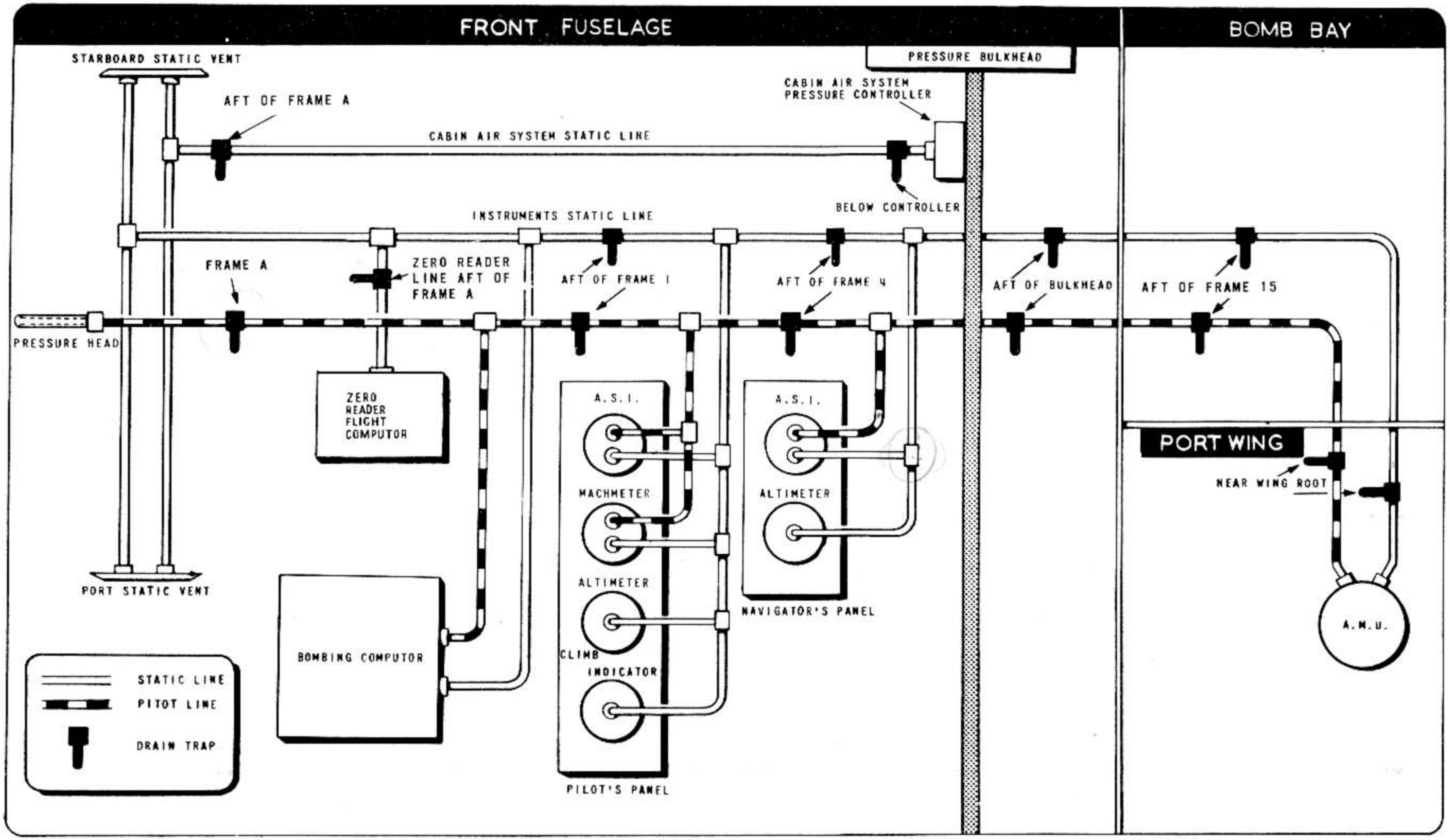

FIG.1. PITOT AND STATIC SYSTEM

9522

Introduction

1. In this group descriptive and service information is given for the pitot and static system and the flight instruments. Table 1 lists the main components together with their reference numbers and their relevant A.P. The location of the main items of equipment can be found by referring to the Table 1 and the location diagrams in the General Information group at the beginning of this chapter.

