

SECTION 8

RADIO INSTALLATION

LIST OF CHAPTERS OVERLEAF

SECTION 8

RADIO INSTALLATION

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Chapter 1 INTERCOMMUNICATION

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Note ... Combined theoretical/routeing diagrams for this installation are contained in A.P.101B-0417-10 (Servicing Diagrams Manual)

DESCRIPTION

General

1. The intercomm. system (A.R.I. 23099/24) is comprised of components of the Ultra UA60 system and provides facilities for intercomm. between the pilot, navigator and A.E.O., their use of the transmission and reception of the H.F., V.H.F. and U.H.F. 1 and 2 communications systems and reception of V.O.R./I.L.S., radio compass and Tacan A. F. signals. A ground crew amplifier is also installed to permit intercomm. between the cabin and four mic/tel sockets. These are situated one in the rear fuselage, one in the starboard wheel well and two in the port side of the bomb bay roof, one of these being just forward of frame 19 and the other just aft of frame 25.

Station boxes

2. A station box is fitted at each crew station. The pilot's box is located on the starboard coaming panel, the navigator's in the port lower corner of his instrument panel and the A.E.O. box is mounted at the starboard end of the navigator's coaming panel.

3. The station boxes are dedicated to the Sylvania Comms.(A.R.I. 23362/0) switch positions. Each station box provides facilities for the mixing of eight inputs and the selection of the required transmitter/receiver from the four fitted to the aircraft. U.H.F. 1 and 2, V.H.F. and H.F. may be used separately or U.H.F. 1 or 2 and H.F. combined. The output from the crew member's microphone passes via a transistorized amplifier and the T/R selector switch to the T/R unit selected. Inputs from the H.F., V.H.F., U.H.F. 1 or 2, radio compass (A.D.F.), V.O.R./I.L.S., marker & Tacan receivers are selected as required by operating individual push-on, push-off switches which incorporate volume controls. The U.H.F. 2, A.D.F. and Tacan signals are controlled by the same push-on, push-off switch. Intercomm. signals from the other station boxes and fuselage mic/tel sockets are similarly selected and the mixed inputs are fed to the associated telephones via another transistorized amplifier, incorporated in the station box.

4. The T/R selection switch, in addition to switching the positive and negative microphone lines, directs the positive telephone and the press-to-transmit (P. TO T.) lines to whichever T/R unit is selected. When a T/R unit is selected, the push-switch for that unit is by-passed and the

receiver output passes directly to the input of the telephones amplifier.

5. An override facility is provided whereby the operator of a station box may, by operating an OVERRIDE lamp/switch adjacent to the box, feed the output of his microphone amplifier to the input of the telephone amplifier of the other station boxes. This is independent of any selection made at those boxes. The OVERRIDE lamp/switch illuminates when the integral switch is operated.

6. In the event of the failure of either of the amplifiers, selection of the NORMAL/EMERGENCY switch to EMERGENCY operates a relay in the station box. The microphone output is fed direct to the T/R selector switch, as in the transmit condition, and via the modulator and sidetone circuits of the T/R unit selected to the other station boxes via the receiver output connections. To obtain reception of this emergency intercomm. signal, the other station boxes must select reception of the T/R unit selected by the box using the emergency facility. Also, all the services selected for reception by this box are fed in parallel, by-passing their individual volume controls, direct to the telephones connected to the box. This will result in crosstalk between the services selected so that if, for example, the box set to EMERGENCY has U.H.F. 1 or 2 and Tacan selected, other boxes selecting U.H.F. 1 or 2 will receive Tacan also.

Ground crew amplifier

7. The inputs from the four intercomm. points in the fuselage are fed in parallel to the UA6070 ground crew amplifier, mounted on the starboard wall of the cabin between frames 6 and 7 just below the distribution box. The amplifier unit contains two transistorized amplifiers, one for microphone inputs and the other for telephone outputs. These inputs pass into the microphone amplifier, via the contacts of a relay mounted in J.B.14, when it is energized by the selection of the GROUND/FLIGHT switch to GROUND. When the GROUND CREW AMPL'R OFF/ON switch is set to ON, a relay is energized and its contacts connect the microphone amplifier output in parallel with the intercomm. microphone amplifier outputs from the station boxes. These latter outputs are also fed via a transformer in the distribution box and the ground crew telephone amplifier to the telephone terminals of the fuselage intercomm. sockets, again via the relay in J.B.14.

Junction box

8. The distribution box, UA6147/1, provides the interconnections between the various T/R units, receivers, station boxes, ground crew amplifiers, fuselage intercomm. sockets and the Sylvania comms system (A.R.I. 23362/0). It contains a filter for the 28V d. c. intercomm. power supply, the override relay, a matching transformer for the intercomm. microphone amplifier outputs and a terminating resistor for each receiver output. Connections are made by means of Cannon plugs and sockets.

Press-to-transmit switches

9. The pilot's press-to-transmit switch is mounted on the right-hand grip of the control column and the navigator's switch is mounted on the forward end of the side table adjacent to his station box. The A.E.O. is provided with two switches, one switch is located on the navigator's coaming panel outboard of the A.E.O.'s station box and the other is a foot-operated switch located on the step forward of the A.E.O.'s position. Either switch may be switched in circuit depending upon the position of the HAND-FOOT-JAM switch mounted on the navigator's lower panel assembly. Operation of these switches affects transmission by whichever T/R unit is selected by the TRANS & REC switch on the station box. Microphone signals are fed into the intercomm. system with the switch in the normal (un-operated) position.

Davall recorder

10. An audio recording system (A.R.I. 23208) comprising the Davall recorder and interface unit, provides automatic recording and replay facilities of the communication system. The recorder is mounted on the navigator's centre pedestal whilst the interface unit is mounted below the A.E.O.'s switch panel.

Radio Relay Link

11. The Intercomm. system may be used in conjunction with the A.R.I. 23362/0 comms. jammer system (Sect. 9, Chap. 4, Supplement) as a radio relay link. The link is usually between two external transmitting sources which are outside transmission range. With U.H.F.2 selected and the A.E.O.'s COMMS JAM switch set to UHF2 the signals received by the U.H.F.2 (Sect.8, Chap.4, Supplement) are re-transmitted (on a different frequency) by the comms. jammer system. Indication of this link facility is made via the LINK warning lamps at the pilot's and navigator's stations. The warning lamps illuminate when the A.E.O. has selected LINK.

Power supplies

12. The installation is powered by a 28V d. c. supply. The main supply is fed from busbar PP8 via fuse No. 174 and the I/COMM. MASTER switch on the navigator's instrument panel to the intercomm. distribution box. This supply also feeds the ground crew amplifier via its own switch. The relay which isolates the fuselage mic/tel socket connections is supplied from PP8 via fuse No. 176 and the ground crew isolating switch which is labelled GROUND/FLIGHT. The Davall recorder and interface unit are both supplied with 28 volts d. c. from busbar PP7 via fuse 171.

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

13. Components and cables should be checked periodically for damage. General Servicing is straightforward and the removal and assembly of equipment should not present undue difficulties. Servicing information on the equipment is contained in A.P. 116N-0101 series.

◀ 14. A.E.O.'s foot operated press-to-transmit switch (26NA/19371). The following instruction must be carried out before installing a new foot-operated switch:

- (1) Ensure that the foot-operated switch cables are 40 centimetres in length maximum. Cut to length as necessary.
- (2) Sleeve the foot-operated switch cables using sleeve tubing, protective, (5F/9143294). ▶

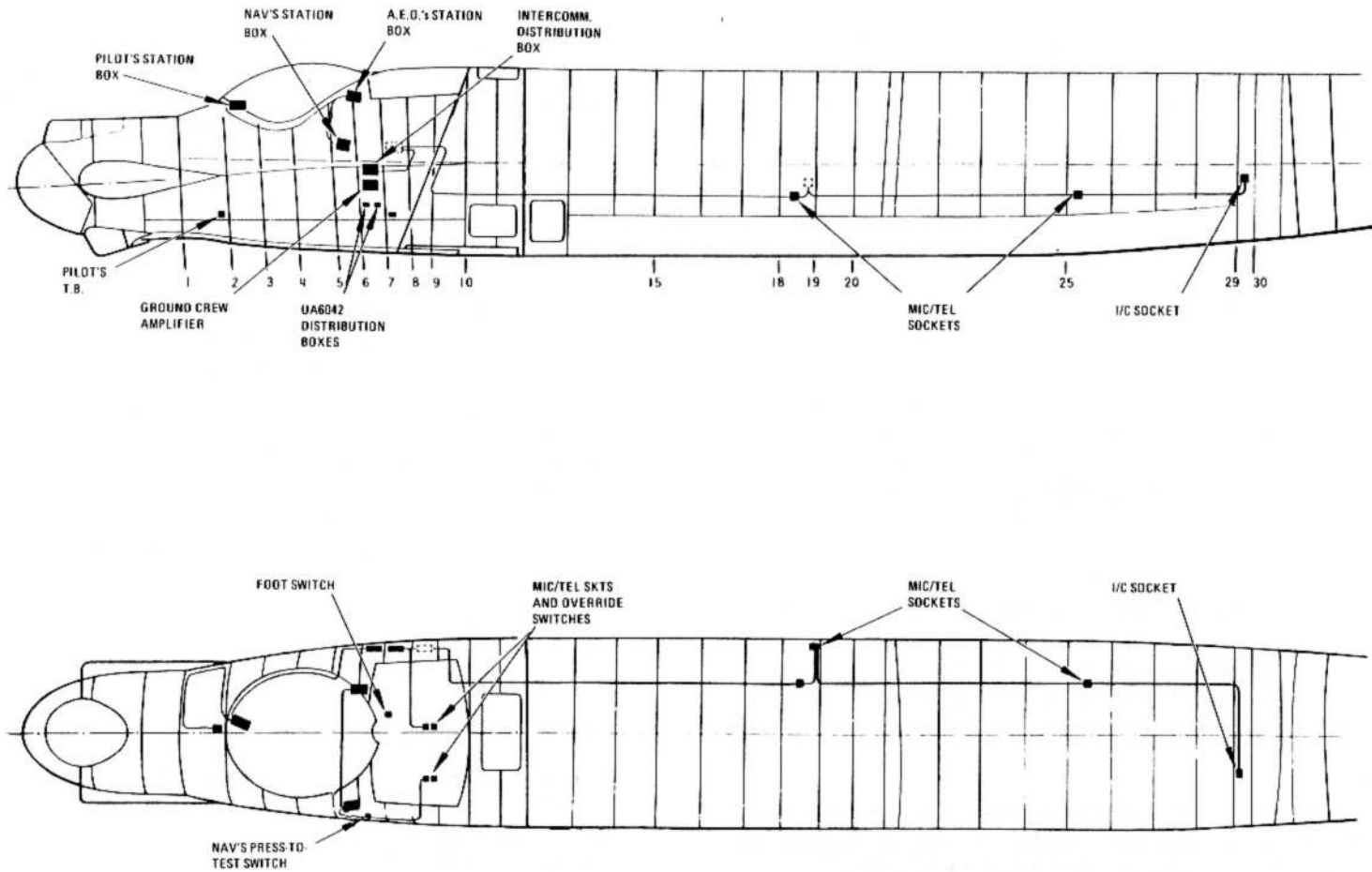


FIG. 1. UA60 INTERCOMM. (A.R.I. 23099 AND A.R.I. 23208) INSTALLATION

TABLE 1 Connector details

CONNECTOR UA60 No. 1 EG7.82.607

TERMINATION	CABLE	TERMINATION
Distribution box UA60 No. 1	X176180	Pilot's station box UA60 No. 1

CONNECTOR UA60 No. 2 EG7.82.609

TERMINATION	CABLE	TERMINATION
Pilot's station box UA60 No. 2	X176180	Nav.'s station box UA60 No. 2

CONNECTOR UA60 No. 3 EG7.82.611

TERMINATION	CABLE	TERMINATION
Nav.'s station box UA60 No. 3	X176180	A.E.O.'s station box UA60 No. 3

CONNECTOR UA60 No. 4 EG7.82.613

TERMINATION	CABLE	TERMINATION
A.E.O.'s station box UA60 No. 4	X176180	Distribution box UA60 No. 4

CONNECTOR UA60 No. 5 EG7.82.615

TERMINATION	PIN	CABLE	PIN	TERMINATION
Distribution box Cannon socket UA60 No. 5	A	N20	C	JB14-UK-AN plug 10-way UA60 No. 5A
	C	NMS20	B	
	D	N20	J	
	E	NMS20	A	
Pressure bulkhead UK-AN fixed socket UA60 No. 5B	F	N20	D	
	A	NMS20	E	
	B	NMS20	F	
	C	N20	G	
	D	N20	H	

CONNECTOR UA60 No. 5C EG7.82.617

TERMINATION	PIN	CABLE	PIN	TERMINATION
Pressure bulkhead UK-AN plug UA60 No. 5C	A	NMS20	Mic +	Mic/tel socket T.B. fwd. frame 19 UA60 No. 5C
	B	NMS20	Mic -	
	C	N20	Tel +	
	D	N20	Tel -	
Mic/tel socket T.B. forward frame 19 UA60 No. 5C	Mic. + (Screening)		Earth	
	Mic. - (Screening)		Earth	

CONNECTOR UA60 No. 9 EG7.82.625

TERMINATION	CABLE	TERMINATION
Distribution box UA60 No. 9	X1731222	Ground crew amplifier UA60 No. 9

CONNECTOR UA60 No. 10 EG7.82.627

TERMINATION	PIN	CABLE	PIN	TERMINATION
Mic/tel socket T.B. UA60 No. 10	Mic -	NMS20	Mic -	External I/C connector T.B. stbd. wheel bay UA60 No. 10
	Mic +	NMS20	Mic +	
	Tel -	N20	Tel -	
	Tel +	N20	Tel +	
External I/C connector T.B. stbd. wheel bay UA60 No. 10	Mic - (Screening)		Earth	
	Mic + (Screening)		Earth	

continued . . .

TABLE 1 Connector details - (continued)

CONNECTOR UA60 No. 11 EG7.82.629

TERMINATION	PIN	CABLE	PIN	TERMINATION
External I/C connector T.B. stbd. wheel bay UA60 No. 11	Mic -	NMS20	Mic -	Mic/tel socket aft. T.B. UA60 No. 11
	Mic +	NMS20	Mic +	
	Tel -	N20	Tel -	
Tel +	N20	Tel +		
Mic/tel socket aft T.B. UA60 No. 11	Earth		Mic - (Screening)	
	Earth		Mic + (Screening)	

CONNECTOR UA60 No. 13 EG7.82.5523 (Cont.)

