AP115E-0500-1
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PRECISION APPROACH RADAR
CR62

System Manual

GENERAL, TECHNICAL AND SERVICING INFORMATION

BY COMMAND OF THE DEFENCE COUNCIL

Ministry of Defence

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PREFACE

▶ Changes of technical import within each new or revised leaf provided to amend this publication will be identified by a marginal indicator >-----<. Such indicators will be omitted when the leaf is re-issued. When a chapter is re-issued by amendment action and the content is so changed or re-orientated that the inclusion of amendment indicators would be impracticable, the note "(completely revised)" will appear under the title of the chapter. ◀

WARNINGS

CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH

MAKE SURE YOU KNOW THE SAFETY PRECAUTIONS AND FIRST AID INSTRUCTIONS BEFORE YOU USE A HAZARDOUS SUBSTANCE

READ THE LABEL ON THE CONTAINER IN WHICH THE SUBSTANCE IS SUPPLIED

READ THE DATA SHEET APPLICABLE TO THE SUBSTANCE

OBEY THE LOCAL ORDERS AND INSTRUCTIONS

WARNINGS

(1) LETHAL VOLTAGE. DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT. REFER TO DEF STAN 61-15 (RAF), EMER MANAGEMENT S250 (ARMY) or AP100(N)-0140 (NAVY) FOR SAFETY PRECAUTIONS.

(2) RADIO FREQUENCY (RF) RADIATION. THIS EQUIPMENT CONTAINS RF TRANSMITTING DEVICES. REFER TO JSP392 FOR SAFETY PRECAUTIONS.

(3) RADIOACTIVE MATERIALS. THIS EQUIPMENT CONTAINS RADIOACTIVE MATERIALS. REFER TO JSP392 FOR SAFETY PRECAUTIONS.

(4) HEAVY EQUIPMENT. WHEN ANY OF THE THREE BOX-TYPE MODULES (VIZ THE EQUIPMENT CABIN MODULE, THE AZIMUTH ANTENNA MODULE OR THE ELEVATION ANTENNA MODULE) REQUIRE REPLACEMENT, SPECIAL-TO-TYPE LIFTING EQUIPMENT MUST BE EMPLOYED. DETAILS OF THIS EQUIPMENT AND THE LIFTING PROCEDURES TO BE FOLLOWED ARE CONTAINED IN AP 115E-0501-1.

LIST OF MODIFICATIONS INCLUDED

Mod No	Unit	Strike No	Brief Description
A9657	'A' Frame Assembly	1	Cabin alignment
A9658	Control Unit, Remote	1	Cabin alignment
A9659	Control Unit, Local	1	Cabin alignment
A9960	Delay Generator PEC	1	Capacitor change
A9846	Timing PEC	1	Elimination of random switching
A9902	Elevation Antenna Module	1	Provision of ladders
A9995	Line Receiver PEC	1	Potentiometer change
A9969	Transmitter	2	Use of alternative magnetron
B0071	High voltage Power Supply	1	Protection against transients
A9997	Control Unit, Remote	2	Prevention of lamp flicker
B0109	RF Commutating Switch	1	Servicing access
B0129	Stargate Generator PEC	1	Improve +12V regulation
B0070	Transmitter	1	Improve air flow sensor
A9996	Control Unit, Local	2	Prevention of turntable over-run
B0187	Range Mark Generator PEC	1	Increase range of antenna shadow adjustment
B0186	Angle Voltage Controller PEC	1	Improve azimuth expansion adjustment
B0194	EHT Control PEC	2	Overheating and instability of Z1
B0240	RF Commutating Switch	2	Increase waveguide air gaps
B0293	Video Amplifier PEC	1	Addition of ferrite suppressor
B0316	Correlation Unit 1 PEC	1	Elimination of scan edge bright-up

LIST OF MODIFICATIONS INCLUDED (continued)

Mod No	Unit	Strike No	Brief Description
B0521	Azimuth Antenna Module	1	Replacement of tilt and slew couplings
B0527	Electronic Frequency Converter	1	Replacement of cable assembly
B0523	RF Commutating Switch	3	Provide access to reed switches
B0524	Equipment Cabin Module	1	Prevention of water ingress
B0525	Wired Assembly Rack	1	Provision of additional cable supports
B0201	EHT Control PEC	1	Improve damping of T8 and operation of Z1
B0565	Multiplexer/Demultiplexer (Local)	1	Replacement of C4
B0563	RF Commutating Switch	4	Prevention of rundown of antenna scan
B0621	Amplifier Detector	1	Incorporate isolating relay
B0491	Elevation Antenna Simulator	1	Improve test capability
B0492	Azimuth Antenna Simulator	1	Improve test capability
B0241	Indicator AZ/EL	1	Elimination of uncontrolled brilliance on CRT
B0564	'A' Frame Assembly	2	Provision of alignment indicator
KA0151	RF Switch Drive	2	Change rectifier connections
KA0152	RF Switch Drive	3	Fitting of horseshoe clamps
KA0153	RF Switch Drive	4	Repositioning of holes
KA0154	Antenna Drive Assembly	1	Change wiring
KA0155	Antenna Drive Assembly	2	Change rectifier connections
KA0156	Antenna Drive Assembly	3	Mechanical improvements

LIST OF MODIFICATIONS INCLUDED (continued)

Mod No	Unit	Strike No	Brief Description
KA1057	Antenna Drive Assembly	4	Change cover retaining screws
KA0150	RF Switch Drive	1	Change wiring
KA0165	Transmitter	3	Protection for trigger amplifiers
KA0172	CRT EHT Power Supply	1	Ease strip down/reassembly
KA0171	Radar Cabin Modules	1/1/2	Replacement of treadplates
KA0173	Indicator AZ/EL	2	Reduction of audio noise
KA0175	Azimuth Antenna	1	Interchangability
KA0220	Stargate Generator PEC	2	Elimination of jitter
KA0218	EHT Control PEC	3	Elimination of PWM instability
KA0174	CRT EHT Power Supply	2	Correction of build state anomalies
KA0195	Equipment Cabin Module	3	Remounting of ladder
KA0288	RF Switch Drive	5	Replacement of filter
KA0285	Multiplexer/Demultiplexer (Local)	1	Simplify interchangeability of power supply PEC
KA0286	Multiplexer/Demultiplexer (Local)	2	Simplify interchangeability of power supply PEC
KA0287	Multiplexer/Demultiplexer (Remote)	1	Simplify interchangeability of power supply PEC
KA0304	Radar Cabin Modules	6	Replacement of fans
KA0306	Indicator Unit	3	Extension of life of indicator lamps
CEL/G/009/6/SDM	RF Switch Drive	6	Capacitor C107 change
CEL/E/003/3/1	Antenna Assemblies	3	Drive coupling mod.

Chapter 1

SYSTEM MANUAL PAR CR 62

CONTENTS

INTRODUCTION

1 The Radar Head shown in Fig 1.1, the equipment in an Operations Centre, and the inter-connecting cables form the CR 62 Precision Approach Radar (PAR) system, Fig 1.2.

2 The Radar Head is mounted on a turntable, and sited adjacent to the runways being used. It can be rotated to any one of four preset bearings, either by local control, or remote control from an Operations Centre. Remote control is by two coaxial cables up to 3000 metres in length. For maintenance purposes, the Radar Head can be controlled locally by the equipment contained in the Radar Cabin.

Note...
The Operations Centre is a designated building or room near an airfield, e.g. a Control Tower.

3 Leading particulars of the system are listed in para. 5.

PURPOSE

4 The CR 62 (PAR) Radar Head is able to plot accurately the approach and landing of aircraft under severe weather conditions, by alternately scanning the horizontal (azimuth) and vertical (elevation) planes, in order to track the course path and glide path of the aircraft in its critical approach to the runway.

LEADING PARTICULARS

5 The overall PAR system characteristics and performance are as listed;

Electrical characteristics

6	A/C supply	(a) 30 Amp. No Break (Radar) (b) 60 Amp. Limited Break (Domestic) (c) A.C.U's.
	Radar head:	Two separate supply inputs, with an optional third input for overseas locations, each of 220/240 V a.c. ± 6% (rms). 1-phase; transients (1 sec. max.) ± 10% max. Frequency: 50 Hz ± 3% transients (3 secs. max.) ± 10% max.
	Operations centre:	220/240 V a.c. ± 6% (rms). 1-phase Frequency: 50 Hz ± 3%
	Source:	Commercial power lines, and/or local generating sets.
	Obstruction light:	Switching pair of nominal 50 V d.c. from Airfield Central Control point.

Dimensions and weights

7

	Weight (kg)	Length (m)	Width (m)	Depth (m)
Radar cabin	4250	6.1	x 2.44	x 2.44
AZ Antenna module	2174	4.88	x 1.83	x 2.44
EL Antenna module	2174	4.88	x 1.83	x 2.44
Angle data generator		0.8	0.57	0.63
Transmitter group consisting of:				
Transmitter-modulator	240	0.43	0.55	0.60
High voltage power supply	181			
Converter group, Signal Data consisting of:				
Electronic frequency converter (1 of 2)	143	0.76	0.27	0.42
Receiver group consisting of:				
Amplitude detector (1 of 2)	126	0.3	0.55	0.51
Blanker interference (1 of 2)	112	0.3	0.55	0.51
Local control group		1.74	0.57	0.63
Indicator console	230	1.50	0.53	0.86
Indicator console (packed)	380*	1.90	0.96	1.27
Remote control unit**	16	0.27	0.48	0.51
Remote mux-demux and dual 28 V PSU	100	1.22	0.53	0.61
Remote mux-demux and dual 28 V PSU (packed)	230*	1.6	0.91	0.99
Power distribution unit				

* Maximum weight estimated for retail trade pack.
** Excluding front panel control projections.

Environmental conditions

8 Temperature range:

Operating:	+45°C max. -29°C min.
Storage (non-operating)	-33°C to +70°C

Humidity:

Operating and non-operating:

Radar Cabin	100% at 45°C (precipitation)
Operations room equipment	Up to 95% at 45°C

Note ...

Operating temperatures of equipment in Radar Cabin are dependent upon air-flow and ventilation.

9 Transportation

Ground	Conventional road transport
Air	C-130 aircraft

Note ...

In each case, the antenna modules are removed from the Radar Cabin and transported separately.

10 System performance

Frequency:	9080 MHz ± 1 MHz
Range:	Better than 15 nautical miles (n miles) on a 1 metre^2 average target for normal video.
Coverage:	
Azimuth:	20°; sub-division about the runway parallel line appropriate to cabin orientation indicator maps: -1° to +6° with respect to ground line.
System Accuracies:	
Azimuth:	Less than 0.4% of range plus 10% deviation from course line, or 9 metres whichever is greater.

Display error at touchdown:	Less than 0.3% or 4.5 metres of distance, whichever is greater, (Radar Head set-back between 530 - 3000 metres).
Elevation:	Less than 0.2% of range plus 10% deviation from glide path, or 6 metres whichever is greater.
Display error at touchdown:	Less than 0.2% or 3 metres of distance, whichever is greater, (Radar Head set-back between 530 - 3000 metres).
Resolution:	
Range	60 metres target separation.
Azimuth	0.8° target separation.
Elevation:	0.6° target separation.
Distance:	
Deviation from glide path (before touchdown):	Less than 2% of target range or 30 metres, whichever is greater.

Note ...

Resolution characteristics relate to targets echoing area coinciding with -3 dB beam width of the antenna. The degree of resolution is dependent upon the echoing area.

System trigger:	
P.r.f. (mean)	3300 pps staggered or unstaggered
Stagger ratio:	10:12:16:14:10.4 approx.
Stagger periods:	242.4, 291.8, 388.4, 340.8, 251.6 µs.
Antenna characteristics:	
Refer to publication	Cabin Ancillary Group, AP 115E-0501-1.
Cross-site cables:	Uniradio 60 M to DEF STAN 61.12 Pt.9, or electrical equivalent.
Length:	Up to 3000 metres.
Impedance:	75 ohms.

Equipment performance

11 Angle data generator:

I/P to indicator:	12-bit word, comprising: 1-bit (MSB) - antenna scan. 1 sign bit and 10 bits - beam pointing angle.
Azimuth scan:	20° ± 0.01°.
Elevation scan:	7° ± 0.004°.

Transmitter Group:

Frequency	9080 MHz. (30 MHz below the STALO frequency).
AFC control	9080 MHz ± 1.0 MHz.
Frequency jitter	15 kHz maximum.
Frequency spectrum	Complies with MIL-STD-469.
Peak power	80 kW typical. 65 kW minimum.
Pulse duration	0.18 μs ± 0.02 μs at 50% amplitude
Pulse repetition	3300 pps average.
Stagger ratio (5 period)	10:12:16:14:10.4 approx.

Converter Group, Signal Data:

Signal input frequency	9080 MHz.
Noise figure (input to receiver channel)	5.2 dB maximum.
STALO frequency	9110 MHz (preset 30 MHz above the magnetron frequency).
I.F. frequency (signal and COHO)	30 ± 0.5 MHz.
I.F. bandwidth	8 MHz minimum.

RECEIVER GROUP

Amplifier detector

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	CHANNELS		
	LOG/FTC	LINEAR	LIMITING
I.F. Centre frequency	30 ± 0.5	30 ± 0.5	30 ± 0.5 (MHz
I.F. Bandwidth (-3 dB points)	8	8	8 (MHz)
I.F. Gain (low level signal)	80	80	70 (dB)
Dynamic range	80	20	27 (dB)
Video Bandwidth (Normal)	4	4	4 (MHz)
(MTI)	4	4	4 (MHz)
Output level (Linear and Log/FTC)	2 ± 0.5	2 ± 0.5	2 ± 0.5 (Volt
	-	- Bipolar	-2V ±0.2 (Volt +2V ±0.2
Logarithmic transfer accuracy	4 dB	-	-

Blanker interference

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Video Cancellation Ratio:	30 dB minimum.
Sub-Clutter Visibility	-20 dB minimum.
Velocity Response:	± 3 dB max. variation over 20 - 300 knots.
First Blind Speed:	600 knots minimum.
STAR Correlator:	Video output inhibited for signal not present on the preceding 2 p.r.i.'s.
Normal Radar Window	
Start range relative to Radar Head	100 to 2500 metres.
Duration (preset adjustable)	0 to 2500 metres.

Indicator group:

14	CRT display	Azimuth and Elevation expanded displays (see Fig. 2.1).
	Display range (Preset adjustable)	SHORT - 7.5 n mile max. LONG - 15 n mile max.
	Range mark intervals (Preset selectable)	0.5 nm intervals up to 7.5 nm max. normally set to 3.0 nm. 1.0 nm up to 15 nm max.
	Elevation display angle	-1° to +6° relative to the horizontal.
	Elevation angle scaling factor	not less than 20 mm/degree at range of 4 n mile.
	Azimuth display angle	+1° to +21° relative to the antenna axis.
	Azimuth angle scaling factor	not less than 7.5 mm/degree at a range of 4 n mile.
	Elevation cursor angle	8 selections, two for each of four runway positions. Each selection is preset adjustable over the range +1.5° to +5°.
	Safety cursor angle	4 selections, one for each of four runway positions. Each selection is preset adjustable over the range +1.5° to +5°.
	Decision height cursor	Selectable by operator in height, 0-850 ft. along glide path with digital read-out, and variable in range.
	Course line cursor angle	4 selections, one for each of four runway positions. Each selection is preset adjustable over the range ± 6° about the Azimuth scan centre-line.
	CRT size	41 cm (16 inch).

Radar head - physical description

15 The Radar Head comprises three assemblies, an Azimuth antenna module, an Elevation antenna module and a Radar Cabin. The three assemblies are mounted on an 'A' frame which constitutes part of the turntable equipment described, together with the Antenna modules, in the Cabin Ancillary Group manual, AP 115E-0501-1.

Radar cabin (Fig 1.3)

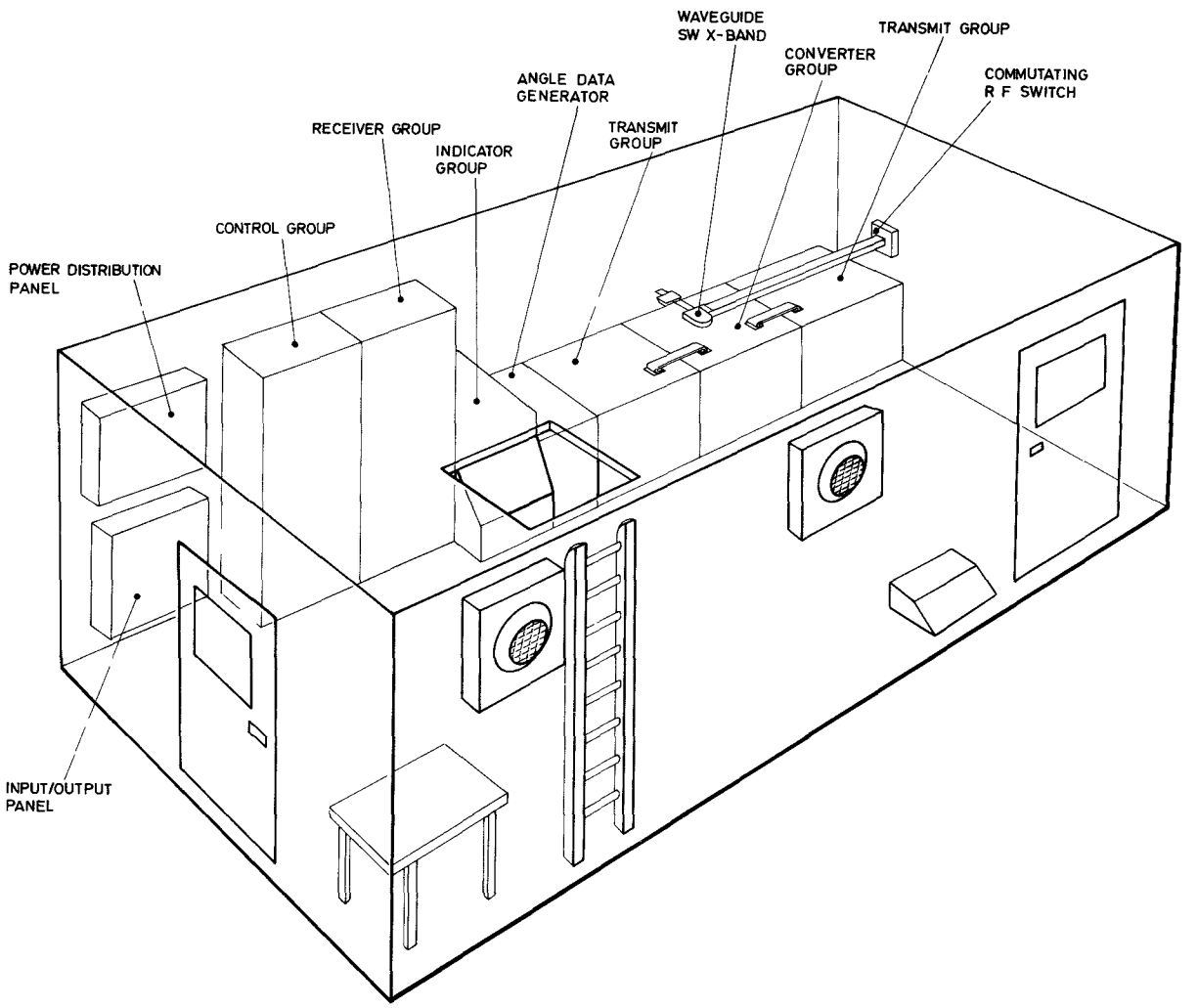
16 The Radar Cabin houses the equipment listed in TABLE 1. Dimensions and weights of the cabin and equipment are given under the heading 'Leading Particulars'. A physical or mechanical description of the ancillary equipment is given, as shown in TABLE 1, in the Cabin Ancillary Group manual. For information on the main equipment groups, refer to the List of Manuals in TABLE 2.

17 Access is provided to both antenna modules, by a hatchway for the Azimuth antenna and a door for the Elevation antenna. The emergency exit door is at the rear of the Cabin on the right-hand side.

18 The Radar Head is designed for operation in conditions of high ambient temperatures (up to 45°C) and high relative humidity. An efficient ventilation system is provided in the form of two variable speed, Ventaxia Fan units or equivalents, fitted to the right-hand wall, to prevent condensation which may occur in certain operational areas when the equipment is off.

19 Provision is made, by means of a modification kit, to replace the ventilation fans with Air Conditioning units for systems used in semi-tropical climates.

20 The equipment cabinets are connected to air ducts by which cooling air is circulated to and from the external atmosphere. Two axial fans provide the forced air-cooling. Thermostatically controlled dampers cause the cooling air to re-circulate at low ambient temperatures.



NOTE: Air ducts are not shown
for reason of clarity.

Fig. 1.3 CR62 Radar Cabin - equipment layout

TABLE 1 LIST OF EQUIPMENT - RADAR HEAD

System Ref. (1)	Equipment (2)	Drawing No. (3)	NATO Ref. 5840-99- (4)	Qty. (5)
7	Angle data generator	174200483-301M		1
7A2	Signal data converter	174200489-301M		1
12	Waveguide switch, X-band	LR100-7-528-103A		1
	Converter group, signal data	174200485-301M		1
9,10	Converter, electronic frequency	174200494-301M		2
8,11	Transmit group CH. A and B	174200484-301M		
8A1,11A1	Transmitter, radar	174200491-301M		
8A2,11A2	HV power supply unit	874127/000		
	Receive group	174200486-301M		
4A1,5A1	Amplifier detector, CH. A and B	174200496-301M		
4A2,5A2	Blanker interference, CH. A and B	174200497-301M		
3	Control group	874133/000		
3A1	Control unit (local)	874135/000		
3A3	Multiplexer/demultiplexer assy.	874137/000	653-9694	
3A4	28V power supply unit	874138/000		
6	Indicator group	874128/000		
6A1	Electronic marker generator	174200503-301M		
6A2	Indicator unit	874131-000		
6A3	Power supply unit	174200505-301M		
	Accessory kit			
	Extender card	X581849/1		
	Extender card	174221234-301		
Cabin ancillary grp. (AP 115E-0501-1)				
14	Antenna interface panel			
	Elevation antenna assy.	874119/000		
	Azimuth antenna assy.	874112/000		
13	R.F. commutating switch	874109/000		
3A2	Turntable control unit - (part of control group)	874136/000		
15	Turning motor			
16	Limit switches and bell			
2	Power distribution board, equipment	574079/000		
41	Power distribution board, domestic			
42	Ventilation control board			
40	Obstruction light control board			
18	Ventilation fans, equipment			
19	Air conditioning control, equipment			
17	Smoke detector (cabin)			
1	Input/output panel	574023/001		

21 Connected to, and across the Transmit and Converter Group cabinets is a waveguide assembly including a high-power dummy load, details of which are given in the Cabin Ancillary Group Manual (AP 115E-0501-1).

22 Heating of the cabin is provided by a 1.5 kW fan heater mounted on the wall above the work-bench.

23 Interconnecting equipment cables are routed in trunking-ducts with removeable covers (refer to system cabling). Access to the cabinet cable connectors is by four access covers which are bolted to the exterior wall of the cabin behind the equipment.

24 A smoke detector is fitted to the cabin's ceiling and connected to air sensors. Details are given in the Cabin Ancillary Group Manual.

25 Mounted on the cabin wall is a telephone for communication to the main switchboard at the site.

26 Three telephone jack sockets (MOD supplied) are also provided, one in each antenna module and one fitted to the cabin wall. Voice communication with the Operations Centre is by multiplexing the data over the cross-site cables then de-multiplexing it the other end.

27 An input/output panel, fitted to the left-hand wall near the cabin entrance, provides an interface for the a.c. mains supply, turntable control, and remote control from the Operations Centre in the form of two cross-site cables.

Note ...

Two power supply inputs are provided with an option for a third input, one supplies the equipment, the other supplies the ancillary equipment e.g. heating, lighting etc. (details are given in the Cabin Ancillary Group Manual). The optional third input is for the exclusive use of air conditioners in Overseas locations.

