GROUP A 1

SYSTEM DETAILS

CONTENTS

ILLUSTRATIONS

TABLES

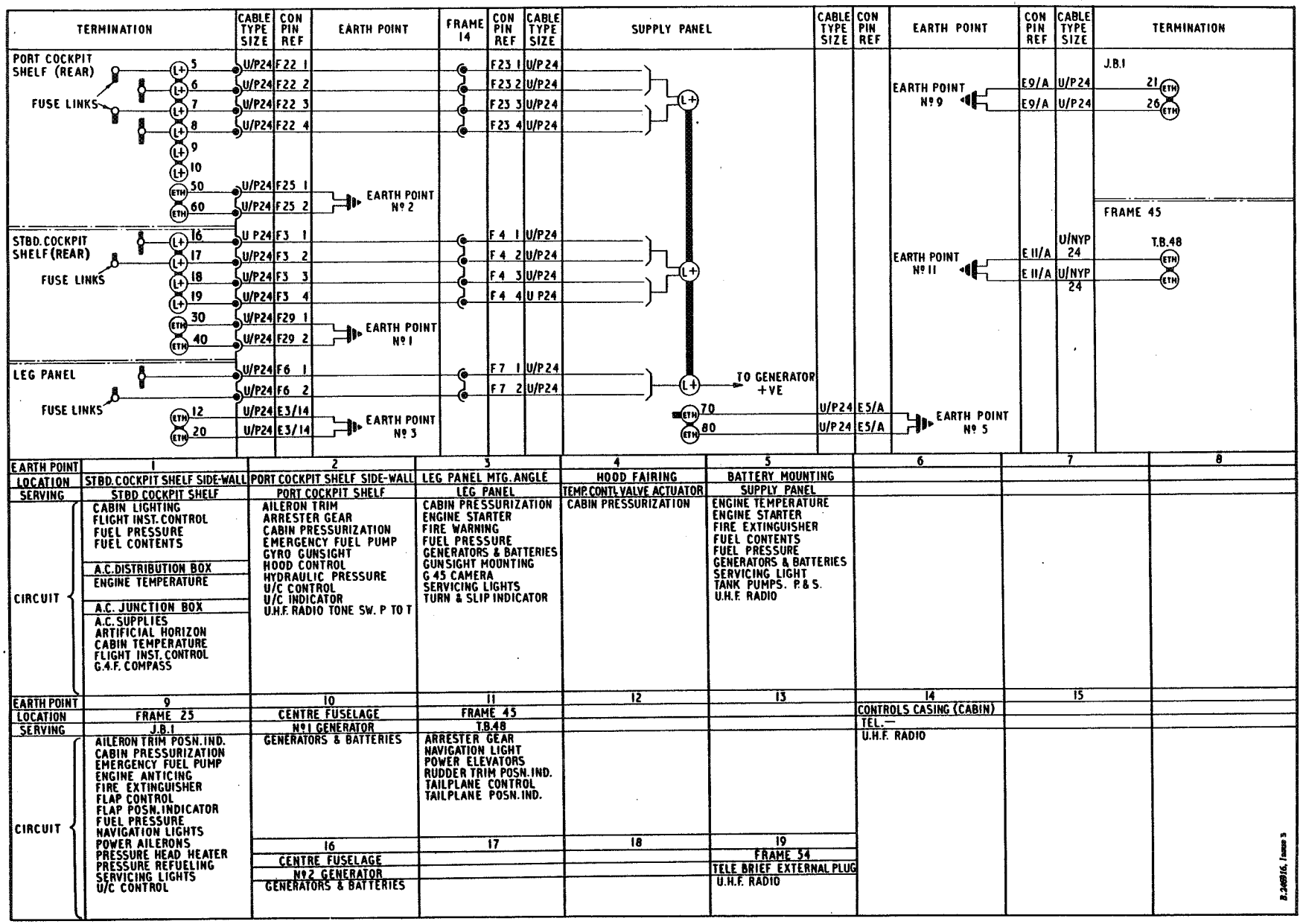
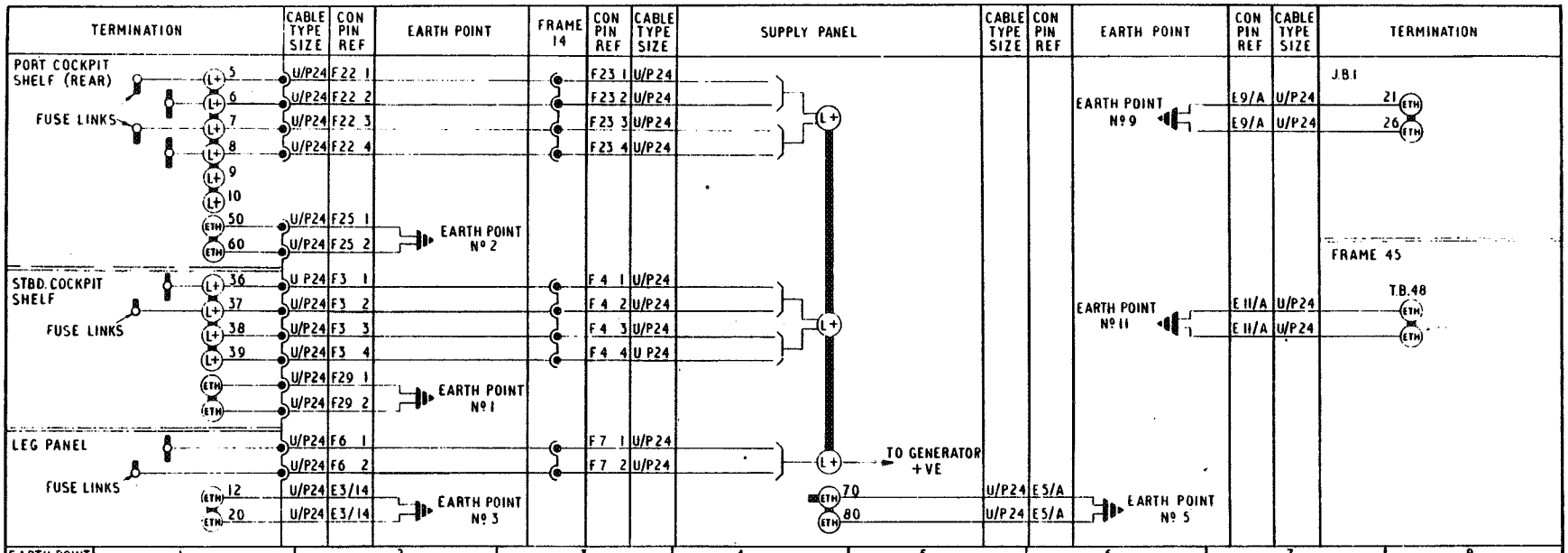


Fig.1 Supply and earth routeing chart

▶ (Mod 1429 added) ◀



EARTH POINT	1	2	3	4	5	6	7	8
LOCATION	STBD COCKPIT SHELF SIDE-WALL	PORT COCKPIT SHELF SIDE-WALL	LEG PANEL MTG ANGLE	HOOD FAIRING	BATTERY MOUNTING			
SERVING	STBD COCKPIT SHELF	PORT COCKPIT SHELF	LEG PANEL	TEMP CONTL VALVE ACTUATOR	SUPPLY PANEL			
CIRCUIT	CABIN LIGHTING FLIGHT INST. CONTROL FUEL PRESSURE FUEL CONTENTS A.C DISTRIBUTION BOX ENGINE TEMPERATURE A.C. JUNCTION BOX A.C. SUPPLIES ARTIFICIAL HORIZON CABIN TEMPERATURE FLIGHT INST. CONTROL G.4.F. COMPASS	AILERON TRIM ARRESTER GEAR CABIN PRESSURIZATION EMERGENCY FUEL PUMP GYRO GUNSIGHT HOOD CONTROL HYDRAULIC PRESSURE U/C CONTROL U/C INDICATOR U.H.F RADIO TONE SW. P TO T	CABIN PRESSURIZATION ENGINE STARTER FIRE WARNING FUEL PRESSURE GENERATORS & BATTERIES GUNSIGHT MOUNTING G.45 CAMERA SERVICING LIGHTS TURN & SLIP INDICATOR	CABIN PRESSURIZATION	ENGINE TEMPERATURE ENGINE STARTER FIRE EXTINGUISHER FUEL CONTENTS FUEL PRESSURE GENERATORS & BATTERIES SERVICING LIGHT TANK PUMPS. P & S. U.H.F. RADIO			

EARTH POINT	9	10	11	12	13	14	15	
LOCATION	FRAME 25	CENTRE FUSELAGE	FRAME 45			CONTROLS CASING (CABIN)		
SERVING	J.B.1	Nº1 GENERATOR	T.B.48			TEL.—		
CIRCUIT	AILERON TRIM POSN. IND. CABIN PRESSURIZATION EMERGENCY FUEL PUMP ENGINE ANTICING FIRE EXTINGUISHER FLAP CONTROL FLAP POSN. INDICATOR FUEL PRESSURE NAVIGATION LIGHTS POWER AILERONS PRESSURE HEAD HEATER PRESSURE REFUELING SERVICING LIGHTS U/C CONTROL	GENERATORS & BATTERIES	ARRESTER GEAR NAVIGATION LIGHT POWER ELEVATORS RUDDER TRIM POSN. IND. TAILPLANE CONTROL TAILPLANE POSN. IND.			U.H.F. RADIO		
		16	17	18	19			
		CENTRE FUSELAGE			FRAME 54			
		Nº2 GENERATOR			TELE BRIEF EXTERNAL PLUG			
		GENERATORS & BATTERIES			U.H.F. RADIO			

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Fig.1A Supply and earth routeing chart — pre-Mod 1429

Introduction

1. This group contains a general description of the electrical system, together with wiring details and general servicing information. Tables listing ratings and references of fuses, circuit breakers, and filament lamps are included, as well as a circuit index giving coding details. Detailed information on the standard items of equipment is given in the Air Publications listed in Table 1 of each Group.