TERMINATION	PIN	CABLE	PIN	TERMINATION
Nav's coaming panel T.B. UA60 No. 13A	R/T	MN22	C	A.E.O. step, plug break UA60 No. 13B

CONNECTOR UA60 No. 14 EG7.82.3027

TERMINATION	PIN	CABLE	PIN	TERMINATION
A.E.O. step plug break UA60 No. 14	C	MN20	3	A.E.O. foot-operated press-to-transmit switch T.B. UA60 No. 14A
	B	MN20	2	
	A	MN20	1	

CONNECTOR UA60 No. 12 EG7.82.631

TERMINATION	PIN	CABLE	PIN	TERMINATION
Mic/tel socket Aft T.B. UA60 No. 12	Mic -	NMS20	Mic -	Mic/tel socket UA60 No. 12
	Mic +	NMS20	Mic +	
	Tel -	N20	Tel -	
	Tel +	N20	Tel +	
Mic/tel socket UA60 No. 12	Mic - (Screening)		Earth	
	Mic + (Screening)		Earth	

CONNECTOR UA60 No. 15 EG7.82.5525

TERMINATION	PIN	CABLE	PIN	TERMINATION
UA60 6147/1 Intercomm. distribution box Free connector PL12 UA60 No. 15	A	NMS20	3	T.B. 3668/1 UA60 No. 15
	B	NMS20	4	
	Screens earthed at E15			

CONNECTOR UA60 No. 13 EG7.82.5523

TERMINATION	PIN	CABLE	PIN	TERMINATION
Hand-foot-jam switch UA60 No. 13	1	MN22	A	A.E.O. step plug break UA60 No. 13B
	6	MN22	B	
	2	MN22	28V-	A.E.O. station box via Nav.'s coaming panel T.B. UA60 No. 13A
	3	MN22	2	A.E.O. press-to-transmit switch UA60 No. 13C
	5	MN22	I/C	A.E.O. press-to-transmit switch T.B. UA60 No. 13A

CONNECTOR UA60 No. 16 EG7.82.5527

TERMINATION	PIN	CABLE	PIN	TERMINATION
UA6042 No. 1 distribution box Cannon connector PL3 UA60 No. 16	A		A	UA6147/1 intercomm. distribution box Cannon connector PL2 UA60 No. 16
	B		B	
	C		C	
	D		D	
	E		E	
	F		F	

CONNECTOR UA60 No. 17 EG7.82.5529

TERMINATION	PIN	CABLE	PIN	TERMINATION
UA6042 No. 2 distribution box Cannon connector PL3 UA60 No. 17	A		A	UA6147/1 intercomm. distribution box Cannon connector PL6 UA60 No. 17
	B		B	
	C		C	
	D		D	
	E		E	
	F		F	

continued...

TABLE 1 Connector details - (continued)

CONNECTOR UA60 No. 18 EG7.82.5531

TERMINATION	PIN	CABLE	PIN	TERMINATION
UA6042 No. 2 distribution box Cannon connector ◀ PL2 UA60 No. 18	A		A	UA6147/1 Intercomm. distribution box Cannon connector PL8 UA60 No. 18 ▶
	B		B	
	C		C	
	D		D	
	E		E	
	F		F	

CONNECTOR UA60 No. 23 EG7.82.5541 - continued

TERMINATION	PIN	CABLE	PIN	TERMINATION
Pilot's link warning lamp UA60 No. 23D Nav's link warning lamp UA60 No. 23F	T1		T1	Comms link warning lamp T.B. UA60 No. 23C
	TB3		T2	
	T1		T1	
	TB3		T2	

CONNECTOR UA60 No. 19 EG7.82.5533

TERMINATION	PIN	CABLE	PIN	TERMINATION
UA6147/1 Intercomm. distribution box Free connector PL5 UA60 No. 19A Earth point on Nav.'s structure. Tag UA60 No. 19C	A		A	UA6042 No. 1 distribution box Free connector PL2 UA60 No. 19 CJ-2 Comms jam switch CJ-3 UA60 No. 19B
	B		B	
	C		C	
	D		D	
	E		E	
	E37		E37	

CONNECTOR UA60 No. 24 EG7.82.5535

TERMINATION	PIN	CABLE	PIN	TERMINATION
Pilot's mic/tel 5-way terminal block UA60 No. 24B	5	N22	EOLC	A.E.O.'s override lamp UA60 No. 24 Earth stud UA60 No.24A
	6	N22	EOL7	
	7	N22	EOL1	
	7	N22	EOL2	
	7	N22	EOL10	
	8	N22	EOL3	
	8	N22	EOL4	
	8	N22	EOL11	
	9	N22	EOL8	
	9	N22	EOL9	
9	N22	E37		

CONNECTOR UA60 No. 23 EG7.82.5541

TERMINATION	PIN	CABLE	PIN	TERMINATION
A.E.O.'s station box Cannon free connector UA60 No. 23	1	T2 (Mic +)		A.E.O.'s mic/tel socket T.B. UA60 No. 23A
	5	T5 (Tel-)		
	9	T3 (Mic-)		
	13	T4 (Tel +)		
	4	I/C		A.E.O.'s press-to- transmit switch T.B.
	10	28v-		
	11	RT		UA60 No. 23E
	7	5		A.E.O.'s station override lamp T.B.
	12	6		
	6	T1		Comms. link warning
15	T2		lamp T.B UA60 No. 23C ▶	

CONNECTOR UA60 No. 25 EG7.82.5543

TERMINATION	PIN	CABLE	PIN	TERMINATION
Pilot's station box Cannon free connector UA60 No. 25	1		T1 (Mic+)	Pilot's mic/tel socket T.B. UA60 No. 25A
	13		T3 (Tel+)	
	9		T2 (Mic-)	
	5		T4 (Tel-)	
Pilot's press-to- transmit switch T.B.	4		I/C	Pilot's press-to- transmit switch T.B.
	10		28v-	
	11		RT	
Pilot's override lamp T.B. UA60 No. 25C	12		2	Pilot's override lamp T.B. UA60 No. 25C
	7			
	1		1	

continued...

TABLE 1 Connector details - (continued)

CONNECTOR UA60 No. 26 EG7.82.5537

TERMINATION	PIN	CABLE	PIN	TERMINATION
Pilot's override lamp 5-way terminal block UA60 No. 26B	5	N22	E35	Earth stud UA60 No. 26A
	1	N22	C	Pilot's override lamp UA60 No. 26
	7	N22	7	
	3	N22	1	
	2	N22	10	
	4	N22	2	
	4	N22	3	
	4	N22	4	
	4	N22	11	
	5	N22	8	
5	N22	9		

CONNECTOR UA60 No. 27 EG7.82.5545

TERMINATION	PIN	CABLE	PIN	TERMINATION
Nav.'s station box Cannon free connector UA60 No. 27	1		Mic +	Nav.'s mic/tel socket
	5		Tel -	T.B.
	9		Mic -	UA60 No. 27A
	13		Tel +	
	4	T1 (I/C)		Nav.'s press-to-
	10	T2 (28v-)		transmit switch
	11	T3 (RT)		UA60 No. 27B
	7		T1	Nav.'s override lamp
	12		T2	T.B. UA60 No. 27C

CONNECTOR UA60 No. 28 EG7.82.5539

TERMINATION	PIN	CABLE	PIN	TERMINATION
Nav.'s override lamp terminal block UA60 No. 28B	1	N22	C	Nav.'s override lamp UA60 No. 28
	2	N22	7	
	3	N22	1	
	3	N22	2	
	4	N22	10	
	4	N22	3	

CONNECTOR UA60 No. 28 EG7.82.5539 - continued

TERMINATION	PIN	CABLE	PIN	TERMINATION
Nav.'s override lamp terminal block UA60 No. 28B	4	N22	11	Nav.'s override lamp
	5	N22	8	UA60 No. 28
		N22	9	
		N22	E36	Earth stud UA60 No. 28A

CONNECTOR UA60 No. 29 EG7.82.5655

TERMINATION	PIN	CABLE	PIN	TERMINATION
Intercomm. master switch (Nav.'s lower panel) UA60 No.29	2	MN20	R4	Radio fuse and relay box UA60 No.29
	3	MN20	R41	
Tone and mute switch (Nav.'s lower panel) UA60 No.29	T3	MN20	E25	

CONNECTOR UA60 No. 30 EG7.82.5725

TERMINATION	PIN	CABLE	PIN	TERMINATION	
Davall recorder Free connector SK.1 UA60 No. 30 Pins B, F and H screens connected to pins E, G and U, all earthed at E25	A		10	T.B. (Nav.'s vertical wall) UA60 No. 30C	
	C		10		
	B		A	Davall interface unit. Free connector SK.2 UA60 No. 30A	
	F		F		
	H		B		
	E		E		
	G				
	U				
		10			D
	T.B. (Nav.'s vertical wall) UA60 No. 30C				
A.E.O.'s press-to-test switch UA60 No. 30B	3		C		
T.B. (Nav.'s vertical wall)	10				
		Fuse	E.C.P.		
		171	UA60 No. 30D		

continued...

TABLE 1 Connector details - (continued)

CONNECTOR UA60 No. 31 EG7.82.5719

TERMINATION	PIN	CABLE	PIN	TERMINATION
Davall interface unit, Free connector SK.3 UA60 No. 31	A		Mic +	A.E.O.'s mic/tel
	F		Mic -	socket T.B.
	D		Tel +	UA60 No. 31A
	C		5	A.E.O.'s 5-way
	E		1	terminal block
A.E.O.'s mic/tel socket T.B. UA60 No. 31A	Tel -		5	UA60 No. 31B

CONNECTOR UA60 No. 33 EG7.82.5723

TERMINATION	PIN	CABLE	PIN	TERMINATION
A.E.O.'s 5-way terminal block UA60 No. 33	3		A	Marker 'RX' backplate
	5		C	J.B. Connector No. 1 UA60 No. 33

CONNECTOR UA60 No. 32 EG7.82.5721

TERMINATION	PIN	CABLE	PIN	TERMINATION
UA6147/1 Intercomm. distribution box. Connector PL10 UA60 No. 32	A		1	A.E.O.'s 5-way
	B		5	terminal block UA60 No. 32

TABLE 2 Cable assembly details

CABLE ASSEMBLY RT20 EG7.82.5651

TERMINATION	PIN	CABLE	PIN	TERMINATION
Pilot's mic/tel socket type 359 RT20	Mic +		Mic +	Pilot's mic/tel socket T.B. RT20
	Mic -		Mic -	
	Tel +		Tel +	
	Tel -		Tel -	

Chapter 2 H.F. RADIO

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NOTE . . . Combined theoretical/routeing diagrams for this installation are contained in A.P.101B-0417-10 (Servicing Diagrams Manual).

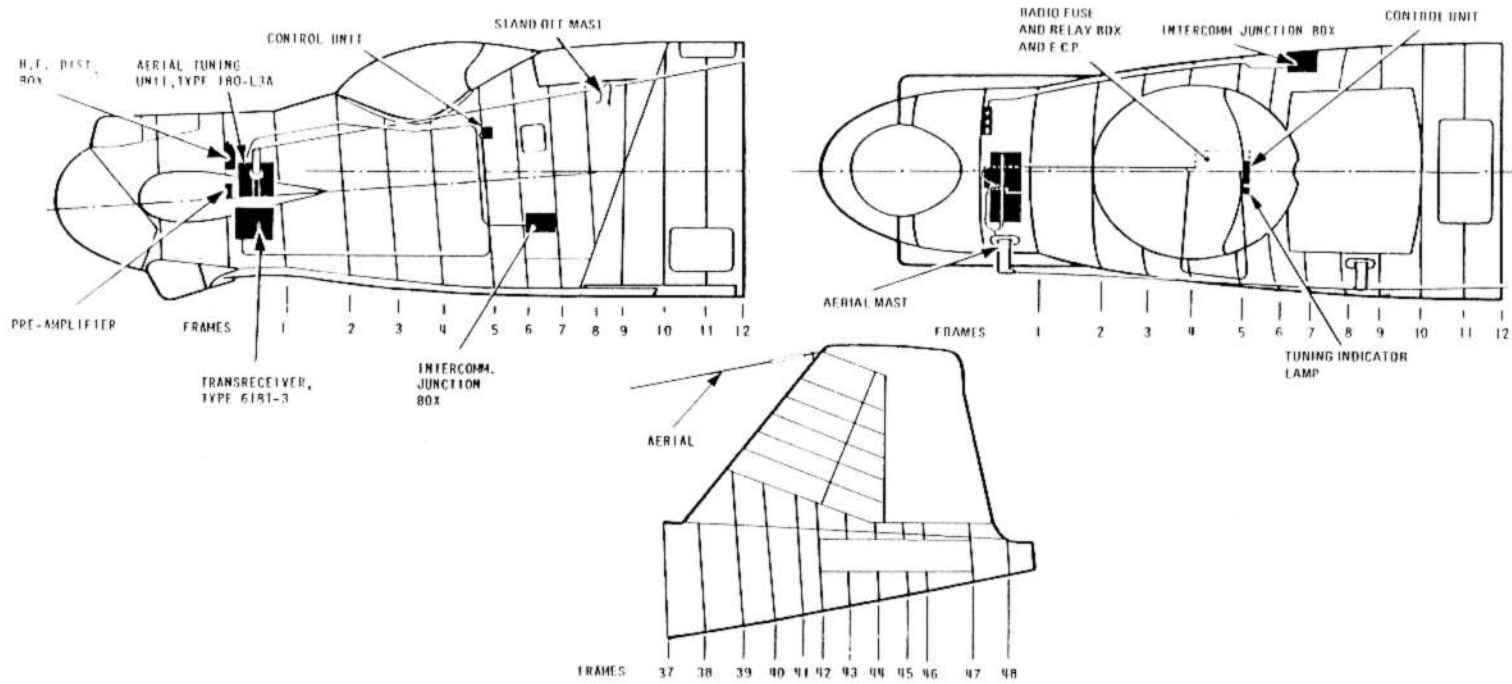


FIG. 1. H.F. RADIO A.R.I. 23090/2 INSTALLATION

DESCRIPTION

General

1. Communication in the H.F. (2 to 25 MHz) band is achieved by a Collins 618T-3 (A.R.I. 23090/2) installation. This provides amplitude-modulated radio-telephony communication on any one of 28,000 channels spaced 1 kHz apart using either a carrier-plus-upper-sideband mode, which is compatible with conventional A.M. communication, or a single-sideband (s.s.b.) suppressed-carrier mode, using the upper or the lower sideband. International standard practice is to use only the upper sideband for s.s.b. working. Detailed information on the equipment and the theory of s.s.b. operation is given in A.P. 116D-0102-1A.
2. The installation utilizes a Chelton long-wire aerial mounted on two stand-off insulating masts and terminating in a tension unit attached to the fin. Aerial tuning is achieved by a Type 180L-3A aerial tuning unit. Control of the operation and frequency selection is performed by a Type 714E-3 control unit.
3. Interconnections between the units of the installation are made via a distribution box mounted on the aft face of bulkhead B, to starboard of the aircraft centre line.