28 A table is provided for spares, tools, and the storage of documentation (see TABLE 2 for a list of Manuals).

TABLE 2 LIST OF MANUALS

Manual No. (1)	Title (2)
AP 115E-0500-1	System Manual
AP 115E-0500-1T	Special-to-Type Test Equipment
AP 115E-0501-1	Cabin Ancillary Group Azimuth and Elevation Antenna Assemblies 'A' Frame Turntable Control Unit Commutating R.F.
AP 115E-0502-1	Angle Data Generator Assembly
AP 115E-0503-1	Transmit Group
AP 115E-0504-1	Converter Group, Signal Data
AP 115E-0505-1	Receive Group
AP 115E-0506-1	Blanker Interference
AP 115E-0507-1	Control Group, Local/Remote
AP 115E-0508-1	Indicator Group

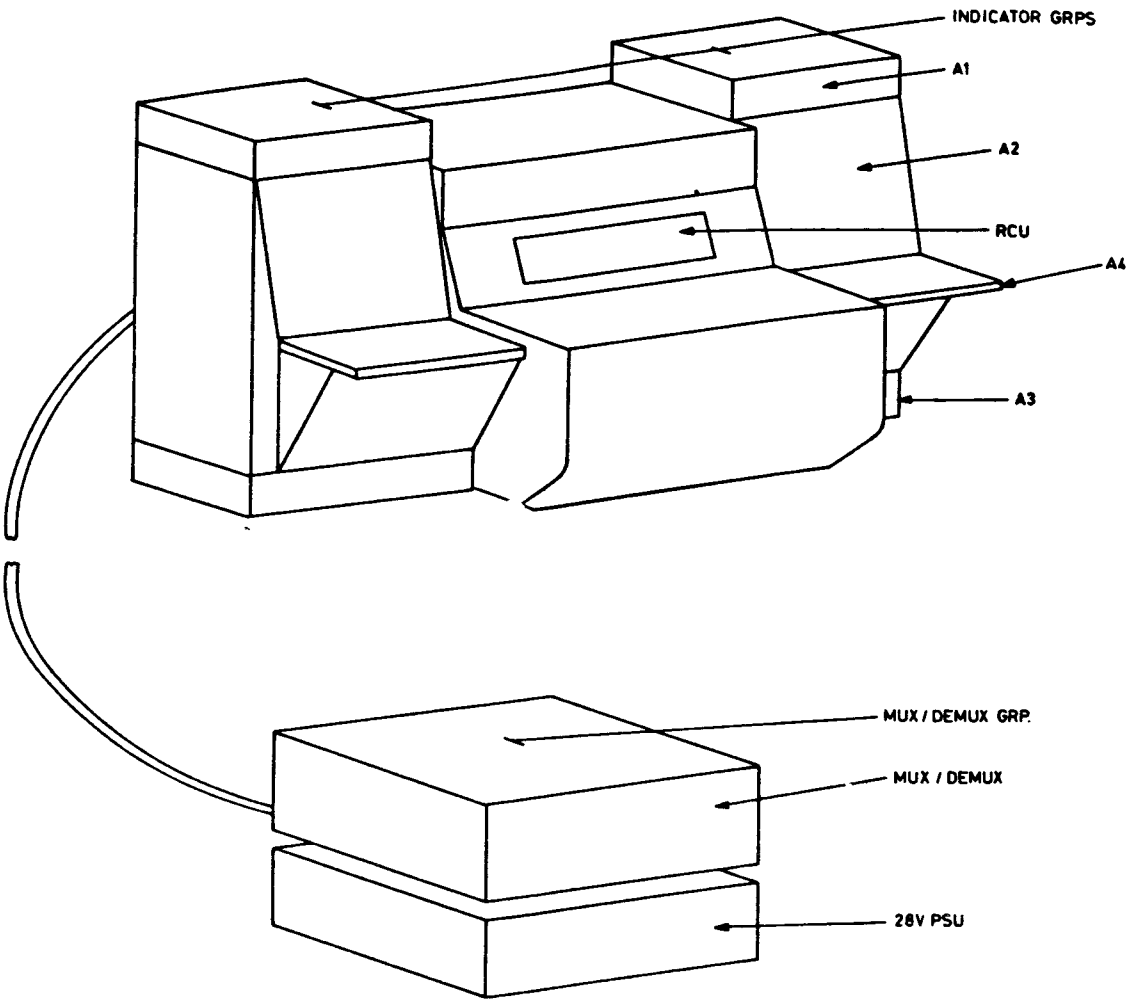


Fig 1.4 Operations Centre - typical equipment

TABLE 3 LIST OF EQUIPMENTS - OPERATIONS CENTRE

System Ref. (1)	Equipment (2)	Drawing No. (3)	NATO Ref. 5840-99- (4)	Qty. (5)
1 and 2	Indicator Groups	874128/000		2
A1	Electronic Marker Generator	174200503-301M		2
A2	Indicator Unit	874131/000		2
A3	Power Supply Unit	174200505-301M		2
A4	Desk Assy.	874139/000		2
RCU	Remote Control Unit	874140/000		1
	Mux/Demux Group	874141/000		1
	Mux/Demux. (remote)	874143/000		1
	Power Supply Unit, 28V	874138/000		1

29 An obstruction light, mounted externally on the azimuth antenna provides a warning for approaching aircraft. The light may be controlled locally, or from the airfield central control system via a D20 Switching Unit (MOD supplied).

Operations centre (Fig 1.4)

30 A list of equipment is given in TABLE 3.

31 Two cross-site coaxial cables, up to 3000 metres in length, are terminated at each end by an 'N' type coaxial connector, or equivalent (refer to heading 'Leading Particulars') (MOD supply).

32 An input/output panel, fitted near the Control and Indicator equipment groups, provides an interface for an a.c. mains supply and two cross-site coaxial cables.

33 Interconnecting equipment cables are routed via existing cable trunks or other such facilities currently in use at Operations Centres.

Safety

34 The PAR system is constructed such as to minimize hazards to maintenance and operator personnel, especially regarding those listed.

Dangerous voltages

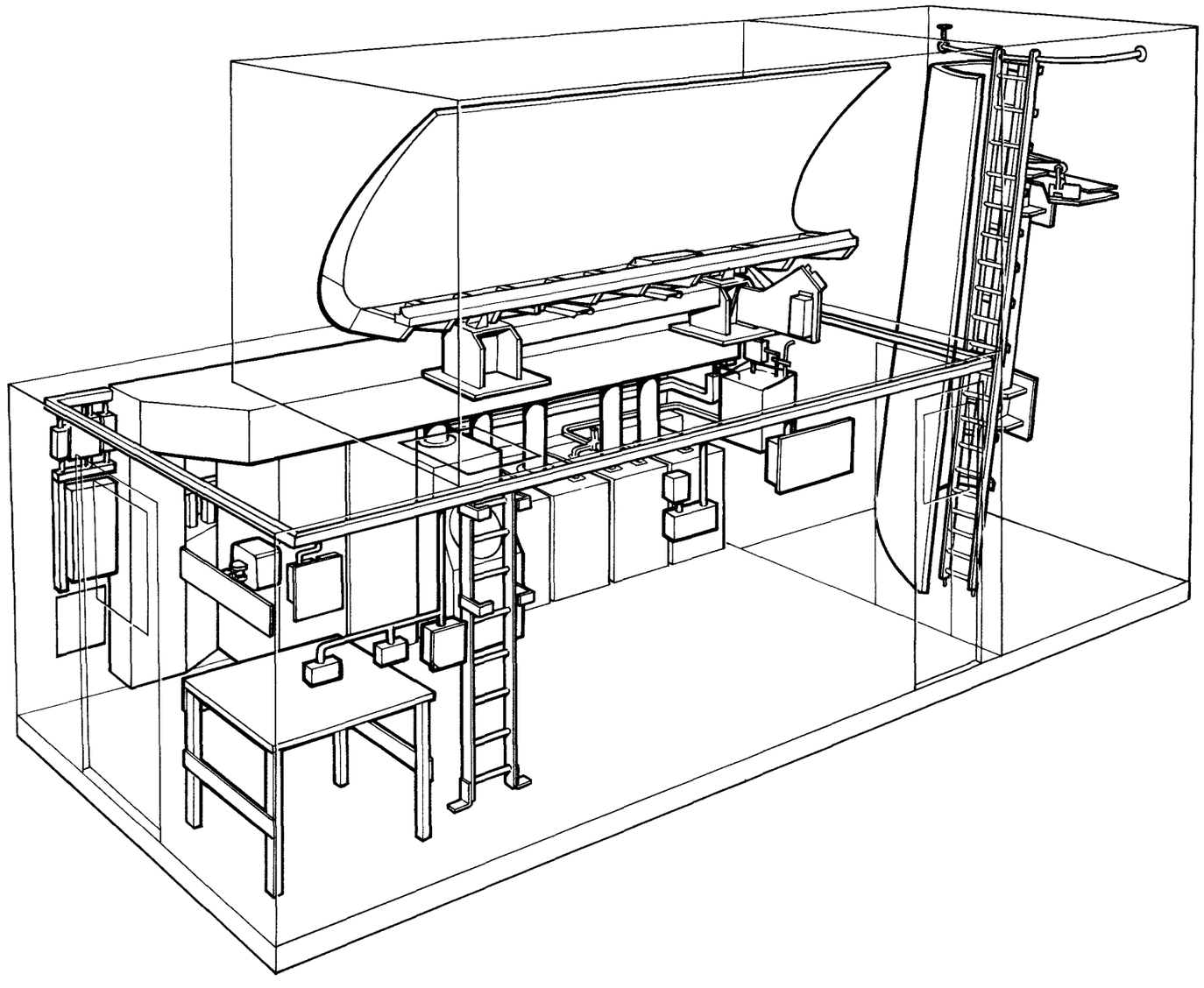
35 Protection is provided in accordance with the relevant sections of the 'SPECIFICATION FOR SAFETY REQUIREMENTS FOR RADIO TRANSMITTING EQUIPMENT' B.SS 3192 (1979). Warning labels are fitted to all units where in voltages in excess of 50V d.c. or 30V r.m.s. are used.

X-ray emission

36 Measurements by an approved authority have confirmed that no X-ray emission, in excess of the permitted level 0.75 millirems/hour, is present during operation or preventative/corrective maintenance routines.

SYSTEM INSTALLATION

37 Instructions for system installation are contained in Royal Air Force Signals Engineering Establishment Technical Memorandum No. 83321, Issue 2, June 1986, Instructions for the Installation of Precision Approach Radar.



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PAR CR62

TITLE

RADAR HEAD

AMENDMENT	ISSUE	DATE

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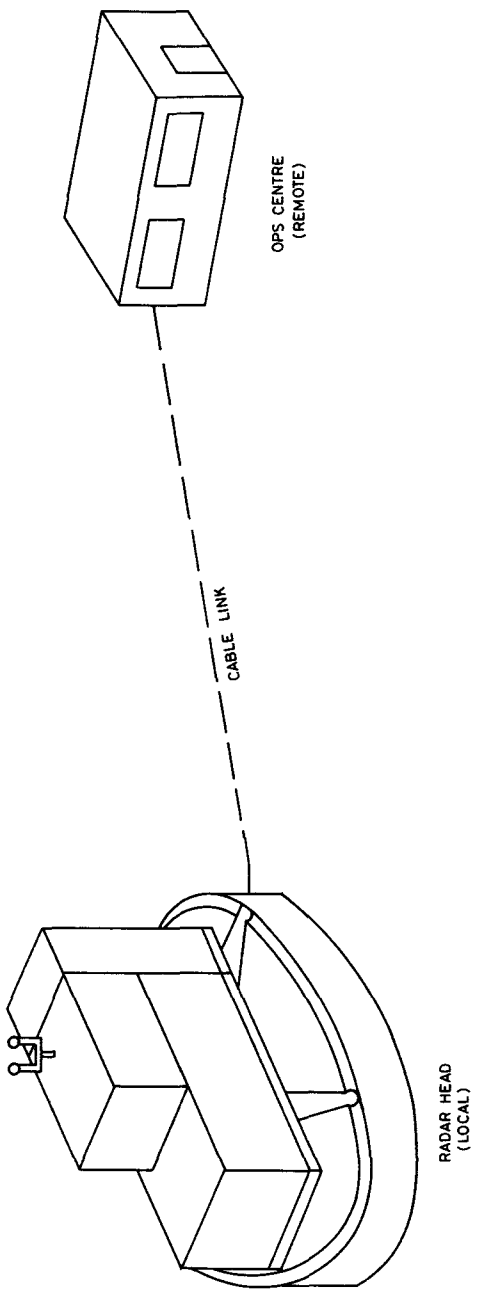
FIG. 1-1



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PAR CR62

TITLE

CR62 (PAR) SYSTEM

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FIG.1-2

Chapter 2

SYSTEM OUTLINE

CONTENTS

ILLUSTRATIONS
(BOUND IN AP 115E-0500-10 CHAPTER 1)

2.2 Block diagram of CR 62 PAR system

SYSTEM OUTLINE - GENERAL

1 The Transmit, Converter Signal Data and Receiver groups in the Radar Head cabin are connected in such a manner as to provide two independent radar channels A and B of nominally identical performance.

2 Channels A or B may be selected by local or remote control either to function as an operational channel, with the remaining channel on standby or, when switched to a Maintenance condition, to enable preventative and corrective maintenance to be carried out without affecting the operational channel.

3 From the Operations Centre, remote control of certain Radar Head functions are carried out by one of two Indicator groups selected as MASTER by the Remote Control group. The Radar Head control functions of the non-selected Indicator become ineffective once the transition has been made.

4 A third indicator group can be installed as part of a future expansion programme.

5 The following description gives a brief outline of the signal flow equipment function of the system and the controlling paths, with reference to Fig 2.2.

System timing

6 The synchronizer in the Blanker Interference unit contains a crystal-controlled oscillator which forms the basis for all timing and clock signals in the operational units. The synchronizer in the standby channel can be slaved to the oscillator in the operational channel to minimise cross-channel interference with that channel in the maintenance or local modes.

Antenna system

7 The AZ and EL antenna waveguide drive motors in the antenna assemblies are synchronized to provide the following cycle of events:

7.1 AZ antenna scans from Left to Right;

7.2 EL antenna scans from Down to Up;

7.3 AZ antenna scans from Right to Left;

7.4 EL antenna scans from Up to Down.

8 The complete cycle is repeated at a rate of 1 Hz. An r.f. commutating switch, in synchronism with the above cycle, connects the operational Radar Transmitter and Converter Grp, Signal Data units via the Waveguide Switch, X-band, to each antenna during its scan periods.

9 Detailed information of the Antenna system is given in the Cabin Ancillary Group manual, AP 115E-0501-1.

Angle data generator

10 The Angle Data Generator (ADG) unit receives digital data from the antenna's shaft encoders, together with the relay pulses originating from the commutating R.F. switch unit. The ADG contains the circuitry, whereby the input number from the shaft encoder is converted to a number in the output word, linearly representing beam pointing angle. The conversion is controlled by front panel programming, using the data from the antenna calibration label. The ADG output comprises a 12-bit digital word. Eleven bits of the word signify the instantaneous beam pointing angle of the antennas, and one bit indicates the selected antenna to which the word applies. The data output is then routed to the Indicator group and Local Control group for processing.

Transmitter group

11 The transmit trigger input to the unit is routed from the Blanker Interference in the Receive Group.

12 The transmitter comprises a ceramic thyratron pulse modulator which provides the input pulse to a tuneable magnetron controlled by an AFC loop. The resulting high power r.f. pulses are fed at a frequency of 9080 MHz to both antennas, via the transmit/receive circulator in the Converter Group Signal Data, the Waveguide Switch X-band and Commutating R.F. switch.

13 Under remote control, the p.r.f. of the triggers is automatically staggered (repeating the stagger over five pulses) to eliminate the generatio of blind speeds for aircraft velocities up to 600 knots. Under local control, unstaggered p.r.f. can be selected, primarily for maintenance purposes, in which case the p.r.f. is constant at 3300 pps.

14 The standby transmitter can be energised simultaneously with the operational one for maintenance purposes as the Waveguide switch, X-band automatically feeds the standby r.f. power into a dummy load.

Waveguide switch, X-band

15 A motor-actuated R.F. switch, responding to the channel-select command from the Local or Remote Control Unit, routes the common transmit/receive waveguide feed from the selected radar channel to the antenna system. The redundant waveguide feed from the standby radar channel is switched to a high-power dummy load.

Converter group, signal data

16 A single cabinet houses two identical Electronic Frequency Converter Units. The following description applies to each converter unit.

17 The high power r.f. pulse generated by the Transmitter is routed via the Converter to the AZ-EL antenna system. A low-power sample of the transmitted pulse is derived, by a directional coupler mixed with a Stable Local Oscillator (STALO), and down-converted to an intermediate frequency of 30 MHz. The resultant i.f. pulse provides two functions:

17.1 To phase-lock a 30 MHz gated oscillator, in order to provide a consistent phase-relationship between the transmitted r.f. pulse and the STALO. This oscillator is titled the Coherent Oscillator (COHO) and provides an input for the phase-sensitive, detection function in the Blanker Interference Unit.

17.2 A reference signal for Automatic Frequency Control (AFC) of the magnetron frequency.

18 Received target signals are routed from the antennas via the Commutating R.F. switch and Waveguide switch X-band to the common input/output port of the Converter. A T/R switch is provided to protect the subsequent signal amplifiers from the high-power transmitted pulse.

19 The received signals are amplified at the r.f. frequency and mixed, together with an input from a Stable Local Oscillator (STALO), for down-conversion to an i.f. frequency of 30 MHz. The signals are then further amplified at i.f. and routed out to the Amplifier Detector unit for processing.

Receiver group

20 A single cabinet houses two Amplifier Detectors and two Blanker Interference units, one for each radar channel.

Amplifier detector unit

21 The i.f. signals from the Converter group are processed to provide the following functions:

21.1 Coherent MTI amplification and signal detection.

21.2 A selectable linear or logarithmic/fast time constant (FTC) amplification and detection, for Normal Radar signals.

21.3 An a.f.c. voltage to drive a tuning motor/gearbox which is mechanically coupled to the transmitter magnetron.

21.4 A sensitivity time constant (STC) waveform to control the receiver gain with respect to range.

21.5 Lock test signals for COHO oscillator tuning and MTI performance testing.

22 The resulting data and video signals are then passed to the Blanker Interference.

Blanker interference unit

23 The incoming signals are processed to provide:

23.1 The rejection of low-speed and stationary targets (clutter).

23.2 A normal radar window, with an adjustable start range of 100 to 2500 metres and duration of 0 to 2500 metres.

23.3 The rejection of asynchronous signals, i.e. noise, interference etc. and second-time-around echoes (STAR) from the indicator display.

23.4 A cancelled video output from zero range to 15 n miles that can be remotely varied in range by the operator.

23.5 In clear weather, it should be noted that the indicator normally displays linear video output, i.e. normal video.

23.6 Remote selection of Normal Radar Linear or Log FTC video presentation on the Indicator display.

24 Control signals are also generated for synchronizing the operation of all active units in the system.

25 The video output signals are routed via the local control group to the Indicator group.

Indicator group

26 The Indicator group comprises three units, the Electronic marker generator, the Indicator unit and a power supply, fitted into a single rack.

Electronic marker generator

27 The Generator receives video signals from the Blanker Interference, the antenna beam-pointing data from the Angle Data Generator and d.c. voltages, corresponding to the angle of slew (Elevation antenna) and tilt (Azimuth antenna). From these inputs, the unit generates 'bright-up' pulses that are routed to the Indicator unit to form a 'video map', together with the received video signals.

28 The unit provides the following functions:

28.1 Auto/Manual selection of each runway map.

28.2 Selection of range markers.

28.3 Selection of the higher/lower of two preset Glide Slopes.

28.4 Variation of the course line and all cursor markers.

28.5 Setting-up of cursors using built-in-test-equipment (BITE).

28.6 Generation of range and angle sweep voltage waveforms.

Indicator unit (Fig 2.1)

29 The received signals are applied to the CRT display and presented as shown in the figure. Sweep amplifiers within the unit amplify the range and angle voltage waveforms and provide the appropriate drive current to the CRT scan coils.

30 The range marks are shown as 'bright-ups' outside the AZ and EL antenna positions and dim within. This presentation can also be reversed, thereby providing a choice in showing the antenna positions. The display characteristics are in the following manner:

Azimuth display

31 Provides cover for angles of 20° about the antenna's centre line pointing angle, out to 15 n mile to the right of the centre line, and 11.5 n mile to the left of the centre line.

Note ...

Terms 'right' and 'left' are as seen by an approaching aircraft.

Elevation display

32 Provides unrestricted range between angles +0.5° and 3.0°. Ranges at other angles are:

32.1 -1° to not less than 6 n mile.

32.2 +4° to not less than 11.5 n mile.

32.3 +6° to not less than 5.5 n mile.

33 The maximum ranges shown are relative to the Radar Head's position.

Local control group

34 The Control group comprises a Control unit, Multiplexer and Demultiplexer, dual 28V power supply and a Turntable Control unit which is described in the Cabin Ancillary Group Manual.

Control unit

35 The functions of the control unit are:

35.1 To select by control selector the choice between Radar Head or Ops. Centre operation.

35.2 To select either radar channel A or B for operation, with the non-operational channel selected for standby or maintenance operation.

35.3 To provide simultaneous status indications of both radar channel

35.4 To select runway position.

35.5 To control the antenna scan drive, and to select the antenna polarization.

35.6 To cancel the remote control selection of either or both radar channels.

35.7 To provide visual and audible warning of certain system malfunctions.

36 The video signals, servo data control and status signals are selected then multiplexed in the Mux/Demux unit for transmission to the Remote Mux/ Demux Group in the Operations Centre.

37 The transmission of the multiplexed data to, and the reception of control and analogue signals from the Operations Centre is by two coaxial cross-site cables, one for transmission and the other for reception.

Remote mux/demux group

38 The Mux/Demux group comprises a Mux/Demux Unit and dual 28V power supply. The received data is demultiplexed, the control data being fed to a Remote Control unit for selection and control of two Indicator groups, and the video signals being routed directly to the Indicator groups.

Remote control unit

39 The remote control unit provides the following functions:

39.1 Selection of radar channel A or B for operational use.

39.2 Simultaneous status indications of both radar channels.

39.3 Selection of Radar Head orientation.

39.4 To control the antenna scan drive, and to select the antenna polarization.

39.5 Selection of either Indicator group as MASTER control.

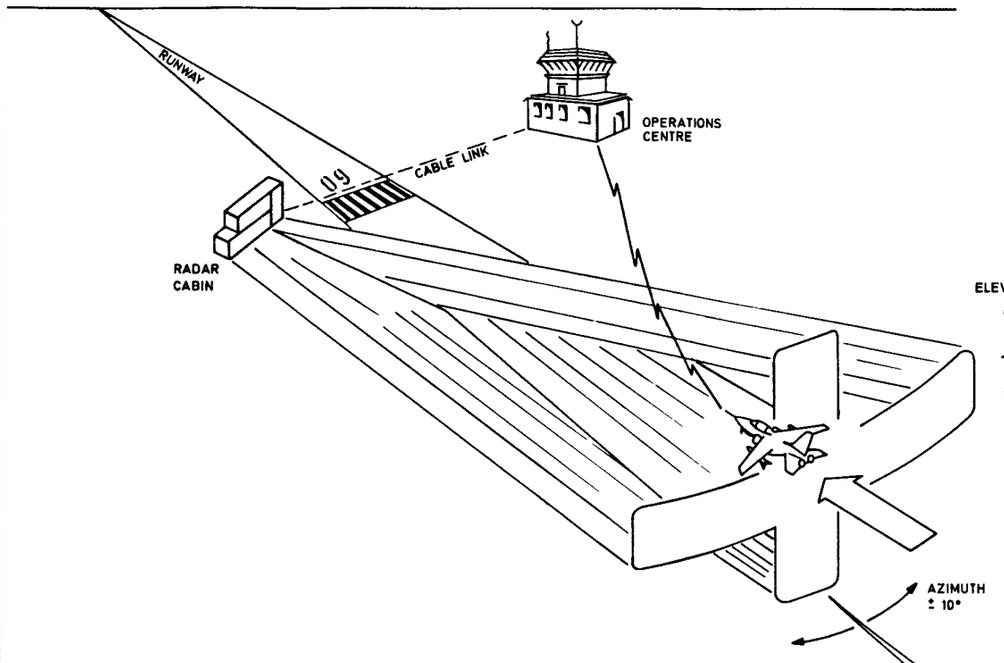
39.6 Visual and audible warning of Radar Head malfunction.

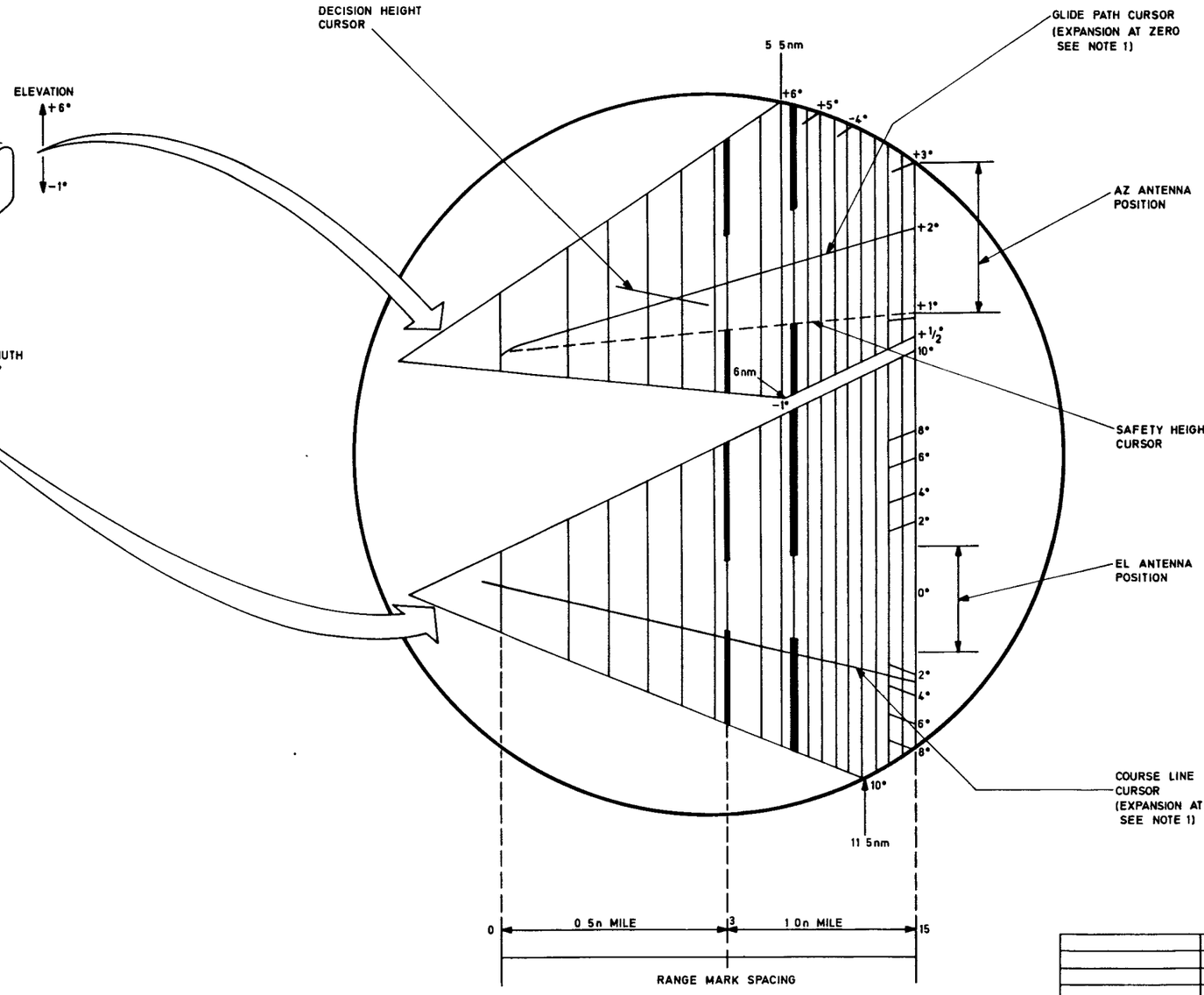
Note ...

The operator controls of the non-selected Indicator become ineffective once the transition has been made.

40 Provision is made for connection of a third Indicator Group.

41 Transfer of control is interlocked so that the last location in control, must allow the transfer to take place before the other site operator takes over. The operation of the remote Indicator groups is the same as that outlined in para. 26 to para. 33.





