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A.P.101B-0402-1B
A.L.207, Dec.77

SECTION 6

RADIO AND RADAR INSTALLATIONS

LIST OF CHAPTERS OVERLEAF

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A.P. 101B-0402-1B
A.L. 207, Dec. 77

SECTION 6

RADIO AND RADAR INSTALLATIONS

LIST OF CHAPTERS

Note:- A list of contents appears at the beginning of each chapter

- 1 Radio installation
- 2 Radar installation

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Chapter 1 RADIO INSTALLATION

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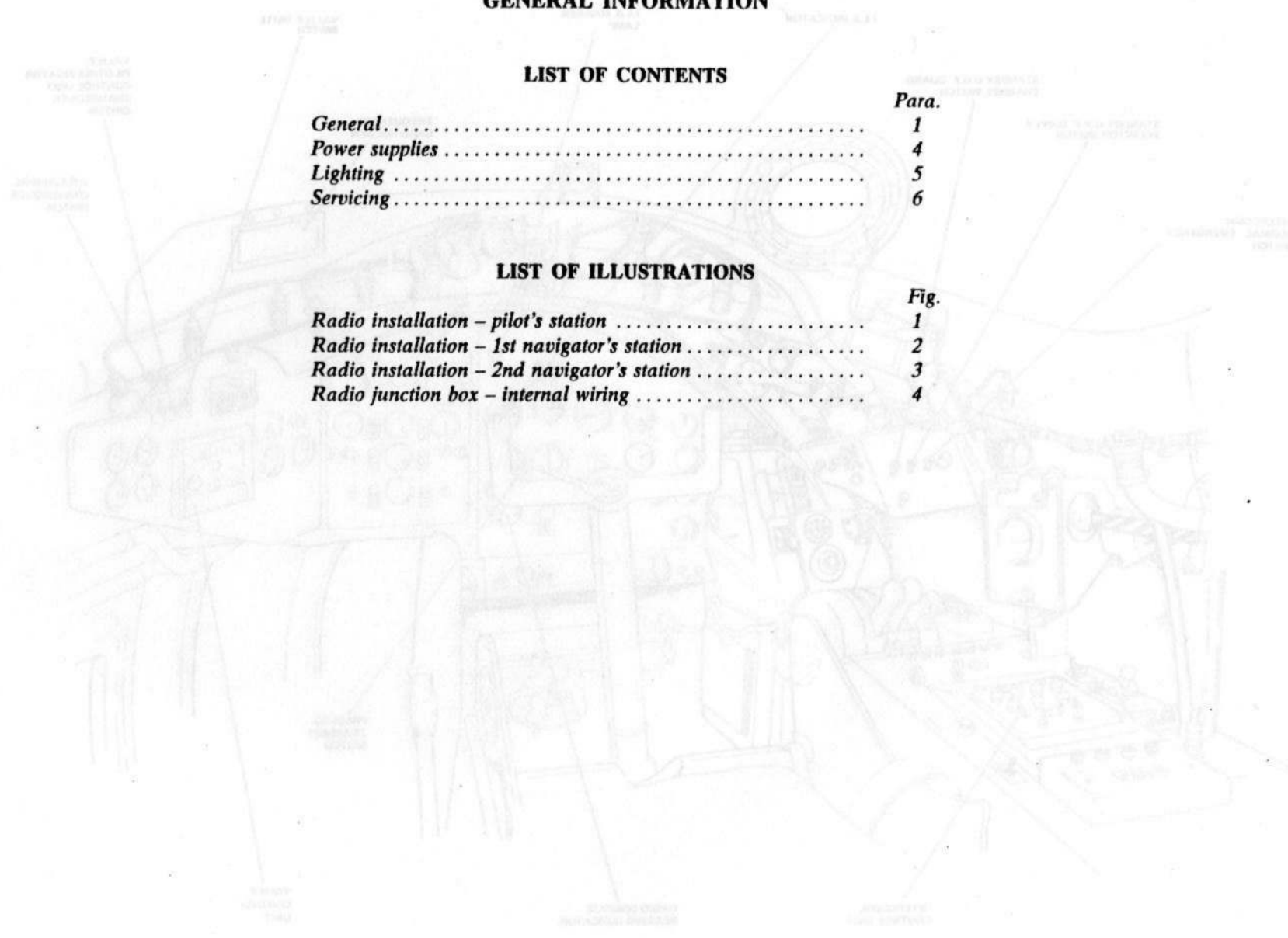
GENERAL INFORMATION

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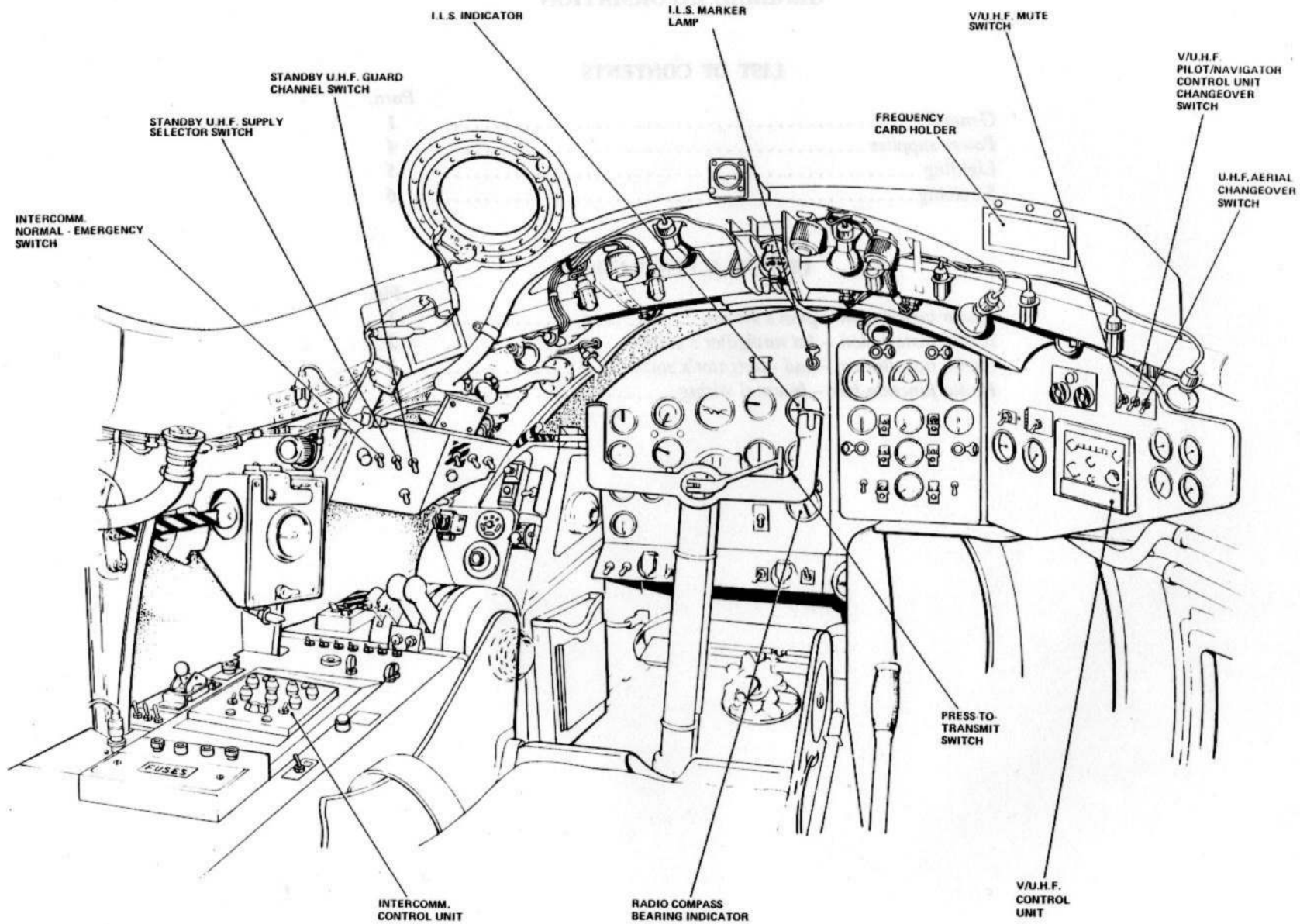


FIG.1. RADIO INSTALLATION—PILOT'S STATION

◀ STI/CAN/586c INCORPORATED ▶

General

1. Information covering the aircraft radio systems is contained in this section. The installations covered are as follows:-

Intercommunication (A.R.I.18089)	Part 1
V/U.H.F. communication (A.R.I.23143 pre Mod.5409 or A.R.I.23300 post Mod.5409) and stand-by U.H.F. (A.R.I.23159)	Part 2
Radio compass (A.R.I.23023)	Part 3
Instrument landing system (A.R.I.18011)	Part 4

2. A location diagram, an interconnection diagram, a table giving connector details and a table giving equipment details, covering type, location, reference number and publication reference, is included in each part.

3. Fig.1, 2 and 3 show the positions of the various indicator's, control units and associated equipment at the pilot's, 1st navigator's and 2nd navigator's stations. Fig.4 shows the internal wiring of the radio junction box.

Power supplies

4. The radio installations require both a.c. and d.c. power

supplies for their operation. Individual equipment power supplies are covered in each part. Detailed information on the power supplies is given in Sect.5, Chap.1, Group D and Group R & S.

Lighting

5. The integral lighting of the control units and the illumination of the frequency card holders is controlled by dimmer switches at the pilot's and navigator's station as follows:-

Pilot's station:

- V/U.H.F. control unit - Starboard red lamps dimmer switch
- Intercomm. control unit - Console lamps dimmer switch
- Frequency card holder - Port red lamps dimmer switch

Navigator's station:

- V/U.H.F. control unit } C.U. LIGHTS dimmer switch
- Intercomm. control unit }

Servicing

6. Servicing information on individual items of equipment is given in the associated publication referred to in Table 1 of each part.

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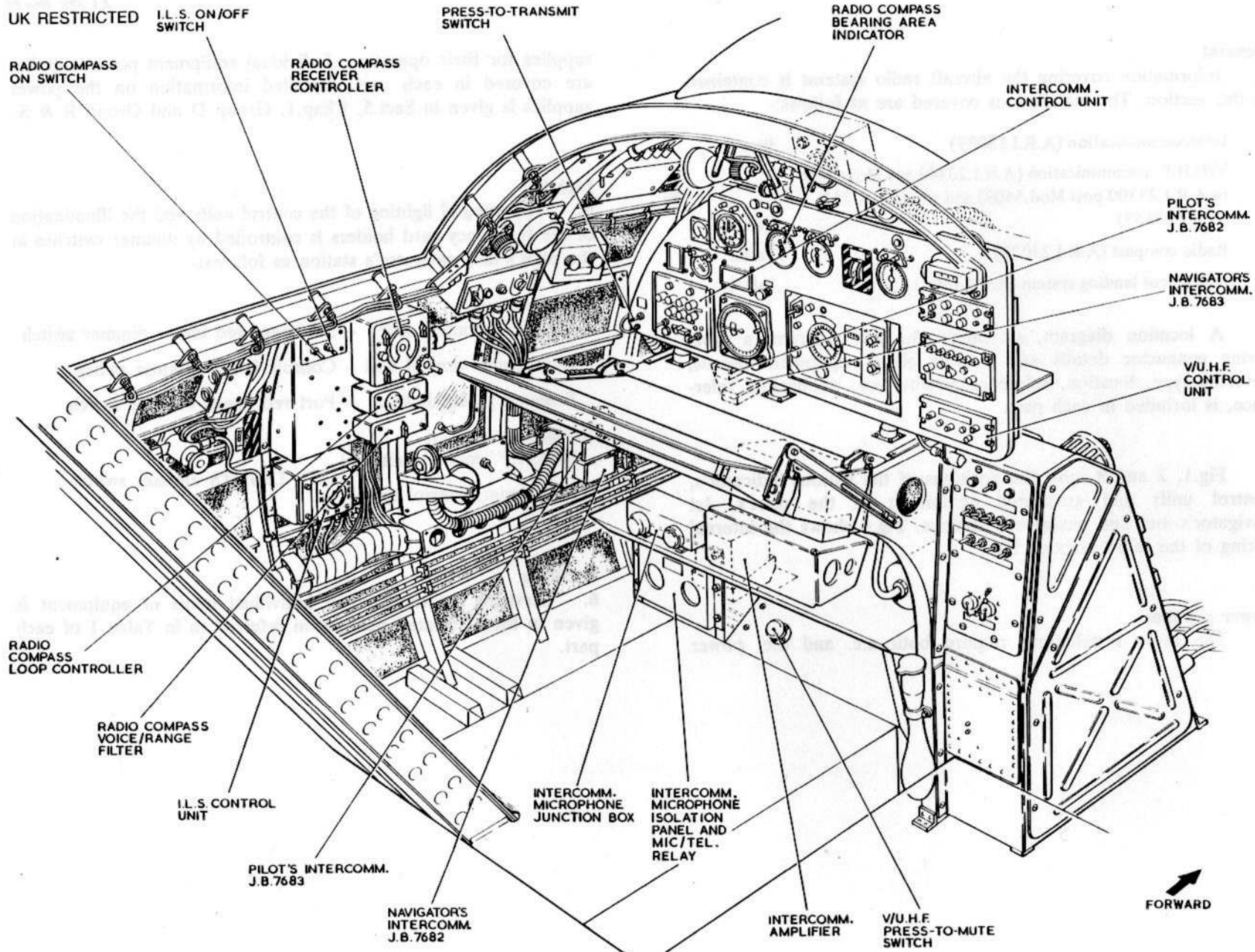


FIG.2. RADIO INSTALLATION—1st NAVIGATOR'S STATION

◀ STI/CAN/586c INCORPORATED ▶

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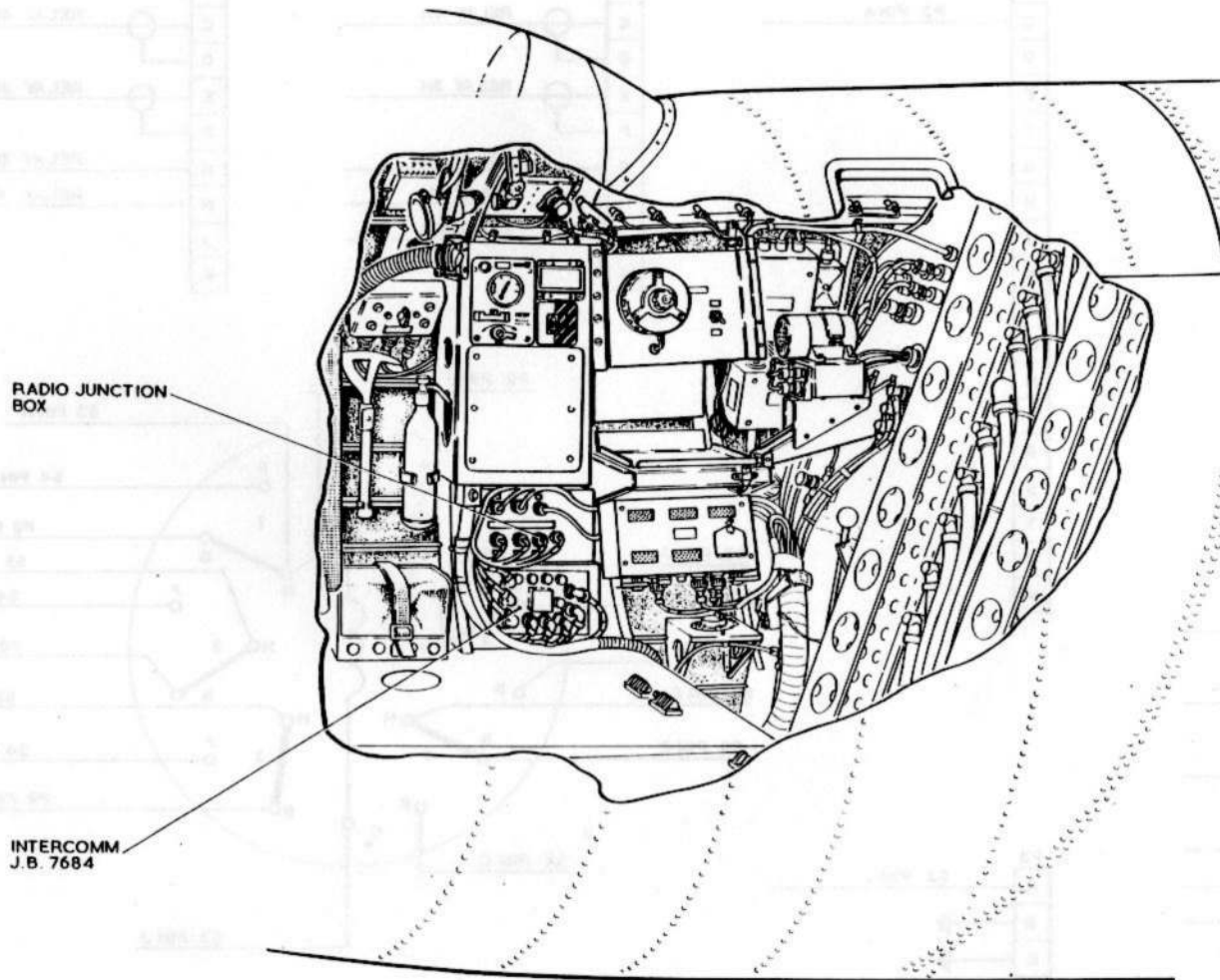


FIG.3. RADIO INSTALLATION—2nd. NAVIGATOR'S STATION

◀ STI/CAN/586c INCORPORATED ▶

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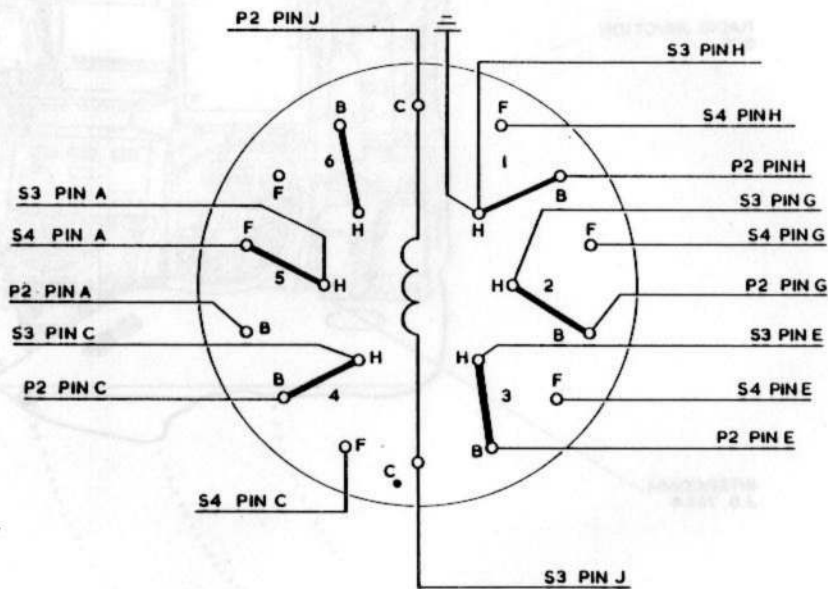
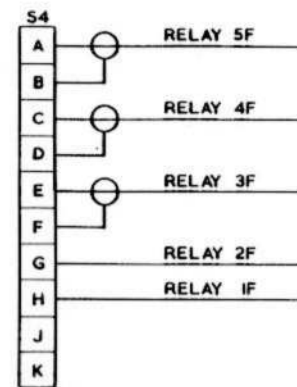
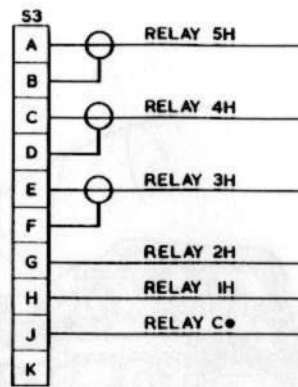
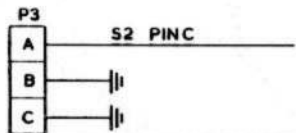
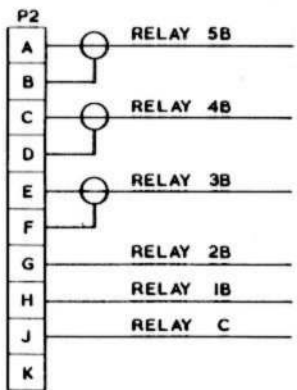
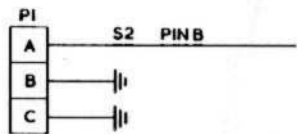
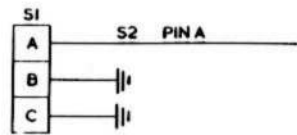


FIG.4. RADIO JUNCTION BOX - INTERNAL WIRING

SRIM DWG 21947

Part 1 INTERCOMMUNICATION (A.R.I.18089)

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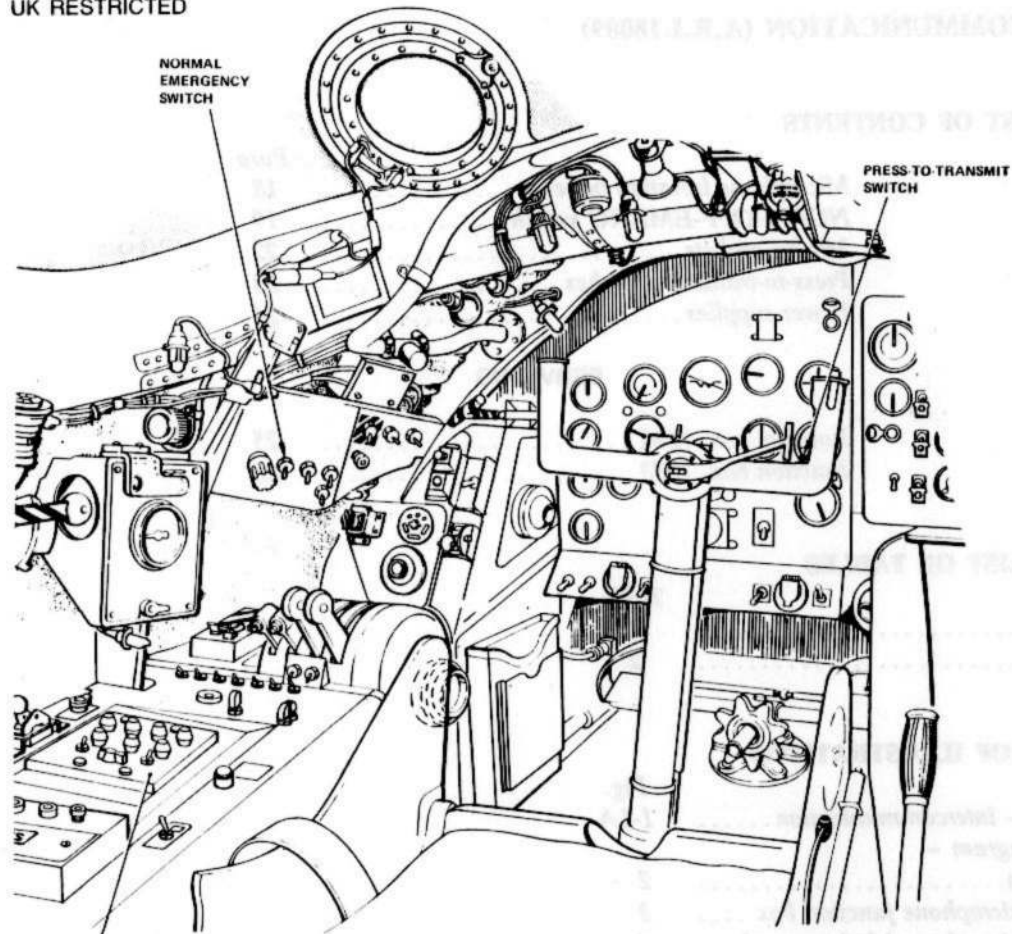
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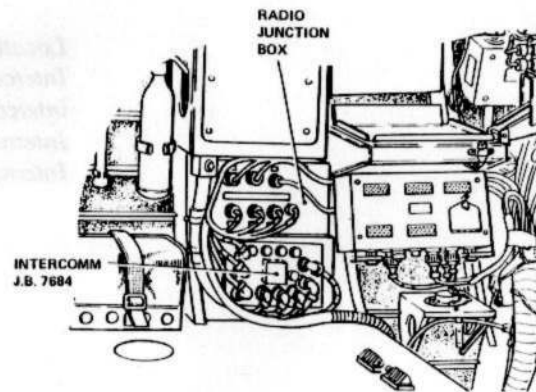
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CONTROL UNIT TYPE 7681

PILOT'S STATION



2nd NAVIGATOR'S STATION

FIG.I. LOCATION DIAGRAM - INTERCOMMUNICATION

◀ STI/CAN/586c INCORPORATED ▶

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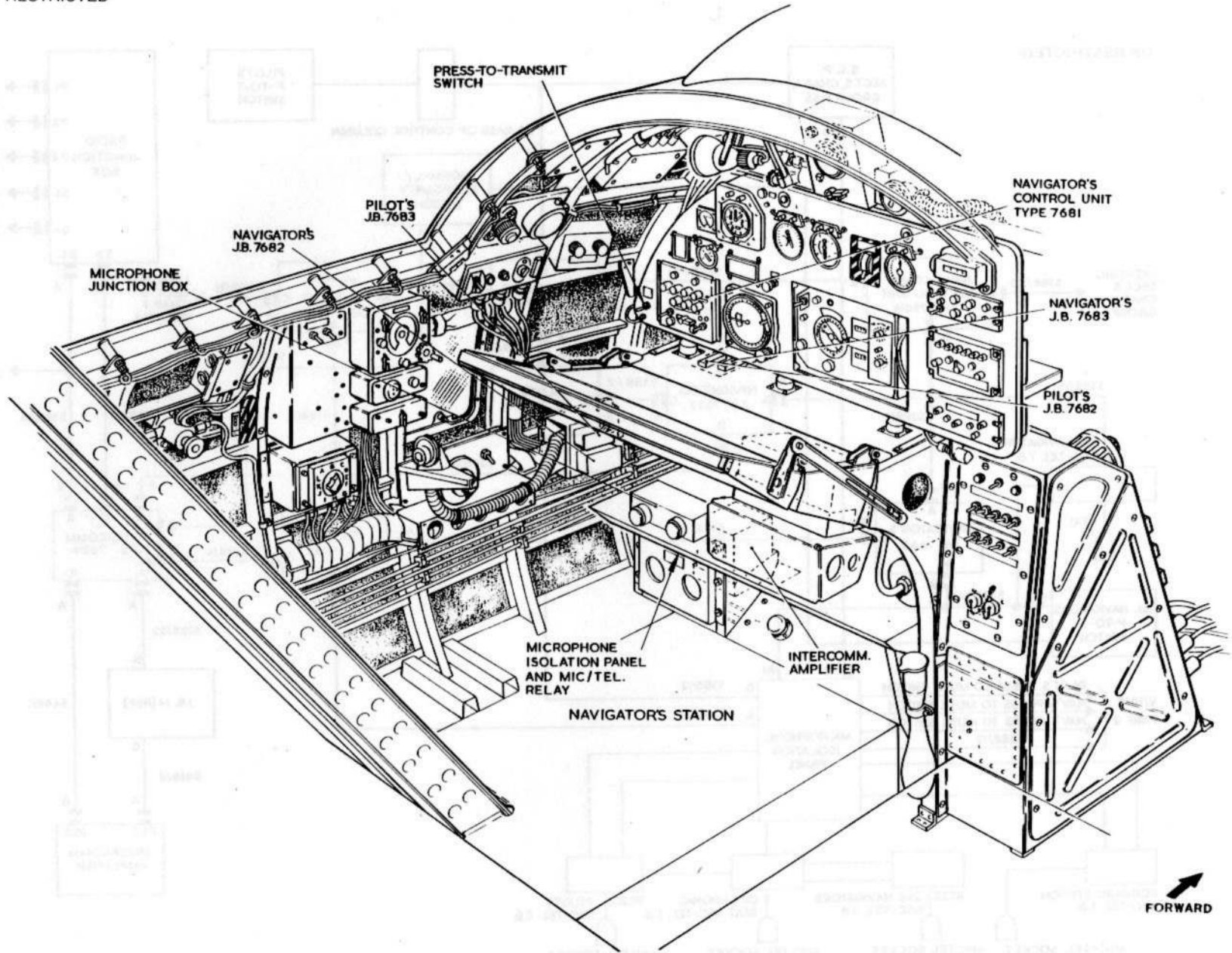