T/R unit

4. The T/R unit is a Collins transmitter/receiver 618T-3, also known as radio transmitter/receiver Type M15 (Ref. No. 10D/23518). It is mounted on a resilient mounting tray (Ref. No. 5340-99-945-1643) located on the port side of the aircraft, between frames 1 and B. The unit has a self-contained power supply unit which is fed from the 28V d.c. and 115V 400 Hz single-phase a.c. busbars. The output of the transmitter is 125W carrier power on A.M. and 400W p.e.p. (peak-envelope-power) on s.s.b. transmission. The T/R unit is also capable of c.w. and data transmission but these facilities are not used in this particular installation. Aerial connections are carried on the front panel of the unit; all the other connections are brought out through a 60-pole Cannon plug which mates with a 60-way socket fitted to the mounting tray.

Control unit

5. The control unit is a Collins Type 714E-3, also known as transmitter/receiver control Type M53 (Ref. No. 10L/16857). This unit contains

switches for the selection of mode and frequency of operation and an R.F. gain control. The frequency selected is indicated on a digital display on the front panel. The unit is located in the navigator's centre pedestal. The other two crew members may receive the H.F. communications by selecting H.F. on their station boxes or use transmission and reception, on a frequency set up by the navigator, by setting their TRANS & REC selector to H.F. Selecting H.F./U.H.F. provides simultaneous operation on both bands.

Pre-amplifier

6. A Type UA6002 microphone pre-amplifier, is mounted just above the junction box. It raises the level of the output of the intercomm. station box microphone amplifier to that required for the input to the modulator of the T/R unit.

Aerial

7. The aerial comprises a single length of wire which is mounted above the fuselage and extends from an aerial mast on the port side of the front fuselage to an anchorage on the leading edge of the fin, via an aerial tensioner unit. A stand-off aerial support mast ensures clearance between the aerial and canopy in the case of jettison. A spark gap is located adjacent to the base of the front aerial mast inside the fuselage. The purpose of the spark gap is to dissipate high radio frequency (R.F.) voltages and lightning strikes, thus preventing damage to the H.F. system.

Aerial tuning

8. Tuning of the aerial to match the output of the T/R unit is carried out automatically by a Type 180L-3A antenna tuner (also known as radio frequency tuner Type M5, Ref. No. 10D/23525). The tuner is mounted on a resilient mounting tray (Ref. No. 5340-99-945-1644) located above the T/R unit. All the connections to the unit are brought out on the front panel.

9. The tuner operates when a change of frequency has been selected on the control unit. The setting of the selector knobs starts the tuning cycle of the T/R unit which continues for 8 seconds. When the tuned transmitter is keyed, the output from the transmitter initiates the operation

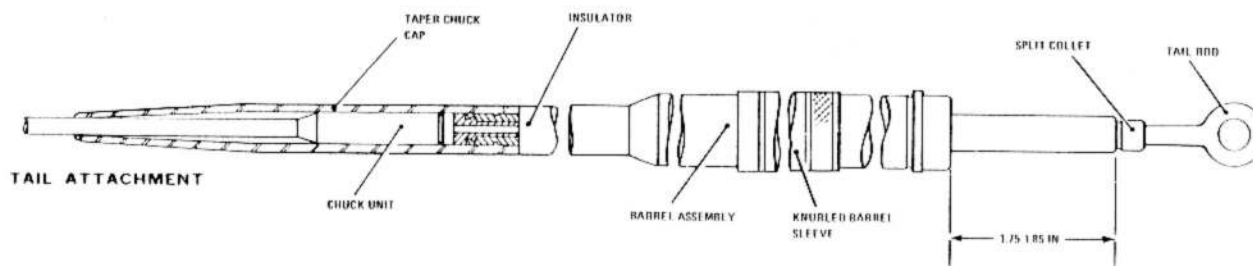
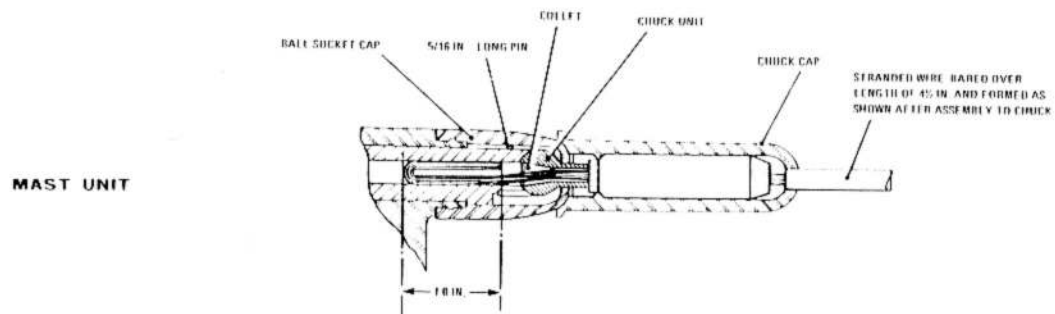


FIG. 2. H.F. AERIAL RENEWAL

of the servo-controlled aerial tuning circuits and these continue for 22 seconds until the tuning elements are correctly adjusted. The H.F. TUNING INDICATOR lamp is mounted on the navigator's control panel, to the left of the control unit. This lamp is normally extinguished, but while aerial tuning is in progress the lamp is lit.

Power supplies

10. The installation derives its 28V d.c. supply from busbar PP7 via fuses No. 169 and 219. The 115V a.c. supply originates at busbar 1XC and is fed via fuse No. 132 to busbar 1XC2 and thence via fuse No. 227 to the H.F. distribution box for distribution to the T/R and aerial tuning units.

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

11. Components and cables should be checked periodically for damage. General servicing is straightforward and the removal and assembly of equipment does not present undue difficulties. Servicing information is given in A.P. 116D-0102-1A.

Aerial renewal

12. Approximately 55 ft of Chelton aerial wire, Part No. 5503, is required.

(1) Assembly of aerial to mast (fig. 2)

(a) Strip 4½ in. of insulation from the aerial wire.

(b) Remove the chuck cap and ball socket cap from the mast unit and assemble on the wire.

(c) Lift the 5/16 in. long securing pin locking the chuck unit, and unscrew the chuck unit counterclockwise from the mast.

(d) Pass the stripped aerial wire through the chuck unit in the direction of the assembly to the full extent of 4½ in.; depress the collet arrangement if necessary to facilitate easier entry of bared aerial wire.

(e) Form the bared aerial wire back over a length of 1 in. and offer the chuck unit to the mast unit screwing clockwise until secure, ensuring that the slots on both mast and chuck units are aligned.

(f) Refit the 5/16 in. long securing pin locking the chuck unit to the mast unit.

(g) Fill the ball socket cap with silicone grease, XG-250; pass over the assembly and refit.

(h) Pass the aerial wire through the ferrule of the stand-off mast prior to assembling to fin anchorage at (2).

(2) Assembly of aerial to fin anchorage

(a) Press the collet against the end of the plunger to free the tail rod from the tension unit; withdraw the tail rod completely and attach it to the fin anchorage. Check that the rod is free to move in both planes.

(b) Replace the tail rod in the tension unit leaving 4 in. of serrations exposed.

(c) Remove the taper chuck cap and pass it over the aerial wire.

(d) Tension the wire and cut opposite the rear end of the chuck ensuring that the tension unit and wire are in line; strip the insulation for 1½ in.

(e) Remove the tension unit from the tail rod and insert the wire into the chuck unit as far as it will go.

(f) Offer the tension unit to the tail rod, thereby connecting the tension unit to the fin anchorage.

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(g) Slide back the knurled sleeve to expose the holes in the tension unit barrel and, by pressing the aerial wire down, insert a 5/16 diameter rod or screwdriver into the rear pair of holes in the barrel, thus locking the plunger in the extended position.

(h) Push the tension unit as far over the tail rod as possible and remove the locking pin to release the plunger. The total plunger

extension should now be between 1.75 in. and 1.85 in.

(j) Slide the knurled sleeve over the holes in the tension unit barrel.

(k) Fill the taper chuck cap with silicone grease, XG-250; pass over the assembly and refit, after ensuring that no wire slip has taken place at the chucks.

TABLE 1

Connectors

CONNECTOR H.F.1 EG7.82.187

TERMINATION	PIN	CABLE	PIN	TERMINATION
H.F. distribution box plug UK-AN 9000-32-6P H.F.1A	P	N8	HF1C	Ground plug H.F.1C
	A	N22	26	
	B	N22	9	
	C	N22	5	
	D	N22	10	
	E	N20	11	
	F	N22	7	
	G	N22	55	
	H	N22	22	
	I	N28	23	
	J	N22	8	
	K	N22	6	
	L	N20	56	
	M	N20	27	
	N	N20	16	
H.F. distribution box plug UK-AN 9000-28-21P H.F.1B	O	N20	4	Trans/receiver Cannon socket DPE-60-336 H.F.1
	S	N20	17	
	A	N20	3	
	B	N20	2	
	C	N20	1	
	D	N20	15	
	E	N20	14	
	F	N20	13	
	G	N16	12	
	H	N22	58	
	J	N22	57	
	K	N22	54	
	L	N22	18	
	M	N22	31	
	N	N22	30	
P	N22	25		
R	N22	59		
S	N22	24		
T	N22	38		

CONNECTOR H.F.1 EG7.82.187 - continued

TERMINATION	PIN	CABLE	PIN	TERMINATION
H.F. distribution box plug UK-AN 9000-28-21P H.F.1B	U	N22	39	Trans/receiver Cannon socket DPE-60-336 H.F.1
	V	N22	40	
	W	N22	41	
	X	N22	49	
	Z	N22	50	
	a	N22	51	
	b	N22	52	
	c	N22	45	
	d	N22	46	
	e	N22	47	
	f	N22	48	
	g	N22	32	
	h	N22	33	
	j	N22	34	
	k	N22	35	
m	N22	36		

CONNECTOR H.F.2 EG7.82.189

TERMINATION	CABLE	TERMINATION
Aerial tuning unit Type 180L-3A tail end H.F.2	Uniradio	Chelton aerial post crown end tag H.F.2

CONNECTOR H.F.3 EG7.82.191

TERMINATION	CABLE	TERMINATION
Spark gap H.F.3	N12	Chelton aerial post H.F.3

continued . . .

TABLE 1 Connectors - continued

CONNECTOR H.F.4 EG7.82.193

TERMINATION	PIN	CABLE	PIN	TERMINATION
Trans/receiver				Aerial tuning unit
Type 618T-3 plug	End A	Uniradio 67	End B	Type 180L-3A
Type 82.GB.553.2				plug Type 49195
H.F.4				(amphenol) H.F.4

CONNECTOR H.F.5 EG7.82.195

TERMINATION	PIN	CABLE	PIN	TERMINATION
Trans/receiver	End A	Uniradio 43	End B	Aerial tuning unit
Type 618T-3 H.F.5				Type 180L-3A
				H.F.5

CONNECTOR H.F.6 EG7.82.5327

TERMINATION	PIN	CABLE	PIN	TERMINATION
H.F. distribution box UK-AN 9000-32-7S socket assembly H.F.6	j	N22	E	Control unit 714E-3 connector pygmy Type PTO8SE H.F.6
	h	N22	D	
	g	N22	C	
	f	N22	B	
	e	N22	A	
	d	N22	N	
	c	N22	M	
	b	N22	L	
	a	N22	K	
	Z	N22	T	
	Y	N22	S	
	X	N22	R	
	W	N22	P	
	N	N22	J	
	M	N22	H	
	L	N22	G	
	K	N22	F	
	J	N22	i	
	I	N22	u	
	H	N22	V	
G	N22	Z		

CONNECTOR H.F.6 EG7.82.5327 - continued

TERMINATION	PIN	CABLE	PIN	TERMINATION
H.F. distribution box UK-AN 9000-32-7S socket assembly H.F.6	F	N22	P	Control unit 714E-3 connector pygmy Type PTO8SE H.F.6
	E	N22	q	
	D	N16	r	
	C	N22	d	
	B	N22	e	
	A	N16	m	

CONNECTOR H.F.7 EG7.82.591

TERMINATION	PIN	CABLE	PIN	TERMINATION
H.F. distribution box socket free UK-AN 9000-20-295 H.F.7	M	N22	10	Aerial tuning unit Type 180L-3A H.F.7
	L	N22	7	
	K	N22	12	
	J	N22	4	
	H	N20	8	
	G	N22	14	
	F	N20	13	
	E	N20	11	
	D	N22	2	
	C	N22	9	
	B	N22	3	
	A	N18	15	

CONNECTOR H.F.8 EG7.82.593

TERMINATION	CABLE	TERMINATION
H.F. distribution box UK-AN 9000-16-1P H.F.8	N22	Intercomm. J.B. socket H.F.8

CONNECTOR H.F.9 EG7.82.595

TERMINATION	PIN	CABLE	PIN	IDENT	TERMINATION
Pre-amplifier	Mic +	19/0076	A	Yellow	H.F. distribution box H.F.9
H.F.9	Mic -	19/0076	B	Green	
	Tel +	19/0076	C	Red	

continued ...

TABLE 1 Connectors - continued

CONNECTOR H.F.10 EG7.82.597					CONNECTOR H.F.11 EG7.82.2433				
TERMINATION	PIN	CABLE	PIN	TERMINATION	TERMINATION	PIN	CABLE	PIN	TERMINATION
H.F. distribution box plug H.F.10	A	N22	TL DC +	In line splice to H.F.11	In line splice to cable H.F.10	TL DC +	N22	1	Tuning light
	B	N22	LLL11	Termination block QR. tags Nav's panel H.F.10		E25	N22	B	

Chapter 4 U.H.F. RADIO (A.R.I. 23301)

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<i>Control units</i>	3		
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Note... Combined theoretical/routeing diagrams for this installation are contained in A.P. 101B-0417-10 (Servicing Diagrams Manual).