DESCRIPTION

PITOT AND STATIC SYSTEM

General

2. Instruments that depend on pitot and static pressure for their operation are connected to common pipelines. Static pressure is taken from two vents fitted one at each side of the nose while pitot pressures are fed from a Mk.8W pressure head installed on the plastic fairing which forms the foremost point of the fuselage. To prevent icing, a heater unit which is controlled by a switch mounted on the pilot's take off panel, is

embodied with the pressure head. The main instruments which depend on the pitot and static system for their operation are the bomb computer, zero reader flight computer, A.S.I's, altimeters, rate of climb indicator, machmeter, and the A.M.U. Provision is made near the A.M.U. in the port wing to connect a V.G. recorder when required.

◂ **Drain traps** *(fig.1)*
3. Moisture in the pipelines is collected by fourteen drain traps located at various points in the system as shown in fig.1. Each drain trap consists of a short length of tube, having a closed end, which is connected to the pipeline by a tee-piece. Drain traps, Ref.No. 26FZ/3400, are fitted at all locations except in the port wing where drain traps Ref.No. 28F/13863, are fitted. ▸

Bonding
4. The pipelines are bonded to the aircraft structure by first scraping the pipes at the point of attachment and wrapping with wire gauze before fitting the clips. Flexible bonding leads are also used at various points to complete the earthing of the pipelines where the runs are broken by the fitting of unions and tee-pieces.

TURN AND SLIP INDICATOR

5. The Mk.2A turn and slip indicator, mounted on the instrument flying panel, is provided to indicate the lateral attitude of the aircraft in straight flight, the direction and rate of turn and the amount of sideslip, if any, during a turn. A power failure indicator is incorporated in the instrument and takes the form of a flag visible through an aperture in the dial; no indication is given when the power is on but the word OFF appears when the speed of the gyro rotor is reduced to the extent when accurate turn indications are no longer provided. The instrument is basically an electrically-driven rate gyroscope which normally operates from one of two duplicated d.c. supplies controlled by the engine MASTER STARTING switches. A further supply, provided from the emergency battery, is connected via the turn and slip supply EMERGENCY switch fitted adjacent to the indicator on the instrument flying panel. The power supplies to the instrument are fully described in Chap.1, Group D.

HORIZON GYRO UNIT

6. The horizon gyro unit is an electrically-operated gyroscopic instrument situated on the instrument flying panel. The instrument continuously simulates the roll and pitch attitude of the aircraft relative to the natural horizon. This is achieved by registering the attitude of the aircraft against a stabilized reference, which in this case is a gravity-controlled gyroscope. Indication of the attitude is shown by the roll angle scale and a miniature aircraft on the instrument bezel. Two references, a roll angle pointer and a natural horizon bar are coupled to the gyroscope. Deviation of the aircraft is indicated on the instrument by the horizon bar in relation to the miniature aircraft and by the movement of the roll angle pointer. Operation of a fast-erection pushbutton switch, embodied below the instrument, speeds up the erection of the gyro if it should have toppled due to extreme change of attitude. The instrument is installed mainly to transmit deviations of aircraft trim to the flight computer of the zero reader system *(para.13)*, and acts as a flight instrument by replacing the artificial horizon normally fitted in aircraft.

ALTIMETERS

7. Two Mk.19B, C or F Type altimeters, one for the pilot and the other for the navigator, are mounted on their respective instrument panels and connected to the common static pipeline. A knurled knob fitted below the dial on each instrument is provided for zero adjustment. With Mod.3747 embodied a vibrator unit is fitted to the rear of each altimeter. These units operate on a 115 volt 400 c/s single-phase a.c. supply *(Chap.1, Group D)*. On B(I) Mk.6 aircraft post Mod.3896 the Mk.19 altimeter and vibrator unit at the pilot's station are replaced by a Mk.22 altimeter and amplifier unit, the latter being situated aft of frame A on the port side of the fuselage.