FIG.1A. LOCATION DIAGRAM - INTERCOMMUNICATION

◀ STI/CAN/586c INCORPORATED ▶

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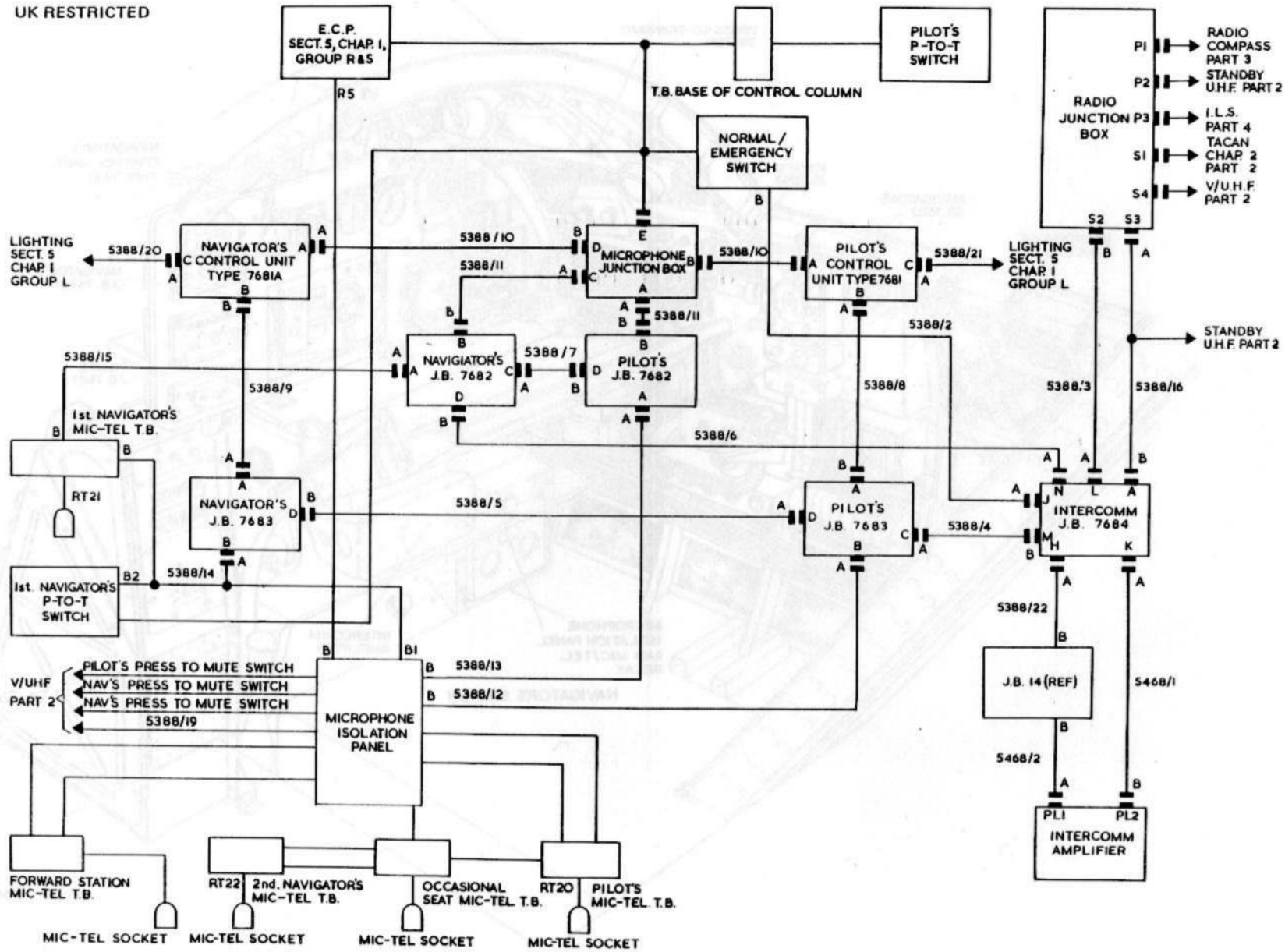


FIG.2. INTERCONNECTION DIAGRAM - INTERCOMMUNICATION

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DESCRIPTION**General**

1. The intercommunication system provides the means of selecting the required aircraft communication service, the mixing of incoming signals and intercommunication facilities between crew members. Emergency intercomm. is provided from the V/U.H.F. system (*Part 2*).

2. The locations of the main items of equipment are shown in fig.1-1A and interconnections in fig.2. Figs.3 and 4 provide wiring information on two items of equipment fitted in the system. Table 1 gives the equipment details and Table 2 the connector details. Detailed technical information is given in A.P.116N-0105-1.

3. The installation comprises the following main items of equipment:-

Intercomm. amplifier

Control Unit (Pilot and navigator)

J.B.7682 (Pilot and navigator)

J.B.7683 (Pilot and navigator)

Intercomm. J.B.

Radio junction box

Microphone junction box

Microphone isolation panel

◀ Mic-tel sockets (4) ▶

Press-to-transmit switch (Pilot and navigator)

Intercomm. amplifier

4. The intercomm. amplifier is mounted on the floor underneath the navigator's table. The unit consists of a three stage audio amplifier which provides microphone and telephone facilities between the crew members.

Control units

5. Two control units are fitted in the system, one for the pilot

and one for the navigator. The pilot's control unit is fitted on his console and the navigator's on his instrument panel.

6. Each control unit has facilities for transmit and receive. The receive section annotated LISTEN ONLY comprises seven potentiometers and in this installation, only five are used, namely:-

A.D.F. (radio compass)

TACAN

V/U.H.F.

I.L.S.

I/C

7. Each potentiometer provides an individual audio level for the particular service connected to it. An anti-crosstalk network provides mixing facilities for the five systems.

8. The transmitters are selected by the SPEAK-LISTEN switch. This switch connects the users microphone to the system selected on the switch and simultaneously connects his telephones and the press-to-transmit facility into the system.

9. The NORMAL-OFF-DIRECT switch controls the 28 V d.c. supply to the integral amplifier and also enables the users telephones to be switched off. In the DIRECT position the output from the selected transmitter/receiver is fed straight to the telephones. However, mixing facilities will not be available.

10. The CALL switch superimposes an I/C call on all other selected systems to alert crew members.

11. Internal lighting of each control unit is provided by six lamps which are connected into the lighting system (*Sect.5, Chap.1, Group L*).

Junction box, 7682

12. The two junction boxes are used to connect the pilot's and navigator's telephone lines to their respective control units.

Junction box, 7683

13. The two junction boxes are used to connect the pilot's and navigator's microphone lines to their respective control units.

Intercomm. J.B.

14. The Type 7684 junction box is located on the starboard wall of the 2nd navigator's station and forms the main interconnection point between the radio junction box and components of the intercomm. system.

Radio junction box

15. The radio junction box is located adjacent to the intercomm. J.B. and provides the interconnection between the radio and radar systems and the intercomm. system. For internal connections of the radio junction box, refer to General Information, this chapter.

Microphone junction box

16. The microphone junction box is located on the shelf below the navigator's table. The unit provides independent control of the intercomm. volume when V/U.H.F. is selected on the V/U.H.F. control unit. The volume of the V/U.H.F. system is controlled by the volume control on the V/U.H.F. system and the volume of the intercomm. is controlled by the I/C volume control on the intercomm. control unit.

17. When either the pilot's or navigator's P-to-T switch is operated, the corresponding microphone is connected direct to the transmitter in use. Failure of the microphone junction box, reverts

the system to both the intercomm. and V/U.H.F. volume being controlled by the V/U.H.F. control unit volume control, with final adjustment by the V/U.H.F. volume control on the intercomm. control unit.

Microphone isolation panel

18. The microphone isolation panel is located adjacent to the intercomm. amplifier. The panel provides the distribution of the microphone and telephone facilities to the associated mic-tel sockets.

NORM-OFF-EMERG switch

19. When the switch is in the OFF position the earth circuits to the intercomm. amplifier and the microphone junction box are disconnected.

20. In the NORM position, the earth circuits for both the amplifier and microphone junction box are completed.

21. In the EMERG position, the earth circuit to the microphone junction box is broken whilst the amplifier earth circuit remains completed.

Mic-tel sockets

22. Microphone and telephone facilities are provided at the pilot's, 1st navigator's, 2nd navigator's and the occasional seat and at the forward station. ◀ ▶

Press-to-transmit switches

23. P-to-T switches are fitted at the pilot's and navigator's stations. The pilot's switch is fitted in the right-hand handgrip of the control column and the navigator's switch is fitted on the instrument panel adjacent to the control unit.

Power supplies

24. The intercomm. system is supplied with 28 V d.c. from busbar P10. The amplifier is supplied via fuse 63 and the junction boxes 7683 and 7684 are supplied via fuses 66 and 64 respectively. The microphone junction box is supplied from fuse 23. All the fuses are located in the E.C.P. Further information on the power supplies can be found in Sect.5, Chap.1, Group R & S.

SERVICING**WARNING**

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

Junction box, 7682

25. On replacement of a junction box 7682, ensure that the links in the replacement box are as follows:-

A - AS

G - GS

Junction box, 7683

26. On replacement of a junction box 7683, ensure that the links in the replacement box are as follows:-

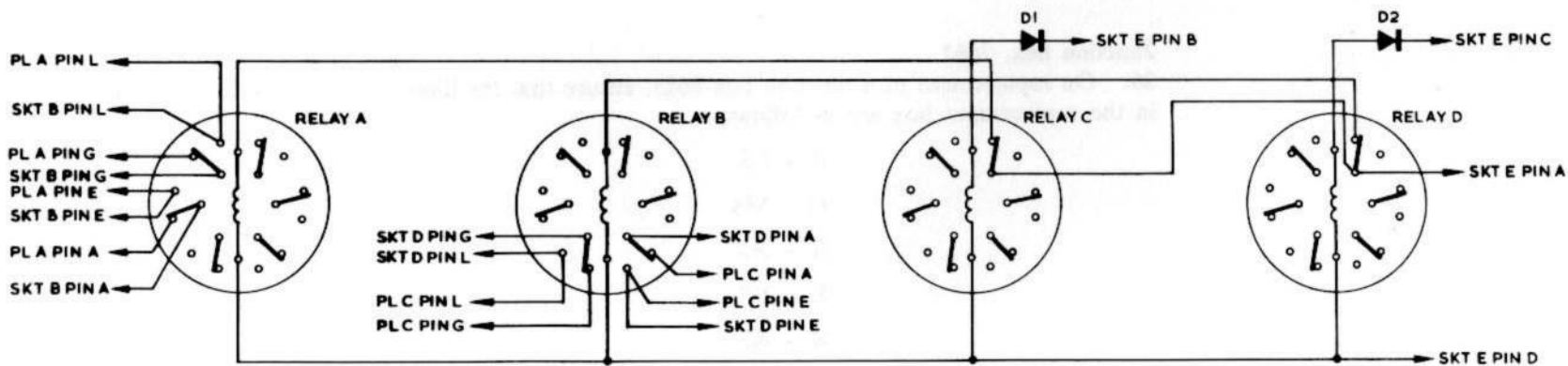
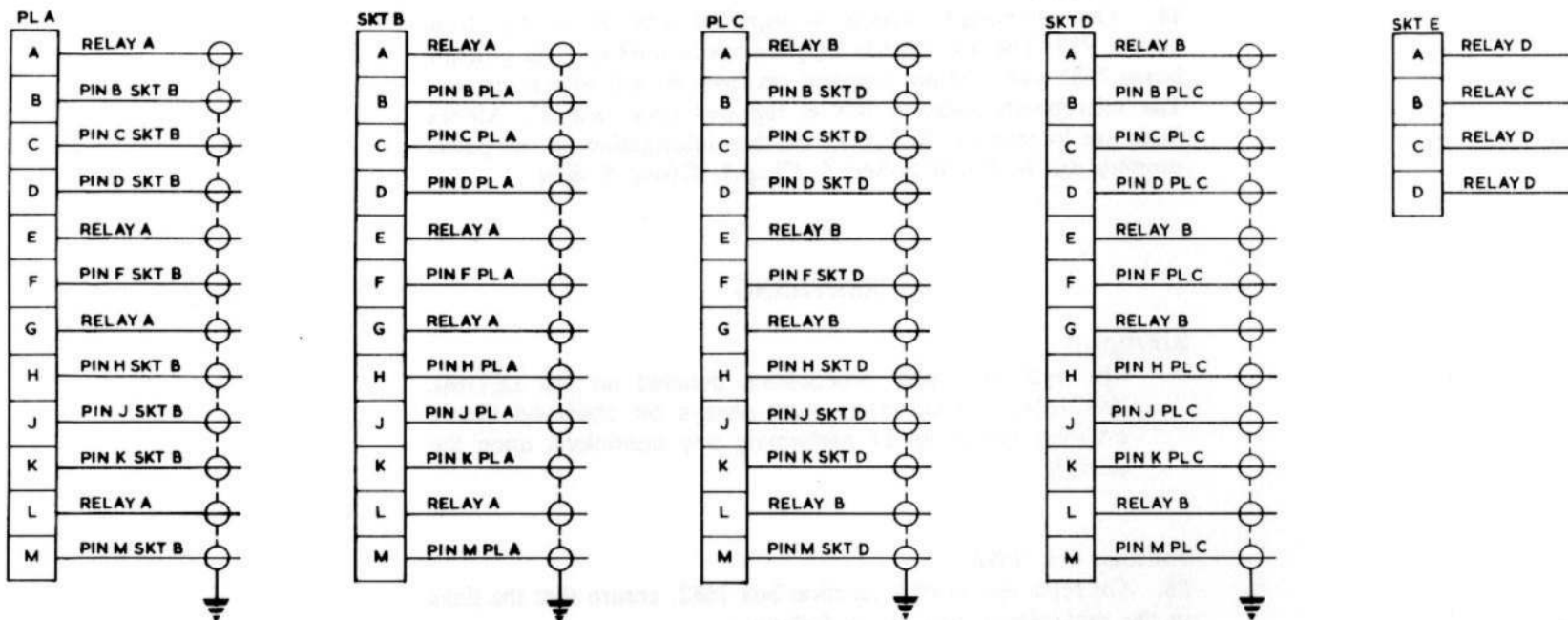
P - LS

Q - MS

R - NS

E - ES

K - KS



SEM CAN O15 STC

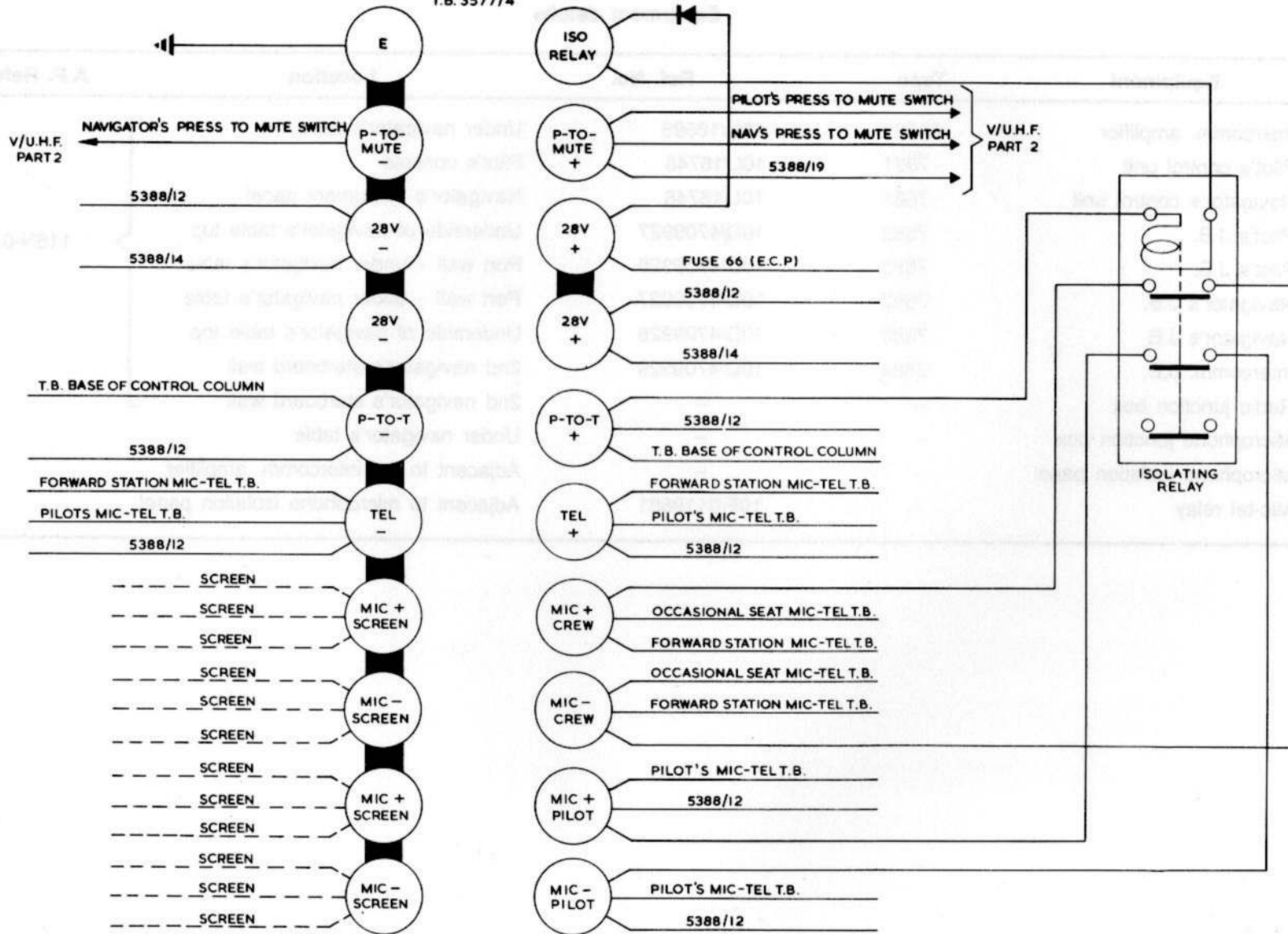
FIG. 3. INTERNAL WIRING - MICROPHONE JUNCTION BOX

TABLE 1

Equipment details

Equipment	Type	Ref. No.	Location	A.P. Reference
Intercomm. amplifier	A1961	10U/16596	Under navigator's table	116N-0105-1
Pilot's control unit	7681	10L/16748	Pilot's console	
Navigator's control unit	7681	10L/16748	Navigator's instrument panel	
Pilot's J.B.	7682	10D/4709927	Underside of navigator's table top	
Pilot's J.B.	7683	10D/4709928	Port wall - under navigator's table	
Navigator's J.B.	7682	10D/4709927	Port wall - under navigator's table	
Navigator's J.B.	7683	10D/4709928	Underside of navigator's table top	
Intercomm. J.B.	7684	10D/4709929	2nd navigator's starboard wall	
Radio junction box	-	-	2nd navigator's starboard wall	
Microphone junction box	-	-	Under navigator's table	
Microphone isolation panel	-	-	Adjacent to the intercomm. amplifier	
◀ Mic-tel relay ▶	-	10F/0119881	Adjacent to microphone isolation panel	

T.B. 3577/4



EA3 82 8003 2 1

FIG. 4. INTERNAL WIRING - MICROPHONE ISOLATION PANEL

◀ MOD 5204 EMBODIED ▶

TABLE 2

Connector details

CONNECTOR 5388/2 (10HB/21521)

Termination A	Pin	Cable	Pin	Termination B
Intercomm. J.B.7684 (J)	A	NV20	Term 6	Normal/Emergency Switch
	B	NV20	Term 6	
	C	NV20	Term 5	
	D	NV20	Term 2	

CONNECTOR 5388/3 (10HB/21522)

Termination A	Pin	Cable	Pin	Termination B
Intercomm. J.B.7684 (L)	A	NV20	A	Radio junction box (S2)
	B	NV20	B	
	C	NV20	C	
	D	NV20	D	
	E	NV20	E	
	F	NV20	F	
	G	NV20	G	
	H	NV20	H	
	J	NV20	J	
	K	NV20	K	
	L	NV20	L	
	M	NV20	M	

CONNECTOR 5388/4 (10HB/21523)

Termination A	Pin	Cable	Pin	Termination B
Pilot's J.B.7683 (C)	A	Min 25C	A	Intercomm. J.B.7684 (M)
	B		B	
	C		C	
	D		D	
	E		E	
	F		F	
	G		G	
	H		H	
	J		J	
	K		K	
	L		L	
	M		M	
	N		N	
	O		O	
	P		P	
	Q		Q	
	R		R	
	S		S	
	T		T	
	U		U	
	V		V	
	W		W	
	X		X	
	Y		Y	
	Z		Z	

continued . . .

TABLE 2 Connector details - continued

CONNECTOR 5388/5 (10HB/21524)

Termination A	Pin	Cable	Pin	Termination B
Pilot's J.B.7683 (D)	A	Min 25	A	Navigator's J.B.7683 (D)
	B			
	C			
	D			
	E			
	F			
	G			
	H			
	J			
	K			
	L			
	M			
	N			
	O			
	P			
	Q			
	R			
	S			
	T			
	U			
	V			
	W			
	X			
	Y			
	Z			

CONNECTOR 5388/6 (10HB/21525)

Termination A	Pin	Cable	Pin	Termination B
Intercomm. J.B.7684 (N)	A	Min 12C	A	Navigator's J.B.7682 (D)
	B			
	C			
	D			
	E			
	F			
	G			
	H			
	J			
	K			
	L			
	M			

CONNECTOR 5388/7 (10HB/21526)

Termination A	Pin	Cable	Pin	Termination B
Navigator's J.B.7682 (C)	A	Min 12C	A	Pilot's J.B.7682 (D)
	B			
	C			
	D			
	E			
	F			
	G			
	H			
	J			
	K			
	L			
	M			

Continued . . .

TABLE 2 Connector details - continued

CONNECTOR 5388/8 (10HB/21527)

Termination A	Pin	Cable	Pin	Termination B
Pilot's control unit Type 7681 (B)	A	Min 18C	A	Pilot's J.B.7683 (A)
	B			
	C			
	D			
	E			
	F			
	G			
	H			
	J			
	K			
	L			
	M			
	N			
	O			
	P			
	Q			
	R			
	S			

CONNECTOR 5388/9 (10HB/21528)

Termination A	Pin	Cable	Pin	Termination B
Navigator's control unit Type 7681 (B)	A	Min 18C	A	Navigator's J.B.7683 (A)
	B			
	C			
	D			
	E			
	F			
	G			
	H			
	J			
	K			
	L			
	M			
	N			
	O			
	P			
	Q			
	R			
	S			

continued . . .

TABLE 2 Connector details - continued

CONNECTOR 5388/10 (10HB/21529)

Termination A	Pin	Cable	Pin	Termination B
Pilot's control unit Type 7681 (A)	A	Min 12C	A	Microphone junction box (B)
	B			
	C			
	D			
	E			
	F			
	G			
	H			
	J			
	K			
	L			
	M			

CONNECTOR 5388/12 (10HB/21531)

Termination A	Pin	Cable	Pin	Termination B
Pilot's J.B.7683 (B)	A	NV22	Tel+	Microphone isolation panel
	B	NV22	Tel-	
	C	NV20	28V+	
	D	NV20	28V-	
	E	NV22	P-TO-T+	
	F	NV22	P-TO-T+	

CONNECTOR 5388/13 (10HB/21532)

Termination A	Pin	Cable	Pin	Termination B
Pilot's J.B.7682 (A)	A	NVMS	Mic+	Microphone isolation panel
	B	NVMS	Mic-	

CONNECTOR 5388/11 (10HB/21530)

Termination A	Pin	Cable	Pin	Termination B
Microphone junction box (C)	A	Min 12C	A	Navigator's J.B.7682 (B)
	B			
	C			
	D			
	E			
	F			
	G			
	H			
	J			
	K			
	L			
	M			

CONNECTOR 5388/14 (10HB/21533)

Termination A	Pin	Cable	Pin	Termination B	
Navigator's J.B.7683 (B)	A	NV22	Tel+	B Navigator's Mic-tel T.B.	
	B	NV22	Tel-		
	C	D	NV20	28V+	B1 Microphone isolation panel
				28V-	
	E	F	NV22	P-TO-T	B2 Navigator's P-TO-T switch
				P-TO-T	

continued . . .

TABLE 2 Connector details - continued

CONNECTOR 5388/15 (10NH/21534)

Termination A	Pin	Cable	Pin	Termination B
Navigator's J.B.7682 (A)	A	NVMS22	Mic +	Navigator's Mic-tel T.B.
	B	NVMS22	Mic -	

CONNECTOR 5388/16 (10HB/21535)

Termination A	Pin	Cable	Pin	Termination B
Radio junction box (S3)	A	NVMS22	A	B Intercomm. J.B.7684 (A)
	B*		*B	
	C	NVMS22	C	
	D*		D	
	E	NVMS22	D	
	F*		F	
	G	NV22	E	B1 Standby U.H.F. ON-OFF switch Part 2
	H	NV22	F	
	I			
	J	NV22	Term 4	

*The screen of pin A is connected to pin B
The screen of pin C is connected to pin D
The screen of pin E is connected to pin F

At end B, bond screens to pin B
Do *not* connect to the shell

CONNECTOR 5388/20 (10HB/21539)

Termination A	Pin	Cable	Pin	Termination B
Navigator's control unit Type 7681 (C)	A	NV22	Term 5	Navigator's lighting T.B.
	B	NV22	Term 10	
	C	NV22	Term 9	
	D	NV22	Term 6	

CONNECTOR 5388/21 (10HB/21540)

Termination A	Pin	Cable	Pin	Termination B
Pilot's control unit Type 7681 (C)	A	NV22	L72	Pilot's lighting T.B.
	B	NV22	E27	
	C	NV22	E27	
	D	NV22	L72	

CONNECTOR 5388/22 (10HB/21541)

Termination A	Pin	Cable	Pin	Termination B
Intercomm. J.B.7684 (H)	A	NV20	R3	J.B.14
	B	NV20	E14	

continued . . .

