Group A.1

SYSTEM DETAILS

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

Introduction

1. This Group contains a general description of the aircraft electrical system, together with wiring details and general servicing information. Tables listing the ratings and References of the fuses, circuit breakers, and filament lamps are also given, together with circuit coding details and a circuit index. For detailed information on the standard items of equipment employed, reference should be made to the appropriate Air Publications, which are listed at the beginning of each Group of this chapter.

2. The system is of the 28-volt, single-pole, earth return, voltage regulated type. It is supplied by two Type 515A generators, connected in parallel and stabilized by two Varley Type 24.15/35EO 24-volt, 35 amp. hour batteries, which are connected in parallel and float across the output of the generators. The batteries are equipped with vented protective covers and the external connections are made by self-locking Elcon-type 2-pole plug and socket combinations. A test socket is provided for checking the state of charge of the batteries 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 in the event of failure of the normal supply.

3. The generators are mounted on, and driven by, the auxiliary gearbox 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 batteries are mounted on platforms also located in the radio bay. The supply circuit from the generators and batteries to

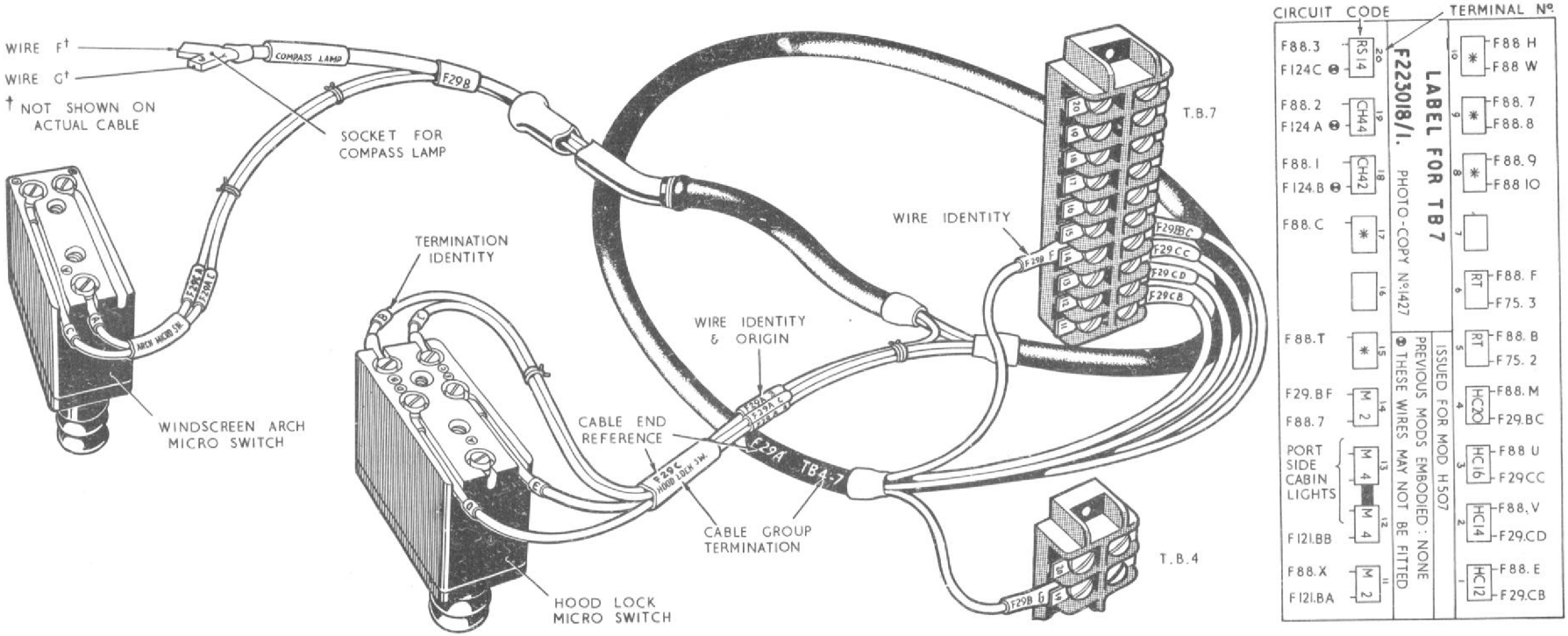

Fig.1 Typical cable assembly

the fuse bus-bars is shown, together with the earth points, in Group B.1.

4. The wiring cable assemblies in the front fuselage are contained in the main Trunking situated below the ejection seats and run out in P.V.C. conduits to panels and junction boxes located at points suitable for distribution to the equipment. The cable assemblies in the centre and rear fuselage, together with those in the wings, run from junction boxes to terminal blocks situated at points convenient for the equipment and for breaking down the aircraft. The majority of the cable assemblies are provided with weatherproof multi-pole plug and socket breakdown points and whenever possible the cable connections to the pins are crimped. To facilitate servicing and testing, earth return connections are restricted in number and taken to stud type earth points; these are shown on the cable assembly layout, *(Group A.3)*, and also on the earth routeing charts given in Group B.1.

DESCRIPTION

Interpretation of diagrams

General

5. 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-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.

6. 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 straight-forward 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 cables have even-numbered references, and all negative cables bear odd numbers.

7. 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

8. 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, consider the circuit of the port tank pump failure warning, illustrated in Group C.3. From the 2.5 amp. fuse, the positive supply lead PF.2 goes to the pressure switch, which is of the type whose contacts close when the pressure falls. From the switch, the positive supply lead, now referenced PF.6, passes to the warning lamp. The negative return from the lamp is connected to earth, which is marked ETH.

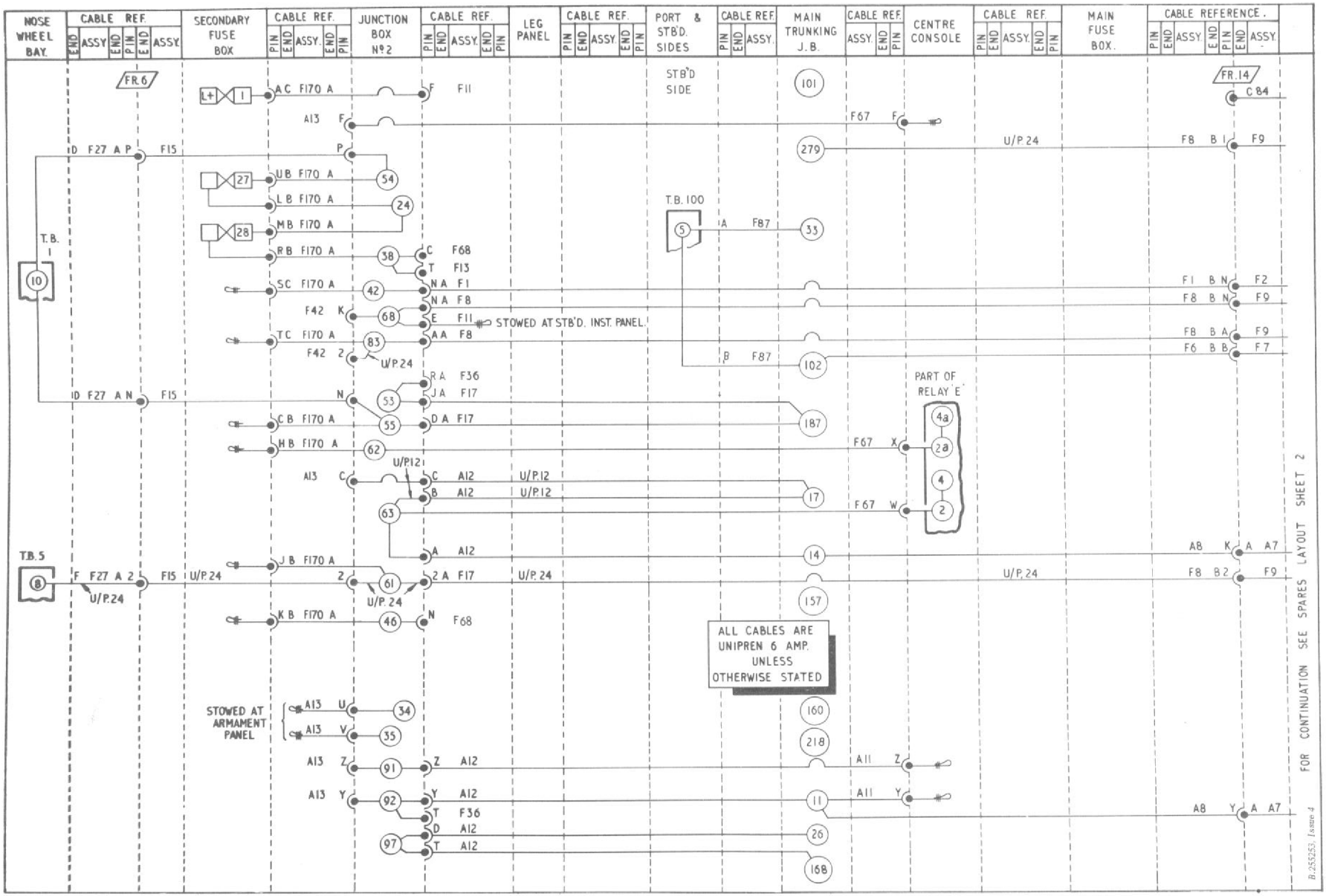

Fig.2 Available spare wiring - sheet 1

9. From the above example and a study of the diagram, it will be seen that when the pressure falls and the switch is closed, the lamp will be supplied with current, and will light, giving warning of pump failure.

Method of reading routeing diagrams

10. Routeing diagrams are divided into columns *(para.5)* and all circuits commence at a fuse or circuit breaker, which is shown in one of the fuse box, junction box, panel, or other termination columns. For an example, the port tank pump failure warning circuit in Group C.3 may again be considered.

11. From fuse No.5 on the supply panel, the positive supply cable is connected to pin Z of plug C.4 attached to the panel. End A of cable assembly C.4 mates with this plug, from which a further cable, PF.2 has its end connected to a terminal of the pressure switch, which is situated adjacent to frames 21 and 22 in the centre fuselage.

12. From the other terminal of the pressure switch, a cable contained in cable assembly C.4, and referenced PF.6 is run forward to pin X of the plug and socket connection on the supply panel. Pin X is wired to terminal 19 on the panel, and from this terminal a further cable in cable assembly F.2 conducts the supply to the plug and socket connection at frame 14, where cable assembly F.2 mates with end B of cable assembly F.1, via pin R.

13. Cable assembly F.1 runs forward to the main trunking, through which it passes *(as indicated by the arched line)* without being connected. It continues to J.B.2, which it enters, and, without being connected, emerges and connects to end A of cable assembly F.62, via pin R of the junction box connector. Still referenced PF.6, the cable runs to the centre instrument panel, where end B connects to the positive terminal of the port tank warning light. The negative return from the lamp is connected to the centre instrument panel earth line, and so to earth as shown on the earth routeing chart in Group B.1.

Circuit coding and group references

14. Each circuit of this aircraft is coded by means of a letter or letters, which normally consist of 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 by means of a label or wiring diagram. The code letters are also shown 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. FW2, FW4, etc. A list of the circuits employed in this aircraft, together with their code letters and the chapter and Group references of the Section is given in Table 1.

TABLE 1

Circuit codes and group references

Circuit	Code	Chapter	Group
A.C. supplies and control	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
Alighting gear control	UC	1	D.7
Alighting gear indicator	U	2	5.A
Air brake control	AB	1	D.7
Artificial horizon	AH	2	3.B
◀ Altimeter	AL	2	3.C
Autostabilizer *(pre Mod.1376)*	AS	1	D.9 ▶
Arresting gear control	AG	1	D.10
◀ Airstream direction detector	AA	2	3.B ▶