NOTES 1 WITH EXPANSION CONTROL AT MAX, BOTH CURSORS OPEN OUT 0 35° EITHER SIDE OF THEIR CENTRAL POSITION
2 ZERO RANGE COINCIDES WITH TOUCHDOWN

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CRT. CENTRE DISPLAY PRESENTATION

AMENDMENT	ISSUE	DATE

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FIG. 2-1

Chapter 3

SYSTEM DETAIL

CONTENTS

ILLUSTRATIONS
(BOUND IN AP 115E-0500-10 CHAPTER 1)

SYSTEM DETAIL

GENERAL

1 The description has been written according to the flow-paths shown in the supporting detailed block diagrams; these diagrams contain significant waveforms for the purpose of fault diagnosis.

2 Where the flow path enters a unit, reference should be made to the equipment's AP publication for detail. The AP number is given within the relevant equipment block on each diagram.

3 System reference numbers are provided within most blocks, and are also indelibly marked on each end of the system's cables. These numbers are listed, together with their equipment, in TABLE 1 Chap 1. Refer to Chap.4 of the Manual for system cabling.

4 Reference to units or sub-units within groups is given in the following manner e.g.:

4.1 No.8 is the Transmit Group CH.A, A1 is the Transmitter, Radar unit and A1 is the sub-unit within the unit i.e. reference 8A1A1.

4.2 No.9 is the CH.A unit within the Converter Group, Signal Data and A3 is the sub-unit within the unit i.e. reference 9A3.

5 In this system, the Transmitter HVPS, the Amplifier Detector and Blanker Interference units each have a front panel switch labelled LOCAL/ REMOTE. When these switches are set to LOCAL, maintenance controls on the front panels of the units, stated, are energised, thereby allowing selection and control of the Radar functions from the units front panels. In the REMOTE position, the front panel controls of the units are inoperative as control has been transferred either to the LOCAL CONTROL UNIT and local indicator group or in the Radar Head, REMOTE CONTROL UNIT in the Ops. Centre and INDICATOR GROUP as selected.

6 In terms of normal operational use of the system, the switch selection stated, should not be confused with LOCAL CONTROL (Radar Head) and REMOTE CONTROL (Operations Centre).

System timing (Figs 3.1, 3.2 and 3.3)

7 A p.r.f. stagger generator in the Synchronizer provides, through the use of state, range and p.r.f. counters, trigger generators, decoders and gating circuits, a repeating series of five staggered pulses from which all system timing triggers are derived.

8 The synchronizer 4A2A4 receives the data logic from level converter 4A2A7 in the form of master/slave and stagger/unstagger signals. In Fig 3.1, these signals are controlled by relays K1, K4 and in the LOCAL position allow master/slave and staggered/unstaggered control of the synchronizer from the front panel switches.

9 However, in the REMOTE position de-energised relays K1, K2, K4 and energised relay K3 automatically place the synchronizer in MASTER operation with only staggered p.r.f. available when that channel is selected.

10 In Fig. 3.2 the clock signal is channel-selected by relay K30 in the Local Control unit, then fed to the Timing Generator (7A2A6) where it initiates the process of data conversion. An output from 4A2A7 level converter is routed to the standby channel for conversion.

11 The pre-system trigger in Fig. 3.3 initiates the COHO gate and r.f./i.f. test signal in the Amplifier Detector (4A1).

12 For further details refer to AP 115E-0506-1.

Transmit path (Figs 3.3 and 3.4)

13 The transmit trigger, generated in the Blanker Interference (4A2) by the Synchronizer (4A2A4), provides a trigger pulse for firing the radar transmitter at precise intervals. The pulse is amplified by the Trigger Amplifier (8A1A1) which fires the main modulator. The modulator generates the high power pulse which in turn causes the magnetron to oscillate and produce stable, 0.18 μs duration, high-power pulses along a waveguide to the Converter Group, Signal Data.

14 AFC control of the magnetron frequency is provided by error signals generated in the Amplifier Detector unit (4A1), from an SCR unit (4A1A2). The input to the SCR unit is derived from the Frequency Discriminator

(4A1A8) which determines whether the COHO lock pulse is at its correct frequency.

15 The four-port, ferrite circulator, HY1, in the Converter Group, Signal Data (9) routes the high-power, r.f. pulses through a waveguide to the Waveguide Switch, X-band (12). Here, the pulses are channelled to either a Commutating R.F. Switch (13), which feeds the pulses alternately at approximately 0.25 second intervals to the Azimuth and Elevation antennas, or to a dummy load.

16 Each antenna receives approximatley 800 r.f. pulses during its operating 0.25 second interval, and radiates them either as circular or linear polarized waves depending upon local or remote control selection by the operator.

17 Details of the waveguides, Commutating R.F. Switch and Antennas are given in AP 115E-0501-1.

Pretrigger paths

18 The Pretriggers are generated by the Synchronizer (4A2A4) just before the transmit trigger. There are four pretriggers that perform the following functions:

18.1 Pretrigger (1)

Converted to logic in Level Converter (4A2A7) and routed to the STC and COHO gate generator (4A1A1) where it generates the R.F. gate and Normal/MTI s.t.c. waveforms.

18.2 Pretrigger (2)

Routed directly to the Local Control unit (3A1) where it is channel-selected and fed to the Gate generator (6A1A6). Here, it is processed in order to produce the gate outputs as shown in Fig 1.25 AP 115E-0508-1. The output to the Sweep Gate generator (6A2A7) produces the outputs shown in Fig 1.43 AP 115E-0508-1.

18.3 Pretrigger (3)

Routed directly to the Local Control unit where it is channel-selected and fed to the Timing generator (7A2A6). Here, it is converted to TTL levels, then passed to 7A2A2 to control the conversion of the corrected AZ-EL angle data from binary to BCD.

18.4 Pretrigger (4)

Routed directly to the Local Control unit where it is channel-selected and fed to the Multiplexer/Demultiplexer (3A3). Here, it is processed and routed over the cross-site cable to the Remote Mux/Demux unit in the Operations Centre, where it is demultiplexed and distributed to both Indicator groups.

Receive path (Figs 3.5 and 3.7)

19 Received signals from the antennas are routed via the commutating R.F. Switch (13) to the Waveguide Switch, X-band (12). Here the r.f. pulses are channel-selected by local or remote control and fed to the TR switch (9A1) via the circulator (HY1). The TR switch is gated to attenuate large signals at close range.

20 The pulses are then applied to r.f. circuits where they are amplified by approximately 20 dB, adding minimal noise in the process, and mixed with an input from a stable local oscillator (STALO) for down-conversion to an i.f. frequency of 30 MHz.

21 After further amplification at i.f. the signal is divided to produce:

21.1 A Normal Video i.f. signal which is routed to the Norm/Log/FTC amplifier (4A1A10), (refer to para. 24).

21.2 An MTI video i.f signal which is routed to a COHO I.F. amplifier (4A1A9), (refer to para. 27).

22 A portion of the transmitted r.f. pulse is fed to the COHO Mixer preamplifier (9A5) together with a signal from the STALO (9A4) to produce a 30 MHz lock-pulse which is applied to the following:

22.1 Frequency Discriminator (4A1A8), to provide the stimulus for automatic frequency control (AFC) of the magnetron.

22.2 An r.f/i.f. test signal generator to provide a test signal for the MTI processor.

22.3 COHO I.F. amplifier (4A1A9) to provide a phase-lock for an internally gated 30 MHz oscillator.

Normal video I.F.

23 The signal is processed and amplified at i.f. frequency then detected to provide the Normal video output. Linear or logarithmic amplification may be selected by the operator to suit operating conditions.

24 Linear operation is controlled locally or remotely by the NORMAL-LOG/FTC switch on the front panel of either the Amplifier Detector unit or Indicator Units, with or without STC operation. In the LOG/FTC mode the signal is amplified, the gain increasing logarithmically as the input signal strength decreases. The signal is detected and further amplified by a video amplifier having a fast time constant circuit.

25 The normal video output is then routed to the Star gate generator (4A2A6) where a three sweep-period video correlator inhibits reply signals from returns that are located at ranges where the signal path transit time exceeds the system pulse repetition interval (Second Time Around Targets), and any other asynchronous signals e.g. interference from other radars. Control of the STAR circuit is provided on the Amplifier Detector and Indicator Units. The signal is then delayed for synchronizing with the MTI video signal at the Video Mixer (4A2A5). Operator ON/OFF control of the video correlator is provided on the front panel of the master indicator in Remote, and the front panel of the Blanker Interference on Local.

Moving target indication (MTI)

Note ...

Paras. 26 to 31 are for explanatory purposes.

26 Moving target indication (MTI) is a means of distinguishing between echoes from fixed and moving targets. It is therefore necessary to choose some characteristic of the signals that are different in each instance. The property that is most sensitive to the change in range of the target, is the phasing of the received MTI signal relative to that of the transmitted pulse.

27 For a fixed target the phase difference is fairly constant from pulse to pulse, but for a moving target it will vary in accordance with the speed of the object.

28 A phase-sensitive detector can thus be used to obtain an output that is constant for a permanent echo, but varies in amplitude and polarity for a moving target echo. Should this output of mixed, permanent echo and moving target pulses be passed through two channels; one of which has a delay equal to the pulse repetition period and the other has its output inverted, the combination of these two outputs will cancel the permanent echoes, but leave the moving target signals on the display.

29 In this system, the output of the stable local oscillator (STALO) (9A4) is mixed with a sample of the transmitted pulse and, by a separate mixer with the received signals, converting both to the intermediate frequency of 30 MHz.

30 The 30 MHz sample of the transmission is used to phase-lock a coherent oscillator (COHO) which is switched off after each scan period, and switched on again just prior to the arrival of the next synchronizing pulse. The COHO is thus phase-locked to the transmitter pulse for the whole of the scan period, and provides a reference output with which the phase of the received signal can be compared.

31 The MTI i.f. signals in the COHO i.f. amplifier (4A1A9) are amplified then divided. One half is fed to a phase sensitive detector where the signals are mixed with the COHO oscillator output to produce a bipolar video pulse, the amplitude and polarity of which is a function of the range of the target. The second half is detected, amplified as video and passed through a limiter stage to inhibit amplitude fluctuations. The output (clutter) is then applied to the STAR Gate Generator (4A2A6) for use in the control of Second Time Around Rejection (STAR) circuits.

32 With the STAR function ON, a normal video output is routed to the Video Mixer (4A2A5) only when three out of three p.r.i's are present in the same range; if less than three p.r.i's are present, the video output is inhibited.

33 The bipolar video pulse is processed in the Blanker Interference by a double-canceller circuit using digital techniques to reject stationary targets or permanent echoes, (refer to the equipment manual for details).

Note ...

Effective cancellation of permanent echoes is ensured by balancing the amplitudes of the pulse outputs from the two cancellers, and by adjusting the normal video delay so that corresponding delayed and undelayed MTI pulses (normal) are synchronous at the cancellation point. Amplitude balance is maintained, by the automatic gain control on the MTI D to A circuits and synchronism of the system p.r.f. being locked to the delay of the normal video line.

34 The Cancelled (MTI) video and the Normal video are routed to an electronic switch in the Video Mixer (4A2A5) where both signals are gated to produce a mixed video output comprising:

34.1 Normal radar signals, for the duration of the radar 'window' which allows signals reflected from the passive touchdown markers to be displayed on the CRT.

34.2 MTI video, to a range determined by the operator.

34.3 Normal radar video, from the end of the MTI range to the maximum displayed range.

35 A short 'window' of Normal Radar video signals is provided in the cancelled-video time domain. The start range and duration of this window is controlled by individual preset controls. The range of adjustment provided is given under the heading of 'Leading Particulars'.

Mixed video (Fig 3.7)

36 The mixed video outputs are then channel-selected in the Local Control unit and routed in the following manner:

36.1 Mixed video (1)

To the Video Mixer (6A1A4) where it is mixed with range marks, glide-path, course line, safety cursor and decision height cursor pulses to form a composite video output which is controlled from the front panel by the VIDEO GAIN and SWEEP INTENSITY controls, and amplified in the Indicator unit (6A2) for application to the CRT display.

36.2 Mixed video (2)

To the Mux/Demux unit where it is processed for distribution over the cross-site cable to the Remote Mux/Demux unit in the Operations Centre; here it is demultiplexed and distributed to both Indicator groups as described in sub-para. 36.1.

CRT display

37 The Indicator unit consists of timebase circuits, video amplifiers and a 16 inch display CRT. The data presented on the CRT has the following characteristics.

37.1 Zero range on the display coincides with the runway touchdown point. A selection of 0.5, 1.0 n mile and two special markers by internal programme links, provide the following marker selections:

37.1.1 0.5 n mile markers up to a maximum of 16 marks (=7.5 n mile).

37.1.2 1.0 n mile markers up to a maximum of 16 marks (=15 n mile).

37.1.3 The first special marker coincides with the last 0.5 n mile mark selected.

37.1.4 The second special marker may be preset to any one mile marker after the end of the 0.5 n mile markers.

Marker selection facility

38 The following two examples illustrate the marker selection facility:

38.1 Example 1

Let 0.5 n mile markers be selected to a range of 3 n mile (=7 marks). The first special mark will occur at 3 n mile range followed by 1.0 n mile marks to the end of the displayed range, with the second special mark at say the 6 n mile range.

38.2 Example 2

Let 0.5 n mile markers be selected to a range of 5 n mile. The first special mark will occur at 5 n mile followed by 1 n mile marks to the end of the displayed range, with the second special mark at say the 7 n mile range.

39 The positions of the Decision Height, Glide Slope, Safety Height cursors and the Course line are variable by preset controls. Built-in metering and monitoring facilities assist the setting-up and operating procedures.

40 A switch selection of two Glide Slope Cursor angles is provided for each of the four runway positions. Preset controls are provided for each selection and these permit the Glide Slope Cursors to be set to any value within the limits given under the heading of 'Leading Particulars'.

41 Control systems (Fig 3.8)

42 Control selection is provided only by the LCU. With SELECT button depressed, relay K1 (LCU) energises K1 (RCU), thereby transferring control to OPS CENTRE and lighting the indicator lamps in both control units.

43 Channel selection is provided by both control units in Radar Head control, with CH.B SELECT button depressed, relay K2 energises relay K3 (LCU). A tellback signal from the LCU to the RCU energises relay K4 and lights the CH.B indicator lamp. Channel A is then on standby and can be used for maintenance purposes.

44 Maintenance selection is provided only by the LCU. With standby channel A selected for maintenance, relay K19 (LCU) energises and operates K21 (RCU); each CH.A MAINT - SEL lamp lights. At the same time relay K21 (LCU) energises and operates K23 (RCU); both CH.A STATUS - MAINT indicators light. However, should the operational channel be selected for maintenance, the selected CH.A or B STATUS - MAINT lamp will not light until such time as the selected channel is transferred to standby and then to maintenance.

Note ...

Once a channel has been selected, that channel cannot be chosen for operation until it is released from maintenance.

Antenna system (Fig 3.9)

45 The servo data and control signals from the antennas are routed through the Contactor panel to the Local Control unit where they are divided. The servo data signals are fed direct to the Indicator group and Mux/Demux unit. The control signals are selected by the operator for RADAR HEAD or OPERATION CENTRE control.

Radar head

46 Radar head On selection, the servo control signals are routed to the front panel joystick control on the Indicator Unit (6A2).

47 Operations centre On selection, the servo control signals are multiplexed with the servo data signals for transmission over the cross-site cables to the Remote Mux/Demux unit, where they are demultiplexed and fed to the master Indicator group for control.

48 The local servo data signals are fed to the Range Marker generator (6A1A5) together with the angle voltage from the Angle Data Generator, and provides range marker intensity.

49 Operation of the antenna scan switch energises relay K13 in the LRU, and contactor relay K5 or 8 and 11, and lights an indicator lamp in both control units. Scan operation can be initiated from either control unit.

50 Linear or circular antenna polarization can be selected locally or remotely. Local operation energises relay K14 in the LCU and the contactor relay K9 in the TTCU. Tellback signals operate the selected polarization indicator lamp in both control units.

Angle data control (Fig 3.10)

51 The antenna encoders determine the pointing angle of the antenna beam and supply this data to a Correction unit (7A2A1) where it is selected by a gate pulse.

52 The angle data is sampled, and its data magnitude compared with that of the preset switches in 7A2A7. The angle data is then corrected for beam pointing angle and fed to the indicator via level converters.

53 Angle data (1) The serialized angle data is routed to a serial/parallel converter (6A1A7) in synchronism with the pretrigger pulse. The data is a 12-bit word; the first bit produces the AZ-EL gate which switches the AZ and EL scans at an approximate rate of 0.25 seconds, the remaining 11-bits are converted to angle voltages, the timing of which is shown in Fig 3.10. The data is distributed in the following manner:

54 The angle voltage data feeds the angle voltage selection switches and DVM on the front panel; determines the Azimuth or Elevation display region of the decision height cursor (DHC); and in the Indicator unit (6A2) controls the display range and timebase circuits which are as follows:

54.1 The X-sweep generator generates a logarithmic timebase sweep corresponding to a maximum displayed range of 15 n miles. The operator may select a long or short range for display by operating the selector switch. Independent preset controls provide the upper limit of the long range which may be preset between 10 and 15 n mile, and similarly, that of the short range to 7.5 n mile.

54.2 The Y-sweep generator receives voltages proportional to the instantaneous pointing angle of the AZ and EL antennas. These are time multiplexed in accordance with the switching sequence of the antenna scanning periods.

54.3 The deflection amplifiers convert the voltage outputs of the X and Y sweep generators into current drive waveforms to drive the CRT deflection coils.

55 Angle data (2) The angle data output is routed to the Mux/Demux unit where it is multiplexed for transmission to the Remote Mux/Demux group, then demultiplexed for distribution to the Indicator groups.

Note ...

The Indicator groups function in the same manner as that in the Radar Head.

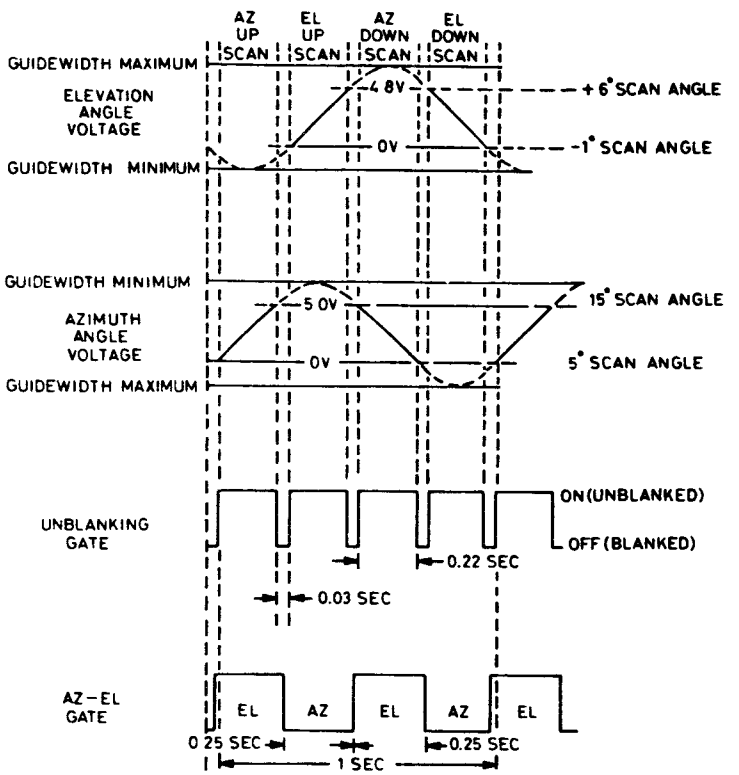


Fig. 3.0 Antenna Function-Timing Chart

Transmit control (Figs 3.11 and 3.12)

56 The HV interlock and control circuits determine the switch-on procedure of Transmitters CH.A and CH.B. Channel B Transmitter is selected by pressing the selection switch and Channel A by releasing the switch.

57 The waveguide interlock is a drawer switch and, when in the closed position, operates either CH.A relay K67 or CH.B relay K68 in the LCU. The antenna radiation safety switch in the closed position energises relay K70.

58 In LOCAL control, with CH.A selected for standby or maintenance (CH.B in operation), relays K27 and K65 de-energises and K66 energises. The Waveguide Switch X-band switches to CH.B via relay K16 in the Turntable Control unit and energises relay K69 thereby enabling the HV interlocks in the Transmit group CH.A or CH.B.

59 In Fig 3.12 control can be from either the LCU, or RCU in the Operations Centre. On application of the a.c. and d.c. supplies, a 3 minute delay in the Transmitter's HV PSU is initiated. At the end of the period relay K10 (CH.A) or K12 (CH.B) will operate and light the selected STATUS - READY lamps in both control units.

60 The HIGH VOLTAGE CONTROL - ON switch on the active control unit when pressed, energises relay K4 (LCU) and, with K7 energised (CH.A in operation), applies power to the selected transmitter. Return signals then energise relays K9 and K11 and light the STATUS - HV lamps in both Control Units.

Note ...

The HV OFF and RESET controls are paralleled with those in the Transmitter Groups, and both may be used to operate the equipment. The standby HV controls are also operational.

Receive control (Fig 3.13)

61 The receive system is controlled mainly from the selected MASTER Indicator group in the Operations Centre, unless the system is undergoing maintenance where upon control is transferred to the local Indicator group in the Radar Head by the LCU.

Note ...

The remote and local Indicator groups are alike and with similar controls.

62 With RADAR HEAD selected at the LCU, relays K34 to K36 de-energise thereby enabling control from the local Indicator group. With CH.A selected for maintenance, the following conditions exist:

62.1 Relays K25 and K26 are de-energised.

62.2 CH.A maintenance and status indicators are lit on the LCU and RCU.

63 The Receiver can be operated only by the local Indicator group if the local/remote switches in both 4A1 (Amp. Dectector) and 4A2 (DMTI) units are in the remote position.

64 Details of the receiver's control functions are given in the equipment's manual as shown.

Runway map selection (Fig 3.14)

65 With the turntable at selected position 1, relay contacts K50 (LCU) close to energise relay K50 (RCU) which in turn energises relays K65 and K66 thus completing the automatic runway selection circuit and lighting the AUTO lamp on the front panel of the Electronic Marker Generator (A1). Manual selection of the runways is initiated by a RUNWAY MAP SELECT switch in Runway Selector board (A1A1). With the turntable CW/ACW switches made, relays K56, K57 are energised, thereby completing auto-map select control path 3 to the Runway select switch.

Turntable control (Fig 3.15)

66 The turntable can be controlled either from the LCU or RCU. With the ENABLE switch pressed relay K39 (RCU) energises K29 (LCU) and initiates a WARNING via relays K37, K40 causing:

66.1 A WARNING indicator lamp to light in both LCU and RCU.

66.2 An audible warning to sound at the Radar Head cabin.

At the end of the warning period, the WARNING lamps extinguishes and the ENABLE-ON lamps light in both control units. MANUAL or AUTO control can then be selected.

67 In AUTO control, relay K37 (RCU) energises relays K32, K49, K64 thereby allowing the use of the AUTO SELECT switches. With a runway position selected, a position indicator lamp lights in both control units. Once the new position has been reached, the other position indicator lamp lights and relay K60 or K61 (LCU) operates the CW or ACW TOLERANCE lamp in both units. In the RCU, relays k56 and K57 are energised.

68 During turntable rotation, the MANUAL CONTROL-CW or ACW indicator lights depending upon direction. However, should the turntable pass through a runway position before reaching the selected position, the position indicators will flash as the position is passed.

69 If only one of the TOLERANCE lamps light, the MAN-AUTO control must be set to MANUAL and the CW/ACW controls used until both TOLERANCE lamps light.

70 With MANUAL control selected, relay K37 (RCU) energised relays K64, K49 and K32 (LCU), and return signal of which energised relay K38 (RCU) and sets the circuit to MANUAL. The manual control CW and ACW switches are held depressed until the turntable reaches its position as indicated.

71 In the event of a fault causing the turntable to overrun, relays K62, K63 (LCU) energise relays K58, K59 (RCU) and the OVERRUN indicators in both units light.

Alarm control (Fig 3.16)

72 A fault at the Local 28V P.S.U. causes relay K17 to energise and 28V PS FAULT lamp to light in the LCU and RCU units.

73 An over-temperature condition, detected in the air-cooling system, causes relay K18 to energise and OVER TEMP FAULT lamp to light in the LCU and RCU units, and an audible warning to sound.

Power distribution - a.c. supply (Fig 3.17)

74 Both the Radar Head and Operation Centres are connected to a local power source or auxiliary power unit supplying 240V, single phase, 50 Hz supply.

75 Distribution of the equipment A.C. supply is as shown. Details regarding A.C. supplies is provided in the Cabin Ancillary Group Manual (refer also to the heading 'Leading Particulars').

28V D.C. supply (Fig 3.18)

76 Both the Radar Head and Operation Centres are provided with a dual 28V power source. Distribution of the 28V power supply for the Radar Head is as shown.

77 Details of the local and remote 28V power supply units are given in the Control Group Equipment Manual.

Cross-site data transmission

78 Two coaxial cables carry the multiplexed data between the Radar Head and Operations Centre. One carries data from the Radar Head to the Operation Centre, the other cable carries data in the reverse direction.

79 Frequency compensation is provided for balancing the frequency/attenuati characteristic of the cross-site cable; the amount is variable to suit the lengths and types of cables.

80 Voice communication between the Radar Head and Operations Centre is provided in the form of a telephone link.

81 The transmitted data is in the following manner:

81.1 Composite video signal

The signal video, radar pretrigger and antenna scan data combine into a single composite video signal, and transmitted in analogue format over a single wide-band video channel at the p.r.f. rate.

81.2 Low frequency analogue signals

The antenna control data is converted into a digital format, and transmitted via a narrow-band sub-channel, at a frequency above the pass-band allocated to the composite video in sub-para. 81.1. At the receiving end the data is re-converted into analogue form.

82 ON/OFF status indications

These signals are time multiplexed, and transmitted via a narrow-band sub-channel at a frequency above the pass-band allocated to the analogue signals in sub-para. 51.2.

Note ...

The signalling rate used for the narrow-band channel signals is approximately a 1000 baud.

Operations centre to radar head

83 Command and control signals, i.e. i.f. gain controls, MTI interval, and ON/OFF signals, are processed then transmitted on two narrow-band channels to the Local Control group, where they are distributed. The analogue functions are converted to digital format for transmission over the cable link, and re-converted to analogue form at the receiving (demux). end.

Chapter 4

SETTING TO WORK

CONTENTS

CONTENTS (contd.)

