

## Chapter I—ELECTRICAL SYSTEM

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Flap indicator ... ..	F	Identification lamp ... ..	J
		Landing lamp ... ..	LL
		Cabin pressure warning ... ..	PW
		Tachometer ... ..	RA
		Ultra-violet and cockpit lamps ... ..	UV, T
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## Introduction

1. This chapter contains illustrations showing the location of the electrical components and schematic and routing diagrams of each circuit. Notes are given covering the functioning of each circuit, general servicing, where necessary, and the location of the main items of equipment. Detailed information on standard items of equipment may be found in the A.P.4343 series. A set of tables covering location, fuses and circuit breakers, lamp filaments and micro switches are included.

## DESCRIPTION

### Interpretation of diagrams

#### Location diagrams

2. These diagrams show the position of the various items of electrical equipment in relation to the aircraft structure. These diagrams, in conjunction with the routing charts and relevant text, will enable the reader to locate each item of equipment.

#### Schematic diagrams

3. The schematic diagrams show each circuit laid out in theoretical form to enable

the reader to appreciate the function of a circuit before referring to the particular routing chart.

#### Access to components

4. To ascertain the location and access panel for any individual item of equipment, a Master Index has been compiled listing each component under its circuit heading. In three columns, headed by the relevant Fig. No., the key number for each item appears. The Master Index appears in Table 1.

TABLE 1—Master index of electrical equipment

Component	Fig. 2	2a	2b
<b>Generators and batteries</b>			
Generator A	60	19	
Generator B	60	19	
Regulator A	85	5	
Regulator B	82	5	
Suppressor A..	84	5	
Suppressor B..	83	5	
Ammeter shunt A	86	5	
Ammeter shunt B	81	5	
Test sockets A	87	5	
Test sockets B	80	5	
Equalising resistor	88	5	
Batteries	21	5	
External supply socket	66	3	
Generator failure warning lamp (A and B)	75		7
Generator isolating relay (A and B)	24	5	
Battery isolating relay	91	19	
Resistance and rectifier unit (A and B)	75		17
External supply relay	92	5	
Generator failure warning relay	75		17
Relay, Type S4	93	5	
Generator isolating switch (A and B)	75		14
Battery isolating switch	75		6
<b>Engine starting</b>			
Turbo starter	61	19	
High energy igniter units (port and starboard)	30	19	
Relay	75		17
Master switch	75		33
Time switch	5		
Selector switch			37
Re-light switch			53
<b>Lighting gear indicator</b>			
Indicator			50
Warning lamp			43
Nose wheel micro switches	2	8	
Port wheel micro switches	34	22	
Starboard wheel micro switches	34	26	
Throttle warning micro switch	90	19	
<b>Lighting gear lever lock</b>			
Solenoid			56
Lever micro switch			59
Port leg compression micro switch	33		
Over-ride switch	13		61
<b>Fire warning and extinguisher</b>			
Fire detectors	28	19, 1	
Fire bottles	55	14, 15	
Warning lamp			40
Extinguisher push-switch	75		13
<b>Oil thermometer</b>			
Indicator			49
Bulb	23	3	
<b>Flap indicator</b>			
Indicator			48
Transmitter	58	14	
<b>Turn and slip indicator</b>			
Indicator			41
Relay	75		17
Emergency switches	75		8
Emergency battery	27	4	

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TABLE I—Master index of electrical equipment—continued

Component	Fig. 2	2a	2b	Component	Fig. 2	2a	2b
<b>Heated pressure head</b>				<b>Wing and pylon fuel tank jettison</b>			
Head .. .. .	53	16		Wing-tip release unit (port and starboard)	42	13	
Switch .. .. .	75		30	Fuel valve (port and starboard) .. .. .	41	13	
<b>Fuel booster pump</b>				Wing-tip cocking test socket (port and starboard) .. .. .	43		
Pump .. .. .	18	5		Relay .. .. .	75		17
Switch .. .. .	75		28	Jettison relay .. .. .			34
Suppressor .. .. .	17	5		Jettison push-switch .. .. .			54
<b>Thermometers</b>				<b>Emergency lighting</b>			
Exhaust gas temperature indicator .. .. .			47	Battery .. .. .	7		
Exhaust gas thermocouple .. .. .	54	1		Lamp .. .. .			42
Rear bearing thermocouple .. .. .	56	1		Switch .. .. .			58
<b>Fuel contents gauge</b>				<b>Gyro gun sight supply</b>			
Power unit .. .. .			2	Switch .. .. .	75		25
Rectifier .. .. .	19	5		Control unit, Type B .. .. .	69		
Gauge .. .. .			38	Regulator .. .. .	69		
Tank unit (main) .. .. .	26	5		Suppressor, Type P .. .. .	69		
Tank unit, No. 1 (port and starboard) .. .. .	57	2		Suppressor, Type F2 .. .. .	70		
Tank unit, No. 3 (port and starboard) .. .. .	48	10		Control unit, Type P .. .. .	76		
<b>Fuel pressure warning</b>				<b>Identification lamp</b>			
Pressure switch .. .. .	25	3		Lamp .. .. .	10	5	
Warning lamp .. .. .			46	Push-switch .. .. .	75		10
Resistor .. .. .	75		17	<b>Landing lamp</b>			
<b>GM4F compass and artificial horizon supply</b>				<b>Cabin pressure warning</b>			
Fuse box .. .. .	68		16	Lamp .. .. .	47	18	
Flight instrument switch .. .. .	75		32	Selector switch .. .. .	75		18
Power failure warning lamp .. .. .			39	<b>Tachometer</b>			
<b>Fuel transfer warning</b>				<b>Ultra-violet and cockpit lighting</b>			
Indicator (port and starboard) .. .. .			36	Dimmer switches .. .. .	71		57
Pressure switch (port and starboard) .. .. .	51	9		U/V lamps .. .. .			4
<b>Fuel pump solenoid</b>				<b>Navigation lamps</b>			
Solenoid .. .. .	22	19		Switch .. .. .	75		29
Switch .. .. .	75		27	Wing-tip lamp (port and starboard) .. .. .	40		
<b>Aileron tab actuator and warning</b>				Tail lamp .. .. .			
Actuator .. .. .	45	27			52	17	
Indicator, power failure .. .. .			51				
Pressure switch .. .. .			5				
Out of trim warning lamp .. .. .			44				
Relay .. .. .	75		60				
Audible cut-out switch .. .. .	75		11				
Aileron trim switch .. .. .			55				
Micro switch .. .. .	46	27					

TABLE I—Master index of electrical equipment—continued

Component	Fig. 2	2a	2b	Component	Fig. 2	2a	2b
<b>G.45 camera</b>				Tail fuzing switch .. .. .	75		19
Camera .. .. .	31	20		Port selector switch .. .. .	75		22
Camera switch .. .. .	75		26	Starboard selector switch .. .. .	75		21
Sunny/cloudy switch .. .. .	75		31	Distributor switch .. .. .	75		23
Relay (1, 2, 3 and 4) .. .. .	75		17	Bombs/R.P. push-switch .. .. .			62
Camera push-switch.. .. .			65	<b>R.P. firing control</b>			
<b>Gun-firing</b>				Pick-up sockets (port and starboard) .. .. .	32		
Gun-firing units .. .. .	16	5		Bombs/R.P. selector switch .. .. .	75		12
Armament master micro switch .. .. .	3	8		4-way auto-selector .. .. .	74		15
Gun-firing trigger .. .. .			66	Resistance and relay box .. .. .	64	19	
Camera test switch .. .. .			3	Pairs/salvo switch .. .. .	75		24
Master relay .. .. .	67	5		Safety brake (port and starboard) .. .. .	50	22, 26	
Gun relay .. .. .	67	5		Bombs/R.P. safety flap .. .. .			64
Bomb relay .. .. .	67	5		<b>A.R.I.5488</b>			
Gun safety flap .. .. .			63	Emergency battery .. .. .	27	4	
<b>Bomb release</b>				Test switch .. .. .	75		9
Release unit (port and starboard) .. .. .	38	24		V.H.F switches .. .. .	75		8
Nose fuzing unit (port and starboard) .. .. .	36	23		<b>P to T Supply</b>			
Tail fuzing unit (port and starboard) .. .. .	39	25		Push-switch .. .. .			52
2-way distributor .. .. .	6			Relay .. .. .	11	5	
Practice plug (port and starboard) .. .. .	37	24		Junction box 1 .. .. .	75		17
Cocking test socket (port and starboard) .. .. .	35			Junction box 2 .. .. .	63	19	
Change-over switch (port and starboard).. .. .	49	22, 26					
Nose fuzing switch .. .. .	75		20				

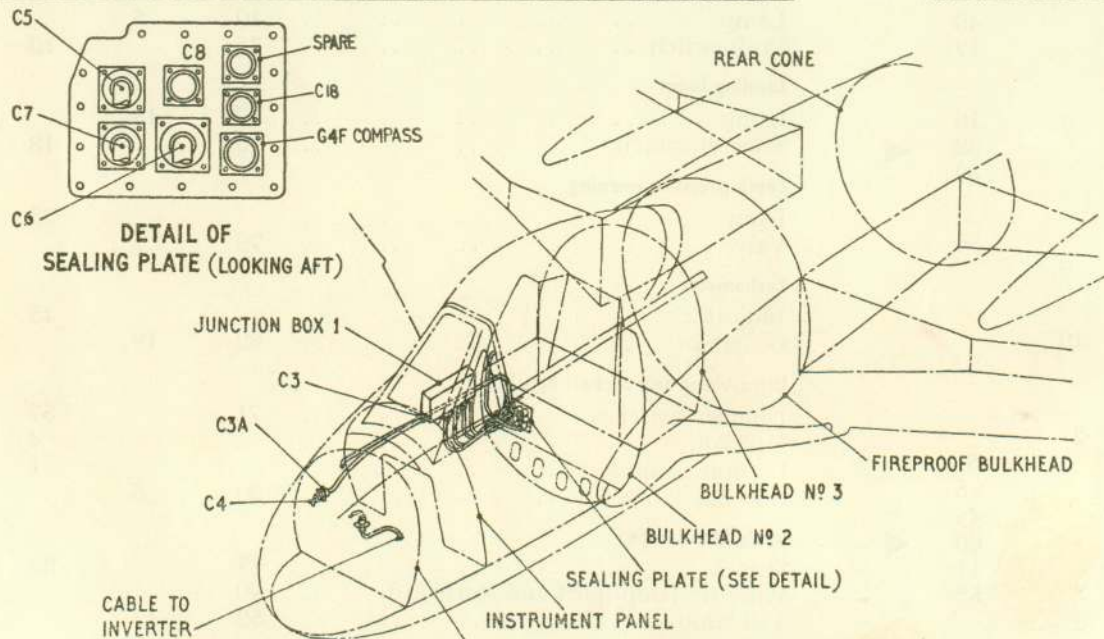


Fig. 1. Sealing plate, plugs and sockets in fuselage

Routing diagrams

5. Each electrical circuit is laid out in the form of a routing chart. These charts have vertical columns, each column representing a location or plug pin reference, as indicated by the title at the head of the column. If an illustration bears more than one circuit, adjacent circuits are separated by a heavy horizontal line.

6. Method of reading a routing diagram. As an example of reading a routing diagram refer to circuit SV (fig. 10). Current is supplied via fuse 18 in J.B.1 through a Unipren 6 amp cable to one terminal of the fuel pump solenoid isolating switch mounted on the top of the junction box. When the switch contacts are made, the current passes to the remaining terminal of the switch and, through a Unipren 6 amp. cable, to pole N of plug C7 fitted in the base of the box. This cable is coded SV2. Loom C7 has a Unipren 6 amp. cable connected to pole N of its socket at the junction box connection and pole N of its bulkhead 2 socket connection.

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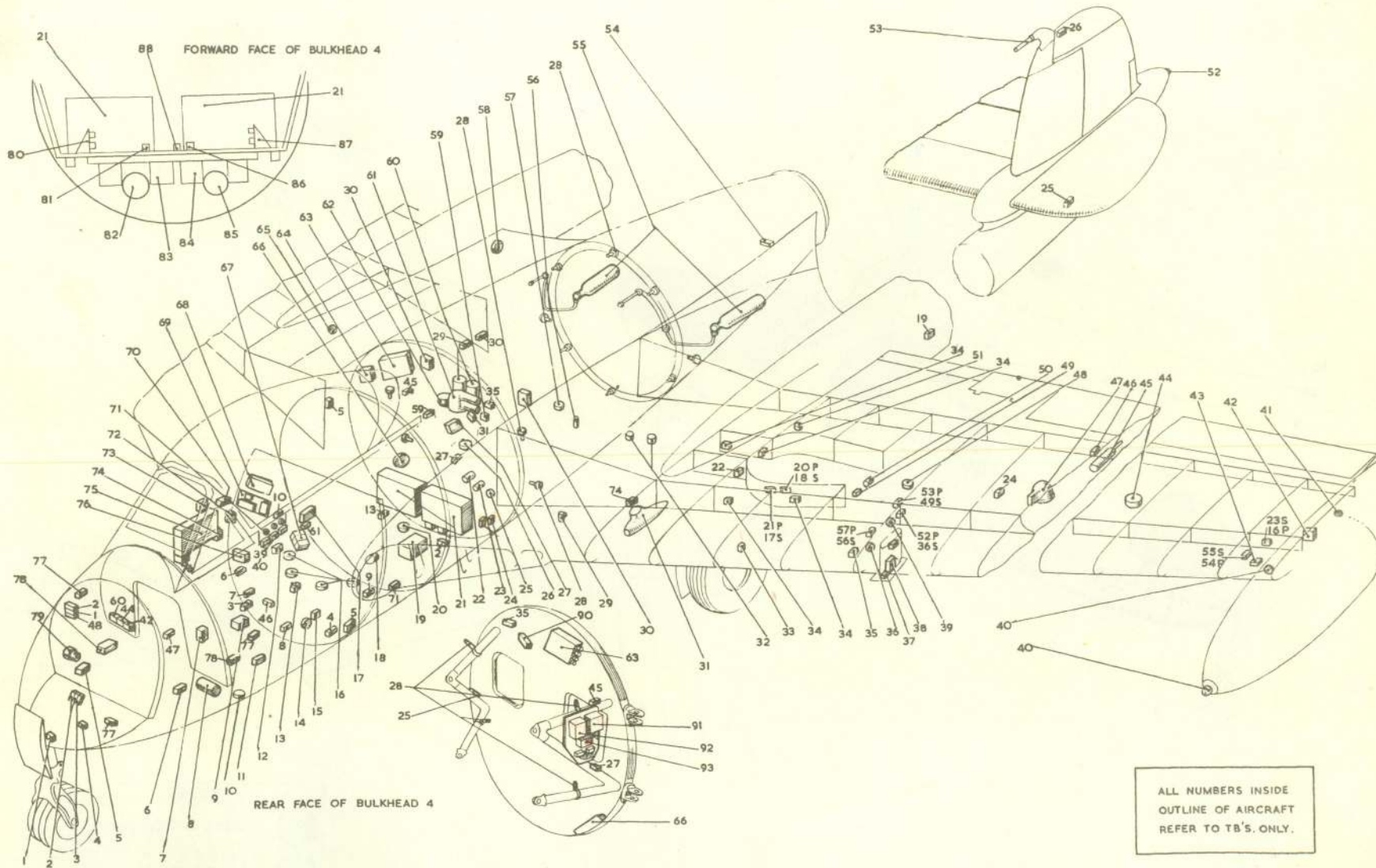
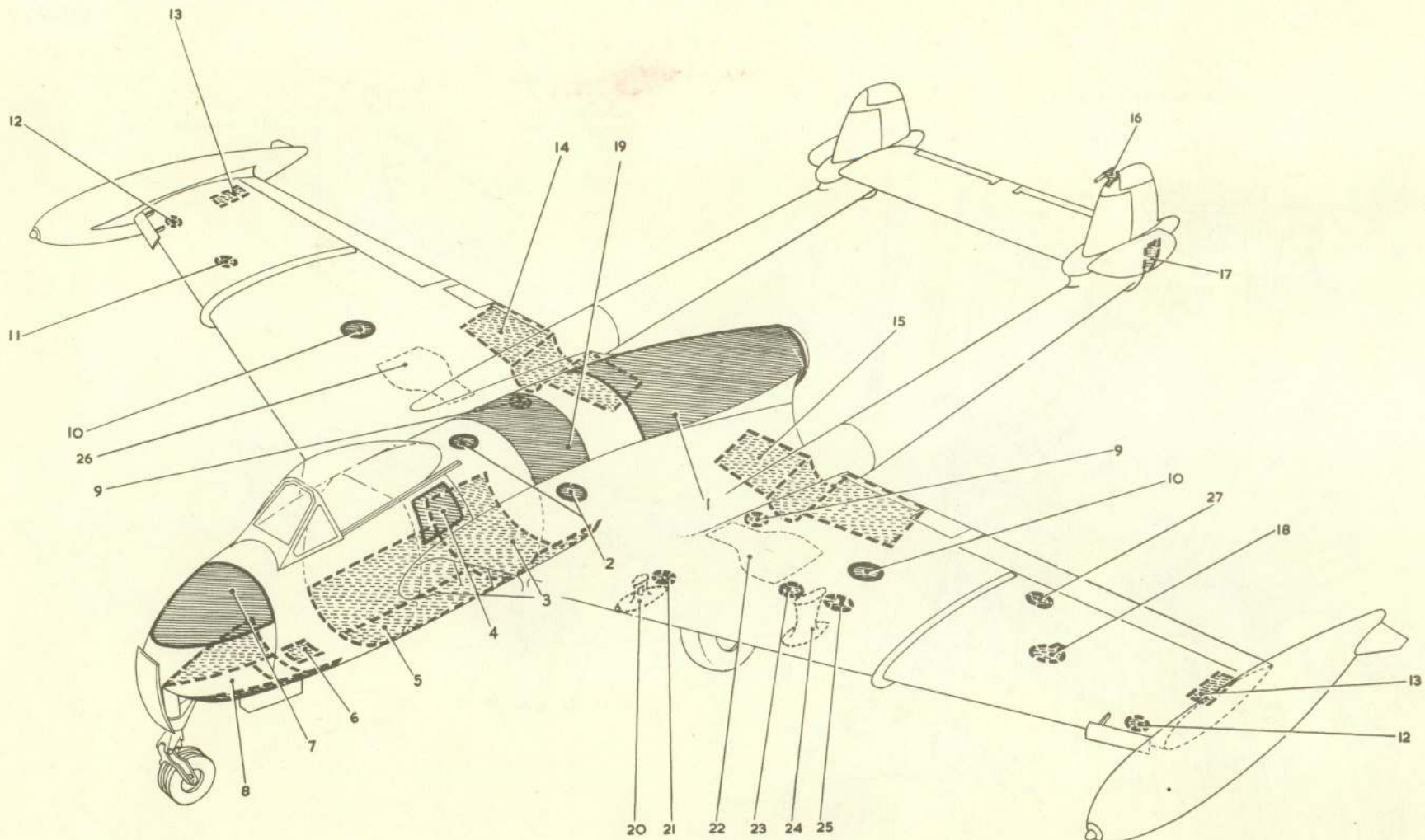