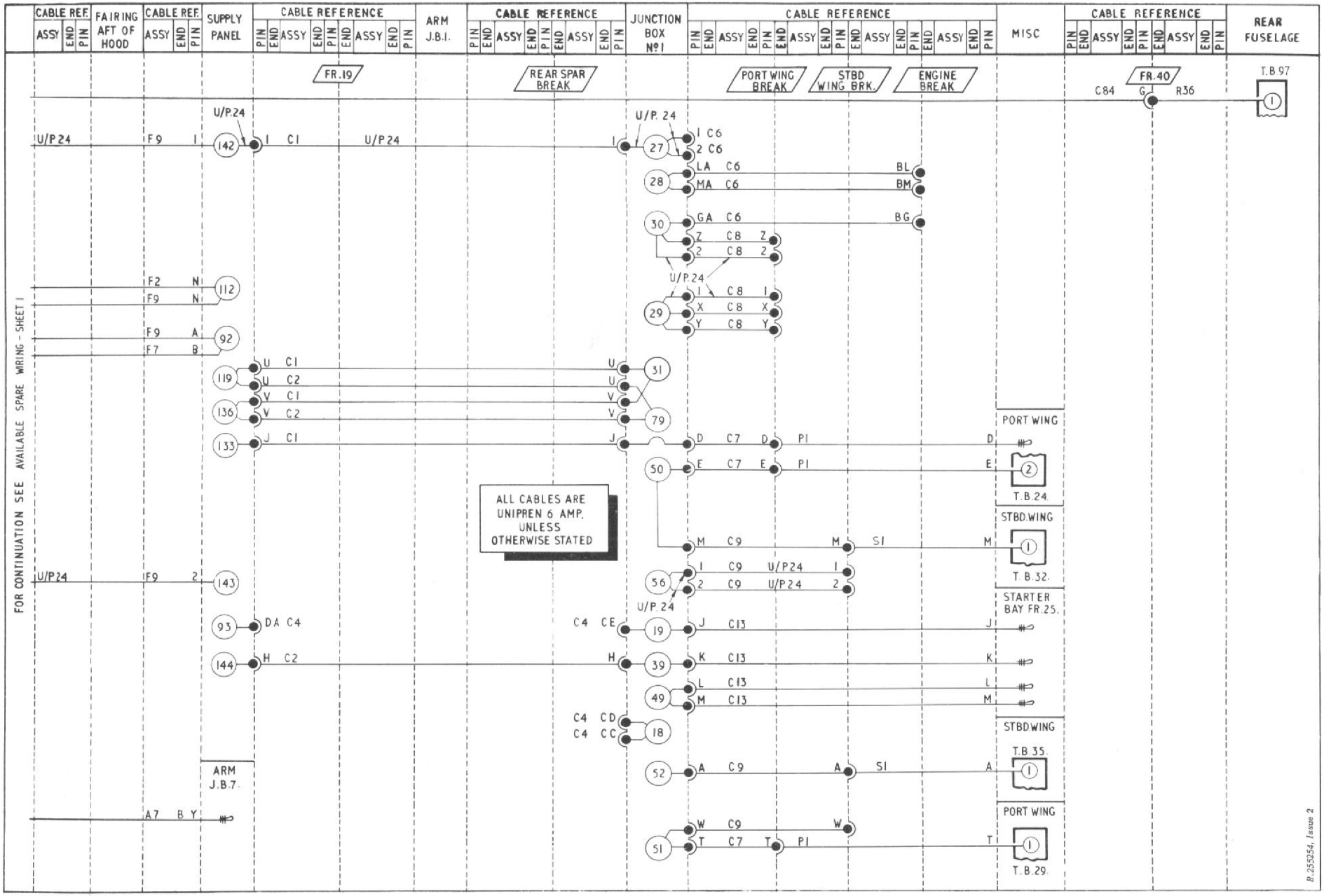

Fig. 3 Available spare wiring — sheet 2

(Minor amendment)

TABLE 1 (Continued)
Circuit codes and group references

Circuit	Code	Chapter	Group
Arresting hook	AG	1	D.10
Bomb fuzing	BF	1	G.1
Stores and drop tank jettison	BJ & JG	1	G.1
Stores release and rocket battery	BR	1	G.1
B+ Distribution	B+	1	B.1
Cabin lighting	M	1	F.1
Cabin pressurization and temperature control	CP	1	D.6
Drop tank empty warning	DE	2	2.A
Drop tank jettison	BJ	1	G.1
Ejector release	BR & BJ	1	G.1
Emergency fuel pump	EF	1	C.6
Engine anti-icing	EA	1	C.4
Engine starting	SA	1	C.1
Elevator power controls	PE	1	D.2
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 filter de-icing	EFD	1	C.5
Fuel transfer pressure warning	FP	2	2.A
Generators and batteries	GA	1	B.1
Gyro gun sight and camera recorder	GS	2	4.A
Gun firing*	GF	1	G.1
Hood control	HC	1	D.5
Hydraulic pressure warning	HP	2	5.A

Circuit	Code	Chapter	Group
IFF/SSR *(post Mod.1371)*	IF	1	H.1
Integrated flight instrument system Standby instruments Internal power supplies		2	3.A
Integrated flight instrument system lighting	M	2	3.A
L + distribution	L+	1	B.1
M.R.G. Navigational display	M.R.G.	2	3.A
M.R.G. power supplies	M.R.G.	2	3.A
Navigation lamps	N	1	F.2
Oil pressure gauge	OP	2	2.C
Oxygen flow indicator	OX	2	5.A
Parachute brake	TC	1	D.8
Pressure head heater	P	2	3.C
Pressure refuelling	PR	1	C.3
Radio and radar supplies	RT & TR	1	H.1
Rocket battery	BR & RP	1	G.1
R.P. firing	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
Tacan radio	TR	1	H.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
U.H.F. radio	RT	1	H.1

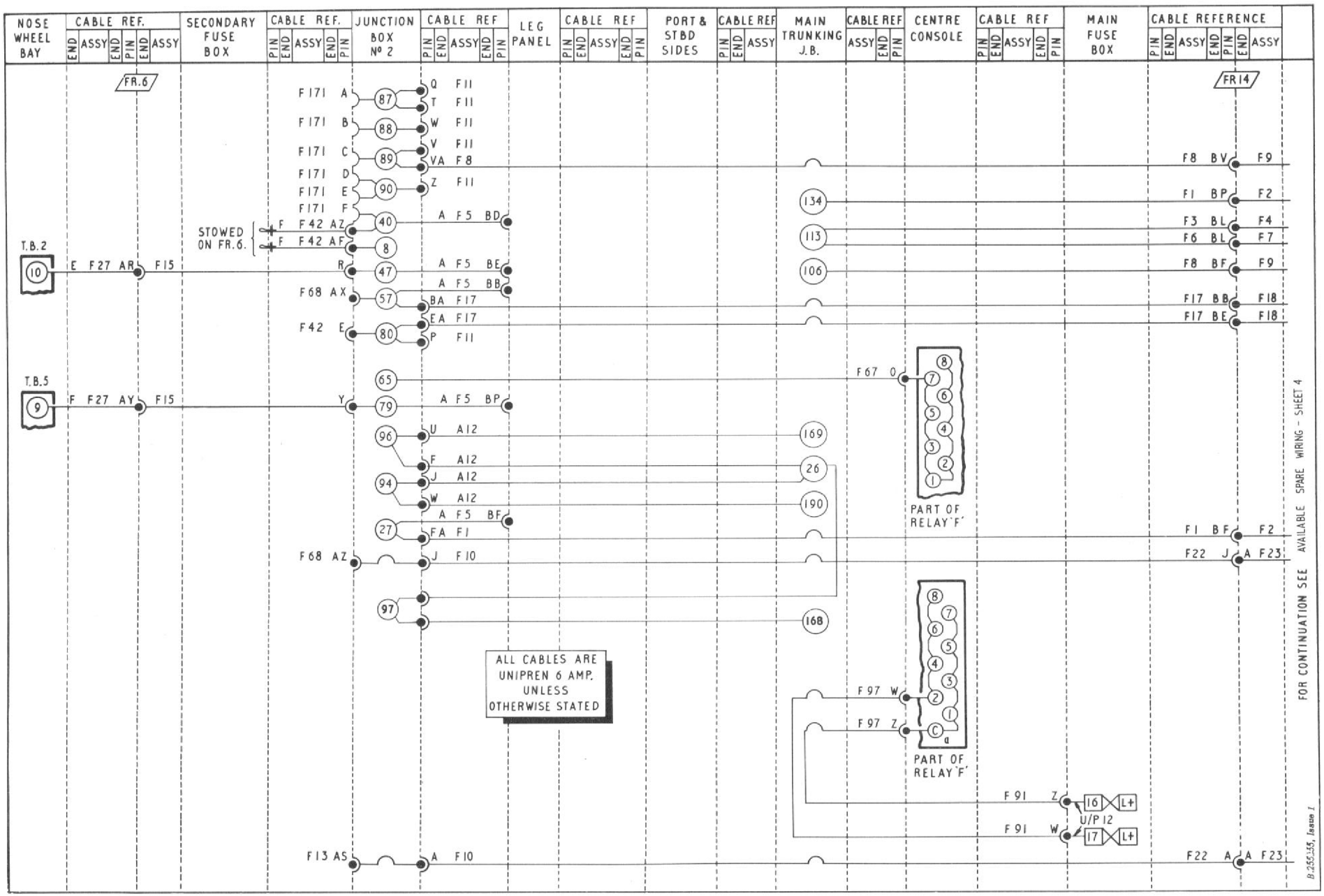

Fig. 4 Available spare wiring — sheet 3

◀ (Minor amendment) ▶

Cable abbreviations

15. Table 2 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

16. 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 they serve. A record of the modification state of the box or panel is also included on the diagram.

Main trunking

17. The main trunking is in the form of a shallow tray which extends across the cabin below the ejection seats, and is provided with readily detachable lids. It contains a large number of terminal blocks and cable assemblies and is the main distribution point for the electrical equipment in the front fuselage. It is bolted to the cabin floor and is designed so that it can be removed, complete with its cable assemblies, in a comparatively short time for major servicing. Access to the trunking, for daily servicing or simple modifications using existing or spare wiring, may be obtained by raising the ejection seats on their guide rails. For complete removal of the trunking, the ejection seats must, however, be removed to provide access. The method of removing the trunking is described in Group A.2. A diagram of the wiring contained in the trunking is attached to the inside of the starboard lid.

TABLE 2

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.)*

WARNING

Before attempting to raise or remove the ejection seats, refer to the ejection seat lethal warning at the front of this volume.

Centre console

18. The centre console is in the form of a box, which is bolted to the cabin floor on the centre line of the aircraft. It extends from the instrument panels to the trunking, and contains most of the relays for the front fuselage electrical system, together with certain controls and switches used by the pilots. It also serves as a cover to the cable trough on which it is mounted. A detachable door on each side of the console provides access to the equipment, and the complete console may be removed for major servicing, as described in Group A.2. A diagram of the internal wiring is contained within the console.

Main fuse box

19. The main fuse box is supported on quick-release mountings on the forward face of the flying control casing in the cabin, and, as its name implies, contains the majority of the circuit fuses for the aircraft's electrical equipment. The box is provided with a readily detachable lid for fuse replacement and a wiring diagram of the contents of the box, including fuse details, is attached to the inside face of this lid.

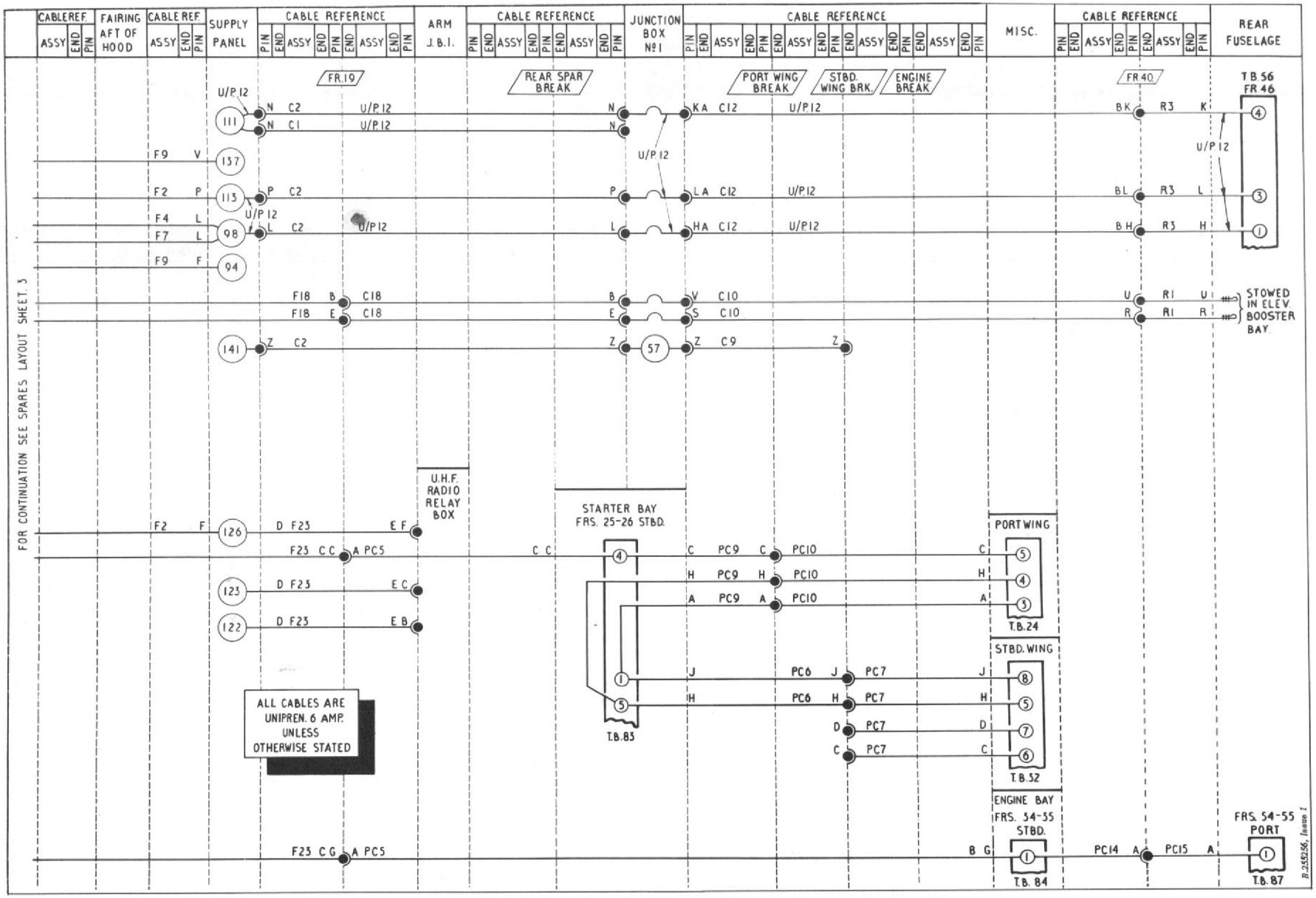

Fig.5 Available spare wiring - sheet 4

Secondary fuse box

20. The secondary fuse box is mounted on top of the gyro gun sight suppressor on the starboard side of the cabin floor; the top of the fuse box being clamped to the lower tube of the instrument panel mounting structure. It contains fuses supplying the instrument panel equipment that were formally housed in J.B.2, making these more readily accessible.