2. The d.c. system is a 28 volt, single pole, earth return, voltage regulated type. Two Type 515A generators, connected in parallel and stabilized by two Type J, 24 volt, 25 amp. hour batteries which are also connected in parallel and which float across the output of the generators. The batteries are coupled into circuit by Cannon type 2-pole plugs and socket combinations, and are provided with protected covers which vent to atmosphere. A battery test socket provides for checking the state of charge by voltage, as no specific gravity check is possible. A 24 volt standby supply, obtained from two 12 volt, 4 amp. hour batteries in series, supplies certain services if the normal supply fails. A 115 volt, a.c. supply, provided by an inverter system, is described in Group E 1.

3. The wiring cable assemblies run between junction boxes and panels located in positions convenient for distribution to the equipment, and for breaking down the aircraft into assemblies. Most of the cable assemblies are provided with weatherproof multi-pole plug and socket breakdown points. Wherever possible, the cable connections to the plug and socket pins are crimped. To facilitate servicing and testing, earth return connections are restricted in number and are taken to stud type earth points; these are shown on the cable assembly layout (Group A 3), and listed on the supply and earth routeing chart, fig.1.

4. The generators are mounted on and driven by the auxiliary gearbox situated in the engine bay; their control equipment is mounted on a panel on the starboard side of the radio bay in the front fuselage. The main batteries are mounted on a platform in the radio bay and the standby batteries are carried in a box which is also located in the radio bay. The supply circuits from the generators and main batteries to the fuse bus-bars are illustrated on fig.1, which also shows the earth return points.

REFERENCING AND GENERAL SERVICING OF COMPONENTS

Junction, control, and distribution boxes

5. These boxes are of welded aluminium, waterproof construction, with insides suede finished to prevent chafing and condensation. They contain terminal blocks and other equipment. With the exception of those labelled according to the circuits they feed, junction boxes are numbered; the numbers being preceded by the letters J.B., or, in the case of armament junction boxes, by ARM. J.B. Each box contains a wiring diagram. The terminals in the boxes are numbered, and can be identified by reference to the wiring diagrams. Starred terminals on the diagrams denote spares. Where a cable passes through a box without connecting to a terminal, the cable is wired pin to pin between its associated plugs, i.e. pin A to pin A, or pin B to pin B, etc. Cable outlets on junction boxes are either multi-pole plugs and sockets, or rubber grommets.

6. Junction box 1 is the major box, and is situated at the bottom of the centre fuselage, on the rear face of the main spar frame. Junction box 2 is mounted above the rear portion of the cabin port shelf, between frames 11 and 12; it is used mainly for distribution to equipment on the port side of the cabin.

7. The A.C. junction box is mounted aft of the cabin starboard shelf. It supplies the flight instruments, the engine top temperature magnetic amplifier, and the oil pressure gauge, and also contains the inverter starting and control equipment. In aircraft embodying Mod 256, a compass junction box is mounted in the fin between frames 51 and 52, above the tail plane actuator. The power controls junction box is situated under the cabin floor on the starboard side, between frames 11 and

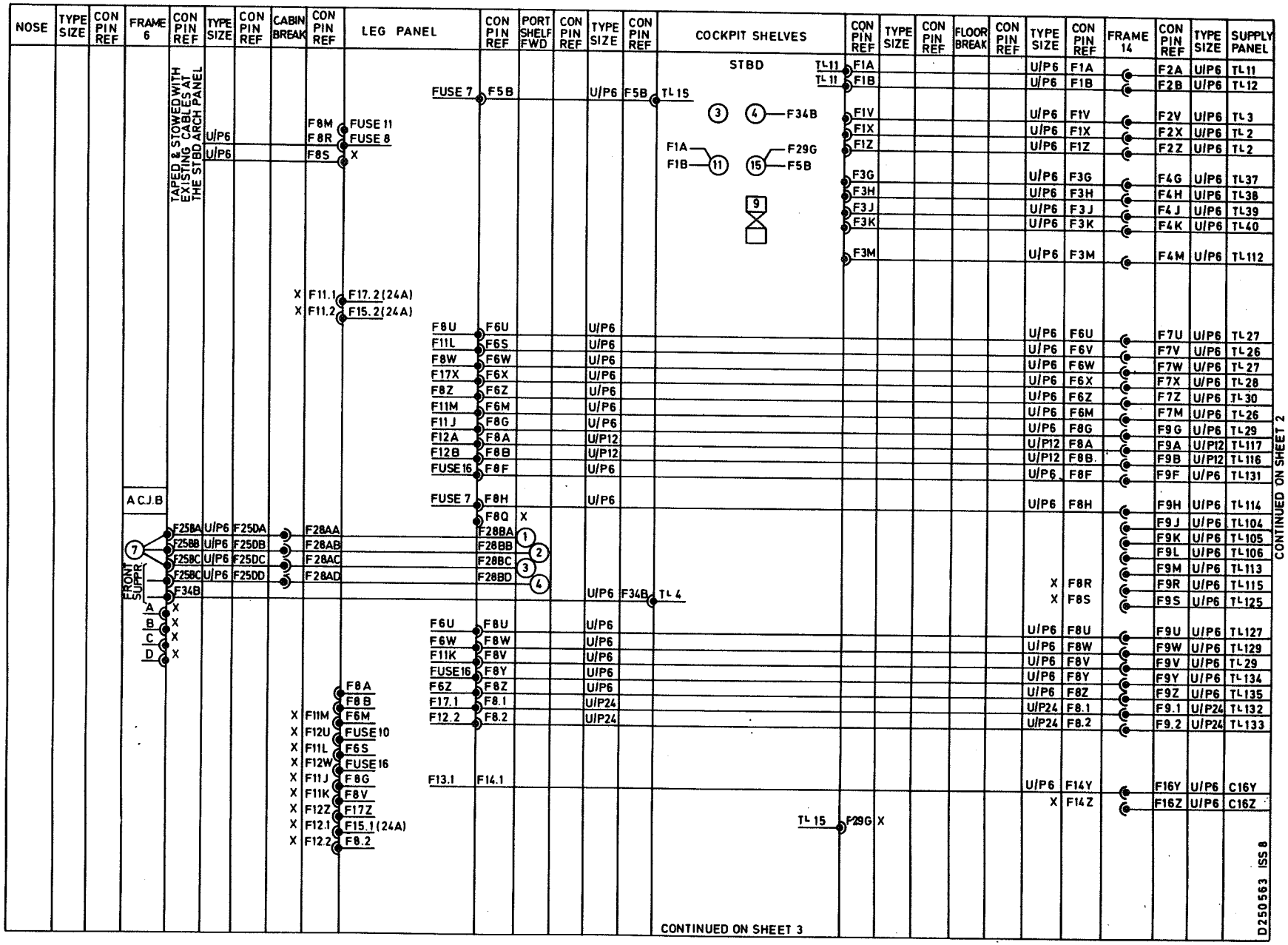


Fig. 2 Available spare wiring (sheet 1)