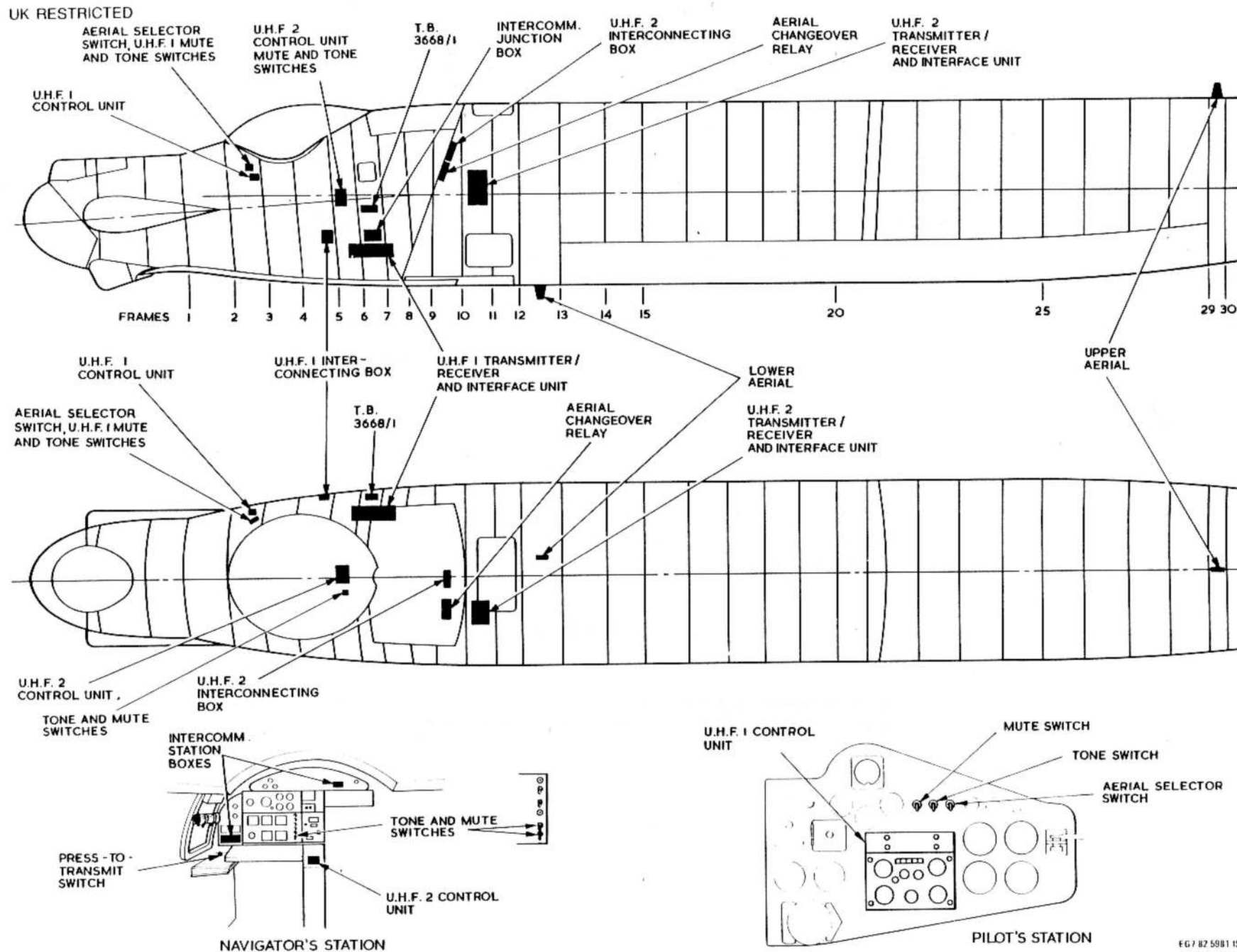


FIG. 1. LOCATION DIAGRAM - U.H.F. 1 AND U.H.F. 2 A.R.I. 23301

◀ ANNOTATIONS AMENDED ▶

DESCRIPTION**General**

1. Communications in the U.H.F. range are provided by two A.R.I. 23301 installations referred to as U.H.F.1 and U.H.F.2. The locations of the main items are shown in fig. 1. Connector and cable assembly details are given in Table 2.

Transmitter/receiver units

2. Two transmitter/receiver units, Type PTR1751WW are fitted in the aircraft. The U.H.F.1 unit is mounted on a tray located beneath the floor at the A.E.O.'s station and is supplied with 28-volts d.c. derived from busbar PP7 via fuse 218 in the E.C.P. The U.H.F.2 unit is mounted on a tray located in the upper equipment compartment and is supplied with 28-volts d.c. derived from busbar P10 via fuse 13 on the M.E.P. Provision is made for the automatic or manual selection of frequencies within the range 220 MHz to 399.95 MHz. Using automatic selection 16 preset frequencies, plus the guard frequency are available. Using manual selection 3500 frequency channels spaced 50 KHz apart or 7000 frequency channels spaced 25 KHz apart are available.

Control units

3. Two Type PV1754W control units are fitted in the aircraft, U.H.F.1 on the pilot's miscellaneous instrument panel and the U.H.F.2 above the E.C.P. to the right of the navigator's table. The U.H.F.1 PRESS-TO-MUTE and TONE switches, together with the UHF 1 LOWER UHF 2 UPPER/UHF 1 UPPER UHF 2 LOWER aerial changeover switch are situated above the U.H.F.1 control unit, also on the miscellaneous instrument panel. The MUTE and TONE switches for the U.H.F.2 system are located on the navigator's control panel — starboard.

4. Each control unit provides the following facilities:-

- (1) Selection of any one of 16 pre-set channels is effected by a rotary switch identified 1 to 16.
- (2) Manual frequency selection is effected by two rotary switches, the left-hand switch controlling 100, 10 and 1 MHz selections and the right-hand switch controlling 100 and 25 KHz selections enabling any one of 3500 manually-selected frequencies to be set.
- (3) A digital display shows the frequency set in (2) above.

(4) A function switch identified OFF/TR/TR+G/TR+H/TR+G+H controls power to the associated installation. The switch has five positions as follows:-

- (a) OFF - power supplies disconnected.
- (b) TR - power applied for normal transmitter/receiver operation.
- (c) TR+G - power applied for normal transmitter/receiver operation and to its guard receiver.
- (d) TR+H and TR+G+H provide similar facilities to (b) and (c) and to homing equipment - not used in this installation.

(5) A mode switch identified Gu/Gv/P/M determines the mode of operation of the installation; when set to Gu, operation is at the guard frequency while at P and M, the installation operates at the pre-set and manually-selected frequencies respectively. Gv is not used in this installation.

(6) A SET CHANNEL button inserts the manually-selected frequency into the selected pre-set channel. The button can only be operated when rotated against spring tension.

(7) A TEST button controls the built-in test facility to check transmitter/receiver and display serviceability; with the button operated, the display shows the first five digits of the frequency set by the mode switch at P or Gu. With the mode switch set to M, the display shows 888.88.

(8) VOL and DIM controls adjust the volume of the transmitter/receiver audio output and the display intensity respectively. Panel lighting is controlled by dimmer switches at the crew's stations.

System facilities are available to crew members by making the appropriate selection on their intercomm. station boxes.

Interface units

5. An interface unit is fitted on each of the transmitter/receiver moun-

ting trays. Their purpose is to match the transmitter/receiver operating parameters with those of the intercomm. installation.

Interconnecting boxes

6. Two Type 5821-99-932-6361 interconnecting boxes are fitted in the aircraft. The U.H.F. 1 box is mounted on a bracket on the starboard side of the cabin between frames 4 and 5. The U.H.F. 2 box is mounted at the rear of the pressure bulkhead in the upper equipment compartment. The boxes carry six multi-pole connectors which provide electrical connections to the various units and a test socket while a muting plug is connected to a seventh connector.

Aerials

7. Two Type 5985-99-911-8266 aerials are fitted to the aircraft; the upper aerial is mounted on the centre line of the upper fuselage between frames 29 and 30 and the lower aerial is mounted on the underside of the fuselage between frames 12 and 13 slightly to starboard of the centre line. Selection of the required aerial is made by UHF 1 LOWER UHF 2 UPPER/UHF 1 UPPER UHF 2 LOWER switch mounted on the pilot's miscellaneous instrument panel. Operation of the switch controls an assembly of four aerial change-over relays. The aerial change-over relay is mounted at the rear of the pressure bulkhead on the port side.

Intercomm. station boxes

8. Each intercomm. station box is modified to bring the Tacan and A.D.F. facilities together in one receive selector button. Individual audio outputs are controlled by the respective gain controls on the Tacan and A.D.F. control units. The intercomm. station box selector button varies both Tacan and A.D.F. audio outputs together. The U.H.F. 2 facility is controlled by the spare push button and the rotary transmit/receive switch has a U.H.F. 2 position.

Radio Relay Link

9. The Intercomm. system (Sect. 8, Chap. 1, Supplement) and the A.R.I. 23362/0 comms. jammer system (Sect. 9, Chap. 4, Supplement) can be used together as a radio relay link. The link is usually made bet-

ween one transmitting source and another receiving source normally outside the transmission distance. With U.H.F. 2 selected and the A.E.O.'s COMM. JAM switch set to U.H.F. 2 the signals received by the U.H.F. 2 are re-transmitted (on a different frequency) by the comms. jammer system.

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

10. All components and cables should be checked periodically for damage. General servicing of the equipment is self-evident and detailed servicing information including test equipment will be found in A.P. 116D-0154-1.

REMOVAL AND ASSEMBLY

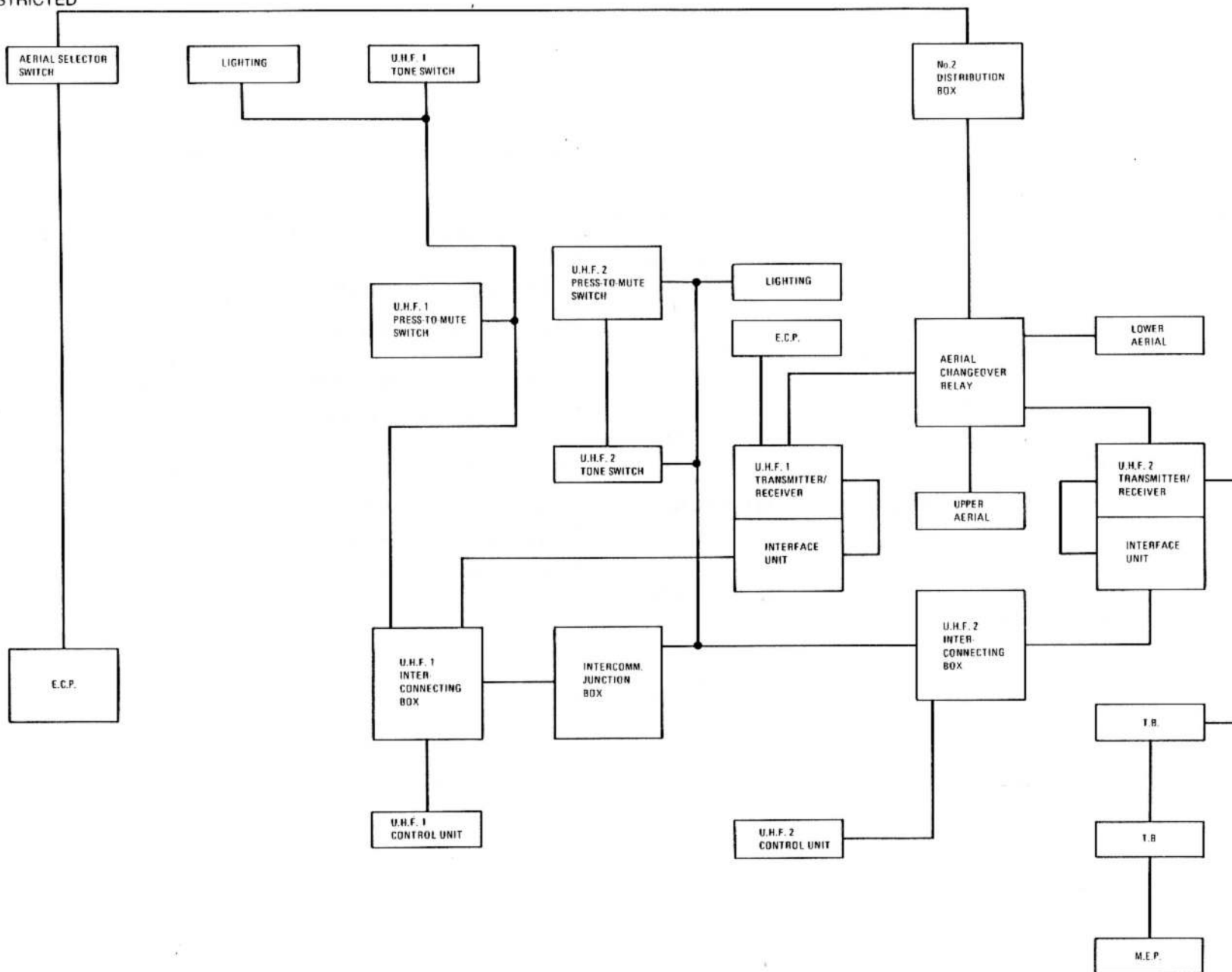
Transmitter/receiver units

11. The U.H.F. 1 transmitter/receiver on its mounting tray is located beneath the floor just forward of the A.E.O.'s station. To gain access to the unit it is necessary to remove the floor panel. The removal and assembly of the unit is then self-evident. The U.H.F. 2 transmitter/receiver on its mounting tray is located in the upper equipment compartment. The removal and assembly of the unit is self-evident.

Interface units

12. The interface units contain links and preset controls which must be set up to suit the Canberra T Mk. 17 installation as detailed in A.P. 116D-0154-1 prior to fitment of a replacement unit.

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FIG. 2. U.H.F. 1 AND U.H.F. 2,(A.R.I. 23301) INSTALLATION - BLOCK DIAGRAM.

◀ SYSTEM AMENDED ▶
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TABLE 1

Equipment details

Equipment	Type	Ref. No.	Location	A.P. Reference	
◀ Transmitter/receiver U.H.F.1	PTR1751WW	5821-99-7667945	A.E.O.'s station, below floor	A.P.116D-0154-1B	
Transmitter/receiver U.H.F.2			Upper equipment compartment		
Interface unit U.H.F.1	PV1746BB	5821-99-7683993	A.E.O.'s station, below floor		
Interface unit U.H.F.2			Upper equipment compartment		
Control unit U.H.F.1	PV1754W	5821-99-6598964	Miscellaneous instrument panel		
Control unit U.H.F.2			Aft face of E.C.P.		
Mounting tray (2 off)	PV1748B	5821-99-6499755	A.E.O.'s station, below floor		
			Upper equipment compartment		
Interconnecting box U.H.F.1		5821-99-9326361	Stbd. fuselage between frames 4 and 5		A.P.116D-0105-1
Interconnecting box U.H.F.2			Upper equipment compartment		
Upper aerial	16 - 1	5985-99-2222399	Upper fuselage between frames 29 and 30	A.P.116D-0133-1	
Lower aerial			Underside of fuselage between frames 12 and 13		

TABLE 2

Connector details

Cable Symbols:- Uniradio = U.R., Equipment wire = Q, Uninyvin = UN, Uninyvinmetsheath = UNMS, Miniature cable = Min.