Leg panel

21. The leg panel is in the form of a box, which is secured to the cabin floor below the instrument panels, just forward of the pupil's control column, a detachable cover plate on the port side of the box provides access to the internal wiring. The forward face of the box slopes backwards and carries the plugs for the cable assemblies to and from the box. The rear face of the box carries the oil pressure gauge, generator power failure warning lamps, ignition and starter selector switches, and a number of ganged control switches. A wiring diagram of the box is attached to the inside face of the detachable cover plate.

Junction boxes

22. These are of welded aluminium, waterproof construction, and contain terminal blocks and other equipment. Generally, they are numbered for reference, the number being preceded by the letters JB. The A.C. junction boxes are designated A.C. J.B. No.1, and A.C. J.B. No.2, and armament junction boxes as ARM. J.B.1, etc. The terminals in each box are numbered, and can be identified by referring to the wiring diagram contained in the box, On the diagram, spare terminals with wires connected to them are starred denoting that the wires are spares. Spare wires in the boxes are long enough to reach any other terminal in the box. The surplus lengths of wire from terminals in the main trunking are stored in the cable trough under the centre console. Where a cable passes through a box without connecting to a terminal, the cable is wired pin to pin between its associated plugs; this is indicated on the routeing diagrams by an arched line in the column concerned. Each such wire in the main trunking and J.B.2 has a marker sleeve attached to indicate its point of origin for location and identification purposes.

23. Junction box number 1 is the major distribution point for the equipment in the centre fuselage and is mounted on the bottom rear face of the main spar frame. Junction box number 2 is mounted just forward of the instrument panels and is used as a distribution point for the equipment on these panels and in the fuselage nose. Access to the interior of J.B.2, is gained from above the instrument panels after the removal of the lid from the top of the box.

24. The junction boxes are provided with readily detachable lids and have, in general, been designed for ease of removal, being supported on quick-release mountings; an exception is J.B.2, which necessitates removal of the instrument panel. When major servicing is necessary, it is recommended that the boxes are removed from the aircraft and replaced with fully serviced components, thus reducing the time in which the aircraft is unserviceable. The faulty boxes should then be serviced on the bench, and returned to store to be held as spares. The method of removing the boxes is described in Group A.2.

A.C. junction box No.1 and No.2

25. A.C. junction box No.1 is mounted aft of the cabin starboard shelf. It contains both d.c. and a.c. circuit fuses; the latter supplying a.c. operated equipment, and the former supplying d.c. to equipment requiring both supplies. A.C. junction nox No.2 is mounted in the nose wheel bay, and is used to distribute supplies to the Tacan equipment in the bay, and to the air data computer on frame 1.C.

Armament junction boxes

26. ARM. J.B.1 is located on the starboard fuel tank access door on the forward face of frame 19. ARM.J.B.3 and 4 are situated in the port outer wing, being mounted on the top skin of the wheel bay and the diaphragm between interspar ribs Q and R respectively. ARM. J.B.5 and 6 are located in similar positions in the starboard outer wing. Junction boxes ARM. J.B.7 and 8 are located side by side in

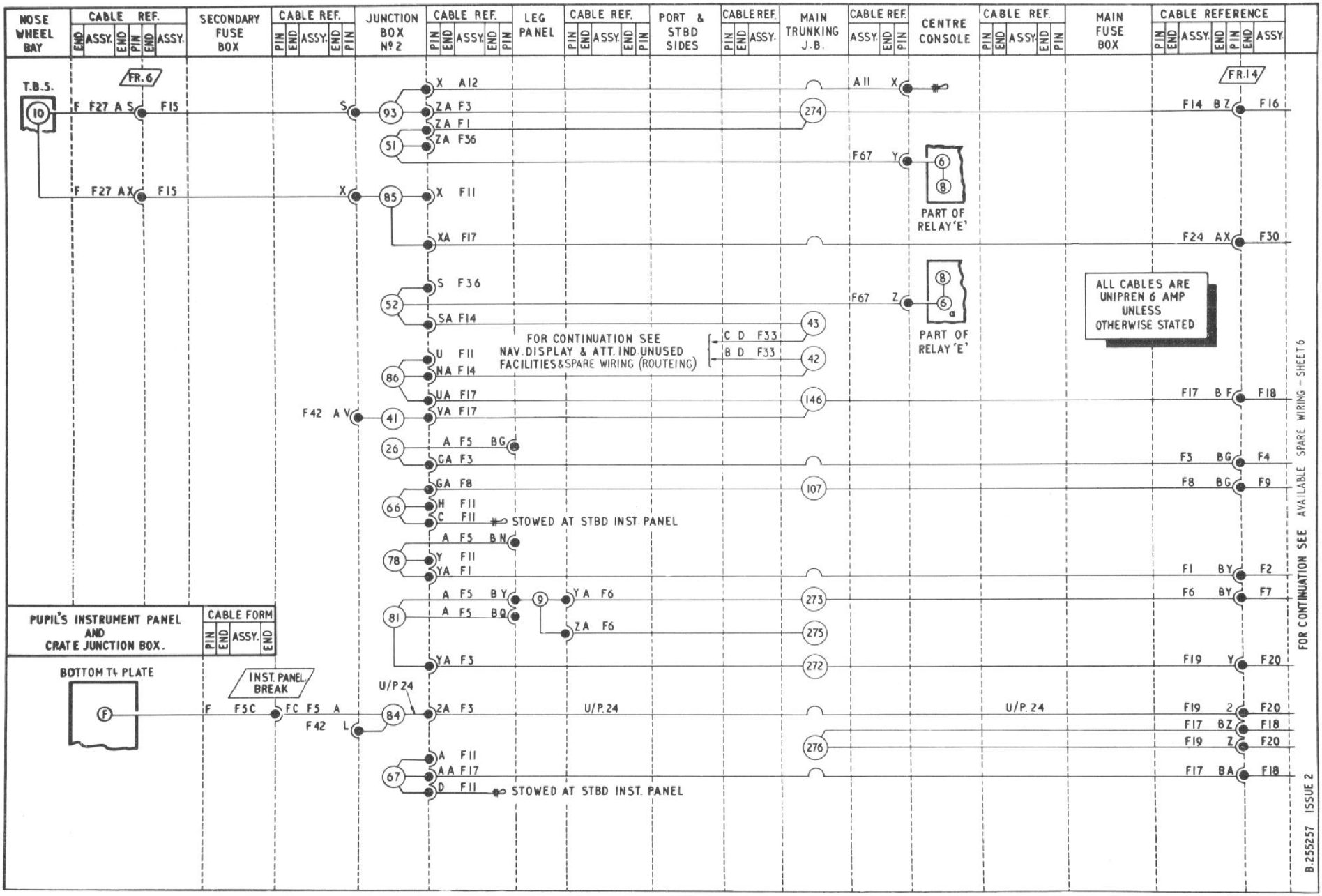

Fig. 6 Available spare wiring – sheet 5

(Minor amendment)

the radio bay, being mounted on the starboard undersurface of the cross member adjacent to frame 18A. All these ARM junction boxes are used as breakdown and distribution points for the armament services and it should be noted that ARM. J.B.2, which on standard Hunter aircraft is located in the cabin, is not installed in this aircraft, its function being carried out by the centre console.

Flight instrument crate junction box

27. This junction box is in the form of a crate divided into five compartments which house the instruments of the integrated flight instrument system. The complete crate assembly is carried on spigots attached to the instrument panel mounting structure, and is retained in position by special locking catches. These must be released, and the crate assembly withdrawn, to gain access to the junction box, which contains terminals and wiring associated with the flight instruments. A wiring diagram is also provided in the box.

Generator control and supply panels

28. These two panels are located together between frames 16 and 19 on the starboard side of the radio bay in the front fuselage. The supply panel, which is curved, is located outboard of the generator control panel and is attached to frames 17A and 17B. This panel carries a number of terminal blocks, fuse boxes and relays, together with plugs for the cable assemblies to and from the panel. The generator control panel, which fits over the supply panel to form a lid, is hinged at its top edge to channel members extending upwards from the supply panel and is attached to this latter panel by four Dzus fasteners along its lower edge. This panel contains all the generator control components, fuse boxes and test equipment sockets. When raised for access to the supply panel, the generator control panel may be retained in the raised position by a hook attached to a chain secured to the local structure.

◀ **Note . . .**

To prevent short circuits between the generator control panel retaining chain and the supply panel terminals, care must be taken to ensure that the chain is adequately secured after removal and replacement of the panel and when servicing in the vicinity takes place. Particular attention must be paid to the serviceability of the hook before reattachment. A damaged hook must be renewed. ▶

Radio relay box

29. This box is supported on a quick-release mounting located at the top of the radio bay on the rear face of frame 15. It contains the radio supply fuses and control relays, together with plugs for the radio connectors to and from the box. For further details of this box, reference should be made to Section 6, Chapter 1.

Cabin port shelf and switch panel

30. The cabin port shelf extends aft from the instrument panels to frame 11, and has a miscellaneous switch panel located at its rear. The shelf comprises a top panel and side member; the forward portion being detachable. Various control switches, warning lamps and indicators are mounted on the shelf, and this equipment is wired via the main trunking; some equipment on the rear portion of the shelf is also fed via a terminal block located adjacent to the throttle control box.

Cabin starboard shelf

31. The cabin starboard shelf extends aft from the instrument panels to frame 11, and consists of a top panel and side member. It carries control units, indicators, and various control switches. The equipment on the shelf is supplied via a terminal block which is located under a guard cover situated above the shelf, between frames 9 and 10.

Cable assemblies

32. These consist of cables held together by P.V.C. sleeving or straps to form looms, most of which are fitted at the ends with multi-pole plugs or sockets. The assemblies are referenced numerically, the number being prefixed with a letter denoting their location in the aircraft or, in certain special installations, the service which they supply. Front fuselage cable assemblies are prefixed by the letter F; centre fuselage assemblies by the letter C; and rear fuselage assemblies with the letter R. Cable assemblies in the port wing are prefixed by the letter P; and those in the starboard wing carry the letter S. The cable assemblies of the artificial horizon, armament, and a.c. supplies installations are prefixed with the letters AH, A, and AC respectively. Cable assemblies in the engine bay hot zones where oil contamination is possible, consist of Nypren insulated cables. The majority of the cable assemblies in the front fuselage are contained in P.V.C. conduits.