SETTING TO WORK

INTRODUCTION

1 This chapter contains the necessary information and instructions for switching on, setting-up, and aligning the dual channel PAR CR62 radar system. Operating and maintenance instructions are supplied as a separate publication. Details for servicing and aligning individual units are provided in their own equipment manuals, a list of which is given in TABLE 2 of Chap. 1.

2 Built-in meters and/or access points are provided in each unit for checking all significant voltages during alignment procedures. The flow diagrams in Chap. 3 show significant waveforms and test points for fault diagnosis, also unit AP numbers for reference.

3 Monitor points are also provided on sub-units and p.c.b's for fault diagnosis. Inaccessible monitor points and preset controls can be reached with the use of an Accessory Kit comprising Extender boards and cables (TABLE 1, Chap. 1) for the Radar Head or Operations Room equipment as necessary. System cable information regarding routing and pin connections is given at the back of this manual.

4 For maintenance purposes, the RADAR HEAD equipment can be switched on

independently as it contains the master selection controls for RADAR HEAD

or OPS CENTRE, and CH.A or CH.B maintenance.

WARNINGS AND CAUTIONS

5 Red warning labels are fitted to all units where in voltages in excess of 50 V d.c. or 30 V r.m.s. are used. Yellow caution labels that require a particular action to be taken are also fitted to each unit. All warning and caution labels must be read and understood before carrying out any service procedures.

SWITCH-ON PROCEDURE

CAUTIONS...

(1) Personnel are advised to keep clear of Antennas to avoid distortion of the radiated beam, and to minimise the risk of discomfort through radiated r.f. power.

(2) Power control switches should be operated in the order given.

6 Under normal conditions the OPS CENTRE and RADAR HEAD equipment are switched on simultaneously, since the CONTROL SELECTOR in the LCU in the Radar Head is initially set to OPS CENTRE.

Operations centre

7 At the OPERATIONS CENTRE, check the condition of the following controls:

7.1 Circuit breakers on the Mains Distribution Panel are set to ON.

7.2 At the Remote Control Unit (RCU), the ANTENNA SCAN ON/OFF switch is set to OFF.

7.3 On the Indicator Units, the SWEEP INTENSITY VIDEO GAIN controls are fully counter clockwise (CCW).

8 At each unit front panel, set the POWER ON/OFF switch to ON.

9 At the Mux/Demux group, set the the dual 28 V power supply switch to ON.

10 At the RCU, select MASTER DISPLAY No. 1.

11 At Indicator Group No.1, allow time for the CRT heaters to warm up, then adjust SWEEP INTENSITY control on the Indicator Unit until the display is just visible.

12 Repeat para's 10 and 11 for Indicator No. 2.

13 Establish contact with the RADAR HEAD by telephone in order for control to be transfered, then check that the RADAR HEAD lamp lights.

Radar head

Note...

Should the Radar Head be already switched on, refer to para. 28 onwards, if not, continue from para. 14.

14 In the Radar Head, set CABIN and OBSTRUCTION light circuit breakers at the Domestic Power Distribution panel to ON, then switch on the Cabin lights. Set VENTILATION circuit breakers to ON.

Note...

For maintenance purposes check that the circuit breaker for the bench power sockets is ON, the ANTENNA light circuit breaker is ON and the HEATER circuit breaker is ON, if required.

15 Check the condition of the following controls:

15.1 Circuit breakers on the Equipment Distribution panel are set to OFF.

15.2 At the LCU, the ANTENNA SCAN ON/OFF switch is set to OFF.

15.3 At the Indicator unit, SWEEP INTENSITY and VIDEO GAIN controls are fully counter clockwise (CCW).

15.4 All unit POWER ON/OFF switches are set to OFF.

CAUTION...

Do not proceed if air-conditioning fans fail to operate.

16 At the Equipment Power Distribution panel, set AIR CONDITIONING and CONTROL circuit breakers to ON then check that the air conditioning fans operate.

17 Set the remaining circuit breakers to ON.

18 At each unit front panel, set the POWER ON/OFF switch to ON.

19 In the Control Group, set the 28V d.c. supply switch to ON at the dual 28 V d.c. power supply unit. At this point the 3 minute timer starts in the Transmitters HV PSU.

20 Check that the following unit front panel switches are in the positions stated:

20.1 At the LCU, the CONTROL SELECT switch is set to RADAR HEAD, check that the RADAR HEAD lamp is lit.

20.2 In the CH.A and CH.B Transmit groups, the HIGH VOLTAGE CONTROL - LOCAL/REMOTE switch on the HV PSU is set to REMOTE.

20.3 In the Receiver group, LOCAL/REMOTE switch on the CH.A and CH.B Amplifier Detector and Blanker Interference units is set to REMOTE.

21 At this point, control may be transferred to the OPS CENTRE by depressi the CONTROL SELECTOR at the LCU. Should control be transferred, refer to para. 27, if not, continue from para. 22.

22 Check that either channel is working, perform the following operations at the LCU:

22.1 Check that the CH.A or CH.B STATUS-MAINT. lamp is not lit.

22.2 Depress the CHANNEL SELECTOR switch A or B, check that the selected lamp lights.

22.3 Check that the selected HV READY lamp is lit, then depress the HIGH VOLTAGE CONTROL - ON switch and check that CH.A or CH.B STATUS - HV ON lamp is lit.

23 In the CH.A or CH.B Transmitter group, check that the fuse lamps and HIGH VOLTAGE CONTROL INTERLOCK BY-PASS lamps are not lit.

24 At the Indicator display, adjust the SWEEP INTENSITY control so that the display sweep is just visible.

25 At the LCU, check that the SYSTEM FAULT lamps are not lit.

26 On the completion of satisfactory operation, depress the HIGH VOLTAGE CONTROL OFF push switch at the LCU, check that the OPS CENTRE lamp lights. Control is now transferred to the RCU for operation.

27 At the OPERATIONS CENTRE, Transmitter CH.A or CH.B can be turned on, if required, by proceeding in the following manner:

27.1 Check that the OPS CENTRE lamp is lit.

27.2 Ensure that CH.A and CH.B STATUS - MAINT lamps are not lit.

27.3 At the RCU, depress the CHANNEL SELECTOR switch A or B check and that the selected lamp lights.

27.4 Check that the CH.A or CH.B STATUS - HV READY lamp is lit, then depress the HIGH VOLTAGE CONTROL - ON switch.

27.5 Check that CH.A or CH.B STATUS - HV ON lamp is lit.

28 At the RCU, check that the ANTENNA SCAN - ON/OFF switch is in the off position.

29 The system should now be ready for setting-up and aligning.

OPERATION UNDER ADVERSE PROPAGATION CONDITIONS

30 In rain conditions, the target (signal) to clutter visibility may be improved by selecting the functions as follows:

30.1 At the RCU, select CIRCULAR POLARISATION operation.

30.2 At the MASTER Indicator, adjust MTI INTERVAL control so that the range of MTI video presentation covers the target range.

30.3 Select LOG/FTC video. Set STAR gate to ON.

Notes..

(1) Some loss of radar sensitivity will result when using these procedures.

(2) Target to clutter visibility improvement is dependent upon the nature of precipitation, thus all combinations should be tried

to obtain optimum results.

31 Should asynchronous interference be present, at the MASTER Indicator set STAR gate to ON.

CONTROLS AND INDICATORS

32 The description of front panel controls and indicators for each unit is given in its own equipment manual listed in TABLE 2 of Chap. 1.

SETTING-UP AND ALIGNMENT

33 Setting-up and alignment procedures of the radar equipment must be done on site after the following have been completed:

33.1 Site surveys for distances, elevations etc. (refer to the appropriate Cossor Installation Schedule for each site).

33.2 Cursor alignment voltages (to be entered on TABLE 9).

33.3 PAR Cabin and Turntable alignment.

33.4 Azimuth and Antenna alignment.

33.5 Commutating switch, R.F. alignment.

Note...
The Radar Head equipment must be switched on at least half an hour prior to these procedures to allow for stable operating conditions.

Antenna angle encoders

WARNING...

THE ANTENNA SCAN AND RADIATE SWITCHES IN THE ANTENNA MUST BE OFF.

34 An encoder must be realigned upon replacement or movement from its original factory set position. Realignment requires a minimum of two technicians and a depth gauge (dial reading type).

35 The optical-digital angle encoders on both the azimuth and elevation antennas provide the instantaneous pointing angle data which is linearized automatically in the Angle Data Generator (ADG) with respect to volts per degree of antenna scan.

36 Calibrate the dial indicator, if necessary, by placing it on any flat surface, and rotating the outer ring so that the indicator reads zero when flush with the surface. Lock the ring. Enter the Azimuth antenna through the hatch via the ladder.

37 Insert and clamp the dial indicator in the azimuth array.

Note...
At this point extra help is required for setting-up the encoder for the correct ADG input code.

38 Rotate the RF switch blade in the direction of normal rotation

until the azimuth lamp is lit, as indicated on the front panel of the angle data generator.

39 Rotate the antenna cam drive shaft until the dial indicator is at the minimum reading.

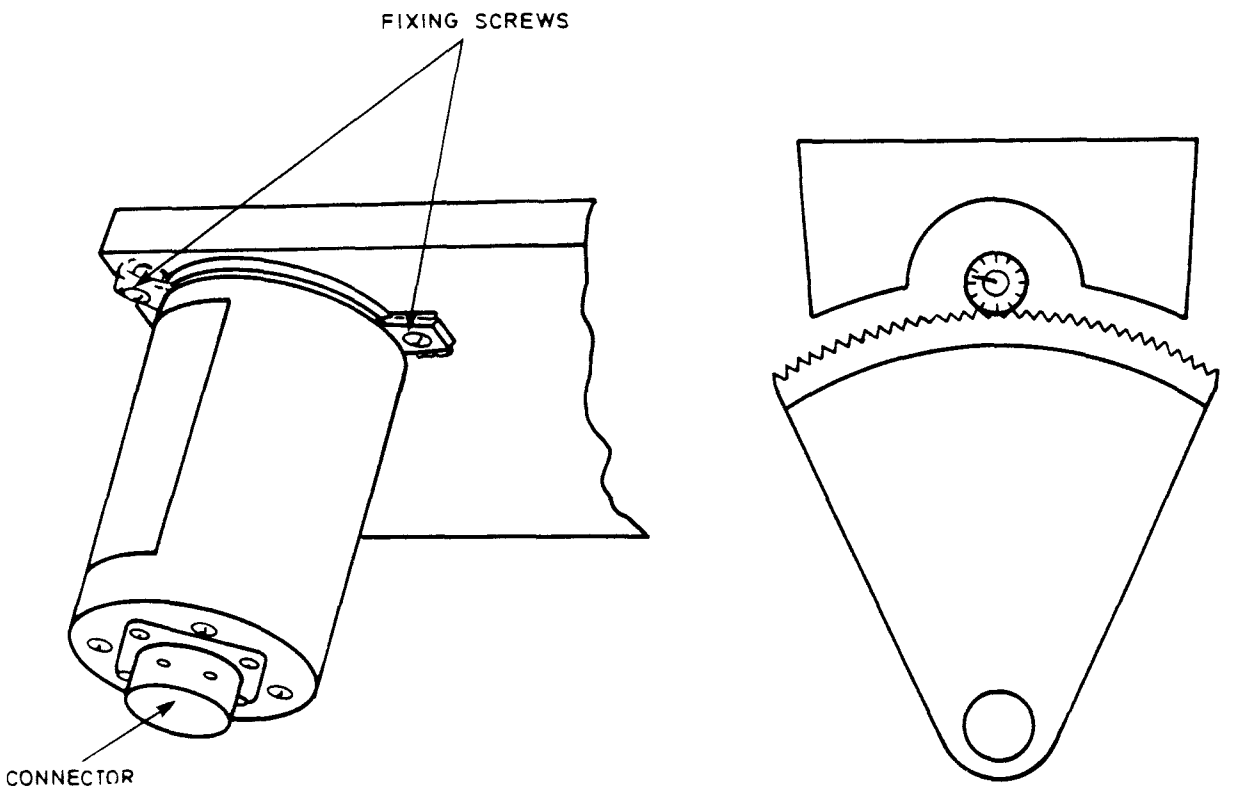


Fig. 4.1 Angle Encoder Gearbox and Quadrant

40 To align the encoder, loosen the three fixing screws so that the encoder can be rotated by hand until the input code, indicated by the LED's on the ADG front panel, is as shown in TABLE 1. Tighten the three fixing screws.

Note...
Confirm that the dial gauge has not changed; if it has changed, repeat para. 40.

TABLE 1 ADG INPUT CODE

	CR1 MSB	CR2	CR3	CR4	CR5	CR6	CR7	CR8	CR9	CR10 LSB
ADG INPUT CODE	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	1	0	0

41 Refit the connector to the relay pulse generator and remove the dial gauge from the Azimuth antenna.

42 Enter the Elevation antenna through the door at the rear of the cabin and clamp the dial gauge in the elevation array.

43 Rotate the antenna cam drive shaft in the normal direction of rotation until the EL lamp lights as indicated on the ADG, then remove the connector from the relay pulse generator.

44 Rotate the rf switch blade until the dial indicator gauge is at a maximum reading. Then align the encoder as stated in para. 40.

45 Reconnect the relay pulse generator's connector. The encoders are now set-up for operation.

Angle data generator (Fig 4.2)

46 The ADG is initially aligned using the dial indicator readings for the seven beam angle positions in the sector of each antenna. The calibration data for the seven beam angles is as shown.

Note...
When checking alignment, the backlash compensation switches of S1 in Memory Unit 7A2A3 should not be altered if the antenna correction points are made in the direction of +6° to -1° for the Elevation antenna, and +10° to -10° for the Azimuth antenna.

47 At the front panel, switch POWER ON/OFF switch to ON.

48 In the ADG Memory unit (7A2A3) set all switches on S1 to OFF (Fig 4.3).

49 Transfer control of the Radar to RADAR HEAD, if necessary, and select an operational channel.

50 Check the ADG power supply output voltages at the front panel. If any of the voltages are out of tolerance, adjust the corresponding voltage adjustment.

50.1 +6 ± 0.2 V (1) power supply - TP5

50.2 +6 ± 0.2 V (2) power supply - TP6

50.3 +6 ± 0.2 V (3) power supply - TP7

50.4 +6 ± 0.2 V (4) power supply - TP8

50.5 +15 ± 0.2 V power supply - TP9

51 At the LCU, depress the HIGH VOLTAGE CONTROL-OFF switch, depress the LIN/CIRC pushbutton switch until the CIRC lamp is lit and set the SCAN-ON/OFF switch to OFF.

Note...
Access to the Azimuth antenna is via the ladder and through the hatch.

NS Nº 5 840-99-858-5525 TITLE. AZIMUTH ANT. IDENTITY 874117/ 000 SER.NO. AAL B53		BEAM ANGLE	MIC READING (INS)
		1°	1·4682
		4°	1·3232
		7°	1·2246
WIDTH	MIC.READING(INS)	10°	1·1547
1,000	1·2680	13°	1·1018
MAX.	1·6701	17°	1·0492
MIN.	1·0074	21°	1·0188

BEAM ANGLE	MIC.READINGS (INS)
1°	1·4682
2°	1·4129
3°	1·3645
4°	1·3232
5°	1·2867
7°	1·2246
9°	1·1761

Azimuth nameplate

NS Nº. TITLE. ELEVATION ANT. IDENTITY 874119/000 SER.No.		BEAM ANGLE	MIC. READING (INS)
		1°	1·4824
		2°	1·4248
		3°	1·3766
WIDTH	MIC.READING(INS)	4°	1·3342
1,000	1·2750	5°	1·2969
MAX.	1·5982	7°	1·2347
MIN.	1·1589	9°	1·1856

BEAM ANGLE	MIC. READINGS (INS)
1°	1·4824
4°	1·3342
7°	1·2347
10°	1·1635
13°	1·1105
17°	1·0576
21°	1·0182

Elevation nameplate

Fig. 4.2 Calibration data on Antenna Nameplate (EXAMPLE)

52 In the azimuth antenna compartment set the ANTENNA SCAN and RADIATE switches to OFF.

53 Place the dial indicator on any flat metallic surface and calibrate, if necessary, by rotating the outer ring so that the indicator reads zero when flush with the surface. Lock the ring.

54 Insert and clamp the dial indicator in the Azimuth antenna array.

55 Rotate the antenna cam drive shaft clockwise until the dial gauge shows the waveguide width measurement corresponding to the 2 degree scan angle. Check that the AZ lamp lights on the front panel.

Note...
Always approach the dial indicator reading from a clockwise direction when rotating the drive shaft.

56 Record the 10-bit ADG INPUT CODE on the table provided at the back of the Preset Switch, protective plate cover on the ADG, and in TABLE 2.

57 Repeat paras. 55 and 56 for each beam angle.

58 Using the SWITCH SELECTOR tool provided in the front panel of the ADG, set each recorded input code into the appropriate A2 WAVEGUIDE WIDTH SET switches on the ADG.

59 Depress the CORRECTION DATA-RESET switch on the ADG front panel.

TABLE 2 AZIMUTH ANTENNA ADG READINGS

Antenna scan Angle (deg.)	Dial Indicator reading (inches)	CR1 (MSB)	CR2	CR3	CR4	CR5	CR6	CR7	CR8	CR9	CR10 (LSB)
2											
5											
8											
11											
14											
18											
22											

Note...
The BUSY lamp will light for several seconds while the calculations are being made. When the BUSY lamp goes off, the ADG is ready to process the antenna angle data.

60 Rotate the antenna cam drive shaft to each of the dial indicator readings, representing the seven scan angles, and note that the ADG angle voltage is within ±0.02 V of the values listed.

Note...
Repeat alignment if angle voltage is not within the tolerance.

Scan angle	Angle volts
2	0.00
5	0.75
8	1.50
11	2.25
14	3.00
18	4.00
22	5.00

61 Remove the dial indicator from the Azimuth array and clamp it in the Elevation array.

62 Rotate the antenna cam drive shaft clockwise until the dial gauge shows the waveguide width measurement corresponding to the 2° scan angle. Check that the EL lamp lights on the ADG front panel.

63 Record the 10-bit ADG INPUT CODE on the table at the back of the Preset Switch, protective plate cover on the ADG, and in TABLE 3.

64 Repeat para's 62 and 63 for each beam angle.

TABLE 3 ELEVATION ANTENNA ADG READING

Antenna scan angle (deg.)	Dial indicator reading (inches)	CR1 (MSB)	CR2	CR3	CR4	CR5	CR6	CR7	CR8	CR9	CR10 (LSB)
2											
3											
4											
5											
6											
8											
10											

65 Using the SWITCH SELECTOR tool provided in the front panel of the ADG, set each recorded input code into the appropriate EL WAVEGUIDE WIDTH SET switches on the ADG.

66 Depress the CORRECTION DATA-RESET switch on the ADG front panel.

Note...
The BUSY lamp will light for several seconds while the calculations are being made. When the BUSY lamp goes out, the ADG is ready to process the antenna angle data.

67 Rotate the antenna cam drive shaft to each of the dial-indicator readings, representing the seven scan angles in TABLE 3, and note on the ADG that the angle voltage is within ±0.02V of the values listed.

Note...
Repeat alignment if angle voltage values are not within the tolerance.

Scan angle	Angle volts
2	0.00
3	0.60
4	1.20
5	1.80
6	2.40
8	3.60
10	4.80

68 Remove the dial indicator from the Elevation array do not set the ANTENNA SCAN and RADIATE switches on until the antennas are set-up and aligned.

Antenna backlash compensation

Note...
This set-up procedure is carried out upon initial alignment of the Radar and when an antenna array is replaced.

69 Radar target may appear at a slightly different vertical position in the up and down sweep on the Indicator display; the cause of this is probably through the inertia of the moving guide in the antenna array producing small changes in the antenna pointing angle known as backlash. Backlash compensation for both Az and EL antennas is contained on one 10-digit logic switch (S1) fitted in Memory Unit (7A2A3) as shown.

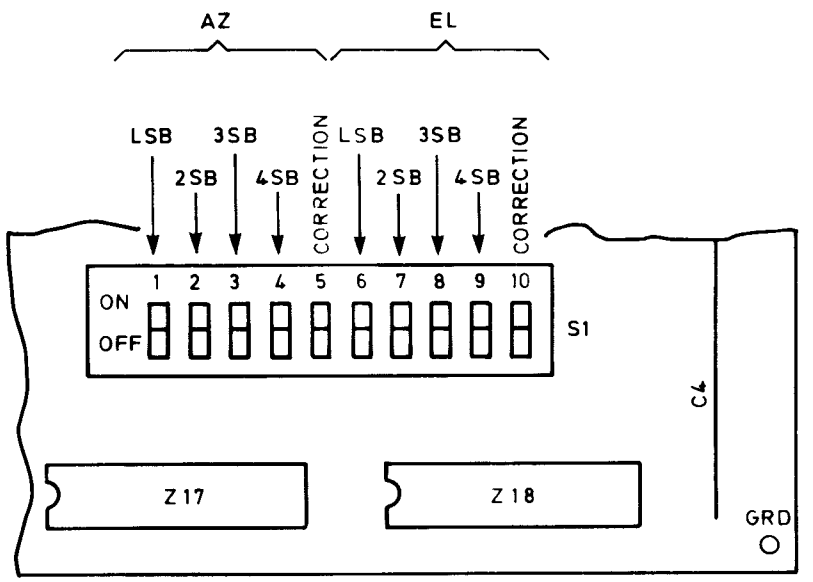


Fig. 4.3
Backlash Compensation Switch

70 Control of the Radar to RADAR HEAD, if necessary.

71 At the ADG unit, carry out the operations stated:

71.1 At the front panel, set the POWER ON/OFF switch to OFF and open the drawer.

71.2 Remove Memory Unit (7A2A3) and insert it into an Extender card (174221234/301) then insert the Extender card into the Memory unit position.

71.3 Set the POWER ON/OFF switch to ON.

71.4 At the Memory unit, set switches S1-1 to S1-10 OFF.

72 At the local indicator display, adjust the I.F. GAIN - NORMAL/LOG and ANT. SERVO controls until a well-defined, clear target, e.g. corner-horn reflector or centre display target appears in the Azimuth display.

73 Carry out the following operations:

73.1 At the ADG Memory unit (7A2A3), set S1-1 (LSB) to ON.

73.2 At the Indicator display, check whether the targets vertical position increases, if not proceed with sub-para. 73.4.

73.3 If it increases, set S1-5 (CORRECTION) to ON; then continue the procedure.

73.4 Set switches S1-1 to S1-4 to any combination until the minimum vertical distance is obtained.

74 At the Indicator display, adjust the I.F. GAIN-NORMAL/LOG and ANT SERVO controls until a well-defined, clear target, eg. a touchdown reflector or centre display target appears in the Elevation display.

75 Carry out the following operations:

75.1 At the ADG Memory unit, set S1-6 (LSB) to ON.

75.2 At the Indicator display, check whether the targets vertical distance increases, if not proceed with sub-para. 75.4.

75.3 If it increases, set S1-10 (CORRECTION) to ON, then continue the procedure.

75.4 Set switches S1-6 to S1-9 to any combination until the minimum vertical distance is obtained.

75.5 Finally, check the vertical distance of the touchdown reflector and centre display target for a minimum, and if necessary, repeat para. 75 until the minimum distance in each case is obtained.

76 At the ADG front panel, set the POWER ON/OFF switch to OFF and remove the Extender card.

77 Remove the Memory unit (7A2A3) from the card and replace it in its connector, then close the ADG drawer.

78 At the ADG front panel, switch the POWER ON/OFF switch to ON.

Transmit trigger - initial alignment

79 The transmit trigger delay is coarsely adjusted with respect to the system trigger in order to ensure that the transmitted r.f. pulse is accurately related in time to the video map presentation on the Indicator's CRT display.

80 The transmit trigger must be set so that it is delayed from 0 - 50 nanoseconds after the start of the system trigger.

81 At the LCU set the MAINTENANCE SELECTOR to CH.A or CH.B, then proceed as follows:

81.1 At the Transmitter CH.A (8A1) or CH.B (11A1) set the LOCAL/REMOTE switch to LOCAL.

81.2 In the Receiver group, set the Blanker Interference (4A2/5A2) and Amplifier Detector (4A1/5A1) front panel controls to the positions stated:

81.2.1 LOCAL/REMOTE to LOCAL

81.2.2 MASTER/SLAVE to MASTER

81.2.3 STAR ON/OFF to OFF

81.2.4 STAGGER/UNSTAGGER to STAGGER

81.2.5 MTI INTERVAL fully counterclockwise

81.2.6 NORMAL-LOG/FTC to NORMAL

81.2.7 GTC ON/OFF to OFF.

81.2.8 MTI TEST ON/OFF to OFF.

81.3 Connect the oscilloscope CH1 input to TP2 (SYSTEM TRIGGER) and the CH2 input to TP5 (MIXED VIDEO).

81.4 Set the oscilloscope controls as follows:

81.4.1 CH 1 vertical deflection to 2V/DIV.

81.4.2 CH 2 vertical deflection to 0.5V/DIV.

81.4.3 Horizontal deflection to 0.2 mS delayed to 0.2 µS/DIV.

81.4.4 Sync oscilloscope to TP1 (PRETRIGGER).

81.5 At the transmitter high voltage power supply (HVPSU) depress the HV ON pushbutton switch.

81.6 At the Amplifier Detector (4A1/5A1) adjust the NORMAL/LOG IF GAIN control to obtain the transmit pulse shown (Fig 4.4).

Note...
Any waveform observed on one channel may contain interference in the form of pulses or spikes moving rapidly across the oscilloscop trace. This interference should be ignored.

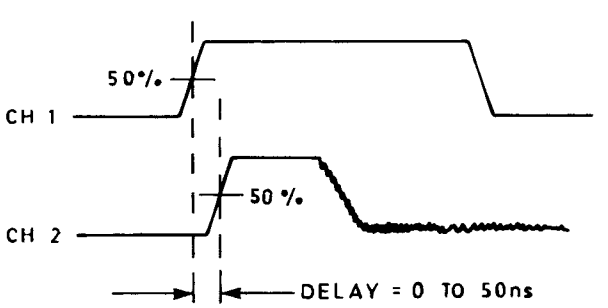


Fig. 4.4 Transmit Trigger Pulse

81.7 Open the Blanker Interference drawer (4A2/5A2). At the synchroniser unit (A4) adjust control TX DELAY ADJ until the transmitter pulse is aligne to the system trigger, as shown.