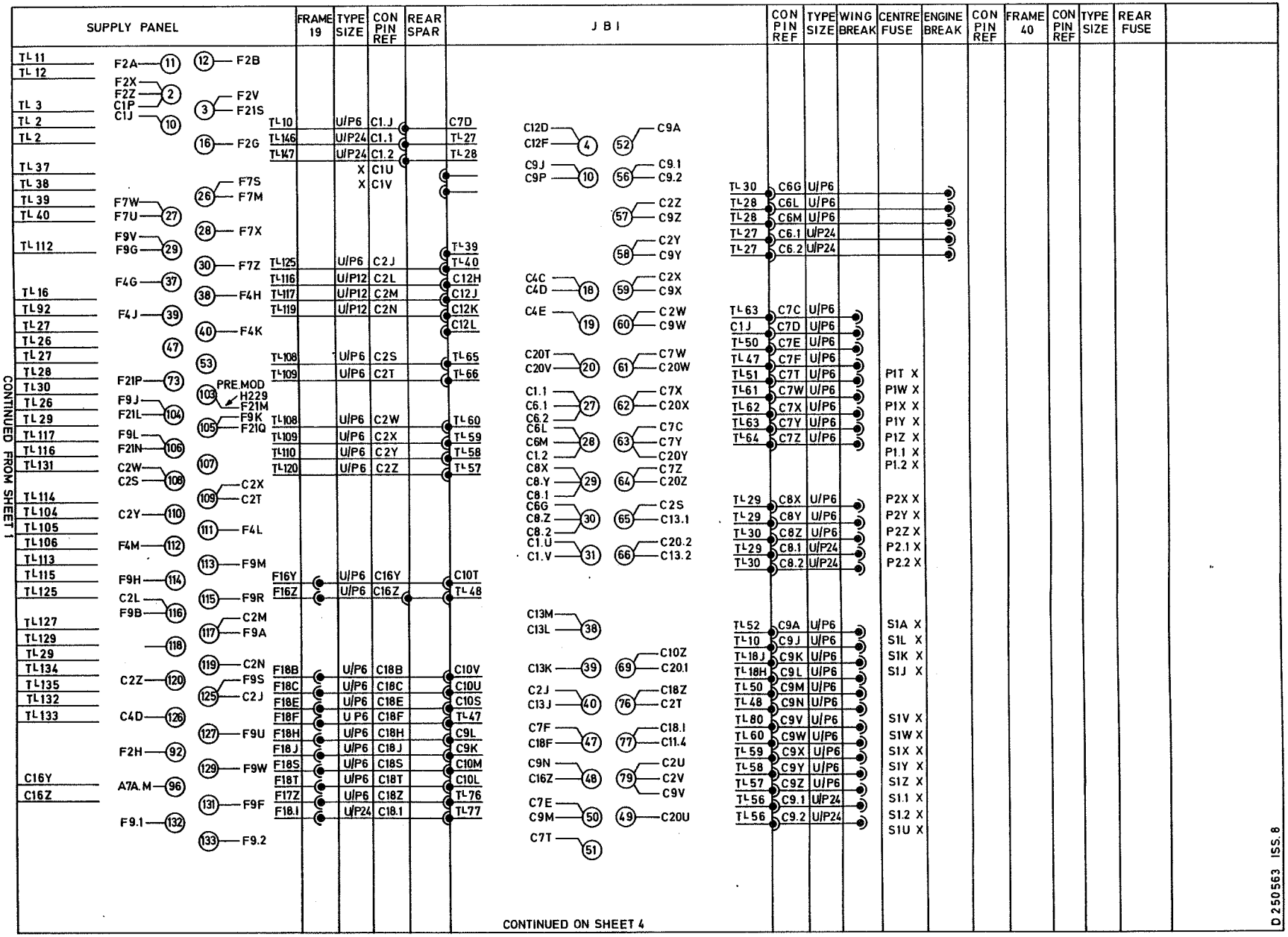


Fig. 2 Available spare wiring (sheet 2)
(Illustration divided for clarity)

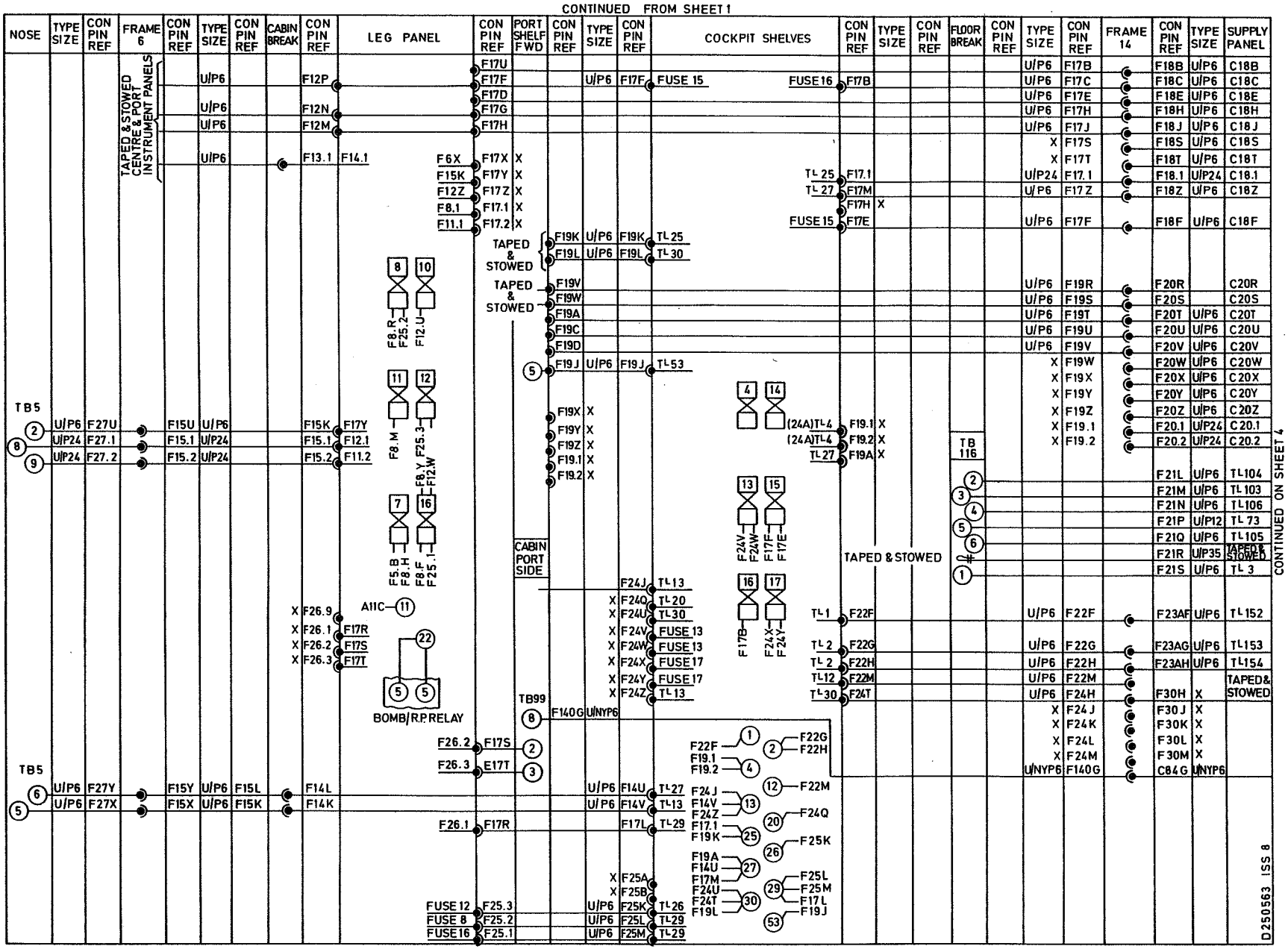


Fig. 2 Available spare wiring (sheet 3)
(Illustration divided for clarity)

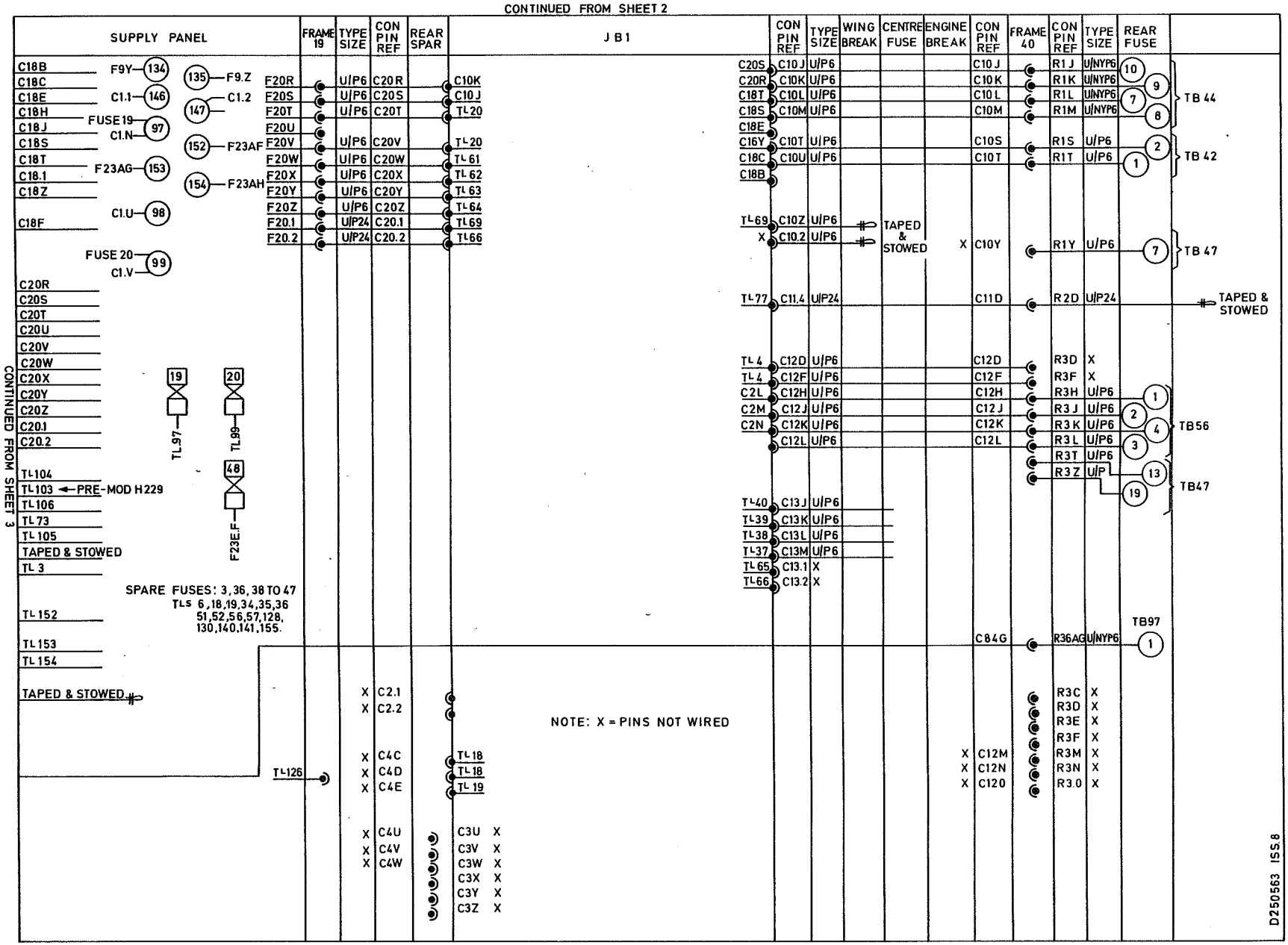


Fig. 2 Available spare wiring (sheet 4)
(Illustration divided for clarity)