Cables

33. All individual cables in a cable assembly are identified by the cable

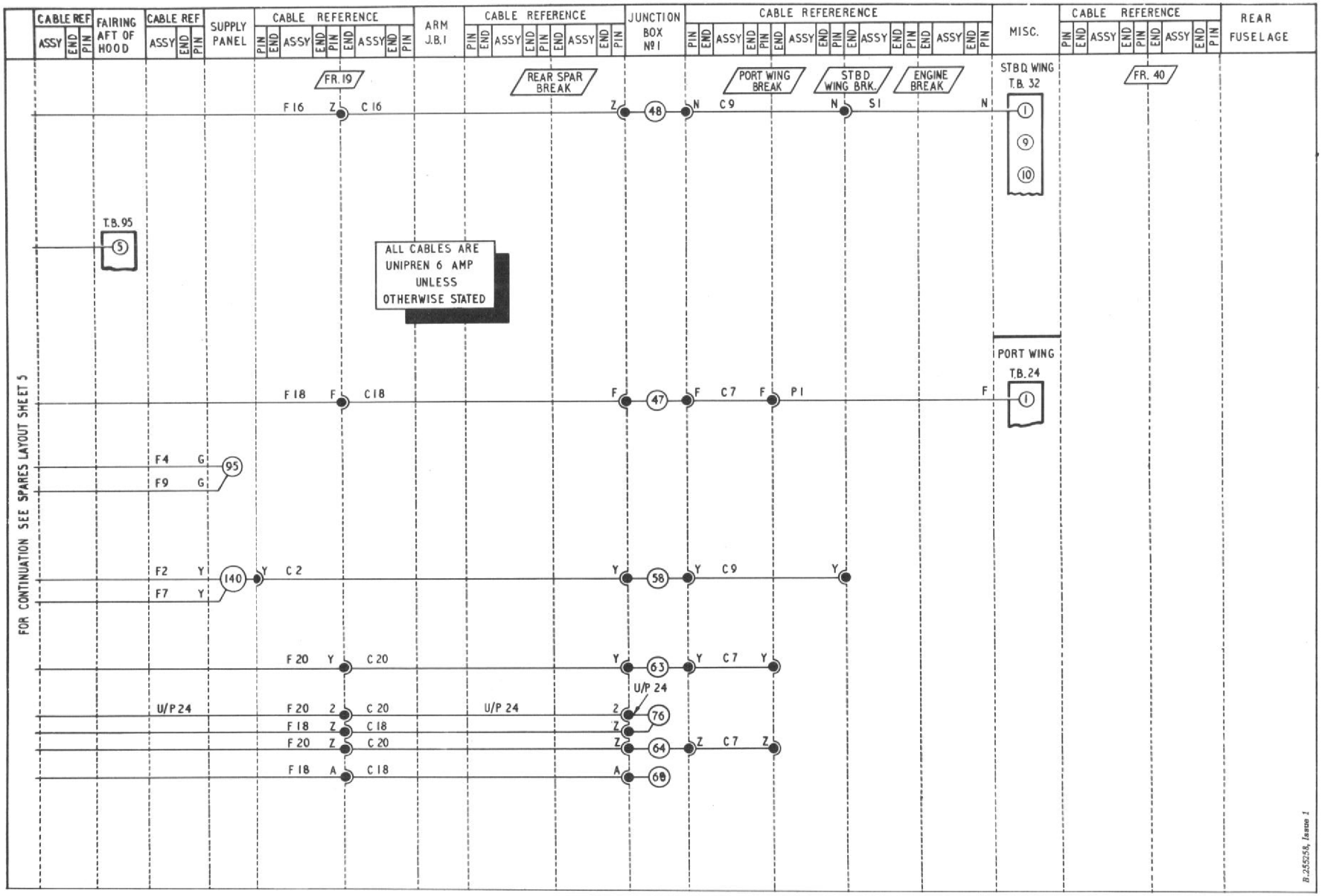

Fig.7 Available spare wiring - Sheet 6

assembly code number and end reference plus the letter of the plug pin, socket insert or equipment terminal to which they are connected. For example, consider cable assembly F.29 *(fig.1)*, which is a general services cable in the front fuselage. It connects between terminal blocks number 4 and 7, located together above the cabin port shelf, and the compass lamp, windscreen arch microswitch and hood lock microswitch. The end of the cable assembly connected to T.B.4 and 7 is known as F.29A; that connected to the compass lamp and windscreen arch microswitch, which is split to form two end tails, is known as F.29B, and the end connected to the hood lock microswitch is known as F.29C. These cable assembly end references, together with the cable group terminations *(e.g. F.29C, hood lock microswitch)* are marked on plastic sleeves passed around each bunch of cable. The individual cables of each bunch also carry sleeves at each end, on one of which is marked its remote end and identify, and on another, its local terminations *(e.g. E. F.29B.A at end C of the assembly and A. F.29C.A at end B)*. It can thus be seen that this length of cable extends from terminal E of the hood lock microswitch to terminal A of the windscreen arch microswitch. End A of the cable assembly is connected to T.B.4 and 7 as previously stated, and on these terminal blocks will be found labels to indicate to which terminal numbers the cable cores are connected. For the type of cable employed in the various circuits, reference should be made to the routeing diagrams and to the table of cable abbreviations given in this Group.

Multi-pole plugs and sockets

34. Plessey standard and pressure-proof plugs and sockets, together with the Mk.4 miniature types, are used on the cable assemblies, junction boxes, panels, etc. These are described in the relevant equipment servicing A.P., and consist of internal mouldings, holding the plug pins and socket inserts, which float in fully weatherproof metal housings. The plug pins and socket inserts are each identified by a letter or number on the internal moulding and are arranged in a pattern so as to prevent incorrect assembly with their associated component, thus preventing cross-connection or short-circuiting. Those plugs and sockets in the centre fuselage, rear fuselage, and wings which are fitted to cable assemblies outside junction boxes, panels, etc., are provided with rubber sleeves and bungs, which seal the cable entry to prevent the ingress of moisture. The sleeves and bungs are retained in position by inner and outer ferrules locked by a coupling nut. The P.V.C. conduits of the cable assemblies in the front fuselage extend right up to the plugs and sockets, being retained in position by inner ferrules and metal clamps At frames 6 and 14, quick-release waterproof pressurized cable entries are used on the plugs and sockets. Each socket may be identified by the cable assembly to which it is attached, the reference being printed on the rubber sleeve or P.V.C. conduit. Each plug is also identified by its associated cable assembly reference or colour which is painted on the junction box or panel to which the plug is attached. Where two or more identical plugs or sockets are situated together, they are coloured for easy identification.

Fuses

35. The majority of the circuit fuses are contained in quick-release fuse blocks located within the main and secondary fuse boxes. Others will also be found in the various junction boxes and on the panels carrying the electrical equipment. There is a bomb circuit fuse in the centre console. Fuses are referenced numerically, each box and panel having its own set of numbers. In most instances, these numbers, together with the fuse amperage and the code letters of the circuit it serves, appear on the associated wiring diagram in the box concerned. In certain instances this information is given on a photographic label attached to the fuse block. The majority of the fuses are of the Type S series, but reference should be made to Table 3 for the References, ratings and fuse numbers. The fuses should be examined periodically to ensure that they are serviceable and of the correct value.

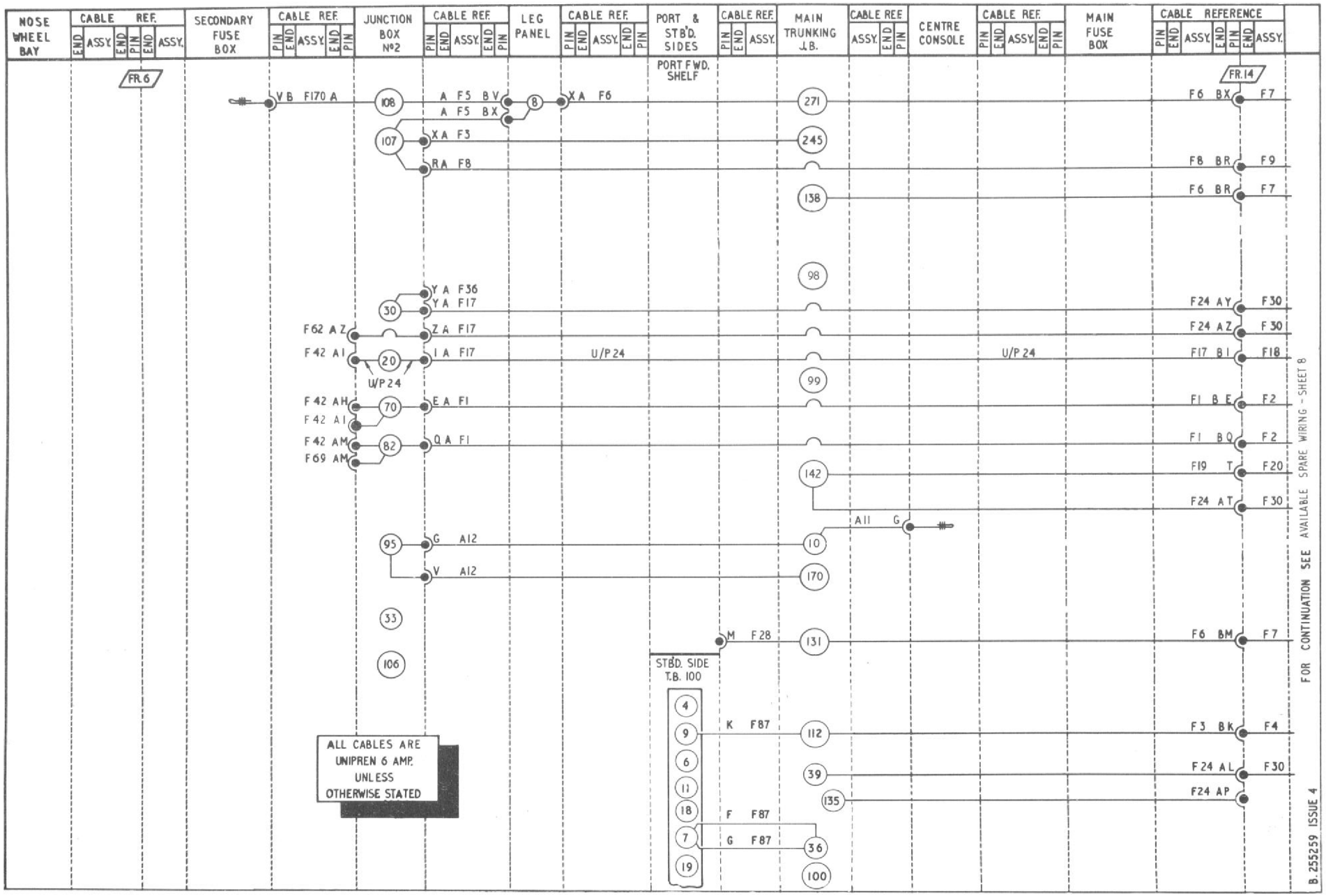

Fig. 8 Available spare wiring — sheet 7

◀ (General amendment) ▶

T.P. (E) 22857

TABLE 3 Fuses

Location	Fuse No.	Size (Amp.)	Service
Main fuse box	1	2.5	Standby compass emergency light
"	2	2.5	Cabin emergency lights
"	3	10	Port artificial horizon and direction indicator control unit, emergency
"	◀ 4	5	Anti-collision lamp } *Mod.1380*
"	5	5	Anti-collision lamp } ▶
"	6	5	Engine starter
"	7	5	Hood control
"	8	2.5	Alighting gear control
"	9	2.5	Fuel pressure
"	10	5	Emergency fuel pump
"	11	10	Engine starter
"	12	2.5	A.C. supplies control
"	13	-	Spare
"	14	5	Engine anti-icing
"	15	2.5	Aileron trim controls
"	16	-	Spare
"	17	-	Spare
"	18	2.5	Oxygen flow indicator
"	19	2.5	Alighting gear indicator
"	20	2.5	H.R.C. Turn and slip indicator standby starboard
"	21	10	Pressure head heater
◀ "	22	5	IFF/SSR *(post Mod.1371)* ▶
"	23	2.5	Hydraulic pressure indicator
"	24	-	Spare
"	25	5	Cabin pressurization control
"	26	5	Cabin pressurization control
"	27	5	Cabin pressurization control

Location	Fuse No.	Size (Amp.)	Service
Main fuse box	28	5	Tail plane control
"	29	20	Tail plane control
"	30	5	Tail plane control
"	31	2.5	Cabin lamps
"	32	2.5	Cabin lamps
"	33	2.5	Cabin lamps
"	34	2.5	Standby compass lamp
"	35	5	Hood control
"	36	5	Power elevator control
"	37	5	Spare
◀ "	38	5	IFF/SSR *(post Mod.1371)* ▶
"	39	5	Arresting hook control
"	40	10	Port artificial horizon and direction indicator control unit
"	41	10	Starboard artificial horizon control unit
"	42	45	Spare
"	46	5	Power aileron control
"	47	2.5	H.R.C. Turn and slip indicator main starboard
◀ "	48 to 56		Spare
	57	10	Airstream direction detector ▶
Centre console		2.5	Tail bomb fuse
Secondary fuse box	1	-	Spare
	2	2.5	IFIS lights control
"	3	5	Engine temperature control
"	4	10	Gun sight
"	5	5	Airbrake control
"	6	5	Alighting gear control
"	7	5	Alighting gear control

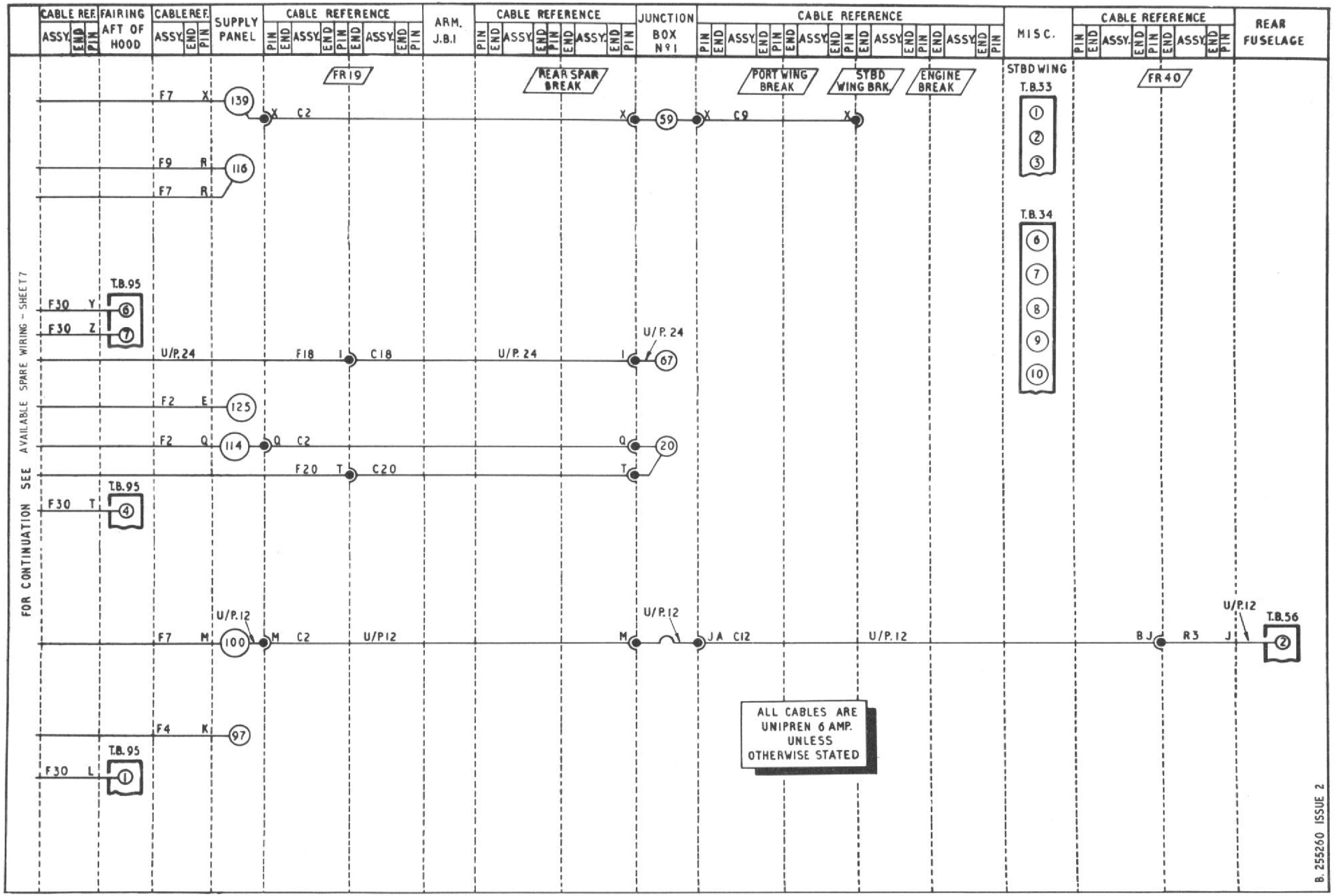

Fig. 9 Available spare wiring — sheet 8

◀ (General amendment) ▶

TABLE 3 Fuses (Continued)