81.8 At the Transmitter HVPSU, depress the HV OFF pushbutton, then set the LOCAL/REMOTE switches on the HVPSU, Amplifier Detector and Blanker Interference units to REMOTE.

I.F. gain compensations and MTI alignment

82 Preset compensation of the I.F. gain controls on the front panel of the Amplifier Detector (4A1/5A1) is provided in order to prevent saturation of the Indicators' display by noise and signal when adjusting for full gain. Compensation must be adjusted in each channel for the different levels of noise in the i.f. amplifiers.

83 Check that the following controls are set to the positions stated:

83.1 At the LCU, control is transfered to the RADAR HEAD, and CH.A or CH.B is selected for operation.

83.2 At the Transmitter (8/11) the HVPSU is ON.

83.3 At the Receiver (4/5) the A.C. power controls are ON.

84 At the Indicator display unit (6A2) set the front panel controls to the positions given:

84.1 GTC ON/OFF to OFF.

84.2 NORMAL/LOC I.F. GAIN - fully clockwise.

84.3 MTI INTERVAL - fully clockwise.

84.5 NORMAL - LOC/FTC to NORMAL.

85 At the Amplitude Detector (4A1/5A1) set the front panel controls to the positions given:

85.1 Set the LOCAL/REMOTE switch to LOCAL.

85.2 MTI TEST ON/OFF to ON.

85.3 RF TEST/I.F. TEST to RF TEST.

85.4 COHO LOCK/UNLOCK to UNLOCK.

86 Using an oscilloscope, monitor TP1 at the front panel of the Amplifier Detector and check that the noise level at TP1 (set with MT1 if Gain Control fully clockwise) does not exceed 0.2 V pk-pk; if this level is exceeded, withdraw the Amplifier Detector unit from the rack and adjust R15 - MAX GAIN MTI HIGH. Check that the d.c. offset does not exceed ± 50 mV.

87 Monitor TP2 and check that the noise level does not exceed 0.75 V; if this level is exceeded, withdraw the unit from the rack and adjust R13 - MAX GAIN NORMAL HIGH. Check that the d.c. offset does not exceed ± 50 mV.

88 Monitor TP1 again, and adjust MTI IF GAIN control until the amplitude of the second large pulse is as shown in Fig. 4.5.

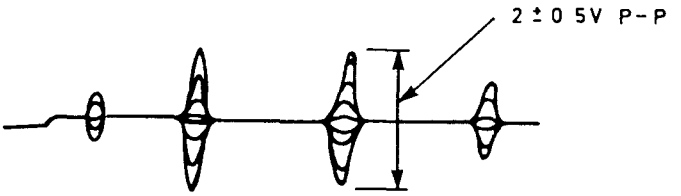


Fig. 4.5 Bipolar Video Pulses (TP1)

89 Expand the oscilloscope display to obtain one test pulse, and check that the signal is tuned as shown in Fig. 4.6. If the signal is not tuned, insert a non-ferrous alignment tool (e.g. plastic screwdriver) in the COHO ADJ hole in the front panel, and rotate it until the signal is tuned.

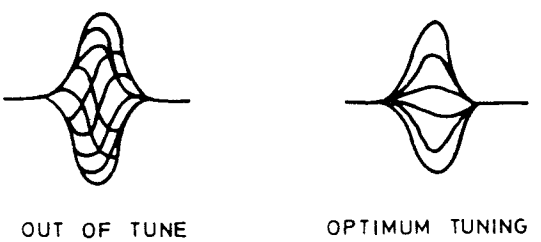


Fig. 4.6 Bipolar Video Pulse - Expanded (TP1)

90 Reset the oscilloscope to its un-expanded display. Check that the amplitude of the last pulse is still 2.0 V ± 0.5 V. If not, re-adjust MTI IF GAIN control.

91 At the Indicator unit, set the MTI INTERVAL control fully counter-clockwise.

92 At the Blanker Interference (4A2/5A2) connect the oscilloscope to monitor point TP5 and, check that the noise level does not exceed 0.75 V ▶ and that the video amplitude is 2.5 V. Should these limits be exceeded, ◀ withdraw the unit from the rack and locate D/A Converter (A5). Adjust controls VIDEO GAIN (R46) and OFFSET ADJ (R48) until the correct results are obtained.

▶ Note ...

DC offset should be 0.02 V with NR and MTI gains at minimum. ◀

93 At the Amplifier Detector, connect the remaining channel of the oscilloscope to TP2 and, at the Indicator unit, adjust the MTI INTERVAL control until the MTI video and normal video are presented on the oscilloscope display.

94 At the Blanker Interference (4A2/5A2), adjust the following controls in the D/A Converter (A5) until the noise amplitude and baseline of the MTI signal is the same as that of the normal signal:

94.1 MTI GAIN (R8).

94.2 BAL CONT (R10).

94.3 VIDEO LIM ADJ (R14).

95 On completion, push the unit back into the rack.

96 Set the front panel controls at the Blanker Interference to the following positions:

96.1 LOCAL/REMOTE to LOCAL.

96.2 MASTER/SLAVE to MASTER.

96.3 STAGGER/UNSTAGGER to STAGGER.

97 At the Amplifier Detector (4A1/5A1), disconnect the oscilloscope lead from TP2 and re-insert it into TP1, adjust the oscilloscope controls to obtain the results in TABLE 4 then proceed accordingly.

98 At the LCU, select the remaining channel and repeat paras. 83-97. To measure the actual cancellation ratio:

98.1 Measure the amplitude of the pulse (A) with Coho UNLOCKED, and of the cancelled residue (B) with Coho LOCKED.

98.2 Divide amplitude of pulse (A) by that of (B) and read the cancellation ratio from TABLE 4.

GTC alignment (Fig 4.7)

Note...

(1) This procedure should be started after the previous i.f. gain compensation procedure has been completed.

(2) Gain Time Control (GTC) alignment is essential if simultaneous control of aircraft at near and far ranges is to be successful. Figure 4.7 shows the timing waveforms of the triggers and gate outputs.

(3) To achieve optimum results, the GTC slope is normally set to decrease the i.f. gain of the radar between 6 dB and 12 dB, for each half-range increment from the range where full gain (recovery) exists

(4) The exact slope and recovery range must be determined by the judgements of the Operator and technician, regarding such factors as set-back distance of the radar from the runway, ground clutter etc

99 At the LCU, set the HIGH VOLTAGE CONTROL to OFF.

100 At the local Indicator unit (6A2) set the controls as stated:

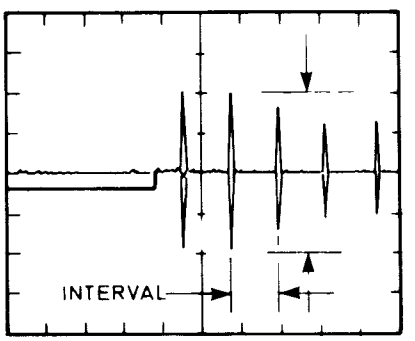
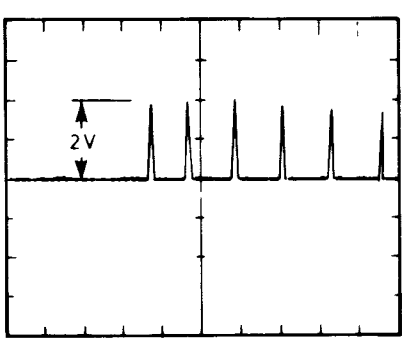
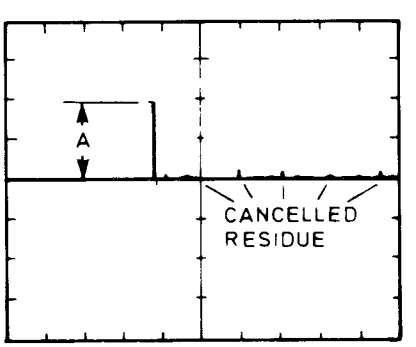
STAR/ON	-	STAR (off)
NORMAL-LOG/FTC	-	NORMAL
MTI INTERVAL	-	Adjust for normal video
MTI I.F. GAIN	-	fully counter-clockwise
GTC/ON	-	GTC (off)

101 At the Amplitude Detector (4A1/5A1) set the LOCAL/REMOTE switch to REMOTE. Slide out the unit from the rack and locate STC and COHO GATE GEN (A1). Set the oscilloscope and adjust the controls for the results in the following table

GTC OFF gate

102 The gate starts at the time of the pre-trigger, and is adjusted so that its duration lasts just before the transmitter fires.

TABLE 4 I.F. CANCELLATION MEASUREMENTS

Osc. settings (1)	Monitor (2)	Controls (3)	Results (4)
VERT: 0.5V/div. HORIZ: 5 µs/div. TRIG: Ext. Connect TRIG. to 4A2/5A2 - TP1	4A1/5A1 TP1		Ampl: 2.0 V ± 0.5 Vp-p Pulse Interval: 6 ± 2µs 
VERT: 1V/div	4A2/5A2 TP5	MTI INTERVAL fully C.W.	
VERT: 0.2V/div.	4A2/5A2 TP5 On 4A1A1/5A1A1	COHO LOCK/ UNLOCK TO LOCK ADJUST R5 FOR MINIMUM RESIDUE AMPLITUDE	
CANCELLATION RATIO:		A ÷ B 18 19 20 21 22 23	Cancellation Ratio (dB) 25.1 25.6 26.0 26.4 26.8 27.2

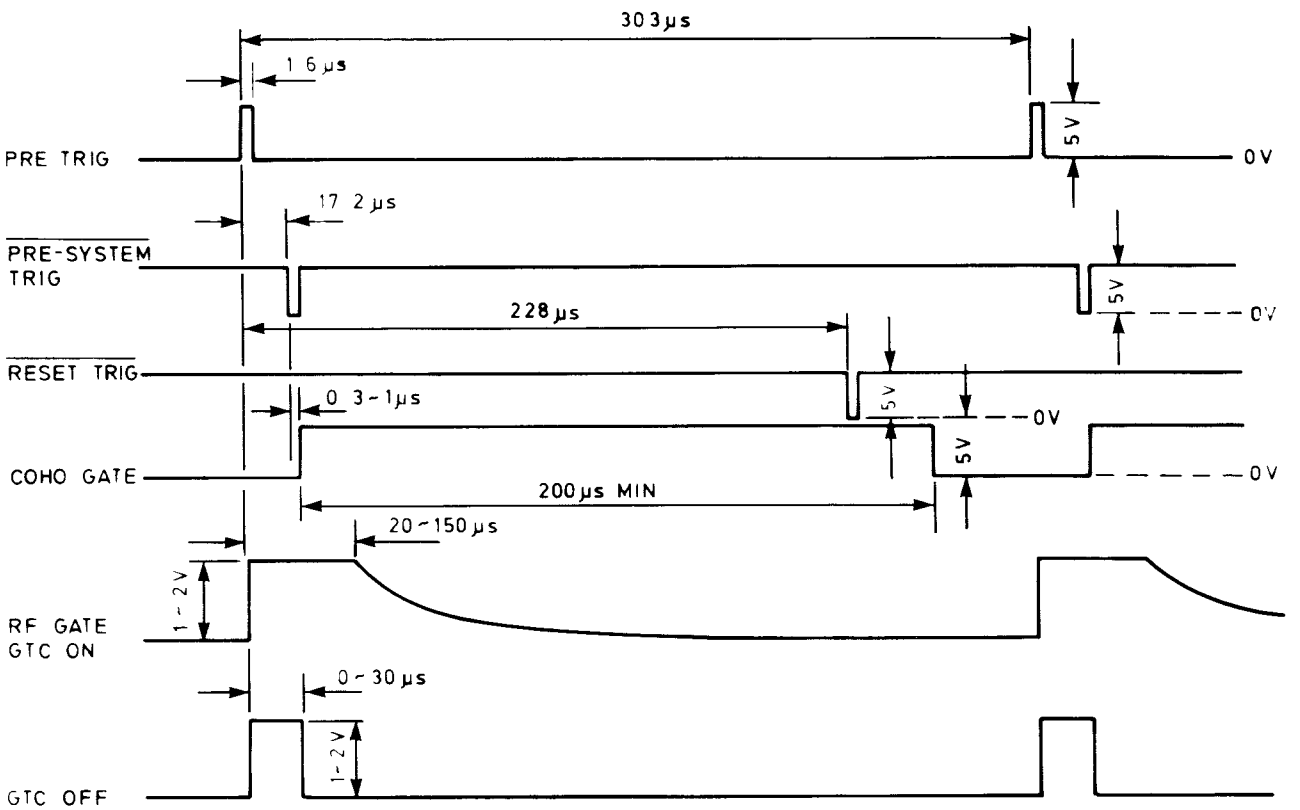
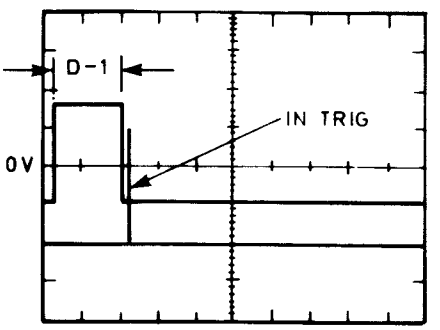
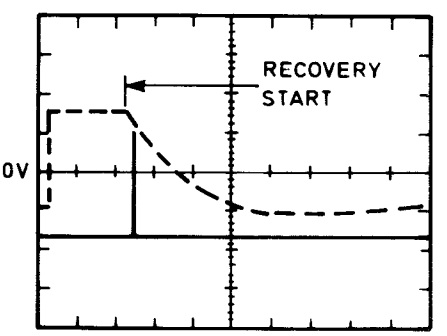


Fig. 4.7 Input Trigger and Output Gate Timing

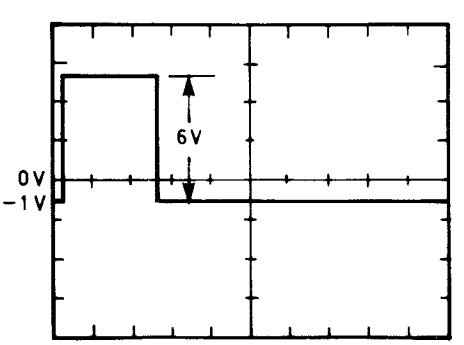
TABLE 5 GTC GATE ADJUSTMENTS

Osc. Setting (1)	Monitor (2)	Controls (3)	Results (4)
I/P to d.c. VERT: IV/div. HORIZ: 10µS/div. I/P to d.c VERT: IV/div. HORIZ: 10µS/div.	CH.1: 4A1/5A1 TP3 (NORMAL) CH.2: 8/11 TP1 (IN TRIG)	At 6A2, Set GTC to OFF Adjust R42(A) until D-1 coincides with IN TRIG.	
SYNC: 4A2/5A2 TP1		At 6A2, set GTC -ON. Adjust R43 (A1) until RECOVERY START occurs 1-2 µS prior to IN TRIG.	

R.F. GTC

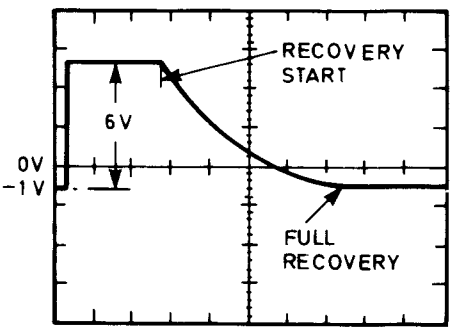
103 The GTC signal applied to the Radar is set independently of the normal and m.t.i. GTC signals. Proceed according to TABLE 6.

TABLE 6 RF GATE ADJUSTMENTS

Osc. Setting (1)	Monitor (2)	Controls (3)	Results (4)
Use X10 PROBE. I/P to d.c. VERT: 2V/div.	CH.1: 4A1A1/5A1A1 TP5	At 6A2, set GTC to OFF. adjust R34(A1) until baseline is at -1 V.	

(continued)

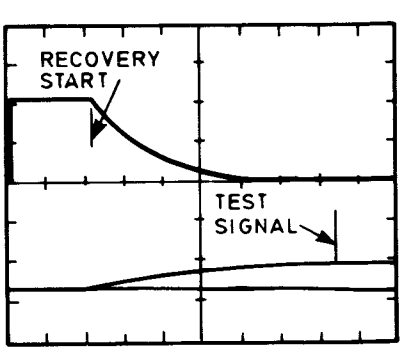
TABLE 6 RF GATE ADJUSTMENTS (continued)

Osc. Setting (1)	Monitor (2)	Controls (3)	Results (4)
		Adjust R30(A1) for 6V pk-pk. At 6A2, set GTC/ON-ON. Adjust R27(A1) until FULL RECOVERY occurs 60µS after its START.	

Normal GTC

104 The GTC signal applied to the Normal/Log i.f. receiver is adjusted for the results in TABLE 7. At Indicator unit (6A2), set GTC/ON control - ON, and NORMAL/LOG - IF GAIN for 0.5 V pk-pk noise after video recovery.

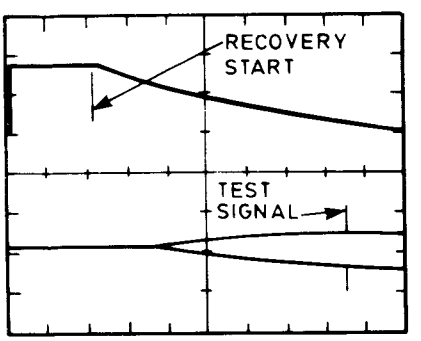
TABLE 7 NORMAL GTC ADJUSTMENTS

Osc. Setting (1)	Monitor (2)	Controls (3)	Results (4)
Use X10 probe. I/P to d.c. VERT: 0.5V/div. VERT: 0.5V/div. HORIZ: 10µS/div. SYNC: 4A2/5A2 TP1	CH.1: STC(A1) TP6 CH.2: 4A1/5A1 TP2	Adjust R47(A1) until recovery occurs 60µS after START. Adjust R50(A1) for 1V pk.	

COHO i.f. GTC

105 At the local Indicator unit (6A2) set MTI INTERVAL - fully clockwise, STAR/ON - STAR (off) and GTC/ON - ON. Adjust MTI - IF GAIN control for 0.5 V pk-pk noise after GTC recovery. Set the oscilloscope controls for the results in TABLE 8.

TABLE 8 MTI GTC ADJUSTMENTS

Osc. Setting (1)	Monitor (2)	Controls (3)	Results (4)
Use X10 probe. I/P to d.c. VERT: 0.5V/div.	CH.1: STC(A1) TP7	Adjust R65(A1) until the MTI waveform is 1V pk.	
VERT: 0.5V/div. HORIZ: 10µS/div.	CH.2: 4A1/5A1 TP1	Adjust R62(A1) until recovery occurs 60µS after START.	

System AFC Alignment

Notes...

(1) This procedure is intended to be used when a magnetron is replaced or AFC alignment is checked.

(2) It is assumed that the receiving system is functioning correctly, that the R.F. Converter (9/10) and Amplifier Detector (4A1/5A1) AFC alignments are correct according to the procedures given in their manual.

106 To align the AFC, an Echo Box (TS-488) and Spectrum Analyser are required. Proceed as follows:

106.1 At the LCU, select RADAR HEAD, if necessary, and set the channel to be aligned in the operational mode.

106.2 At the Transmitter HVPSU (8A2/11A2), set the LOCAL/REMOTE switch to LOCAL.

106.3 At the transmitters front panel, set the AFC/MAN switch to MAN.

106.4 At the HVPSU, depress the HV ON pushbutton.

106.5 At the Amplifier Detector (4A1/5A1), set the LOCAL/REMOTE switch to LOCAL.

106.6 Connect echo box TS-488 to the transmitter front panel, TP5. Set frequency dials on echo box to operating frequency.

106.7 Rotate LIMIT INDICATOR/MANUAL TUNE control on the Transmitter front panel to produce peak output indication on the echo box meter.

106.8 Disconnect the echo box, and connect the spectrum analyser via the 10 and 20 dB coaxial attenuator pads, to TP5. Set the analyser for dispersion of 1 MHz/div.

Note...
Coaxial attenuator pads are required to protect the spectrum analyser.

106.9 At the Amplifier Detector, rotate CAL adjustment on the MAGNETRON TUNING meter, fully clockwise.

106.10 Turn the LIMIT INDICATOR/MANUAL TUNE control for zero indication on MAGNETRON TUNING meter. Centre the magnetron spectrum on the analyser.

◀ 106.11 Turn the LIMIT INDICATOR/MANUAL TUNE control in the HIGH direction until the analyser indicates a frequency change of +2 MHz.

106.12 Rotate CAL adjustment on MAGNETRON TUNING meter so that meter indicates +2 MHz.

106.13 Turn the LIMIT INDICATOR/MANUAL TUNE control in the LOW direction until the analyser indicates a frequency change of -2 MHz.

106.14 Confirm that the MAGNETRON TUNING meter indicates approximately -2 MHz.

106.15 Turn the LIMIT INDICATOR/MANUAL TUNE control until the MAGNETRON TUNING meter indicates -1.2 MHz. ▶

106.16 At the Transmitter front panel, set the AFC/MAN switch to AFC. Confirm that the afc drive motor actuates to retune the magnetron.

106.17 Check that the MAGNETRON TUNING meter indicates less than ± 1 MHz.

Note...
If the drive motor does not actuate, or if it oscillates, adjust HIGH LIMIT control (R2) of SCR unit (4 A1A2/5A1A2) until the motor actuates, or until the motor stabilises and restores magnetron frequency to ± 1 MHz, as indicated on the MAGNETRON TUNING meter.

◀ 106.18 Repeat from sub-para. 106.15 for a frequency of +1.2 MHz. If ▶ the drive motor does not actuate, adjust LOW LIMIT control (R3) of SCR unit (4A1A2/5A1A2) until the magnetron frequency is restored.

106.19 At the Transmitter front panel, depress the LIMIT IND ADJ button and simultaneously adjust the LIMIT INDICATOR/MANUAL TUNE control so that the control is central. Release the LIMIT IND ADJ button.

106.20 Turn the LIMIT INDICATOR/MANUAL TUNE control to the HIGH position. Set the AFC-MAN switch to AFC and check that the control returns to the central position.

106.21 Set the AFC-MAN switch to MAN and rotate the LIMIT INDICATOR/ MANUAL TUNE control to LOW.

106.22 Set the AFC-MAN switch to AFC and check that the LIMIT INDICATOR/ MANUAL TUNE control returns to its central position.

106.23 Disconnect all test equipment and return the equipment to normal operation.

Indicating system alignment

Notes...

(1) Adjustments must be made at the local Indicator group and at the two remote Indicator groups.

(2) Control should be transferred to the Operations Centre at the LCU, when adjusting the remote Indicator groups.

Initial Adjustments

WARNING...

RADIATION HAZARD. ENSURE THAT ALL PERSONNEL ARE CLEAR OF THE ANTENNAS BEFORE RADIATING.

◀ 107 At the Generator Electronic Marker, set the ANGLE V switch to OPERATE, and on the Local/Remote Control Unit, set the SCAN to ON. ▶

108 At the Indicator unit front panel, set the MTI INTERVAL control fully counter clockwise and adjust the SWEEP DELAY control counter-clockwise. The transmitter-pulse marker should move out approximately one inch from the vertex of the azimuth and elevation displays.

Note...

The transmitter-pulse marker appears as a wide, bright vertical line and may be identified by setting the transmitter high voltage off and then on.

◀ 109 On Generator Electronic Marker (6A1) depress the strobe button and adjust the align control at the same time. The strobe pulse leading edge should be aligned with the leading edge of transmitting pulse. Release the strobe button. ▶

110 Set the RM CALIB-ON/OFF switch to ON.

111 Adjust the RM CALIB control so that the first range mark coincides with the leading edge of the transmitter-pulse marker.

112 Set the RM CALIB-ON/OFF switch to OFF.

113 At the Indicator unit front panel, adjust the SWEEP DELAY control so that the leading edge of the transmitter-pulse marker is at the start of the sector sweep vertex.

◀ 114 At the Generator Electronic Marker (6A1), set the RUNWAY MAP SELECT switch to the desired runway position. ▶

115 Set the corresponding RNWY SELECT switch to L or R, depending upon cabin positioning relative to the selected runway.

116 Turn the CURSOR INTENSITY GP/CL control until the courseline and glidepath cursors appear in their sectors.

117 Set the SC and DHC CURSOR INTENSITY controls fully counterclockwise.

Note...
No cursors may appear at this time if internal cursor adjustments are far out of adjustment.

118 Turn the RM INTENSITY control fully clockwise.

119 Adjust the selected RUNWAY RM TD control until the first range mark coincides with the leading edge of the reflector target denoting touchdown.

120 Adjust the selected COURSE LINE-CL ANGLE control until the courseline cursor appears.

121 Adjust the selected runway COURSE LINE-D TO RNWY control until the courseline cursor is located between the two runway reflectors.

122 Adjust the CL ANGLE control until the cursor is adjacent to the 0-degree mark for left operation and the +5 degree mark for right operation.

Note...
The two controls interact and may have to be readjusted until both conditions are met.

123 Adjust the selected runway GLIDE PATH-D TO TD, HI control until the elevation glidepath cursor intersects the touchdown reflector as seen in the elevation display sector.

124 Set the GP-ANGLE control to HI and adjust the HI control until the cursor is at 3 degrees as marked on the overlay.

125 Adjust the CURSOR INTENSITY-SC control until the safety cursor appears in the elevation sector.

126 Adjust the selected runway SAFETY CURSOR-START and ANGLE controls until the safety cursor is approximately 0.5 degree below the glidepath cursor.

127 Set the METER SELECT control to D HEIGHT (FEET) and adjust the CURSOR INTENSITY-DHC control fully clockwise.

128 Adjust the DHC HEIGHT control until the digital voltmeter (DVM) indicates the desired height.

129 Adjust the selected runway DECISION HEIGHT CURSOR-RANGE and the DHC-LENGTH controls until the cursor intersects the TD range mark (if possible) and the 1 nm range mark.

Course line cursor

130 Align the cursor using the computed alignment data as follows:

130.1 Set the RUNWAY MAP SELECT switch to the desired runway position. Set the corresponding RNWY SELECT switch to L or R depending upon cabin positioning relative to the selected runway.

130.2 Adjust the RM INTENSITY control and the CURSOR INTENSITY-GP/CL control for desired intensity.

130.3 Set the SC and DHC, CURSOR INTENSITY controls fully clockwise.

Note...
Set the Indicator DISPLAY RANGE switch to SHORT.

130.4 Adjust the selected runway RM TD control so that the first range mark falls on the leading edge of the TD reflector.