TABLE 2 Connector details - continued

CONNECTOR 5468/1 (10HB/22120)

Termination A	Pin	Cable	Pin	Termination B
Intercomm. J.B.7684 (K)	A	Min 6D	A	Intercomm. Amplifier (PL2)
	B		B	
	C		C	
	D		D	
	E		E	
	F		F	

CONNECTOR 5468/2 (10HB/22121)

Termination A	Pin	Cable	Pin	Termination B
Intercomm. Amplifier (PL1)	A	NV20	28V+	J.B.14
	B	NV20	28V-	

CONNECTOR RT20 EA3-82-59/1

Termination A	Pin	Cable	Pin	Termination B
Pilot's Mic-tel socket	Mic+		Mic+	Pilot's Mic-tel T.B.
	Mic-		Mic-	
	Tel+		Tel+	
	Tel-		Tel-	

CONNECTOR RT21 EA3-82-129

Termination A	Pin	Cable	Pin	Termination B
1st navigator's Mic-tel socket	Mic+		Mic+	1st navigator's Mic-tel T.B.
	Mic-		Mic-	
	Tel+		Tel+	
	Tel-		Tel-	

CONNECTOR RT22 EA3-82-131

Termination A	Pin	Cable	Pin	Termination B
2nd navigator's Mic-tel socket	Mic+		Mic+	2nd navigator's Mic-tel T.B.
	Mic-		Mic-	
	Tel+		Tel+	
	Tel-		Tel-	

**Part 2 V/U.H.F. COMMUNICATION SYSTEM (A.R.I.23143 AND A.R.I. 23300)
AND STAND-BY U.H.F. (A.R.I.23159)**

◀(completely revised)▶

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DESCRIPTION**General**

1. The aircraft is equipped with two communication installations. Pre-mod. 5409 aircraft are equipped with A.R.I.23143 V/U.H.F. and A.R.I. 23159 stand-by U.H.F. while post-mod. 5409 aircraft are equipped with A.R.I. 23300 V/U.H.F. and A.R.I. 23159 stand-by U.H.F. Full technical information on the main units are contained in A.P.116D-0116-1 (A.R.I. 23143), A.P.116D-0107-1 (A.R.I. 23159) and A.P.116D-0154-1 (A.R.I. 23300).

2. The locations of the main units are shown in fig. 1-1A and interconnections in fig.2 (pre-mod. 5409) or in fig.3 (post-mod. 5409). Table 1 lists equipment details together with their A.P. references while Table 2 provides connector details.

V/U.H.F. INSTALLATION - A.R.I.23143 (PRE MOD. 5409)**Introduction**

3. A.R.I.23143 provides the following facilities:-

- 3500 communication channels in the U.H.F. band of 225 to 399.95 MHz with a channel spacing of 50 KHz.
- 370 communication channels in the V.H.F. band of 117.5 to 135.95 MHz with a channel spacing of 50 KHz.
- Constant monitoring of the guard (international U.H.F. distress) frequency of 243 MHz via an additional fixed tuned receiver incorporated in the main U.H.F. transmitter/receiver.
- Emergency intercomm. between crew members, using the A.F. amplifier section of the transmitter/receiver.

4. The installation comprises the following main items of equipment:-

Transmitter/receiver, Type PTR175

Mounting tray

Control unit, Type C1607/4

Control unit, Type C1607/7

Control receiver muting

Interconnection box

U.H.F. aerial, Type 16-1-P1 (2)

V.H.F. whip aerial (1)

Aerial switch unit

Transmitter/receiver

5. The transmitter/receiver unit is mounted on a shock-mounted tray, located in the centre fuselage between frames 28 and 29. Cooling air for the unit is provided by a double-ended blower motor assembly, mounted on the front panel, which circulates air between the inner and outer covers. Pressurization of the unit is maintained at 5 lb/in² through a Schraeder valve, using dry air or nitrogen. The valve and all electrical connectors are located on the front plate of the unit.

6. In conjunction with the pilot's control unit, the transmitter/receiver can be selected to operate on any one of 19 preset channels (one of which is tuned to the guard frequency) or manually tuned to any one of the 3500 U.H.F. and 370 V.H.F. frequencies available.

7. A self-contained receiver sub-assembly of the main unit functions as the guard receiver. Connected to the same U.H.F. aerial as the main unit, it has only one reception channel (238 MHz to 248 MHz) which is normally tuned to the international U.H.F. distress frequency of 243 MHz.

Control units

8. A control unit, Type C1607/4, mounted on the miscellaneous instrument panel, provides the pilot with complete control of the system. A control unit, Type C1607/7, mounted on the navigator's

instrument panel, provides the navigator with frequency selection facilities only.

Control unit change-over switch

9. A switch, annotated C.U. PILOT - C.U. NAV, located on the miscellaneous instrument panel, enables the pilot to allocate control of the system to the navigator.

Control unit, Type C1607/4

10. The control unit, Type C1607/4, provides the following facilities:-

(1) Manual frequency selection is effected by three identical knobs controlling MHz selection; the left hand knob selects hundreds and tens, the central knob selects units, and the right-hand knob selects the decimal places.

(2) Channel selection is effected by a rotary switch, idented CHAN, with 20 positions, idented 1 to 18, G and M; the switch selects any one of the preset channels, the guard frequency, or manual selection. Position G can be selected by turning the knob in either direction until it reaches a stop.

(3) A volume control sets the audio signal in the telephones to the required level.

(4) A rotary function switch has seven positions as follows:-

- (a) OFF - power supplies disconnected.
- (b) T/R - equipment switched on for normal use.
- (c) T/R+G - the guard receiver is switched on with retention of normal transmission/reception facilities on the selected channel.

- (d) ADF
 - (e) DL
 - (f) DL/T
 - (g) T/R ON D/L OFF
- } not used in this installation.

(5) A two-position switch, idented G/D and located at the right-hand side of the control unit is the Guard/Data link change-over switch; in this installation it should be set to the guard position G.

(6) Access to the frequency scale adjusters for the preset channels is obtained by pulling open the cover plate at the bottom of the front panel. Setting up instructions are given in A.P.116D-0116-1, Chap.3.

11. Two panel lamps, integral with the unit are controlled by the starboard red lamps dimmer switch (*Sect.5, Chap.1, Group L*).

Control unit, Type C1607/7

12. The control unit is located on the navigator's instrument panel and provides control of the system when the control unit change-over switch, on the pilot's miscellaneous instrument panel is set to C.U.NAV.

13. The control unit has three controls for manual frequency selection, operating as in the Type C1607/4 control unit. An indication lamp, located on the front panel, lights when the C.U. PILOT-C.U.NAV. switch on the miscellaneous instrument panel is in the C.U.NAV position. With the switch in this position control of frequency selection is from the control unit, Type C1607/7. Two panel lamps, integral with the unit are controlled by the CU LIGHTS dimmer switch (*Sect.5, Chap.1, Group L*).

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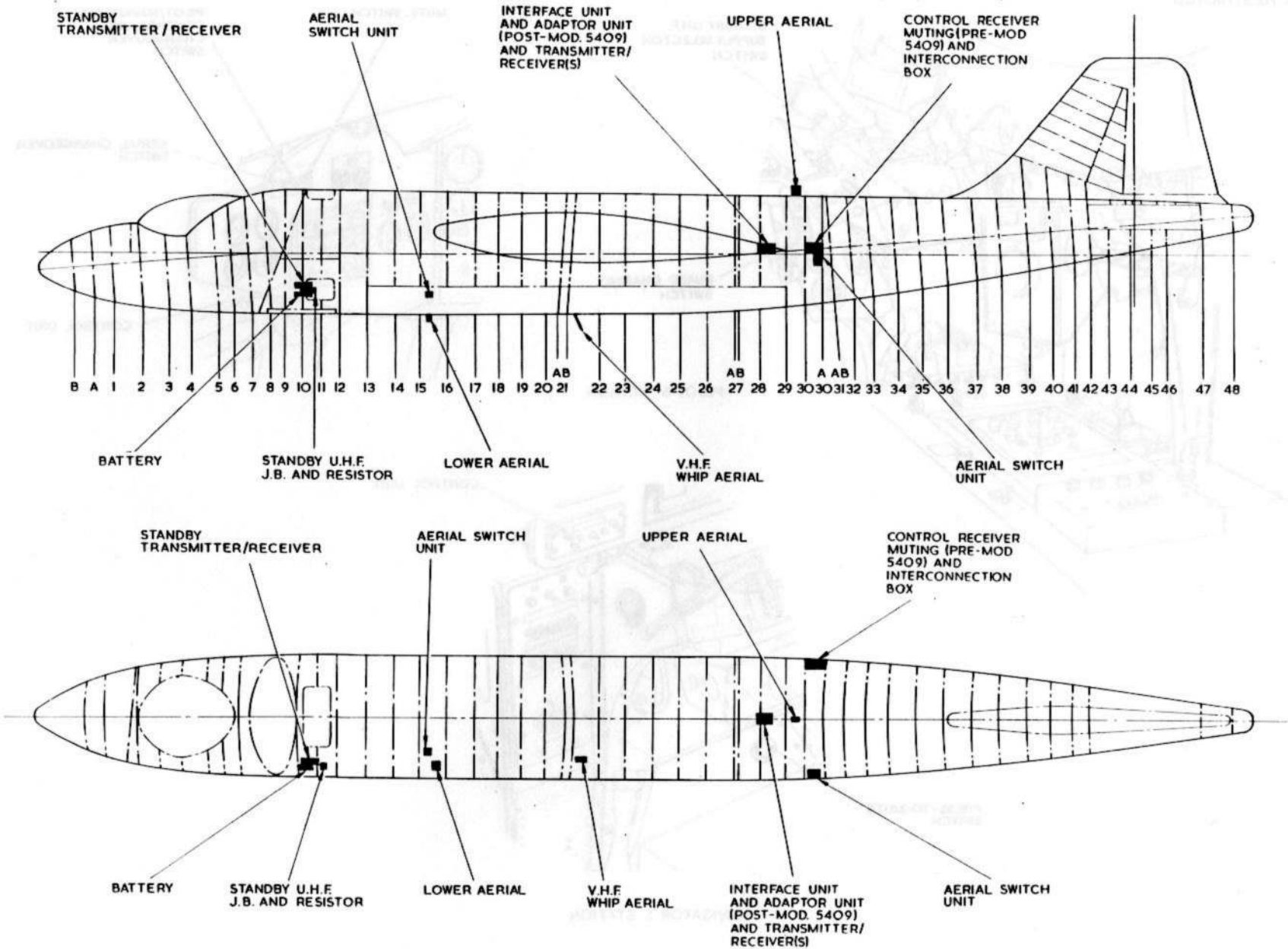


FIG.1. LOCATION DIAGRAM-V/U.H.F. COMMUNICATION SYSTEM AND STANDBY U.H.F. (PRE AND POST MOD. 5409)

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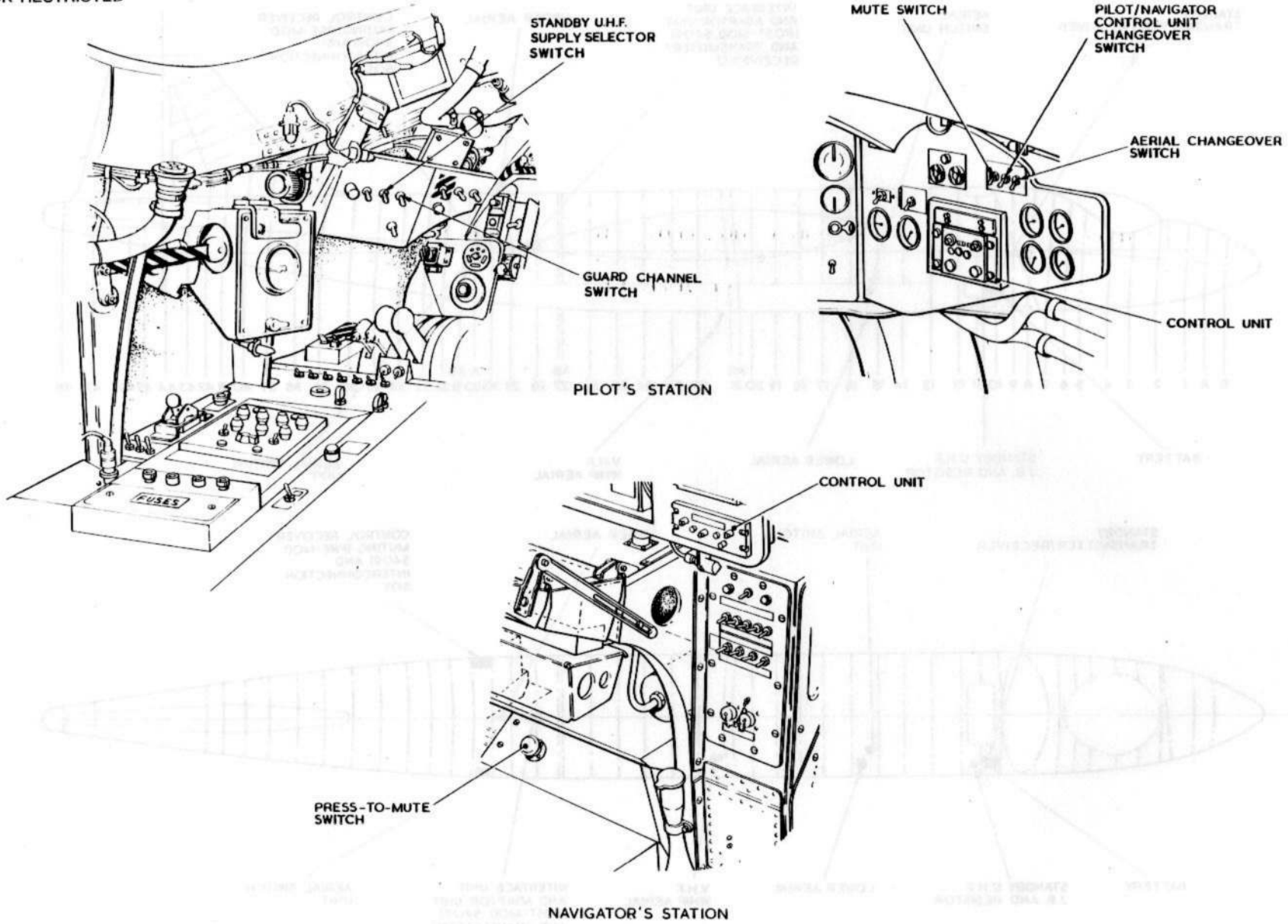


FIG. 1A. LOCATION DIAGRAM - V/U.H.F. COMMUNICATION SYSTEM AND STANDBY U.H.F. (PRE AND POST MOD. 5409)

◀ STI/CAN/586c INCORPORATED ▶

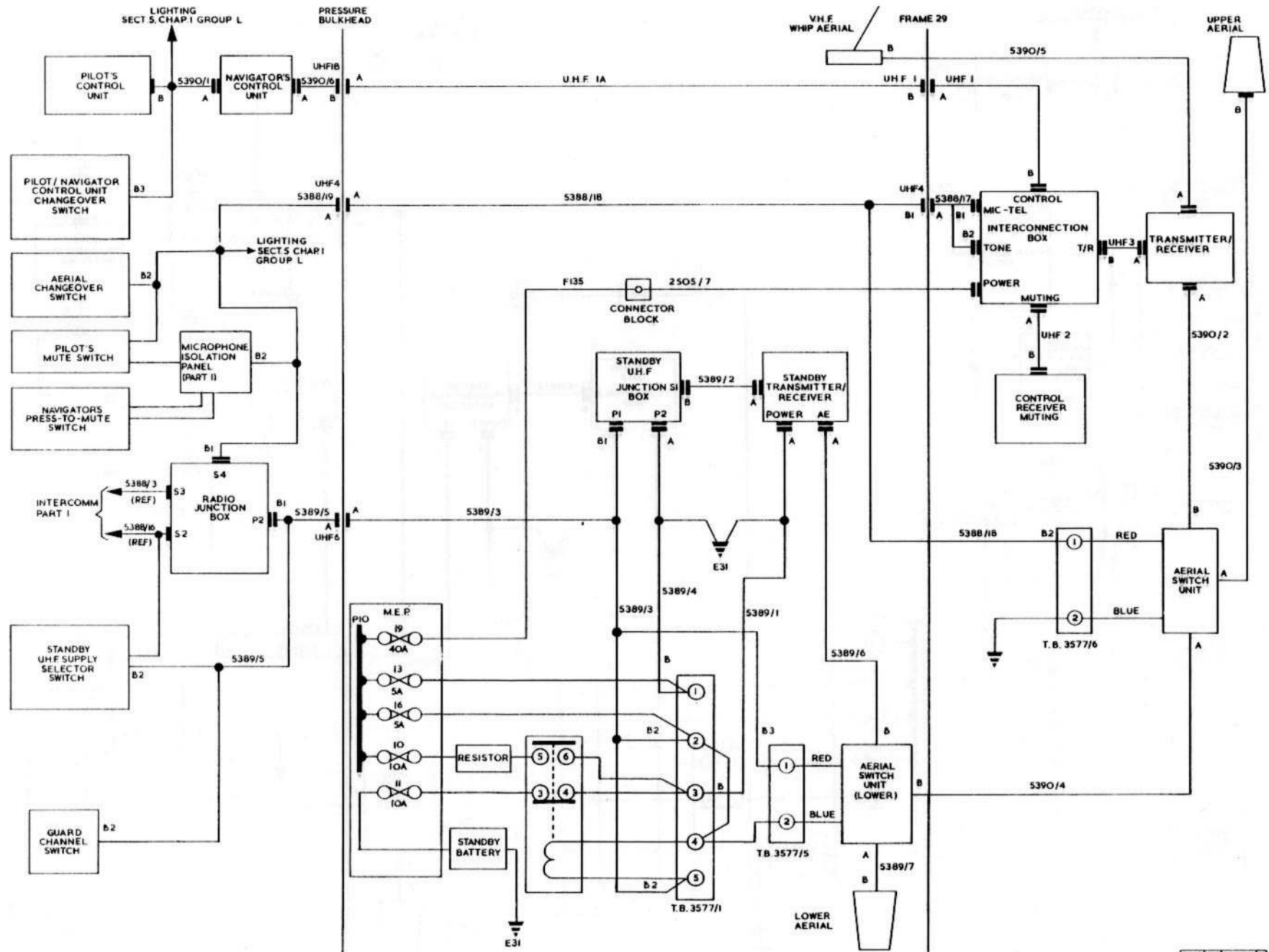


FIG.2. INTERCONNECTION DIAGRAM-V/U.H.F. COMMUNICATION SYSTEM AND STANDBY U.H.F. (PRE-MOD. 5409)

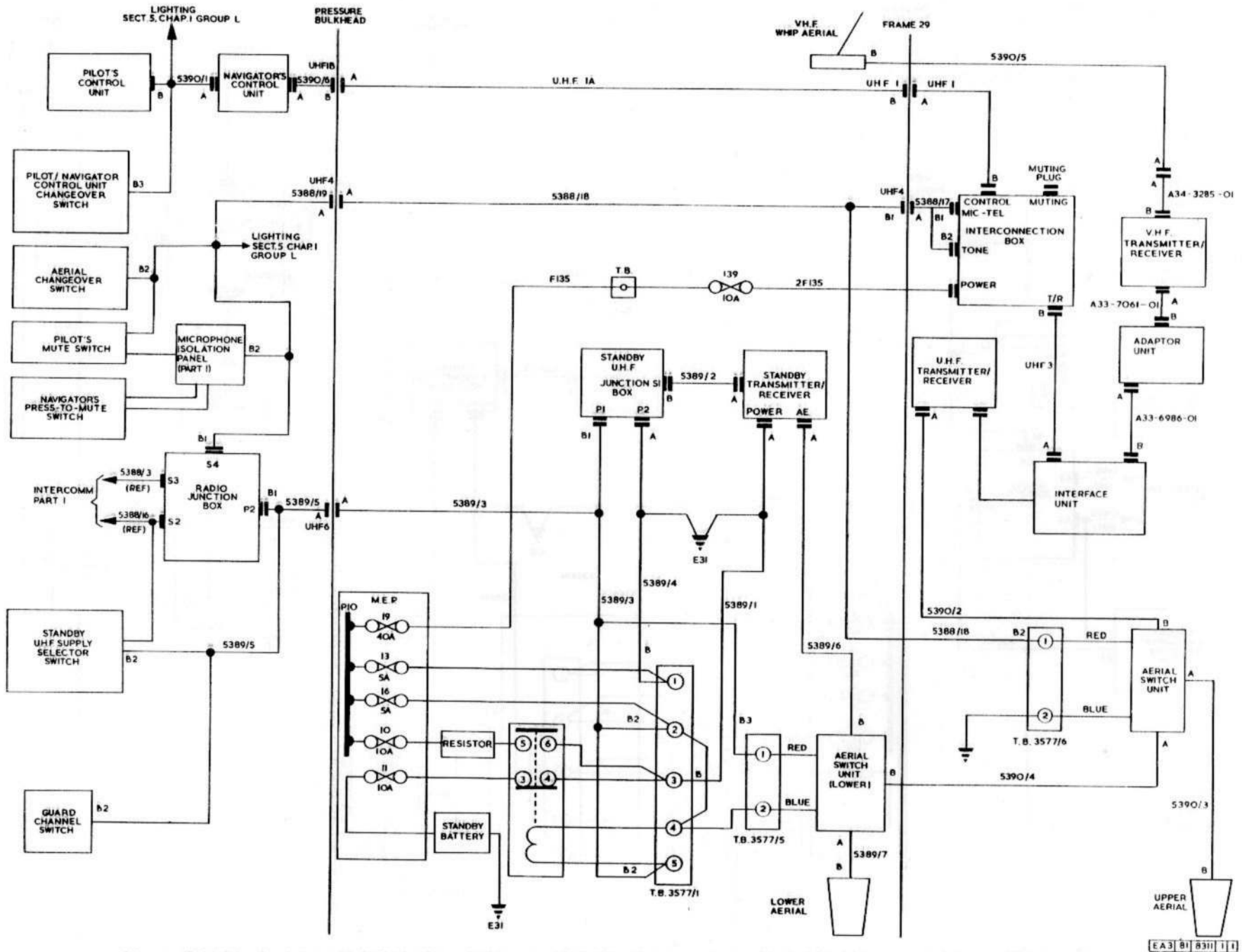


FIG. 3. INTERCONNECTION DIAGRAM-V/U.H.F. COMMUNICATION SYSTEM AND STANDBY U.H.F. (POST MOD. 5409)

Control receiver muting

14. The control receiver muting is located adjacent to the interconnection box in the centre fuselage on the starboard side between frames 30 and 30A. The unit enables the transmitter/receiver output to be muted as required.

Interconnection box

15. The interconnection box is located in the centre fuselage between frames 30 and 30A on the starboard side, and provides the following:-

- (1) Microphone inputs and audio output circuits from the transmitter/receiver to the crew headsets via the radio junction box.
- (2) Muting and tune facilities and panel lights to the appropriate switches and controls.
- (3) Power supplies to the control unit and transmitter/receiver.
- (4) Control unit to the transmitter/receiver.

Intercommunication system

16. The press-to-transmit switches and microphone-telephone circuits, used for voice communication are part of the intercommunication system described in Part 1 of this chapter.

Aerials

17. Three aerials are fitted to the aircraft, an upper aerial, a lower aerial and a V.H.F. whip aerial. The upper U.H.F. aerial is located between frames 29 and 30 on the centre-line of the fuselage skin. The lower U.H.F. aerial and the V.H.F. aerial are located in the port bomb bay door.

U.H.F. aerial switching

18. To ensure optimum radiation, a choice of U.H.F. aerials is provided. Operation of a switch, labelled AE UPPER - AE LOWER, mounted on the miscellaneous instrument panel, connects either the upper or lower U.H.F. aerial to the transmitter/receiver. The switch controls a 28V d.c. supply to the solenoid of the relay armature within the aerial switch unit. With the switch

in the AE UPPER position the relay is energized and the T/R is connected to the upper U.H.F. aerial. With the switch in the AE LOWER position the relay is de-energized and the T/R is connected to the lower U.H.F. aerial via the closed contact of the energized lower aerial relay.

Power supplies

19. The V/U.H.F. installation operates on 28V d.c. supplied from busbar P10. The transmitter/receiver is supplied via the interconnection box from fuse 19 in the MEP. The aerial switch unit, is supplied via the aerial change-over switch, from fuse 84, in the E.C.P. and the control unit change-over switch from fuse 164 also in the E.C.P.

20. The power supply circuits are described in Sect.5, Chap.1, Group R and S.

V/U.H.F. INSTALLATION - A.R.I.23300 (POST MOD. 5409)**Introduction**

21. A.R.I. 23300 provides the following facilities:-

- 3500 communication channels in the U.H.F. band of 220 to 399.95 MHz with a channel spacing of 50 KHz.
- 720 communication channels in the V.H.F. band of 118 to 135.975 MHz with a channel spacing of 25 KHz.
- Constant monitoring of the guard (international U.H.F. distress) frequency of 243 MHz.
- Emergency intercomm. between crew members using an emergency intercomm. amplifier.

Any sixteen of the available 4220 V/U.H.F. channels may be pre-set by the pilot for quick channel selection.

22. The installation comprises the following main items of equipment:-

- U.H.F. transmitter/receiver, Type PTR 1751W
- V.H.F. transmitter/receiver, Type AA1201-3
- V/U.H.F. control unit, Type PV1753M
- V/U.H.F. control unit, Type PV1754L
- Adaptor unit, Type AA1220-1
- Interface unit, Type PV1746B
- Interconnecting box
- U.H.F. aerial, Type 16-1-P1(2)
- V.H.F. aerial, Type 228
- Aerial switch unit
- Mounting tray

V.H.F. transmitter/receiver

23. The V.H.F. transmitter/receiver is fitted in a shock-mounted tray which also carries the V.H.F. adaptor unit, U.H.F. transmitter/receiver and the interface unit, located in the centre fuselage between frames 28 and 29.

24. In conjunction with the pilot's control unit, the transmitter/receiver can be selected to operate on any one of sixteen preset channels or manually tuned to any of the available 720 V.H.F. channels via the pilot's or navigator's control units.

U.H.F. transmitter/receiver

25. The U.H.F. transmitter/receiver can, in conjunction with the pilot's control unit, be operated on any one of sixteen preset channels or manually tuned to any of the available 3500 U.H.F. channels via the pilot's or navigator's control units. A separate guard receiver enables the international U.H.F. distress frequency to be monitored.

Interface unit

26. The interface unit provides interfacing between the transmitter/receivers and the remaining system components. It contains links and preset controls for setting the modulation audio levels and an emergency intercomm amplifier.

Adaptor unit

27. The adaptor unit converts the control unit frequency selection data into a form suitable for the V.H.F. transmitter/receiver and produces an inhibit signal if a frequency outside the range of the transmitter/receiver has been selected.

Pilot's and navigator's control units

28. A control unit, Type PV1754L, is mounted on the miscellaneous instrument panel and provides the pilot with control of the system. A control unit, Type PV1753M, mounted on the navigator's instrument panel, provides the navigator with control of the system but with fewer facilities than those available to the pilot.

Control unit change-over switch

29. A switch, annotated C.U. PILOT-C.U.NAV, located on the miscellaneous instrument panel, enables the pilot to allocate control of the system to the navigator.