Location	Fuse No.	Size (Amp.)	Service
Secondary fuse box	8	20	Brake parachute control
	9	2.5	Service lamp (nose)
"	10	5	Flap control
"	11	10	Fire extinguisher
"	12	2.5	Oxygen flow indicator
"	13	5	Navigation lamps
"	14	2.5	Fuel contents indicator *(port)*
"	15	2.5	Fuel contents indicator *(starboard)*
"	16	2.5	Port panel lamps
"	17	2.5	Standby panel lamps
"	18	2.5	IFIS lighting control
"	19	2.5	Centre instrument panel lamps *(port)*
"	20	2.5	Centre instrument panel lamps *(starboard)*
"	21	2.5	Starboard instrument panel lamps
"	22	5	Arresting hook control
"	23	2.5	Aileron power indicator
"	24	2.5	Elevator power indicator
"	25-28		Spare
A.C. junction Box No.1	1	5	A.C. supplies control and fast erection
"	2	5	Test socket +ve
"	3	3	M.R.G. supply change-over relay
"	4		
A.C. junction Box No.1	5	20	100A inverter +ve
	6	3	M.R.G. +ve No.1
"	7	3	Tacan radio +ve
"	8	3	M.R.G. +ve No.2
"	9	2.5	M.R.G. red phase
"	10	2.5	M.R.G. blue phase
"	11	7	Tacan radio red phase
"	12	2.5	Air data system red phase
"	13	2.5	Air data system blue phase
"	14	2.5	Tacan radio blue phase
"	15	2.5	I.F.I.S. lighting control unit red phase
"	16	2.5	I.F.I.S. lighting control unit blue phase
"	17	2.5	Oil pressure auto-transformer red phase
"	18	2.5	Engine top temperature control red phase
"	19	2.5	Engine top temperature control blue phase
"	20	2.5	Cabin temperature control blue phase
"	◀ 21	2.5	Mk.30B altimeter, red phase. ▶
"	22	2.5	Spare.
"	◀ 23		Spare ▶
"	24	2.5	Port artificial horizon and direction indicator control unit red phase
"	25	2.5	Port artificial horizon and direction indicator control unit blue phase

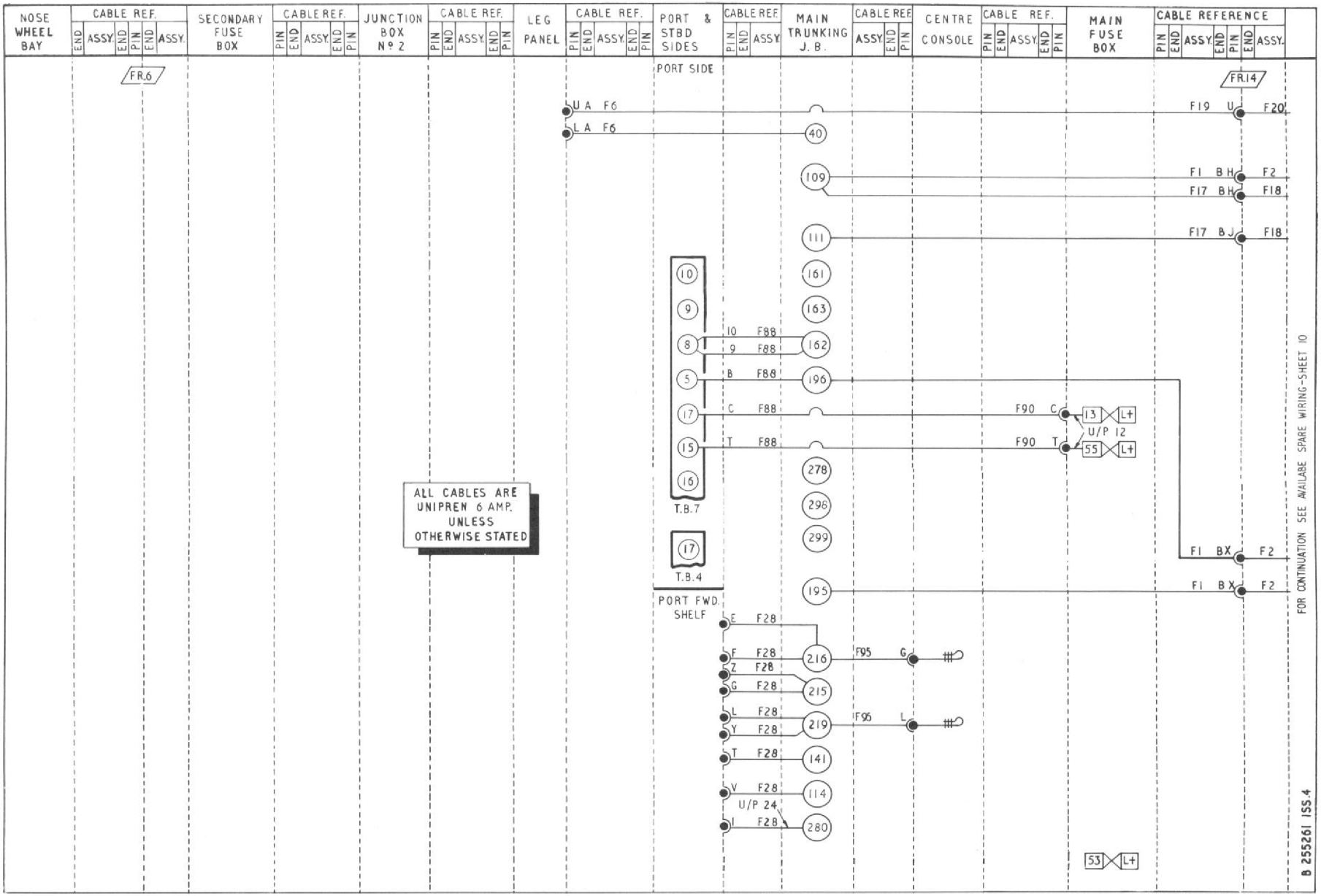

Fig. 10 Available spare wiring — sheet 9

◀ General amendment ▶

T.P.(E)24746

TABLE 3 Fuses (Continued)

Location	Fuse No.	Size (Amp.)	Service
A.C. junction box No.1	◀ 26	2.5	Altimeter test socket. ▶
	27	2.5	Starboard artificial horizon and direction indicator control unit red phase
"	28	2.5	Starboard artificial horizon and direction indicator control unit blue phase
"	29	2.5	Test socket red phase
"	30	2.5	Test socket blue phase
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	No.1 inverter test +ve
"	8	10	No.2 inverter test +ve
"	9	125 HRC	No.1 inverter
"	10	125 HRC	No.2 inverter
Supply panel	1	2.5	Fuel contents *(port)*
"	2	2.5	Fuel contents *(starboard)*
"	3	2.5	Fuel pressure *(port)*
Supply panel	4	2.5	Fuel pressure *(starboard)*
"	5	2.5	Tank pump failure *(port)*
"	6	2.5	Tank pump failure *(starboard)*
"	7	5	Pressure refuelling *(pre Mod.1381)*
"	8	5	Pressure refuelling *(post Mod.1381)*
"	9	-	Spare
"	10	5	IFF/SSR *(post Mod.1371)*
"	11	5	Fuel filter de-icing valve
"	12	10	Fuel filter de-icing pump
"	13	10	Ignition *(port)*
"	14	10	Ignition *(starboard)*
"	15	5	Fire warning
"	16	2.5	Tail plane position indicator
"	17	2.5	Flap position indicator
"	18	2.5	Aileron trim tab position indicator
"	19	2.5	Rudder trim tab position indicator
"	20	2.5	Service lamp *(radio bay)*
"	21	2.5	Service lamp *(starter bay)*
"	22	2.5	Drop tank empty indicator
"	23	10	IFF/SSR *(post Mod.1371)*
"	24	5	Autostabilizer *(Pre Mod.1376)*
"	25	10	Gun firing
"	26	5	Pylon jettison gun
"	27	10	Bomb jettison and fuzing
"	28	5	R.P. reset

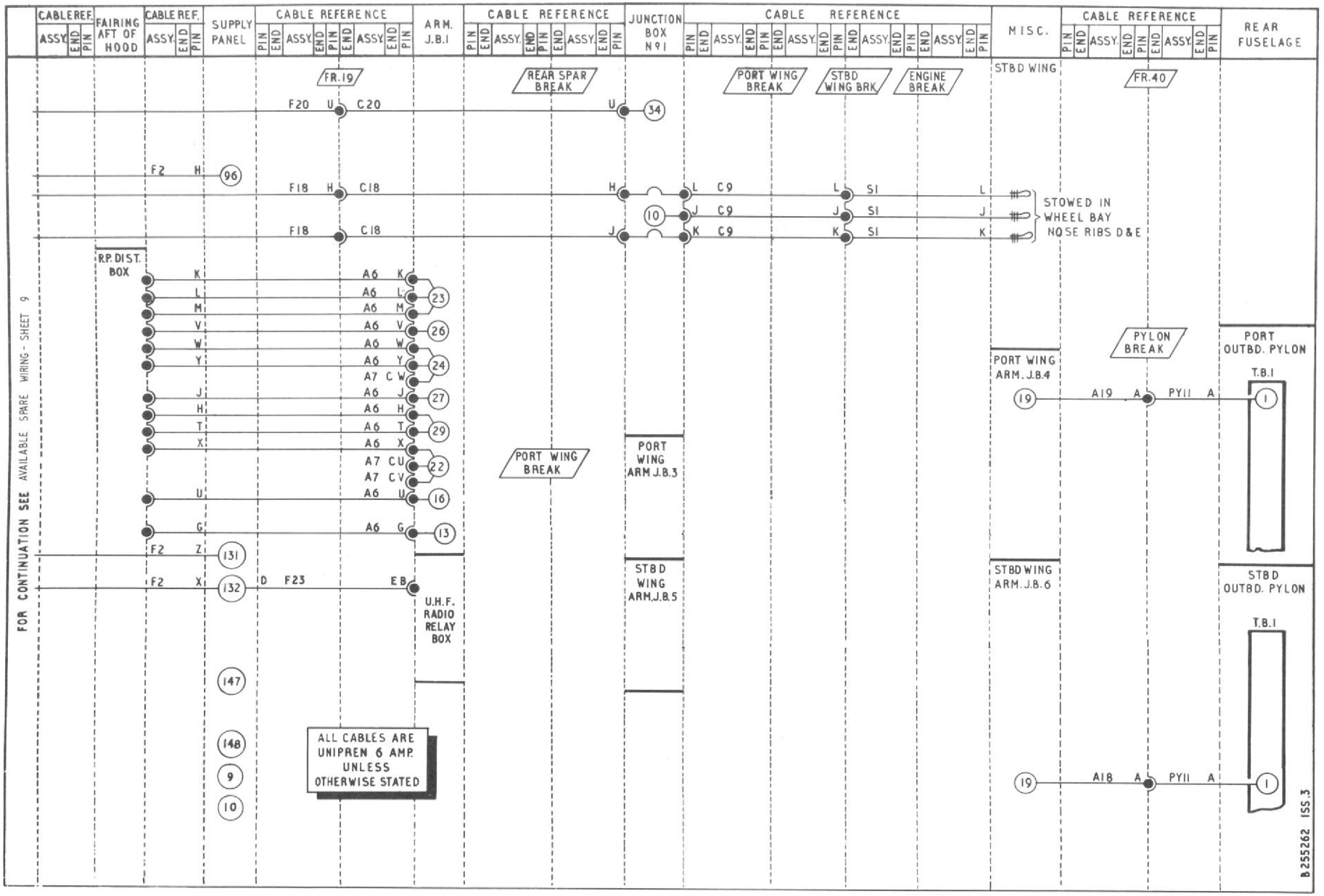

Fig. 11 Available spare wiring — sheet 10

◀ General amendment ▶

T.P.(E)24748

TABLE 3 Fuses (Continued)