Fig. 2. Location diagram - wing and fuselage

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LEGEND	
	upper surface panels.
	lower surface panels.

Fig. 2A. Access to components  
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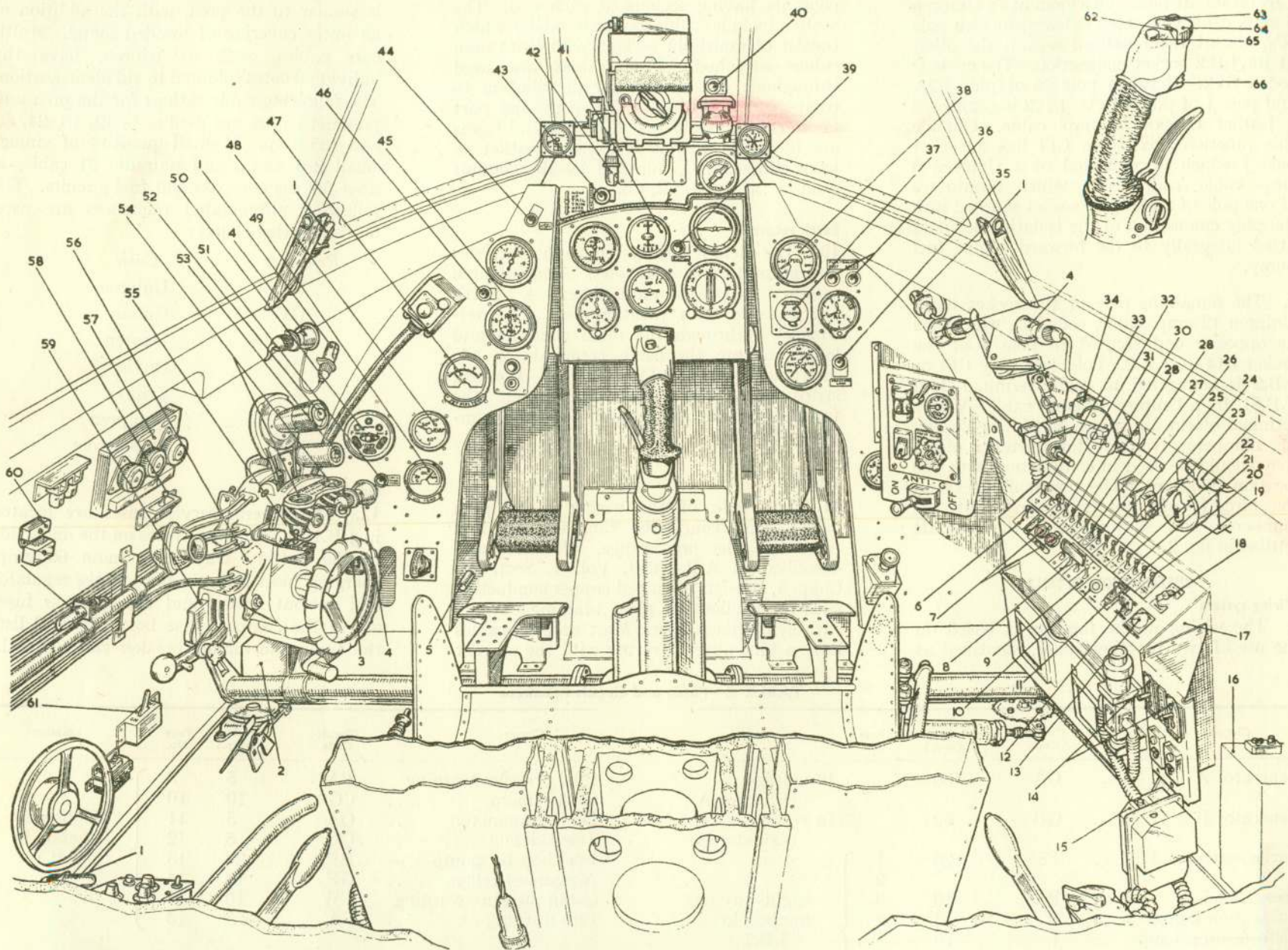


Fig. 2B. Location diagram—cockpit

7. At bulkhead 2 a pressurised bulkhead plug is fitted, picking up the socket of loom C7A on its aft face. This loom has a Unipren 6 amp. cable connected between its two pole N's, one at the bulkhead socket, the other at its J.B.2 socket connection. The cable is coded SV2. Between pole N of plug C7A and pole J of plug C14 in J.B.2 is connected a further Unipren 6 amp. cable. Outside this junction box, loom C14 has a socket pole J which is connected to a Unipren 6 amp. cable, coded SV2, which terminates at one pole of a two-pole socket screwed into the plug connection of the isolating solenoid fitted integrally to the forward engine fuel pump.

8. The remaining pole of the socket has a Unipren 12 amp. cable, coded E, which has its opposite end secured to pole 4 of the socket C14 at J.B.2. Pole 4 of plug C14 at J.B.2 is connected to earth terminal 3 of T.B.51, by a Unipren 12 amp. cable. Where terminal blocks are shown on routing charts, the numbers given are for reference only; they should be used in conjunction with the location diagrams. The terminal blocks on the aircraft are not numbered, but are numbered and shown *inside* the aircraft outline in fig. 2.

#### INSTALLATION DETAILS

##### Wiring system

9. The wiring in the fuselage is based on the use of two junction boxes, identified as

J.B.1 and J.B.2, the junction box inter-connections being contained in polyvinyl conduits having sockets at each end. The system includes cable loom assemblies which consist of multi-pin sockets with loose pre-n cables attached. Pren cables are used throughout the aircraft for distribution to components. Wiring in the wings and port boom is by cable looms. Conduits and looms are identified by labels at each socket or loom end, e.g., C, followed by the conduit number; thus C1, C2, C3.

##### Earth return

10. The earth return system to the batteries and generators is as follows. A main earth terminal is located on bulkhead 4. Earth terminals in each junction box are inter-connected through the main conduits and looms, as are the earth terminals on the instrument panels and in the wings. Bonding strips (*para.* 16) fitted throughout the fuselage ensure continuity between components.

##### Cables

11. The bulk of the wiring is by pre-n cables comprising two ranges, pre-n and pre-nmet. The pre-n range, which is fully described in A.P.4343B, Vol. 1, Sect. 24, Chap. 4, consists of tinned copper conductors with an insulant of glass braiding covered with synthetic rubber. Most unipren cables have a blue outer covering with the current

rating printed in yellow at intervals along the length of the cable. The pre-nmet range is similar to the pre-n, with the addition of an outer covering of braided metal. Multi-core cables, such as tripren, have the individual cores coloured to aid identification. The following cable ratings for the pre-n and pre-nmet cables are used:—6, 12, 18, 24, 50 and 135 amp. A small quantity of vinmet small 2.5 amp., and uniradio 31 cable, is used for the compass and fuel circuits. The following abbreviated references are used on the routing charts:—

Reference	Cable
U	Unipren
UV	Univin
D	Dupren
DV	Duvin
T	Tripren
Q	Quinpre-n
DM	Duprenmet

##### Fuses

12. The general service fuses are located in J.B.1, the generator fuses on the underside of the battery trays (the main 60 amp. charging fuses being in the voltage regulator and cut-out units), and the compass fuses are in the compass fuse box. Table 2 lists the fuses and circuit breaker ratings used.

TABLE 2—Fuses and circuit breakers

Circuit	Circuit Code	Fuse rating (amp.)	Fuse No.	Location	Circuit	Circuit Code	Fuse rating (amp.)	Fuse No.	Location
Generator A .. ..	GA	60		In voltage regulator A	Fuel pressure warning	PA	5	9	Eight-way fusebox in J.B.1
Generator B .. ..	GB	60		In voltage regulator B	G.45 camera .. ..	CG	10	10	
Turbo starter .. ..	TS	20	1	Eight-way fusebox in J.B.1	Oil thermometer .. ..	OA	5	11	
Pressure head .. ..	P	10	3		Tele-briefing .. ..	QG	5	12	
					Fuel booster pump —	BP	20	13	
Navigation lamps .. ..	N	5	4		Armament relays .. ..	GF	10	14	
Identification lamps .. ..	J	10	5		Cabin pressure warning	PW	10	15	
U/V lamps .. ..	UV	5	6		Fire warning .. ..	FA	5	16	
Cockpit lamps .. ..	T	5	7		Landing lamp motor .. ..	LL	5	17	Eight-way fusebox in J.B.1
Fire extinguisher .. ..	FA	20	8		Fuel pump solenoid .. ..	SV	5	18	
								19	

TABLE 2—Fuses and circuit breakers—continued

Circuit	Circuit Code	Fuse rating (amp.)	Fuse No.	Location	Circuit	Circuit Code	Fuse rating (amp.)	Fuse No.	Location
Fuel contents gauge ..	S	5	20	Eight-way fusebox in J.B.1	Battery isolator relay ..	GA	5	50	Six-way fusebox on underside of the port battery tray
Flap position indicator	F	5	21		Gen. A. failure warning	GA	5	51	
Alighting gear indicator	U	5	22		Gen. B failure warning	GB	5	52	
Alighting gear lever lock	UL	5	23		Gen. A failure warning	GA	5	53	
Gyro gun sight supply ..	GS	5	24		Gen. A amp. test ..	GA	5	54	
			25		Gen. A amp. and volt. test	GA	5	55	
Gun-firing supply (inners)	GF	20	26	Four-way fusebox in J.B.1	Gen. B failure warning	GB	5	56	Six-way fusebox on underside of the starboard battery tray
Gun-firing supply (outers)	GF	20	27		External supply and hold-off relays ..	GA	5	58	
Landing lamp filament	LL	20	28		Gen. balancing circuit	GA	5	59	
V.H.F. radio supply ..	QG	40	29	Single fusebox in J.B.1	Gen. B amp. and volt. test ..	GB	5	60	
			30		Gen. B amp. test ..	GB	5	61	
			31		Artificial horizon a.c. supply ..	GC+AC1	2.5	1	In compass fusebox
			32		GM4F a.c. supply ..	GC+AC2	2.5	2	
			33	Artificial horizon a.c. supply ..	GC AC1	2.5	3		
High energy igniter units	TS	20	34	GM4F a.c. supply ..	GC AC2	2.5	4		
Bomb and R.P. release	B	10	35	GM4F d.c. supply ..	GC+3	2.5	5		
Bomb fusing ..	B	5	36	Torque switch d.c. supply	GC 8	5	6		
Fuel transfer warning (port) ..	FTA	2.5	37	Power failure warning lamp ..	GC+2	5	7		
Fuel transfer warning (starboard) ..	FTD	2.5	38						
			39	Eight-way fusebox in J.B.1	<b>CIRCUIT BREAKERS</b>				
			40		Gen. A field ..	GA	5	Aft end of J.B.1	
Tank jettison ..	TJ	10	41		Gen. B field ..	GB	5	Aft end of J.B.1	
Turn and slip indicator supply (normal) ..	TB	2.5	42		Rebecca Mk. 7 ..	QS	10	Aft end of J.B.1	
Turn and slip indicator supply (stand-by) ..	TB	2.5	43		Aileron tab actuator ..	AT	5	Port side of cockpit	
P. to T. relay supply ..	P. to T.	5	44				Compass fuse-box		
			45						
			46						
			47						
Aileron tab warning lamp	AT	2.5	48		GM4F compass d.c. supply ..	GC	5		
Gen. failure warning relay	GA	5	49						

**Filament lamps**

13. A list of the filament lamps used is given in the following Table 3.

TABLE 3—Filament lamps

Lamps	Stores Ref.	Voltage	Wattage	Lamps	Stores Ref.	Voltage	Wattage
<b>External</b>				<b>External</b>			
Port wing-tip ..	5L/X952431	28	24	Tail ..	5L/X952276	24	10
Port drop tank ..	5L/X952431	28	24	Downward identification ..	5L/X952604	24	80
Starboard wing-tip ..	5L/X952431	28	24	Landing ..	5L/X954717	26	240
Starboard drop tank ..	5L/X952431	28	24				

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(A.L. 21, Feb. 55)

TABLE 3—Filament lamps—continued

Lamps	Stores Ref.	Voltage	Wattage	Lamps	Stores Ref.	Voltage	Wattage
<b>Internal</b>				<b>Internal</b>			
Ultra-violet (4 off) .. ..	5L/X952261	12	7	Fire warning .. ..	5L/951273	28	3.5
Red floodlamp (6 off) .. ..	5L/X951263	24	2.8	Fuel pressure warning .. ..	5L/X951110	6	0.24
Emergency .. ..	5L/X951130	2.5	0.75	Generator A power failure warning	5L/X951110	6	0.24
Gun compartment .. ..	5L/X952254	24	6	Generator B power failure warning	5L/X951110	6	0.24
Gun sight (2 in use : 2 spare) ..	5L/X951260	22	12	Alighting gear position indicator			
Cabin pressure warning .. ..	5L/951273	28	3.5	(9 off) .. ..	5L/951272	28	3.5
Throttle warning .. ..	5L/951273	28	3.5	Hydraulic power failure warning ..	5L/951273	28	3.5
Aileron tab neutral position indicator	5L/951273	28	3.5				

**Junction boxes**

14. The junction boxes are prefixed by the letters J.B., and on the routing charts are referenced numerically, J.B.1. and J.B.2. Their positions on the aircraft are shown on the location diagrams. Multi-pole plugs on the J.B.'s, and the corresponding sockets on the looms, bear identification markings. The internal wiring of the J.B.'s is carried out with unipren cable, having crimped end connectors at the T.B.'s.