Control unit, Type PV1754L

30. The control unit, Type PV1754L, provides the pilot with the following facilities:-

(1) Manual frequency selection is effected by two pairs of concentrically-mounted knobs. The left-hand controls are used to select frequencies in 10 MHz and 1 MHz steps while the right-hand controls are used to select frequencies in 100KHz and 25KHz steps.

(2) A rotary function switch has the following positions:-

- (a) OFF - power supplies disconnected.
 - (b) T/R - equipment switched on for normal use.
 - (c) T/R+G - the guard receiver in the U.H.F. transmitter/receiver is switched on with retention of normal transmission/reception facilities on the selected channel.
 - (d) T/R+H
 - (e) T/R+G+H
- } not used in this installation.

- (3) A rotary mode switch has the following positions:-
- M - the installation operates on the manually selected frequency.
 - P - the installation operates on the preset frequency.
 - Gv - the installation operates at the V.H.F. distress frequency of 121.5 MHz.
 - Gu - the installation operates at the U.H.F. distress frequency of 243 MHz.
- (4) A channel select rotary switch marked 1 to 16 selects one of the sixteen preset channels for use.
- (5) A VOL control sets the level of the transmitter/receiver audio output.
- (6) A frequency display shows the first five digits of the manually-selected frequency.
- (7) A DIM control controls the brightness of the frequency display.
- (8) A TEST push-button, when operated, provides a confidence check on the display and on the transmitter/receiver. With the mode switch set to M, pressing the TEST push-button causes the display to indicate 888.88 while with P, Gv or Gu selected, the display indicates the operating frequency.
- (9) A SET CHANNEL button inserts the manually-set V.H.F. or U.H.F. frequency into the selected preset channel. This is achieved by rotating the button clockwise against spring tension and then depressing it.

Control unit, Type PV1753M

31. This unit has the same controls as the Type PV1754L with the exception of the mode and preset channel switches and SET CHANNEL button, all channel selections being made manually.

Interconnection box

32. The interconnection box, located in the centre fuselage between frames 30 and 30A on the starboard side, enables the following connections to be made:-

- (1) Microphone inputs and audio output circuits from the transmitter/receivers to the crew headsets via the radio junction box.
- (2) Muting and tone facilities and panel lights to the appropriate switches and controls.
- (3) Power supplies to the control units and transmitter/receivers.
- (4) Control units to the transmitter/receivers.

A muting plug is fitted to the MUTING socket of the unit.

Intercommunication system

33. The press-to-transmit switches and microphone-telephone circuits, used for voice communication are part of the intercommunication system described in Part 1 of this chapter.

Aerials

34. Three aerials are fitted to the aircraft, an upper and a lower U.H.F. aerial and a V.H.F. aerial. The upper U.H.F. aerial is located between frames 29 and 30 on the centre-line of the fuselage skin. The lower U.H.F. aerial and the V.H.F. aerial are located in the port bomb bay door.

U.H.F. aerial switching

35. To ensure optimum radiation, a choice of U.H.F. aerials is provided. Operation of a switch, labelled AE UPPER - AE LOWER, mounted on the miscellaneous instrument panel, connects either the upper or lower U.H.F. aerial to the transmitter/receiver. The switch controls a 28V d.c. supply to the solenoid of the relay armature within the aerial switch unit. With the switch in the AE UPPER position the relay is energized and the T/R is connected to the upper U.H.F. aerial. With the switch in the AE LOWER position the relay is de-energized and the T/R is connected to the lower U.H.F. aerial via the closed contact of the energized lower aerial relay.

Power supplies

36. The V/U.H.F. installation operates on 28 volts d.c. supplied from busbar P10. The transmitter/receivers are supplied from fuse 19 on the M.E.P. via fuse 139 adjacent to the interconnection box. The aerial switch unit is supplied via the aerial change-over switch from fuse 84 in the E.C.P. and the control unit change-over switch from fuse 164, also in the E.C.P.

37. The power supply circuits are described in Sect.5, Chap.1, Group R and S.

STAND-BY U.H.F. INSTALLATION - A.R.I.23159

Introduction

38. A.R.I.23159 provides the following facilities:-

- single channel communication on the guard frequency of 243 MHz.
- single channel communication on a frequency within 1 MHz of the guard frequency.

The system will operate from an emergency battery for up to 60 minutes if the main power supply fails.

39. The installation comprises the following main items of equipment:-

Transmitter/receiver, Type D403M

Mounting electrical

Stand-by U.H.F. junction box

Battery, Type K, 24V

Lower aerial switch unit

Transmitter/receiver

40. The transmitter/receiver, on its mounting tray, is located in the port equipment compartment. When the aircraft power supplies are switched on the stand-by system is immediately available. In the event of failure of normal power supplies the transmitter/receiver is automatically switched to a supply from the U.H.F. stand-by battery.

Stand-by U.H.F. junction box

41. The stand-by U.H.F. junction box is located, on a mounting plate, in the port equipment compartment. It is provided with a TEST socket for the connection of a test set used in testing the

installation. A switch, also annotated TEST, is the battery test switch which is described in para.30.

Power supplies

42. Power supplies to the stand-by U.H.F. transmitter/receiver are controlled by the STANDBY U.H.F. supply selector switch which is located on the pilot's port panel and annotated OFF-NORMAL-BATT.

43. In the OFF position an earth return is provided via the closed contacts of the battery TEST switch to energize the supply switching relay from the 28V d.c. busbar P10 via 5A fuse 16 in the main electrical panel.

44. With the supply switching relay energized, the closed contacts 5 and 6 complete the circuit to feed the aircraft normal 28V d.c. from busbar P10, via 10A fuse 10 in the M.E.P. and a 2 ohm, 50 watt dropping resistor to the stand-by U.H.F. transmitter/receiver.

45. With the STANDBY UHF switch selected to NORMAL the energizing circuit for the supply switching relay remains unbroken and the stand-by U.H.F. transmitter-receiver is still supplied from the aircraft normal 28V d.c. supply. The additional switch contacts close to apply an earth return circuit for the stand-by transmitter/receiver, which energizes an internal relay to switch the transmitter/receiver supplies on for normal operation.

46. With the STANDBY UHF switch selected to BATT the earth return circuit of the stand-by U.H.F. transmitter/receiver is maintained. The earth return to the supply switching relay is broken, de-energizing the relay. The relay contacts change over to feed the 24V d.c. supply from the stand-by U.H.F. battery via 10A fuse 11 in the main electrical panel to the stand-by U.H.F. transmitter/receiver.

Battery test switch

47. The battery TEST switch, located on the front panel of the stand-by U.H.F. junction box, when selected to TEST breaks the earth return to the supply switching relay, causing the stand-by U.H.F. transmitter/receiver to be supplied from the battery as described in para.29.

Battery

48. The battery, Type K, which is mounted in the port equipment compartment, provides an emergency supply to the stand-by U.H.F. transmitter/receiver for up to 60 minutes in the event of a main power supply failure.

Aerial switch unit (lower)

49. The lower aerial switch unit, located on the port bomb door, connects the lower U.H.F. aerial to either the V/U.H.F. transmitter/receiver via the aerial switch unit or the stand-by U.H.F. transmitter/receiver. It is controlled by a contact of the STANDBY UHF switch which is located on the pilot's port panel.

50. With the STANDBY UHF switch selected to OFF an earth return is provided to energize the lower aerial switch unit from the 28V d.c. busbar P10 via 5A fuse 16 in the main electrical panel and connect the lower U.H.F. aerial to the aerial switch unit. In the event of failure of normal aircraft supplies the de-energized lower aerial switch unit automatically connects the lower U.H.F. aerial to the stand-by U.H.F. transmitter/receiver. The same applies when the STANDBY UHF switch is selected to either NORMAL or BATT.

OPERATION**V/U.H.F. INSTALLATION - A.R.I.23143 (PRE MOD. 5409)****General**

51. To operate the V/U.H.F. equipment for voice communication on any one of the preset channels, the procedure is as follows:-

- (1) Select the control unit change-over switch on the pilot's

miscellaneous instrument panel to C.U. PILOT or C.U.NAV as required.

- (2) Set the function switch on the respective control unit to T/R and allow 30 seconds for warm-up.
- (3) Set the channel selector CHAN to the required channel.
- (4) Adjust the volume control to approximately the centre of its travel.
- (5) Readjust the volume control when the signal is received.
- (6) To transmit, operate the respective press-to-transmit switch; to receive, release the switch.

CAUTION

It is of the utmost importance to ensure that the equipment is in the 'receive' condition before changing channels. The transmitter/receiver may be seriously damaged if channels are changed whilst in the 'transmit' condition.

Guard receiver

52. Selection of T/R+G at the control unit brings the guard receiver into operation. With the channel selector CHAN set to any of the channels other than G, watch can be maintained on both the guard frequency and the selected operating frequency. The level of audio output of the guard receiver relative to that of the main receiver is preset internally, and the volume control on the control unit adjusts the audio level of the combined signal fed to the telephones.

Receiver muting

53. When either of the pilot's or navigator's mute switches are operated, a relay inside the control receiver muting unit is energized. Contacts of this relay close to apply a negative bias of approximately -10 volts to the a.g.c. line, rendering the r.f. amplifier section of the V/U.H.F. receiver inoperative.

V/U.H.F. INSTALLATION - A.R.I.23300 (POST MOD. 5409)

Preset channel selection

54. To insert a particular frequency into a preset channel, the procedure is as follows:-

- (1) Set the control unit change-over switch on the pilot's miscellaneous instrument panel to C.U. PILOT.
- (2) Set the pilot's control unit function switch to T/R.
- (3) Set the mode switch to M.
- (4) Set the channel select rotary switch to the required preset channel number.
- (5) Using the manual frequency selectors, set the required V.H.F. or U.H.F. frequency on the frequency display.
- (6) Rotate the SET CHANNEL button clockwise against spring tension and then depress it.
- (7) Check that the correct frequency has been applied by setting the mode switch to P and pressing the TEST push-button - the frequency display should indicate the frequency set in (5) above.

STAND-BY U.H.F.

General

55. To operate the stand-by U.H.F. equipment for voice communication the procedure is as follows:-

- (1) Select the STANDBY UHF switch to NORMAL, or in the event of power failure to BATT and allow 30 seconds for warm up. The lower U.H.F. aerial will automatically be connected to the stand-by U.H.F. transmitter/receiver by the de-energized lower aerial relay and the mic/tel circuits by the similarly de-energized mic/tel relay which is wired in parallel.

- (2) Select the required service, either 'A' or GUARD on the 'A'-GUARD switch which is located adjacent to the STANDBY UHF switch.

SERVICING

WARNING

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

General

56. Servicing, other than that listed in the aircraft Supplementary Servicing Schedules, consists of regular inspection of the units and cable assemblies for physical damage and security of mounting. The cable assembly details given in Table 2 are for use during routine continuity checking and fault diagnosis.

Interface unit

57. The interface unit fitted to post mod 5409 aircraft contains preset controls and links which must be set up to suit the Canberra B Mk.2 installation as detailed in A.P.116D-0154-1 prior to fitment of a replacement unit.

Whip aerial

58. The whip aerial fitted to pre mod. 5409 aircraft must be shortened to a length of 22.75 inches from the aerial base. Those fitted to post mod. 5409 aircraft are not to be shortened.

TABLE 1
Equipment details

Equipment	Type	Ref. No.	Location	A.P. Reference
Pre-mod. 5409:-				
Transmitter/receiver	PTR175	5821-99-971-1781	Centre fuselage, frames 28-29	116D-0116-1
Mounting tray	MT1477R	5821-99-942-8544	Centre fuselage, frames 28-29	
Control unit	C1607/7	5821-99-107-0030	Navigator's instrument panel	
Control unit	C1607/4	5821-99-945-5739	Miscellaneous instrument panel	
Control receiver muting	-	5821-99-943-3247	Centre fuselage, frames 30-30A	
Whip aerial (shortened)	-	10B/951-3781	Port bomb bay door	
Post-mod. 5409:-				
V.H.F. transmitter/receiver	AA1201-3	5821-99-649-8446	Centre fuselage, frames 28-29	116D-0154-1
U.H.F. transmitter/receiver	PTR1751W	5821-99-646-6595	Centre fuselage, frames 28-29	
Interface unit	PV1746B	5821-99-652-0258	Centre fuselage, frames 28-29	
Adaptor unit	AA1220-1	5821-99-649-8447	Centre fuselage, frames 28-29	
Control unit	PV1754L	5821-99-649-0317	Miscellaneous instrument panel	
Control unit	PV1753M	5821-99-652-0259	Navigator's instrument panel	
Mounting tray	AA13306-1	5821-99-649-8448	Centre fuselage, frames 28-29	
Muting plug	A34-3292-01		Centre fuselage, frames 30-30A	
Whip aerial	228	10B/4307081	Port bomb bay door	

continued...

TABLE 1 Equipment details - continued

Equipment	Type	Ref. No.	Location	A.P. Reference
Items common to both modification states:-				
Interconnection box	-	5821-99-932-6361	Centre fuselage, frames 30-30A	116D-0105-1
Upper aerial	16-1-P1	10B/2222399	Upper fuselage, frames 29-30	
Lower aerial	16-1-P1	10B/2222399	Port bomb bay door	
Aerial switch unit	-	10F/9321487	Port bomb bay door	
Stand-by U.H.F. junction box	-	-	Port equipment compartment	
Aerial switch unit	-	10F/9321487	Rear fuselage, port, frames 30-30A	
Stand-by transmitter/receiver	D403M	10D/9528931	Port equipment compartment	116D-0107-1
Mounting electrical	-	5821-99-107-5369	Port equipment compartment	
Battery	K	5J/1115903	Port equipment compartment	113C-0307-13A

TABLE 2

Connector details

CONNECTOR 5388/17 (10HB/21536)

Termination A	Pin	Cable	Pin	Termination
Frame 29 (UHF4)	A	UNMS22	A	B1 Interconnection box (MIC-TEL)
	B	NYVIN22	B	
	C	UNMS22	C	
	D	UNMS22	D	
	E	NYVIN22	E	B2 Interconnection box (TONE)
	F	NYVIN22	F	
	G	NYVIN22	A	

CONNECTOR 5388/18 (10HB/21537)

Termination A	Pin	Cable	Pin	Termination
Pressure bulkhead (UHF4)	A	Min 6	A	B1 Frame 29 (UHF4)
	B		B	
	C		C	
	D		D	
	E	NYVIN22	E	B2 T.B.3577/6
	F		F	
	G		G	
	H		Term 1	

CONNECTOR 5388/19 (10HB/21538)

Termination A	Pin	Cable	Pin	Termination
Pressure bulkhead (UHF4)	A	UNMS22	A	B1 Radio junction box (S4)
	-	BRAID	B	
	B	NYVIN22	H	
	C	UNMS22	C	
	-	BRAID	D	B2 Microphone isolation panel CU dimmer switch Aerial change-over switch
	D	UNMS22	E	
	-	BRAID	F	
	E	NYVIN22	G	
F	NYVIN22	P-TO-M+		
G	NYVIN22	-		
H	NYVIN22	2		

CONNECTOR 5389/1 (10HB/21543)

Termination A	Pin	Cable	Pin	Termination B
Stand-by Transmitter/receiver (POWER)	A	Min 2R	3	T.B.3577/1
	B		E31	

continued. . .

TABLE 2 Connector details - continued

CONNECTOR 5389/2 (10HB/21544)

Termination A	Pin	Cable	Pin	Termination B
Stand-by Transmitter/ receiver	B	NYVIN22	B	Stand-by U.H.F. junction box (S1)
	-	BRAID	C	
	D	UNMS22	D	
	E	NYVIN22	E	
	F	NYVIN22	F	
	G	UNMS22	G	
	-	BRAID	H	
	H	NYVIN22	J	
	J	UNMS22	K	
	-	BRAID	L	
	M	NYVIN22	M	

CONNECTOR 5389/4 (10HB/21546)

Termination A	Pin	Cable	Pin	Termination B
Stand-by U.H.F. junction box (P2)	A	NYVIN20	1	T.B.3577/1
	B	NYVIN20	E31	

CONNECTOR 5389/5 (10HB/21547)

Termination A	Pin	Cable	Pin	Termination
Pressure bulkhead (UHF6)	H	UNMS22	A	B1 Radio junction box (P2)
	-	BRAID	B	
	F	UNMS22	C	
	-	BRAID	D	
	C	UNMS22	E	
	-	BRAID	F	
	D	UN22	G	B2 Stand-by U.H.F. supply selector switch
	B	UN22	H	
	L	UN22	J	
	G	UN22	6	
	K	UN22	2	
M	UN22	4	Guard channel switch	
J	UN22	2		

CONNECTOR 5389/3 (10HB/21545)

Termination A	Pin	Cable	Pin	Termination
Pressure bulkhead (VHF6)	B	UN22	B	B1 Stand-by U.H.F. junction box (P1)
	-	BRAID	C	
	C	UNMS22	D	
	D	UN22	E	
	F	UNMS22	G	
	-	BRAID	H	
	G	UN22	J	
	H	UNMS22	K	
	-	BRAID	L	
	J	UN22	M	
	K	UN22	N	
L	UN22	2	B2	
B1 Stand-by U.H.F. junction box (P1)	M	UN22	1	T.B.3577/1
	F	UN22	5	B3
				T.B.3577/5
			B2	T.B.3577/1

continued . . .

TABLE 2 Connector details - continued

CONNECTOR 5389/6 (10HB/21548)

Termination A	Pin	Cable	Pin	Termination B
Stand-by transmitter/receiver (AE)	-	UR67	-	Aerial switch unit (lower)

CONNECTOR 5389/7 (10HB/21549)

Termination A	Pin	Cable	Pin	Termination B
Aerial switch unit (lower)	-	UR67	-	Lower aerial

CONNECTOR 5390/2 (10HB/21551)

Termination A	Pin	Cable	Pin	Termination B
U.H.F. Transmitter/receiver	-	UR67	-	Aerial switch unit

CONNECTOR 5390/3 (10HB/21552)

Termination A	Pin	Cable	Pin	Termination B
Aerial switch unit	-	UR67	-	Upper aerial

CONNECTOR 5390/1 (10HB/21550)

Termination A	Pin	Cable	Pin	Termination
Navigator's control unit	A	UN22	A	B Pilot's control unit
	B		B	
	C		C	
	D		D	
	E		E	
	F		F	
	H		H	
	J		J	
	K		K	
	L		L	
	M		M	
	N		N	
	R		R	
	S		S	
	T		T	
	U		U	
	V		V	
	W		W	
	X		X	
	Y		Y	
	Z		Z	
	<u>a</u>		<u>a</u>	
	<u>b</u>		<u>b</u>	
	<u>c</u>		<u>c</u>	
	<u>d</u>		<u>d</u>	
	<u>f</u>		<u>f</u>	
<u>g</u>	<u>g</u>			
<u>h</u>	<u>h</u>			
<u>i</u>	<u>i</u>			
P	L52			
				B2 Lighting T.B.

continued. . .

TABLE 2 Connector details - continued

CONNECTOR 5390/1 (10HB/21550) - continued

Termination A	Pin	Cable	Pin	Termination
B Pilot's control unit	P	UN22	2	B3 Pilot/navigator control unit change-over switch

All cables are uninyvin 22

CONNECTOR 5390/4 (10HB/21553)

Termination A	Pin	Cable	Pin	Termination B
Aerial switch unit	-	UR67	-	Aerial switch unit (lower)

CONNECTOR 5390/5 (10HB/21554)

Termination A	Pin	Cable	Pin	Termination B
To transmitter/ receiver (Pre-mod. 5409) or to connector A34-3285-01 (Post mod. 5409)	-	UR67	-	V.H.F. whip aerial

CONNECTOR 5390/6 (10HB/21555)

Termination A	Pin	Cable	Pin	Termination B
Navigator's control unit	A	Q22	A	Pressure bulkhead (UHF1B)
	B		B	
	C		C	
	D		D	
	E		E	
	F		F	
	H		H	
	J		J	
	K		K	
	L		L	
	M		M	
	N		N	
	P		P	
	R		R	
	S		S	
	T		T	
	U		U	
	V		V	
	W		W	
	X		X	
	Y		Y	
	Z		Z	
	a		a	
	b		b	
	c		c	
	d		d	
f	f			
g	g			
h	h			
i	i			

All cables are Q22

continued . . .

TABLE 2 Connector details - continued

CONNECTOR UHF 1 (EB6-82-229)					CONNECTOR UHF 1A (EA3-82-553)				
Termination A	Pin	Cable	Pin	Termination B	Termination A	Pin	Cable	Pin	Termination B
Frame 29 (UHF1)	A	Q22	A	Interconnection box (CONTROL)	Pressure bulkhead (UHF1B)	A	Q22	A	Frame 29 (UHF1)
	B		B			B			
	C		C			C			
	D		D			D			
	E		E			E			
	F		F			F			
	H		H			H			
	J		J			J			
	K		K			K			
	L		L			L			
	M		M			M			
	N		N			N			
	P		P			P			
	R		R			R			
	S		S			S			
	T		T			T			
	U		U			U			
	V	V	V						
	W	W	W						
	X	X	X						
Y	Y	Y							
Z	Z	Z							
<u>a</u>	Q22	<u>a</u>	<u>a</u>						
<u>b</u>		<u>b</u>	<u>b</u>						
<u>c</u>		<u>c</u>	<u>c</u>						
<u>d</u>		<u>d</u>	<u>d</u>						
<u>e</u>		<u>e</u>	<u>e</u>						
<u>f</u>		<u>f</u>	<u>f</u>						
<u>g</u>		<u>g</u>	<u>g</u>						
<u>h</u>		<u>h</u>	<u>h</u>						

All cables are Q22

All cables are Q22

continued . . .

TABLE 2 Connector details - continued

CONNECTOR UHF 2 (EA3.82.231) (POST MOD. 5409)

Termination A	Pin	Cable	Pin	Termination B
Interconnection box	A	Min 4D	A	Control receiver muting
	C		C	
	D		D	
	E		E	

CONNECTOR UHF3 (EA3.82.233 - PRE MOD 5409 or EA3.82.5671 - POST MOD. 5409)

Termination A	Pin	Cable	Pin	Termination B
Transmitter/receiver (Pre mod. 5409) or interface unit (Post mod. 5409)	A	Q16 *	A	Interconnection box
	B	Q16 *	B	
	C	Q22	C	
	D	Q22	D	
	E	Q22	E	
	F	Q22	F	
	H	Q22	H	
	J	Q22	J	
	K	Q22	K	
	L	Q22	L	
	M	Q22M	M	
	N	Q22M	N	
	P	Q22	P	
	R	103/202/GY	R	
	S	103/202/GY	S	
	T	Q22	T	
U	Q22	U		
V	Q22	V		
W	Q22	W		

* Post mod. 5409, MN14

CONNECTOR UHF 3 - continued

Termination A	Pin	Cable	Pin	Termination B
Transmitter/receiver (Pre mod. 5409) or interface unit (Post mod. 5409)	a	Q22	a	Interconnection box
	b		b	
	c		c	
	d		d	
	e		e	
	f		f	
	g		g	
	h		h	
	i		i	
	j		j	
	k		k	
	m		m	
	n		n	
	p		p	
	q		q	
	r		r	
s	s			
t	t			
u	u			
w	w			

CONNECTOR A34-3285-01 (POST MOD. 5409)

Termination A	Pin	Cable	Pin	Termination B
Mates with connector 5390/5	-	PW7173/1	-	V.H.F. transmitter/receiver

TABLE 2 Connector details - continued

CONNECTOR A33-6986-01 (POST MOD. 5409)

CONNECTOR A33 - 7061-01 (POST MOD. 5409)

Termination A	Pin	Cable	Pin	Termination B
Adaptor unit	A	19/0.15	A	Interface unit
	B	2 x AWG 24 BRAIDED	B	
	C		C	
	D		D	
	E	19/0.15	E	
	F	2 x AWG 24 BRAIDED	F	
	G		G	
	H		H	
	J	19/0.15	J	
	K	19/0.2	K	
	L	19/0.2	L	
	M	19/0.2	M	
	N	19/0.15	N	
	P	19/0.15	P	
	R	2 X AWG 24 BRAIDED	R	
	S		S	
	T	BRAID	T	
	U	19/0.15	U	
	V		V	
	W	19/0.2	W	
	X	19/0.2	X	
	Y	19/0.2	Y	
	Z	19/0.2	Z	
	-	BRAID	a	
	b	19/0.15	b	
	c	19/0.15	c	

Braid from cores R and S connected to pin T at end B
 Braid from cores B and C connected to pin T at end A
 Braid from cores G and H connected to pin U at end B
 Overall braid connected to pin a at end A

Termination A	Pin	Cable	Pin	Termination B
V.H.F. transmitter/receiver	A	19/0.15	A	Adaptor unit
	B	19/0.15	B	
	C	2 x AWG 24 BRAIDED	C	
	D		D	
	E		E	
	G	19/0.15	G	
	H		H	
	J		J	
	K		K	
	L		L	
	M	19/0.15	M	
	N		N	
	P		P	
	R		R	
	S		S	
	T	19/0.15	T	
	U		U	
	V		V	
	W	AWG24 BRAIDED BRAID	W	
	X		X	
Y	19/0.15	Y		
Z		Z		
b	19/0.15	b		
c		c		
d		d		
e		e		
f	19/0.2	f		
g		g		
h	19/0.2	h		
j		j		

Braids from cores C, D and X connected to pin Y at end A
 Overall braid connected to pin Y at end B

Part 3 RADIO COMPASS (A.R.I.23023)