CONNECTOR CS 5411/1

Termination	Pin	Cable	Ident	Pin	Termination
	A	Q3	1 White	A	
	B	Q3	2 White	B	
	C	Q2	3 White	C	
	D	Q2	4 White	D	
	E	Q2	5 White	E	
	F	Q2	6 White	F	
	H	Q2	7 White	H	
	J	Q2	8 White	J	
	K	Q2	9 White	K	
	L	Q2	10 White	L	
	M	Q25	11 Pink	M	
	N	Q25	12 Pink	N	
	P	Q2	13 White	P	
	R	Q25	14 Pink	R	
	S	Q25	15 Pink	S	
	T	Q2	16 White	T	
	U	Q2	17 White	U	
	V	Q2	18 White	V	
	W	Q2	19 White	W	
	X	Q25	20 Pink	X	
	Y	Q25	21 Pink	Y	
	Z	Q25	22 Pink	Z	
	a	Q2	23 Pink	a	
	b	Q2	24 Pink	b	
	c	Q2	25 Pink	c	
	d	Q2	26 Pink	d	
	e	Q2	27 Pink	e	
	f	Q2	28 Pink	f	
	g	Q2	29 Pink	g	
	h	Q2	30 Pink	h	
	i	Q2	31 Pink	i	

No.2 interface unit

U.H.F.2 Interconnecting box (TR unit)

CONNECTOR CS 5411/1 - continued

Termination	Pin	Cable	Ident	Pin	Termination
	j	Q2	32 Pink	j	
	k	Q2	33 Pink	k	
	m	Q2	34 Pink	m	
	n	Q2	35 Pink	n	
	p	Q2	36 Pink	p	
	q	Q2	37 Pink	q	
	r	Q2	38 Pink	r	
	s	Q2	39 Pink	s	
	t	Q2	40 Pink	t	
	u	Q2	41 Pink	u	
	w	Q2	42 Pink	w	

No.2 interface unit

U.H.F.2 Interconnecting box (TR unit)

CONNECTOR CS 5411/3

Termination	Pin	Cable	Ident	Pin	Termination
	a	Q2		a	
	b	Q2		b	
	c	Q2		c	
	d	Q2		d	
	e	Q2		e	

Wire capital idents pin to pin

Pressure bulkhead U.H.F.2/1

U.H.F.2 Control unit

continued . . .

TABLE 2 Connector details - continued

CONNECTOR CS 5411/3 - continued

Termination	Pin	Cable	Ident	Pin	Termination
Pressure bulkhead U.H.F.2/1	f	Q2		g	U.H.F.2 Control unit
	g	Q2		h	
	h	Q2		i	

CONNECTOR UHF 2/2 - continued

Termination	Pin	Cable	Pin	Termination
Pressure bulkhead U.H.F.2/2	H	UN20	Term 1	Mute switch } U.H.F. 2/2C Tone switch } TAG, T.B. Nav's coaming panel } U.H.F.2/2B
	J	UN20	Term 2	
	K	UN20	T.B. LL 73	

CONNECTOR CS 5411/5

Termination	Pin	Cable	Ident	Pin	Termination
U.H.F.2 Interconnecting box (control unit)	a	Q3		a	Pressure bulkhead U.H.F.2/1
	b	Q3		b	
	c	Q3		c	
	d	Q3		d	
	f	Q3		e	
	g	Q3		f	
	h	Q3		g	
	i	Q3		h	

CONNECTOR CS 5411/9

Termination	Pin	Cable	Pin	Termination
Intercomm. junction box PL10 (orange/red)	A	UN20	Term 3	T.B. 3668/1
	B	UN20	Term 4	
	C	not used		

CONNECTOR 5411/10

Termination	Pin	Cable	Pin	Termination
U.H.F.2 Transmitter/receiver		U.R.67		Aerial change-over relay SKT D

CONNECTOR UHF 2/2 EG7-82-5547

Termination	Pin	Cable	Ident	Pin	Termination
Pressure bulkhead U.H.F.2/2	A	UN20		A	No. 1 Distribution box, plug 1 U.H.F.2/2A
	B	UN20		B	
	C	UNMS		C	
	D	UNMS		D	
	E	UN20		E	Earth ring
	F	Braid of C			
	G	Braid of D			

CONNECTOR 5411/11

Termination	Pin	Cable	Pin	Termination
Pressure bulkhead U.H.F.2/2	A	UN20	A	U.H.F.2 Interconnecting box (mic/tel) B1
	B	UN20	B	
	C	UNMS	D	
	D	UNMS	C	Interconnecting box (mic/tel) U.H.F.2
	E	UN20	E	
	F	Braid	Shell	
	G	Braid	Shell	Interconnecting box (PL & tone) B2
	H	UN20	F	
	J	UN20	C	
	K	UN20	A	



TABLE 2 Connector details - continued

CONNECTOR U.H.F.4 EG7.82.117 - continued

Termination	Pin	Cable	Ident	Pin	Termination
No. 1 interface unit	q	DEF 12B-2	White	q	U.H.F.1 Interconnecting box plug (T.R. unit)
	r	DEF 12B-2	White	r	
	s	DEF 12B-2	White	s	
	t	DEF 12B-2	White	t	
	u	DEF 12B-2	White	u	
	w	DEF 12B-2	White	w	

CONNECTOR U.H.F.6 EG7.82.605

Termination	Cable	Termination
Aerial change-over relay U.H.F.6	Uniradio 67	Lower aerial plug UKN2 U.H.F.6

CONNECTOR U.H.F.7 EG7.82.603

Termination	Cable	Termination
Aerial change-over relay U.H.F.7	Uniradio 67	Upper aerial plug UKN2 U.H.F.7

CONNECTOR U.H.F.9 EG7.82.5965

Termination	Ident	Cable	Ident	Termination
T.B., U.H.F. equipment panel U.H.F.9	RR31		RR31	Fuse 251, U.H.F.9A
	EG		EG	
				U.H.F. equipment panel

CONNECTOR U.H.F.10 EG7.82.5967

Termination	Pin	Cable	Ident	Termination
No.2 U.H.F. transmitter/receiver, plug 2 U.H.F.10	A		RR31	2-way T.B., U.H.F. equipment panel U.H.F. 10A
	B		RR31	
	C		RR31	
	D		EG	
	E		EG	
	F		EG	

CONNECTOR U.H.F.12 EG7.82.5969

Termination	Pin	Cable	Ident	Termination
No.1 U.H.F. transmitter/receiver, plug 2 U.H.F.12	A		R6	Tags, E.C.P. (fuse 218) U.H.F.12A
	B		R6	
	C		R6	
	D		E25	Terminal strip, E.C.P. U.H.F.12A
	E		E25	
	F		E25	

CONNECTOR RT430 EG7.82.121

Termination	Pin	Cable	Pin	Termination
Terminal block miscellaneous instrument panel QR Tag RT 430	P-to-M		P-to-M	3-way T.B. on U.H.F. equipment panel QR Tag RT430
	P-to-M		P-to-M	
	NEG		NEG	

CONNECTOR RT431 EG7.82.5521

Termination	Pin	Cable	Pin	Termination
U.H.F.1 interconnecting box plug 6-way Mk. 7 RT 431A	A	N20	A	Intercomm. junction box UA6147/1 socket 3 RT 431
	B		B	
	C		C	
	D		D	
	E		E	
	F		N20	P-to-M

Note: For details of cables F25, N25, N427, N512 and 2F135 refer to Sect. 6, Chap. 11.

Chapter 5 V.O.R./I.L.S.

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NOTE. . . Combined theoretical/routeing diagrams for this installation are contained in A.P.101B-0417-10 (Servicing Diagrams Manual).

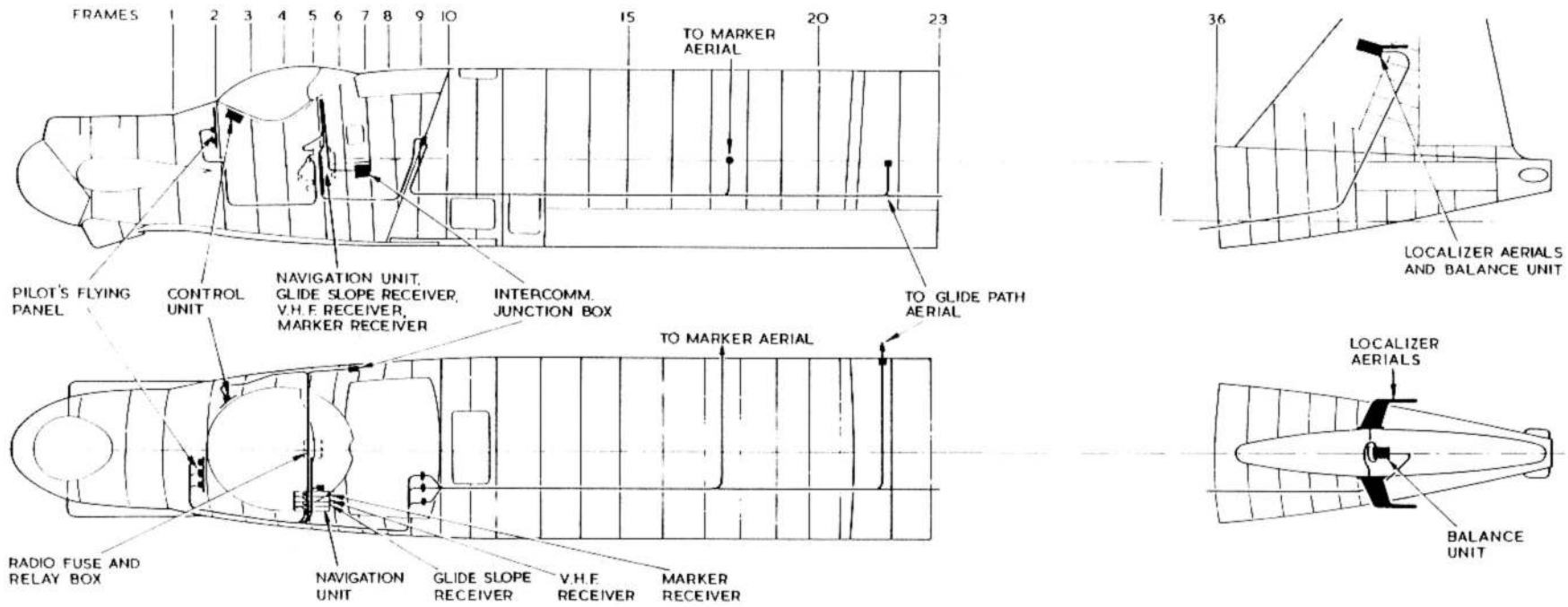


FIG. 1. V.O.R./I.L.S. A.R.I. 23118 INSTALLATION

FG787.85-10

DESCRIPTION**General**

1. A Marconi A.D. 260 V.O.R./I.L.S. installation (A.R.I. 23118) is fitted. This is a navigation and landing aid using a V.H.F. omni-range system and a V.H.F./U.H.F. instrument landing system. Details of the equipment and a description of the principles of V.O.R. and I.L.S. are given in A.P. 116B-0407-1.
2. The installation consists of a Type 6401-M V.H.F. receiver, a Type 6402-MA navigation unit, a Type 6404 ME glide slope receiver, a Type 7430-M control unit, a Type RL 7003-184B omni bearing selector and deviation indicator, a Type 6403 M marker receiver, and their associated aeriels. The V.H.F. and glide slope receivers and the navigation unit are mounted on a Type EJB-21B-1 backplate junction box, located under the navigator's table. The marker receiver is mounted on its Type EJB-21C backplate junction box, located adjacent to the other junction box.

V.H.F. receiver

3. The V.H.F. receiver's frequency range (from 108 to 135 MHz) covers the V.O.R., I.L.S. and V.H.F. communication channels. Tuning of the receiver is carried out by two automatic tuning mechanisms controlled by the control unit, which also makes the circuit changes in the navigation unit necessary for V.O.R. or I.L.S. operation.

Navigation unit

4. This unit receives navigational data from the V.H.F. receiver and processes it in different ways according to the mode of operation selected. In the V.O.R. mode, it receives compass data from the GM4B compass system (Sect.7, Chap.4, Supplement) and provides an output to the pilot's and navigator's radio magnetic indicators (R.M.I.). These give an indication of the magnetic bearing of the V.O.R. transmitter from the aircraft position and the bearing of the V.O.R. transmitter relative to the aircraft heading. In the I.L.S. mode the unit supplies an output to the deviation indicator to give left and right indications or to actuate the OFF flag when these indications become unreliable.

Glide slope receiver

5. The glide slope receiver is tuned to the channel appropriate to the I.L.S. channel selected on the control unit. The operational frequencies

lie between 329.15 MHz and 335 MHz with a channel spacing of 150 kHz. The output from this receiver drives the horizontal (high/low) pointer of the indicator and its associated flag.

Frequency selection

6. Selection of the frequency of operation of the V.O.R./I.L.S. installation is made on the Type 7430M control unit mounted on the pilot's starboard coaming panel directly beneath the V.H.F. communication control unit. These two control units are identified NAV. and COMM. respectively. The front panel of the control unit carries a combined volume control and on/off switch, and whole and fractional MHz selection switches. The frequency selected is indicated by a digital display.
7. Odd 100 kHz frequency channels in the range 108.1 to 111.9 MHz are allocated to I.L.S. localizer use. Each of these is 'paired' with a glide slope channel frequency. The even 100 kHz channels up to and including 111.8 MHz and all channels from 112 to 117.95 MHz are allocated for V.O.R. use.

Omni-bearing selector and indicator

8. The omni-bearing selector (O.B.S.) and an indicator is mounted on the flight instrument panel above the R.M.I. The instrument combines the functions of V.O.R. bearing selector and a crossed-pointer deviation indicator. The deviation indicator has a vertical pointer which gives deviation indications in the V.O.R. mode and left and right of localizer beam indications in the I.L.S. mode. The horizontal pointer gives indications of being high or low with respect to the glide slope beam in the I.L.S. mode. Flags are provided for both pointers to show when their indications are unreliable. A TO/FROM indicator is also incorporated; this gives an indication of the direction in which the aircraft is flying with respect to the V.O.R. transmitter whose bearing has been selected using the O.B.S. control knob and shown on the scale of the indicator. The R.M.I., which displays the bearing of the V.O.R. transmitter relative to the aircraft, is also used for a similar purpose in the radio compass system.

Marker receiver

9. The marker receiver operates on a fixed frequency of 75 MHz and receives signals from ground marker beacons. The power supply is controlled by an ON/OFF switch mounted on the pilot's starboard coaming

panel, just outboard of the V.H.F. COMM. control unit.