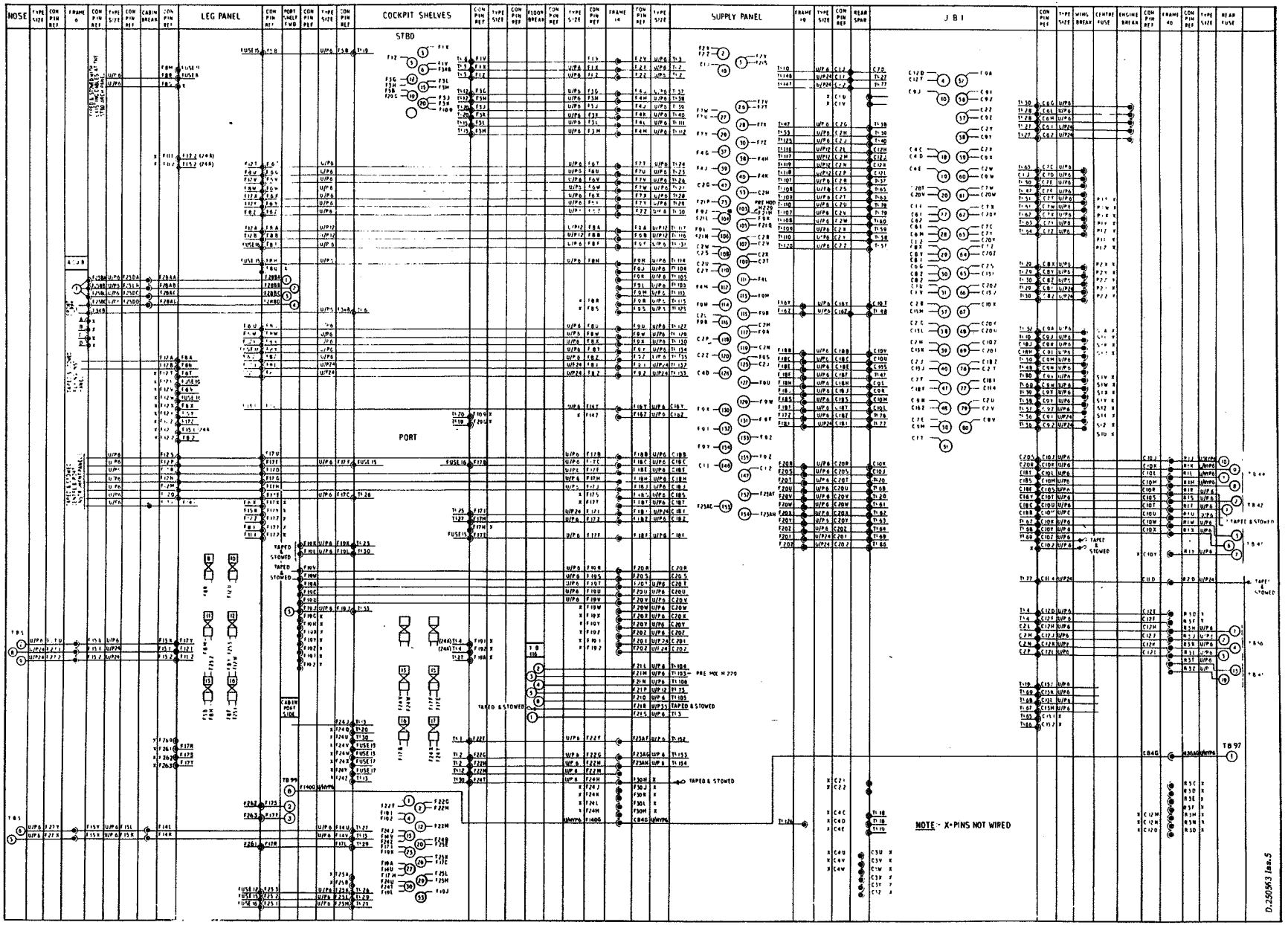


Fig.2A Available spare wiring — pre-Mod 1429

12, at the aft end of the cabin wall. It contains a terminal block and fuses, part of the elevator and aileron power control circuits.

8. ARM. J.B.1 is mounted on the forward face of frame 19, above the battery platform in the radio bay. ARM. J.B.2 is situated between frames 12 and 13, on the port side. ARM. J.B.3 and 4 are situated in the port wing, on the top skin of the wheel bay, and the diaphragm between interspar ribs Q and R, respectively. ARM. J.B.'s.5 and 6 occupy similar positions in the starboard wing. ARM. J.B.'s 7 and 8 are mounted between frames 15 and 16, on the port side of the front fuselage. All these junction boxes provide breaking down and distribution points for the armaments circuits.

9. The airbrake relay control box, containing relays employed in the airbrake control circuit, is situated in the cabin, above the port shelf between frames 10 and 11.

10. PR Mk.11 aircraft incorporate a camera junction box and a camera control box. The camera junction box is located at the top of the nose wheel bay between frames 4 and 5. The camera control box is situated in the cabin, being mounted above the starboard glare shield on a bracket attached to frame 9. These two boxes contain most of the control equipment and fuses for the photographic reconnaissance camera installation.

Servicing of junction boxes

11. Regular examinations of junction boxes should be made to ensure that they are correctly supported, clean, and undamaged. The components in the boxes should also be examined for security, and wiring and terminals examined for signs of damage and corrosion.

12. Junction boxes are designed for easy removal, being supported on quick-release mountings. The lids of the junction boxes are detachable. For major servicing, it is recommended that the boxes be removed from the aircraft and replaced with serviced components; thus reducing the time in which the aircraft is unserviceable. Faulty boxes should be made serviceable in the servicing bay and then held as spares. The method of removing junction boxes is described in Group A.2.

Generator control and supply panels

13. The generator control and supply panels are located together between frames 16 and 19 on the starboard side of the radio bay. The supply panel is outboard of the generator control panel, and is curved to conform with the inside contour of the fuselage skin; studs on frames 17 and 18 engage with channel members of the panel. Terminal blocks, fuse boxes, and relays are carried on the panel, together with plugs by which the cable assemblies to and from the panel are connected. The generator control panel is hinged to the top longeron and fits over the supply panel, forming a lid; it is attached to the supply panel by four fasteners along the lower edge. When raised to give access to the supply panel, the generator control panel can be retained in the raised position by a hook attached to a chain which is secured to the radio mounting structure. The generator control panel contains all the generator control components, fuse boxes and test equipment.

Leg panel

14. The leg panel is in the form of a box, bolted to the cabin floor below the centre instrument panel and just forward of the control column. It has a hinged door on the port side, and a sloping plate carrying plugs for cable assemblies on its forward face. On the rear face are the oil pressure gauge, generator failure warning lamps, ignition and starter switches, together with the gyro gun sight circuit breaker and a number of control switches. The leg panel contains relays, terminal blocks and fuse blocks, the latter mounted on the inside face of the door so as to be easily accessible.

Cabin port shelves

15. The cabin port shelf extends between frames 8 and 12; the two portions described are removable parts of this structure. The forward portion is adjacent to the throttle lever and extends forward; the rear portion extends aft from just beyond the throttle lever to the end of the structure. Each portion is in the form of a panel with a side member, and is attached to the main structure by screws and fasteners. The rear portion has also an end plate on which plugs for connecting the cable assemblies to the shelf are carried. Control switches, warning lamps and indicators are carried on the panels, while below a hinged door in the top of the rear portion are terminal and fuse blocks supplying the equipment.

Cabin starboard shelf

16. The cabin starboard shelf, the major part of which is removable, extends between frames 8 and 12. The removable portion, in the form of a panel with a side member and end plate, is attached to the fixed structure by fasteners. Switches and circuit breakers, together with the radar controllers and fuel content gauges, are mounted on the panel, and a hinged door at the rear end provides access to the fuse and terminal blocks. The plugs for connecting the cable assemblies are on the end plate.

Radio relay box

17. The radio relay box is mounted on frames 17 and 18 in the radio bay. It contains the radio supply fuses and control relays, and is equipped with plugs for connecting the radio units. Further details of this box are given in Sect.6, Chap.1.

Servicing of panels and shelves

18. Equipment panels and the cabin shelves should be inspected regularly to ensure that they are clean, undamaged, and secure. Wiring and terminals should be inspected for signs of damage and corrosion. The fasteners of panels and shelves should also be inspected to ensure that they engage correctly, and are not damaged or distorted; particular attention should be paid to the springs. Fasteners found unlocked should be re-engaged, and any found defective should be renewed as described in A.P.1464B, Vol.1, Part 2, Sect.6, Chap.3.

19. For major servicing of the panels and shelves it is recommended that they be removed from the aircraft and replaced with serviceable units, thus reducing the time in which the aircraft is unserviceable. Faulty panels or shelves should be serviced in the servicing bay and held as spares. The method of removing panels and shelves is described in Group A.2.

Cable assemblies

20. A cable assembly consists of a number of cables assembled together by P.V.C. sleeving or straps to form a loom. In most instances cable assemblies are fitted with multi-pole plugs or sockets at their ends. The assemblies are referenced numerically, the number being prefixed by a letter which denotes their location in the aircraft, or, in certain instances, the service which they supply. Front fuselage cable assemblies are prefixed by the letter F; centre fuselage assemblies by C; and rear fuselage assemblies by R. Cable assemblies in the port wing have their numbers prefixed by the letter P, while those in the starboard wing carry the letter S. The artificial horizon, the GM-4F compass, and armament cable assembly numbers are prefixed by AH,GC, and A respectively. Cable assemblies in the engine bay hot zones are Nypren insulated.

21. Periodical inspections of cable assemblies should be made for signs of oil soakage, and also to ensure that they are properly supported and not chafed, cut, or damaged. Damaged cables must be renewed or repaired as described in A.P. 4343, Vol.1, Sect.12, Chap.5, and any slack support clips re-tightened.