LIST OF CONTENTS

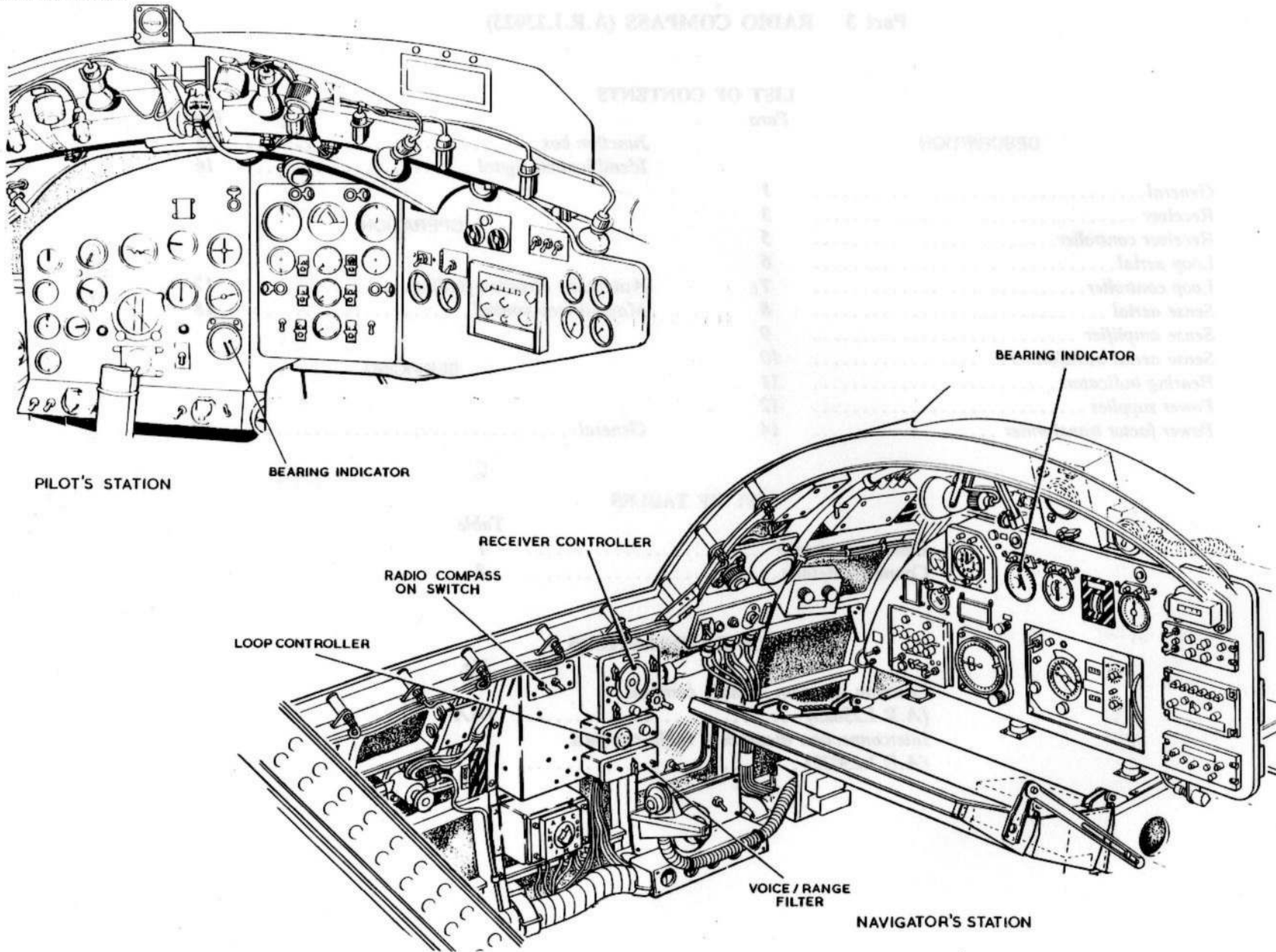
DESCRIPTION	Para.	Para.	
<i>General</i>	<i>1</i>	<i>Junction box</i>	<i>15</i>
<i>Receiver</i>	<i>3</i>	<i>Identification signal</i>	<i>16</i>
<i>Receiver controller</i>	<i>5</i>		
<i>Loop aerial</i>	<i>6</i>	OPERATION	
<i>Loop controller</i>	<i>7</i>	<i>Automatic direction finding</i>	<i>17</i>
<i>Sense aerial</i>	<i>8</i>	<i>Manual loop control</i>	<i>18</i>
<i>Sense amplifier</i>	<i>9</i>		
<i>Sense aerial transformer</i>	<i>10</i>	SERVICING	
<i>Bearing indicators</i>	<i>11</i>	<i>General</i>	<i>19</i>
<i>Power supplies</i>	<i>12</i>		
<i>Power factor transformer</i>	<i>14</i>		

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<i>Connector details</i>	<i>2</i>

LIST OF ILLUSTRATIONS

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<i>Location diagram - radio compass (A.R.I.23023)</i>	<i>1-1A</i>
<i>Interconnection diagram - radio compass (A.R.I.23023)</i>	<i>2</i>



EA3B270113

FIG.1. LOCATION DIAGRAM-RADIO COMPASS (A.R.I. 23023)

◀ STI/CAN/586c INCORPORATED ▶

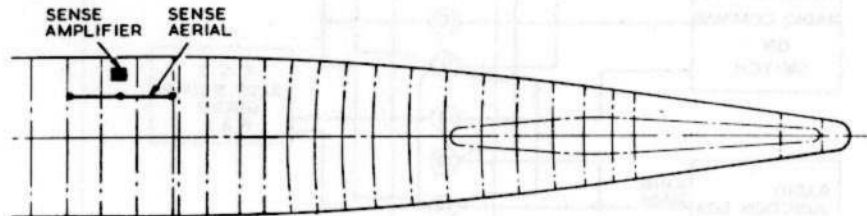
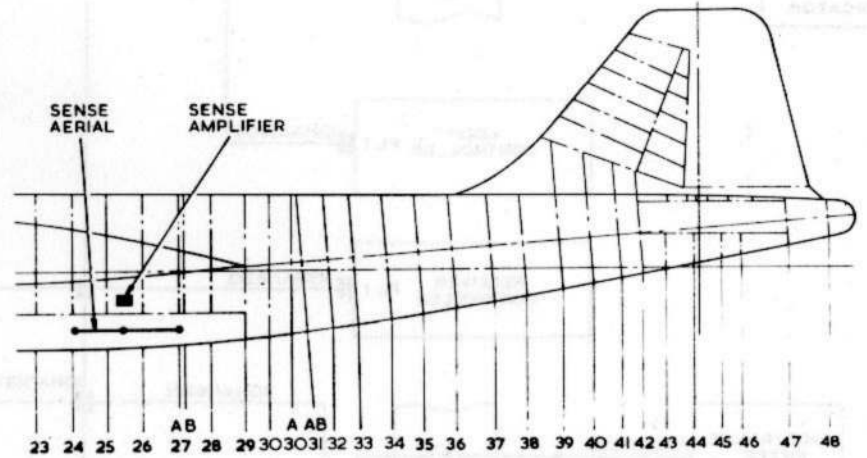
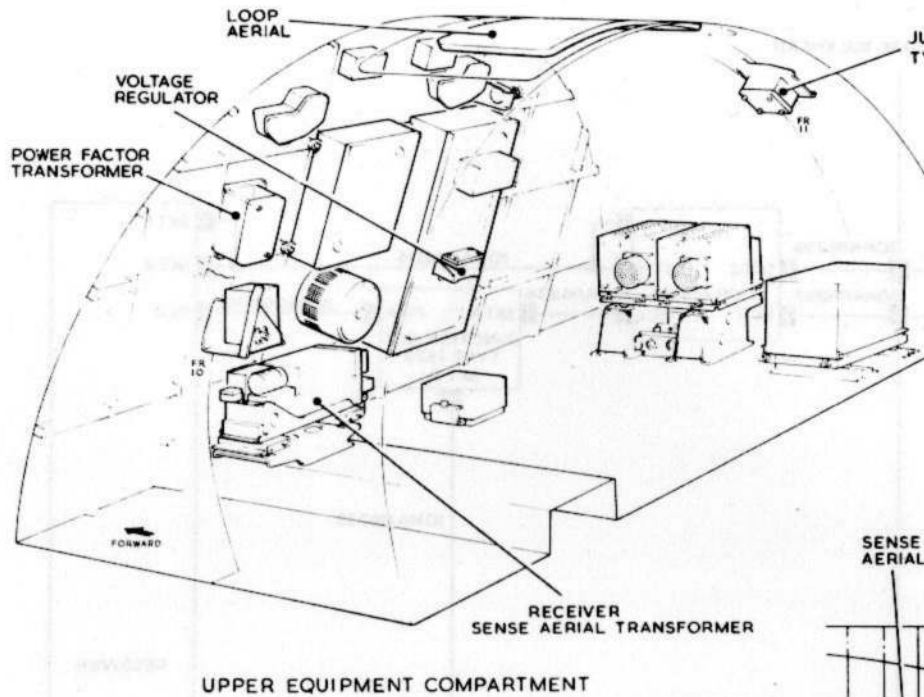


FIG. 1A. LOCATION DIAGRAM - RADIO COMPASS (A.R.I. 23023)

◀ ANNOTATIONS AMENDED ▶

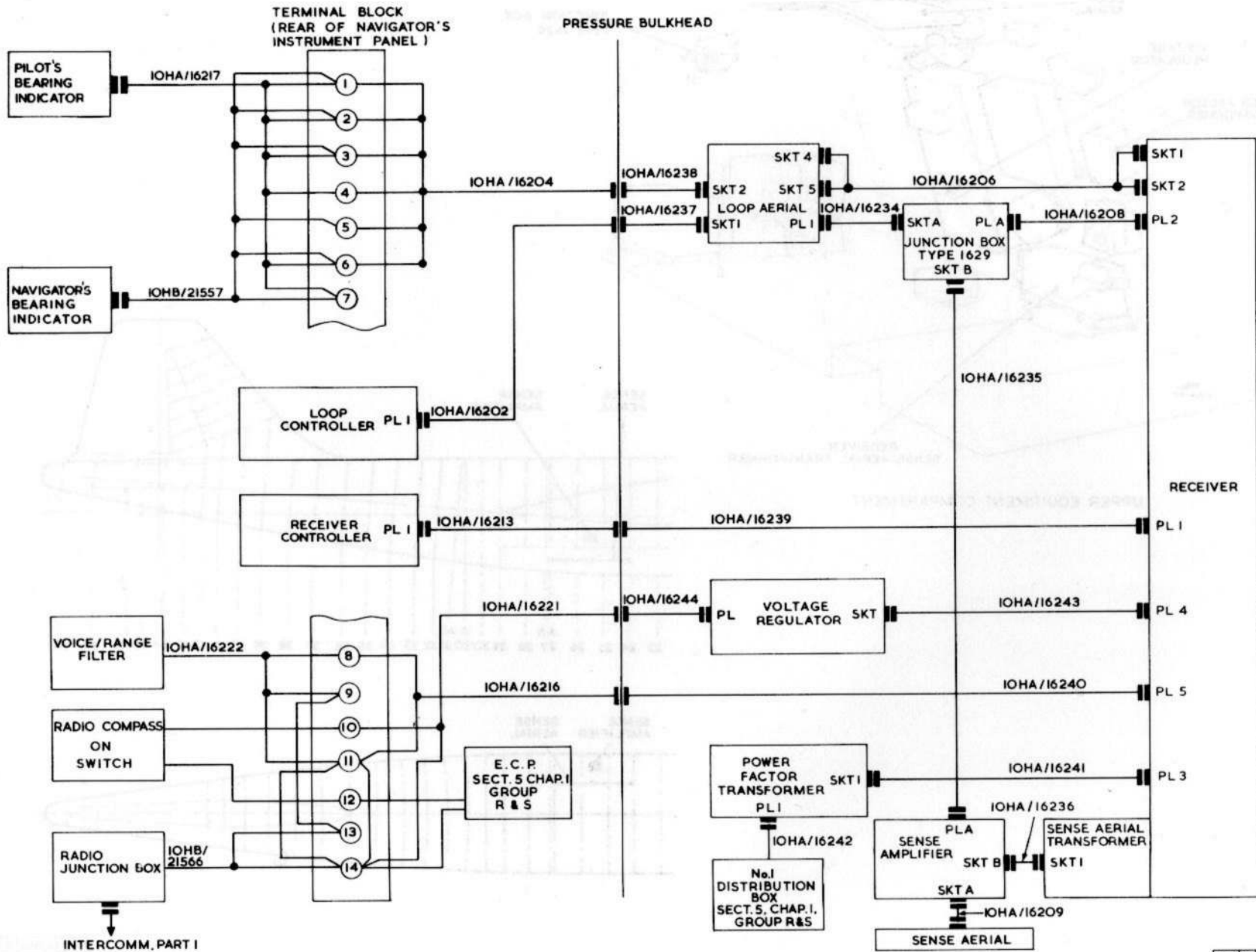


FIG. 2. INTERCONNECTION DIAGRAM-RADIO COMPASS (A.R.I. 23023)

◀MOD 5204 EMBODIED▶

EA3828013

DESCRIPTION**General**

1. The Marconi airborne radio compass, or Automatic Direction Finder (A.D.F.) (A.R.I.23023) provides visual indication to the pilot and navigator of the bearing of a ground station relative to the aircraft heading. Bearings can be obtained automatically or by manual operation with remote control of the loop aerial. Ground station identification signals are fed into the intercommunication system (*Part 1*). The installation comprises the following main items of equipment:-

Receiver, Type AD7092D
 Rack assembly, Type 182
 Backplate, Type 1332
 Receiver controller, Type 1274
 Loop aerial, Type 1324A
 Loop controller, Type 1342
 Sense aerial, Type 8071
 Sense amplifier, Type 1628
 Sense aerial transformer, Type 1343
 Bearing indicators, Type 1630 (2)
 Voltage regulator, Type 1555A
 Power factor transformer, Type 1571
 Junction box, Type 1629

2. The locations of the main items are shown in fig.1 and interconnections in fig.2. Table 1 gives equipment details and Table 2 gives connector details. Detailed technical information is given in A.P.116B-0107-1.

Receiver

3. The receiver is positioned in the upper equipment compartment. It operates in the frequency band 150 kHz to 2 MHz. Two integral motor drive units, with their associated switches, one operating the receiver range selection, the other operating selectivity selection, are mounted inside the front panel of the unit and are accessible via removable covers.

4. The receiver, with its backplate, is mounted in a rack assembly, all electrical connections being made at the rear panel. The main circuits of the receiver are as follows:-

Loop amplifier
 Balanced modulator
 R.F. amplifier
 Frequency changer
 I.F. amplifier
 Audio detector
 Beat-frequency oscillator
 Audio amplifier and output stage
 A.D.F. detector
 Loop motor amplifier
 Vibrator unit

Receiver controller

5. Remote control of the receiver is provided by a receiver controller, mounted on the port wall at the navigator's station, containing the following controls described below:-

(1) Function switch. A six-position rotary switch, at the top left-hand corner of the unit, provides the following facilities:-

- (a) OFF - Power supplies disconnected.
- (b) OMNI - In this and the following four positions, power supplies are connected to the receiver. The balanced modulator valves are biased beyond cut-off, preventing any automatic direction-finding action. The sense aerial is connected and the loop aerial is inoperative.
- (c) AUTO - The balanced modulator valves are in operation, the sense aerial is connected and fully automatic direction-finding facilities are available.
- (d) Figure of eight - One modulator valve is inoperative and the loop control circuits are operating.

(e) Left SENSE - As for (d) except that the sense aerial is connected.

(f) Right SENSE - As for (e) except that the modulator valve mentioned in (d) is now operative, the other modulator valve being inoperative.

(2) RANGE switch. The four-position range switch, at the bottom left-hand corner of the unit, operates the frequency range switch drive unit (*para.3*) in the receiver, to select one of four sets of tuning inductors corresponding to the four frequency ranges of the receiver. Selection of any range lights one of four lamps to illuminate the corresponding tuning scale in the controller.

(3) Tuning control. The crank-handled tuning control knob, at the bottom right-hand corner of the unit, alters the setting of the receiver tuning capacitor. The manually-applied setting is transmitted back, via an Aysynn system driving a pointer, to provide a reading on the selected frequency scale in the controller.

(4) Selectivity switch. The selectivity switch, located at the top right-hand corner of the unit and idented RT/CW, controls the bandwidth of the intermediate frequency amplifier, providing selection of narrow, medium or broad bandwidth. In the CW position, the same bandwidth selection facilities are provided with introduction of the beat-frequency oscillator for c.w. reception.

(5) GAIN control. With AUTO selected on the function switch, the knob at bottom centre of the unit adjusts the level of the identification signal fed to the telephone circuits; with other operational modes selected, the control adjusts the h.f. gain of the receiver.

(6) Dial illumination. The switch, located at centre left of the unit and idented OFF/N/D, provides two levels of light intensity for day or night illumination of the tuning scale.

Loop aerial

6. The loop aerial is located in the upper equipment compart-

ment hatch. It consists of a nine-turn coil with an iron core, which is rotated about its vertical axis by a small two-phase a.c. motor to a point of minimum signal pick-up, i.e. a null point. The loop bearing is transmitted to the bearing indicators by an Aysynn system. Provision is also made for the loop to be rotated manually from the loop controller.

Loop controller

7. The loop controller, is positioned directly below the receiver controller on the port wall at the navigator's station. The large single knob operates a potentiometer, which controls loop movement in either direction. The loop controller is operative only when the function switch on the control unit is selected to OMNI, Figure-of-eight or SENSE, although it is not used with OMNI selected.

Sense aerial

8. The sense aerial, is a centre-fed T-aerial, supported on insulators and mounted longitudinally on the starboard bomb-bay door.

Sense amplifier

9. The sense amplifier, is mounted at the starboard side of the bomb bay above the sense aerial. The function of the amplifier is to match the impedance of the sense aerial to that of the coaxial cable connecting the aerial to the receiver.

Sense aerial transformer

10. The aerial transformer is mounted on the receiver backplate and serves to match the input impedance of the receiver to that of the coaxial cable connecting the sense amplifier to the receiver.

Bearing indicators

11. Two bearing indicators, one mounted on the pilot's flight instrument panel and the other on the navigator's instrument

panel, provide indication of relative bearing, correct receiver tuning and signal strength.

Power supplies

12. The installation requires 28 V d.c. and 26 V, 400 Hz, single phase a.c. power supplies. The d.c. requirement is provided from busbar P10 via fuse 78 in the electrical control panel. Following the fuse, the supply is controlled by the RADIO COMPASS-ON switch fitted adjacent to the receiver controller and routed to the installation via terminals 10 and 12 of the terminal block fitted at the rear of the navigator's instrument panel. A voltage regulator, connected across the supply, provides a regulated 19 V d.c. supply for heating the receiver valves and sense amplifier valve. The voltage regulator is mounted on the cover of the d.c. distribution box in the upper equipment compartment. The 28 V d.c. supply is also fed directly to the receiver for operation of a rotary transformer, mounted at the rear of the receiver case, which provides the high tension supply for the receiver. The radio power supplies are described in Sect.5, Chap.1, Group R & S.

13. The 26 V, 400 Hz, single phase a.c. supply is provided by the power factor transformer (*para.14*), supplied from the 115 V instrument power supply via fuses 102 and 104 in the No.1 distribution box. The instrument power supplies are described in Sect.5, Chap.1, Group D.

Power factor transformer

14. The power factor transformer is located in the upper equipment compartment. Its function is to improve the power factor loading on the a.c. supply to the receiver and to provide a step-down from 115 V to 26 V, for use in the receiver remote tuning control system and the indication repeater systems. When the receiver is switched on at the controller, a relay in the transformer unit is energized and change-over of the relay contacts connects the 115 V incoming supply (*para.13*) to the transformer primary, the secondary producing 26 V which is fed to the receiver. Power factor correction is provided by a capacitor, connected across selected tapping points on the transformer primary. The tapping

points are selected by the manufacturer according to the type of installation.

Junction box

15. The junction box, located in the upper equipment compartment, provides a means of connecting power supplies to the sense amplifier (*para.9*) and the loop aerial system.

Identification signal

16. After normal detection and amplification in the receiver, the ground station identification signal is routed, via terminals 13 and 14 of the terminal block (*para.12*) and the radio junction box, to the intercommunication system for selective application to the telephones (*Part 1*).

OPERATION

Automatic direction finding

17. In automatic direction finding, the signals received by the motor-driven, self-aligning loop aerial are combined with the signals received by the sense aerial to initiate loop rotation to a position of zero signal. Since the r.f. voltages from the loop and sense aerials are unsuitable for operating the loop motor, they are processed to provide a low frequency power source which reverses phase in sympathy with the phase-reversal of the r.f. output as the loop aerial passes through the null points. This is accomplished by switching the loop output signal to provide in-phase and anti-phase loop signals during alternate half cycles of the 110 Hz switching signals. By mixing these with the sense aerial output signal, addition and subtraction of the r.f. voltages generates a signal, modulated at 110 Hz, which is then amplified and rectified. The rectified modulation signal is further amplified and phase-shifted 90 deg to provide one of the drives for the two-phase loop motor. A second 110 Hz signal, taken directly from the modulator output, provides the complementary drive to the loop motor. Since the loop output reverses phase as the loop passes through a null point, so also does the derived 110 Hz driving supply to the loop motor, causing the loop to be driven in the appropriate direction to the correct null point.

Manual loop control

18. In the figure-of-eight and sense modes (*para.5*), the loop is controlled manually from the loop controller, using Desynn potentiometric resolvers, driven by the loop and manual control knob on the controller respectively, the output from the potentiometer in the controller being fed back via the loop motor amplifier to provide the motor drive. The 110 Hz output from the modulator is used to power the transmitting potentiometer. Since phase-reversal of the motor drive signal occurs as the loop-driven potentiometer sliders pass through the position set at the controller, the loop is driven in the appropriate direction to the null point, where the sliders of the two potentiometers are, relatively, at right angles.

SERVICING

WARNING

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

General

19. Servicing, other than that listed in the aircraft Supplementary Servicing Schedules, consists of regular inspection of the units and connectors for physical damage and security of mounting. The connector details given in Table 2 are for use during routine continuity checking and fault diagnosis.

TABLE 1
Equipment details

Equipment	Type	Ref.No.	Location	A.P. Reference
Receiver	AD7092D	10D/19598	} Upper equipment compartment	} 116B-0107-1
Backplate	1332	10AR/1026		
Rack assembly	182	10D/17031		
Receiver controller	1274	10L/16073	} Navigator's station, port wall	
Loop aerial	1324A	10B/16446	} Upper equipment compartment hatch	
Loop controller	1342	10J/13152	} Navigator's station, port wall	
Sense aerial	8071	10B/17658	} Bomb bay, starboard door	
Sense amplifier	1628	10U/16964	} Bomb bay, starboard side	
Sense aerial transformer	1343	10K/18225	} Receiver backplate	
Bearing indicator	1630	10Q/16314	} Pilot's flight instrument panel	
Bearing indicator	1630	10Q/16314	} Navigator's instrument panel	
Power factor transformer	1571	10K/16244	} Upper equipment compartment	
Junction box	1629	10D/19525	} Upper equipment compartment	
Voltage regulator	1555A	5UC/6007	} Upper equipment compartment	

TABLE 2

Connector details

CONNECTOR 10HA/16217					CONNECTOR 10HA/16238				
Termination A	Pin	Cable	Pin	Termination B	Termination A	Pin	Cable	Pin	Termination B
Pilot's bearing indicator	A	PF/375	Term 1	Terminal block 3577/2 (rear of navigator's instrument panel)	Loop aerial	1	PF/375	A	Pressure bulkhead
	B		Term 2			2		B	
	C		Term 3			3		C	
	D		Term 6			5		E	
	E		Term 7			6		F	
	F		Term 4			11		M	
CONNECTOR 10HA/16237					CONNECTOR 10HA/16204				
Termination A	Pin	Cable	Pin	Termination B	Termination A	Pin	Cable	Pin	Termination B
Loop aerial	1	DN/375	A	Pressure bulkhead	Pressure bulkhead	A	PF/374	Term 1	Terminal block 3577/2 (rear of navigator's instrument panel)
	2		B			Term 2			
	3		C			Term 3			
	4		D			Term 4			
	5		E			Term 5			
	6		F			Term 6			
CONNECTOR 10HA/16202					CONNECTOR 10HA/16234				
Termination A	Pin	Cable	Pin	Termination B	Termination A	Pin	Cable	Pin	Termination B
Pressure bulkhead	A	DN/374	1	Loop controller	Loop aerial	1	DM/A/375	1	Junction box Type 1629
	B		2			2			
	C		3			3			
	D		4			4			
	E		5			5			
	F		6			6			

continued . . . ▶

TABLE 2 Connector details - continued

CONNECTOR 10HA/16234 - continued

Termination A	Pin	Cable	Pin	Termination B
Loop aerial	7	DM/A/375	7	Junction box Type 1629
	8		8	
	9		9	
	10		10	
	11		11	
	12		12	

CONNECTOR 10HA/16206

Termination A	Pin	Cable	Pin	Termination B
Loop aerial	1	DK/373	1	Receiver
	2		2	

CONNECTOR 10HA/16235

Termination A	Pin	Cable	Pin	Termination B
Junction box Type 1629	1	GR/A/375	A	Sense amplifier
	2		B	
	4		D	

CONNECTOR 10HA/16208

Termination A	Pin	Cable	Pin	Termination B
Junction box Type 1629	1	DM/373	1	Receiver
	2		2	
	3		3	
	4		4	

continued . . .