130.5 Set the ANGLE V switch to ART AZ. Set DVM to ANGLE V.

130.6 Artificial angle voltages are calculated for the point of intercept of the CL and GP cursors at ranges of 0.5 nm and 7.0 nm.

130.7 Select SHORT range and set the ANGLE V switch to ART AZ. Adjust the brightness, video gain and cursor brilliance controls until the range marks and course line (appearing as dots on the CRT) are barely visible.

130.7.1 Set the ART ANGLE V control until the DPM indicates the calculated intercept voltage for 0.5 nm range. Adjust the D to to RNWY for the appropriate runway so that the CL 'dot' is exactly superimposed on the 0.5 nm range mark 'dot'.

130.7.2 Set the ART ANGLE V control to the intercept voltage for 7.0 nm range and adjust the CL ANGLE control for the appropriate runway until the CL 'dot' is superimposed on the 7.0 nm range mark 'dot'.

130.7.3 Since the D to RNWY and CL ANGLE controls are interdependen repeat 130.7.1 and 130.7.2 until both conditions are satisfied simultaneously.

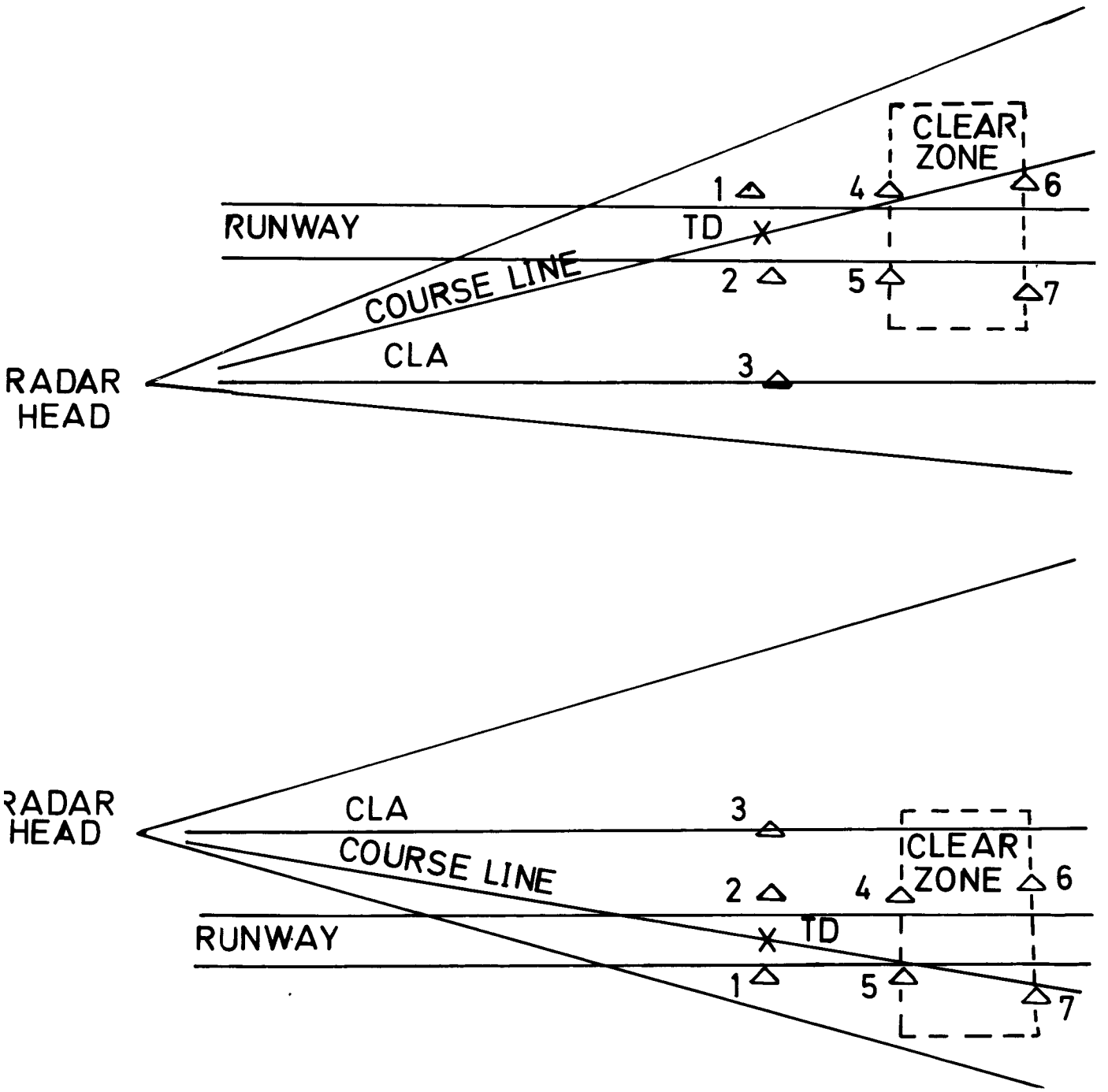
130.8 Set the ANGLE V control to OPERATE.

130.9 At the Indicator display, check that the courseline cursor is centred between the runway reflectors in the Azimuth sector as shown in Fig 4.8.

TABLE 9 EXAMPLE OF PAR ALIGNMENT DATA SHEET

PAR ALIGNMENT DATA		DATE	
Airfield Name	Location	Runway No.	Right Hand Op. Left Hand Op.
	Glidepath Angle		degrees
	Safety Cursor Angle		degrees
	Decision Height (Above TDP)		feet
	Distance to Runway		feet
	Distance to Touchdown		feet
	ALIGNMENT DATA		
1	Az Angle Bias (CLA) Voltage		volts
2a	Az Cursor 1 nm Alignment Voltage		volts
2b	Az Cursor 6 nm Alignment Voltage		volts
2c	Az Cursor TD Alignment Voltage		volts
3a	EL Angle Bias (TD) Voltage		volts
3b	EL Angle Bias (Secondary Reflector) voltage		volts
4a	EL Glidepath 1 nm Alignment Voltage		volts
4b	EL Glidepath 6 nm Alignment Voltage		volts
5a	Safety Cursor 1 nm Alignment Voltage		volts
5b	Safety Cursor 6 nm Alignment Voltage		volts
5c	Safety Cursor Termination		nm
6	Decision Height/EL Glidepath Intercept		volts

Note...
This is an example of a data sheet as supplied after installation. There will be a data sheet for each runway position at each site location.



Note: 1. No's 1 and 2 ARE TOUCHDOWN (TD) AND RUNWAY REFLECTORS.

2. No. 3 IS A TD AND CLA REFLECTOR.

3. No's. 4 to 7 ARE RUNWAY REFLECTORS.

Fig. 4.8 Setting-up of Course Line Cursor

Glide path (GP) cursor

131 Align the glide path cursor as follows:

131.1 Set the ANGLE V switch to ART EL. Set the ART ANGLE V control until the DPM indicates the voltage for the 0.5 nm intercept voltage. Adjust the D to TD HI control of the appropriate runway until the 'dots' of the GP and 0.5 nm range mark are coincident.

131.2 Readjust the ART ANGLE V control until the DPM indicates the intercept voltage for 7.0 nm. Set the GP ANGLE switch to HI and adjust the HI control until the 'dots' of the GP and 7.0 nm range mark are coincident.

131.3 Repeat 131.1 and 131.2 until both conditions are satisfied simultaneously.

131.4 Repeat 131.1 and 131.2 and 131.3 but for the GP LO selection using D to TD, GP ANGLE switch to LO and the LO gp angle control.

131.5 Note that the GP ANGLE controls HI and LO, are common to all four runways and when set up for the first runway must be left unchanged for all remaining runways, only the D to TD controls for each runway may be adjusted subsequent to the first set of adjustments.

131.6 Adjust the selected runway GLIDEPATH-GRD, LEVEL control until the GP cursor terminates at the first range mark (touchdown).

Safety height cursor alignment

132 Align the elevation safety height cursor as follows:

132.1 Adjust the RM INTENSITY and CURSOR INTENSITY-SC controls to the required brilliance.

132.2 Adjust the other CURSOR INTENSITY controls fully counterclockwise

132.3 Set the ANGLE V switch to ART EL.

132.4 Obtain the safety cursor 6 nm alignment voltage from TABLE 9 and adjust the ART ANGLE V control to display the voltage on the DVM.

132.5 Alternate the ANGLE V switch between OPERATE and ART EL, then adjust the selected runway SAFETY CURSOR-ANGLE controls until the safety cursor pulse coincides with the intensified 6 nm range mark pulse.

132.6 Obtain the safety cursor 1 nm alignment voltage from TABLE 9.

132.7 Set ANGLE V switch to ART EL, and adjust the ART ANGLE V control to display the voltage on the DVM.

132.8 Alternate the ANGLE V switch between OPERATE and ART EL, and adjust the selected runway SAFETY CURSOR-START control until the safety cursor pulse coincides with the 1 nm range mark pulse.

132.9 If necessary, repeat sub-para's. 132.3 to 132.8 until the requirements for the 6 nm and 1nm alignments are satisfied.

132.10 Set the ANGLE V switch to OPERATE.

Decision height cursor (DHC)

133 Align the elevation DHC as stated:

133.1 Adjust the CURSOR INTENSITY-DHC control until the DHC appears on the display.

133.2 Set the METER SELECT switch to D HEIGHT (FEET).

133.3 Adjust the DHC-HEIGHT control fully counterclockwise.

133.4 Set the ANGLE V switch to OPERATE.

133.5 Adjust the selected runway DHC-GRD LEVEL control, so that a DHC pulse coincides with the first range-mark (touchdown) and glidepath cursor.

133.6 If necessary, adjust the selected runway DHC-RANGE control and DHC LENGTH control for the DHC to intersect the glidepath cursor.

133.7 While monitoring the DVM, adjust the control for the decision height (above TDP) as listed in TABLE 9.

133.8 Adjust the select runway DHC-RANGE control and DHC LENGTH control so that the DHC extends an equal distance from both sides of the glidepath cursor, and intersects the safety cursor.

133.9 Set the ANGLE V switch to ART EL.

133.10 Obtain the decision height/EL glidepath intercept, alignment voltage from TABLE 9.

133.11 Adjust the ART ANGLE V control to display the voltage on the DVM.

133.12 Alternate the ANGLE V switch between OPERATE and ART EL.

133.13 Check that the intercept point of the decision height/EL glidepath is within, ± 0.02 V of the value in sub-para. 133.10.

134 At the LCU, select RADAR HEAD and repeat para's 107 to 133 for the remote display.

Normal radar window

135 The Normal Radar window is set-up to include the nearest and furthest-most corner reflectors. The start time of the NR window is set approximately to 50m (100m = 0.067 μS) from the shortest gate by adjusting R41 of 4A2A6. The duration of the window is set approximately 50m after the further most corner reflector by adjusting R43 of 4A2A6.

Note...
The time should be related to the transmitted pulse.

System angle bias compensation

◀ Note...
Within the Royal Air Force, system angle bias compensation is not used on the CR 62 system. Therefore, AZ and EL angle bias voltages must be set to OV.

136 Set AZ and EL angle bias voltages to OV, using the setting up procedure given in AP 115E-0508-1, Chapter 2, paras 12.3 and 12.4. For convenience these paras are repeated below:

136.1 (Para 12.3) Connect the voltmeter between TP3 and TP7 (GRD), and adjust ANGLE BIAS-AZ (R15) on Display A2 for 0 ± 0.002 V on the voltmeter. After adjustment lock the control R15.

136.2 (Para 12.4) Connect the voltmeter between TP5 and TP7 (GRD), adjust A2R14 (ANGLE BIAS-EL) for a voltage reading of 0 ± 0.002 V. After adjustment lock the potentiometer A2R14. ▶

Remote system alignment

137 This procedure sets-up the signal levels and corrects the balance of the cross-site cables to eliminate or at least minimise low frequency injection. Refer to Control System AP 115E-0507-1, Chap. 2-0 for setting-up procedure.

SWITCH-OFF PROCEDURE

Note...
The following procedure is for shutting down the Radar cabin and Operations Centre equipment.

Radar cabin

138 At the Indicator unit (6A2), rotate the SWEEP INTENSITY and VIDEO GAIN controls fully counter-clockwise.

139 Set the main A.C. POWER circuit breaker on the Equipment Power Distribution Panel to OFF.

140 Set all service outlet sockets to OFF.

141 Should it be required to isolate and shutdown only selected units, i.e. for routine maintenance, the equipment should be switched OFF from its front panel and, the relevant circuit breaker on the Equipment Power Distribution Panel.

Operations centre

142 At both Indicator groups, set the SWEEP INTENSITY and VIDEO GAIN controls fully counter-clockwise.

143 Set the POWER ON/OFF switch on the front panels of the Mux/Demux group and Indicator groups to OFF.

144 At the Mux/Demux group, set the 28 V supply switch to OFF.

Note...
Switching ON after a shutdown or routine maintenance period is the reverse procedure of para's. 167 to 173.

OPERATION UNDER FAULT CONDITIONS

Radar channel failure

145 In the event of failure of the operational channel, select the STANDBY channel and depress the HV ON switch appropriate to the selected channel (this assumes that the STANDBY channel is pre-heated, i.e. HV READY lamp is on).

146 At the LCU, operate the MAINTENANCE SELECT switch for the faulty channel, so that its selection for operation is inhibited.

Indicator unit failure (remote)

147 At the RCU, operate MASTER DISPLAY switch to select another Indicator.

Loss of MTI or normal video

148 Rotate MTI INTERVAL control fully c.c.w. for loss of MTI video, or fully c.w. for loss of Normal Radar Video.

System faults

149 On the local control unit (LCU) and remote control unit (RCU) check the SYSTEM FAULT lamps when lit and refer to TABLE 10. For all faults, reference should be made to the figures in Chap. 1.

TABLE 10 SYSTEM FAULT LOCATION

Observed Fault (1)	Probable Source (2)	Remedial Procedure (3)
28V PS	28V PSU (Radar Head or Ops. Centre	Refer to Fig. 3.16 and AP 115E-0507-1
OVER TEMP and ALARM	Air cooling system (Radar Head)	Cancel alarm at LCU or RCU. Refer to Fig. 3.16 and AP 115E-0507-1, if necessary.
OVERRUN CW/ACW	Turntable or Turntable Control Unit	Refer to Fig. 3.15 and AP 115E-0501-1

150 The following information is contained in the figures of Chap.1:

150.1 AP numbers - for equipment diagnosis.

150.2 Significant waveforms - for system fault location.

Built-in test equipment (BITE)

151 Reference should be made to the AP numbers for the following information:

Amplifier Detector

152 Each equipment (4A1/5A1) contains an r.f./i.f. test signal generator to check radar coherence levels and MTI cancellation.

153 A front panel meter indicates the frequency deviation of the magnetron frequency.

154 Front panel power supply alarms indicate internal d.c. power supply faults.

Blanker Interference (AP 115E-0506-1)

155 Each equipment (4A2/5A2) contains a DMTI ALARM indicating that a fault is in the Canceller.

156 Front panel power supply alarms indicate internal d.c. power supply faults.

Converter group signal data (AP 115E-0504-1)

157 Each equipment (9/10) contains a meter, the functions of which are selected to display signal and COHO mixer currents.

158 A.C. and d.c. power supply overloads are shown by their respective indicators.

Transmitter groups (AP 115E-0503-1)

159 Each transmitter group (8/11) contains meters which monitor HVPSU voltage and current, and magnetron current.

160 Test points and an r.f. test jack are provided on the front panel.

Angle data generator (AP 115E-0502-1)

161 A display is provided for the beam angle information from the antenna encoders, a lamp also lights indicating either azimuth or elevation voltage.

162 Front panel indicators show internal d.c. supply faults.

Indicator group (AP 115E-0508-1)

163 The Generator, Electronic Marker (6A1) contains a digital voltmeter (DVM) used to monitor angle voltages, to align the cursors on the indicator display and to monitor external d.c. voltages.

164 The Indicator power supply (6A3) contains a front panel switch for monitoring the internal d.c. supplies.

165 Power supply alarm indicators light when an overload condition occurs.

Local and Remote Control System (AP 115E-0507-1)

166 The LCU and RCU contain SYSTEM FAULT lamps previously described in TABLE 10.

167 The local and remote Mux/Demux units contain a front panel FAULT indicator, and monitor points for internal d.c. supplies.

Power distribution

168 For details on Equipment and Domestic power distribution refer to AP 115E-0501-1.

CROSS-SITE CABLE FAULT

169 In the event of a major fault to the cross-site cables, a PAR approach facility could be operated from the Radar Head, subject to the provision of temporary R/T communications at the Radar Head (Ground to air and Radar Head to ATC).

TABLE 11 CABLE ROUTEING

Cable route (1)	Cable Numbers (2)
A	606,607,608,609,610,611,612,613,614

(continued)

TABLE 11 CABLE ROUTEING (continued)

Cable route (1)	Cable Numbers (2)
B	606,607
C	611,612,613,614
D	608,609,610
E	611,612,613,614
F	402 to 412,416,417,418
G	101,102,201,401,502,513
J	101,102,201,222,401 to 412,501,513
K	101,102,201,211,212,213,216,217,218,222,401 to 415,502,513,701
L	211,212,213,216,217,218,413,414,415,701
M	101,102,201,222,401 to 412,502
N	101,102,201,211,212,213,216,217,218,222,401 to 412,413,414,415,502
P	(1)103 to 119(2)103 to 119,120 to 129(3)115 to 130(4)117 to 130 (5)120 to 129(6)121 to 129(7)125 to 129(8)129
R	(1)202 to 210,216 to 218,301 to 314(2)202 to 210,214 to 218,301 to 314 (3)204 to 210,214 to 218,303,304(4)207 to 210,214 to 218,303,304 (5)207 to 210,214,215,303,304,(6)208 to 210,215,304(7)209,210,215,304 (8)210,215,304
S	(1)405 to 412(2)405 to 412(3)407 to 412(4)408 to 412(5)409 to 412 (6)410 to 412(7)411,412(8)412
T	211
U	222,223,416,417
V	223,416,417

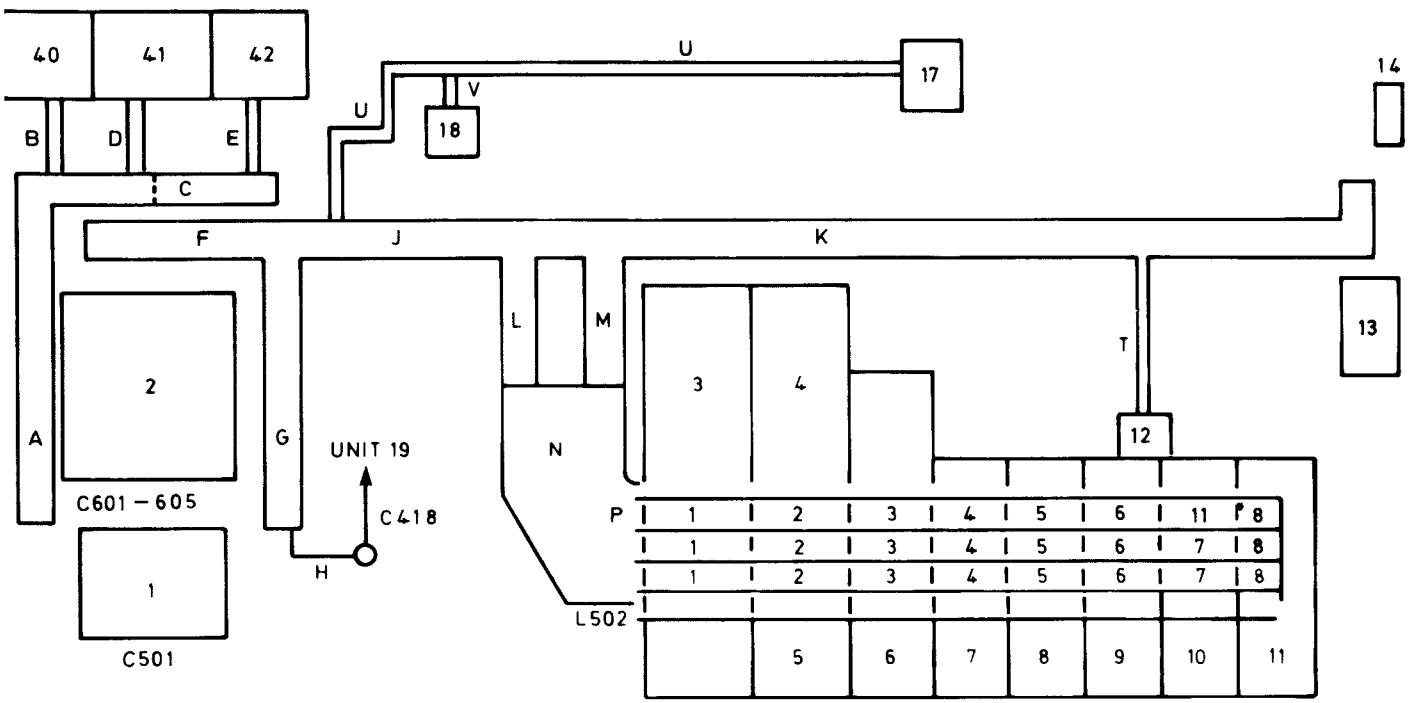


Fig 4.9 Cable Layout - Radar Head

SYSTEM CABLING

170 Cable layout of the Radar Head is shown in Fig 4.9 which must be read in conjunction with TABLE 11. In Fig 4.9, the numbers represent the System reference numbers given in TABLE 1 of Chap.1, these numbers are also marked at each end of the cables. Equipment cable interconnections within the Radar Head are given in TABLE 12, and those for the Operations Centre in TABLE 13. Cable numbers are placed in numerical order.

171 Access to the equipment cable connections is by four access panels bolted externally to the left-hand side of the cabin wall. Should it be necessary to replace a cable assembly, first check its destination by referring to TABLE 12, then check from Fig 4.9 the cables route. Second, remove the 'snap on' covers from the ducts and remove the cable.

Abbreviations

172 The following list provides a key to the abbreviations used in the tables:

Colour

Black	BK
Brown	BN
Red	R
Orange	O
Yellow	Y
Green	G
Blue	B
Violet	V
Slate	S
White	W

Colour (cont.)

Pink	P
Light Green	LG
Turquiose	TQ
Grey	GR

Colour combinations are written thus:

Black/Slate	BK/S
Red/Yellow	R/Y etc.

General

Lin.	-	Linear
Circ.	-	Circular
Tol.	-	Tolerance
Pos.	-	Position
Sel.	-	Select
M/S and M/R	-	Master/Slave or reset
Int.	-	Interval
NC	-	No Connection
W/G	-	Waveguide
Ind.	-	Indicator
Com.	-	Common
Man. Pol.	-	Manual Polarisation
R	-	Release
M/D	-	Motor Drive
P.P.S.	-	Pulses per second
S/D	-	Shutdown
Cap.	-	Capacitor

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C101, RG59B/U	1-J6		3-J44			BASEBAND TRANSMIT
C102	1-J7		3-J45			BASEBAND RECEIVE
C103	3-J27		4-J14			PRETRIGGER 4 CH.A
C104	3-J28		4-J10			MIX. VID.(2) CH.A
C105	3-J29		4-J11			SYS. CLK. CH.A
C106	3-J30		4-J13			PRETRIG.(3) CH.A
C107	3-J31		4-J12			PRETRIG.(2) CH.A
C108	3-J32		4-J9			MIX. VID.(1) CH.A
C109	3-J33		5-J29			PRETRIG.(4) CH.B
C110	3-J34		5-J25			MIX. VID.(2) CH.B
C111	3-J35		5-J26			SYS. CLK. CH.B
C112	3-J36		5-J27			PRETRIG.(2) CH.B
C113	3-J37		5-J28			PRETRIG.(3) CH.B
C114	3-J38		5-J24			MIX. VID.(1) CH.B
C115	3-J42		6-J7			MIX. VID.SELECTED
C116	3-J43		6-J5			PRETRIG.SELECTED
C117	3-J39		7-J9			SYS. CLK.SELECTED
C118	3-J40		7-J10			PRETRIG.SELECTED
C119	3-J41		7-J6			ANGLE DATA
C120	4-J15		8-J5			TX. TRIG, CH.A
C121	4-J5		9-J11			COHO LOCK
C122	4-J6		9-J13			NORM. I.F.
C123	4-J7		9-J14			MTI I.F.
C124	4-J8		9-J12			STC (RF GATE)
C125	5-J20		10-J4			COHO LOCK
C126	5-J21		10-J6			NORM. I.F.
C127	5-J22		10-J7			MTI I.F.

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C128	5-J23		10-J5			STC (RF GATE)
C129, RG59B/U	5-J30		11-J5			TX. TRIG,CH.B
C130	6-J6		7-J5			ANGLE DATA
C201	1-J5	A	3-J20	A	BN	BELL
13 PAIR,SCREEN		B		B	W/BN	return
		C		C	R/BN	ACW TOL
		D		D	B/BN	return
		E		E	R/BK	CW TOL
		F		F	B/BK	return
		G		G	R	POS. 4-IND
		H		H	W/R	return
		J		J	G	POS. 3-IND
		K		K	W/G	return
		L		L	B	POS. 2-IND
		M		M	W/B	return
		N		N	R/Y	POS. 1-IND
		P		P	B/Y	return
		R		R	R/G	OVERRUN, ACW
		S		S	B/G	return
		T		T	TQ	OVERRUN, CW
		U		U	GR	return
		V		V	BK	SCREEN
		W		W	P	spare
		X		X	W/P	spare
		Y		Y	O	spare
		Z		Z	W/O	spare

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		a		a	V	spare
		b		b	W/V	spare
		c		c	Y	N.C.
C202	3-J21	A	4-J4	A	BK	SCREEN
7 PAIR,SCREEN		C		C	O	GTC ON/OFF, CH.A
C202	3-J21	D	4-J4	D	W/O	return
7 PAIR,SCREEN		E		E	V	NORM LOG/FTC SEL,
		F		F	W/V	return
		P		P	BN	STAR-SEL, CH.A
		R		R	W/BN	return
		S		S	Y	M/S-AUTO, CH.A
		T		T	W	return
		U		U	R	NORM I.F. GAIN, CH.A
		V		V	W/R	return
		a		a		shield
		W		W	B	MTI I.F. GAIN CH.A
		X		X	W/B	return
		b		b		shield
		Y		Y	G	MTI INT. CH.A
		Z		Z	W/G	return
		c		c		shield
		B		B		N.C.
		G		G		N.C.
		H		H		N.C.
		J		J		N.C.