Cables

22. Cables are identified at each end by means of rubber sleeves. At the end which connects to a unit, the marking on the sleeve denotes the unit and the terminal to which the cable connects. At terminal blocks, the sleeve marking denotes the unit and the terminal from which the cable originated. The types of cables used in the various circuits are given on the routeing diagrams and the table of cable abbreviations that follows paragraph 53. The method of servicing and repairing cables and P.V.C. conduit is described in A.P.4343, Vol.1, Sect.12, and A.P.4343C, Vol.1, Book 3, Sect.5.

Multi-pole plugs and sockets

23. Plessey standard and pressure-proof plugs and sockets, as well as Mk.4 miniature types, are used on cable assemblies, junction boxes, panels, etc. They are described in A.P.4343C, Vol.1, Book 3, Sect.5, Chap.1 and 8, and consist of internal mouldings holding the plug pins and socket inserts, which float in weatherproof metal housings. Plug pins and

socket inserts are identified by a letter or number on the internal moulding. To ensure correct mating, the pins and sockets are arranged in patterns, thereby preventing cross-connections or short circuits.

24. Plugs and sockets fitted to cable assemblies outside junction boxes, panels, etc., are provided with rubber sleeves and bungs, which seal the cable entry and prevent the ingress of moisture. The sleeves and bungs are retained in position by inner and outer ferrules locked by a coupling nut. Sockets can be identified by the cable assemblies to which they are attached; the reference being printed on the rubber sleeve or P.V.C. conduit. Plugs are also identified by their associated cable assembly reference or colour: the former is printed on the junction box or panel to which the plug is attached, and where two or more identical plugs or sockets are situated together, they are coloured for easy identification.

25. Before attempting to remove a Plessey standard or pressure-proof socket from its associated plug, the coupling nut which retains the sleeve and bung, or ferrule and P.V.C. assembly to the socket, must be slackened. This is necessary because the coupling nut also serves to lock the socket when it is mated with its plug. It is important that the coupling nut should also be slackened before fitting the socket to the plug. Effective contact should be completed by tightening the coupling nut by hand; assisting the operation by push-on the back. A spanner, or undue force, must not be used or damage may result.

26. Plugs and sockets should be inspected periodically for signs of corrosion. Any corrosive deposit found, must be removed taking care to avoid damaging the plated surfaces of pins and socket inserts. The importance of cleanliness and the need for regular lubrication of plug and socket screw threads cannot be over-emphasised if seizing of these threads is to be avoided. Grease MS–4 *(Ref.33H/9424829)* should be used and any excess wiped off. On no account should a lubricant with a graphite base be used.

27. For the purpose of inspecting or servicing cable connections to plugs and sockets incorporating rubber sleeves and bungs, access can be gained by releasing the sleeve at the coupling nut, and rolling it back clear of the connections.

Fuses

28. Fuses in the A.C. junction box, and on panels and shelves in the cabin are contained in quick-release fuse blocks. The fuses are referenced numerically, each panel and shelf having its own series of numbers. In most instances, the fuse number with the fuse rating and the code letters of the circuit it serves, appear on the wiring diagram in the box concerned. In certain instances this information is given on a photographic label attached to the fuse block. Most of the fuses are of Type S series. Table 1 gives the fuse locations, ratings, and fuse numbers. Fuses should be inspected periodically to ensure that they are serviceable and of the correct value. The reference numbers of the fuses used are:-

2.5	amp.	10H/21797
5	amp.	10H/4709560
10	amp.	10H/4709561
20	amp.	10H/4695448

29. The PR Mk.11 aircraft reconnaissance camera circuit fuses in the camera junction box are also listed in Table 1. The reference numbers of these fuses are:-

2 amp.	10H/059/0110
5 amp.	10H/059/0112
7 amp.	10H/059/0113
10 amp.	10H/059/9925

30. Dummy fuses are fitted in NOT IN USE circuits to prevent inadvertant operation of the circuit. These fuses, in red plastic, can be identified by feel, having square section centres and corrugated sides. One side is embossed "NOT IN USE". Whenever a live fuse is removed during servicing it should be temporarily replaced by a dummy fuse fitted with a 9 inch by 1 inch streamer. The reference numbers of the dummy fuses which may be used are:-

2.5	amp.	size fuse dummy	10H/21791
5	amp.	size fuse dummy	10H/21791
10	amp.	size fuse dummy	10H/21790

TABLE 1

Fuses

Location	Fuse	Size (Amp.)	Service
Supply panel	1	2.5	Hydraulic pressure warning
"	2	10	Ignition (Starboard)
"	3	10	I.F.F. (Dummy post-Mod 1319)
"	4	10	Ignition (Port)
"	5	2.5	Service lamp, radio bay
"	6	2.5	Service lamp, starter bay
"	7	2.5	Flap position indicator
"	8	5	Pressure refuelling
"	9	5	Fire warning
"	10	2.5	Fuel transfer pressure
"	11	2.5	Fuel transfer pressure
"	12	2.5	Fuel contents
"	13	2.5	Fuel contents
"	14	2.5	Tail plane position indicator
"	15	2.5	Aileron trim indicator
"	16	2.5	Rudder trim indicator
"	17	5	Arrester gear control
"	18	10	Anti-collision lamps (Mod 1443)
"	19	2.5	Fuel contents (port wing)
"	20	2.5	Fuel contents (starboard wing)
"	21	5	SSR test socket (Mod 1383/1387)
"	22	5	Power controls
"	23	10	Anti-collision lamps (Mod 1443)
"	24	20	Altimeter inv. supply (Mod 1383)
"	25	10	Bomb jettison and fuzing
"	26	5	Jettison gun (pylon)
"	27	10	Gun firing
"	28	5	Dummy (post-Mod 1441)
"	29	2.5	Booster pump indicator
"	30	2.5	Booster pump indicator
"	31	2.5	Dummy (Mod 1429)
Supply panel	32	5	Elevator power controls
"	33	2.5	Engine fuel pressure
"	34	20	Fire extinguisher
"	35	5	Fire extinguisher
"	36	-	Spare
	37	5	Altimeter inv. control (Mod 1383/1387)
A.C. junction box	1	2.5	No. 1 inverter relay
"	2	2.5	Compass d.c. bias
"	3	10	No. 1 inverter supply
"	4	10	No. 2 inverter supply
"	5	2.5	Radar Altimeter (Mod 1468)
"	6	-	Spare
"	7	-	Spare
"	8	2.5	Altimeter
"	9	2.5	Oil pressure blue phase
"	10	2.5	Engine top temperature control (blue phase)
"	11	2.5	Artificial horizon blue phase
"	12	2.5	Compass blue phase
"	13	2.5	Oil pressure red phase
"	14	2.5	Engine top temperature control red phase
"	15	2.5	Artificial horizon red phase
"	16	2.5	Compass red phase
Cabin port shelf	1	5	Emergency fuel pump
"	2	2.5	Alighting gear control
"	3	5	Gyro gun sight
"	4	-	Spare
"	5	2.5	Tail plane control
"	6	20	Tail plane control

TABLE 1 — Fuses (Continued)

Location	Fuse	Size (Amp.)	Service
Cabin port shelf	7	2.5	Tail plane control
"	8	5	Arrester gear control
"	9	5	Aileron power controls
"	10	5	Hood control
"	11	2.5	Aileron trim control
"	12	5	Auto-tone
"	13	-	Spare
"	14	-	Spare
"	15	-	Spare
"	16	-	Spare
"	17	2.5	Dummy, Mod 1429 (pre-Mod 1429 - Nose lamp on pre-Mod 228 GA a/c)
"	18	2.5	Alighting gear indicator
"	19	5	Alighting gear control
"	20	5	Flap control
"	21	5	Cabin pressurization control
"	22	5	Cabin pressurization control
"	23	5	Cabin pressurization control
"	24	5	Air brake control
Cabin starboard shelf	1	5	Navigation lamps
"	2	2.5	Oxygen regulator
"	3	10	Anti-collision lamps (Mod 1443)
"	4	10	Airstream direction detector (Mod 1231)
		2.5	Nose lamp, Mod 1429 (pre-Mod 1429 - Nose lamp on post-Mod 228 GA a/c)
"	5	2.5	Cabin panel lamps (U/V)
"	6	2.5	Cabin panel lamps (red)
"	7	2.5	Cabin lamps (shelves)
"	8	5	Engine anti-icing
"	9	-	Spare
"	10	10	A.C. supplies
"	11	5	Radar Altimeter Tx/Rx (Mod 1468)
"	12	2.5	Radar altimeter tone generator and amplifier (Mod 1468)
"	13	-	Spare
"	14	-	Spare
"	15	2.5	Fuel contents port tanks
"	16	2.5	Fuel contents starboard tanks

Location	Fuse	Size (Amp.)	Service
Generator control panel	1	5	Generator test socket No.2
"	2	5	Generator test socket No.2
"	3	5	Generator test socket No.1
"	4	5	Generator test socket No.1
"	5	5	Power failure indicator No.2
"	6	5	Power failure indicator No.1
"	7	10	A.C. supplies
"	8	-	Spare
Leg panel	1	2.5	Nose wheel bay service lamp
"	2	10	Fire extinguisher
"	3	2.5	Turn and slip indicator
"	4	2.5	Turn and slip indicator
"	5	10	Pressure head heater
"	6	10	G.45 camera gun
"	7	-	Spare
"	8	-	Spare
"	9	5	Engine temperature control
"	10	-	Spare
"	11	-	Spare
"	12	-	Spare
"	13	5	Engine starter
"	14	10	Engine starter
"	15	2.5	Standby altimeter (Mod 1383 or 1387)
"	16	-	Spare
Radio relay box	1	10	Standby battery
"	2	5	Tele-briefing
"	3	-	Spare
"	4	-	Spare
"	5	5	Test set
"	6	-	Spare
"	7	-	Spare

TABLE 1

Fuses (Continued)

Location	Fuses	Size (Amp.)	Service
Radio relay box			
"	8	-	Spare
"	9	5	Transmitter-receiver (standby)
"	10	-	Spare
"	11	-	Spare
"	12	2.5	Set selection
Power controls junction box	-	2.5	Elevator indicator
"	-	2.5	Aileron indicator

Location	Fuse	Size (Amp.)	Service
Camera junction box	1	10	P.R. Camera
" " "	2	10	P.R. Camera
" " "	3	10	P.R. Camera
" " "	4	2	P.R. Camera
" " "	5	2	P.R. Camera
" " "	6	7	P.R. Camera
" " "	7	7	P.R. Camera
" " "	8	7	P.R. Camera

Circuit breakers

31. All circuit breakers except those on and below the generator control panel in the radio bay are accessible from the cabin. Circuit breakers are not referenced, but each has the name of the circuit it protects marked adjacent to it. Circuit breaker interiors are inaccessible; servicing is therefore restricted to the functional and insulation tests described in the relevant equipment servicing A P. Circuit breakers, with their ratings, are listed on Table 2.