RATE OF CLIMB INDICATOR

8. A Mk.3P rate of climb indicator is mounted on the instrument flying panel and connected to the common static pipeline.

MACHMETER

9. A Mk.2 machmeter is mounted on the instrument flying panel and connected to the common pitot and static pipelines.

AIR SPEED INDICATORS

10. Two Mk.9H*P or Mk.9M or (post Mod. 3402) Mk.15A A.S.I's, one mounted on the pilot's instrument flying panel and the other on the navigator's instrument panel, are connected to the pitot and static common pipelines.

EXTERNAL AIR THERMOMETER

11. The temperature of the air outside the aircraft is indicated by a Type B thermometer on the navigator's instrument panel. The instrument functions in conjunction with a resistance bulb which protrudes from the leading edge of the main plane between the fuselage and the port engine. The circuit is not switched but fed direct from the d.c. supply, via a fuse in the E.C.P.

ACCELEROMETER

12. A Mk.2 accelerometer is installed below the engine instrument panel.

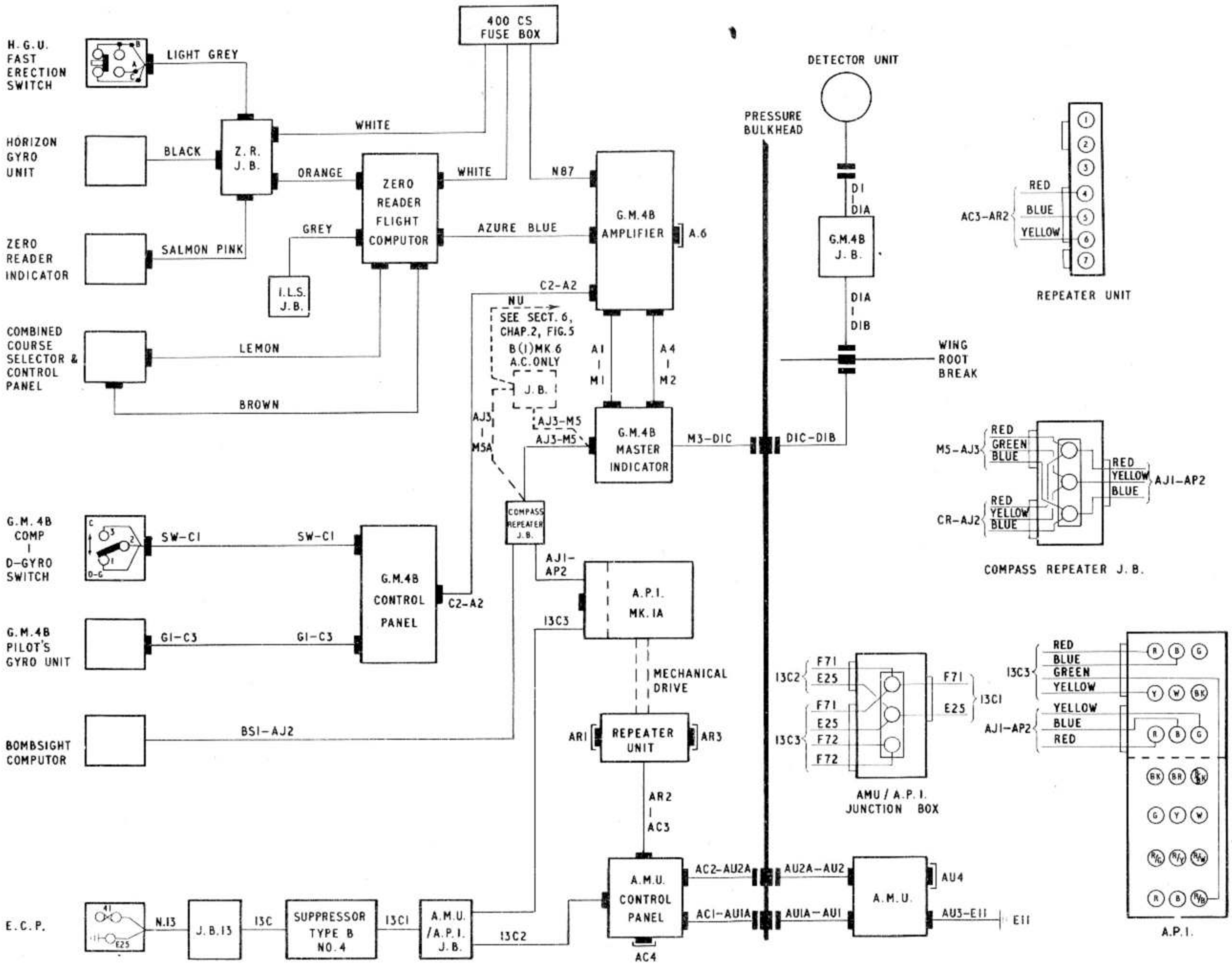

Fig. 2. Zero reader, G.M.4B compass, A.P.I. and A.M.U.

ZERO READER

General

13. This installation comprises a flight computor which co-ordinates signals from the horizon gyro unit, G.M.4B compass, and the I.L.S. meter, for operating a single indicator in conjunction with a combined course selector and control panel. The indicator and the combined course selector and control panel are located on the pilot's instrument panel together with the horizon gyro unit *(para.6)*. The flight computor fitted in an anti-vibration mounting jack, is mounted on the cabin floor forward of the pilot's station. A junction box, which interconnects the zero reader equipment, is fitted on the starboard side, in the roof, forward of frame 1.

Indicator

14. The zero reader indicator is a cross bar indicator incorporating a vertical and horizontal bar and two OFF flags. The vertical bar is actuated by heading and roll, and the horizontal bar by pitch. A circle is marked at the centre of the convex dial face. The flight path, as set on the course selector and control panel, is achieved when the bars intersect at the centre of the circle. The two warning flags indicate failure of the power supply, failure of H.T. in the flight computor, or that the output of one of the I.L.S. receivers has fallen below 270 micro amps.

Combined course selector and control panel