CONNECTOR 10HA/16208 - continued

Termination A	Pin	Cable	Pin	Termination B
Junction box Type 1629	5	DM/373	5	Receiver
	6		6	
	7		7	
	8		8	
	9		9	
	10		10	
	11		11	
	12		12	

CONNECTOR 10HA/16209

Termination A	Pin	Cable	Pin	Termination B
Sense amplifier	-	GT/373	-	Sense aerial

CONNECTOR 10HA/16236

Termination A	Pin	Cable	Pin	Termination B
Sense amplifier	-	DJ/A/375	-	Sense aerial transformer

CONNECTOR 10HA/16241

Termination A	Pin	Cable	Pin	Termination B
Receiver	1	DV/375	1	Power factor transformer
	2		2	
	3		3	
	4		4	

continued . . . ►

TABLE 2 Connector details - continued

CONNECTOR 10HA/16239

Termination A	Pin	Cable	Pin	Termination B
	1		A	
	2		B	
	3		C	
	4		D	
	5		E	
	6		F	
	7		G	
	8		H	
	9		J	
	10		K	
	11		L	
Receiver	12	DW/375	M	Pressure bulkhead
	13		N	
	14		O	
	15		P	
	16		Q	
	18		R	
	19		S	
	21		T	
	22		U	
	23		V	
	24		W	
	26		X	
	27		Y	
	28		Z	

CONNECTOR 10HA/16213 - continued

Termination A	Pin	Cable	Pin	Termination B
	D		4	
	E		5	
	F		6	
	G		7	
	H		8	
	J		9	
	K		10	
	L		11	
	M		12	
	N		13	
Pressure bulkhead	O	DW/374	14	Receiver controller
	P		15	
	Q		16	
	R		17	
	S		18	
	T		19	
	U		20	
	V		21	
	W		22	
	X		23	
	Y		24	
	Z		25	

CONNECTOR 10HA/16213

Termination A	Pin	Cable	Pin	Termination B
Pressure bulkhead	A	DW/374	1	Receiver controller
	B		2	
	C		3	

CONNECTOR 10HA/16243

Termination A	Pin	Cable	Pin	Termination B
	1		1	
Receiver	2	DT/375	2	Voltage regulator
	3		3	
	4		4	

continued . . .

continued . . . ▶

TABLE 2 Connector details - continued

CONNECTOR 10HA/16240

Termination A	Pin	Cable	Pin	Termination B
Receiver	1	DS/375	A	Pressure bulkhead
	2		B	
	3		C	
	4		D	

CONNECTOR 10HA/16221

Termination A	Pin	Cable	Pin	Termination B
Pressure bulkhead	A	EX/374	Term 14	Terminal block 3577/2 (rear of navigator's instrument panel)
	B		Term 10	

CONNECTOR 10HA/16216

Termination A	Pin	Cable	Pin	Termination B
Pressure bulkhead	A	DS/374	-	Terminal block 3577/2 (rear of navigator's instrument panel)
	B		Term 8	
	C		Term 11	
	D		-	

CONNECTOR 10HA/16222

Termination A	Pin	Cable	Pin	Termination B
Voice/range filter	1	DS/A/374	Term 9	Terminal block 3577/2 (rear of navigator's instrument panel)
	2		Term 11	
	3		Term 8	
	4			

CONNECTOR 10HA/16242

Termination A	Pin	Cable	Pin	Termination B
Power factor transformer	1	FQ/375	EW	No.1 Distribution box
	2		Fuse 102	
	3		Fuse 104	
	4			

CONNECTOR 10HB/21557

Termination A	Pin	Cable	Pin	Termination B
Navigator's bearing indicator	A	WE/23/0076	Term 1	Terminal block 3577/2 (rear of navigator's instrument panel)
	B		Term 2	
	C		Term 3	
	D		Term 6	
	E		Term 7	
	F		Term 5	

CONNECTOR 10HA/16244

Termination A	Pin	Cable	Pin	Termination B
Voltage regulator	1	EX/375	A	Pressure bulkhead
	2			
	3		B	
	4			

CONNECTOR 10HB/21566

Termination A	Pin	Cable	Pin	Termination B
Radio junction box	A	UNMS22	Term 13	Terminal block 3577/2 (rear of navigator's instrument panel)
	B		Term 14	

Part 4 INSTRUMENT LANDING SYSTEM (A.R.I.18011)

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<i>Junction box, Type 157</i>	5	<i>Localizer</i>	14
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UK RESTRICTED

JUNCTION BOX 157
LOCALIZER/MARKER RECEIVER
GLIDESLOPE RECEIVER

JUNCTION BOX 164

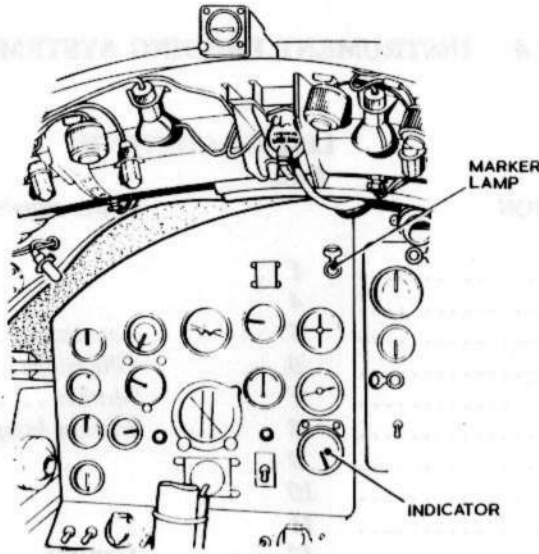
VOLTAGE
REGULATOR

VOLTAGE
REGULATOR

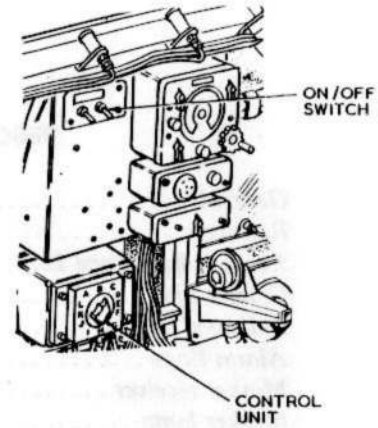
B A 1 2 3 4 5 6 7 8 9 10 11 12 13

JUNCTION BOX 157
LOCALIZER/MARKER RECEIVER
GLIDESLOPE RECEIVER

JUNCTION BOX 164



PILOT'S STATION



NAVIGATOR'S STATION

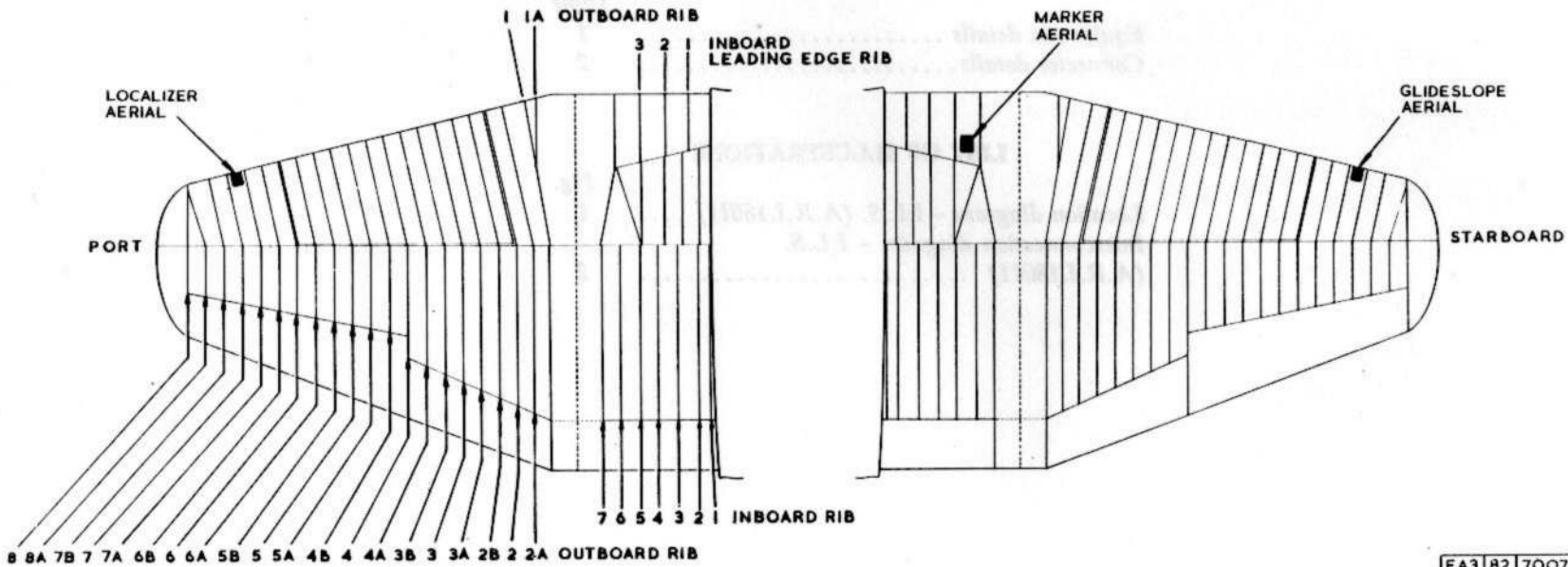
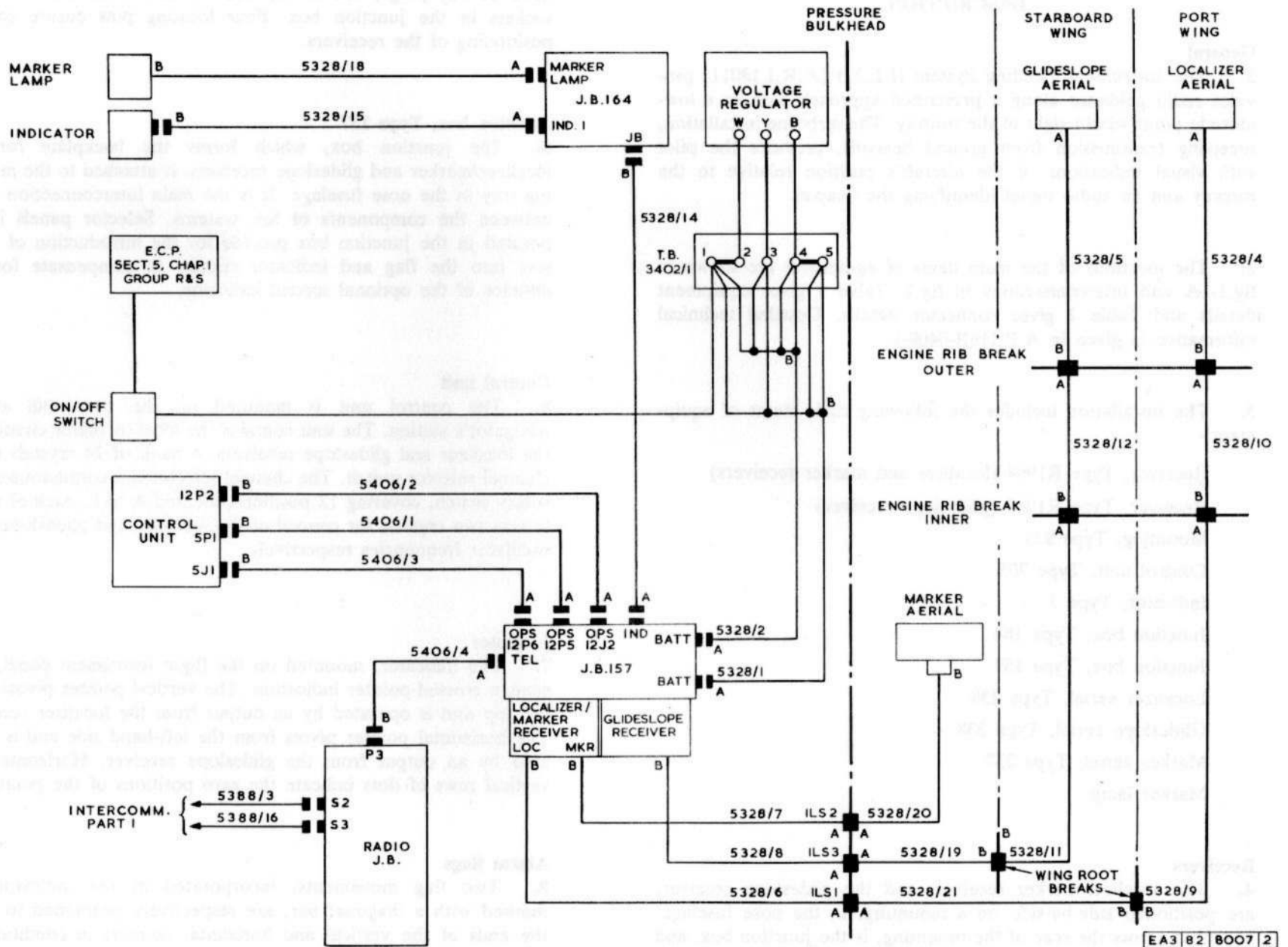


FIG. 1. LOCATION DIAGRAM—I.L.S. (A.R.I. 18011)

◀ STI/CAN/596c INCORPORATED ▶



EA3 82 8007 2

FIG.2. INTERCONNECTION DIAGRAM - I.L.S. (A.R.I. 18011)

◀MOD 5204 EMBODIED▶

DESCRIPTION

General

1. The Instrument Landing System (I.L.S.) (A.R.I.18011) provides radio guidance along a prescribed approach path to a low-altitude point within sight of the runway. The airborne installation, receiving transmission from ground beacons, provides the pilot with visual indications of the aircraft's position relative to the runway and an audio signal identifying the beacon.

2. The locations of the main items of equipment are shown in fig.1-1A and interconnections in fig.2. Table 1 gives equipment details and Table 2 gives connector details. Detailed technical information is given in A.P.116B-0408-1.

3. The installation includes the following main items of equipment:-

Receiver, Type R1964 (localizer and marker receivers)

Receiver, Type R1965 (glideslope receiver)

Mounting, Type 933

Control unit, Type 705

Indicator, Type 7

Junction box, Type 164

Junction box, Type 157

Localizer aerial, Type 239

Glideslope aerial, Type 238

Marker aerial, Type 237

Marker lamp

Receivers

4. The localizer/marker receiver, and the glideslope receiver, are positioned side-by-side on a mounting, in the nose fuselage. Mounted across the rear of the mounting, is the junction box, and main connections to the receivers are made by the mating of two

fixed 20-way plugs, one at the rear of each receiver, into fixed sockets in the junction box. Four locating pins ensure correct positioning of the receivers.

Junction box, Type 157

5. The junction box, which forms the backplate for the localizer/marker and glideslope receivers, is attached to the mounting tray in the nose fuselage. It is the main interconnection point between the components of the systems. Selector panels incorporated in the junction box provide for the introduction of resistors into the flag and indicator circuits to compensate for the absence of the optional second indicator.

Control unit

6. The control unit is mounted on the port wall at the navigator's station. The unit contains the local oscillator circuits for the localizer and glideslope receivers, a bank of 24 crystals and a channel selector switch. The channel selector is a continuous-action rotary switch, covering 12 positions, idented A to L, each of which selects two crystals for control of the localizer and glideslope local oscillator frequencies respectively.

Indicator

7. The indicator, mounted on the flight instrument panel, presents a crossed-pointer indication. The vertical pointer pivots from the top and is operated by an output from the localizer receiver. The horizontal pointer pivots from the left-hand side and is operated by an output from the glideslope receiver. Horizontal and vertical rows of dots indicate the zero positions of the pointers.

Alarm flags

8. Two flag movements, incorporated in the indicator and marked with a diagonal bar, are respectively positioned to cover the ends of the vertical and horizontal pointers in conditions of inadequate received signal strength.

Marker receiver

9. The marker receiver, which is part of the localizer receiver, is tuned to a fixed frequency of 75 MHz.

Marker lamp

10. The marker lamp, located on the flight instrument panel, is coloured amber.

Junction box, Type 164

11. The junction box is positioned forward of the pilot's instrument panel. The junction box provides connections for feeding the indicator, and the marker lamp. In this installation, both the zero reader and the second indicator socket are fitted with blanking caps.

Aerials

12. The localizer aerial, and glideslope aerial are fitted in the leading edge of the port and starboard wings respectively. The marker aerial is located in the skin of the underside of the starboard wing, inboard of the engine.

Power supplies

13. The I.L.S. equipment operates on 28V d.c., supplied from busbar P10 via a circuit breaker on the electrical control panel. Following the circuit breaker the supply circuit is controlled by the ILS - ON/OFF switch on the port wall at the navigator's station. A regulated 19V d.c. supply for heating the receiver valves is obtained from a voltage regulator, located in the nose fuselage, connected across the 28V d.c. supply. The power supplies are described in Sect.5, Chap.1, Group R and S. A 5-way terminal block, mounted adjacent to the voltage regulator, provides the interface between the power supply circuits and the I.L.S. equipment. High tension supplies for the receivers are generated by rotated transformers, one in each receiver.

OPERATION**Localizer**

14. The line of approach to the runway in the horizontal plane is covered by the localizer beacon, sited at the far end of the runway. The radiation pattern of the beacon takes the form of two horizontally-disposed major lobes, overlapping on the runway centre line. The left-hand lobe (looking towards the touch-down point) carries a modulation of 90 Hz and the right-hand lobe carries a modulation of 150 Hz. With the aircraft on course, 90 Hz and 150 Hz signals of equal amplitude are produced in the localizer receiver comparison circuits. Deviation to the left or right produces signals of unequal amplitude, the difference being converted, in the receiver, into a proportional positive or negative d.c. signal which deflects the vertical pointer in the indicator. The pointer provides 'fly left/fly right' indications, which enable the pilot to regain the correct course, indicated by return of the pointer to the vertical position.

15. At regular intervals, the localizer ground beacon transmits an identification signal in the form of a 100 Hz note, keyed and coded to distinguish the particular ground installation. In the localizer receiver, the identification signal is separated from the 90 Hz and 150 Hz signals and, after amplification, is routed, via terminals 14 and 20 in the radio junction box, to the intercomm. system for selective application to the telephones (*refer to Part 1 of this chapter*). In an emergency, speech may be transmitted from the ground station in lieu of the identification signal. The localizer beacon has a range of approximately 25 miles at a flight altitude of 2000 ft.

Glideslope

16. The line of approach to the touch-down point in the vertical plane is covered by the glideslope beacon sited at the side of the runway. The radiation pattern of this beacon takes the form of two

vertically-disposed major lobes, overlapping along the correct approach path. The upper and lower lobes carry modulation of 90 Hz and 150 Hz respectively. With the aircraft on course, 90 Hz and 150 Hz signals of equal amplitude are produced in the glide-slope receiver comparison circuits. Deviation above or below the correct approach path produces signals of unequal amplitude, the difference being converted, in the receiver, into a positive or negative d.c. signal which deflects the horizontal pointer in the indicator. The pointer provides 'fly-up/fly-down' indications, which enable the pilot to regain the correct vertical approach path, indicated by return of the pointer to the horizontal position.

Marker

17. The marker receiver is tuned to a fixed frequency of 75 MHz and receives signals from outer, middle and, in some cases, inner marker beacons, positioned along the approach path to the runway. The carrier signal from each beacon has a distinctive coded tone modulation, which is detected and processed for both aural and visual presentation. The audio signal for the outer marker is a 400 Hz note, coded at two dashes per second, for the middle marker a 1300 Hz note, coded by alternate dots and dashes, and for the inner marker a 300 Hz note, coded at six dots per second. The audio signal, mixed with the localizer identification signal, is amplified in the localizer receiver audio amplifier and routed to the intercomm. system as described in para.15. The maximum flight altitude for reliable reception is approximately 3000 ft.

Marker lamp

18. The marker audio signals are rectified in the receiver to produce d.c. pulses; after amplification, these are fed to the marker lamp (para.10), which flashes in accordance with the coding of the particular marker beacon.

SERVICING

WARNING

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

General

19. Servicing, other than that listed in the aircraft Supplementary Servicing Schedules, consists of regular inspection of the units and cable assemblies for physical damage and security of mounting. The connector details given in Table 2 are for use during routine continuity checking and fault diagnosis. For repair of I.L.S. aerial covers refer to A.P.101B-0400-6, Cover 1, Chap.3, para.12.

Note . . .

If rain erosion effects are such that the fibreglass base has been pitted and damaged then the aerial cover must be wholly replaced. ►

TABLE 1
Equipment details

Equipment	Type	Ref.No.	Location	A.P. Reference
Receiver (localizer and marker)	R1964	10D/17818	} Nose fuselage	} 116B-0408-1
Receiver (glideslope)	R1965	10D/17819		
Mounting	933	10AJ/118		
Control unit	705	10L/263	Navigator's station, port wall	
Indicator	7	10Q/61	Flight instrument panel	
Junction box	157	10D/17815	Attached to mounting, Type 933	
Junction box	164	10D/17921	Nose fuselage	
Aerial (localizer)	239	10B/16708	Leading edge of port wing	
Aerial (glideslope)	238	10B/16707	Leading edge of starboard wing	
Aerial (marker)	237	10B/16706	Underside of starboard wing, inboard of engine	
Connector (blanking)	5413/1	-	J.B., Type 164	
Connector (blanking)	5413/2	-	J.B., Type 164	
ON-OFF switch	-	-	Navigator's station - port wall	

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TABLE 2

Connector details

CONNECTOR 5406/1 (10HB/21561)

Termination A	Pin	Cable	Pin	Termination B
Junction box 157 (OPS) (12P5)	A	Min 6C	A	Control unit (5P1)
	B		B	
	C		C	
	D		D	
	E		E	
	F		F	

Screens are connected to the shell at each end.

CONNECTOR 5406/2 (10HB/21562)

Termination A	Pin	Cable	Pin	Termination B
Junction box 157 (OPS) (12J2)	-	UR43	-	Control unit (12P2)

CONNECTOR 5406/3 (10HB/21563)

Termination A	Pin	Cable	Pin	Termination B
Junction box 157 (OPS) (12P6)	-	UR43	-	Control unit (5J1)

CONNECTOR 5406/4 (10HB/21564)

Termination A	Pin	Cable	Pin	Termination B
Junction box 157 (TEL)	A* B	UNMS22	*A B	Radio junction box (P3)

*The screens of pin B is connected to pin A at each end.

CONNECTOR 5328/1 (10HB/20992)

Termination A	Pin	Cable	Pin	Termination B
Junction box 157 (BATT)	A	Min 4R	5	Terminal block (3402/1)
	B		5	
	C		3	
	D		1	

CONNECTOR 5328/2 (10HB/20993)

Termination A	Pin	Cable	Pin	Termination B
Junction box 157 (BATT)	A	Min 4R	4	Terminal block (3402/1)
	B		4	
	C		3	
	D		1	

continued. . .

Table 2 Connector details - continued

CONNECTOR 5328/4 (10HB/20995)

Termination A	Pin	Cable	Pin	Termination B
Localizer aerial	-	UR 67	-	Engine rib break outer

CONNECTOR 5328/5 (10HB/20996)

Termination A	Pin	Cable	Pin	Termination B
Glideslope aerial	-	UR 67	-	Engine rib break outer

CONNECTOR 5328/6 (10HB/20997)

Termination A	Pin	Cable	Pin	Termination B
Pressure bulkhead (ILS1)	-	UR 67	-	Localizer/marker receiver (LOC)

CONNECTOR 5328/7 (10HB/20998)

Termination A	Pin	Cable	Pin	Termination B
Pressure bulkhead (ILS2)	-	UR 67	-	Glideslope receiver

CONNECTOR 5328/8 (10HB/20999)

Termination A	Pin	Cable	Pin	Termination B
Pressure bulkhead (ILS3)	-	UR 67	-	Glideslope receiver

CONNECTOR 5328/9 (10HB/45)

Termination A	Pin	Cable	Pin	Termination B
Engine rib break inner	-	UR 67	-	Wing root break port

CONNECTOR 5328/10 (10HB/46)

Termination A	Pin	Cable	Pin	Termination B
Engine rib break outer	-	UR 73	-	Engine rib break inner

CONNECTOR 5328/11 (10HB/49)

Termination A	Pin	Cable	Pin	Termination B
Engine rib break inner	-	UR 67	-	Wing root break starboard

continued. . .

Table 2 Connector details - continued

CONNECTOR 5328/12 (10HB/50)

Termination A	Pin	Cable	Pin	Termination B
Engine rib break outer	-	UR 73	-	Engine rib break inner

CONNECTOR 5328/14 (10HB/20756)

Termination A	Pin	Cable	Pin	Termination B
Junction box 157 (IND)	A	Min 12C	A	Junction box 164 (JB)
	B		B	
	C		C	
	D		D	
	E		E	
	F		F	
	G		G	
	H		H	
	J		J	
	K		K	
	L		L	
M	M			

CONNECTOR 5328/15 (10HB/20757)

Termination A	Pin	Cable	Pin	Termination B
Junction box 164 (IND1)	A	Min 12C	A	Indicator
	B		B	
	C		C	
	D		D	
	E		E	
	F		F	
	G		G	
	H		H	
	J		J	
	K		K	
	L		L	
M	M			

CONNECTOR 5328/18 (10HB/20767)

Termination A	Pin	Cable	Pin	Termination B
Junction box 164 (MARKER LAMP)	A	Min 2C	-	Marker lamp
	B		-	

CONNECTOR 5328/19 (10HB/20768)

Termination A	Pin	Cable	Pin	Termination B
Pressure bulkhead (ILS3)	-	UR 67	-	Wing root break starboard

continued...

Table 2 Connector details - continued

CONNECTOR 5328/20 (10HB/20769)

Termination A	Pin	Cable	Pin	Termination B
Pressure bulkhead (ILS2)	-	UR 67	-	Marker aerial

CONNECTOR 5328/21 (10HB/20770)

Termination A	Pin	Cable	Pin	Termination B
Pressure bulkhead (ILS1)	-	UR 67	-	Wing root break port

Chapter 2 RADAR INSTALLATION

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General information	
I.F.F./S.S.R. 1520 (A.R.I.23134/3)	1
◀ Tacan (A.R.I.18107/3)	2 ▶

Note . . .

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GENERAL INFORMATION

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<i>Power supplies</i>	<i>4</i>
<i>Lighting</i>	<i>5</i>
<i>Servicing</i>	<i>6</i>

LIST OF ILLUSTRATIONS

	<i>Fig.</i>
<i>Radar installation - pilot's station</i>	<i>1</i>
<i>Radar installation - navigator's station</i>	<i>2</i>

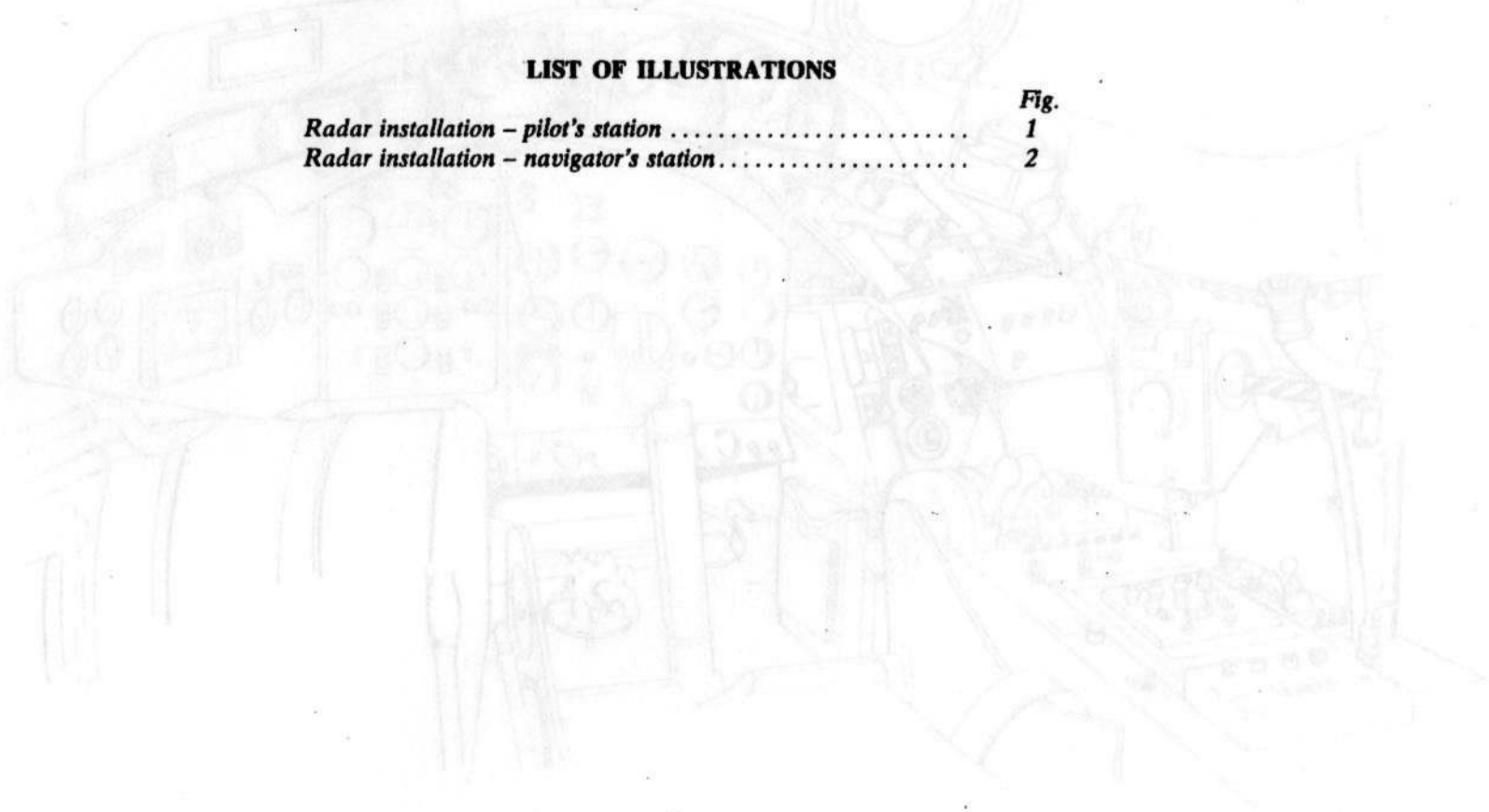


FIG. 1 RADAR INSTALLATION - PILOT'S STATION

UK RESTRICTED

UK RESTRICTED

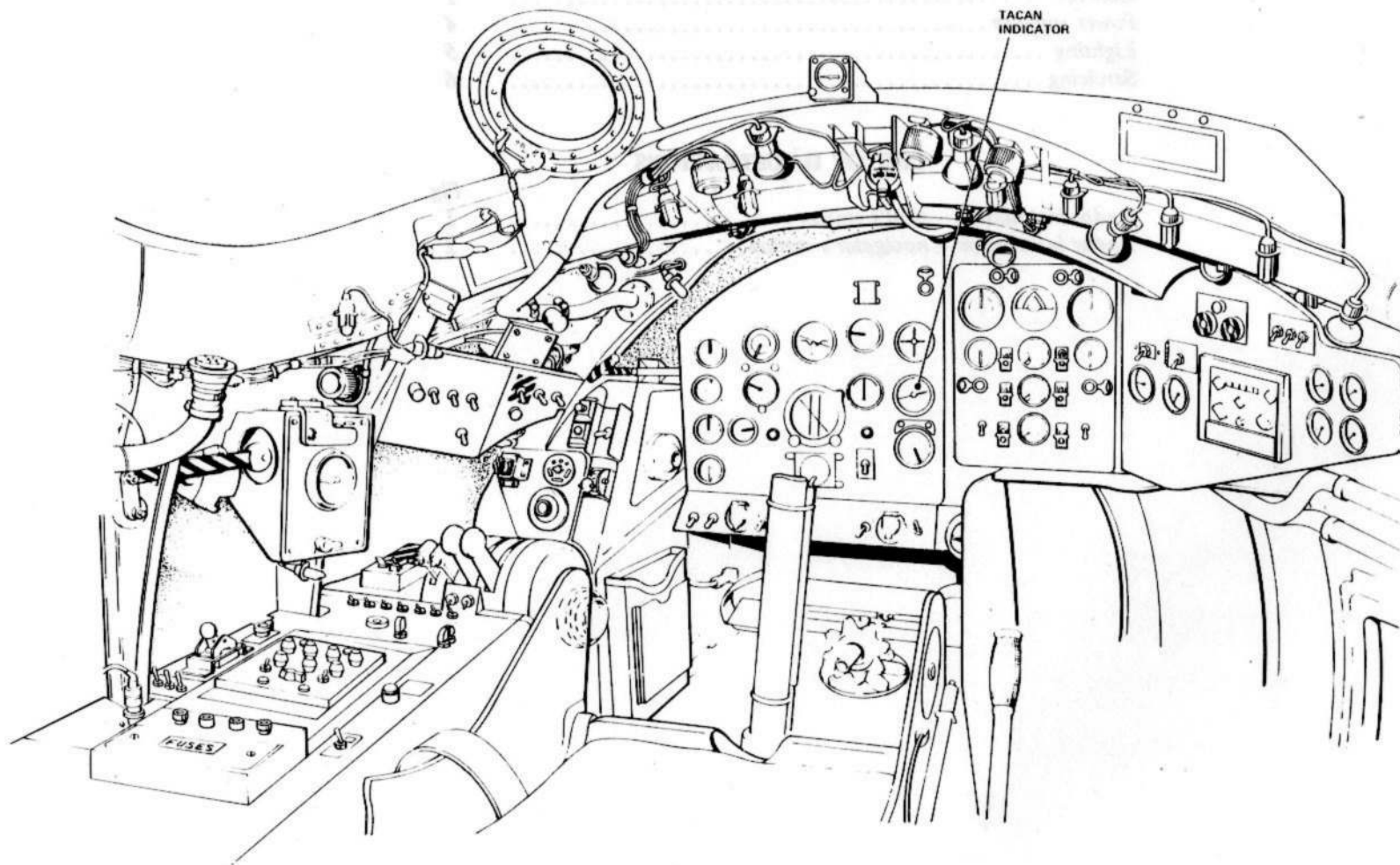


FIG. 1. RADAR INSTALLATION - PILOT'S STATION

◀ STI/CAN/596c INCORPORATED ▶

UK RESTRICTED

General

1. Information covering the aircraft radar systems is contained in this section. The installations covered are as follows:-

I.F.F./S.S.R. 1520 (A.R.I.23134/3) Part 1

Tacan (A.R.I.18107/3) Part 2

2. A location diagram, an interconnection diagram, a table giving cable assembly pin connections and a table giving equipment details, covering type, location, reference number and publication reference, are included in each part.