**Wiring**

15. All cables should be examined periodically and all connections checked for possible looseness. With soldered connections, inspections should be made at points where the soldered portion of the cable and the unsoldered flexible portion meet, breaking being liable to occur at these points. Metal braided cables should be clipped in such a way that intermittent contact between the cables and metallic aircraft parts is avoided. For cable insulation testing, refer to A.P.1095A, Vol. 1, and for details of weather-proofing the electrical system to Sect. 12, Chap. 2 of the same publication.

**Bonding**

16. All the metal parts of the aircraft are connected together to form an electrically continuous system of low and unvarying resistance, and also to provide a large and constant capacity for the radio earth. In addition, bonding reduces the risk of fire by minimising the difference of potential between metallic components. In the fuselage,

the bonding comprises four main strips which are bolted or clipped to pipes, controls, etc. There are no earth strips in the main planes, tail unit or booms, but where bonding is necessary, as for instance, between moving surfaces, pipes, etc., the connections are made with copper flex. The main planes are bonded separately to the main fuselage strips, which in turn, are earthed when the aircraft is on the ground, through the conductive nose wheel hub and tyre. Where flexible bonding is used, the length should not exceed six inches, and care should be taken to prevent intermittent contact with metallic parts. When making bonding connections the contacting faces should be scraped clean; also when soldering connections, the flux used must be acid free and all traces of flux removed after soldering. The resistance between any selected point and the main earth strips must not exceed 0.05 ohms. The electrical conductivity of the nose wheel tyre should be checked periodically with a 250-volt insulation resistance tester; the resistance should not exceed 10 megohms.

**OPERATION AND SERVICING**

**D.C. power supplies**

**Generators**

17. D.C. power is supplied by two generators, Type HX2, mounted on the top, forward end of the engine, and driven by the engine through a twin-drive unit. Their combined full load output is 100 amp. at 28 volts. Each generator output is regulated by a combined voltage regulator and cut-out unit, Type A2, which is mounted, together with

its associated ammeter shunt and fuse block, on the underside of the battery trays in the gun bay. A Type Y3 suppressor is mounted adjacent to, but outboard of, each regulator unit. A resistance and rectifier unit is connected in series with a 6-volt warning lamp between each generator positive and battery positive to provide indication of failure of either generator circuit. The lamps and resistance and rectifier units are mounted in J.B.1 on the starboard side of the cockpit.

18. Two test sockets, marked AMPS and VOLTS, are located on the top of each battery tray to enable a ground charging check of each generator circuit to be carried out. Each generator has an isolating switch, mounted on J.B.1, which completes a circuit through a Type K relay, situated on the port side of the fuel tank bay, thus switching the generator output to the general services bus-bar via terminal block 80 in J.B.1.

**Note . . .**

*A 3-ohm ballast resistance, fitted to the port battery tray, and a 5-amp. fuse are connected in series between terminals No. 5 of both voltage regulator and cut-out units. This is purely a balancing circuit which becomes effective to speed up the balancing action of the two generators should one generator take too large a share of the electrical load.*

19. For detailed servicing information on the components in the power supply circuit reference should be made to the following Air Publications:—

Generator, Type HX2—A.P.4343A, Vol. 1, Sect. 3, Chap. 2.

Voltage regulator and cut-out unit,  
Type A2—A.P.4343B, Vol. 1, Sect.  
1, Chap. 18.

Suppressor, Type Y, No. 3—A.P.4343B,  
Vol. 1, Sect. 24, Chap. 10.

Relay, Type K—A.P.4343B, Vol. 1,  
Sect. 22, Chap. 7.

#### Batteries

**20.** The main aircraft batteries are 12-volt, 25-ampere/hour, Type C, lead-acid units. Fig. 3 shows their method of removal from the aircraft and, though this is relatively easy, it must be remembered that, when a battery is fitted to its tray in the aircraft, the tray is very heavy and needs considerable support. The batteries are stowed in the fuel tank bay on the forward face of the fireproof bulkhead. Information on the servicing of these batteries is given in A.P.1095C, Vol. 1, Sect. 1, Chap. 3.

#### REMOVAL OF BATTERY FROM MOUNTING.

1. Release lock lever (A) by disengaging from spring clip and pulling downwards
2. Support weight of battery beam and pull out brace (B)
3. Disconnect electrical leads and link cable complete from batteries
4. Lift outboard end of battery and slide from beam, complete with tray  
(The battery can now be freed from the tray by loosening the wing nuts)

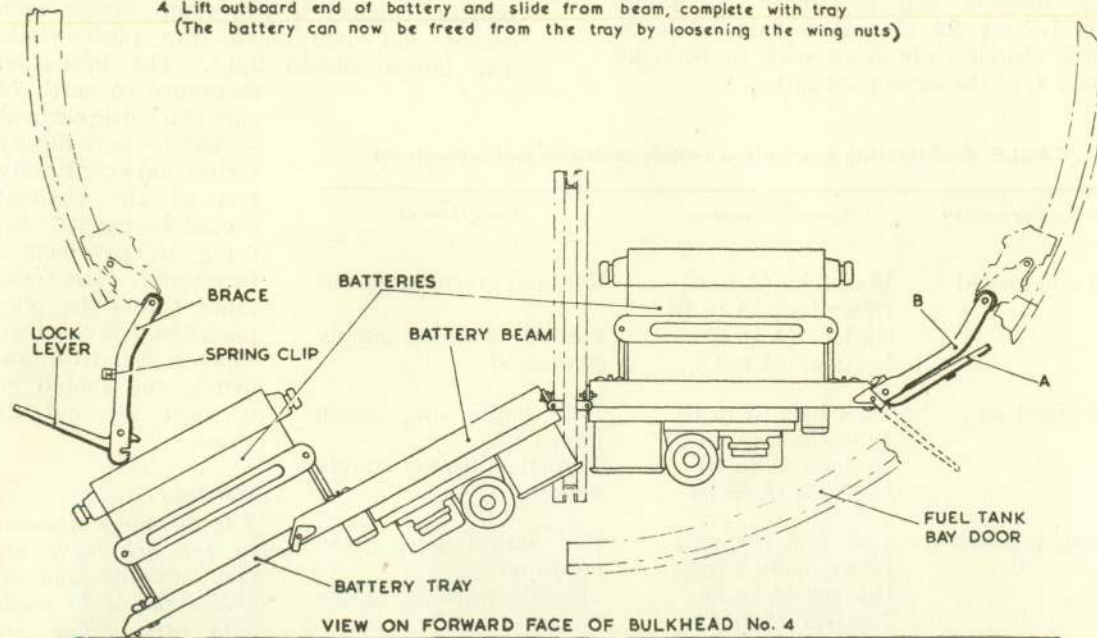


Fig. 3. Removal of main batteries

#### External supply

**21.** The external supply is fed into the aircraft via a 3-pole plug, situated at the starboard side of the engine bay, the small pole of which supplies the coil of a Type S4 relay which in turn energises the coil of a heavy-duty relay, Type R, so automatically connecting the external supply positive to the aircraft system. Both these relays are fitted, together with the battery isolating relay, to the panel on the starboard engine bearer. The external supply negative is connected to earth from the 3-pole plug via the main earth bolt on bulkhead 4. There is no means of switching this supply on or off inside the aircraft, and the aircraft battery supply cannot be switched on whilst the external supply is connected. The connections to the relays and external supply plug should be checked frequently for tightness and kept thoroughly clean. The relays, Type

R and S4, are described in A.P.4343, Vol. 1, Sect. 22, Chap. 12 and 13, respectively.

#### Engine starting

**22.** The engine starting system comprises a Teddington selector and starting switch unit, Type FJB-A2, mounted on the right-hand instrument panel, a time switch, Type FHM/A/25, fitted to the aft face of bulkhead No. 1 in the cockpit and two high-energy igniter units, Type C10TS/1, fitted one either side of the engine. The d.c. supply to the selector switch unit is controlled by a master switch fitted to J.B.1. Depressing the push-switch on the selector switch unit actuates the time switch and, via a Type Q3 relay mounted inside J.B.1, the high-energy igniter units. The selector switch supplies the turbo starter breech with current, and is so wired that this current can be fed to only one of the two starter cartridges at a time. A safety circuit is wired into the breech such that should the breech cap be not fully screwed home no circuit is completed to the cartridge in that breech. Provision is made for re-lighting the engine in flight. Depressing a push-switch, fitted in the H.P. fuel cock lever, energises the Type Q3 relay, putting a separately fused supply directly to the igniter units. Great care should be taken to ensure that the leads from the igniter units are kept free from oil and dirt. Further information on engine starting is given in Sect. 4, Chap. 1 of this book.

#### Note . . .

*It is essential that, after the L.T. supply to the high energy igniter units has been disconnected, at least 1 minute should elapse before any servicing is carried out on the H.T. side. This allows the capacitors to fully discharge, as the output of these units can be lethal.*

The Teddington selector and starter switch and the time switch will be described in A.P.4343B, Vol. 1, Sect. 22 at a later date. The Type Q3 relay is described in Chap. 11 of the above publication. The high-energy igniter units will appear in A.P.1374E, Vol. 1, Sect. 1, Chap. 2 at a later date.

#### Alighting gear position indicator

**23.** The alighting gear position indicator, Type D, is fitted to the left hand instrument panel. When the alighting gear is down and locked, the green lamp circuit is completed through the leg lock and down lock micro switches, as shown in circuit U (fig. 4a). Immediately the mechanical leg lock is released, the green lamp circuit is broken by the contacts of the leg lock and down lock micro switches changing over to complete the red lamp circuit through the leg lock and door lock micro switches. When the alighting gear is locked up the leg lock micro switch returns to its normal position, the contacts at the door micro switch open (A to C), thereby disconnecting the red lamp supply, and the contacts of the up lock micro switch change over to connect a supply to the throttle warning circuit. The throttle warning lamp circuit is completed when the alighting gear is locked up, and the throttle setting is reduced to approximately a quarter open. Reducing the throttle setting actuates a micro switch fitted to the rear face of bulkhead 4.

**24.** All the micro switches in this circuit should be kept clean and free from moisture. Particular attention should be given to the weather-proofing of the micro switches and terminal blocks and to the tightness of the lamps inside the position indicator. The settings of the various micro switches for the alighting gear are important and are described in Sect. 3, Chap. 5, of this A.P. The setting instructions for the throttle-operated micro switch will be issued later. Micro switches are described in A.P.4343B, Vol. 1, Sect. 20, Chap. 4; the position indicator in A.P.4343E, Vol. 1, Sect. 18, Chap. 4.

#### Alighting gear selector lever lock

**25.** The selector lever lock ensures that the alighting gear cannot be inadvertently retracted. The circuit consists of two micro switches and a solenoid Type MS.7609/M, in series, one micro switch being operated by the initial movement of the alighting gear selector lever and the other, fitted to the port main undercarriage leg torque link, is operated only when the leg is extended.

The selector lever and micro switch are fitted to the throttle quadrant and the lock solenoid is fitted inside the quadrant. The solenoid plunger locks the selector lever in the down position. When the aircraft is standing on the ground the selector lever cannot be moved to the up position. When the aircraft is airborne, the legs extend, the leg micro switch contacts close and selection to alighting gear up is enabled by current passing through the leg micro switch, the selector lever micro switch and the lock solenoid, thus withdrawing the solenoid plunger clear of the selector lever. When this lever is fully up, its micro switch contacts again open, thereby de-energizing the solenoid as a safeguard against it burning out.

**26.** An over-ride switch, which short-circuits the leg micro switch, is fitted at the port side of the cockpit and is for emergency use only. It is locked in its off position with 26 S.W.G. soft iron locking wire. The settings for the port leg micro switch are given in Sect. 3, Chap. 5, of this Publication. The setting instructions for the selector lever micro switch will be issued later. The lever lock solenoid will appear in A.P.4343B, Vol. 1, Sect. 22, at a later date, while the micro switches are dealt with in Sect. 20, Chap. 4, of the same publication.

TABLE 4—Alighting gear micro switch positions and indications

Alighting gear position	Micro switch position	Circuit affected
Up and locked	Door-lock (A to C)	Red and green lamps out
	Down-lock (A to B)	
	Up-lock (A to C)	Throttle warning supply connected
	Leg-lock (A to C)	
Intermediate	Door-lock (A to B)	Red lamps on, green lamps out
	Down-lock (A to B)	
	Up-lock (A to B)	Throttle warning supply broken
	Leg-lock (A to B)	
Down and locked	Door-lock (A to B)	Red lamps out, green lamps on
	Down-lock (A to C)	
	Up-lock (A to B)	Throttle warning supply broken
	Leg-lock (A to C)	

#### Fire warning

**27.** This circuit comprises twelve resetting type fire detectors, Mark 4, wired in parallel and positioned round the combustion chambers of the engine and the rear cone, and a red warning lamp mounted above the stand-by compass in the cockpit. The detectors contacts close in the event of a rise in ambient temperature above 300 deg. C, thus completing the circuit to the warning lamp. To test the circuit, each fire detector in turn should be operated by placing a shroud type heater coil, Stores Ref. 5G/566, over the barrel of the switch till the warning lamp lights, then removing the heater coil and waiting till the lamp goes out before testing the next switch. The detectors are described in A.P.4343E, Vol. 1, Sect. 14, Chap. 2.

#### Fire extinguishers

**28.** Two fire extinguisher bottles are wired in parallel to each other, and in series with a push-switch located on the top of J.B.1. The fire bottles are housed, one in each flap recess. The system is further described in Sect. 4, Chap. 5 of this publication. To test the circuit remove the sockets from the fire bottles, connect a test lamp across each socket and depress the fire push-switch. The lamps should light. The insulation resistance to earth of each fire bottle element should be periodically tested, and a continuity test of the element should be carried out using a pyrotechnic fuze tester. The resistance across the plug pins should be checked, using a safety ohmmeter, and should be between 20 and 24 ohms.

#### Warning . . .

*The discharge elements in the fire bottle are very sensitive and all checks should be made with care. The fire bottles should on no*

account be tested when removed from their brackets (or an equivalent test bracket and discharge pipe), as the charge plug emerges with considerable force on firing. If the extinguisher should be accidentally discharged **DO NOT INHALE THE GAS.**

#### Oil thermometer

29. The oil thermometer, Mk. 2A\*, is described in Chap. 2 of this section.

#### Flap position indicator

30. The flap position indicator and transmitter are described in Chapter 2 of this section.

#### Turn and slip indicator supply

31. This instrument, which is described in Chapter 2 of this section, has a duplicated supply so that in the event of the normal aircraft supply failing, the emergency supply may be switched into circuit. The emergency supply consists of a 24-volt, 4-ampere/hour lead-acid battery mounted on the starboard ammunition bay door, the V.H.F. NORMAL/STAND-BY switches on J.B.1 and fuses 42 and 43 in J.B.1, as shown in fig. 4B. The two fuses constitute an additional safety circuit. If the energised Type Q3 relay, fitted in J.B.1, fails, then fuse 43 feeds the instrument via the normally closed contacts of the relay. The Type Q3 relay is described in A.P.4343C, Vol. 1, Sect. 3, and the battery is described in A.P.4343A, Vol. 1, Sect. 11.

#### Pressure head heater

32. The heater, positioned on the port tail fin, is controlled by a switch on the top of J.B.1 and must be switched off when the aircraft is on the ground, or the element will burn out. The circuit should be checked for functioning prior to each flight and it is recommended that the following tests are carried out periodically :—

- (1) A 24-volt supply should be connected and the element allowed to remain on until the head is too hot to be held by

the naked hand, and then switched off. Measure the insulation resistance of the head while hot. The reading obtained should not be less than  $\frac{1}{2}$  megohm at 250 volts. Allow the head to cool and again measure the insulation resistance, which should not be less than 3 megohms at 250 volts.

- (2) To test the continuity of the head, measure the resistance of the heating element with a suitable testmeter; the resistance should be approximately 6.0 ohms.

The pressure head is a Mk. 8Q, and is described in A.P.1275B, Vol. 1, Sect. 1.