Location	Fuse No.	Size (Amp.)		Service
Supply panel	29	5	HRC	IFF/SSR *(post Mod.1371)*
"	30	5	HRC	IFF/SSR *(post Mod.1371)*
"	31			Spare
"	32	-		Spare
"	33	20		Fire extinguisher
"	34	10		Battery master switch
"	35	2.5		Battery voltage test socket
"	36	10		Telebriefing relay
"	37	5		Generator No.1 crash switch
"	38	5		Generator No.2 crash switch
Supply panel	39-48	-		Spare
Radio relay box	1	10	HRC	Standby battery
"	2	5		Telebriefing
"	3	2.5		Emergency press-to-talk
"	4	10	HRC	Test set supply
"	5	5	HRC	Amplifier A.1961
"	6	2.5		Audio warning
"	7	2.5		Main press-to-talk
"	8	-		Spare
"	9	10		Standby set supply
"	10	-		Spare
"	11	-		Spare
"	12	2.5		Main/Standby selection

TABLE 4

Circuit breakers

Circuit	Rating (amp.)	Ref.
Parachute brake	6	5CY/
No.1 Generator, field	10	5CY/9550803
No.2 Generator, field	10	5CY/9550803
Stores release	10	5CY/9550803
Tank pumps		
Port	25	5CY/9992777
Starboard	25	5CY/9992777
U.H.F. main supply *(ARC.52)*	25	5CY/9992777
Tail plane, normal	24	5CY/4376481
Engine starting	35	5CY/9550804
Tail plane, override	45	5CY/4376060
L + distribution *(6 off)*	45	5CY/4376060
U.H.F. services	45	5CY/4376060
No.1 Generator, main	200	5CY/4376491
No.2 Generator, main	200	5CY/4376491

Circuit breakers

36. All the circuit breakers, apart from those on and below the generator control panel and those forward of the supply panel, which are located in the radio bay, are accessible from the cabin. They can be identified by the name of the circuit that they protect, this being given adjacent to each breaker. Table 4 lists the circuit breakers, together with their ratings and references.

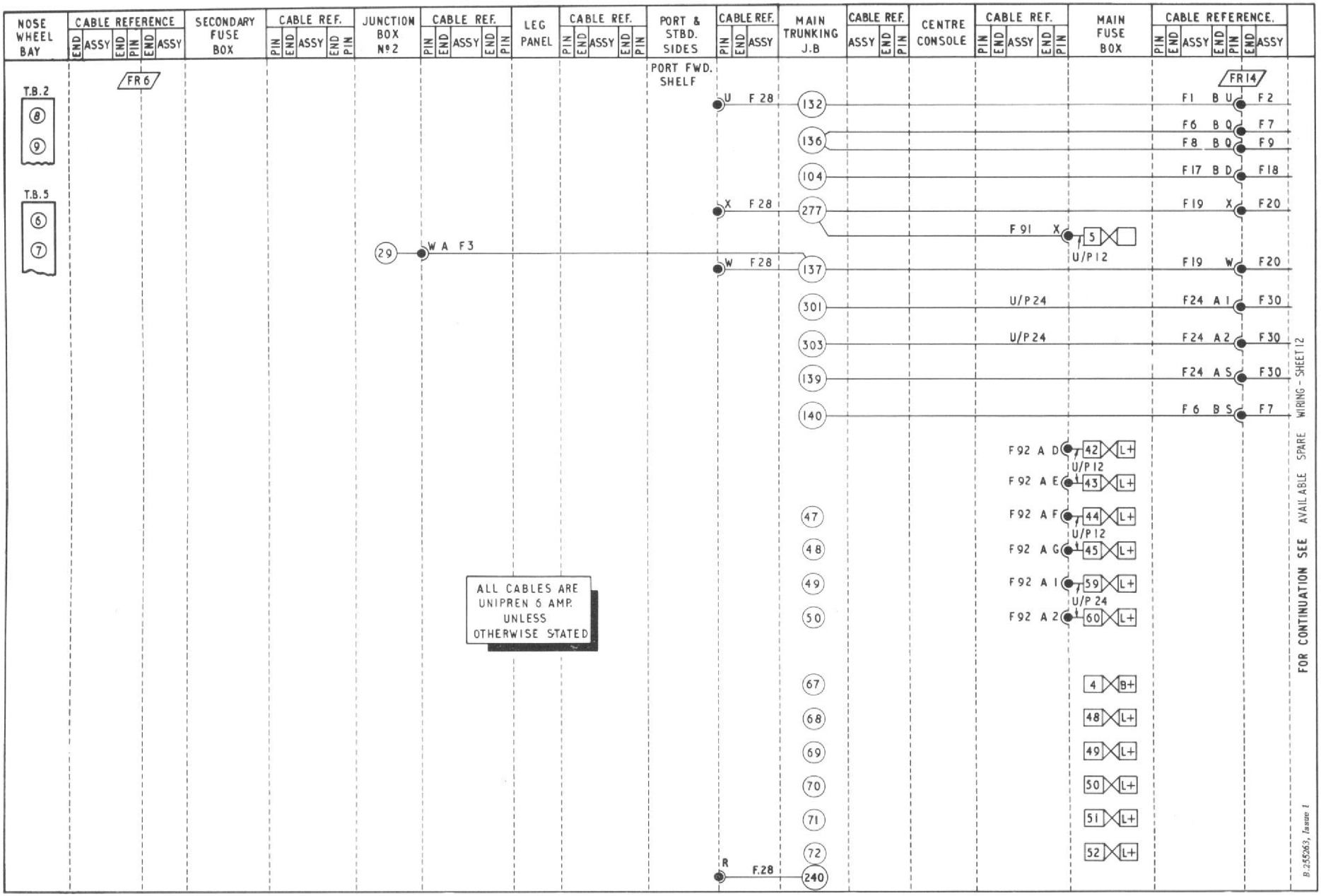

Fig. 12 Available spare wiring — sheet 11
◀ (Minor amendment) ▶

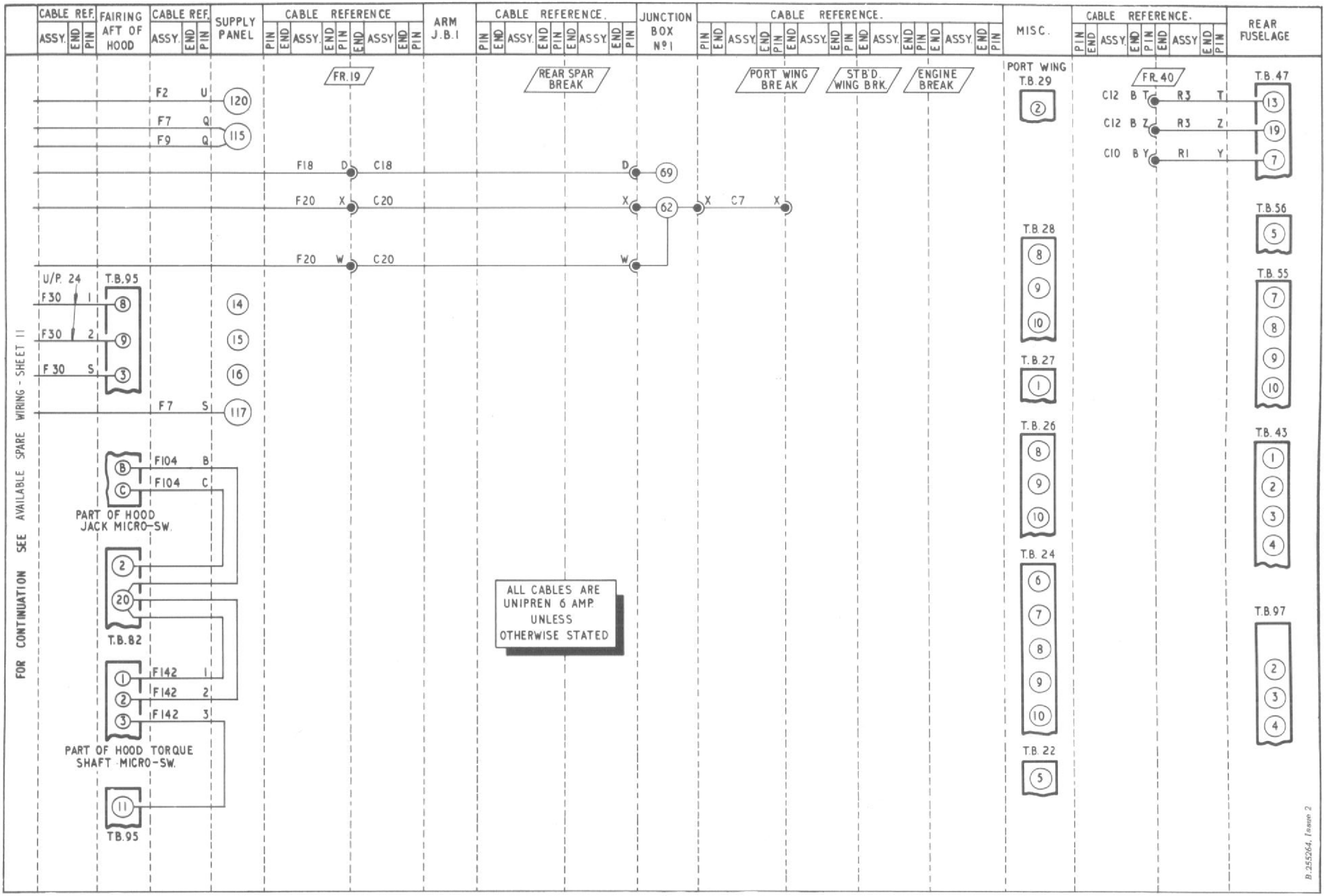

Fig. 13 Available spare wiring — sheet 12

◀ (Minor amendment) ▶

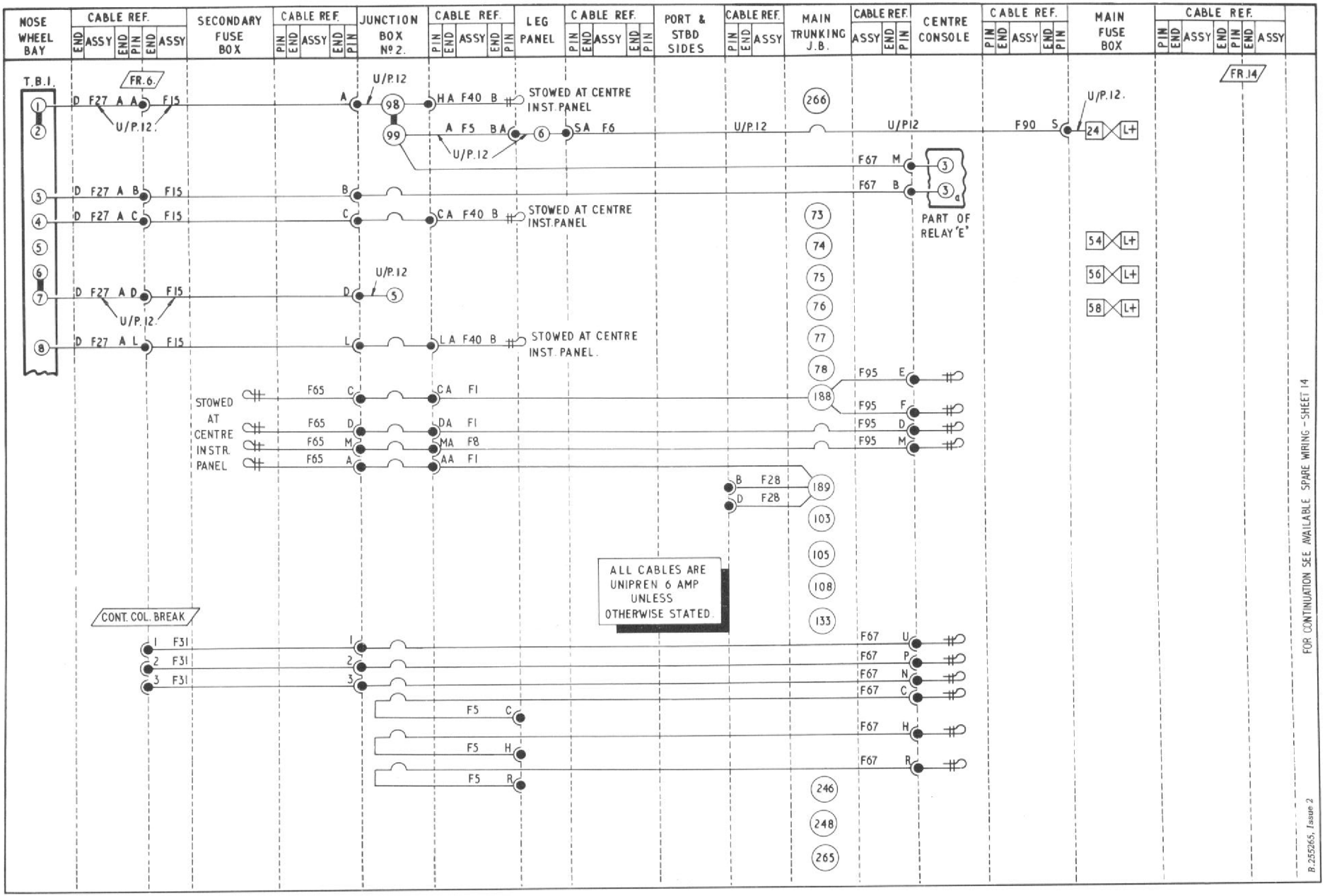

Fig. 14 Available spare wiring — sheet 13

◀ (Minor amendment) ▶

T.P. (E) 22867

Relays

37. Most of the relays are contained within the centre console; others are in the various junction boxes and on the panels carrying electrical equipment. They are referenced alphabetically in each assembly, the letters being given adjacent to each unit and on the wiring diagrams.