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		K		K		N.C.
		L		L		N.C.
		M		M		N.C.
		N		N		N.C.
C203	3-J15	A	5-J19	A	BK	SCREEN
7 PAIR,SCREEN		C		C	O	GTC ON/OFF CH.B
		D		D	W/O	return
C203	3-J15	E	5-J19	E	V	NORM LOG/FTC SEL, CH.B
7 PAIR,SCREEN		F		F	W/V	return
		P		P	BN	STAR-SEL, CH.B
		R		R	W/BN	return
		S		S	Y	M/S-AUTO CH.B
		T		T	W	return
		U		U	R	NORM I.F. GAIN, CH.B
		V		V	W/R	return
		a		a		shield
		W		W	B	MTI I.F. GAIN CH.B
		X		X	W/B	return
		b		b		shield
		Y		Y	G	MTI INT. CH.B
		Z		Z	W/G	return
		c		c		shield
		B		B		N.C.
		G		G		N.C.

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		H		H		N.C.
		J		J		N.C.
		K		K		N.C.
		L		L		N.C.
		M		M		N.C.
		N		N		N.C.
C204	3-J13	C	6-J4	C	B	SERVO DATA-EL
2 PAIR,SCREEN		D		D	W/B	return
		L		N/C	BK	SCREEN
		H		H	R	SERVO DATA-AZ
C204	3-J13	J	6-J4	J	W/R	return
2 PAIR,SCREEN		K		N/C	BK	SCREEN
		A		A		N.C.
		B		B		N.C.
		E		E		N.C.
		F		F		N.C.
		G		G		N.C.
C205	3-J16	A	6-J3	A	G	MTI INT
7 PAIR,SCREEN		B		B	W/G	return
		T		T		shield
		E		E	R	NORM I.F. GAIN
		F		F	W/R	return
		V		V		shield
		C		C	B	MTI I.F. GAIN
		D		D	W/B	return
		U		U		shield
		W		W	O	ANT-RIGHT
		G		G	W/O	return

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		R		R	V	ANT-UP
		S		S	W/V	return
		Z		Z	BK	SCREEN
		X		X	BN	ANT-LEFT
		Y		Y	W/BN	return
		P		P	Y	ANT-DOWN
		a		a	W	return
		H		H		N.C.
		J		J		N.C.
		K		K		N.C.
		L		L		N.C.
		M		M		N.C.
C205	3-J16	N	6-J3	N		N.C.
7 PAIR,SCREEN		b		b		N.C.
		c		c		N.C
C206	3-J22	M	6-J2	M	B	N.C.
6 PAIR,SCREEN		N		N	W/B	spare
		P		P	G	spare
		R		R	W/G	spare
		S		S	Y	spare
		T		T	W	spare
		U		U	V	NORM LOG/FTC-SEL
		V		V	W/V	return
		W		W	R	GTC ON/OFF
		X		Z	W/R	return
		Y		Y	BN	STAR SEL.

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		Z		Z	W/BN	return
		a		a	BK	SCREEN
		A		A		N.C.
		B		B		N.C.
		C		C		N.C.
		D		D		N.C.
		E		E		N.C.
		F		F		N.C.
		G		G		N.C.
		H		H		N.C.
		J		J		N.C.
		K		K		N.C.
		L		L		N.C.
		b		b		N.C.
		c		c		N.C.
C207	3-J23	A	8-J3	A	BK	SCREEN
6 PAIR,SCREEN		C		C	R	HV ON CH.A
		D		D	W/R	return
		E		E	V	HV ON CH.B
		F		F	W/V	return
		a		a	BN	HV ON-IND CH.A
		P		P	W/BN	return
		R		R	G	HV READY-IND CH.A
		S		S	W/G	return
		T		T	B	HV RESET CH.A
		U		U	W/B	return
		V		V	Y	HV INTRLCK CH.A

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		W		W	W	N.C.
		B		B		N.C.
		G		G		N.C.
		H		H		N.C.
		J		J		N.C.
		K		K		N.C.
		L		L		N.C.
		M		M		N.C.
		N		N		N.C.
		X		X		N.C.
		Y		Y		N.C.
		Z		Z		N.C.
		b		b		N.C.
		c		c		N.C.
C208	3-J24	A	9-J10	A	R	spare
6 PAIR,SCREEN		B		B	W/R	spare
		C		C	V	spare
		E		E	W/V	spare
		D		D	BK	SCREEN
		F		F	BN	W/G INTRLOCK CH.A
		G		G	W/BN	return
		H		H	Y	spare
		J		J	W	spare
		K		K	G	spare

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		L		L	W/R	spare
C209	3-J18	A	10-J3	A	R	spare
6 PAIR,SCREEN		B		B	W/R	spare
		C		C	V	spare
		E		E	W/V	spare
		D		D	BK	SCREEN
		F		F	BN	W/G INTRLOCK CH.B
		G		G	W/BN	return
		H		H	Y	spare
		J		J	W	spare
		K		K	G	spare
		L		L	W/G	spare
C210	3-J17	A	11-J3	A	BK	SCREEN
6 PAIR,SCREEN		C		C	R	HV ON CH.B
		D		D	W/R	return
		E		E	V	HV OFF CH.B
		F		F	W/V	return
		a		a	BN	HV ON-IND CH.B
		P		P	W/BN	return
		R		R	G	HV READY-IND CH.B
		S		S	W/G	return
		T		T	B	HV RESET CH.B
		U		U	W/B	return
		V		V	Y	HV INTRLOCK CH.B

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		W		W	W	return
		B		B		N.C.
		G		G		N.C.
		H		H		N.C.
		J		J		N.C.
		K		K		N.C.
		L		L		N.C.
		M		M		N.C.
		N		N		N.C.
		X		X		N.C.
		Y		Y		N.C.
		Z		Z		N.C.
		b		b		N.C.
		c		c		N.C.
C211	3-J14	A	12TB1	A	R	W/G SW. CH.A-SEL
		B		B	B	SEL-COMMON
		C		C	G	W/G SW. CH.B-SEL
		D		D	Y	W/G SW. CH.A-IND
		E		E	W	IND-COMMON
		F		F	BK	W/G SW. CH.B-IND
C212	3-J25	A	14-J2	A	B	LIMIT SW. 1-LEFT
9 PAIR		B		B	W/B	return
		C		C	TQ	LIMIT SW. 2-RIGHT
		D		D	G	return

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		F		F	P	LIMIT SW. 3-LIN
		G		G	W/P	MAN. POL (LIN)
		H		H	O	LIMIT SW. 4-CIRC
		J		J	W/O	BRAKE RELEASE
		K		K	V	+28 V d.c.
		L		L	W/V	0 VOLTS
		N		N	R	EL DATA
		M		M	W/R	return
		P		P	BK	SCREEN
		T		T	BN	POL. IND. 2-LIN
		U		U	W/BN	MAN POL-CIRC
		R		R	Y	POL. IND. 1-CIRC
		W		W	W	MAN. SCAN
		X		X	G	spare
		Y		Y	W/G	spare
		E		E		N.C.
		S		S		N.C.
		V		V		N.C.
		Z		Z		N.C.
		a		a		N.C.
		b		b		N.C.
		c		c		N.C.
C213	3-J19	A	14-J7	A	B	LIMIT SW. 1-UP
		B		B	W/B	return

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		C		C	TQ	LIMIT SW. 2-DOWN
		D		D	G	return
		F		F	P	LIMIT SW. 3-LIN
		G		G	W/P	MAN. POL-LIN
		H		H	O	LIMIT SW. 4-CIRC
		J		J	W/O	BRAKE RELEASE
		K		K	V	+28 V d.c.
		L		L	W/V	0 VOLTS
		N		N	R	AZ DATA
		M		M	W/R	return
		P		P	BK	SCREEN
		T		T	BN	POL IND. 2-LIN
		U		U	W/BN	MAN. POL-CIRC
		R		R	Y	POLARISER IND.1-CIR
		W		W	W	MAN. SCAN
		X		X	G	spare
		Y		Y	W/G	spare
		E		E		N.C.
		S		S		N.C.
		V		V		N.C.
		Z		Z		N.C.
		a		a		N.C.
		b		b		N.C.
		c		c		N.C.
C215	5-J18	A	11-J4	A	BK	SCREEN
		C		E	R	AFC M/D (HIGH)
		D		F	W/R	AFC M/D (LOW)
		E		C	V	AFC CONTROL

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		F		D	W/V	return
		G		G	BN	spare
		H		H	W/BN	115V a.c.
		J		J	Y	spare
		K		K	W	spare
		L		L	G	spare
		M		M	W/G	spare
		N		N	B	spare
		P		P	W/B	spare
		B		B		N.C.
		R		R		N.C.
		S		S		N.C.
		T		T		N.C.
		U		U		N.C.
		V		V		N.C.
		X		X		N.C.
		Y		Y		N.C.
		Z		Z		N.C.
		a		a		N.C.
		b		b		N.C.
		c		c		N.C.
C216	7-J4	A	13-J4	A	R	AZ REL. PULSE
6 PAIR, SCREEN		B		B	W/R	return
		D		D	BK	SCREEN

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		E		E	V	EL REL. PULSE
		F		F	W/V	return
		G		G	BN	spare
		H		H	W/BN	spare
		J		J	Y	spare
		K		K	W	spare
		L		L	G	spare
C217	7-J2	A	14-J3	A	BK	SCREEN
13 PAIR,SCREEN		C		C	Y	+5 V d.c.
		B		B	W	0 VOLTS
		D		D	R/BN	20
		U		U	B/BN	20 return
		E		E	R/BK	21
		V		V	B/BK	21 return
		G		G	R	22
		W		W	W/R	22 return
		J		J	G	23
		X		X	W/G	23 return
		K		K	B	24
		Y		Y	W/B	24 return
		L		L	R/Y	25
		Z		Z	B/Y	25 return
		N		N	R/G	26
		a		a	B/G	26 return
		P		P	TQ	27
		S		S	G	27 return
C217	7-J2	R	14-J3	R	P	28
13 PAIR,SCREEN		T		T	W/P	28 return
		b		b	O	29

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		c		c	W/O	29 return
		F		F	V	spare
		H		H	W/V	spare
		M		M	BN	N.C.
C218	7-J3	A	14-J6	A	BK	SCREEN
13 PAIR,SCREEN		C		C	Y	+5 V d.c.
		B		B	W	0 VOLTS
		D		D	R/BN	20
		U		U	B/BN	20 return
		E		E	R/BK	21
		V		V	B/BK	21 return
		G		G	R	22
		W		W	W/R	22 return
		J		J	G	23
		X		X	W/G	23 return
		K		K	B	24
		Y		Y	W/B	24 return
		L		L	R/Y	25
		Z		Z	B/Y	25 return
		N		N	R/G	26
		a		a	B/G	26 return
		P		P	TQ	27
		S		S	G	27 return
		R		R	P	28
C218	7-J3	T	14-J6	T	W/P	28 return
13 PAIR,SCREEN		b		b	O	29
		c		c	W/O	29 return
		F		F	V	spare

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		H		H	W/V	spare
		M		M	BN	N.C.
C219	13-J2	A	14-J4	A	R	1.5 kHz REF.
6 PAIR, SCREEN		B		B	W/R	return
		C		C	V	STATOR DR.1
		D		D	W/V	return
		E		E	BN	STATOR DR.2
		F		F	W/BN	return
		G		G	Y	400 P.P.S.
		H		H	W	0 VOLTS
		J		J	G	V.C.O. S/D
		K		K	W/G	POWER UP SENSE
		L		L	B	M/R
		M		M	W/B	0 VOLTS
		P		P	BK	SCREEN
C220	13-J3	A	14-J5	A	R	1.5 kHz REF.
6 PAIR, SCREEN		B		B	W/R	return
		C		C	V	STATOR DR.1
		D		D	W/V	return
		E		E	BN	STATOR DR.2
		F		F	W/BN	return
		G		G	Y	400 P.P.S.
		H		H	W	0 VOLTS
		J		J	G	V.C.O. S/D
		K		K	W/G	POWER UP SENSE
		L		L	B	M/R

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C220	13-J3	M	14-J5	M	W/B	0 VOLTS
		P		P	BK	SCREEN
C221	1-J5	A	16	TB2-A2	BN	BELL
13 PAIR,SCREEN		B		TB2-A1	W/BN	return
		C		TB2-A10	R/BN	TOL ACW
		D		TB2-A9	B/BN	return
		E		TB2-A8	R/BK	TOL CW
		F		TB2-A7	B/BK	return
		G		TB1-A6	R	POS.4-IND
		H		TB1-A5	W/R	return
		J		TB1-A8	G	POS.3-IND
		K		TB1-A7	W/G	return
		L		TB2-A4	B	POS.2-IND
		M		TB2-A3	W/B	return
		N		TB2-A6	R/Y	POS.1-IND
		P		TB2-A5	B/Y	return
		R		TB1-A2	R/G	OVERRUN ACW
		S		TB1-A1	B/G	return
		T		TB1-A4	TQ	OVERRUN CW
		U		TB1-A3	G	return
		V			BK	SCREEN
		W		TB1-A10	P	spare
		X		TB1-A9	W/P	spare
		Y		TB1-A12	O	spare
		Z		TB1-A11	W/O	spare
		a		TB2-A12	V	spare
		b		TB2-A11	W/V	spare
		c			Y	N.C.

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C222	3-J26	A		3	BK	OVERTEMP IND.
4 CORE		B		2	B	0 VOLTS
		C		1	BN	+28V d.c.
C223	17TS1		18TS1	5	BK	OVERTEMP IND
4 CORE				3	B	0 VOLTS
				1	BN	+28 V d.c.
C231	Antenna		Elevation			
	Interface	J2-A	Antenna	TS.1-A	B	Limit Switch 1
	Panel		Junct.Box			(Left)
		J2-B		TS.1-B	W/B	Return
		J2-C		TS.1-C	TQ	Limit Switch 2 (Right)
		J2-D		TS.1-D	GR	Return
		J2-F		TS.1-F	P	Limit Switch 3 (Lin)
		J2-G		TS.1-G	W/P	Manual Pol. (Lin)
		J2-H		TS.1-H	O	Limit Switch 4 (Circ)
		J2-J		TS.1-J	W/O	Brake Release
		J2-K		TS.1-K	V	+28V DC
		J2-L		TS.1-L	W/V	0 VOLTS
		J2-N		TS.1-N	R	Elevation Data
		J2-M		TS.1-M	W/R	Return
		J2-P		TS.1-P	BK	Screen - Pair 1
		J2-T		TS.1-T	BN	Polarizer Ind.2 (Lin)
		J2-U		TS.1-U	W/BN	Man. Pol. (Circ)
		J2-R		TS.1-R	Y	Polarizer Ind.1 (Circ)

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		J2-W		TS.1-W	W	Manual Scan
		J2-X		TS-1-X	G	Spare
		J2-Y		TS-1-Y	W/G	Spare
C232, 6 pair	Antenna		EL.Ant.			
Screened	Interface	J4-A	W/G drive	J2-A	R	1.5kHz reference
	Panel (14)	J4-B	(25)	J2-B	W/R	Return
		J4-C		J2-C	V	Stator Drive 1
		J4-D		J2-D	W/V	Return
		J4-E		J2-E	BN	Stator Drive 2
		J4-F		J2-F	W/BN	Return
		J4-G		J2-G	Y	400 P.P.S.
		J4-H		J2-H	W	0V
		J4-J		J2-J	G	VCO Shutdown
		J4-K		J2-K	W/G	Power-up Sense
		J4-L		J2-L	B	Master-Reset
		J4-M		J2-M	W/B	0V
		J4-P		J2-P	BK	Screen
C233, 13 pair	Antenna		Elevation			
Screened	Interface	J3-A	Antenna	N/C	BK	Screen
	Panel (14)	J3-C	Encoder(25)	J1-b	Y	+5V d.c.
		J3-B		J1-S	W	0V
		J3-D		J1-A	R/BN	20
		J3-U		J1-5	B/BN	Return
		J3-E		J1-B	R/BK	21
		J3-V		J1-S	B/BK	Return
		J3-G		J1-C	R	22
		J3-W		J1-S	W/R	Return
		J3-J		J1-D	G	23
		J3-X		J1-S	W/G	Return
		J3-K		J1-E	B	24
		J3-Y		J1-S	W/B	Return

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C233, 13 pair Screened	Antenna Interface Panel (14)	J3-L	Elevation Antenna Encoder(25)	J1-F	R/Y	25
		J3-Z		J1-S	B/Y	Return
		J3-N		J1-G	R/G	26
		J3-a		J1-S	B/G	Return
		J3-P		J1-H	TQ	27
		J3-S		J1-S	GR	Return
		J3-R		J1-J	P	28
		J3-T		J1-S	W/P	Return
		J3-b		J1-K	O	29
		J3-c		J1-S	W/O	Return
		J3-F		J1-N	V	Spare
		J3-H		J1-O	W/V	Spare
C234, 3 core Screened	Elevation Antenna Junct.Box (21)	TS2-L	Elevation Antenna Slew (22)	TS1-3	R	Voltage Reg.(+ve)
		TS2-M		TS1-2	B	Data (OV)
		TS2-N		TS1-1	G	El. Data
		TS2-P		N/C	BK	Screen
C235, 7 core		TS2-A		TS2-2	B	Limit Sw.1 (Left)
		TS2-B		TS2-4	W	Return
		TS2-C		TS2-1	G	Limit Sw.2 (Right)
		TS2-D		TS2-3	BK	Return
		TS2-J		TS2-5	Y	Brake Release
		TS2-K		TS2-6	R	+28 V d.c.
C236, 6 core	El.Ant.J.B (21)	TS2-F	Elevation Antenna Polariser (23)	TS4-5	B	Limit Sw.4 (Lin)
		TS2-H		TS4-3	BK	Limit Sw.3 (Circ)
		TS2-R		TS4-4	Y	Pol.Ind.1 (Circ)
		TS2-S		TS4-1	R	+28 V d.c
		TS2-T		TS4-2	W	Pol.Ind.2 (Lin)

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C241	Antenna		Azimuth			
	Interface	J7-A	Antenna	TS.1-A	B	Limit Sw.1 (Up)
	Panel	J7-B	Junct.Box	TS.1-B	W/B	Return
		J7-C		TS.1-C	TQ	Limit Sw.2 (Down)
		J7-D		TS.1-D	GR	Return
		J7-F		TS.1-F	P	Limit Sw.3 (Lin)
		J7-G		TS.1-G	W/P	Man. Pol. (Lin)
		J7-H		TS.1-H	O	Limit Sw.4 (Circ)
		J7-J		TS.1-J	W/O	Brake R
		J7-K		TS.1-K	V	+28V DC
		J7-L		TS.1-L	W/V	0 VOLTS
		J7-N		TS.1-N	R	Azimuth Data
		J7-M		TS.1-M	W/R	Return
		J7-P		TS.1-P	BK	Screen-Pair 1
		J7-T		TS.1-T	BN	Pol.Ind. 2 (Lin)
		J7-U		TS.1-U	W/BN	Man.Pol. (Circ)
		J7-R		TS.1-R	Y	Pol.Ind. 1 (Circ)
		J7-W		TS.1-W	W	Manual Scan
		J7-X		TS.1-X	G	Spare
		J7-Y		TS.1-Y	W/G	Spare
C242, 6 pair	Antenna	J5-A	Az. Ant.	J2-A	R	1.5 kHz reference
Screened	Interface	J5-B	W/G Drive	J2-B	W/R	Return
	Panel	J5-C	(35)	J2-C	V	Stator Drive 1
		J5-D		J2-D	W/V	Return
		J5-E		J2-E	BN	Stator Drive 2
		J5-F		J2-F	W/BN	Return
		J5-G		J2-G	Y	400 P.P.S.
		J5-H		J2-H	W	OV
		J5-J		J2-J	G	VCO Shutdown

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C242, 6 pair	Antenna	J5-K	Az. Ant.	J2-K	W/G	Power-up Sense
Screened	Interface	J5-L	W/G Drive	J2-L	B	Master-Reset
	Panel	J5-M	(35)	J2-M	W/B	OV
		J5-P		J2-P	BK	Screen
C243,13 pair	Antenna	J6-A	Azimuth	N/C	BK	Screen
Screened	Interface	J6-C	Antenna	J1-b	Y	+5 V d.c.
	Panel	J6-B	Encoder(36)	J1-S	W	OV
		J6-D		J1-A	R/BN	20
		J6-U		J1-S	B/BN	Return
		J6-E		J1-B	R/BK	21
		J6-V		J1-S	B/BK	Return
		J6-G		J1-C	R	22
		J6-W		J1-S	W/R	Return
		J6-J		J1-D	G	23
		J6-X		J1-S	W/G	Return
		J6-K		J1-E	B	24
		J6-Y		J1-S	W/B	Return
		J6-L		J1-F	R/Y	25
		J6-Z		J1-S	B/Y	Return
		J6-N		J1-E	R/G	26
		J6-a		J1-S	B/G	Return
		J6-P		J1-H	TQ	27
		J6-S		J1-S	GR	Return
		J6-R		J1-J	P	28
		J6-T		J1-S	W/P	Return
		J6-b		J1-K	O	29
		J6-C		J1-S	W/O	Return
		J6-F		J1-N	V	Spare
		J6-H		J1-P	W/V	Spare

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C244, 3 core	Azimuth	TS2-L	Azimuth	TS1-3	B	Voltage Reg. (+ve)
Screened	Antenna	TS2-M	Antenna	TS1-2	B	Data (OV)
	Junct.Box	TS2-N	Slew	TS1-1	G	Az Data
		TS2-P		N/C	BK	Screen
C245, 6 core		TS2-A		TS2-2	B	Limit Sw.1 (Left)
		TS2-B		TS2-4	W	Return
		TS2-C		TS2-1	G	Limit Sw.2 (Right)
		TS2-D		TS2-3	BK	Return
		TS2-K		TS2-6	R	+28V d.c.
C246, 6 core	Azimuth	TS2-F	Azimuth	TS4-5	B	Limit Sw.4 (Lin)
	Antenna	TS2-H	Antenna	TS4-3	BK	Limit Sw.3 (Circ)
	Junct. Box	TS2-R	Polariser	TS4-4	Y	Pol.Ind. 1 (Circ)
	(31)	TS2-S	(33)	TS4-1	R	+28 V d.c.
		TS2-T		TS4-2	W	Pol.Ind.2 (Lin)
C301	3-J8	A	4-J2	A	BN	+28 V d.c.
1 PAIR		B		B	B	Return
C302	3-J9	A	5-J17	A	BN	+28V d.c.
1 PAIR		B		B	B	Return
C303	3-J10	A	8-J2	A	BN	+28 V d.c.
1 PAIR		B		B	B	Return
C304	3-J11	A	11-J2	A	BN	+28 V d.c.
1 PAIR		B		B	B	Return

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C242, 6 pair	Antenna	J5-K	Az. Ant.	J2-K	W/G	Power-up Sense
Screened	Interface	J5-L	W/G Drive	J2-L	B	Master-Reset
	Panel	J5-M	(35)	J2-M	W/B	0V
		J5-P		J2-P	BK	Screen
C243,13 pair	Antenna	J6-A	Azimuth	N/C	BK	Screen
Screened	Interface	J6-C	Antenna	J1-b	Y	+5 V d.c.
	Panel	J6-B	Encoder(36)	J1-S	W	0V
		J6-D		J1-A	R/BN	20
		J6-U		J1-S	B/BN	Return
		J6-E		J1-B	R/BK	21
		J6-V		J1-S	B/BK	Return
		J6-G		J1-C	R	22
		J6-W		J1-S	W/R	Return
		J6-J		J1-D	G	23
		J6-X		J1-S	W/G	Return
		J6-K		J1-E	B	24
		J6-Y		J1-S	W/B	Return
		J6-L		J1-F	R/Y	25
		J6-Z		J1-S	B/Y	Return
		J6-N		J1-E	R/G	26
		J6-a		J1-S	B/G	Return
		J6-P		J1-H	TQ	27
		J6-S		J1-S	GR	Return
		J6-R		J1-J	P	28
		J6-T		J1-S	W/P	Return
		J6-b		J1-K	O	29
		J6-C		J1-S	W/O	Return
		J6-F		J1-N	V	Spare
		J6-H		J1-P	W/V	Spare

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C244, 3 core	Azimuth	TS2-L	Azimuth	TS1-3	B	Voltage Reg. (+ve)
Screened	Antenna	TS2-M	Antenna	TS1-2	B	Data (OV)
	Junct.Box	TS2-N	Slew	TS1-1	G	Az Data
		TS2-P		N/C	BK	Screen
C245, 6 core		TS2-A		TS2-2	B	Limit Sw.1 (Left)
		TS2-B		TS2-4	W	Return
		TS2-C		TS2-1	G	Limit Sw.2 (Right)
		TS2-D		TS2-3	BK	Return
		TS2-K		TS2-6	R	+28V d.c.
C246, 6 core	Azimuth	TS2-F	Azimuth	TS4-5	B	Limit Sw.4 (Lin)
	Antenna	TS2-H	Antenna	TS4-3	BK	Limit Sw.3 (Circ)
	Junct. Box	TS2-R	Polariser	TS4-4	Y	Pol.Ind. 1 (Circ)
	(31)	TS2-S	(33)	TS4-1	R	+28 V d.c.
		TS2-T		TS4-2	W	Pol.Ind.2 (Lin)
C301	3-J8	A	4-J2	A	BN	+28 V d.c.
1 PAIR		B		B	B	Return
C302	3-J9	A	5-J17	A	BN	+28V d.c.
1 PAIR		B		B	B	Return
C303	3-J10	A	8-J2	A	BN	+28 V d.c.
1 PAIR		B		B	B	Return
C304	3-J11	A	11-J2	A	BN	+28 V d.c.
1 PAIR		B		B	B	Return