#### Fuel booster pump

33. The booster pump is driven by a totally-enclosed, compound-wound, two-pole motor, and is fitted in the base of the main fuel tank. It is controlled by a single-pole switch situated on the top of J.B.1. The power supply is connected through a suppressor, Type O, No. 2, to prevent electrical interference with the radio equipment. A test of the efficiency of the pump and its circuit can be made with the low-pressure fuel cock on and the high-pressure fuel cock off. If the pump is satisfactory, the fuel pressure warning lamp will go out almost immediately after the pump is switched on. The pump requires little servicing, but the vent gauze at the base should be kept clean to ensure sufficient ventilation of the pump. For details of servicing on the pump, Type BP3, Mk. 3, refer to A.P.4343D, Vol. 1, Sect. 7.

#### Thermometers

34. These instruments are described in Chapter 2 of this section.

#### Fuel contents system

35. The fuel contents system is described in Chapter 2 of this section.

#### Fuel pressure warning

36. Should the pressure from the fuel pumps fall below 1.25 lb. per sq. in., a pressure switch, Mk. 1E\*, fitted to the outlet of the fuel low pressure filter in the engine bay, will cause a lamp mounted on the instrument panel to light. The lamp is supplied with d.c. from fuse 9 and a resistor, both mounted in J.B.1, to the pressure switch and thence to the lamp. The resistor is incorporated to drop the voltage so that the potential across the pressure switch and lamp is 6 volts. Servicing instructions for the switch, and a description of both switch and resistor, are contained in A.P.1275A, Vol. 1, Sect. 11.

#### GM4F compass and artificial horizon supply

37. The actual GM4F compass and artificial horizon systems are described in Chap. 2 of this section. Both derive their supply from the inverter, Type 100A, located in the forward gun bay. This inverter is excited by d.c., the supply of which is controlled by two relays and a circuit breaker fitted to the compass fuse box, located in the cockpit on the starboard forward face of bulkhead 2. Referring to fig. 4C, the supply circuit is shown in the off condition. With the circuit as shown, the power failure warning lamp, mounted on the blind flying panel, is illuminated, the circuit being completed via the 5-amp. fuse and across terminals 2—2a of the Type S4 relay. This relay and the Type Q3 relay, together with the torque switch, Type EAP2312, suppressor, Type F2, and all the fuses and circuit breakers, are mounted either on or in the compass fuse box.

38. With the circuit breaker made and the flight instrument switch closed, a d.c. supply is completed to the d.c. terminal A of the inverter, via terminals 3 and 4 of the Type Q3 relay and 4—4a of the Type S4 relay, through the inverter windings and thence to earth. The inverter commences to run up to speed. The torque switch contacts 4 and 5 then make and complete a circuit to the coil of the Type S4 relay via the circuit breaker, flight instrument switch and 5-amp. fuse.

This energises the relay, opening contacts 4—4a and closing contacts 1—1a, thereby feeding the inverter direct from the circuit breaker. Contacts 2—2a of the relay open, thus extinguishing the power failure warning lamp, and 3—3a close allowing the coil of the Type Q3 relay to become energised, closing its contacts 5 and 6 to complete its own hold-in circuit.

39. In the event of the inverter failing, the torque switch contacts will open thus breaking the supply to the Type S4 relay which will return to its state shown in fig. 4C. The power failure warning lamp will light and the d.c. supply to the inverter will be broken.

**Note . . .**

*The original starting cycle cannot take place until the flight instrument switch, or compass circuit breaker, are broken and re-made, as the Type Q3 relay remains energised by its own hold-in circuit.*

Servicing and descriptive notes on the above equipment are to be found as follows:—

- Inverter.....A.P.4343B, Vol. 1, Sect. 16
- Circuit breaker...A.P.4343B, Vol. 1, Sect. 10
- Relays.....A.P.4343C, Vol. 1, Sect. 3
- Torque switch...A.P.4343C, Vol. 1, Sect. 4

**Fuel transfer warning**

40. While fuel is being transferred from the pylon and/or wing-tip tanks, an indication is given to the pilot through the medium of two magnetic indicators, Type C.1838Y, Mk. 1, mounted on the starboard instrument panel. These indicators, when energised, show black. They are energised by the closing of the contacts in the pressure operated switches, Mk. 1E\*, which are fitted one in each main plane in the fuel line between the wing-tip tank and the main fuselage fuel tank. These switches are pre-set to close their contacts at 1½ lb. per sq. in. The switch units are described in A.P.1275A, Vol. 1, Sect. 7, Chap. 11, while the indicators will be described in A.P.1275A, Vol. 1, at a later date.

**Fuel pump isolating solenoid**

41. The fuel pump isolating solenoid is mounted in the front engine-driven fuel pump, and controls the fuel flow from this pump into the fuel supply system to the engine. When the switch, mounted on J.B.1, is in its ON position, the solenoid in the pump opens the valve allowing fuel from both the front and rear engine fuel pumps to supply the engine. The electrical solenoid connections on the pump should be periodically inspected for cleanliness and serviceability. The pump is described in A.P.4282A, Vol. 1, Sect. 2, under its type number GC208.

**Aileron tab control and indicator**

42. The ailerons on this aircraft are, under normal conditions, operated by hydraulic power and are assisted by their servo tabs. The port servo tab, under emergency conditions, can be operated by an electrical linear actuator, fitted in the port main plane, to assist the pilot to operate the ailerons manually. The circuit (fig. 4D) consists of a 5-amp. circuit breaker, mounted on the port side of the cockpit and labelled AILERON ELECTRIC TRIM, in series with a selector switch on the throttle box, a hydraulic pressure switch and the actuator. In parallel with the selector switch and actuator are wired two warning circuits. In these circuits are a magnetic indicator, located on the lower port instrument panel, and an audible warning cut-out switch, mounted on J.B.1, which controls a Type Q1 relay in the pilot's headphone circuit. The two circuits give a visual and an audible warning, respectively, of hydraulic power failure of the ailerons. A drop in hydraulic pressure below 1,400 lb. per sq. in. causes the electrical contacts in the pressure switch to close, thus operating the two warning circuits.

43. The aileron trim switch is marked PORT and STARBOARD. Selection to PORT energises the field to retract the actuator, thus lowering the port tab. Under flying conditions this would result in the raising of the port aileron and the consequent lowering of the port wing. This would result in a turn to port. Selecting the switch to STARBOARD would have the

opposite effect, raising the tab and consequently the port wing, to turn the aircraft to starboard. On the ground, therefore, selection of the switch to PORT will lower the port tab, whilst selection to STARBOARD will raise it. The actuator has internal limit switches and an electric brake to prevent over-run.▶

44. Whenever the port aileron is away from its neutral position the contacts of the micro switch, fitted in the port main plane at the actuator location, are made, thus completing a circuit, via a 2·5-amp. fuse in J.B.1, to an amber indicator lamp fitted to the starboard instrument panel. Servicing information for the Rotax, Type A0903, actuator will appear in A.P.4343D, Vol. 1, Sect. 14, at a later date. The magnetic indicator, Type EBA, is described in A.P.1275A, Vol. 1, Sect. 1, Chap. 10, and the relay, Type Q1, is described in A.P.4343C, Vol. 1, Sect. 3. The hydraulic pressure switch, Type 5216 (Thermal Controls Ltd.) appears in A.P.1275A, Vol. 1, Sect. 24.

**Pylon tanks jettison**

45. Fuel tanks may be fitted, in lieu of bombs, to the bomb pylons, one under each main plane. The tank is held in position by the bomb release unit, which is an electromagnetic release unit, No. 1, Mk. 1. These fuel tanks may be jettisoned mechanically, as described in Sect. 4, Chap. 2 of this book, or electrically. The electrical jettison is effected by depressing a deeply recessed push-switch fitted to the inboard side of the engine throttle box. The recess minimizes the risk of inadvertent operation. Pressure on this jettison push-switch, energises a Type Q1 relay, fitted in J.B.1 in the cockpit which operates a solenoid valve, Type FAW/A/228, fitted in the fuel pressure vent line in each wing-tip. This valve by-passes the fuel transfer process of the pylon tanks, the method being explained fully in Sect. 4, Chap. 2 of this book. When the relay is energised, its own contacts complete its hold-in circuit. At the same time as the solenoid valve relay is being energised, a further Type Q1 relay is energised putting a supply to the bomb wiring and direct to the E.M.

release units, thus jettisoning the fuel tanks. When carrying out the cocking test of the release units, ensure that the battery voltage does *not exceed 4.5 volts*. The release unit is described in A.P.4343X, Vol. 1, Sect. 5, Chap. 7. The Type Q1 relays are described in A.P.4343B, Vol. 1, Sect. 22, Chap. 10 and the solenoid valve in A.P.4343E, Vol. 1, Sect. 1, Chap. 10.

#### Wing-tip tanks jettison

**46.** An electro-magnetic release unit, No. 1, Mk. 1, is fitted in each wing-tip to secure the wing-tip fuel tanks. These tanks may be jettisoned in flight either mechanically, as described in Sect. 4, Chap. 2 of this book, or electrically. The electrical jettison is effected by depressing a deeply recessed push-switch fitted to the inboard side of the engine throttle-box. The recess minimises the risk of inadvertent operation. When carrying out the cocking test ensure that the battery voltage does *not exceed 4.5 volts*. The release unit is described in A.P.4343X, Vol. 1, Sect. 5, Chap. 7.

#### Emergency lamp

**47.** The emergency lighting circuit is a simple series circuit consisting of a 2.4-volt, 1.2-amp./hr. alkaline battery fitted to the port side of the cockpit forward of the instrument panel, a red cockpit lamp fitted to the port side of the gyro gun sight and a switch fitted to the port side of the cockpit, just below the lighting dimmer switch panel. The battery is described in A.P.1095C, Vol. 1, Sect. 1, Chap. 5.

#### Gyro gun sight

**48.** The gyro gun sight and its associated equipment are dealt with in Chap. 2 of this section. The servicing instructions and descriptions of the components in the supply system to the control unit, Type B, Mk. 6, namely, the voltage regulator, Type 22, and suppressor, Type P, however, are given in A.P.4343B, Vol. 1, Sect. 1, Chap. 1 and Sect. 24, Chap. 10, respectively. This regulator and suppressor are fitted in the cockpit on the starboard side, forward of bulkhead 2.

#### Identification lamp

**49.** This lamp is a clear-screened lamp and is fitted to the fuselage just forward of the gun bay doors. The lamp is a Type C unit and is controlled by a push-switch fitted to J.B.1. The lamp is described in A.P.4343E, Vol. 1, Sect. 7, Chap. 7.

#### Landing lamp

**50.** A landing lamp, Type J, is fitted to the lower skin of the port wing. Its motor is controlled by a rotary selector switch, Type B, fitted to J.B.1, giving a choice of two operating angles relative to the aircraft. It is supplied via fuse 17. Fuse 28 in J.B.1 is the direct supply to the lamp filament. The lamp assembly may be removed from the aircraft by unscrewing the flange-securing screws and disconnecting the electrical connection to the lamp. The lamp will be described in A.P.4343E, Vol. 1, Sect. 7, Chap. 3 at a later date, so also will the rotary switch in A.P.4343B, Vol. 1, Sect. 20, Chap. 2.

#### Cabin pressure warning

**51.** The cabin of this aircraft is pressurised for high altitude flying, Sect. 3, Chap. 8 of this book, and an indicator lamp is fitted to the starboard indicator panel to indicate to the pilot a cabin pressure drop of more than  $\frac{1}{2}$  lb. per sq. in. below the normal for any altitude. The switch, which operates the lamp, is built into the pressure-regulating valve which is fitted to the forward face of bulkhead No. 1. The lamp may be tested by removing the ground test union cap nut taking care not to loosen the union lock-nut. Insert an insulated rod of suitable diameter into the hole in the adjusting screw and press against the adjusting head until the switch closes. The lamp should light. Remove the rod and replace the union cap securely. Information on the valve is given in A.P.1275A, Vol. 1, Sect. 10, Chap. 3.

#### Tachometer

**52.** This instrument is described in Chap. 2 of this section.

#### Ultra-violet and cockpit lamps

**53.** The ultra-violet lighting consists of four lamps, each containing a 12-volt filament, wired in series-parallel and controlled by a single dimmer switch. The lamp-screen is designed to emit a convergent beam, and transmits only ultra-violet radiations which interact with the fluorescent paint used on certain instrument dials causing the paint to become discernible in the dark; the degree of discernibility being controlled by the dimmer switch setting. There are six cockpit red lamps, two being controlled from one dimmer switch and the remainder from another dimmer switch. The positions of both the ultra-violet and cockpit lamps, together with their respective dimmer switches are best located by reference to fig. 3. An inspection lamp, Mk. 1A, is fitted to the cannon bay roof for use during re-arming and re-loading of the guns. This lamp is described in A.P.4343E, Vol. 1, Sect. 7, Chap. 15.

#### Navigation lamps

**54.** Five navigation lamps, Type A, are wired in parallel, and are controlled by a switch wired in series with the lamps, fitted to J.B.1. There is a tail lamp, fitted to the rear extremity of the port boom bullet fairing, a wing-tip lamp in leading edge of each wing-tip and an additional lamp fitted to the nose of either wing-tip fuel tank, when these are fitted to the aircraft. The fuel tank fairing covers the normal wing-tip lamps. The electrical connection to the tip tank is by means of a spring-loaded pad which bears on a contact plunger in the tip tank. The navigation lamps will be described in A.P.4343E, Vol. 1, Sect. 7, Chap. 12 and 13, at a later date.

#### G.45 camera

**55.** The camera is fitted in a streamlined pod below the port main plane, and may be used independently of, or in conjunction with, either the gun or R.P. circuits. The pressing of the camera push-switch on the control column completes the supply to the operating coil of relay 1, which is a Type P1 relay

mounted on the aft face of J.B.1, causing the contacts to close. With the camera switch closed, the supply is now completed through the normally closed contacts of relay 2 to the operating coil of relay 4. The closing of the contacts of this relay completes the negative return circuit of the camera. The same sequence of operations will occur when the guns are fired provided the camera switch is closed, due to the closing of the Type Q1 relay, wired in parallel to the gun relay, which short-circuits the camera push-switch on the control column, as shown in fig. 4C. For operation in conjunction with the R.P. firing circuit, the bombs/R.P. master switch keeps the operating coil of relay 4 energised. As soon as the rockets are fired, by pressing the push-switch on the control column, the operating coil of relay 2 is energised and the contacts of relay 4 open, thereby stopping the camera. Selection of exposure, either for SUNNY or CLOUDY conditions, is made available by a solenoid built integrally into the camera shutter mechanism controlled directly by a switch mounted on J.B.1.

**56.** The camera may be tested by operating the camera test switch and simultaneously pressing the camera push-switch on the control column, as the camera test switch by-passes the armament safety micro switch in the nose wheel well. The other armament circuits remain isolated so long as the nose wheel is down. Camera relays 2, 3 and 4 are housed inside, and the switches are mounted outside, of J.B.1. For servicing information on the camera, reference should be made to A.P.1355D, Vol. 1, Sect. 1, Chap. 3. Relays 2 and 3 are Type P2, while relay 4 is a Type Q1. All relays are described in A.P.4343B, Vol. 1, Sect. 22, Type P in Chap. 8, Type P2 in Chap. 9 and Type Q1 in Chap. 10.

#### Gun-firing

**57.** Before the guns can be fired, the contacts of the armament safety micro switch in the nose wheel well must be closed, and gun-firing switch safety flap on the top of the control column must be lifted to energise the gun-firing master relay, Type Q1, which is fitted to the relay panel on the starboard

side of the fuel tank bay. This relay completes the gun-firing units and gun relay circuits to earth. The guns may now be fired by pressing the gun-firing trigger. This trigger puts a supply, via the camera test switch, fig. 4C, to the coil of the gun relay, Type Q1, energising the relay and making the relay contacts. These contacts supply the inner and outer pairs of guns from fuses 26 and 27, respectively, in J.B.1. It is of vital importance that the safety devices are maintained in correct adjustment and in good electrical condition. It is recommended that, for additional safety, when the guns are loaded, the electrical plug and socket connections on the rear gun stirrups be disconnected until immediately prior to flight, also that before these connections are re-made they are tested to ensure that the circuit is not closed. The armament safety micro switch, which is ganged with the nose wheel position indicator micro switches, must be adjusted when the alighting gear retraction test is carried out.