3. Fig.1 and fig.2 show the positions of the various indicators and control units at the pilot's and navigator's stations.

Power supplies

4. The radar installations require both a.c. and d.c. power supplies for their operation. Individual equipment power supplies are covered in each part. Detailed information on the power supplies is given in Sect.5, Chap.1, Group R and S.

Lighting

5. The integral lamps in the Tacan and I.F.F./S.S.R. control units are supplied with 28 V d.c. via a dimmer switch, annotated CU LIGHTS, located on a panel on the port fuselage wall adjacent to the navigator's instrument panel.

Servicing

6. Servicing information on an individual item of equipment is given in the associated publication referred to in Table 1 of each part.

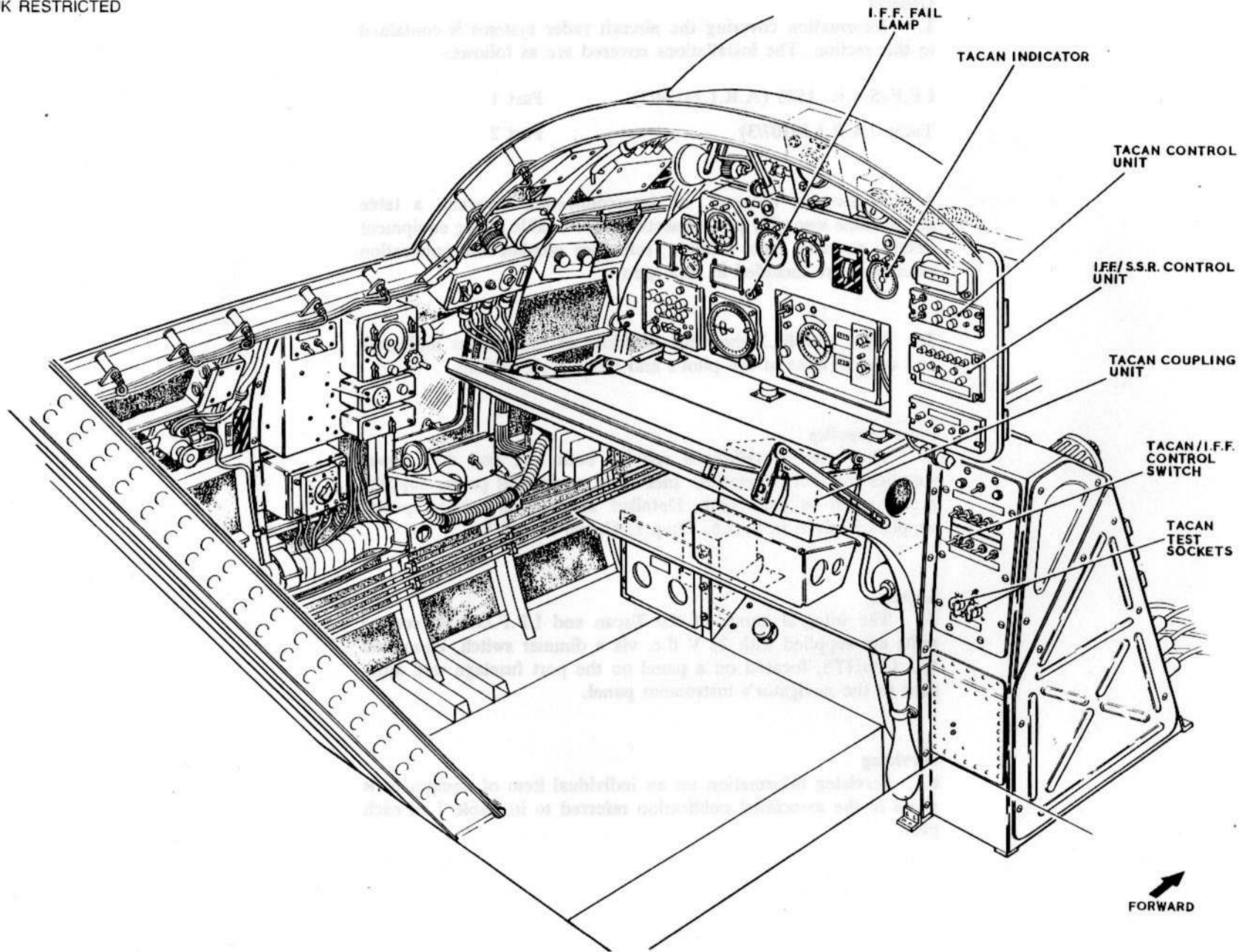


FIG. 2. RADAR INSTALLATION - NAVIGATOR'S STATION

◀STI/CAN/586c INCORPORATED▶

Part 1 I.F.F./S.S.R.1520 (A.R.I.23134/3)

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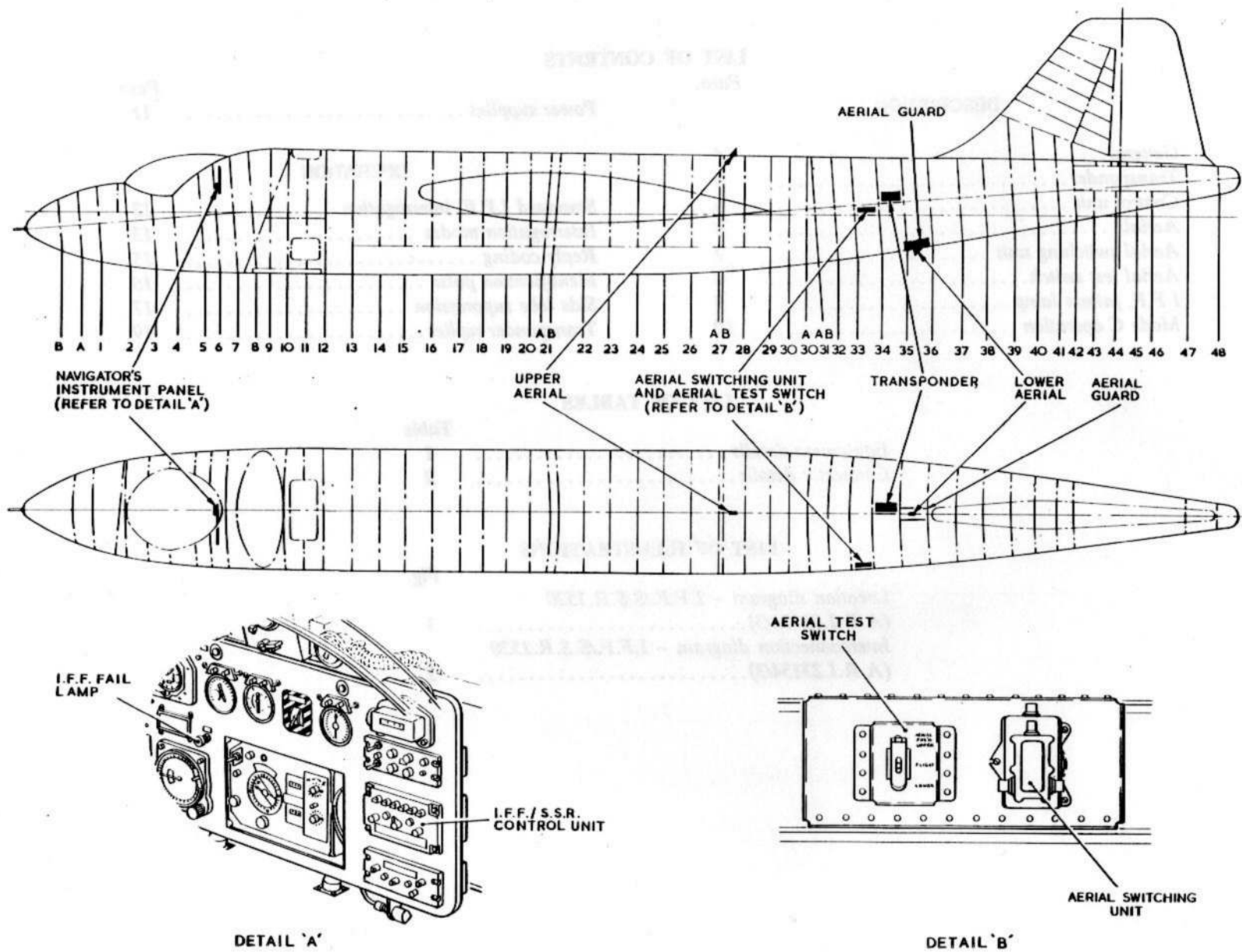


FIG. 1. LOCATION DIAGRAM - I.F.F./S.S.R. 1520 (A.R.I. 23134/3)

◀ DETAIL 'A' AMENDED ▶

DESCRIPTION**General**

1. I.F.F./S.S.R.1520 (A.R.I.23134/3) forms the airborne part of a secondary surveillance radar system, which is designed to identify, as friendly or hostile, aircraft detected by a ground-based primary radar. In response to interrogation pulses, coded according to any one of six modes, transmitted from the ground station, the airborne equipment automatically transmits a coded reply appropriate to the interrogation mode. Reply codes include a code representative of the aircraft flight altitude and an emergency distress code.

2. The locations of the main items are shown on fig.1 and interconnections on fig.2. Equipment details are given in Table 1 and connector and cable assembly details in Table 2. Detailed technical and servicing information on the equipment is contained in A.P.114J-0101-16.

3. The installation comprises the following main items of equipment:-

Transponder, Type 16928
 Mounting tray, Type 16946
 Control unit, Type 16929
 Aerials, Type 10A-6(2)
 Aerial switching unit, Type 16941
 Aerial test switch
 I.F.F. failure lamp

Transponder

4. The transponder, in its mounting tray, is located on the starboard side of the rear fuselage between frames 34 and 35. Electrical connections to the transponder are made via a 98-way socket at the rear of the mounting tray and a complementary mating plug at the rear of the transponder. Aerial connection is made via a coaxial socket on the front panel of the unit. Two Schraeder valves on the front panel permit pressurization of the

unit with dry air or nitrogen to 4 lb/in². Coding switches on the front panel are used for setting up the reply code to a Mode 2 interrogation. No external cooling is required.

Control unit

5. The control unit, is located on the starboard side of the navigator's instrument panel. Electrical connections to the unit are made via a 55-way socket at the rear. Control facilities provided on the front panel are as follows:-

(1) Four toggle switches at the top left provide on/off selection of Modes 1, 2, C and D respectively.

(2) A toggle switch, idented CIVIL/MIL, determines the content of the information pulses contained within the first frame of an emergency reply on receipt of a Mode 3/A or B interrogation as follows:-

CIVIL position	code 7700
MIL position	the switch-selected code

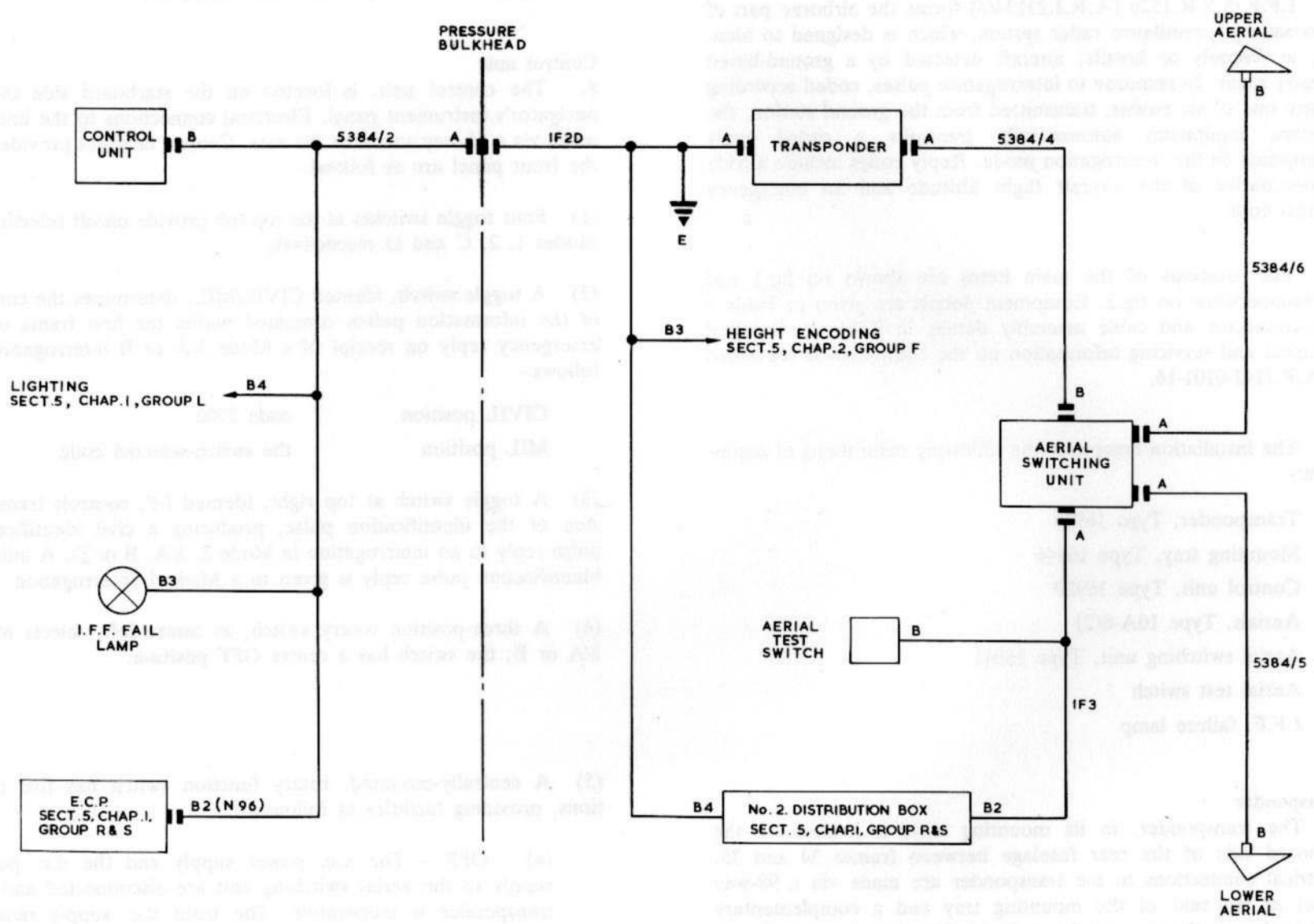
(3) A toggle switch at top right, idented I/P, controls transmission of the identification pulse, producing a civil identification pulse reply to an interrogation in Mode 2, 3/A, B or D. A military identification pulse reply is given to a Mode 1 interrogation.

(4) A three-position rotary switch, at centre left, selects Mode 3/A or B; the switch has a centre OFF position.

(5) A centrally-mounted, rotary function switch has five positions, providing facilities as follows:-

(a) OFF - The a.c. power supply and the d.c. power supply to the aerial switching unit are disconnected and the transponder is inoperative. The main d.c. supply remains connected.

(b) SBY (Standby) - All power supplies are connected but



EA3 82 8013 2

FIG.2. INTERCONNECTION DIAGRAM — I.F.F./S.S.R.1520 (A.R.I.23134/3)

◀MOD 5204 EMBODIED▶

transponder replies are inhibited, i.e. the transponder replies are inhibited, i.e. the transponder is in a state of readiness.

(c) **LOW** - The transponder is operational but with reduced receiver sensitivity.

(d) **NORM** - The transponder is fully operational in all modes.

(e) **EMGY** (emergency) - The transponder is fully operational in all modes with the addition of a special emergency reply to each interrogation in Mode 1, 2, 3/A or B. To select the EMGY position, the switch knob must be pushed in before rotating.

(6) A press-to-test switch and lamp assembly, identified TEST, provides a means of initiating the internal self-test circuits in the transponder. If the transponder operation is satisfactory, the lamp is lit; if unsatisfactory, the I.F.F. failure lamp (*para.9*) is lit.

(7) Four code selection switches, identified MODE 1, at the lower left of the panel, provide facilities for setting up a four-digit reply code for a Mode 1 interrogation. The right-hand bank of four switches, identified MODE 3/A/B provide facilities for setting up the reply code for a Mode 3/A or B interrogation.

(8) Eight integral lamps illuminate the selected code numerals whilst the front panel is edge-lit by a further two lamps. The brilliance of the lamps is controlled by the dimmer switch, annotated CU LIGHTS, located on a panel on the port fuselage wall adjacent to the navigator's instrument panel.

Aerials

6. Two omni-directional aerials, are used to provide all-round coverage. The upper aerial is mounted on the centre line of the upper front fuselage between frames 27 and 28. The lower aerial is mounted on the centre line of the underside of the rear fuselage between frames 35 and 36.

Aerial switching unit

7. The aerial switching unit, is located on a panel at the star-

board side of the rear fuselage between frames 33 and 34. The unit is a solid state coaxial switch, used to connect the transponder alternately to the upper and lower aerials at a rate of 40 ± 4 Hz when the aerial test switch (*para.8*) is in the FLIGHT position.

Aerial test switch

8. The aerial test switch is a guarded three-position switch, identified AERIAL POSN-UPPER-FLIGHT-LOWER, and is mounted on the panel adjacent to the aerial switching unit (*para.7*). The switch is used for servicing purposes only, permitting selection as required, of the upper or lower aerial for continuous connection to the transponder. In normal operating conditions, the switch is guarded in the FLIGHT position.

I.F.F. failure lamp

9. An amber, iris-dimmed lamp, identified IFF FAIL, is mounted on the navigator's instrument panel. Lighting of the lamp indicates failure of the transponder to reply correctly to a valid interrogation, or to operation of the TEST switch on the control unit (*refer to para.5*). With the d.c. power connected and the function switch on the control unit selected OFF, the lamp remains lit to indicate non-availability; with the function switch at SBY, or the transponder not warmed up, the lamp flashes on for one second to indicate recognition of an interrogation. A press-to-test facility is embodied in the lamp for testing the filaments of the I.F.F. FAIL lamp and the TEST lamp on the control panel.

Mode C operation

10. In response to Mode C interrogation, the transponder transmits coded height information derived from the servo altimeter. The connections from the height encoder are routed through a plug break, on the I.F.F. tray, which is provided for servicing purposes. The height encoding system is described in Sect.5, Chap.2, Group F.

Power supplies

11. The installation operates from 28V d.c. and 115V, 400 Hz, single-phase a.c. supplies. The d.c. requirement is supplied from busbar P10 via fuses 157, 158, 159 and 160. Fuse 160 supplies

power for lamp testing. Fuse 158 provides the main d.c. supply to the transponder. Fuse 157 provides the d.c. supply to the aerial switching unit, via contacts 1-1a of relay No.7 in the No.2 distribution box. The a.c. requirement is provided from either inverter A or B, depending on the position of the TACAN/I.F.F. control switch, via fuse 136 and contacts 3-3a of the relay. The relay is operated, from fuse 159, to connect the supplies when the function switch on the control unit is selected to any position other than OFF. The power supplies are fully described in Sect.5, Chap.1, Group R & S.

OPERATION

Standard I.F.F. interrogation

12. By international agreement, the standard interrogation signal transmitted by a ground station consists of two pulses, P1 and P3, radiated on a carrier frequency of 1030 MHz at a rate of 400 interrogations per second.

Interrogation modes

13. The ground station interrogations are transmitted in various modes, obtained by adjustment of the time interval between pulses P1 and P3. Six modes are available as follows:-

Mode	Spacing	Function
1	3 microseconds	Military identification
2	5 microseconds	Military identification
3/A	8 microseconds	Civil/military identification
B	17 microseconds	Civil identification
C	21 microseconds	Automatic altitude reporting
D	25 microseconds	Future expansion; not yet in use

14. The reception of interrogations on a carrier frequency of 1030 MHz, in any mode, will trigger the transponder to transmit an appropriately encoded reply on a carrier frequency of 1090 MHz, provided that the same mode is selected at the control unit.

Reply coding

15. The transponder reply codes are contained between two framing pulses spaced 20.3 microseconds apart. Between the framing pulses, twelve information pulses can be introduced at intervals of 1.45 microseconds. The presence or absence of any of the pulses is determined by the setting of the code selection switches at the control unit or, for Mode 2 interrogations, the setting of similar switches on the front panel of the transponder, the latter being preset before flight, or, for altitude reporting, the positions of the encoding switches driven by the servo altimeter.

Identification pulse

16. The transponder contains facilities for the transmission of an identification pulse at an interval of 4.35 microseconds after the second framing pulse, i.e. at 24.65 microseconds after the first framing pulse. Introduction of this pulse is controlled by the I/P - on/off switch on the control unit.

Side lobe suppression

17. Provision is made for the automatic suppression of transponder replies during spurious triggering by side lobes of the main ground station transmission. Two aeriels are involved at the ground station. The rotating interrogation aerial transmits pulses P1 and P3 (*para.12*) with high power in the direction of interrogation accompanied by low power side lobes. A second rotating aerial with an omni-directional pattern, except for a trough in the direction of interrogation, transmits an extra pulse P2 at a spacing of 2 microseconds after P1.

18. By comparing the amplitudes of P1 and P3 with that of P2, the transponder determines whether the interrogation is genuine or originates from a side lobe. For correct main lobe interrogation, the amplitudes of P1 and P3 are greater than that of P2 and a transponder reply is generated, During all interrogations originating from side lobes, P2 is greater than P1 and P3 and an internal inhibiting pulse is generated, preventing any reply transmission.

Transponder replies

19. The transponder replies fall into four categories:-

- (1) Normal: consists of the framing pulses containing the selected (coded) information pulses in one group. When the I/P and EMGY (emergency) switches are not operated, this reply is given to any interrogation.
- (2) Civil I/P: consists of the framing pulses, the information pulses and the identification pulse in one group. When the I/P switch is operated, this reply is given to an interrogation in any mode except Mode 1 or C. On reply to a Mode C interrogation, the identification pulse is transmitted automatically when information pulse D4 is selected by the altitude encoder with no operation of the I/P switch.
- (3) Military I/P: consists of a normal reply repeated, i.e. two sets of framing pulses spaced 4.35 microseconds apart, each containing information pulses. When the I/P switch is operated this reply is given to an interrogation in Mode 1.
- (4) Emergency: consists of normal reply followed by three repeats, the repeats containing no information pulses. When the EMGY (emergency) switch is operated, this reply is given to an interrogation in Mode 1, 2, 3/A or B. The information pulses contained in the first frame for a Mode 3/A or B interrogation depend on the position of the CIVIL/MIL switch thus:-

CIVIL - Code 7700
MIL - Selected code

TABLE 1

Equipment details

Equipment	Type/Part No.	Ref.No.	Location	A.P. Reference
Transponder	16928	5895-99-956-3378	Rear fuselage, starboard side, frames 34-35	114J-0101-16
Mounting tray	16946	5820-99-107-5637	Rear fuselage, starboard side, frames 34-35	
Control unit	16929	5895-99-956-3379	Navigator's instrument panel	
Aerial (upper)	100B	10B/20275	Centre line upper fuselage, frames 27-28	
Aerial (lower)	100B	10B/20275	Centre line lower fuselage, frames 35-36	
Aerial switching unit Aerial test switch	16941 -	5895-99-107-1521 5CW/1047694	Rear fuselage, starboard side, frames 33-34	
I.F.F. failure lamp	C1101/C/7	5CW/4400657	Navigator's instrument panel	113D-1102-1
◀ Aerial guard	-	26FZ/26567	Centre line lower fuselage, frames 35-36	▶

TABLE 2

Connector details

◀ CONNECTOR I.F.2D (EA3.82.5649) ▶

Termination	Pin	Pin	Termination
	A	88	
	B	13	
	C	14	
	D	15	
	E	17	
	F	18	
	G	19	
	H	26	
	J	27	
	K	28	
	L	29	
	M	30	
	N	31	
	P	32	
Pressure bulkhead B	R	33	Transponder 16928 A
	S	34	
	T	35	
	U	38	
	V	39	
	W	40	
	X	41	
	Z	43	
	b	45	
	c	46	
	d	47	
	e	48	
	f	49	
	g	50	
	h	51	
	i	52	

◀ CONNECTOR I.F.2D (EA3.82.5649) - continued ▶

Termination	Pin	Pin	Termination
	j	53	Transponder 16928 A
	k	54	
	m	55	
	n	56	No.2 distribution box B4
Pressure bulkhead B	v	IFF3	
	a	IFF4	
	y	IFF1	
	x	96	No.2 distribution box B4
	p	57	
	q	70	
	r	71	No.2 distribution box B4
	s	24	
	t	44	
	u	42	No.2 distribution box B4
	J	78	
	H	79	
	G	80	Transponder 16928 A
	F	81	
Height encoding (Sect.5, Chap.2, Group F) B3	E	82	
	D	83	
	C	84	
	B	85	Transponder 16928 A
	A	86	
	K	92	
	L	25	No.2 distribution box B4
	M	91	
	-	93	
Earth	-	23	No.2 distribution box B4
No.2 distribution box B4	TF5	22	

continued . . .