Note . . .

The starter and booster pump circuit breakers and those below the generator control panel are fitted with rubber packing at their mountings to prevent tripping due to vibration (S T I /Hunter/290). When replacing these circuit breakers ensure that this packing is re-fitted.

Relays

32. Relays are located in junction boxes and on the panels and shelves carrying electrical equipment. They are referenced alphabetically, the identifying letters being marked adjacent to the unit and also on the wiring diagram. Relays should be inspected regularly to ensure that they are undamaged and secure. They should also be subjected periodically to the functional tests described in the relevant equipment servicing A.P.

Note . . .

Relays that are operating correctly are best left alone. It is therefore recommended that the covers are not removed or the contacts cleaned, unless the relays are suspected of being defective.

Switches

33. The switches in this aircraft are sealed units which cannot be readily dismantled for servicing. They should, however, be inspected for cracks and signs of strain giving particular attention to the switch dollies.

Terminal blocks

34. Terminal blocks, with the exception of those fitted in junction boxes and on panels carrying electrical equipment, are used as distribution and breakdown points throughout the aircraft. These latter are quick-release, 2, 3, 5, 10 and 20-way types. Terminal blocks are referenced numerically, the numbers being preceded by the letters T.B. Each terminal on the block carries a coding plate on which the terminal number shown on the wiring diagram is marked. The location of terminal blocks are shown on the cable assembly layout and location diagrams contained in Group A 3.

Note . . .

Terminal Blocks 11, 22, 24, 32, 42, 43, 44, 45, 46, 47, 48, 73, 79, 87, 97, 98 should not be fitted with perspex covers (introduced by STIs 182A and 262).

34A. Where cable terminations take place at terminal blocks, microswitches and components, situated in exposed external areas, they are to be treated with grease MS–4 (Ref.33H–9424829) to prevent the ingress of moisture.

Filament lamps

35. When renewing filament lamps, reference should be made to Table 3 to ensure that the correct types of lamps are used.

Earth points

36. The engine starter, inverters, suppressors, and radio and radar sets are earthed either internally, or adjacent to their mountings. All other earth leads are grouped for easy servicing and insulation resistance testing, and are connected to the aircraft structure at stud type main earth points. The main earth points are numbered, and their locations are shown on the cable assembly layout diagram in Group A 3, and on the supply and earth routeing chart (fig.1 of this group). When refitting earth leads, care must be taken to ensure that surfaces in contact are clean, and, in particular, are free from grease and paint. Completed assemblies should be protected against corrosion by one coat of blue oil-base paint to D.T.D. Spec.827.

Circuit coding and group references

37. Each circuit of this aircraft is coded by means of a letter or letters. Normally, letters are the initials of the circuit title, e.g. the fire warning circuit is coded FW. It must be noted that these code letters are for reference only, and will not be found on the cables in the aircraft. They are, however, shown at every terminal connection in the aircraft on labels and wiring diagrams. The code letters are also given on the theoretical and routeing diagrams in the various groups of this chapter, because each section of a particular circuit is also referenced by a number preceded by the circuit code letters, e.g. FW.2, FW.4, etc. Table 4 lists all the circuits in this aircraft, with their code letters and the chapter and group in which they are described.

TABLE 2
Circuit breakers

Circuit	Rating (Amp.)	Ref. No.	Type	Location
Bomb and RP	15	5CY/4376383	A.3	Below supply panel
Gun sight mounting	10	5CY/9550803	A.2	Leg panel
No.1 generator field	10	5CY/9550803	A.2	Generator control panel
No.2 generator field	10	5CY/9550803	A.2	Generator control panel
AC supplies				
Normal	15	5CY/4376383	A.3	AC junction box
Stand-by	15	5CY/4376383	A.3	AC junction box
Hood control	15	5CY/4376383	A.3	Port shelf (rear)
Tail plane control	24	5CY/4376481	LGA/24/B1/1	Port shelf (forward)
Tank pumps				
Port	25	5CY/9992777	A.4	Starboard shelf
Starboard	25	5CY/9992777	A.4	Starboard shelf
ARC 52 (pre-Mod 1480)	25	5CY/9992777	A.4	Below supply panel
PTR 1751 (post-Mod 1480)	7.5	5CY/6429790	-	Below supply panel
Engine starting	45	5CY/4376060	A.6	Starboard shelf
No.1 and No.2 generators main	200	5CY/2853	D	Generator control panel
UHF services	45	5CY/4376060	A.6	Below supply panel
IFF (pre-Mod 1319)	45	5CY/4376060	A.6	Below supply panel
IFF/SSR (post-Mod 1319)	10	5CY/9550803	A.2	Below supply panel
PR Camera (PR Mk. 11 only)	45	5CY/4376060	A.6	Below supply panel
Nose lamp	35	5CY/9550804	A.5	Below supply panel
VHF services (Mod 1429)	5	5CY/9703169	A.1	Below supply panel

External supply socket

38. The external supply socket is mounted on the battery support structure below the batteries. Access to it is gained by opening the radio access panel, and the external supply is connected by means of a standard plug. When servicing the aircraft, it is important that the external supply be used, in order that the aircraft's battery will not be discharged. When the external supply is connected, the aircraft's generators are automatically isolated to prevent a reverse feed (Group B 1). It is recommended that the battery master switch on the leg panel be placed to OFF, thereby ensuring that the aircraft's batteries will not be discharged if the voltage of the external supply falls below that of the batteries.

Rendering aircraft electrically safe

39. When not required for flight, and also during any servicing operations not requiring the electrical supply, the aircraft must be rendered electrically safe. This eliminates any possibility of a short circuit causing accidental operation of armament or hydraulic units, etc., with consequent injury to personnel or damage to the aircraft. To render the aircraft electrically safe, the battery master switch must be put to OFF. In addition, it is recommended that the leads from the batteries be disconnected and stowed clear of the aircraft structure, since operation of the battery master switch will not disconnect the battery supply completely (Group B 1). Also ensure that the external supply is disconnected.

TABLE 3

Filament lamps

Lamp	Circuit	Qty.	Voltage	Wattage	Inter-Service Ref.No.
I F F /S S R failure warning	I F F /S S R (Mod 1319)	1	24	2.4	5L/9951273
Power failure warning	Generators and batteries	2	28	3.5	5L/9951273
Cabin pressure warning	Cabin pressurization and temperature control	1	28	3.5	5L/9951273
Alighting gear indicator	Alighting gear indicator	9	28	3.5	5L/9951272
Alighting gear warning	Alighting gear indicator	1	28	3.5	5L/9951273
Ultra-violet lamps	Cabin lighting	2	12	7.5	5L/9952261
Red lamps	Cabin lighting	8	24	2.8	5L/9951263
Red stand-by lamps	Cabin lighting	2	24	2.8	5L/9951263
Wing-tip navigation	Navigation lamps	2	28	24	5L/9952431
Tail navigation	Navigation lamps	1	24	10	5L/9952276
Service lamps	Service lamps	3	28	7	5L/9953271
Gun sight	Gun sight	2	22	12	5L/9951260
Hydraulic pressure indicator	Hydraulic pressure	1	28	3.5	5L/9951273
U H F control	U H F control	2	28	1.1	5L/9951122
Tele-briefing	U H F	1	28	3.5	5L/9951273
Fire warning	Fire warning and extinguisher	1	28	3.5	5L/9951272
Fuel pump warning	Emergency fuel pump	1	28	3.5	5L/9951272
Tank pump	Tank pumps	2	28	3.5	5L/9951273
Arrester hook	Arrester hook	1	28	3.5	5L/9951273
Warning lamps (*PR Mk.11 only*)	PR Cameras	3	28	3.5	F25/9951273
Fuel low level	Fuel contents	2	28	3.5	5L/9951273
Nose lamp warning	Nose lamp installation (Mod 1391)	1	28	3.5	5CX/1044332