**58.** The setting of the micro switch is the same as that for the nose wheel micro switches and is described in Sect. 3, Chap. 5, of this book. The gun-firing relays should be inspected periodically for security, damage and cleanliness, and tested for correct functioning. Details of servicing for the firing units are given in A.P.4343X, Vol. 1, Sect. 13, Chap. 1, the control handle in A.P.4343X, Vol. 1, Sect. 7, Chap. 2, and the Type Q1 relay in A.P.4343B, Vol. 1, Sect. 22, Chap. 10.

#### Bomb control

**59.** The bomb control circuit consists of the bombs/R.P. push-switch on the control column, the bomb relay, Type Q1, mounted on the relay panel at the starboard side of the main fuel tank bay and the two-way bomb distributor fitted to the port cockpit wall forward of the instrument panel. In addition, there are selector, fuzing, distributor and bombs/R.P. selector switches fitted to the top of J.B.1, changeover switches in the wheel wells and release units fitted in the bomb pylons. With the bombs/R.P. selector switch set to BOMBS, pressure on the firing push-switch will release the

port or starboard bombs, or both, as selected by the individual bomb selector switches. With the distributor switch and both selector switches made, operation of the firing push-switch will release the port bomb, followed by the starboard bomb after a pre-determined time delay of 0.3 sec. The time delay is due to the slugging of the relays in the two-way bomb distributor.

**60.** Provision is made for a light-series bomb rack to be fitted to each bomb pylon, the supply to the rack being taken from the practice bomb socket fitted in the pylon. This two-pin socket, shown in Sect. 4, Chap. 2, fig. 12, is fed with two d.c. positive supplies, one from the change-over switch in the wheel well and the other from the tail fuzing switch, the earth return being by way of the rack itself. The cable insulation resistance test is similar to that for R.P.'s (*para.* 63), but the reading allowed for insulation resistance to earth should not be less than 500,000 ohms. The external sockets in the wings, the bomb carrier plugs and wiring must be kept free from moisture. When carrying out the release unit cocking test, ensure that the battery voltage does *not exceed 4.5 volts*. Information on the head of the control column, known as the control handle, is contained in A.P.4343X, Vol. 1, Sect. 7, Chap. 1, the bomb distributor is described in Sect. 3, Chap. 1 of the same A.P., while the electro-mechanical release unit, No. 1, Mk. 1, and fuzing units, No. 1, Mk. 1, are described in Sect. 5 of that publication.

#### R.P. firing control

**61.** The provision for R.P.'s, and their method of attachment to the aircraft, is described in Sect. 7, Chap. 2 of this book. The firing circuit consists of the bombs/R.P. push-switch on the control column handle and the bomb relay, Type Q1, fitted to the relay panel at the starboard side of the main fuel tank bay. The selection control circuit includes the bombs/R.P. selector switch and pairs/salvo switch fitted to J.B.1, the four-way auto selector switch mounted in the cockpit, a relay and resistance unit located on the starboard wing rib 1 in the

engine bay, the safety breaks in the wheel bays and the pick-up points on the underside of each main plane. Pressure on the firing push-switch energises the bomb relay, via fuse 14 in J.B.1, the armament safety micro switch in the nose wheel-well, and the stores switch on the control column. When this relay is energised, a circuit is completed from fuse 35 in J.B.1, through the relay contacts to the bombs/R.P. selector switch. With selection to R.P's the supply is now fed to the auto-selector and thence, in sequence, to the resistance and relay unit, through the safety breaks to the projectiles.

**62.** With this selection made and the auto-selector set to its No. 1 position, the first depression of the firing push switch will fire the outer-lower rocket on each wing. Successive operations of the firing push-switch will then fire outer-upper, inner-lower and inner-upper R.P's respectively. If the pairs/salvo switch has been closed, the relay in the

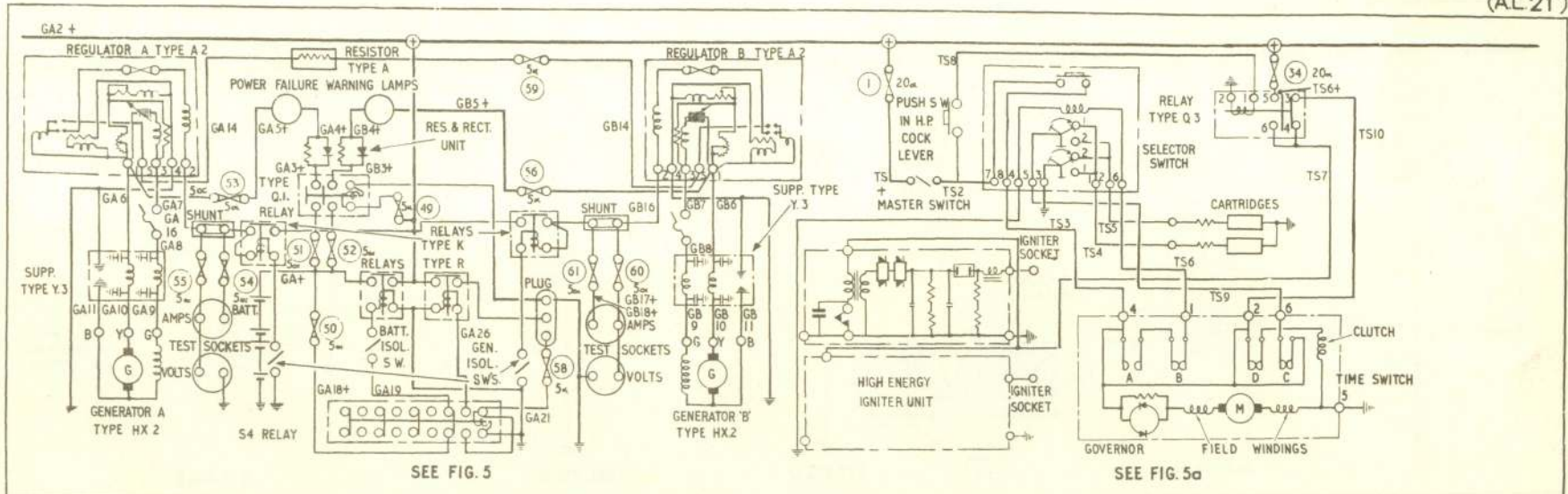
relay and resistance box will be energised, and with the auto-selector switch set at No. 1, the first depression of the firing push-switch will fire all the lower R.P's; the next depression of the firing push-switch will fire all the upper R.P's.

**63.** The circuit is interconnected with the G.45 camera circuit and is so designed that the camera stops at the instant the R.P's are fired, as described in para. 55. The firing sockets on the R.P. mounting attachments should be kept free from oil and moisture and the cables maintained in a good condition. When carrying out insulation tests this circuit should be tested separately from the main electrical system and the reading obtained for insulation resistance testing to earth should not be less than 200,000 ohms. There is a safety break in each wing cable loom in the wheel wells. If a series of test lamps mounted on a board are connected to

sockets, a functional test on the complete system can readily be carried out. Before the rocket firing leads are plugged into the firing sockets a test lamp should be inserted in each socket and then the safety break opened. Immediately prior to flight, a test lamp should be inserted in the safety break socket before the connection is made. Information on the four-way auto-selector switch is contained in A.P.4343X, Vol. 1, Sect. 3, Chap. 22.

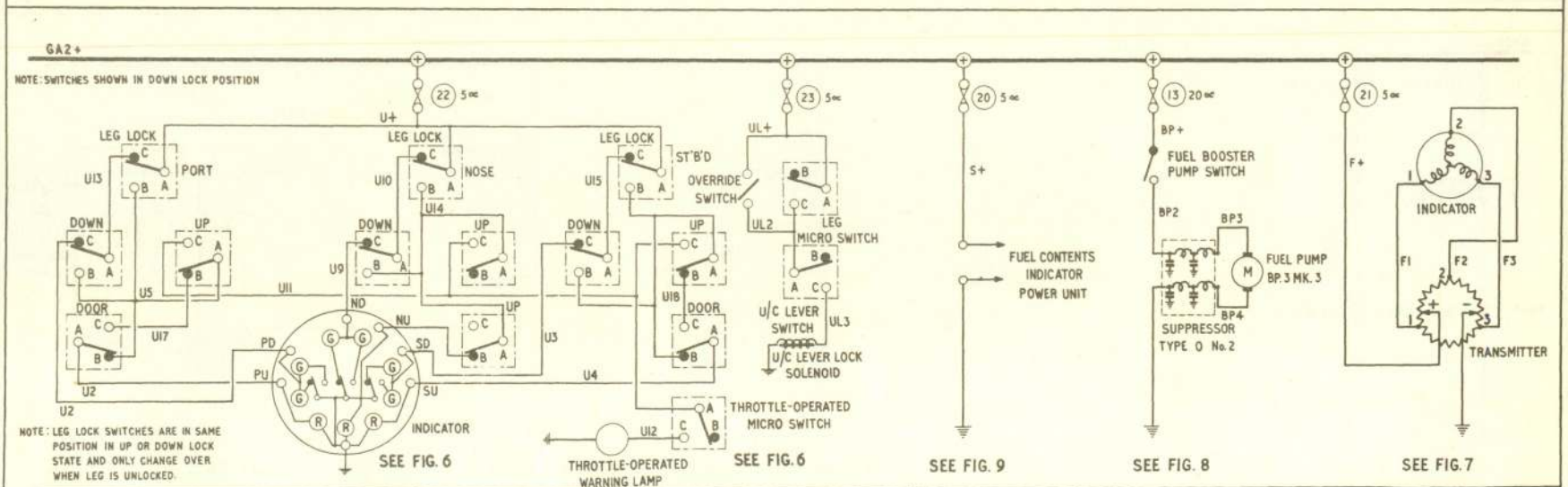
#### Radio supplies

**64.** The wireless and radar equipment is described in Sect. 6 of this book. The d.c. supplies to the various items of equipment are, however, shown in fig. 4D. The V.H.F. emergency battery is that used also for the turn and slip indicator (*para.* 31), and an additional test switch is fitted to J.B.1 to enable the stand-by V.H.F. set to be tested from the main aircraft d.c. supply.