Terminal blocks

38. In addition to those terminal blocks inside junction boxes and on panels carrying electrical equipment, terminal blocks are also used as distribution and breakdown points throughout the aircraft. They are Plessey quick-release 2, 3, 5, 10 and 20-way types, together with a few Air Ministry 2 and 3-way types. The blocks are referenced numerically, the numbers being preceded by the letters T.B. Each terminal carries a coding plate marked with the terminal number given in the wiring diagram. Terminal blocks can be located by reference to the cable assembly layout and location diagrams contained in Group A.3.

◀ **Note . . .**

Terminal Blocks 11, 12, 22, 24, 32, 42, 43, 44, 45, 46, 47, 48, 56, 73, 79, 87, 97 & 98 should not be fitted with perspex covers (introduced by STIs 182A and 262). ▶

38A. When cable terminations are at terminal blocks microswitches and components in exposed external areas, they are to be treated with grease XG 250 (MS-4) to prevent ingress of water.

Filament lamps

39. When renewing filament lamps, reference should be made to Table 5 to ensure that the correct type is used.

TABLE 5

Filament lamps

Lamp	Circuit	No.off	Voltage	Wattage	Ref.
Parachute indicator	Parachute brake	2	28	3.5	5L/9951273
Power failure	Generators and batteries	2	28	3.5	5L/9951273
Fuel low pressure warning	Fuel pressure	1	28	3.5	5L/9951273
Cabin pressure warning	Cabin pressurization and temperature control	1	28	3.5	5L/9951273
Alighting gear warning	Alighting gear indicator	1	28	3.5	5L/9951273
Alighting gear indicator	Alighting gear indicator	9	28	2.5	5L/9951286
Hook warning	Arresting hook	1	28	3.5	5L/9951273
Wing tip navigation	Navigation lamps	2	28	24	5L/9952431
Tail navigation	Navigation lamps	1	24	10	5L/9952276
Service lamps	Service lamps	3	24	6	5L/9952254
Hydraulic pressure	Hydraulic pressure indicator	1	28	3.5	5L/9951273
U.H.F. Control	Cabin lighting	2	28	1.1	5L/9959118
Telebriefing	U.H.F.	1	28	3.5	5L/9951273
Tacan control	Cabin lighting	2	28	1.12	5L/9959118
Fire warning	Fire warning and extinguisher	1	28	3.5	5L/9951272
Emergency fuel pump	Emergency fuel pump	1	28	3.5	5L/9951273
Hood lock	Hook control	1	28	3.5	5L/9951273
Tank pump failure	Tank pumps	2	24	2.4	5L/9959215
Gun sights	Gun sight	4 plus 4 spare	22	12	5L/9951260
◀ Failure warning	IFF/SSR (Mod.1371)	1	28	3.5	5L/9951273 ▶

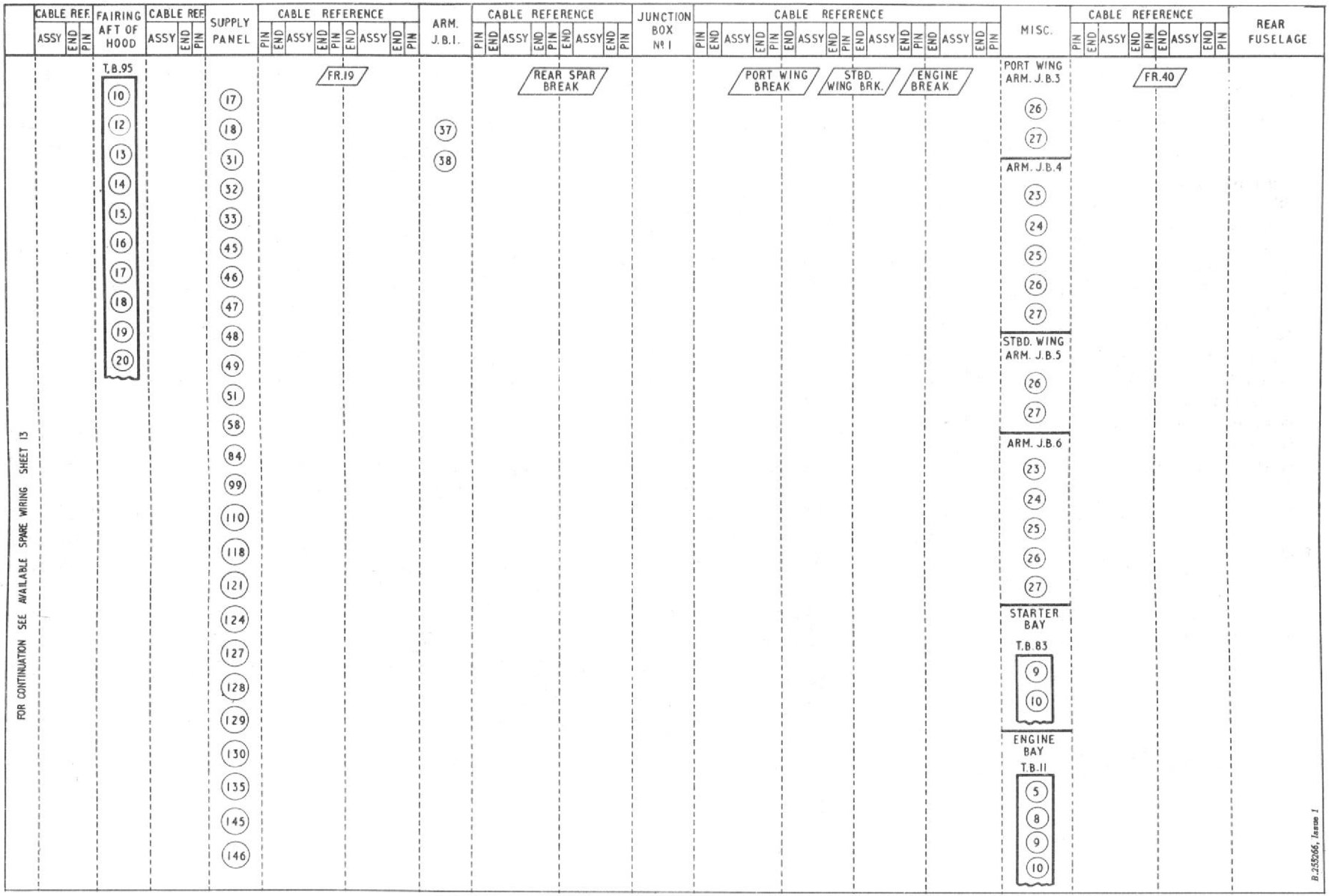

Fig. 15 Available spare wiring - sheet 14

◀ (General amendment) ▶

TABLE 5 (Continued)

Filament lamps

Lamp	Circuit	No.off	Voltage	Wattage	Ref.
Cabin lamps					
Side lamps	Cabin lighting	7	28	3.5	5L/9951271
Pillar lamps	Cabin lighting	23	28	1.12	5L/9959118
Pillar lamps	Cabin lighting	4	28	3.5	5L/9951271
Panel lamps	Cabin lighting	24	28	1.12	5L/9959118
Emergency lamps	Cabin lighting	3	28	3.5	5L/9951271
Standby compass	Cabin lighting	1	28	1.12	5L/9959118
Panel lamps	I.F.I.S. lighting	21	4	1	-
Pillar lamp	I.F.I.S. lighting	1	4	1.04	5L/9959125

Earth points

40. Apart from the engine starter, inverters, suppressors, panel lamps and the U.H.F. main and standby radio sets, which are earthed internally or adjacent to their mountings, all other earth leads are grouped for ease of servicing and insulation resistance testing, and connected to the aircraft structure at stud-type main earth points. All main earth points are numbered and can be located by reference to the cable assembly layout in Group A.3, and to the earth routeing chart given in Group B.1.

SERVICING

External supply plug

41. When electrical power is required during servicing, an external supply should be used. For this purpose, an external supply plug is mounted in the radio bay, on the port underside of the cross member adjacent to frame 18A. Access to the plug is gained via a small access door on the radio access panel. The plug enables an external supply to be connected to the aircraft services by means of standard socket, thereby preventing the aircraft batteries from being discharged. When the external connection is made, the generators are automatically isolated, thus preventing a reverse feed *(Group B.1)*. It is recommended that the battery master switch on the leg panel in the cabin should be put to OFF, to prevent discharge of the aircraft batteries if the external supply voltage falls below that of the batteries.

Note . . .

If necessary in an emergency, the aircraft batteries may be charged in situ by connecting a suitable supply to the external supply socket and placing the battery master switch to the ON position.

Rendering aircraft electrically safe

42. Before commencing any servicing operation not requiring the electrical supply, the aircraft must be rendered electrically safe, to eliminate any possibility of a short circuit causing the hydraulic units, etc., to operate, with consequent damage to the aircraft, or injury to personnel. To render the aircraft electrically safe, the battery master switch must be put to OFF *(para.41)*, and also, since this does not isolate all the electrical supplies, the leads of the main and emergency batteries must be disconnected. If an external supply is in use, this should be disconnected.

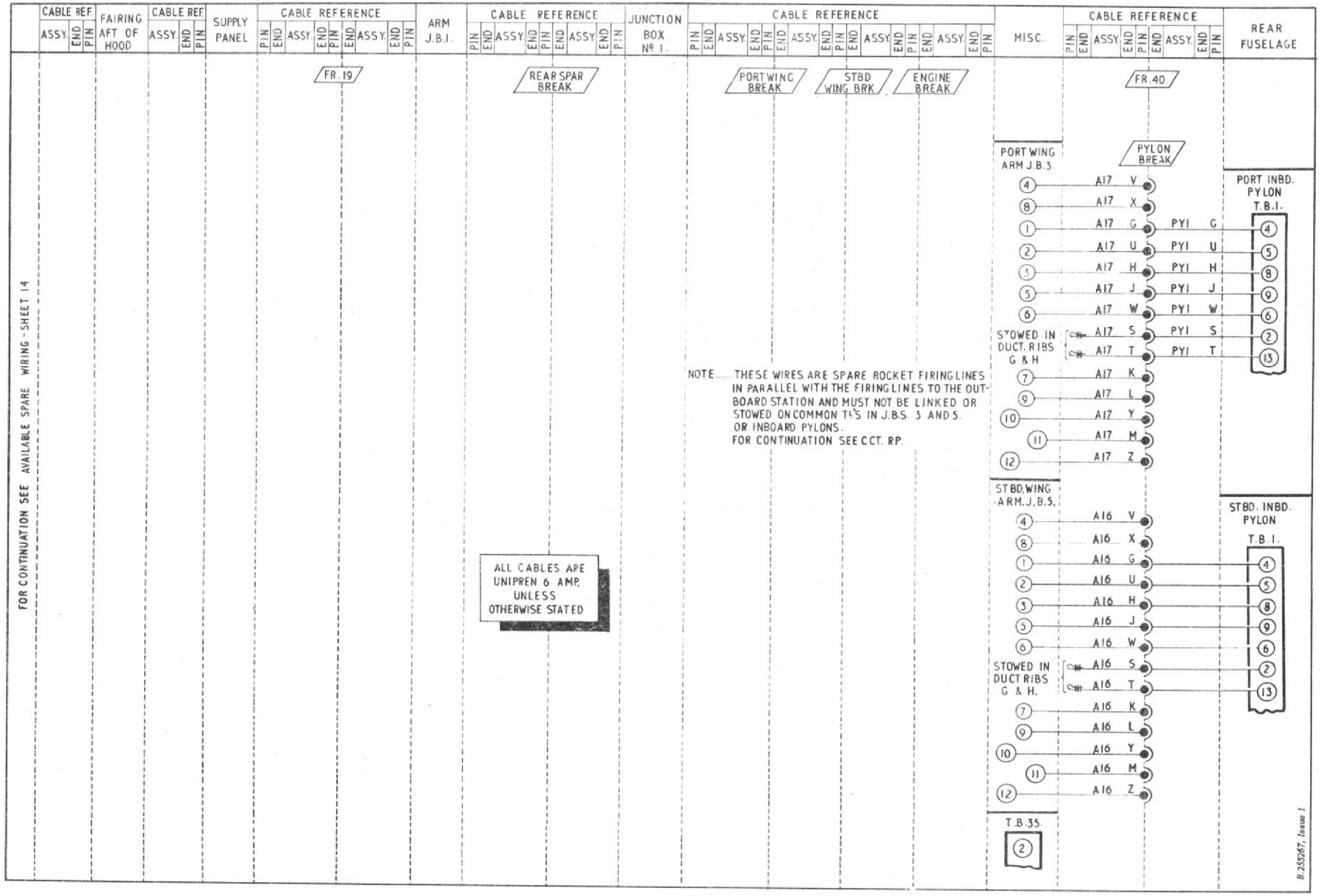

Fig. 16 Available spare wiring - sheet 15

◀ (General amendment) ▶

Servicing, main components

43. The fuse and junction boxes, the main trunking, centre console, and all other main components should be inspected regularly, to check that they are correctly supported, and are clean and undamaged. All the equipment on and within these components should also be checked for security, and the wiring and terminals inspected for signs of damage and corrosion. The Dzus fasteners securing the removable portion of the cabin port shelf and the generator control panel should be examined to ensure that they are correctly engaged and not damaged or distorted in any way, paying particular attention to the springs. Any fasteners found to be unlocked must be re-engaged and any found defective renewed as described in the relevant equipment servicing A.P. When major servicing is necessary to the main components, it is recommended that they be removed from the aircraft and replaced with fully serviceable units, thus reducing the time in which the aircraft is unserviceable. The faulty units should then be serviced on the bench, and returned to store to be held as spares. The method of removing these components is given in Group A.2.