TABLE 4

Circuit codes and group references

Circuit	Code	Chapter	Group
A.C. supplies	CH	1	E 1
Aileron trim controls	A	1	D 1
Aileron trim indicators	AD	2	3 B
Aileron power controls	PA	1	D 2
Airstream direction detector	ADD	2	3 B
Alighting gear control	UC	1	D 7
Alighting gear indicator	U	2	5 A
Altimeter	AL	2	3 A
Air brake control	AB	1	D 7
Artificial horizon	AH	2	3 B
Arrester gear control	AG	1	D 8
B+ distribution	B+	1	B 1
Bomb fuzing and S.S.D. control	BF	1	G 1
Bombs and pylon stores	BJ	1	G 1
Bomb release	BR	1	G 1
Camera	CG	1	G 1
Cabin lighting	M	1	F 1
Cabin pressurization and temperature control	CP	1	D 6
Reconnaissance Cameras *(PR Mk.11 only)*	FR	1	D 9
Engine anti-icing	EA	1	C 4
Engine starting	SA	1	C 1
Elevator power controls	PE	1	D 2
Emergency fuel pump	EF	1	C 5
Exhaust gas thermometer and top temperature control	ET	2	2 B
Fire warning	FW	1	C 2
Fire extinguisher	FE	1	C 2
Flap control	F	1	D 4
Flap position indicator	FD	2	3 B
Fuel content gauges	FG	2	2 A
Fuel transfer pressure warning	FP	2	2 A
Generators and batteries	GA	1	B 1
Gyro compass	GC	2	3 B
Gyro gun sight and camera recorder	GS	2	4 A
Gun firing	GF	1	G 1
Gun sight retractable mounting	SM	2	4 A
Hood control	HC	1	D 5
Hydraulic pressure warning	HP	2	5 A
I.F.F. radar	IF	1	H 1
L+ distribution	L+	1	A 1
▶ Navigation and anti-collision lamps	N	1	F 2 ◀
Nose lamp installation	HL	1	F 4
Oil pressure gauge	OP	2	2 C
Oxygen flow indicator	OX	2	5 A

TABLE 4

Circuit codes and group references (Continued)

Circuit	Code	Chapter	Group
Pressure head heater	P	2	3 A
Pressure refuelling	PR	1	C 3
R.P. firing and rocket battery	RP	1	G 1
Rudder trim controls	R	1	D 1
Rudder trim indicators	RD	2	3 B
Service lamps	L	1	F 3
Spare wiring	*	1	A 1
Tachometer	RA	2	2 C
Tail plane control	T	1	D 3
Tail plane position indicator	TD	2	3 B
Tank pumps	BP	1	C 3
Tank pump failure warning	PF	1	C 3
Turn and slip indicator	TS	2	3 B
▶ UHF and VHF radio installations	RT	1	H 1 ◀

Use of spare cables for emergency servicing

40. Fig.2 shows the spare cables available in the cable assemblies. These are provided for future modifications and additions to existing installations, but may also be used in an emergency to replace a defective cable. In this event, having located the defective portion of cable, refer to fig.2 to find a similar cable that can be used. At suitable points, modify the existing cable run to use the spare cable and isolate the defective portion. Amend the junction box, panel and shelf wiring diagrams accordingly, and note the fact of this change in the aircraft log book, with the instruction that the cable assembly containing the defective portion must be changed at the next available opportunity.

Note. . .

The reinstatement of a service by use of spare wiring is only to be adopted as a temporary measure to keep the aircraft operational.

Insulation resistance testing

41. As an interim measure, pending the introduction of a full insulation resistance test, the following procedure, which covers only the minimum requirements, should be carried out. Reference should also be made to the aircraft Servicing Schedule:-

(1) Disconnect the main and standby batteries and stow the connectors clear of the airframe structure.
(2) Remove all lamps.
(3) Disconnect the inverters.
(4) Disconnect earth points 1 to 20.
(5) Remove the white compass plug from the A.C. junction box.
(6) Remove the plugs from the fire extinguishers.
(7) Remove the supply plugs from both fuel contents gauge amplifiers.
(8) Disconnect the gun sight suppressor F.5.
(9) Bridge all other suppressors.
(10) Remove the voltmeter, if this has been fitted.
(11) Remove the lamps from the Type A cut-outs.
(12) Remove the engine igniter plugs.
(13) Disconnect all radio equipment.
(14) Place all switches to the ON position.

(15) Connect a 250-volt insulation resistance tester to the main battery positive lead and to an earth point of the aircraft.

Note . . .

It is not necessary to disconnect the suppressors if an insulation resistance tester, Type C (Ref.No.5G/152) is used.

Electrical cables on throttle lever

42. The engine throttle lever carries the gyro gun sight ranging twist grip control unit, which also incorporates the radio press-to-transmit and air brake control switches. The cables from these switches are clamped to the throttle lever, and pass through a grommet in the cabin port shelf. To avoid accidental operation of the hood control switch due to fouling by these cables, it is important that all excessive slack be eliminated as follows:-

(1) With the throttle lever fully forward, i.e. throttle open, draw the cables through the grommet on the cabin port shelf so that all slack between the throttle lever and grommet is taken up. Care must be taken during this operation to avoid kinking the cables at the clamp block on the throttle lever.

(2) Re-position the cable strapping to clear the guard on the hood control switch box.

◀ Bonding check

43. It is not required to carry out bonding checks on those parts of the airframe, or airframe systems which are capable of movement, or of being moved over an electrically conductive bearing *(e.g. control columns, rudder bars, etc.)*, physical examination that these items are correctly bonded being sufficient. The following items should, however, be checked using a Safety Ohmmeter Ref. 5G/1006388 or other suitable Safety Ohmmeter:-

(1) Metal frames of radio and radar equipment.

(2) Aerial mounting brackets.

(3) Electrical control and distribution panels.

(4) Fuel pipelines.

(5) Hydraulic pipelines.

(6) Engine.

(7) Jet pipe.

With the battery master switch OFF and the external supply disconnected, check each item from an aircraft main earth point. The maximum permissible resistance is 4.5 ohms. ▶

Main undercarriage electrical cables-replacement

44. When replacing the electrical cable looms from the compression microswitches on each main undercarriage leg, as called for during Major Servicing, the following points must be observed:-

(1) The run and strapping of the cables is to be in accordance with fig.4.

(2) Uninyvin 20 cable must not be used in this connection, because of its lack of flexibility. Unitersil 20 cable should be used.

(3) Hellerman Twin Grip Ring Tags *(Ref.5X/7553)* should be fitted to the cable terminations at the microswitches when the cable looms are changed.

INTERPRETATION OF DIAGRAMS

General

45. The wiring of all the circuits in this aircraft is shown on routeing and theoretical diagrams. Routeing diagrams show the complete wiring of each circuit and the physical relationship between the electrical components. The diagrams are divided into columns in which the names of junction boxes and panels through which the cable passes are shown, and which also give the circuit code, connector pin references, and the cable type, as well as break points and terminations. A plug and socket connection is indicated by a small semi-circle embracing a black dot; the semi-

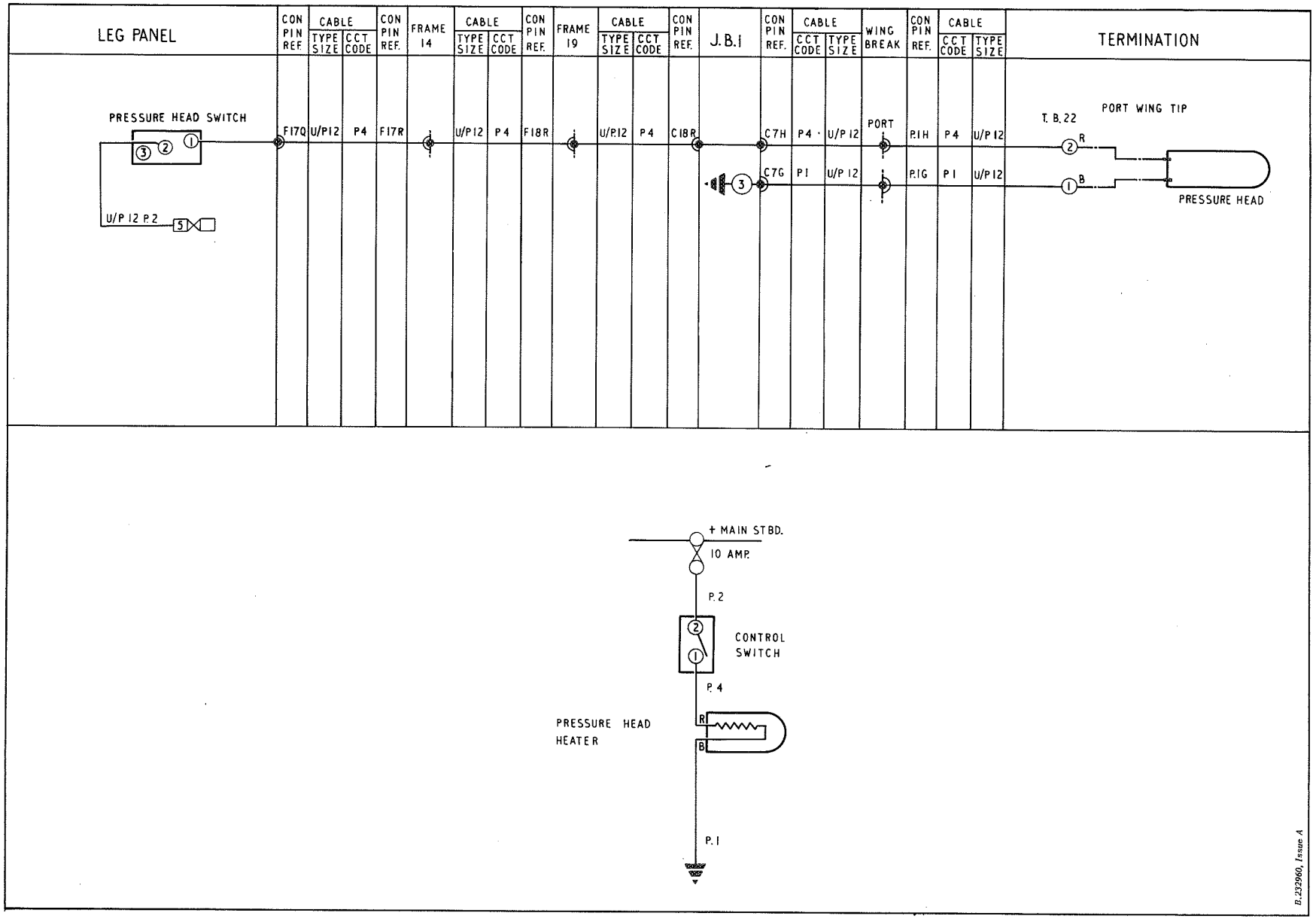


Fig.3 Typical routeing and theoretical diagram

RESTRICTED

circle denotes the socket and the dot the plug pin. Terminals in junction boxes and on equipment panels are represented by small circles with their reference numbers enclosed. Fuses are numbered and, in most instances are shown in the equipment panel column. The numbers refer only to the terminals and fuses in the box or on the panel concerned; each unit having its own series of numbers, as shown on the diagrams. External connections to the equipment are shown in correct relationship, but internal wiring is shown only on the theoretical diagrams.