GA,GB GENERATORS AND BATTERIES

TS STARTER



U ALIGHTING GEAR INDICATOR

UL ALIGHTING GEAR LEVER LOCK

S FUEL GAUGE SUPPLY

BP FUEL BOOSTER PUMP

F FLAP INDICATOR

Fig.4A. Schematic diagrams of electrical services  
RESTRICTED

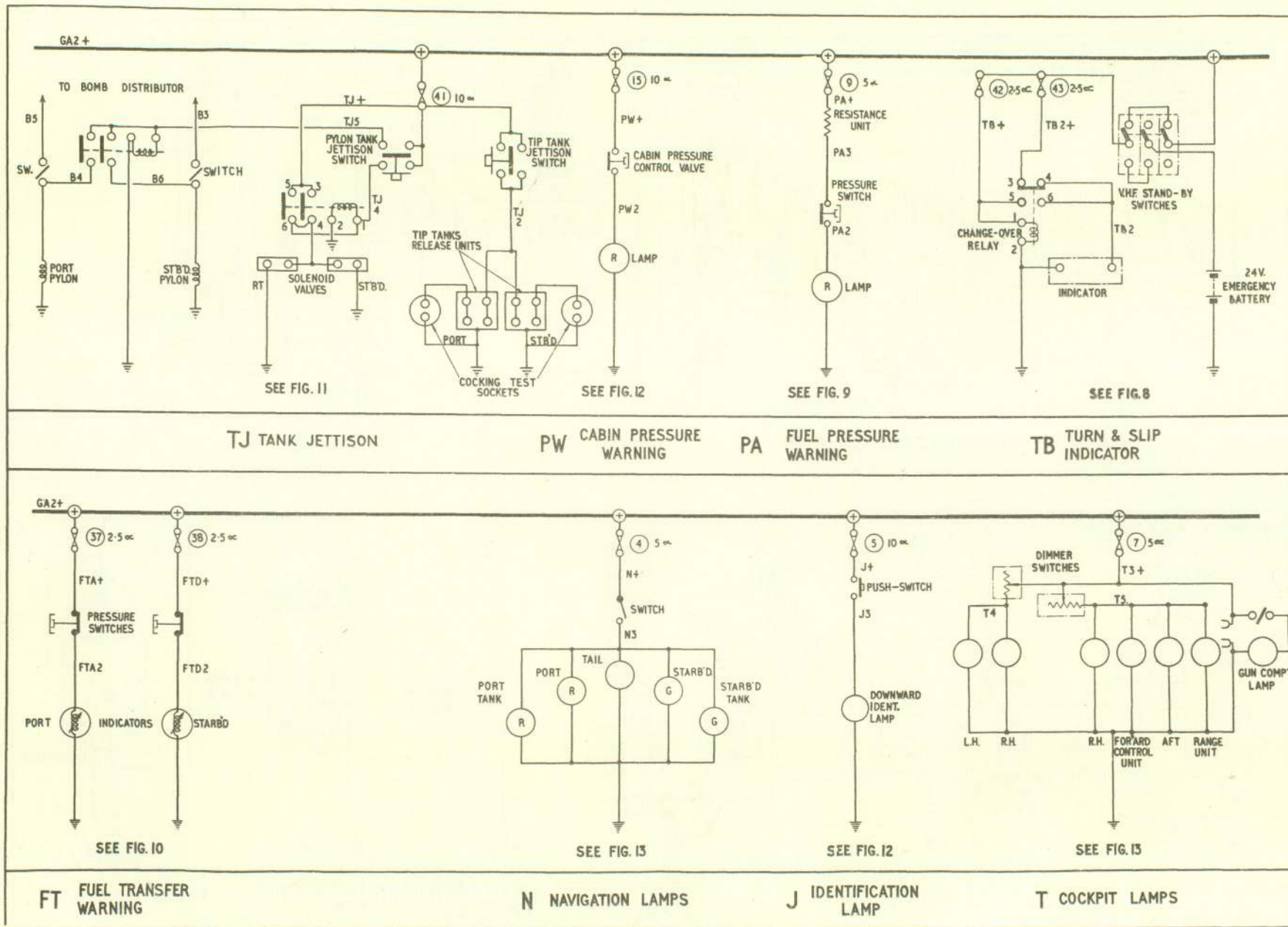


Fig.4B. Schematic diagrams of electrical services  
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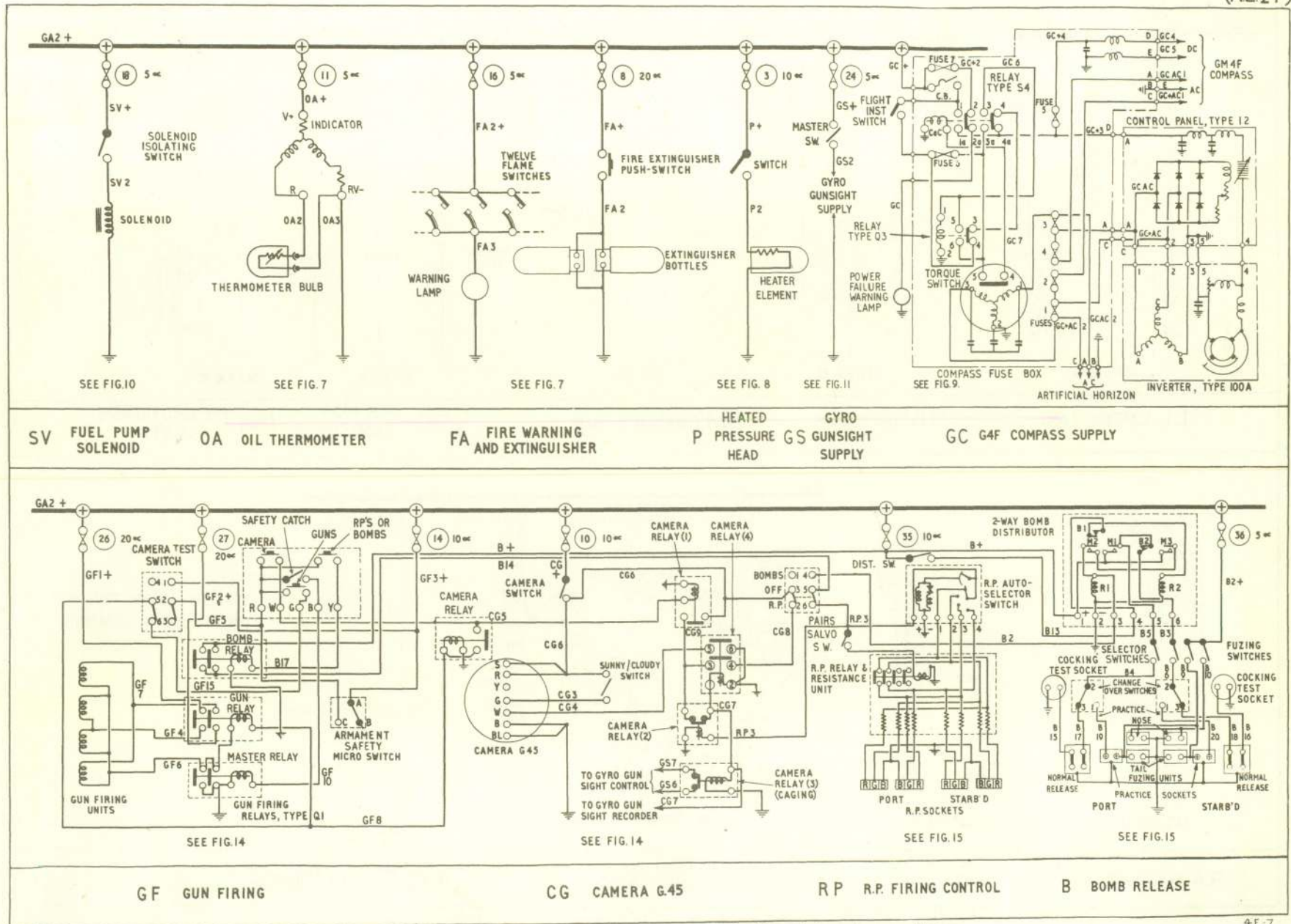
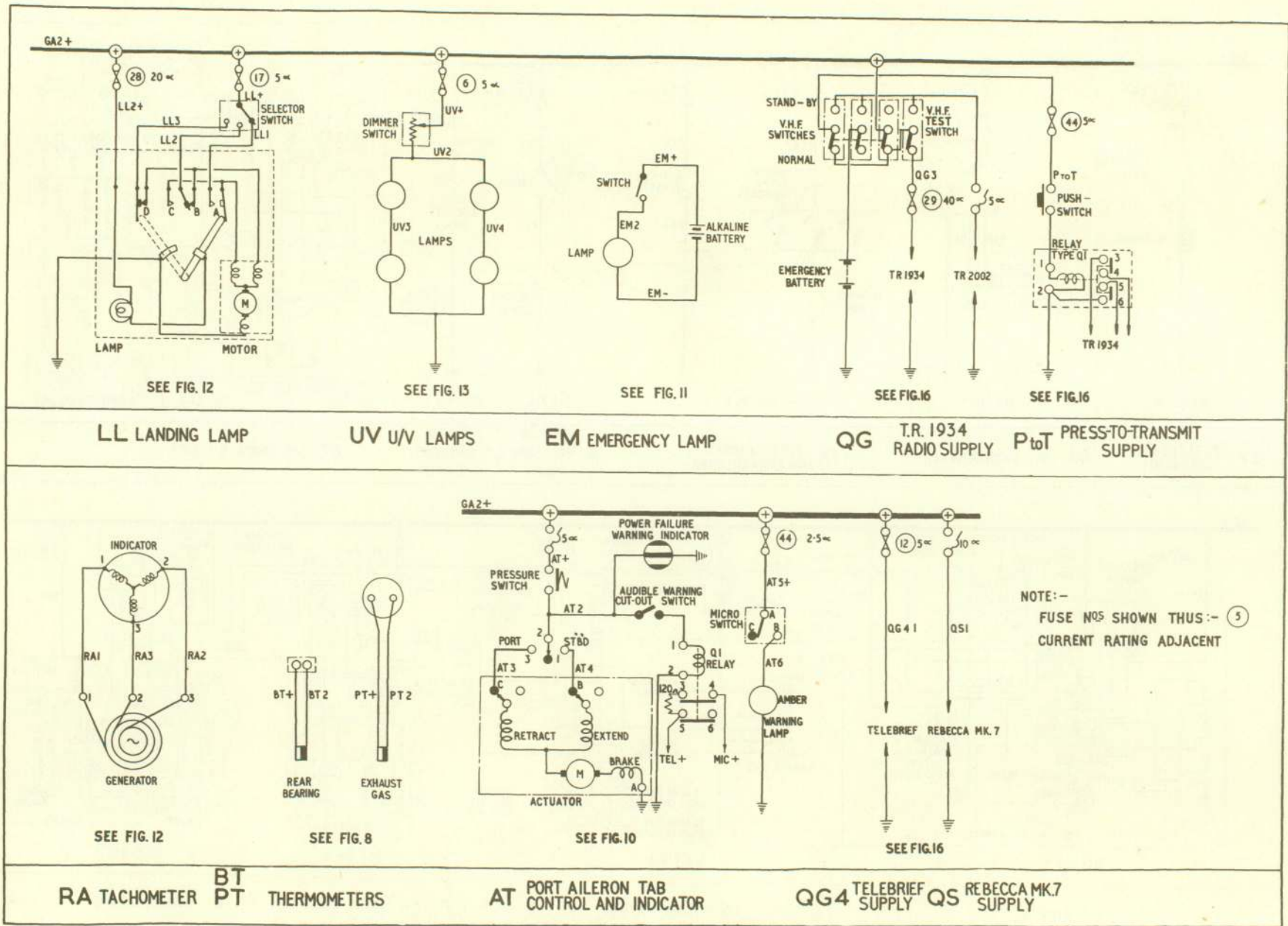


Fig. 4C. Schematic diagrams of electrical services  
**RESTRICTED**



SEE FIG. 12

SEE FIG. 13

SEE FIG. 11

SEE FIG. 16

SEE FIG. 16

LL LANDING LAMP

UV U/V LAMPS

EM EMERGENCY LAMP

QG T.R. 1934 RADIO SUPPLY

PtoT PRESS-TO-TRANSMIT SUPPLY

SEE FIG. 12

SEE FIG. 8

SEE FIG. 10

SEE FIG. 16

RA TACHOMETER BT REAR BEARING PT THERMOMETERS

AT PORTAILERON TAB CONTROL AND INDICATOR

QG4 TELEBRIEF SUPPLY QS REBECCA MK.7 SUPPLY

NOTE:-  
FUSE NOS SHOWN THUS:- (5)  
CURRENT RATING ADJACENT

Fig.4D. Schematic diagrams of electrical services  
RESTRICTED

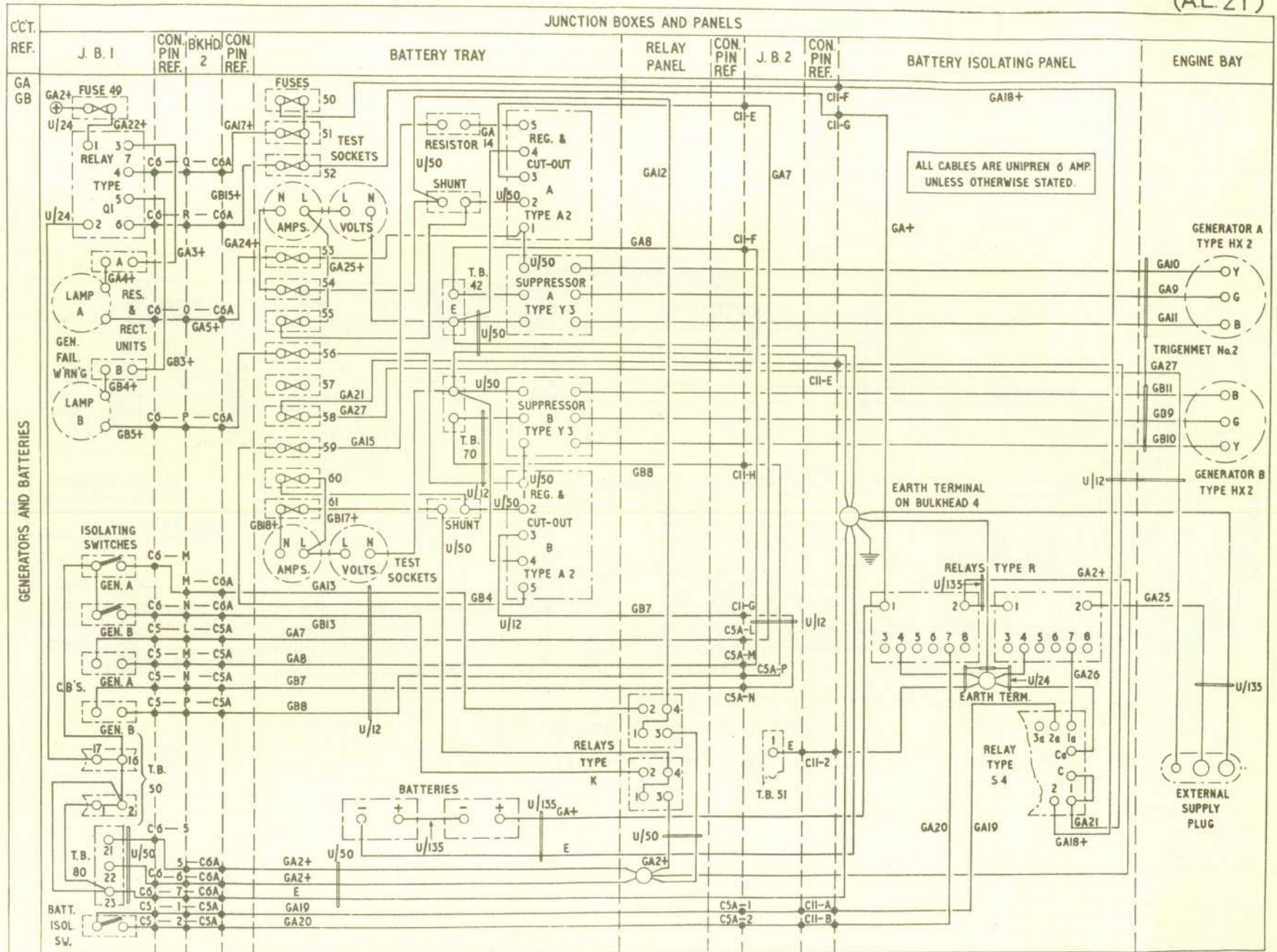


Fig. 5. Generators and Batteries (GA-GB)

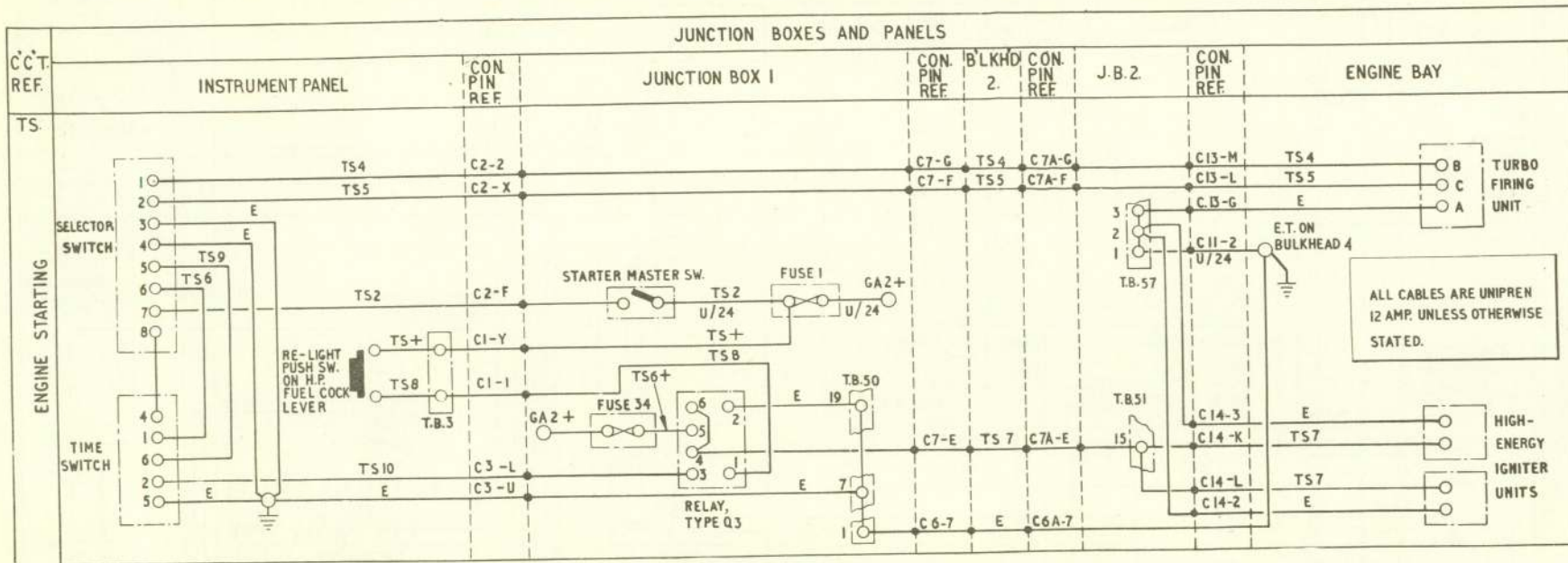


Fig. 5A. Engine Starting (TS)