15. The course selector portion of this instrument consists basically of a deviation synchro connected to a compass card and manually operated by a knob which encircles the control panel test button on the dial. The compass card is graduated in five-degree dimensions and registers against a lubber line on the dial. When a change of course is desired, rotation of the compass card knob to the required setting will transmit a signal to the zero reader indicator which then shows a 'fly left' or 'fly right' indication on the dial. The control panel portion of the instrument, in conjunction with the course selector portion, enables the pilot to select the desired flight path. It contains four switches which are electrically interlocked, the main selector switch, test button, altitude switch, and pitch control.

Power supplies

16. The zero reader system operates from the instrument power supplies of 28 volts d.c. and 115 volts, 400 c/s, 3-phase a.c. as described in Chap.1, Group D of this section.

G.M.4B COMPASS

General

17. The Mk.4B gyro-magnetic compass combines the functions of a directional gyro and a magnetic compass and possesses the particular advantages of each. The indications shown by the compass are stabilized by means of a gyro, and synchronized with the earth's magnetic field by a remote detector unit and a monitoring system. By means of a repeater system, compass heading is fed into the bombsight computor in the nose, the G.P.I., the A.P.I., and the zero reader flight computor.

18. The installation consists of a detector unit, amplifier, control panel, gyro unit, and master indicator. The detector unit is fitted in the starboard wing tip, the amplifier and control panel at the starboard side of the air bomber's rear station and the gyro unit and master indicator on the pilot's and navigator's instrument panels respectively. A switch, labelled COMP/D-GYRO and mounted on the starter panel, permits the pilot to operate the gyro unit as either a compass or directional gyro as required.

Power supplies

19. The compass system operates from the 28-volts d.c. and 115-volts, 400 c/s, 3-phase a.c. power supplies described in Chap.1, Group D.

E.2.A. COMPASS

20. A stand-by magnetic compass, Type E.2.A., is mounted above the instrument flying panel. The instrument is fitted with a lamp which is controlled by a 'RED' dimmer switch mounted on the canopy coaming.