Marker indications

10. Three coloured lights flash when the aircraft passes over the marker beacons. These are situated on the pilot's flying panel, adjacent to the O.B.S. The blue light indicates the outer marker, the amber the middle and the white indicates airways marker or the inner marker if still installed. The sensitivity of the marker receiver may be varied by the operation of a switch adjacent to the three lights, annotated SENS. SWITCH HIGH/LOW. Audible signals from the marker beacons may be heard by selecting MARKER on the crew's intercomm. station boxes.

Aerials

11. Three separate aerials are required for the V.O.R./I.L.S. system. The V.O.R. and I.L.S. localizer signals are received by a pair of Type 140-LRU-A99A V.H.F. aerials, mounted one on each side of the fin. The signals received by these are combined in a Type 133-LRU-14A balance unit, located in the fin and then passed via the backplate junction box to the receiver. A circular area on each side of the fin, centred on the aerial base, is covered in copper gauze bonded to the fin structure to provide a ground plane. These areas are connected to the metal leading edge and the base of the fin by sprayed zinc strips. A removable panel is located to the rear of the port aerial to give access to the aerial connectors and the balance unit.

12. Marker signals are received by a Type 237 marker aerial mounted just outboard of the starboard wheel well. The aerial is tuned to resonate at 75 MHz and provision is made for access to use a trimming tool, Ref. No. 10C/749, for this purpose.

13. The glide slope aerial is a Type 238 suppressed aerial mounted in the leading edge of the starboard main plane, between ribs 6B and 7A.

Power supplies

14. The 28V d.c. supplies required for the operation of the V.O.R., I.L.S. and marker receivers is derived from busbar PP7 via fuse No. 167. The supply to the marker receiver is controlled by the ON/OFF switch on the pilot's starboard coaming panel. The supplies to the junction box for the V.H.F. and glide slope receivers and the navigation unit are switched by a relay in the E.C.P. This relay is controlled by the

on/off switch of the VOL. control on the NAV. control unit. One of the contacts on this relay switches the 26V 400 Hz a.c. supply for the synchros in the R.M.I.'s (*Sect. 6, Chap. 4 and 11*). A test socket for the 28V d.c. supply is located adjacent to the forward upper corner of the cabin entrance door. This socket is energized when the relay contacts are closed (*Sect. 6, Chap. 11*). This socket also serves as a power source for the V.O.R./I.L.S. test equipment.

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

15. Components and cables should be checked periodically for damage. General servicing is straightforward and the removal and assembly of equipment should not present undue difficulties. Servicing information on the equipment is contained in A.P. 116B-0407-1. 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 fibreglass base has been pitted and damaged, then the aerial cover must be wholly replaced.

Interconnecting box, Type M7A

16. The following modification must be carried out before installing a new I/C box of this type. At the resistor card inside the box:-

- (1) Fit and solder a 1 k-ohm resistor Ref. No. 5905-99-012-8491 at positions R1 and R4.
- (2) Fit and solder a 200-ohm resistor Ref. No. 5905-99-012-8474 at position R2.
- (3) Fit and solder a 240-ohm resistor Ref. No. 5905-99-012-8476 at position R3.

(4) Label the box in a similar manner to the unserviceable item.

Interconnecting box, Type M8

17. The following modification must be carried out before installing a new I/C box of this type. At the tag board inside the box:-

(1) Fit and solder a 33-ohm resistor at positions R1, R2 and R3.

(2) Label the box in a similar manner to the unserviceable item.

TABLE 1 Connectors - continued

CONNECTOR V.O.R./I.L.S. No. 4 EG7.82.1439

TERMINATION	PIN	CABLE	PIN	TERMINATION
Radio fuse and relay box UK-AN plug V.O.R./I.L.S.4	H	N20	1	Radio magnetic indicator (pilot's) Cannon plug V.O.R./I.L.S. 4A
	A	NMS20	2	
	C	NMS20	3	
	G	N20	4	
	B	NMS20	5	Radio magnetic indicator (pilot's) Cannon plug V.O.R./I.L.S. 4B
	J	N20	1	
	D	NMS20	2	
	F	NMS20	3	
	K	N20	4	
	E	NMS20	5	
	L	N20	6	

CONNECTOR V.O.R./I.L.S. No. 5 EG7.82.5513 - continued

TERMINATION	PIN	CABLE	PIN	TERMINATION
Backplate junction box EJB-21B-1 Cannon plug socket 2 V.O.R./I.L.S.5	38	N20	38	Navigation control unit Type 7430M Cannon socket V.O.R./I.L.S. 5A
	39	N20	39	
	41	N20	41	
	42	N20	42	
	43	N20	43	
	44	N20		
	47			
	48	N20	48	
	49	N20	49	

CONNECTOR V.O.R./I.L.S. No. 5 EG7.82.5513

TERMINATION	PIN	CABLE	PIN	TERMINATION
Backplate junction box EJB-21B-1 Cannon plug socket 2 V.O.R./I.L.S.5	1	N20	1	Navigation control unit Type 7430M Cannon socket V.O.R./I.L.S. 5A
	2	N20	2	
	3	N20	3	
	4	N20	4	
	5	N20	5	
	6	N20	6	
	7	N20	7	
	8	N20	8	
	10	N20	10	
	11	N20	11	
	12	N20	12	
	14	N20	14	
	15	N20	15	
	27	N20	27	
	28	N20	28	
	29	N20	29	
	33	N20	33	
34	N20	34		
35	N20	35		
36	N20	36		
37	N20	37		

CONNECTOR V.O.R./I.L.S. No. 6 EG7.82.5515

TERMINATION	PIN	CABLE	PIN	TERMINATION
Backplate junction box EJB-21B-1 Cannon socket 1 V.O.R./I.L.S.6	B	NMS20	A	Intercomm. distribution box UA6147/1 Plug 11 V.O.R./I.L.S.6
	C	NMS20	B	

CONNECTOR V.O.R./I.L.S. No. 8 EG7.82.1447

TERMINATION	PIN	CABLE	PIN	TERMINATION
Marker backplate junction box Type EJB-21C Cannon plug socket 2 V.O.R./I.L.S.8	A	N20	Com	Pilot's flying panel quick-release tags V.O.R./I.L.S.8
	B	N20	BL-L	
	C	N20	AM-L	
	D	N20	WH-L	
	E	NMS20	MED	
	F	NMS20	SEN-E	
	H	N20	E25	
	J	NMS20	SEN-HI	
	K	N20	TEST	

continued . . .

TABLE 1 Connectors - *continued*

CONNECTOR V.O.R./I.L.S. No. 9 EG7.82.1449			CONNECTOR V.O.R./I.L.S. No. 11A EG7.82.895		
TERMINATION	CABLE	TERMINATION	TERMINATION	CABLE	TERMINATION
Backplate junction box Type EJB-21B-1 Cannon plug socket 7 V.O.R./I.L.S.9	coaxial	Pressure bulkhead free socket V.O.R./I.L.S.9	Pressure bulkhead free socket V.O.R./I.L.S. 11A	coaxial	Frame 29 bulkhead free socket V.O.R./I.L.S. 11A
CONNECTOR V.O.R./I.L.S. No. 9A EG7.82.900			CONNECTOR V.O.R./I.L.S. 11B EG7.82.896		
TERMINATION	CABLE	TERMINATION	TERMINATION	CABLE	TERMINATION
Pressure bulkhead free socket V.O.R./I.L.S. 9A	coaxial	Starboard wing free socket V.O.R./I.L.S. 9A	Frame 29 bulkhead free socket V.O.R./I.L.S. 11B	coaxial	Balance unit Type 133-LRU-14A V.O.R./I.L.S. 11B
CONNECTOR V.O.R./I.L.S. No. 10 EG7.82.1451			CONNECTOR V.O.R./I.L.S. No. 11C EG7.82.897		
TERMINATION	CABLE	TERMINATION	TERMINATION	CABLE	TERMINATION
Marker backplate junction box Type EJB-21C Cannon plug V.O.R./I.L.S. 10	coaxial	Pressure bulkhead free socket V.O.R./I.L.S. 10	Balance unit Type 133-LRU-14A free socket V.O.R./I.L.S. 11C	coaxial	Localizer aerials free socket V.O.R./I.L.S. 11C
CONNECTOR V.O.R./I.L.S. No. 10A EG7.82.899			CONNECTOR V.O.R./I.L.S. No. 15 EG7.82.901		
TERMINATION	CABLE	TERMINATION	TERMINATION	CABLE	TERMINATION
Pressure bulkhead free socket V.O.R./I.L.S. 10A	coaxial	Marker aerial free socket V.O.R./I.L.S. 10A	Inner starboard wing rib 6 free socket V.O.R./I.L.S.15	coaxial	Starboard wing root free socket V.O.R./I.L.S.15
CONNECTOR V.O.R./I.L.S. No. 11 EG7.82.1453			CONNECTOR V.O.R./I.L.S. No. 16 EG7.82.902		
TERMINATION	CABLE	TERMINATION	TERMINATION	CABLE	TERMINATION
Backplate junction box Type EJB-21B-1 straight plug socket 6 V.O.R./I.L.S.11	coaxial	Pressure bulkhead free socket V.O.R./I.L.S.11	Outer starboard wing rib 2 free socket V.O.R./I.L.S.16	coaxial	Inner starboard wing rib 6 free socket V.O.R./I.L.S.16

continued . . .

TABLE 1 Connectors - continued

CONNECTOR V.O.R./I.L.S. No. 17 EG7.82.903		
TERMINATION	CABLE	TERMINATION
Glide path aerial Type		Outer starboard wing rib
238 free socket	coaxial	2 free socket
V.O.R./I.L.S.17		V.O.R./I.L.S.17

Chapter 6 RADIO COMPASS

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NOTE. . . Combined theoretical/routeing diagrams for this installation are contained in A.P. 101B-0417-10 (Servicing Diagrams Manual).

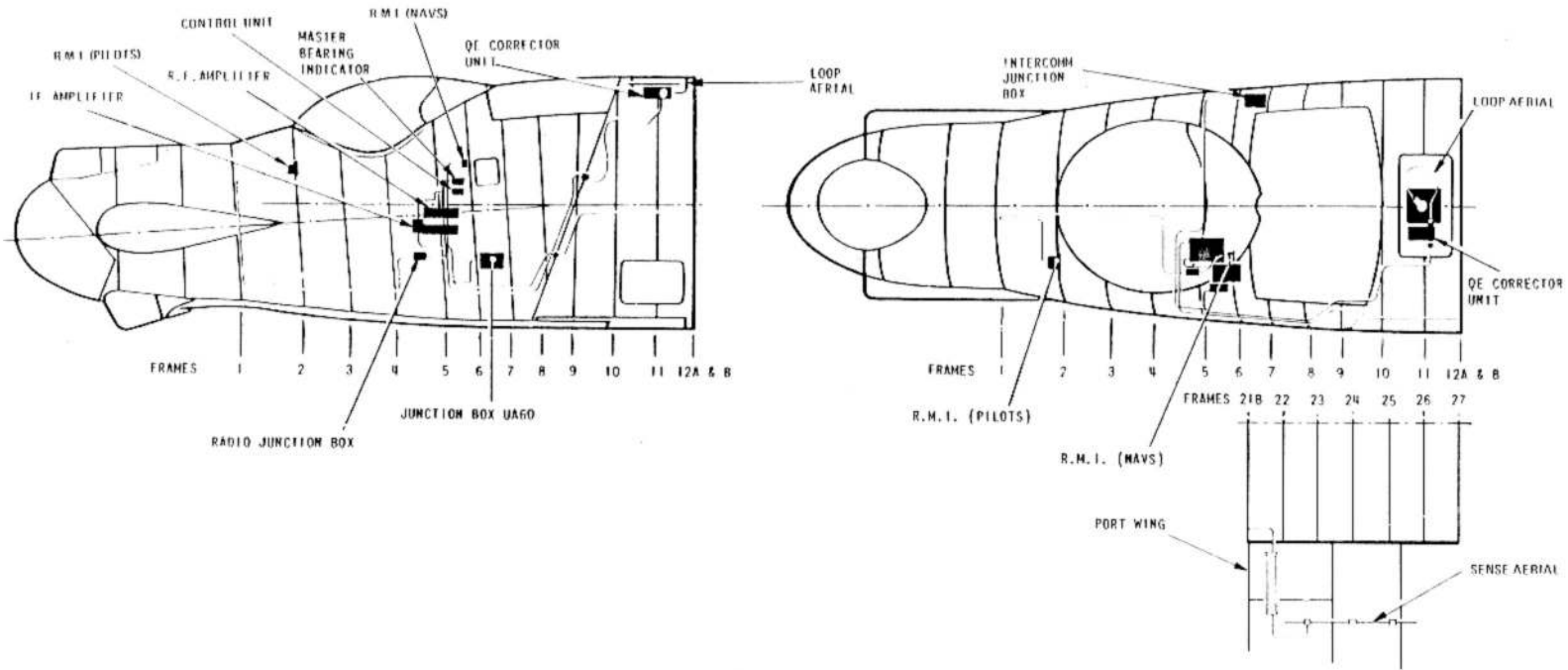


FIG. 1. RADIO COMPASS A.R.I. 5877 INSTALLATION

DESCRIPTION

General

1. A Marconi Type AD722 sub-miniature radio compass (A.R.I. 5877) is fitted to the aircraft. The installation is also known as Automatic Direction Finding (ADF) and is identified thus on the intercomm. station boxes. The system is a navigational aid which gives an indication of the bearing of a radio transmitter to whose frequency the receiver is tuned. The receiver operates on frequencies in the range from 200 kHz to 1700 kHz.

2. The installation comprises a Type A8281 R.F. amplifier, a Type A8282 I.F. amplifier, a Type 8283 control unit, a loop aerial, a sense aerial and three indicator units. Detailed information on the equipment is given in A.P. 116B-0102-16.

R.F. amplifier

3. The R.F. amplifier is located on a Type 8288 mounting tray, fitted on a bridge over the I.F. amplifier, under the navigator's table. The amplifier contains the R.F. circuits and balanced modulator sections of the receiver. Tuning of the receiver is effected by a flexible cable drive from the control unit which transmits the operation of the tuning handle on the control unit to the permeability-tuning system in the R.F. amplifier. Changes of frequency band are made by a motor-driven switch which is controlled by the selector switch in the control unit. The connecting cables and the flexible drive are terminated on the mounting tray and connect to the amplifier when it is installed on the tray by two mating plugs and sockets and a drive coupling.

I.F. amplifier

4. The I.F. amplifier is located on a Type 8289 mounting tray, fitted on a shelf under the navigator's table, inboard of the V.O.R./I.L.S. receivers. The amplifier contains the I.F. amplifier stages, detector and A.F. amplifier and output stages. Connections to the unit are made via the mounting in a similar manner to that on the R.F. amplifier, using a single plug and socket. An additional socket, normally fitted with a blanking plug, is provided for the connection of test equipment to the installation.