**RESTRICTED**

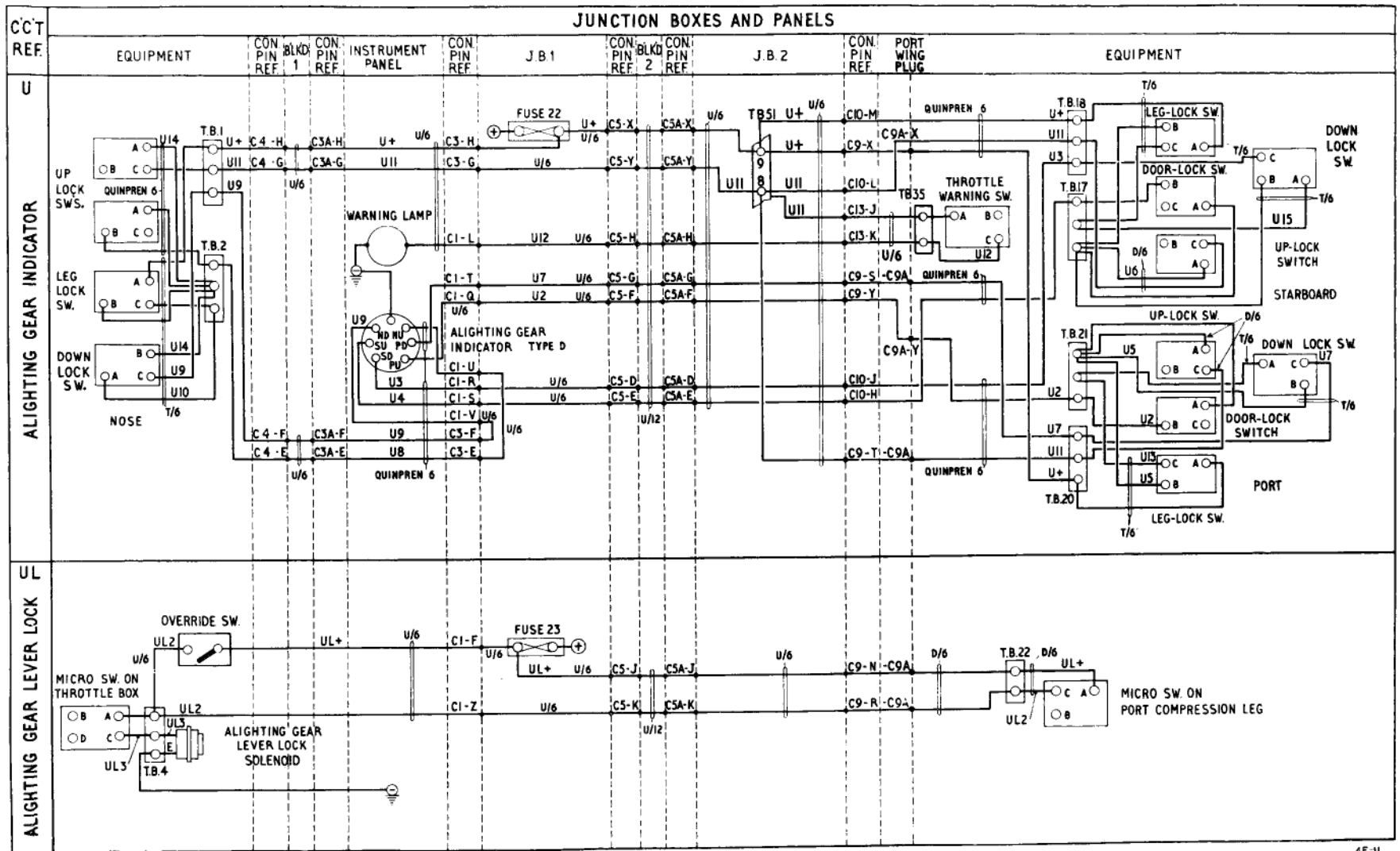
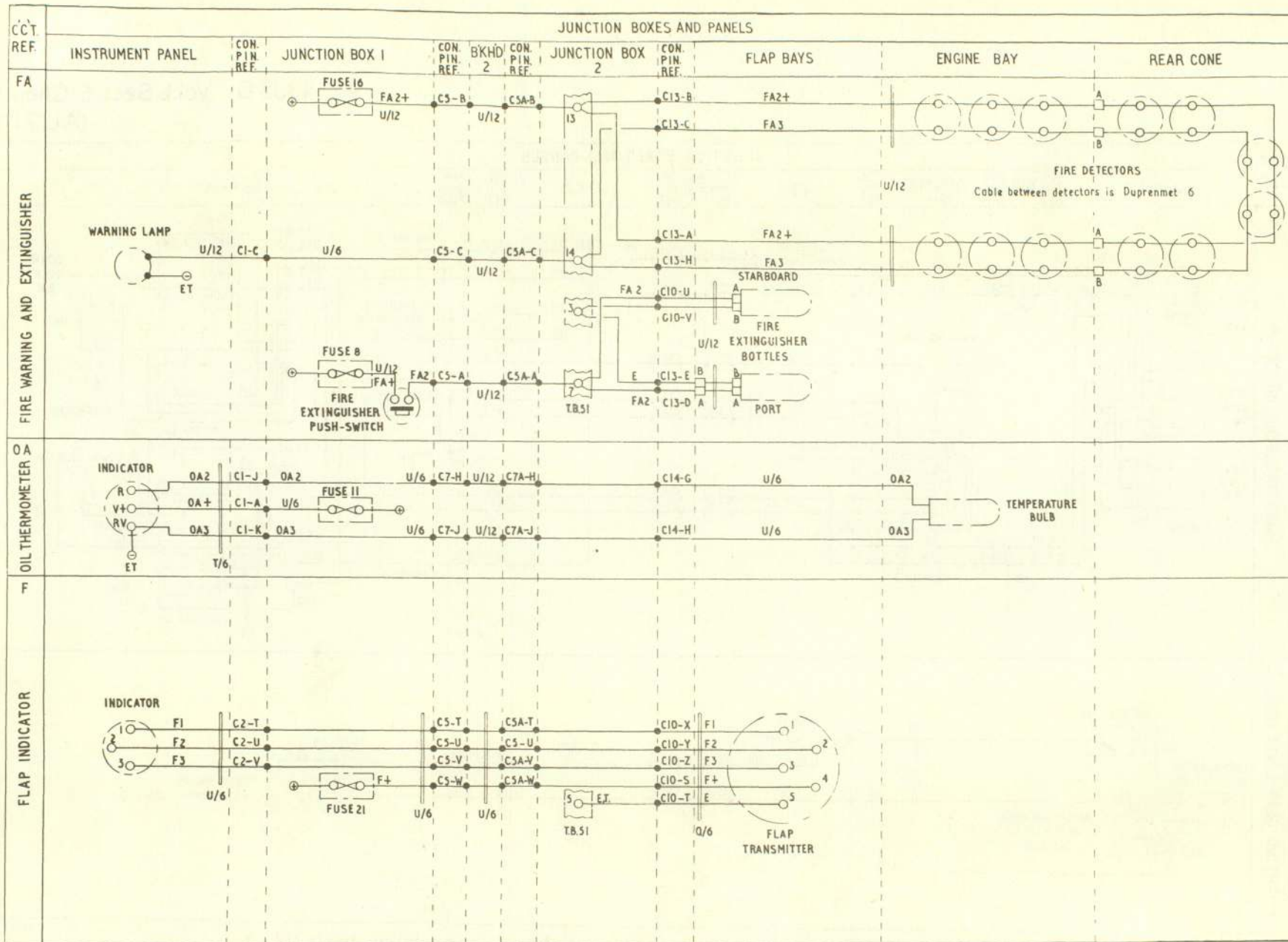


Fig.6. Alighting gear indicator (U); alighting gear lever lock (UL)  
RESTRICTED



4e-12.

Fig.7. Fire warning and extinguisher (FA),oil thermometer (OA), flap indicator (F).

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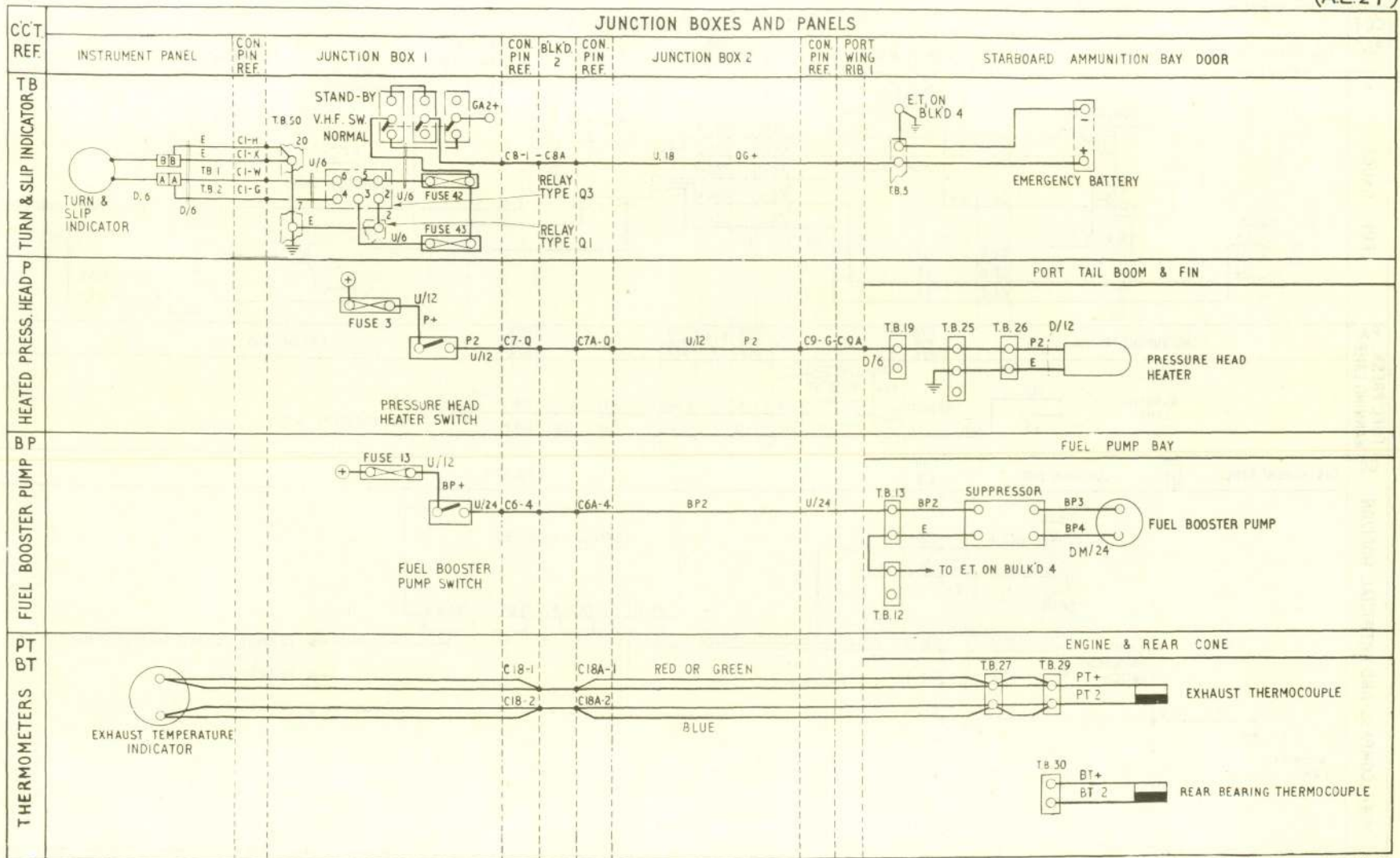


Fig. 8. Turn and slip indicator (TB); heated pressure head (P); fuel booster pump (BP); thermometers  
RESTRICTED (A.L.21, Feb., 55)

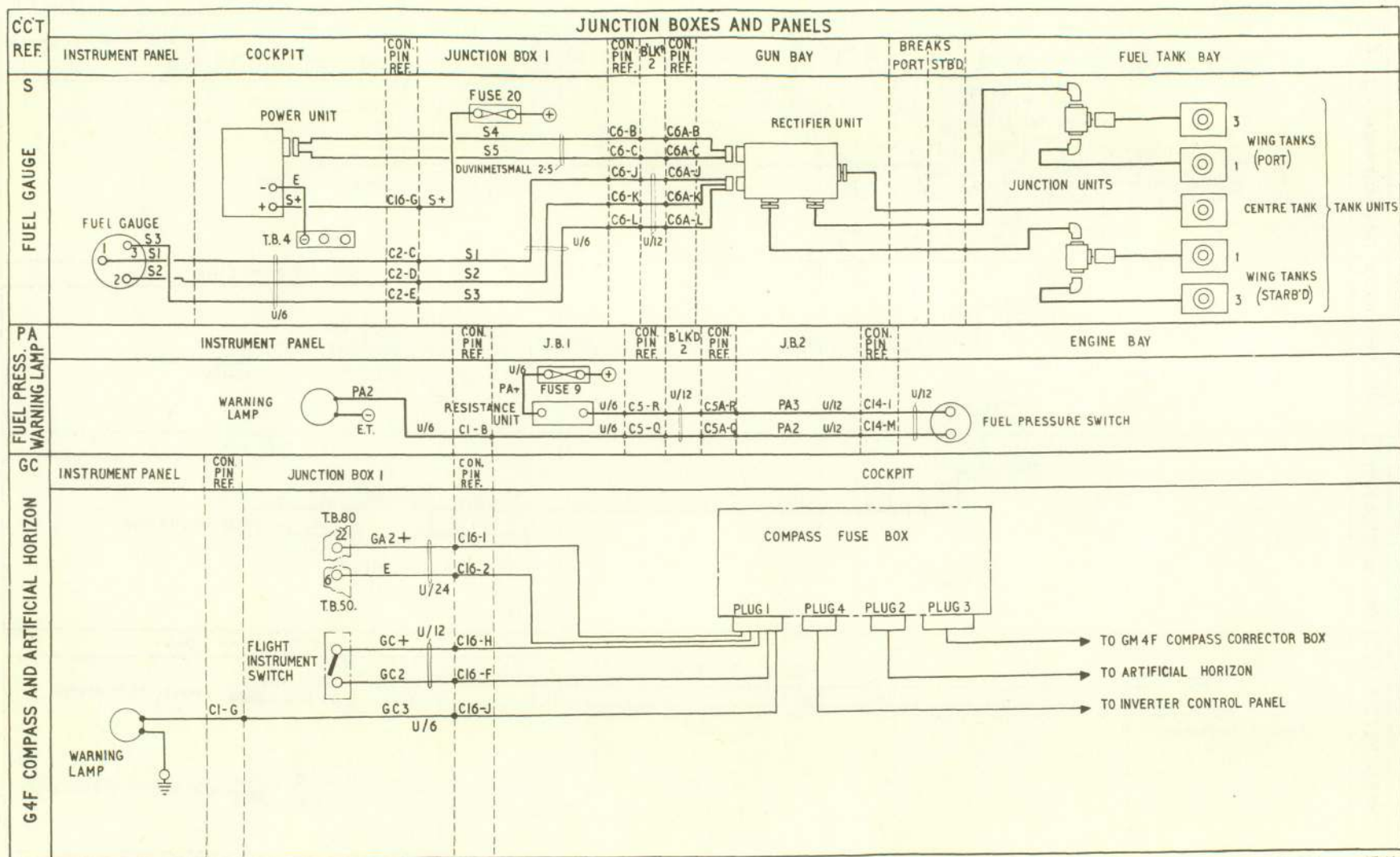


Fig. 9. Fuel gauge (S); fuel pressure warning lamp (PA); G4F compass and artificial horizon (GC)  
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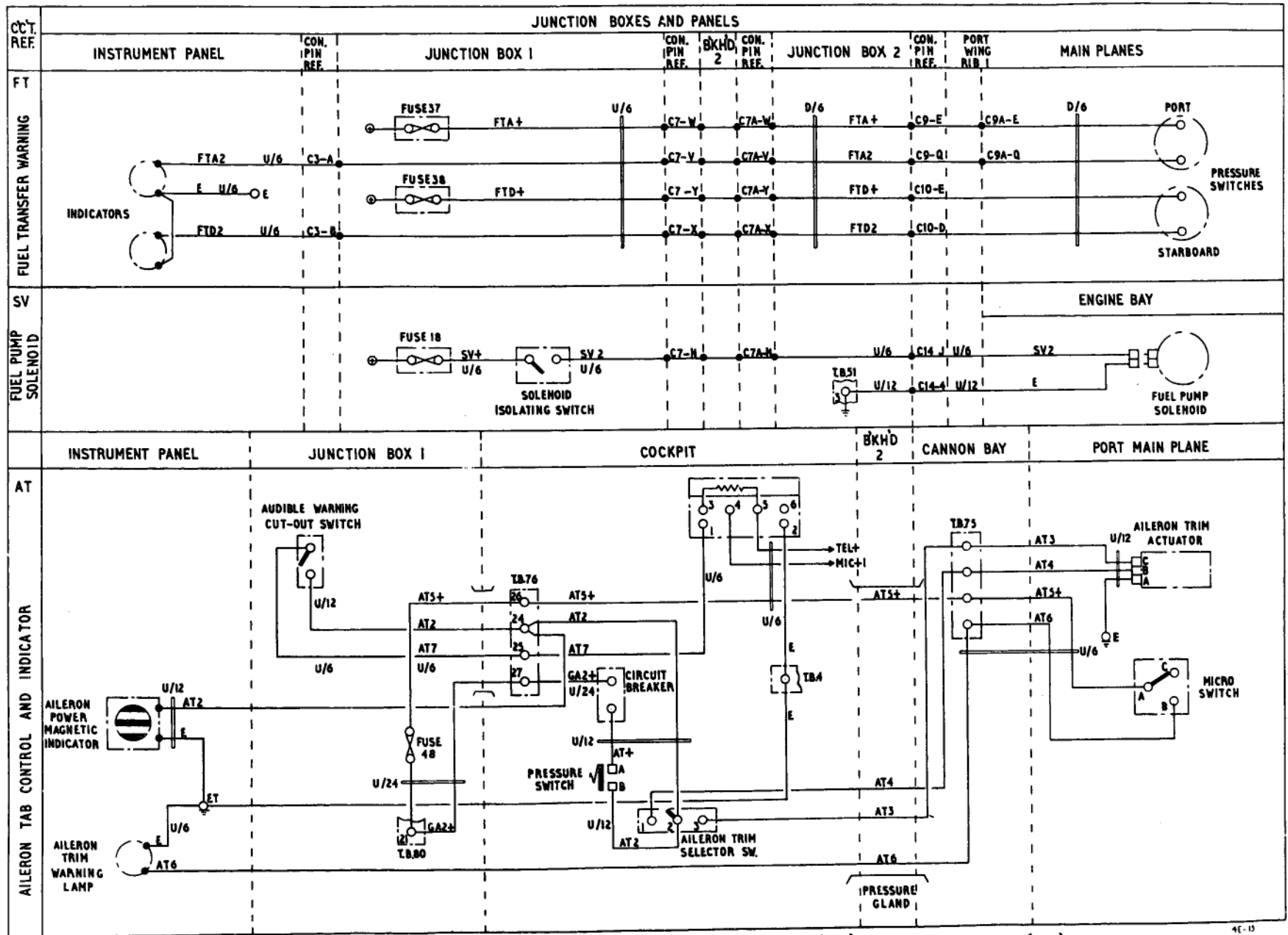