A.D.R.I.S.

General

21. The air mileage unit *(A.M.U.)* and the air position indicator *(A.P.I.)*, together with the G.M.4B compass, are designed to maintain a continuous and accurate air plot in terms of latitude and longitude. The main components comprise the A.M.U., A.M.U. control panel, A.M.U. repeater unit, and the A.P.I.

Air mileage unit

22. The Mk.4A A.M.U. is installed in the port wheel well and is mounted flush with the lower surface of the main plane. The electrical connections to it are made by screened cables and Plessey miniature plugs and sockets. Also fitted on the unit are two unions for connecting the pitot and static pipelines.

A.M.U. control panel

23. The A.D.R.I.S. installation is controlled from the A.M.U. control panel mounted near the fuselage skin above the navigator's table. The panel includes the A.M.U. MAIN ON/OFF switch, an ON/OFF switch which controls the electrical transmission from

the A.M.U. to the A.M.U. repeater unit, and a ground test push-switch. An indicator lamp embodied below the face of the panel shows when the A.M.U. is operating satisfactorily and an adjustable screen, marked BRIGHT, DIM, and OUT, fitted over the lamp, can be adjusted to control the illumination from it.

A.M.U. repeater unit

24. A.M.U. output is received as 'M' type electrical transmission by a motor in the A.M.U. repeater unit; a flexible drive from the repeater unit feeds this output into the A.P.I. The unit is mounted on a panel below and forward of the navigator's table and is accessible from the port side of the pilot's seat. On B(I) Mk.6 aircraft incorporating Mod.2622, the repeater unit is mounted on the forward face of the pressure bulkhead and is accessible from the port side of the navigator's seat.

Air position indicator

25. This indicator, fitted on the port wall at the navigator's station, shows the aircraft's position in latitude and longitude. It receives inputs from the A.M.U. repeater by flexible drive and from the G.M.4B master indicator by 'M' type electrical transmission. The cable run from the G.M.4B master indicator to the A.P.I. passes through a junction box mounted on a panel between frames 5 and 6 near the navigator's table.

Power supplies

26. Both the A.M.U. and A.P.I. operate from a common source of 28-volts d.c. fed from the E.C.P. via J.B.13 and a Type B4 suppressor, and a 3-entry junction box mounted on the same panel as the G.M.4B/A.P.I. junction box.

SERVICING

PITOT AND STATIC SYSTEM

General

27. As all instruments that function by pitot and static pressure operate from common pipelines, any faults in the lines will normally affect them all. Any single instrument giving suspect readings should be checked by reference to the relevant A.P. and renewed if necessary. The drain traps should be periodically removed and drained; after being refitted, the system must be tested for leaks and re-calibrated.

Leakage tests

28. The following tests are to be made on the pitot and static system in accordance with the aircraft Servicing Schedule and after any operation that involves disturbing joints or connections to the pipelines.

Test equipment

29. The leak test set *(Ref.No.6C/849)* described in A.P.1275T, Vol.1, Sect.3, Chap.4, is to be used when making tests on the pitot and static system.

Note...

The pump embodied in the tester must not be operated too vigorously as such action may cause damage to the instrument capsules.

Method of testing

30. The test procedure described in the following paragraphs has been summarised ◄ from A.P.1275A, Vol.2, Leaflet A9. ►

(1) Disconnect the pitot and static pipelines from the A.M.U. and seal them off. Seal one of the static vents with a Mk.2 protective plug *(Ref.No.6A/2679)*.

(2) Couple the pitot head, by means of the appropriate adapter, to the pitot connector on the tester and set the selector valve to 'Pressure to Pitot'. Apply pressure by using the pump until the test indicator reads just over 130 knots. Check the time taken for the indicator reading to fall to 125 knots; this must be greater than 3 minutes.

(3) Couple the static vent, by means of an adapter, to the static connector on the tester and set the selector to 'Sunction to static'. Using the pump, apply suction until the tester indicator reads just over 130 knots and check the time taken for the indicator reading to fall to 125 knots. This should exceed 3 minutes.