TABLE 2 Connector details - continued

CONNECTOR 5384/2 (10HB/21514)

Termination	Pin	Pin	Termination
Pressure bulkhead A	A	A	Control unit 16929 B
	B	B	
	C	C	
	D	D	
	E	E	
	F	F	
	G	G	
	H	H	
	J	J	
	K	K	
	L	L	
	M	M	
	N	N	
	P	P	
	R	R	
	S	S	
	T	T	
	U	U	
	V	V	
	W	W	
	X	X	
	Z	Z	
	b	b	
	c	c	
	d	d	
	e	e	
f	f		
g	g		
h	h		
i	i		

CONNECTOR 5384/2 (10HB/21514) - continued

Termination	Pin	Pin	Termination
Pressure bulkhead IFF 1 A	j	j	Control unit 16929 B
	k	k	
	m	m	
	n	n	
	p	p	
	q	q	
	r	r	
	s	s	
	v	v	
	t	B3	
	u	2	
	x	A	
	y	B	
	a	C	
t	F		
u	G		
x	H		
w	5		
Fail lamp B3	i	E	Lighting T.B. B4 E.C.P. B2
	B	J	

continued . . .

TABLE 2 Connector details - continued

CONNECTOR I.F.3 (EA3.82.8053)

Termination	Pin	Pin	Termination
Aerial switching unit, Type 16941 End A	[A C D B]	[2 1 3 I.F.F.2]	Aerial test switch End B No.2 distribution box End B2

CONNECTOR 5384/4 (10HB/21516)

Termination A	Pin	Pin	Termination B
Transponder 16928 (AERIAL)	-	-	Aerial switching unit 16941 (TRANSPONDER)

CONNECTOR 5384/5 (10HB/21517)

Termination A	Pin	Pin	Termination B
Aerial switching unit 16941 (LOWER)	-	-	Lower aerial Type 100B

CONNECTOR 5384/6 (10HB/21518)

Termination A	Pin	Pin	Termination B
Aerial switching unit 16941 (UPPER)	-	-	Upper aerial Type 100B

◀ Part 2 TACAN (A.R.I.18107/3) ▶

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DESCRIPTION

General

1. TACAN (A.R.I.18107/3) is an airborne navigational system, working, in conjunction with complementary ground beacons, in the 962 to 1213 MHz frequency band. The following indications are available to the pilot and navigator:-

- (1) Continuous meter indication of the bearing of the aircraft with respect to the beacon.
- (2) Continuous meter indication of the distance from the beacon.
- (3) Aural indication of the identity of the beacon to which the equipment is channelled.
- (4) Flag alarm indication in the absence of correct distance signals.

2. The location of the main items are shown in fig.1 and interconnections in fig.2. Equipment details are given in Table 1 and connector details in Table 2. Full technical information on the TACAN equipment is contained in A.P.116B-0304-1.

3. The installation comprises the following main items of equipment:-

Transmitter/receiver, Type RT-220C/ARN21
 Mounting, Type 9274
 Control unit, Type 9273
 Indicator, electrical, Type 9547 (2)
 Coupling unit, Type 9546
 Mounting, Type 9545
 Aerial, Type 100B

Transmitter/receiver

4. The transmitter/receiver, is positioned on the mounting, in

the upper equipment compartment. The rear of the mounting tray forms a junction box connecting the transmitter/receiver to the power supplies, coupling unit and control unit. Connection is made by the mating of a fixed 45-way plug at the rear of the transmitter/receiver with a socket on the junction box. The aerial and suppression pulse output connections are made at the front panel of the unit.

Control unit

5. The control unit is located on the right hand side of the navigator's instrument panel. Electrical connection to the control unit is via a 14-way cable connector at the rear of the unit. The following controls and indications are provided:-

(1) Channel selection is effected by four push-buttons, arranged centrally on the panel. One operation of each button operates a ratchet which turns a rotary switch, changing the units (right-hand pair of buttons) or the tens (left-hand pair of buttons) by one digit in the window. The top pair of buttons increases the reading, the bottom pair decreases it.

(2) A two-position toggle switch is positioned at the top left corner and identified BRG/DIST BRG. With BRG selected, the equipment displays bearing information only; with DIST BRG selected, both bearing and distance are displayed.

(3) A two-position toggle switch, located at the lower left corner and identified ON/OFF, controls the power supply to the installation.

(4) A knob, located at the upper right-hand side and identified VOL, controls the level of the audio identification signal fed to the telephones.

(5) Two lamps are provided to illuminate the channel indicator and panel captions; the brightness is controlled by the CU LIGHTS dimmer switch located on a panel on the port fuselage wall adjacent to the navigator's instrument panel.

Indicator units

6. Two indicator units are provided, one on the pilot's instru-

ment panel and one on the navigator's instrument panel. The function of the instrument is to display the slant distance and bearing of the aircraft with respect to a selected surface TACAN beacon. Distance information is displayed by a three-digit counter unit and bearing information by a pointer and circular calibrated dial. The indicator unit comprises the following sub-units:-

- (1) Bearing synchro receiver.
- (2) One-mile synchro receiver.
- (3) Ten-mile synchro receiver.
- (4) Unreliability indicator, which is associated with searching and 100-mile indications, synchro receiver.

Unreliability indicator

7. When the transmitter is switched off, is searching, or operating unreliably, a bar partially obscures the tens and units digits. Correct searching is indicated when the bar is showing and the tens and units digits are seen revolving behind the bar. When lock is achieved, a 28V d.c. signal removes the bar to disclose the tens and units digits. The closing of the 100-mile switch in the coupling unit causes the extra digit, numeral 1, to appear before the tens digit.

Coupling unit

8. The coupling unit in the quick-release anti-vibration mounting, is positioned on the shelf below the navigator's table. The function of the unit is to provide an electro-mechanical link between the transmitter/receiver and the indicators. The unit consists of two servo links with associated gear trains to operate the indicators, one servo providing bearing data and the other distance information. Four indicator dials on the front panel of the unit provide coarse and fine readings of both distance and bearing.

Aerial

9. The omni-directional aerial is mounted on the underside of the nose fuselage forward of frame 1 and slightly to port of the aircraft centreline.

Power supplies

10. The installation operates from 28V d.c. and 115V, 400 Hz, single-phase a.c. supplies. The d.c. requirement is supplied from busbar P10 via fuse 77. The a.c. requirement is supplied from either inverter A or B, depending on the position of the TACAN/I.F.F. control switch, via relay No.6 in the No.2 distribution box, and fuses 105 and 106 in the No.1 distribution box. The power supplies are fully described in Sect.5, Chap.1, Group R & S.

Test sockets

11. An a.c. and a d.c. socket are located on the rear face of the E.C.P. and provide power sources for the Tacan test equipment. The supply to the d.c. socket is drawn from busbar P10 via fuse 162 in the E.C.P. whilst the supply to the a.c. socket is provided by either inverter A or B, depending on the position of the TACAN/I.F.F. control switch, via relay No.6, in the No.2 distribution box, and fuse 108 in the No.1 distribution box (*Sect.5, Chap.1, Group R & S*).

OPERATION

General

12. The airborne transmitter initiates the radiation of interrogation pulses from the aircraft aerial. These signals are detected by the ground transponder beacon and initiates transmission of the distance reply signal. The reply signal is processed in the airborne receiver range circuits, which measure the time period from transmission of the interrogating pulse to receipt of the reply pulse. Distance information is derived from the time period and is displayed on the indicator units.

13. In addition to the distance reply pulses, the ground beacon continuously transmits coded and random radio frequency pulses which are amplitude-modulated by a rotating aerial system. The coded pulses are detected in the azimuth circuits of the airborne receiver, where an internally-produced phase shift is applied to them so that the coded reference signals appear at a fixed point on the modulation waveforms. The amount of phase shift applied is a measure of the aircraft's bearing relative to the ground beacon. This phase shift is converted into azimuth angle information which is indicated by the bearing pointer.

14. The amplitude modulation of the ground beacon transmission is effected by parasitic elements, rotating around the central aerial array at 900 rev/min. One reflector produces a 15 Hz sine-wave modulation and nine directors produce a 135 Hz sine-wave modulation. Reference signals are transmitted by the beacon main aerial in the form of 15 Hz signals every 66.6 milliseconds with eight 135 Hz signals equally spaced between the 15 Hz signals. In the airborne receiver, the relationship between modulation signals and reference signals changes with the aircraft's position. In practice, the function of the bearing circuits is to adjust the phase of the 15 Hz and 135 Hz components with respect to the reference signals until the waveform and reference signals are related as in the due South position. The amount of phase shift necessary to achieve this pattern is a measure of the bearing of the aircraft relative to the beacon.

Frequency coverage

15. 126 channels can be selected in the following frequency bands:-

Receiving:	962 to 1024 MHz and 1151 to 1213 MHz
Transmitting:	1025 to 1150 MHz

There are 252 discrete frequencies, at 1 MHz spacing. Each

channel consists of a receiving frequency and an associated transmitting frequency, at 63 MHz spacing.

Identification signal

16. At intervals of 37.5 seconds, each ground beacon radiates a Morse-coded identification signal, which, after detection, is routed to the telephones via the intercommunication control system described in Sect.6, Chap.1, Part 1.

SERVICING

WARNING

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

General

17. Servicing, other than that listed in the aircraft Supplementary Servicing Schedules, consists of regular inspection of the units and connectors for physical damage and security of mounting. The connector details given in Table 2 are for use during routine continuity checking and fault diagnosis.

TABLE 1

Equipment details

Equipment	Type	Ref.No.	Location	A.P. Reference
Transmitter/receiver	RT220C/ARN21	5826-00-691-4896	Upper equipment compartment	116B-0304-1
Mounting	9274	10AJ/251	Upper equipment compartment	
Control unit	9273	10L/16324	Navigator's instrument panel	
Indicator, electrical (No.1)	9547	10Q/4280389	Pilot's instrument panel	
Indicator, electrical (No.2)	9547	10Q/4280389	Navigator's instrument panel	
Coupling unit	9546	10D/22534	Below navigator's table	
Mounting	9545	10AJ/258	Below navigator's table	
Aerial	100B	10B/20275	Underside of nose, frame 1	

TABLE 2

Connector details

◀ CONNECTOR 5373/6 (10HB/21931) ▶

Termination	Pin	Cable type	Cable colour	Pin	Termination
Indicator 9547 (Pilot) B	A	Min. 12C	White	A	Coupling unit (PL1) A
	B		Black	B	
	C		Yellow	C	
	D		Red	N	
	E		Blue	E	
	F		Brown	O	
	G		Grey	G	
	H		Lt. Green	H	
	J		Green	J	
	K		Violet	K	
	L		Pink	L	
	M		Orange	M	

CONNECTOR 5391/4 (10HB/21559)

Termination	Pin	Cable type	Cable colour	Pin	Termination
Indicator 9547 (Navigator) B	A	Min. 12C	White	A	Coupling unit (PL3) A
	B		Black	B	
	C		Yellow	C	
	D		Red	N	
	E		Blue	E	
	F		Brown	O	
	G		Grey	G	
	H		Lt. Green	H	
	J		Green	J	
	K		Violet	K	
	L		Pink	L	
	M		Orange	M	

continued. . .

Table 2 Connector details - continued

Termination		Pin	Cable type	Cable colour	Pin	Termination	
Transmitter/receiver (S2) A	}	A	UN 20	-	A	Pressure bulkhead (T1) B	
		B		-			C
		C		-			G
		D		-			H
		E*		-			J
		F	UNMS 20	K			
		G		-	D		
		H		-	B		
		I		-	E		
		J		-	F		

*Screening connected to pin E at End A and clamped to H/D clamp at End B

Termination		Pin	Cable type	Cable colour	Pin	Termination		
Control unit A	}	A	UN 20	-	A	Pressure bulkhead (T1) B		
		B*	UNMS 20	-			B	
		C	UN 20	-			C	
		D	-	-			D	
		E	-	-			E	
		F	-	-			F	
		G	-	-			G	
		H	-	-			H	
		J*	-	-			J	
		K	-	-			K	
		M	UNMS 20	4			B2 Lighting T.B.	
		N*		Screen			A	B1
							B*	Radio junction box

*Braiding connected to pin J at End A and to shell at End B, End B1 screen connected to pin B

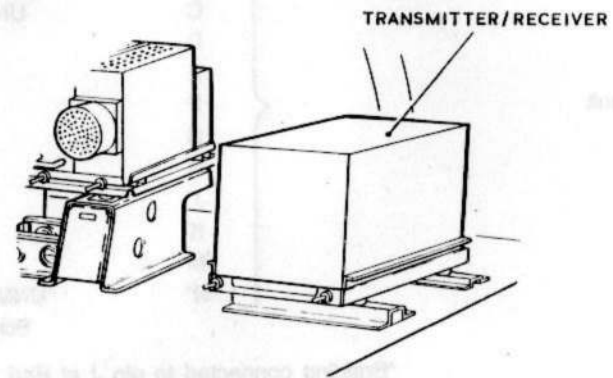
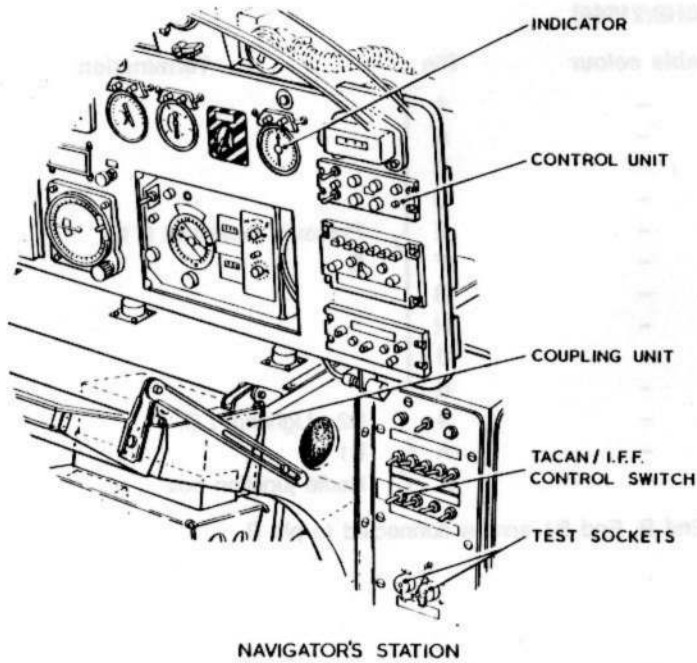
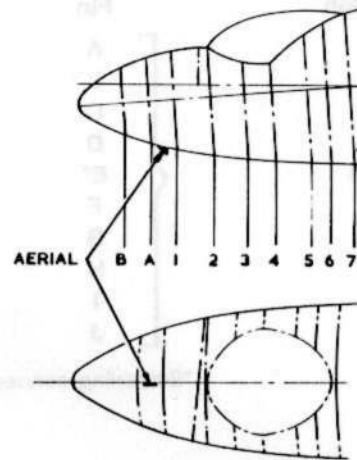
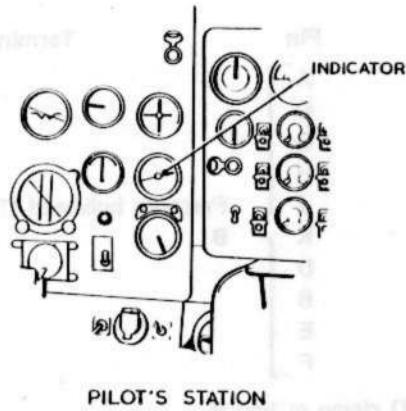


FIG.1. LOCATION DIAGRAM — TACAN (A.R.I.18107/ 3)

◀NAV'S STATION AMENDED▶

TABLE 2 Connector details - continued

CONNECTOR 5373/4 (10HB/21389)					
Termination	Pin	Cable type	Cable colour	Pin	Termination
Transmitter/receiver (S3) A	A	Min. 18J	Yellow	L	Pressure bulkhead (T3) B
	B		White H.T.*	A	
	C		Red	E	
	D		Yellow H.T.*	Q	
	J*		Black	J*	
	K		Red H.T.*	P	
	M		Violet	H	
	N		Black H.T.*	B	
	R		Green H.T.*	R	
	S		Blue H.T.*	S	
	T		White	K	
	U		Brown H.T.*	C	

*Braiding connected to pin J at both ends

CONNECTOR 5373/12 (10HB/21397)					
Termination	Pin	Cable type	Cable colour	Pin	Termination
Pressure bulkhead (T5) A	A	UN 20	-	TAC 5	No.1 distribution box (tails) B
	B		-	EW	

continued. . .

TABLE 2 Connector details - continued

CONNECTOR 5373/11 (10HB/21396)					
Termination	Pin	Cable type	Cable colour	Pin	Termination
Transmitter/receiver (PL2) A	A	UN 20	-	EW	No.1 distribution box (tails) B
	B			TAC 5	
	C			TAC 1	
	D			M 34	
	E			TAC 2	
	G			TAC 3	

CONNECTOR 5373/9 (10HB/21394)					
Termination	Pin	Cable type	Cable colour	Pin	Termination
Transmitter/receiver (AE) A	-	UR 67	-	-	Pressure bulkhead (T4) B

CONNECTOR 5373/10 (10HB/21395)					
Termination	Pin	Cable type	Cable colour	Pin	Termination
Aerial A	-	UR 67	-	-	Pressure bulkhead (T4) B

continued . . .

Table 2 Connector details - continued

CONNECTOR 5373/7 (10HB/21392)					
Termination	Pin	Cable type	Cable colour	Pin	Termination
Transmitter/receiver (S2) A	A	UN 20	-	A	Pressure bulkhead (T1) B
	B		-	C	
	C		-	G	
	D		-	H	
	E*		-	J	
	F	UNMS 20 UN 20	-	K	
	G		-	D	
	H		-	B	
	I		-	E	
	J		-	F	

*Screening connected to pin E at End A and clamped to H/D clamp at End B

CONNECTOR 5391/5 (10HB/21560)					
Termination	Pin	Cable type	Cable colour	Pin	Termination
Control unit A	A	UN 20	-	A	Pressure bulkhead (T1) B
	B*	UNMS 20	-	B	
	C	UN 20	-	C	
	D	-	-	D	
	E	-	-	E	
	F	-	-	F	
	G	-	-	G	
	H	-	-	H	
	J*	-	-	J	
	K	-	-	K	
	M	-	-	4	B2 Lighting T.B.
	N*	UNMS 20	-	A	B1
		Screen	-	B*	Radio junction box

*Braiding connected to pin J at End A and to shell at End B, End B1 screen connected to pin B

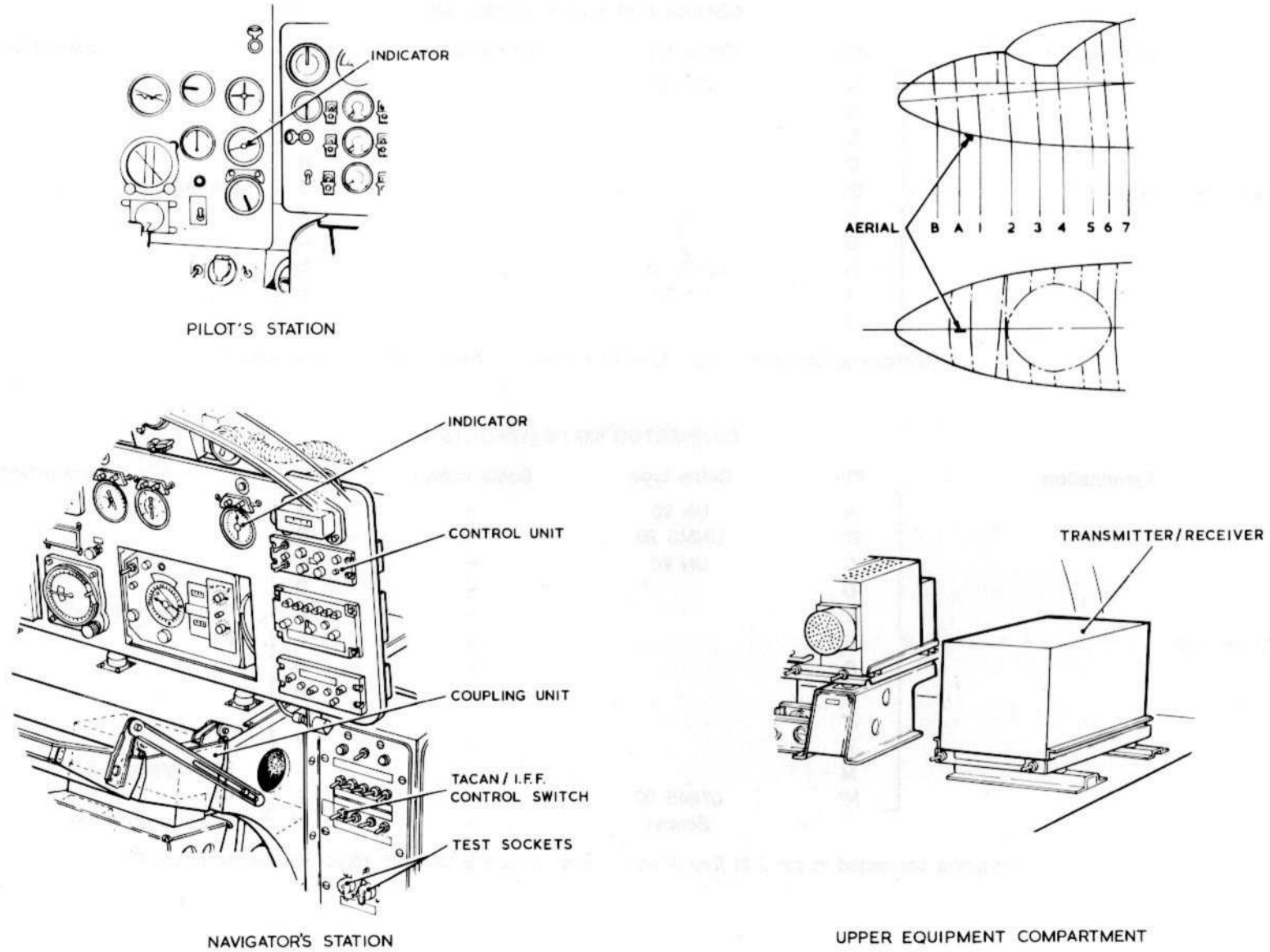
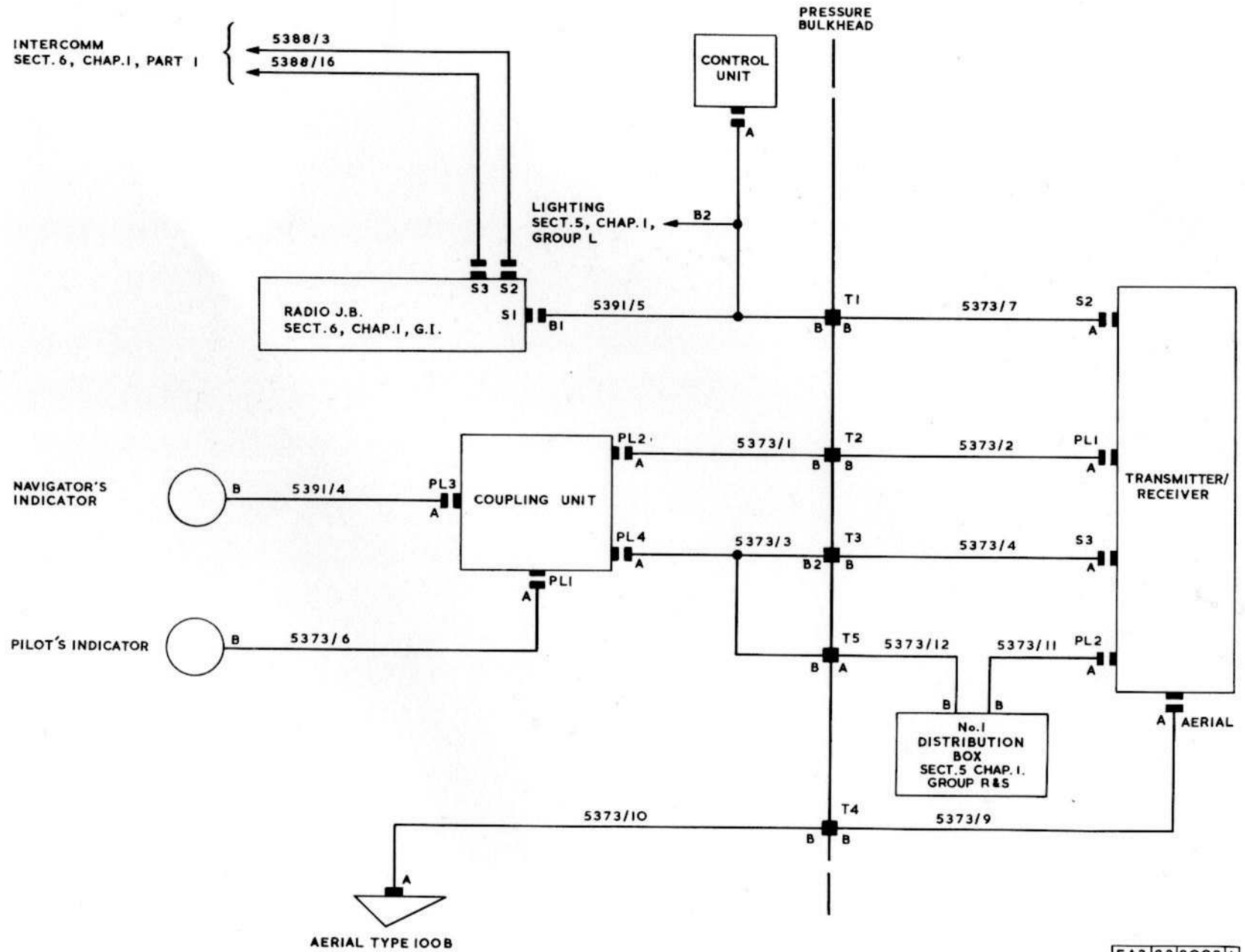


FIG.1. LOCATION DIAGRAM — TACAN (A.R.I. 18107/18)



EA3 82 8009 1

FIG.2. INTERCONNECTION DIAGRAM — TACAN (A.R.I. 18107/ 3)

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