Control unit

5. The control unit is located at the navigator's lower panel assembly, above the navigator's table. Tuning of the receiver is achieved by turning the cranked handle below the tuning scale; this is coupled to a flexible drive cable which is connected via the mounting tray to the R.F. amplifier to actuate its permeability-tuning mechanism. The frequency bands of 200 to 415 kHz, 415 to 840 kHz and 840 to 1700 kHz are selected by operation of a switch lever which projects through the panel above the tuning scale. When the lever is operated, the appropriate scale is displayed (calibrated in decimals of MHz) and the band-selector switch in the R.F. amplifier set as required.

6. The GAIN control operates on the A.F. output from the detector in the I.F. amplifier before it is introduced to the A.F. output stage. In operation, the ADF volume controls on the station boxes should be set to their maximum positions and the volume of the output adjusted, as required, by means of the GAIN control. The TUNE meter is incorporated to give an indication of signal strength; the tuning control is adjusted to give maximum deflection of the needle. When the ADF/REC switch is set to ADF, the receiver will function as an automatic direction finding equipment. When REC is selected, the equipment functions as a conventional receiver and no bearing information is displayed. The C.W./R.T. switch selects reception of keyed C.W. signals or telephony signals.

7. The tuning scale and panel engravings are illuminated by a single lamp situated below the tuning scale window. Control of the intensity of illumination is effected by the setting of a push-button annotated DIM PUSH. A spare lamp is provided and housed in a holder marked SPARE.

Aerials

8. Two aerials are fitted as part of the installation. A Type 8280 loop aerial is housed in the access hatch of the upper equipment compartment. It is a fixed crossed-coil loop aerial, wound on a ferrite core and enclosed in an insulating case. Connections to the ends and commoned centre-tap of the loops are brought out via a six-pole plug in the centre of the case.

9. The sense aerial is located on the upper surface of the port main plane between the fuselage and the engine. The aerial is a rod mounted parallel

to the longitudinal axis of the aircraft on three fibreglass insulators. Connection to the aerial is fed through the forward insulator.

Q.E. correction

10. Correction of quadrantal errors (Q.E.), i.e. errors in the polar response of the loop aerial due to circulating R.F. currents in the aircraft structure, is made by the use of a Q.E. corrector unit (Ref. No. 10D/20169). This is mounted adjacent to the loop aerial in the access hatch. It consists of a preset balanced-L inductive attenuator which is inserted in the leads from one of the aerial loops. **The connector between the Q.E. corrector unit and the master bearing indicator must not be reduced in length under any circumstances.**

Indicators

11. Three indicators are included in the system. A Type 9551 electrical indicator and a Smiths Type 21 RNA/CP/1 radio magnetic indicator, (R.M.I.) (Ref. No. 6A/18460) are located at the navigator's lower panel assembly and the navigator's instrument panel respectively. A similar R.M.I. is fitted at the bottom lefthand of the pilot's flight instrument panel, below the omni-bearing selector.

12. The Type 9551 indicator operates as the master bearing indicator. It displays the bearing of the radio transmitter relative to the aircraft heading. This bearing information is relayed to the R.M.I.'s by means of a synchro transmission system.

13. The R.M.I. has two pointers which move over the face of a rotating compass card. The compass card is driven by an integral servo system which is supplied with information from the G4B compass system (*Sect.*

7, Chap. 4) and gives an indication of the magnetic heading of the aircraft against a fixed lubber mark at the top of the bezel. The magnetic bearing of the transmitter to which the radio compass is tuned is indicated by a red single-bar pointer. The bearing of a V.O.R. transmitter is shown by a green two-bar pointer. Magnetic bearings of these transmitters are indicated with respect to the compass card; relative bearings are shown by the relationship of the pointers to the lubber mark.

Power supplies

14. The 28V d.c. power supply required for radio compass is obtained from busbar PP8 in the E.C.P. via fuse No. 175. The supply is controlled by the ON/OFF switch on the control unit. The 26V 400 Hz a.c. supply for operation of the indicators' synchro systems is obtained from a transformer in the radio fuse and relay box (*Sect. 6, Chap. 4 and 11*).

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

15. Components and cables should be checked periodically for damage. General servicing is straightforward and the removal and assembly of equipment should not present undue difficulties. Detailed servicing of individual units is contained in A.P. 116B-0102-16.

TABLE 1

Connectors

CONNECTOR Q.A. EG7.82.429				
Termination	Pin	Cable	Pin	Termination
Q.E. corrector unit plug Q.A.	1	RPC1533	1	Aerial loop socket Q.A.
	2	RPC1533	2	
	4	RPC1533	4	
	5	RPC1533	5	

Pin 3 is connected to screening of pins 1 and 2. Pin 6 is connected to screening of pins 5 and 4.

CONNECTOR Q.B. EG7.82.431				
Termination	Pin	Cable	Pin	Termination
Pressure bulkhead plug Q.B.	A	RPC1533	1	Q.E. corrector unit socket Q.B.
	B	RPC1533	2	
	D	RPC1533	4	
	E	RPC1533	5	

Pin C is connected to screening of pins A and B. Pin F is connected to screening of pins D and E. Pin 3 is connected to screening of pins 1 and 2. Pin 6 is connected to screening of pins 4 and 5.

CONNECTOR Q.B.1 EG7.82.433				
Termination	Pin	Cable	Pin	Termination
Bearing indicator Type 9551 socket Q.B.1	1	RPC1533	E	Pressure bulkhead socket Q.B.1
	2	RPC1533	D	
	3	RPC1533	B	
	4	RPC1533	A	

Pin 5 is connected to screening of pins 1, 2, 3 and 4.

CONNECTOR Q.C. EG7.82.435				
Termination	Pin	Cable	Pin	Termination
Master bearing indicator Type 9551 socket Q.C.	1	BICC1534	QC/B	R.F. amplifier coax socket yellow Q.C.B.
	2	BICC1534	24	
	3	BICC1534	15	R.F. amplifier Q.C.A.
	4	BICC1534	25	
	5	BICC1534	QC/C	R.F. amplifier coax socket red Q.C.C.

CABLE ASSEMBLY Q.D. SCSHQ 127090/1				
Termination	Pin	Cable	Pin	Termination
R.F. amplifier Type A8281		UR64		Pressure bulkhead break Q.D.

CABLE ASSEMBLY Q.D. SCSHQ 127090/2				
Termination	Pin	Cable	Pin	Termination
Pressure bulkhead Break Q.D.		UR64		Sense aerial

CONNECTOR Q.E. EG7.82.5329				
Termination	Pin	Cable	Pin	Termination
Control unit plug Q.E.	1	N20	1	R.F. amplifier Q.E.
	2	N20	2	
	3	N20	3	
	4	N20	4	
	5	N20	14	
	6	NMS20	18	
	7	N20	6	
	8	NMS20	8	
	9	N20	19	
	10	N20	22	

continued . . .

TABLE 1 Connectors - continued

CONNECTOR Q.E. EG7.82.5329 - continued

Termination	Pin	Cable	Pin	Termination
Control unit plug Q.E.	11	N20	4	R.F. amplifier Q.E.
	12	N20	14	
	13	N20	12	
	14	N20	21	
	15	N20	20	

At end R.F. amplifier, pin 9 is connected to screening of pin 18, and pin 17 is connected to screening of pin 8.

CONNECTOR Q.H. EG7.82.443 - continued

Termination	Pin	Cable	Pin	Termination
I.F. amplifier free socket Q.H.	18	Q22	22	R.F. amplifier ring-tongue tags Q.H.
	19	QMS20	8	
	20	QMS20	18	
	21	Q22	23	
	22	Q22	4	
	23	Q22	4	
	25	QMS20	16	

At end I.F. amplifier, pin 14 is connected to screening of pin 1 and pins 4, 19, 20 and 25 are connected to screening of pin 24. At end R.F. amplifier, pin 11 is connected to screening of pin 10.

CONNECTOR Q.G. EG7.82.441

Termination	Pin	Cable	Pin	Termination
Control unit free socket Q.G.	6	N20	E25	Electrical control panel Q.G.
	7	N20	E25	
	8	N20	E25	
	9	N20	R5	
	10	N20	R5	
	11	N20	R5	

CABLE ASSEMBLY Q.J. EG7.82.5517

Termination	Pin	Cable	Pin	Termination
R.F. amplifier Q.J.	14	NMS22	2	T.B. 3668/1
	23	NMS22	1	Q.J.

CONNECTOR Q.H. EG7.82.443

Termination	Pin	Cable	Pin	Termination
I.F. amplifier free socket Q.H.	1	QMS20	10	R.F. amplifier ring-tongue tags Q.H.
	2	Q22	9	
	3	Q22	9	
	4	QMS20	7	
	5	Q22	24	
	6	Q22	25	
	7	Q22	13	
	9	Q22	20	
	10	Q22	12	
	11	Q22	21	
	12	Q22	15	
	15	Q22	5	
	16	Q22	5	
	17	Q22	19	

CONNECTOR Q.K. EG7.82.447

Termination	Pin	Cable	Ident	Pin	Termination
Junction box tails Q.K.	A	14/.0076	White	1	Radio compass bearing indicator Cannon socket Q.K.
	B	14/.0076	White	2	
	C	14/.0076	White	3	
	D	14/.0076	White	4	
	E	14/.0076	White	6	

CABLE ASSEMBLY Q.L. EG7.82.451

Termination	Pin	Cable	Ident	Pin	Termination
Junction box tails Q.L.	A	14/.0076	White	1	R.M.I.
	E	14/.0076	White	2	Nav's panel
	C	14/.0076	White	3	free
	B	14/.0076	White	4	Cannon socket
	D	14/.0076	White	5	Q.L.

continued . . .

TABLE 1 Connectors - *continued*

CABLE ASSEMBLY Q.L./144 EG7.82.449					
Termination	Pin	Cable	Ident	Pin	Termination
Junction box tails Q.L./144	A	14/.0076	White	1	R.M.I. Pilot's panel free Cannon socket Q.L./144
	E	14/.0076	White	2	
	C	14/.0076	White	3	
	B	14/.0076	White	4	
	D	14/.0076	White	5	

Chapter 8 OMEGA NAVIGATION SYSTEM (A.R.I. 23314)

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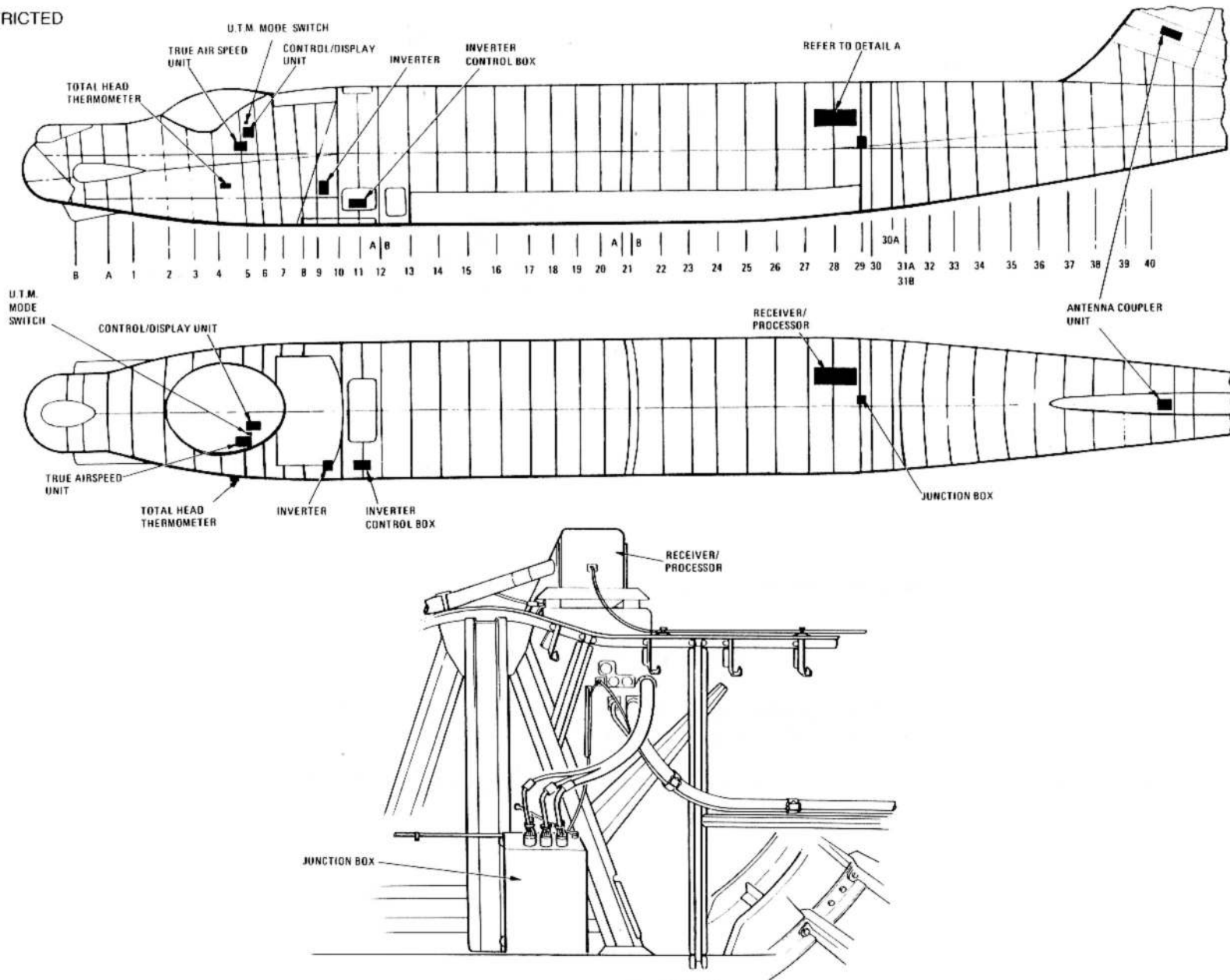
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Note . . . Combined theoretical/routeing diagrams for this installation are contained in A.P. 101B-0417-10 (Servicing Diagrams Manual).

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DETAIL A - EQUIPMENT BETWEEN FRAMES 29 AND 31

EG7 82 5985 SH.1 ISS.3
EG7 82 5985 SH.2 ISS.3

FIG.1. OMEGA NAVIGATION SYSTEM (A.R. I.23314) INSTALLATION

◀ PICTORALLY AMENDED ▶

DESCRIPTION

General

1. Omega Navigation System (ONS) is a worldwide, all-weather navigation aid which operates in the VLF band using signals from three out of eight ONS ground stations, or four out of nine VLF communication stations. As a back-up to the primary ONS/VLF mode of operation, a dead-reckoning (DR) mode is provided. This mode is automatically selected when the number and quality of received ONS/VLF signals falls below the levels required for accurate navigation. The main components of the installation consist of a control display unit, receiver processor unit, antenna coupler unit and true airspeed unit.