(4) Connect the tester and an Air Reservoir of 100 cu.in. capacity *(Ref.No.6C/1447)* to the pitot and static connections of the A.M.U. in turn. Apply pressure by the pump in each case and time the drop from 130 to 117 knots. The time must be greater than 50 secs for the pitot line and 20 secs for the static line.

(5) Reconnect the A.M.U. and repeat the tests detailed in (2) and (3) but with the 100 cu.in Air Reservoir tee-ed into the system. Check that the time taken for the pressure to drop from 130 to 117 knots is greater than 75 secs for the pitot line and 50 secs for the static line.

Drying out the system

31. When aircraft have been dispersed for any length of time under adverse weather conditions that have caused moisture to collect in the pitot and static system, it is necessary to empty all drain traps and dry the system out to prevent icing at high altitude. The procedure given in the following paragraphs is to be carried out at the following times:—

(1) Whenever the system is suspect.

(2) When called for in the relevant Servicing Schedule.

(3) When the aircraft has been out of service for more than 4 weeks.

32. The drying-out operation calls for the use of an instrument and auto-control testing trolley *(Ref.No.4F/1510)*, a pitot head test adapter *(Ref.No.4F/1502)*, and a static vent test adapter Mk.1 *(Ref.No.6C/499)*.

33. The procedure to be adopted is as follows:—

(1) Disconnect all instruments coupled to the pitot and static system at the point nearest each instrument.

(2) Connect the test trolley supply, by means of rubber hose and the pressure head adapter, to the pressure head and secure the clip.

(3) Start the motor of the trolley and allow the air supply, when completely warm, to circulate through the system for at least 5 minutes.

(4) Remove the trolley air supply hose from the pressure head and re-connect to to one of the static vents by means of the Mk.1 static vent adapter. Repeat the previous sub-para.(3).

34. On the conclusion of the operation, remove the test trolley, re-connect all instruments and carry out the leak test detailed in para.28. If the aircraft is not for immediate use, fit and tape up a pressure head cover and refit the static vent plugs to prevent ingress of moisture into the system.

35. It is essential that during servicing which involves the removal and replacement of pipelines, bonding should be efficiently maintained by cleaning the pipelines and their clip attachment points and also that all bonding leads are refitted where necessary.

G.M.4B COMPASS

General

36. The compass installation should be checked in accordance with the current Servicing Schedule. During a visual examination, particular attention should be paid to the security of the connector plugs and sockets and the amplifier mountings.

Servicing periods

37. These are laid down in A.P.3158, Vol. 2, Leaflet B11. Functioning tests and detailed routine servicing of the equipment is given in A.P.1275B, Vol.1, Sect.11.

Calibration

38. The compass system should be calibrated periodically using the procedure outlined in A.P.1275B, Vol.1, Sect.11, Chap.5, App.3.

Functional test

39. To check the functioning of the G.M.4B compass:

(1) Switch on the d.c. and a.c. power supplies to the compass by operating the engine MASTER STARTING switches on the starter panel. Allow at least two minutes for the inverters to run up and check that the compensator lamps in the amplifier are alight; these are visible through small holes on the front of the amplifier case. Failure of either lamp will cause the value of the current flowing through the compensator coil to alter, thus introducing compass errors. Set the variation scale on the Master Indicator to read '0'.

(2) Turn the selector switch on the control panel to GYRO COMPASS and allow the precession amplifier to warm up. Verify that the dot (.) or the cross (x) is shown in the annunciator window of the gyro unit and that a similar indication is shown by the annunciator in the master indicator on the navigator's panel.

(3) Press in the synchronizing knob and and turn it in the direction shown by the flag in the annunciator window *(i.e., clockwise when the dot (.) is showing and counter-clockwise when the cross (x) is showing)*. When the indication in the annunciator window changes to the opposite sign, slowly turn the synchronizing knob back until the window is cleared, or a dot and cross appear alternately. The gyro unit is now synchronized. Check that the indications shown in the master indicator annunciator window are similar to those shown by the gyro unit. Note the compass card heading against the lubber line; this reading should agree approximately with stand-by compass.