46. In theoretical diagrams, symbols are used to represent items of equipment, whose internal wiring is also shown. The symbols are annotated and arranged so that the operation of the circuit can be readily understood. Since the diagrams are drawn to simplify reading, symbols do not appear in their correct physical relationship, but are positioned to give straightforward representation; the connections being arranged to assist in this. The fuse rating is given adjacent to each fuse, and each part of a circuit is referenced at suitable points with the circuit code. It must be noted that these circuit codes are for reference only, and will not be found on cables in the aircraft but are shown on labels and wiring diagrams at terminal connections through which the wiring passes. When reading theoretical and routeing diagrams, it will assist if reference is made to the cable assembly layout in Group A.3, and also to remember that all positive cable have even-numbered references, and all negative cables bear odd numbers.

47. With the exception of those annotated otherwise, routeing and theoretical diagrams are drawn to represent the condition of the circuits when the aircraft is at rest on the ground, with its alighting gear down, throttle closed, engine stopped and electrical power off.

Method of reading theoretical diagrams

48. Reading theoretical diagrams is simplified by starting at the fuse or circuit breaker which is shown at the top of the diagram, and then following the wiring through to the earth point at the bottom. As an example, the pressure head heater circuit, fig.3, may be considered. From the 10-amp. fuse, the positive supply cable, referenced P.2, is taken to the control switch, a single-pole switch marked OFF and ON. From the switch the positive supply cable, P.4, passes to the heater element in the pressure head. The negative return from the heater, referenced P.1, is connected to earth.

49. From the above example and a study of the diagram, it will be seen that, when the switch is closed, the heater element will be supplied with current and will thus heat the pressure head.

Method of reading routeing diagrams

50. Routeing diagrams are divided into columns (paragraph 43), and all circuits commence from a fuse or circuit breaker, which is shown in one of the shelf, panel, or termination columns. For an example, the pressure head heater circuit in fig.3 may again be considered.

51. From fuse No.5, on the leg panel, the positive supply is conducted by a unipren 12 cable, referenced P.2, to terminal 2 of the pressure head switch, which is also mounted on the leg panel. From terminal 1 of the switch, another unipren 12 cable, referenced P.4, connects with pin Q of plug F.17 on the leg panel. Cable assembly F.17 mates with this plug and a further unipren 12 cable, also referenced P.4, and connected to pin Q of the socket, continues the supply to pin R of a plug and socket break at frame 14.

52. After this break the cable assembly number changes to F.18, and the unipren 12 cable, still referenced P.4 and connected to pin R, continues to a plug and socket break at frame 19. At this point the cable assembly number changes to C.18, and the unipren 12 cable, still referenced P.4, continues to pin R of plug C.18 attached to J.B.1. The cable passes through the junction box, leaving it via pin H of plug C.7 on J.B.1. The cable assembly C.7, which mates with this plug, passes to the port wing plug and socket break.

53. After the break the cable assembly number becomes P.1, and the unipren 12 cable, still referenced P.4 and connected to pin H of the socket on this cable assem-

bly, continues to terminal 2 of T.B.22 in the port wing-tip. From this terminal the red core of the pressure head heater cable continues the supply to the heater element.

54. The negative return from the heater, the blue core, is connected to terminal 1 of T.B.22. From this a unipren 12 cable, referenced P.1 enters cable assembly P.1 and connects to pin G of the plug and socket break in the port wing. After this break, the cable assembly number changes to C.7, and the cable, still referenced P.1, connects to pin G of the plug on this cable assembly and runs to J.B.1. Here it is connected to pin G of plug C.7 on the junction box. From the plug a length of unipren 12 cable connects with earth terminal 3 in J.B.1.

Cable abbreviations

55. Table 5 should be used in conjunction with the cable type and size column on the routeing diagrams to define the types of cable used in the various circuits in the aircraft.

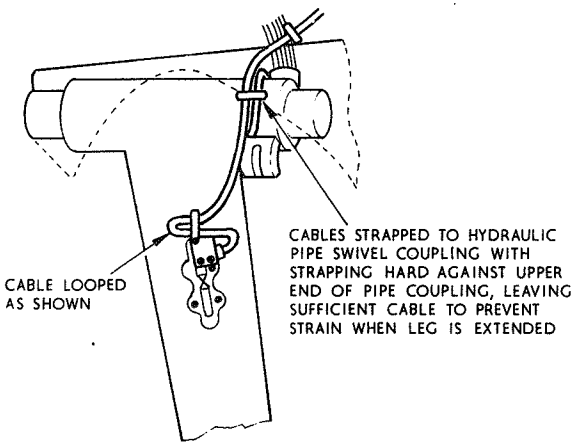
Junction box, panel and shelf wiring diagrams

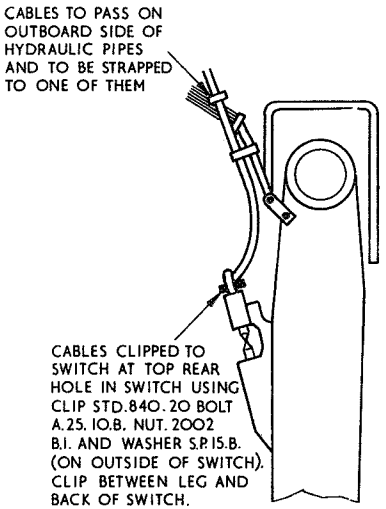
56. To facilitate servicing, each junction box, equipment panel, and shelf of this aircraft contains a diagram of its electrical wiring. These diagrams give the cable size, terminal numbers and plug references, together with the fuse numbers, ratings and the services that they serve. A record of the modification state of the box or panel is also included on the diagram.

TABLE 5

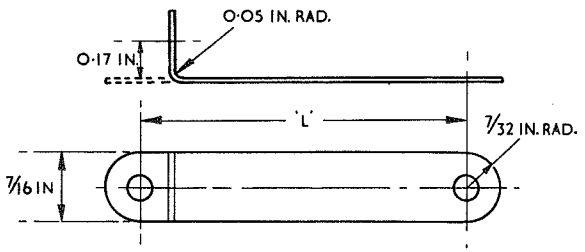
Cable abbreviations

Abbreviation	Definition
U/P	Unipren
D/P	Dupren
T/P	Tripen
D/P SHEATH	Duprensheath
T/P SHEATH	Tripensheath
Q/P SHEATH	Quinprensheath
U/PM	Uniprenmet
D/PM	Duprenmet
T/PM	Triprenmet
U/NYP	Uninypren
U/FIRE	Unifire
D/CS	Ducralsil
D/CV	Ducralvin
MIN.2C etc.	Miniature cables 2C (etc.)



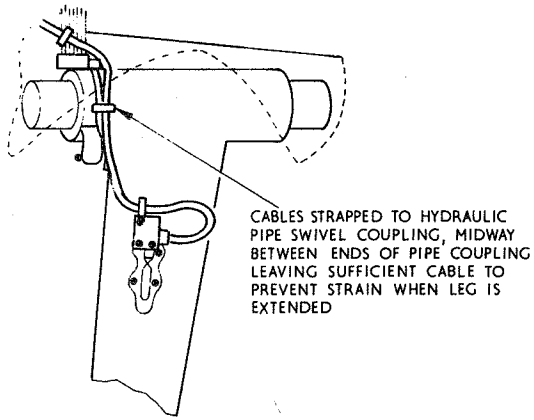


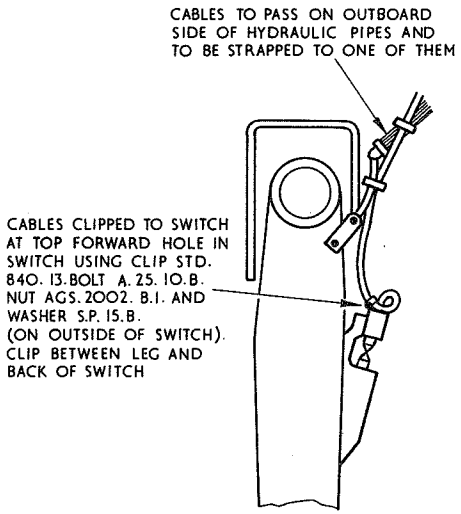
PORT LEG



DETAIL OF STD. 340 CLIP
MAKE FROM 22 G. L.A.

STD. 840.13 'L'=1·31N.
STD. 840.20 'L' 2·0 IN.
HOLES MORSE No.10





STARBOARD LEG

CABLES STRAPPED WHERE SHOWN WITH HELLERMAN STRAPS AND STUDS, HV.3341 (1/2 IN. WIDE) AND HV.3342 ON POST MOD. 178 OR MOD. 197 AIRCRAFT.
ON PRE MOD. AIRCRAFT CABLES CLIPPED TO SWITCH AS SHOWN BUT STRAPPED TO FLEXIBLE HYDRAULIC PIPES AS BEFORE

Fig. 4 Clipping of cables from undercarriage compression switch