Control display unit

2. The control display unit is located at the navigator's control panel, in the upper centre position. It contains an arrangement of push-buttons, switches, indicators and digital read-outs, to enable the operator to insert data, extract data, interrogate the computer and override some automatic functions. All input and output connections are made via a multi-pin plug at the rear of the unit.

Receiver/processor unit

3. The receiver/processor unit (RPU) is positioned on the rear pack bay shelf, between frames 27 and 28. The RPU receives r. f. input signals from the antenna coupler unit together with the airspeed input (from the true airspeed unit) and the heading input (from the GM4B compass master indicator). Various electronic components within the RPU process the input data to provide present position and navigation guidance parameters, required for an accurate airborne navigation readout.

Mounting

4. A mounting tray located on a rack in the rear equipment bay is used to secure the RPU. The RPU is held in position on the mounting tray by guide pins and quick release knurled knobs. The mounting tray contains a multi-pin connector at the rear which mates with the RPU.

Antenna coupler unit

5. The antenna coupler unit (ACU) is fitted in the tail between ribs 1 and 2, mounted flush against the outside. The ACU consists of two ferrite rods at right angles to each other which operate as an H-field, ▶

bi-directional loop antenna. The unit which is designed to optimize reception of the 10 to 14 kilohertz Omega signal, contains several stages of amplification to achieve a very-high sensitivity.

GM4B compass installation

6. The ONS installation is interconnected with the GM4B master indicator. The master indicator provides heading input data to the ONS, controlled by the compass/DG switch.

True airspeed unit

7. This unit provides airspeed information which is transmitted to the receiver/processor unit. The true airspeed unit is mounted behind the navigator's instrument panel.

Total head thermometer

8. This unit is installed on the fuselage skin, port side, between frames 4 and 5. It supplies external temperature data to the installation.

Lighting

9. Integral lighting of the Omega control unit is provided by a lighting transformer. The transformer steps-down the 115 volt a. c. supply, fed from the 400 Hz fuse box, to 5 volts a. c. This 5 volt output to the control unit lighting is brilliance controlled by a dimmer switch, situated at the navigator's station.

Omega junction box

10. The Omega junction box is installed in the rear fuselage, just starboard of the centreline, between frames 29 and 30. This contains the transformer and the rectifier circuit/relay assembly.

Undercarriage interlock

11. Interconnection with the undercarriage oleo micro switch, via a relay, inhibits the navigation process when the aircraft is on the ground. On the ground the relay is energized by the oleo microswitch, putting an earth on pin A27 of the receiver processor unit, via the Omega FLT/GRD test switch.

Power supplies

12. Both a. c. and d. c. supplies are required to operate the Omega installation. The installation is supplied with 28-volt d. c. from fuse 166 via the

◀ Omega switch. A single-phase 115 volt a.c. supply is provided from an inverter. A.C. power from the inverter, situated between frames 9 and 10, is supplied via paralalled fuses 105 and 106, in the No.2 distribution box, to the Omega junction box. Part of this a.c. supply is stepped-down to 26 volt a.c. by a transformer within the junction box. ▶

Flight/Ground test switch (FLT/GRD test switch)

13. For test purposes pin A27 on the Omega receiver/processor unit can be disconnected from earth, whilst the aircraft is on the ground. This is achieved by selecting GRD TEST on the Omega FLT/GRD test switch.

◀ **Universal transverse mercator (U.T.M.) mode switch**

14. This switch is installed on the navigator's flight instrument panel and is annotated OMEGA U.T.M. MODE SW. The U.T.M. mode switch is an on/off switch, which when selected to the ON position changes the ▶

◀ type of co-ordinates shown on the control display unit from land to sea (mercator). ▶

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

◀ 15. Components and cables should be checked periodically for damage. ▶
General Servicing is straightforward and the removal and assembly of equipment should not present undue difficulties. Servicing information on the equipment is contained in A.P. 116B-0617 series.

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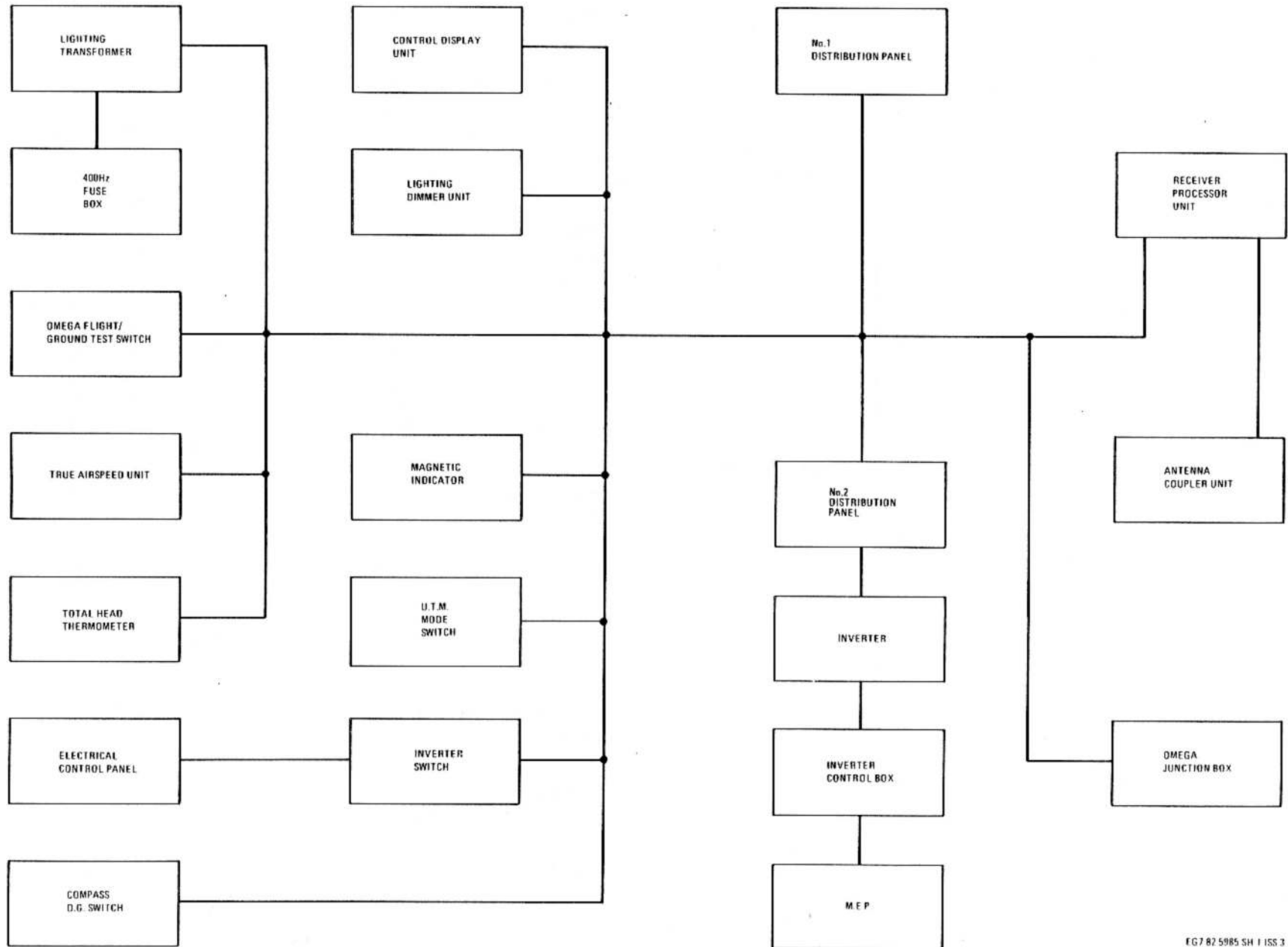


FIG. 2. OMEGA NAVIGATION INSTALLATION - BLOCK DIAGRAM.

◀ SYSTEM AMENDED ▶

TABLE 1 Cable assembly details

CONNECTOR ONS 1 EG7.82.5473			
TERMINATION	PIN/ CABLE	PIN/ CABLE	TERMINATION
	TERMINAL	TERMINAL	
G4B compass master indicator (ONS 1E)	A	N	Pressure bulkhead (ONS 1A)
	B	P	
	C	D	
	D	E	
	E	C	
		A	
Omega control unit (ONS 1F)	a	B	Pressure bulkhead (ONS 1)
	b	C	
	c	D	
	d	E	
	e	F	
	f	H	
	U	J	
	V	K	
	W	L	
	X	M	
	Y	N	
	Z	P	
	J	R	
	K	S	
	L	T	
	M	U	
	R	V	
	S	W	
T	X		
g	F	Pressure bulkhead (ONS1A)	
D	G		
J	H		
C	J		
True airspeed unit (ONS 1B)	K	L	
	H	M	
Compass/d.g. switch (ONS 1G)	B	A	
	4	Z	
Inverter switch (ONS 1H)	3		

CONNECTOR ONS 1 EG7.82.5473 - continued				
TERMINATION	PIN/ CABLE	PIN/ CABLE	PIN/ CABLE	TERMINATION
	TERMINAL	TERMINAL	TERMINAL	
Omega flt/grd test switch (ONS 1K)	2	R		Pressure bulkhead (ONS 1A)
U.T.M. mode switch (ONS 1L)	2 3	S		Pressure bulkhead (ONS 1A)
		T		
Omega control unit (ONS 1F)	D	1		Dimmer unit (ONS 1D)
		2		
Lighting transformer (ONS 1C)	5 1	E		Omega control unit (ONS 1F)
		3		
Earth stud (ONS 1J)	E26 E26 E26	G		True airspeed unit (ONS 1B)
		Parallel connector (at pin C)		
		5		
Inverter switch (ONS 1H)	3			Compass/d.g. switch (ONS 1G)
Screens from cores J, K, L, M, R, S, T, U, V, W, X, Y, Z (at end ONS 1F) connected to pin F.				
Screens from cores H, J, K, L, M, N, P, R, S, T, U, V, W (at end ONS 1) connected to pin G.				
Screens from cores C, D, E, F, G, H, L, M, N, P (at end ONS 1A) connected to pin B.				
CONNECTOR ONS 2 EG7.82.5475				
TERMINATION	PIN/ CABLE	PIN/ CABLE	PIN/ CABLE	TERMINATION
	TERMINAL	TERMINAL	TERMINAL	
No.2 dist. box, tags (ONS2H)	F106 F105	A		Omega junction box (ONS 2E)
		B		
Pressure bulkhead (ONS 2A)	Z	N16		Omega junction box (ONS 2D)
		N16		
		B		
		A		

continued . . .

TABLE 1 Connector assembly details - continued

CONNECTOR ONS 2 EG7.82.5475 - continued				CONNECTOR ONS 2 EG7.82.5475 - continued					
TERMINATION	PIN/ TERMINAL	CABLE	PIN/ TERMINAL	TERMINATION	PIN/ TERMINAL	CABLE	PIN/ TERMINAL	TERMINATION	
Pressure bulkhead (ONS 2A)	L		G	Omega junction box (ONS 2E)	V		B62	Receiver/ processor unit (ONS 2G)	
	M		H		W		B63		
	N		J		X		B67		
	P		K	Receiver/ processor unit (ONS 2G)	Omega junction box (ONS 2K)	A	A5	Receiver/ processor unit (ONS 2G)	
	A		A2			B	A31		
	C		A9			C	A4		
	D		A10		Omega junction box (ONS 2E)	C	B1		
	E		A11			D	B10		
	F		A12			L	A66		
	G		A22	M		A67			
	H		A23	R	A46				
	J		A21	S	A47				
R		3A	RT tag, relay No. 1, No. 1 distribution panel (ONS 2B)	T	A37				
Pressure bulkhead (ONS 2A)	S		A8	Receiver/ processor unit (ONS 2G)	U	A38	Receiver/ processor unit (ONS 2G)		
	T		*	Receiver/ processor unit (ONS 2G)	V	A56			
Pressure bulkhead (ONS 2)	A		B6	Receiver/ processor unit (ONS 2G)	3		A27	Cooling fan (ONS 2F)	
	B		B7		connected together by a parallel splice *	RT tag (ONS 2J) Omega junction box (ONS 2E)	E31 E F		A36
	C		B14						A53
	D		B15						A17
	E		B16		Parallel connector (at pin B50)	Receiver/ processor unit (ONS 2G)	Parallel connector (at pin B16)		A15
	F		B17						B5
	H		B35		parallel splice marked * above (ONS 2G)	Receiver/ processor unit (ONS 2G)	Receiver/ processor unit (ONS 2G)		A
	J		B36						B
	K		B37						C
	L		B38						D
	M		B39						
	N		B40						A19 - connected to A22, via splice A20 - connected to A23, via splice
	P		B47						
	R		B48						
	S		B49						
	T		B50						
	U		B61						

continued...

TABLE 1 Connector assembly details - continued

Screens from cores H, J, K, L, M, N, P, R, S, T, U, V, W (at end ONS 2) connected to pin G.

Screens from cores C, D, E, F, G, H, (at end ONS 2A) connected to pin B.

CONNECTOR ONS 3 EG7.82.5933

TERMINATION	PIN/ TERMINAL	CABLE	PIN/ TERMINAL	TERMINATION
Receiver/ processor unit	P3		P1	Antenna coupler unit

CONNECTOR ONS 4 EG7.82.5935

TERMINATION	PIN/ TERMINAL	CABLE	PIN/ TERMINAL	TERMINATION
Inverter control unit (ONS 4)	{ J L K M		{ Fuse 105 EW E29 T4	No.2 distribution box, (ONS 4C) Earth (ONS 4B) Terminal, inverter control box (ONS 4A)

CONNECTOR ONS 5 EG7.82.5939

TERMINATION	PIN/ TERMINAL	CABLE	PIN/ TERMINAL	TERMINATION
No.2 distribution box (ONS 5A)	T.B.6		T2	Inverter control box (ONS 5)

CONNECTOR ONS 6 EG7.82.5937

TERMINATION	PIN/ TERMINAL	CABLE	PIN/ TERMINAL	TERMINATION
T.B., inverter control box (ONS 6)	{ T1 T1		{ Fuse 143 Fuse 143	Main electrical panel (ONS 6A)

CONNECTOR ONS 7 EG7.82.5941

TERMINATION	PIN/ TERMINAL	CABLE	PIN/ TERMINAL	TERMINATION
Inverter control box (ONS 7)	T3		E29	Earth stud (ONS 7A)

CONNECTOR ONS 8 EG7.82.5963

TERMINATION	PIN/ TERMINAL	CABLE	PIN/ TERMINAL	TERMINATION
Inverter mtg. foot (ONS 8)	E29		E29	Earth stud (ONS 8A)

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Instrument panel from a MiG-21 (XP558)