(4) Offset the compass card 5 deg from the indicated heading by means of the synchronizing knob and note the time taken for it to return to the original heading within ± 0.5 deg. The time taken should not exceed 3 minutes. Check that the master indicator follows the compass card and agrees within ± 1 degree.

(5) Set the pilot's switch to D-GYRO and verify that D.G. is shown in the annunciator windows of the gyro unit and the master indicator.

(6) Alter the heading shown by the compass card by means of the synchronizing knob and check that the master indicator pointer follows the movement of the card and agrees with ± 1 deg.

(7) Having synchronized the gyro, set 10 degrees of westerly variation on the master indicator. Check that the new card indication after synchronizing is 10 degrees less than the previous readings. Return the variation scale to zero.

A.D.R.I.S.

Ground testing

40. The following procedure describes a brief check to test the A.M.U. on the ground. After setting the main and electrical transmission switches on the control panel to the ON position, wait for 30 seconds and then press the ground test switch. Allow a few seconds for the instrument to settle down and then check the following:—

(1) That the control panel indicator lamp is 'winking'. The rate of winking may be considerably greater than in normal flight conditions.

(2) Check that the A.P.I. counters are moving in the appropriate direction according to the heading indicated by the instrument.

Note...

The ground test speed of the A.M.U. may be anywhere between 70 and 270 knots.

Servicing of the items of equipment is only to be undertaken by qualified personnel. Faults in the power supplies should be traced by referring to Chap.1, Group D.

101B-0406-1/140/462603/355/5-69/BAC/1307

TABLE 1

Flight instruments

Ref.No.	Equipment	Quantity	Relevant A.P. Vol.1
6A/3953	Turn-and-slip indicator, Mk.2A	1	A.P.1275A, Sect.13
6A/3147	Air speed indicator, Mk.9H*P	2	A.P.1275A, Sect.21
OR			
6A/4722	Air speed indicator, Mk.9M	2	A.P.1275A, Sect.21
OR			
6A/3360	Air speed indicator, Mk.15A	2	A.P.1275A, Sect.21
6A/3384	Machmeter, Mk.2	1	A.P.1275A, Sect.21
6A/5040	Altimeter, Mk.19B, C or F	2	A.P.1275A, Sect.22
OR			
6A/7018			
OR			
6A/8267/1			
6A/7041	Altimeter vibrator unit (post Mod.3747)	2	A.P.1275A, Sect.22
6A/4832	Mk.22 altimeter } B (I) Mk.6 aircraft	1	A.P.1275A, Sect.22
6A/5465	Mk.22 altimeter amplifier, Mk.1A } (post Mod.3896)	1	
6A/5845	Rate of climb indicator, Mk.3P	1	A.P.1275A, Sect.22
6A/3820	Pressure head, Mk.8W	1	A.P.1275A, Sect.27
6A/3682	Air thermometer, Type B	1	A.P.1275A, Sect.17
6A/3684	Resistance bulb, Type A	1	
	Zero reader		A.P.1275A, Sect.23
6A/3119	Indicator	1	
6A/3120	Combined course selector and control panel	1	
6A/3122	Flight computor	1	
6A/5798	Horizon gyro unit, Mk.4A	1	
6A/6126	Junction box, Type E	1	
	ADRIS system		A.P.1275B, Sect.16
6B/554	Air mileage unit, Mk.4A	1	
6B/471	Control panel, A.M.U. Mk.4	1	
6B/314	Repeater unit	1	
6B/458	Air position indicator, Mk.1B	1	
	G.M.4B compass system		A.P.1275B, Sect.11
6B/1993	Detector unit, Type A	1	
6B/562	Amplifier, Type B	1	
6B/437	Mounting tray, Type A	1	
6B/408	Control panel, Type A	1	
6B/634	Master indicator, Type B	1	
6B/561	Gyro unit, Type B	1	
6B/405	Compass, Type E2A	1	A.P.1275B, Sect.10


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ENTRANCE OTHER SIDE