Cable assemblies

44. Periodical inspections of the cable assemblies should be made for signs of oil soakage and to ensure that they are properly supported and not chafing, cut or damaged in any way. Damaged cables must be renewed or repaired as described in the relevant equipment servicing A.P., and all slack support clips retightened.

Multi-pole plugs and sockets

45. The plugs and sockets should be examined periodically for signs of corrosion which, if found, must be removed without delay. When removing corrosion, care must be taken not to damage the plated surface of the plug pins and socket inserts or early re-corrosion will result. The importance of cleanliness and the need for regular lubrication of the plug and socket screw threads cannot be over-emphasized if seizing of these threads is to be avoided. Silicone grease XG 250 (MS-4) is to be used and all excess wiped off. On no account should a lubricant with a graphite base be employed. When it is required to examine or service the cable connections to plugs and sockets incorporating rubber sleeves and bungs, access may be gained by releasing the sleeve at the coupling nut and rolling it back until clear of the connections.

Circuit breakers

46. The interior of the circuit breakers is inaccessible and servicing is therefore restricted to the functional and insulation tests given in the relevant equipment servicing A.P.

Dummy fuses

47. Dummy fuses are fitted in NOT IN USE circuits to prevent inadvertent operation of the circuit. These fuses, in red plastic, are identifiable by feel by their square section centre and corrugated sides. One side is embossed "NOT IN USE". Whenever a live fuse is removed while servicing is it to be temporarily replaced by a dummy fuse fitted with a 9 inch by 1 inch streamer. ▶ ◀

Relays

48. Relays should be inspected at regular intervals to ensure that the contacts are kept clean and that the units are undamaged and secure. They should also be subjected periodically to the functional tests given in the relevant equipment servicing A.P.

Note . . .

Relays that are operating correctly are best left alone and it is therefore recommended that the covers are not removed or the contacts cleaned unless absolutely necessary.

Switches

49. The switches employed in this aircraft are sealed units and cannot be readily dismantled for servicing. They should, however, be examined for cracks and signs of strain, paying particular attention to the switch dollies.

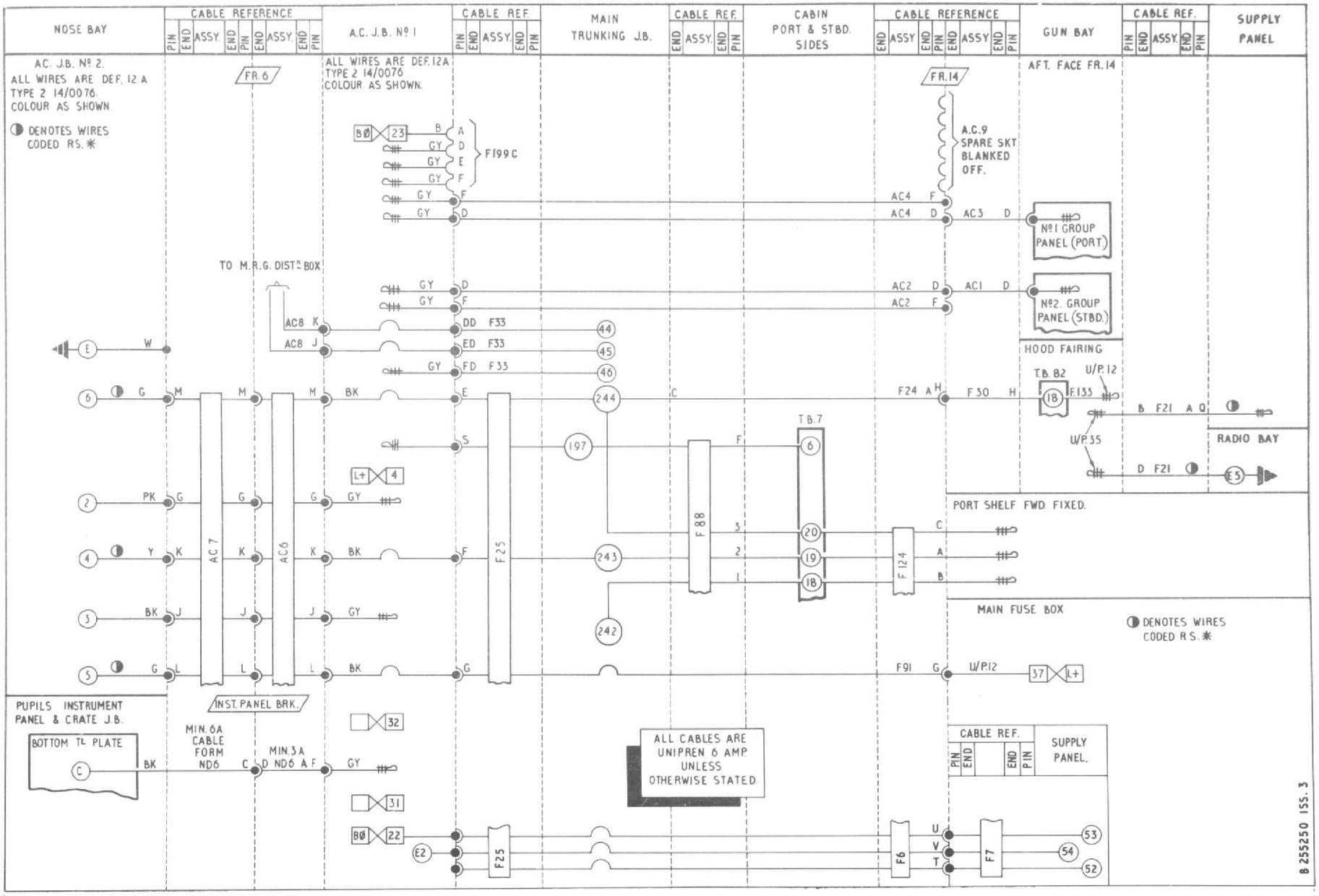

Fig. 17 Available spare wiring — (a.c. supplies and control)

◀ General amendment ▶

T.P.(E)24749

Insulation resistance testing

50. Pending the introduction of a full insulation resistance test, the following procedure, which only covers the minimum requirements, should be carried out. Reference should also be made to the aircraft servicing schedule.

(1) Remove all lamps.
(2) Disconnect the inverters and the static inverters.
(3) Disconnect all main earth points.
(4) Remove the plug from the fire extinguisher.
(5) Remove the supply plug from the fuel contents gauge amplifiers.
(6) Remove the voltmeter, if this has been fitted.
(7) Disconnect the M.R.G.
(8) Disconnect cable assembly F.92B from a.c. junction box No.1.
(9) Remove all the instruments from the integrated flight instrument panel.
(10) Bridge all the suppressors.
(11) Disconnect the Tacan transmitter-receiver.
(12) Remove the engine igniter plugs.
(13) Place all switches to the ON position.
(14) Connect a 250-volt insulation resistance tester to the L+ bus-bar and to an earth point of the aircraft.

Note . . .

It is not necessary to bridge the suppressors if an insulation resistance tester Type C (Stores Ref.5G/152) is in use.

Bonding check

51. 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 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.

Use of spare cables for emergency servicing

52. Routeing diagrams of the available spare cables incorporated in the cable assemblies are given in this group. Spare cables are provided for future modifications and additions to the existing system, but may also be used in an emergency to replace a defective cable. Under this condition, having found the defective portion of cable, refer to the spares routeing charts to find a similar cable which can be used. At suitable points, modify the existing cable run to use the spare cable and isolate the defective cable. Amend the junction box and panel wiring diagrams to agree and note the fact of this change in the aircraft log book, with the instruction that the cable assembly containing the defective cable must be changed or repaired at the next available opportunity.

Note . . .

The above procedure is only to be adopted as an emergency measure to keep the aircraft flying and the fault must be rectified at the first opportunity, as later modifications may depend upon the use of such spare wiring being available.

REMOVAL AND ASSEMBLY

Disconnection of sockets

53. Before an attempt is made to remove a Plessey standard or pressure-proof socket from its associated plug, the coupling nut retaining the sleeve and bung, or ferrule and P.V.C. assembly to the socket, must be slackened. This is necessary as the coupling nut also serves to lock the socket when it is mating with its plug. It should also be noted that this nut should be slackened before fitting the socket, and

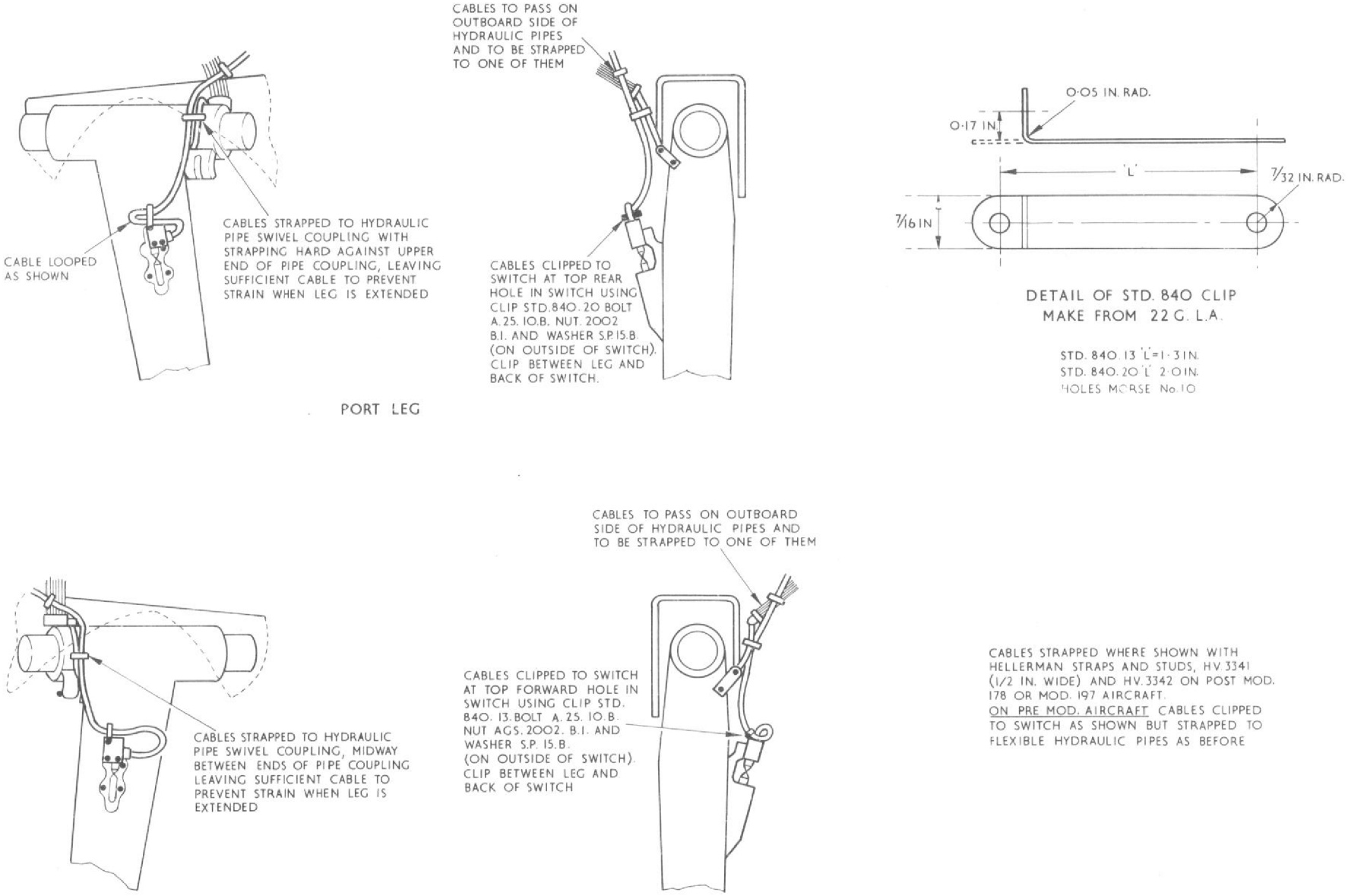

Fig. 18 Clipping of cables from undercarriage compression switch

the socket screwed in by hand, being assisted home by pushing on the back. A spanner or undue force must NOT be used, or damage will result.

Refitting earth leads

54. When refitting earth leads, care must be taken to ensure that the surfaces in contact are perfectly clean and, in particular, free from grease and paint. Completed assemblies should be protected against corrosion by one coat of blue oil-base paint to Spec.827.

Main undercarriage electrical cables - replacement

55. 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.18.

(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 micro-switches when the cable looms are changed.