Fig. 10. Fuel transfer warning (FT) Fuel pump solenoid (SV) Aileron tab (AT)

(A.L.21, Feb., 55)

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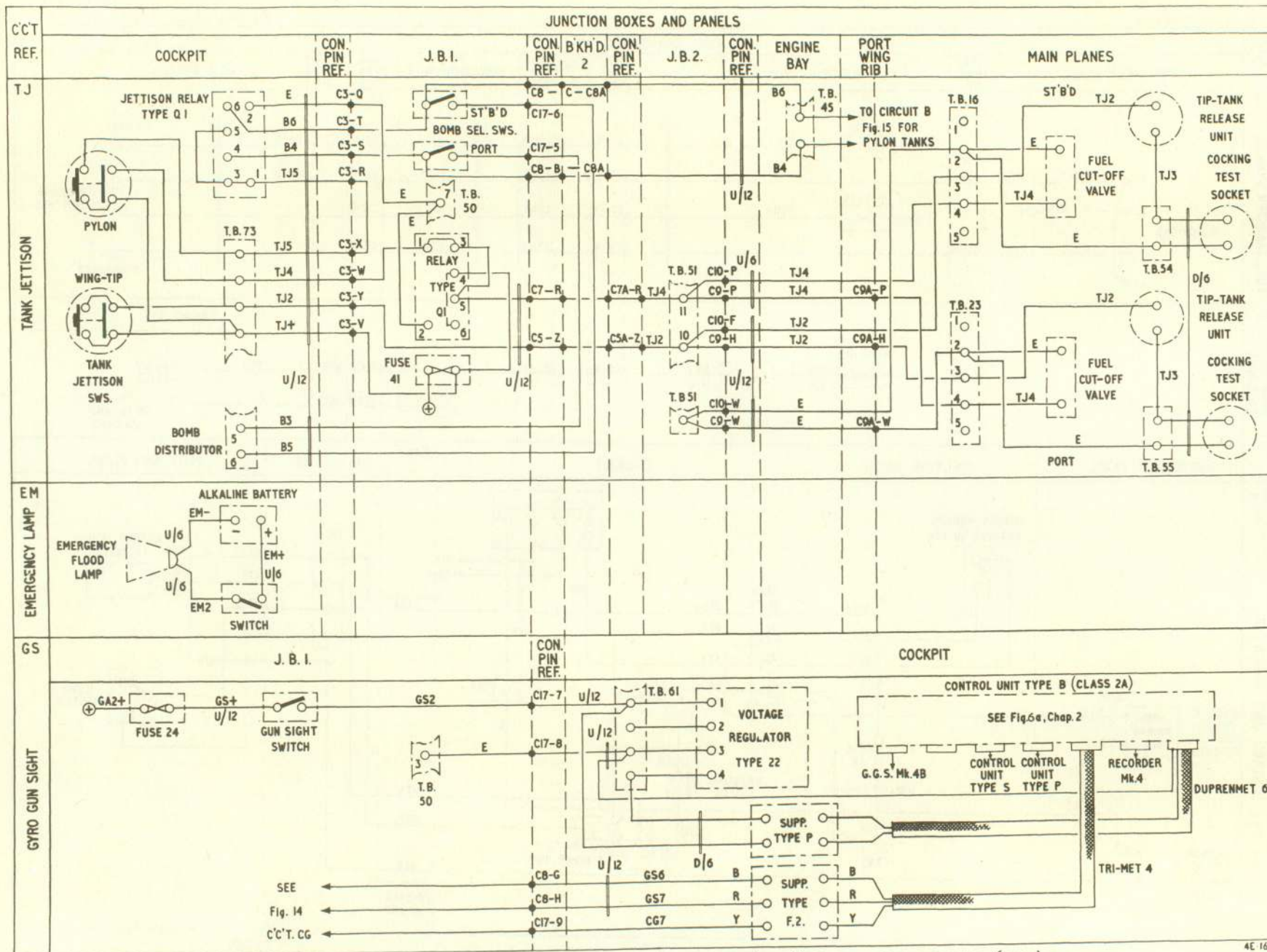


Fig. 11. Tank Jettison (TJ), Emergency Lamp (EM), Gyro Gun Sight (GS).

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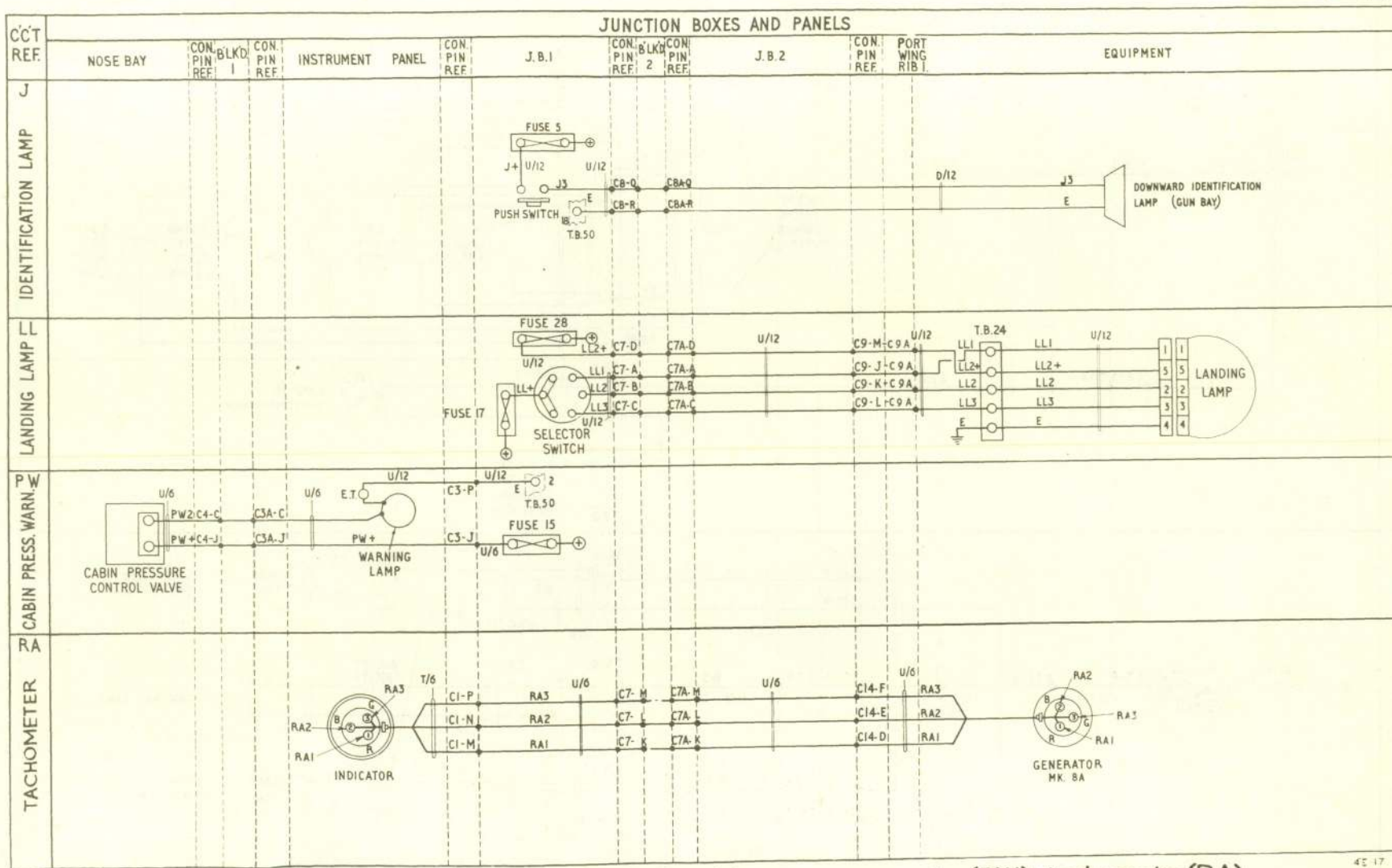


Fig.12. Ident. lamp (J):landing lamp (LL):cabin pressure warning(PW): tachometer(RA)  
RESTRICTED



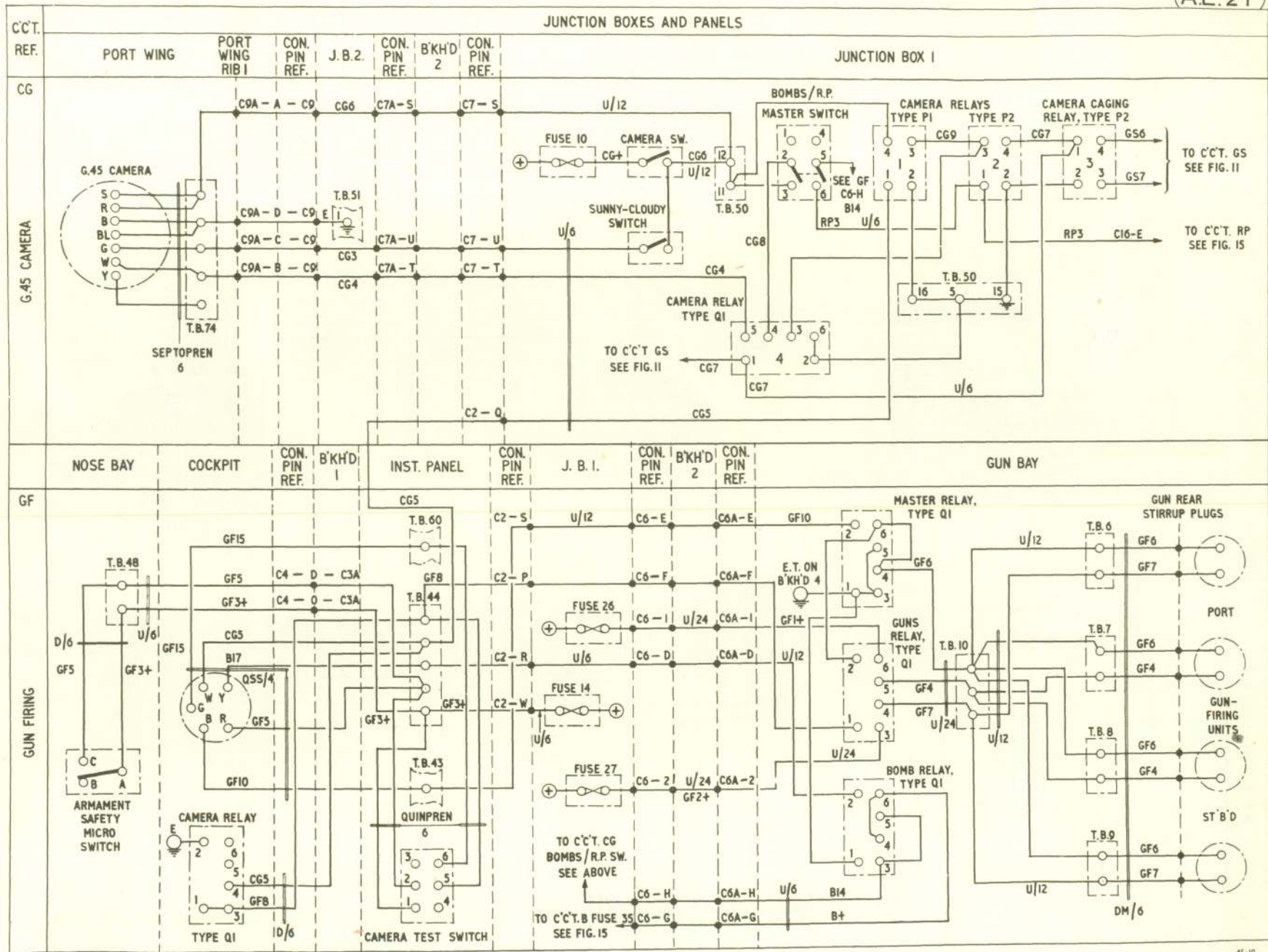


Fig. 14. G.45 Camera (CG); Gun Firing (GF)

4E-10  
(A.L. 21, Feb., 55)



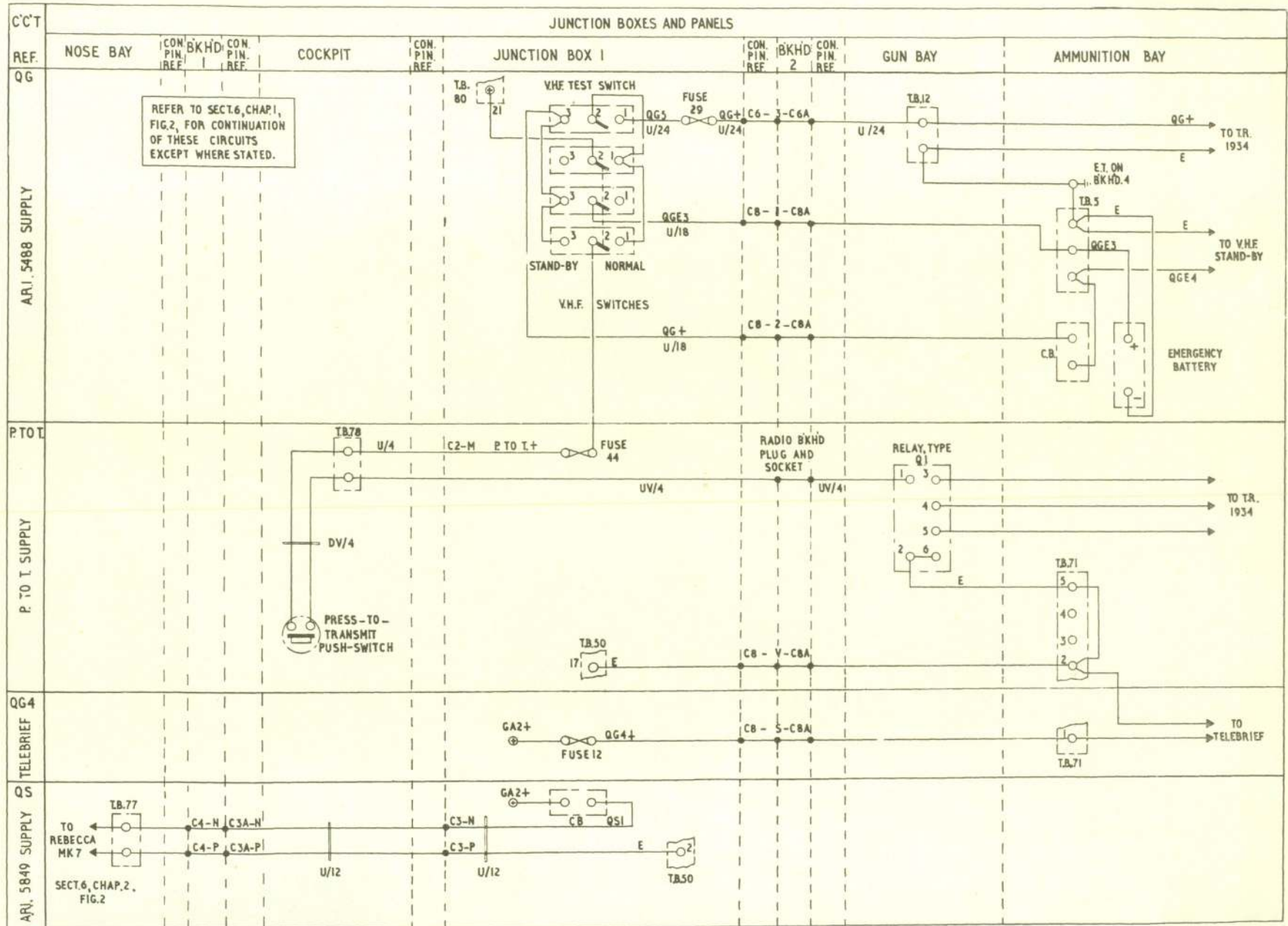


Fig. 16. ARI. 5488 Supply (QG), P to T. Supply (P to T.), Telebrief (QG4), ARI 5849 Supply (QS).

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