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C401	1-J8	2	3-J6	A	BK	START CAP.
5 CORE		4		B	V	START FIELD
		3		C	BN	240V a.c. (L)
		1		D	B	240V a.c. (N)
		E		E	G/Y	EARTH
C402, 3 CORE	2-WY1	MCB1	3-J3	A	BN	240V a.c. (L)
		N		B	B	240V a.c. (N)
		E		C	G/Y	EARTH
C403	2-WY2	MCB2	3-J2	A	BN	240V a.c. (L)
3 CORE		N		B	B	240V a.c. (N)
		E		C	G/Y	EARTH
C404, 3 CORE	2-WY3	MCB3	3-J1	A	BN	240V a.c. (L)
		N		B	B	240V a.c. (N)
		E		C	G/Y	EARTH
C405	2-WY4	MCB4	4-J1	A	BN	240V a.c. (L)
3 CORE		N		B	B	240V a.c. (N)
		E		C	G/Y	EARTH
C406, 3 CORE	2-WY5	MCB5	5-J16	A	BN	240V a.c. (L)
		N		B	B	240V a.c. (N)
		E		C	G/Y	EARTH
C407	2-WY6	MCB6	6-J1	A	BN	240V a.c. (L)
3 CORE		N		B	B	240V a.c. (N)
		E		C	G/Y	EARTH
C408, 3 CORE	2-WY7	MCB7	7-J1	A	BN	240V a.c. (L)
		N		B	B	240V a.c. (N)
		E		C	G/Y	EARTH
C409	2-WY8	MCB8	8-J1	A	BN	240V a.c. (L)
3 CORE		N		B	B	240V a.c. (N)
		E		C	G/Y	EARTH
C410, 3 CORE	2-WY9	MCB9	9-J8	A	BN	240V a.c. (L)
		N		B	B	240V a.c. (N)
		E		C	G/Y	EARTH

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C411,	2-WY10	MCB10	10-J1	A	BN	240V a.c. (L)
3 CORE		N		B	B	240V a.c. (N)
		E		C	G/Y	EARTH
C412, 3 CORE	2-WY11	MCB11	11-J1	A	BN	240V a.c. (L)
		N		B	B	240V a.c. (N)
		E		C	G/Y	EARTH
C413,	3-J7	A	13-J1	A	BN	240V a.c. (L)
3 CORE		B		B	B	240V a.a. (N)
		C		C	G/Y	EARTH
C414, 7 CORE	3-J4	A	14-J1	A	BK	SLEW MOTOR L-LEFT
		B		B	W	SLEW MOTOR L-RIGHT
		C		C	O	POL L-LIN
		D		D	V	POL L-CIRC
		E		E	B	NEUTRAL
		F		F	G/Y	EARTH
		G		G	BN	SCAN MOTOR L
C415	3-J5	A	14-J8	A	BK	TILT MOTOR L-UP
7 CORE		B		B	W	TILT MOTOR L-DOWN
		C		C	O	POL L-LIN
		D		D	V	POL L-CIRC
		E		E	B	NEUTRAL
		F		F	G/Y	EARTH
		G		G	BN	SCAN MOTOR L
C416	2-WY12	MCB12	18A-TB		BN	240V a.c. (L)
3 CORE						
		N			B	240V a.c. (N)
		E			G/Y	EARTH
C417	2-WY13	MCB13	18B-TB		BN	240V a.c. (L)
3 CORE		N			B	240V a.c. (N)
		E			G/Y	EARTH

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C418	2-WY14	MCB14	19	240V	BN	240V a.c. (L)
3 CORE		N		N	B	240V a.c. (N)
		E		E	G/Y	EARTH
C419	1-J8	2	15-J1	2	BK	START CAP.
5 CORE		4		4	V	START FIELD
		3		3	BN	240V a.c. (L)
		1		1	B	240V a.c. (N)
		E		E	G/Y	EARTH
C431, 7 CORE	Antenna		Elevation			
	Interface	J1-A	Antenna	TS.3-A	BK	Slew Motor L (Left)
	Panel (14)	J1-B	Junct. Box	TS.3-B	W	Slew Motor L (Right
		J1-C	(21)	TS.3-C	O	Polarizer L (Lin)
		J1-D		TS.3-D	V	Polarizer L (Circ)
		J1-E		TS.3-E	B	Common Neutral
		J1-F		TS.3-F	G/Y	Earth
		J1-G		TS.3-G	BN	Scan Motor L
C432, 4 CORE	Elevation	TS4-A	Elevation	TS3-3	BN	Slew Motor L (Left)
	Antenna	TS4-B	Antenna	TS3-2	BK	Slew Motor L (Right
	Junct.Box	TS4-E	Slew (22)	TS3-1	B	Slew Motor N
	(21)	TS4-F		TS3-4	G/Y	Earth
C433, 4 CORE	Elevation	TS4-C	Elevation	TS5-3	BN	Polariser L (Lin)
	Antenna	TS4-D	Antenna	TS5-2	BK	Polariser L (Circ)
	Junct.Box	TS4-H	Polarizer	TS5-1	B	Polariser N
		TS4-J	(23)	Motor Earth 'B'	G/Y	Earth
C434, 3 CORE	Elevation	TS4-G	Elevation	J1-A	BN	Scan Motor L
	Antenna	TS4-K	Antenna	J1-B	B	Scan Motor N
	Junct.Box	TS4-L	W/G Drive	J1-G	G/Y	Earth

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C441	Antenna		Azimuth			
	Interface	J8-A	Antenna	TS.3-A	BK	Tilt Motor L(Up)
	Panel	J8-B	Junct.Box	TS.3-B	W	Tilt Motor L(Down)
		J8-C		TS.3-C	O	Polarizer L (Lin)
		J8-D		TS.3-D	V	Polarizer L (Circ)
		J8-E		TS.3-E	B	Common Neutral
		J8-F		TS.3-F	G/Y	Earth
		J8-G		TS.3-G	BN	Scan Motor L
C442, 4 CORE	Azimuth	TS4-A	Azimuth	TS3-3	BN	Tilt Motor L(Up)
	Antenna	TS4-B	Antenna	TS3-2	BK	Tilt Motor L(Down)
	Junct.Box	TS4-E	Tilt (32)	TS3-1	B	Tilt Motor N
	(31)	TS4-F		TS3-4	G/Y	Earth
C443, 4 CORE	Azimuth	TS4-C	Azimuth	TS5-3	BN	Polarizer L (Lin)
	Antenna	TS4-D	Antenna	TS5-2	BK	Polarizer L (Circ)
	Junct.Box	TS4-H	Polariser	TS5-1	B	Polarizer N
		TS4-J	(33)	Motor Earth'B'	G/Y	Earth
C444, 3 CORE	Azimuth	TS4-G	Azimuth	J1-A	BN	240V a.c. (L)
	Antenna	TS4-H	Antenna	J1-B	B	240V a.c. (N)
	Junct.Box	TS4-L	W/G Drive (35)	J1-G	G/Y	Farth
C501 1 CORE, 10mm^2	1-E1					EARTH
C502 1 CORE, 10mm^2	1-E1					EARTH BUS
C503 1 CORE, 6mm^2	3-E1					RACK EARTH
C504 1 CORE, 6mm^2	4-E1					RACK EARTH
C505 1 CORE, 6mm^2	5-E2					RACK EARTH

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C506 1 CORE, 6mm2	6-E1					RACK EARTH
C507 1 CORE, 6mm2	7-E1					RACK EARTH
C508 1 CORE, 6mm2	8-E1					RACK EARTH
C509 1 CORE, 6mm2	9-E2					RACK EARTH
C510 1 CORE, 6mm2	10-E1					RACK EARTH
C511 1 CORE, 6mm2	11-E1					RACK EARTH
C512 1 CORE, 6mm2	13-E1		14-E1			RACK EARTH
C513 1 CORE, 10mm2	1-E1		14-E1			EARTH BUS
C514 10mm2	EARTH (cabin)		EARTH (A-frame)			EARTH BOND
C515 1 CORE, 1mm2	Trunking		C513			EARTH
C531	Antenna Interface Panel		Elevation Antenna Junct.Box	E1		EARTH
C533	Elevation Antenna Junct.Box	E1	Elevation Antenna Frame	Earth		Earth
C541	Antenna Interface Panel	E1	Azimuth Antenna Junct.Box	E1		Earth

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C543	Azimuth Antenna Junct.Box	E1	Azimuth Antenna Frame	Earth		Earth
C601, 6mm^2	1-TS1	TS1F	2	IL	R	240V a.c.(NO BRK)L
C602, 6mm^2	1-TS2	TS2F	2	1N	BK	240V a.c.(NO BRK)N
C603, 6mm^2	1-TS3	TS3A	2	E1	G/Y	EARTH
C604, 1.6mm^2	1-TS1	TS1E	2	2L	R	240V a.c.(LTD BRK)L
C605, 1.6mm^2	1-TS2	TS2E	2	2N	BK	240V a.c.(LTD BRK)N
C606, 1.5mm^2	1-TS1	TS1A	40	1L	R	
C607, 1.5mm^2	1-TS2	TS2A	40	1N	BK	
C608, 1.6mm^2	1-TS1	TS1D	41	1L	R	240V a.c.(LTD BRK)L
C609, 1.6mm^2	1-TS2	TS2D	41	1N	BK	240V a.c.(LTD BRK)N
C610, 6mm^2	1-TS3	TS3B	41	E1	G/Y	EARTH
C611, 1.6mm^2	1-TS1	TS1B	42	1L	R	240V a.c.(LTD BRK)L
C612, 1.6mm^2	1-TS2	TS2B	42	1N	BK	240V a.c.(LTD BRK)N
C613, 1.6mm^2	1-TS1	TS1C	42	2L	R	240V a.c.(LTD BRK)L
C614, 1.6mm^2	1-TS2	TS2C	42	2N	BK	240V a.c.(LTD BRK)N
C631, 5 CORE	Radar Cabin JB.A	TB.5	Elevation Antenna JB.B	TB.6	BN	240V a.c.(L) POWER
		TB.1		TB.1	BK	240V a.c.(L) LIGHTS
		TB.4		TB.5	B	240V a.c.(N) POWER
		TB.2		TB.2	V	240V a.c.(N) LIGHTS
		TB.3		TB.3	G/Y	EARTH
C632, 3 CORE	Radar Cabin JB.A	TB.6	Elevation Antenna JB.B	TB.7	BN	240V a.c.(L) HEATER
		TB.7		TB.8	B	240V a.c.(N)
		TB.8		TB.9	G/Y	EARTH
C641, 5 CORE	Radar Cabin JB.A	TB.11	Azimuth Antenna JB.C	TB.6	BN	240V a.c.(L) POWER
		TB.10		TB.1	BK	240V a.c.(L) LIGHTS
		TB.12		TB.5	B	240V a.c.(N) POWER
		TB.9		TB.2	V	240V a.c.(N) LIGHTS
		TB.13		TB.3	G/Y	EARTH

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C642, 3 CORE	Radar	TB.16	Azimuth	TB.7	BN	240V a.c.(L) HEATER
	Cabin	TB.15	Antenna	TB.8	B	240V a.c.(N)
	JB.A	TB.14	JB.C	TB.9	G/Y	EARTH
C643, 3 CORE	Radar	TB.17	Azimuth	TB.12	BN	240V a.c.(L) OBST.
	Cabin	TB.18	Antenna	TB.11	B	240V a.c.(N) LIGHT
	JB.A	TB.19	JB.C	TB.10	G/Y	EARTH
C644, 3 CORE	Obst.	TB.	3-way	TB.	BN	240V a.c.(L)
	Light	TB.	TB.	TB.	B	240V a.c. (NO
		TB.		TB.	G/Y	EARTH
C701	3-J12	J	TBs 1,2	1	R	T/PHONE Rx
6 PAIR, SCREEN				2		T/PHONE Rx LINK
				3		T/PHONE Rx 1,2,3
		K		4	W/R	return
				5		return LINK
				6		return 4,5,6
		G		7	B	T/PHONE Tx LINK
				8		T/PHONE Tx 7,8,9
				9	B	T/PHONE Tx
		H		10	W/B	return
				11		return LINK
				12		return 10,11,12
		A		1	BK	SCREEN
				2		SCREEN LINK 1-2
		E		3	V	RING
		F		4	W/V	return
		C		5	BN	RING OUT
		D		6	W/BN	return
		N		N.C.	Y	

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C701	3-J12	P	TBs 1,2	N.C.	W	
6 PAIR, SCREEN		L		N.C.	G	
		M		N.C.	W/G	
		B				
		R,S				NOT USED
		T,U				
		V,W				
		X,Y				NOT USED
		Z,a				
		b,c				
C702	TBs 1,2	7-TB1	14(EL PHONE)	A	B	T/PHONE Tx
2 PAIR, SCREEN		10-TB1		B	W/B	return
				C	BK	SCREEN
		1-TB1		D	R	T/PHONE Rx
		4-TB1		E	W/R	return
		1-TB2		F	BK	SCREEN
C703	TBs 1,2	8-TB1	14(AZ PHONE)	A	B	T/PHONE Tx
2 PAIR, SCREEN		11-TB1		B	W/B	return
				C	BK	SCREEN
		2-TB1		D	R	T/PHONE Rx
		5-TB1		E	W/R	return
		2-TB2		F	BK	SCREEN
C741	Antenna		Azimuth			
	Interface	A	Antenna		B	Telephone-Tx
	Panle	B	Phone Jack		W/R	Return
		C Az.			BK	Screen Pair 1
		D Ant.			R	Telephone-Rx
		F Phone			W/R	Return
		F Jack			BK	Screen Pair 2

(continued)

TABLE 12 SYSTEM INTERCONNECTIONS (LOCAL) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C731	Antenna Interface Panel	A	Elevation Antenna	B	W/B	Telephone-TX Return
		B	Phone Jack		BK	Screen Pair 1
		C El.			R	Telephone-Rx
		D Ant.			W/R	Return
		E Phone			BK	Screen
		F Jack				

TABLE 13 SYSTEM INTERCONNECTIONS (OPS CENTRE)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C10 Coax, 75 ohm	Landline Termination Panel	J1	Mux/Demux Unit	J24		BASEBAND RX
C11 Coax, 75 ohm		J2		J15		BASEBAND TX
C12 3-Core 32/0.2	Mux-Demux Unit	J1-A	Mains Dist. Board	L	BN	Mains Supply-Line
		J1-B		N	B	Mains Supply-Neut
		J1-C		E	Y	Mains Supply-Earth
C13 5-screen pair (20 AWG)	Mux/Demux Unit	J2-E	Remote Control Un.	J5-E	R	Normal IF
		J2-F		J5-F	W/R	Return
		J2-j		J5-	Braid	Screen
		J2-G		J5-G	B	MTI IF
		J2-H		J5-H	W/B	Return
		J2-j		J5-	Braid	Screen
		J2-J		J5-J	G	MTI Interval
		J2-K		J5-K	W/G	Return
		J2-j		J5-	Braid	Screen
		J2-X		J5-X	BN	EL Servo Data
		J2-Y		J5-Y	W/BN	Return
		J2-j		J5-	Braid	Screen
▶ C13 5-screen pair (20 AWG)	Mux/Demux Unit	J2-Z	Remote Control Un.	J5-Z	V	AZ Servo Data ◀
		J2-a		J5-a	W/V	Return
		J2-j		J5-	Braid	Screen
C14 Wire equip,T.3	Mux/Demux Unit	J2-C	Mux/Demux Cabinet	TB.A-1	R	Telephone-Ring

(continued)

TABLE 13 SYSTEM INTERCONNECTIONS (OPS CENTRE) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C15 Wire, equip,T.3		J2-D		TB.A-2	BN	(to Radar Head)
C16 Wire, equip,T.3		J2-V		TB.A-3	B	Telephone-Ring
C17 Wire, equip,T.3		J2-W		TB.A-4	BK	(from Radar Head)
C18 Wire, equip,T.3	Mux/Demux Unit	J2-m	Mux/Demux	TB.A-6	O	Telephone-Tx
C19 Wire, equip,T.3		J2-n		TB.A-7	Y	(to Radar Head)
C20 Wire, equip,T.3		J2-s		TB.A-8	P	Telephone-Rx
C21 Wire, equip,T.3		J2-t		TB.A-9	W	(from Radar Head)
C22 26-pair (22 AWG)	Mux/Demux Unit	J26-A	Remote Control Unit	J6-A	R	Enable-Select
		J26-B		J6-B	W/R	Return
		J26-C		J6-C	B	Manual/Auto-Select
		J26-D		J6-D	W/B	Return
		J26-E		J6-E	G	Runway 1 Select
		J26-F		J6-F	W/G	Return
		J26-G		J6-G	Y	Runway 2 Select
		J26-H		J6-H	W	Return
		J26-J		J6-J	BN	Runway 3 Select
		J26-K		J6-K	W/BN	Return
		J26-L		J6-L	V	Runway 4 Select
		J26-M		J6-M	W/V	Return

(continued)

TABLE 13 SYSTEM INTERCONNECTIONS (OPS CENTRE) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
		J26-N		J6-N	O	Manual-ACW
		J26-P		J6-P	W/O	Return
		J26-R		J6-R	P	Manual-CW
		J26-S		J6-S	W/P	Return
		J26-T		J6-T	TQ	Scan On/Off
		J26-U		J6-U	GR	Return
		J26-V		J6-V	R/B	Antenna-Up
		J26-W		J6-W	B/P	Return
		J26-X		J6-X	R/G	Antenna-Down
		J26-Y		J6-Y	B/G	Return
		J26-Z		J6-Z	R/Y	Antenna-Left
		J26-a		J6-a	R/Y	Return
		J26-b		J6-b	R/BN	Antenna-Right
		J26-c		J6-c	B/BN	Return
		J26-d		J6-d	R/BK	Enable-On Ind.
		J26-e		J6-e	B/BK	Return
		J26-f		J6-f	R/O	Manual/Auto-Ind.
C22 26-pair (22 AWG)	Mux/Demux Unit	J26-g	Remote Control Unit	J6-g	B/O	Return
		J26-h		J6-h	R/GR	Runway 1-Ind.
		J26-i		J6-i	B/GR	Return
		J26-j		J6-j	G/V	Runway 2-Ind.
		J26-k		J6-k	BN/V	Return
		J26-m		J6-m	G/O	Runway 3-Ind.
		J26-n		J6-n	BN/O	Return
		J26-p		J6-p	G/P	Runway 4-Ind.
		J26-q		J6-q	BN/P	Return
		J26-r		J6-r	G/GR	Warning Ind.
		J26-s		J6-s	BN/GR	Return
		J26-t		J6-t	R/B/W	Tolerance-CW Ind.

(continued)

TABLE 13 SYSTEM INTERCONNECTIONS (OPS CENTRE) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C22 26-pair (22 AWG)	Mux/Demux Unit	J26-u	Remote Control Unit	J6-u	B/P/W	Return
		J26-v		J6-v	R/G/W	Tolerance-ACW Ind.
		J26-w		J6-w	B/G/W	Return
		J26-x		J6-x	R/Y/W	Overrun-CW Ind.
		J26-y		J6-y	B/Y/W	Return
		J26-z		J6-z	R/BN/W	Overrun-ACW Ind.
		J26-AA		J6-AA	B/BN/W	Return
		J26-BB		J6-BB	R/BK/W	Scan On/Off Ind.
		J26-CC		J6-CC	B/BK/W	Return
		J26-DD		J6-DD	R/O/W	Polarization Lin. Ind.
		J26-EE		J6-EE	B/O/W	Return
C23 26 PAIR (22 AWG)	Mux/Demux Unit	J27-A	Remote Control Unit	J7-A	R	Polarization Lin/ Circ.
		J27-B		J7-B	W/R	Return
		J27-C		J7-C	B	Norm/Log FTC-Select
		J27-D		J7-D	W/B	Return
		J27-E		J7-E	G	Sens. Time Control
		J27-F		J7-F	W/G	Return
		J27-G		J7-G	Y	Star-Select
		J27-H		J7-H	W	Return
		J27-J		J7-J	BN	Chan. A-Select
		J27-K		J7-K	W/BN	Return
		J27-L		J7-L	V	Chan. B-Select
		J27-M		J7-M	W/V	Return
		J27-N		J7-N	O	HV-On
		J27-P		J7-P	W/O	Return
		J27-R		J7-R	P	HV-Off

(continued)

TABLE 13 SYSTEM INTERCONNECTIONS (OPS CENTRE) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C23 26 PAIR (22 AWG)	Mux/Demux Unit	J27-S	Remote Control Unit	J7-S	W/P	Return
		J27-T		J7-T	TQ	HV-Reset
		J27-U		J7-U	GR	Return
		J27-d		J7-d	R/B	Polarization Circ. Ind.
		J27-e		J7-e	B/P	Return
		J27-f		J7-f	R/G	Chan. A/B-Ind.
		J27-g		J7-g	B/G	Return
		J27-h		J7-h	R/Y	Ch.A Maint. Req. Ind.
		J27-i		J7-i	B/Y	Return
		J27-j		J7-j	R/BN	Ch.B Maint. Req. Ind.
		J27-k		J7-k	B/BN	Return
		J27-m		J7-m	R/BK	Ch.A Status-Maint. Ind.
		J27-n		J7-n	B/BK	Return
		J27-p		J7-p	R/O	Ch.B Status-Maint.
		J27-q		J7-q	B/O	Return
		J27-r		J7-r	R/GR	Ch.A Status-HV On Ind.
		J27-s		J7-s	B/GR	Return
		J27-t		J7-t	G/V	Ch.B Status-HV On Ind.
		J27-u		J7-u	BN/V	Return
		J27-v		J7-v	G/O	Ch.A Status-HV Ready Ind.
		J27-w		J7-w	BN/O	Return
		J27-x		J7-x	G/P	Ch.B Status-HV Ready Ind.
		J27-y		J7-y	BN/P	Return
		J27-z		J7-z	G/GR	28V P.S. Fault Ind.
		J27-AA		J7-AA	BN/GR	Return
		J27-BB		J7-BB	R/B/W	Overtemp Fault Ind.

(continued)

TABLE 13 SYSTEM INTERCONNECTIONS (OPS CENTRE) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C23 26 PAIR (22 AWG)	Mux/Demux Unit	J27-CC	Remote Control Unit	J7-CC	B/P/W	Return
		J27-DD		J7-DD	R/G/W	Control Sel. Ind.
		J27-EE		J7-EE	B/G/W	Return
		J27-		J7-	R/Y/W	Spare unterminated
		J27-		J7-	B/Y/W	Spare unterminated
		J27-		J7-	R/BN/W	Spare unterminated
		J27-		J7-	B/BN/W	Spare unterminated
		J27-		J7-	R/BK/W	Spare unterminated
		J27-		J7-	B/BK/W	Spare unterminated
		J27-		J7-	R/O/W	Spare unterminated
		J27-		J7-	B/O/W	Spare unterminated
C24 Coax, 75 ohm	Mux/Demux Unit	J7	Remote Indicator No. 1	J5		Pre-trigger
C25 Coax, 75 ohm	Mux/Demux Unit	J10	Remote Indicator No.1	J6		Angle Data
C26 Coax, 75 ohm		J4		J7		Mixed Video
C27 Coax, 75 ohm		J8	Remote Indicator No.2	J5		Pre-trigger
C28 Coax, 75 ohm		J11		J6		Angle Data
C29 Coax, 75 ohm		J5		J7		Mixed Video
C30 3-Core 32/0.2.	+28V Power Supply Unit	J1-A	Mains Dist. Board	L	BN	Mains Supply-Line
		J1-B		N	B	Mains Supply-Neut
		J1-C		E	G/Y	Mains Supply-Earth

(continued)

TABLE 13 SYSTEM INTERCONNECTIONS (OPS CENTRE) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C31 3-Core (16 AWG)	+28V Power Supply Unit	J2-A	Remote Control Unit	J1-A	R	+28V D.C.-Line
		J2-B		J1-B	BK	+28V D.C.-Return
		J2-C		J1-C	B	+28V D.C.-P.S. Fault
C32 84/0.3 PVS	Mux/Demux Unit.	E1	Mux/Demux Cabinet	Earth Stud		Earth
C33 84/0.3 PVC	+28V PSU	E1	Mux/Demux Cabinet	Earth Stud		Earth
C34 84/0.3 PVC	Mux/Demux Cabinet	Earth Stud	Earth Busbar			Earth
C35 3-Core 32/0.2	Remote Indicator No. 1	J1-A	Mains Dist. Board	L	BN	Mains Supply-Line
		J1-B		N	B	Mains Supply-Neut
		J1-C		E	G/Y	Mains Supply-Earth
C36 4-pair 1 Scan pair	Remote Indicator No. 1	J2-R	Remote Control Unit	J2-R	BN	Master Display Tellback
		J2-P		J2-S	W/BN	Return
		J2-S		J2-	Braid	Screen
		J2-U		J2-A	R	Norm/Log FTC Select
		J2-V		J2-B	W/R	Return
		J2-W		J2-C	B	Sensitivity Time Control
		J2-X		J2-D	W/B	Return
		J2-Y		J2-E	G	Star Select
		J2-Z		J2-F	W/G	Return
		J2-a		J2-	Braid	Screen

(continued)

TABLE 13 SYSTEM INTERCONNECTIONS (OPS CENTRE) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C37 7-pair screened	Remote Indicator No.1	J3-A	Remote Control Unit	J2-X	R	MTI Interval
		J3-B		J2-Y	W/R	Return
		J3-T		J2-	Braid	Screen
		J3-C		J2-V	B	MTI Gain Control
		J3-D		J2-W	W/B	Return
		J3-U		J2-	Braid	Screen
		J3-E		J2-T	G	Norm./Log Gain Control
		J3-F		J2-U	W/G	Return
		J3-V		J2-	Braid	Screen
		J3-P		J2-J	Y	Antenna-Down
		J3-a		J2-K	W	Return
		J3-R		J2-G	BN	Antenna-Up
		J3-S		J2-H	W/BN	Return
		J3-W		J2-N	V	Antenna-Right
		J3-G		J2-P	W/V	Return
		J3-X		J2-L	O	Antenna-Left
		J3-Y		J2-M	W/O	Return
		J3-Z		J2-	Braid	Screen
C38 4-pair screened (20 AWG)	Remote Indicator No.1	J4-A	Remote Control Unit	J2-e	R	Auto(Map)Control
		J4-B		J2-d	W/R	Auto(Map)Control
		J4-G		J2-	Braid	Screen
		J4-C		J2-b	B	EL Servo Data
		J4-D		J2-c	W/B	Return
		J4-L		J2-	Braid	Screen
		J4-E		J2-g	G	Auto(Map)Control
		J4-F		J2-f	W/G	Auto(Map)Control

(continued)

TABLE 13 SYSTEM INTERCONNECTIONS (OPS CENTRE) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C38 4-pair screened (20 AWG)	Remote Indicator No.1	J4-G	Remote Control Unit	J2-	Braid	Screen
		J4-J		J2-Z	BN	AZ Servo Data
		J4-H		J2-a	W/BN	Return
		J4-K		J2-	Braid	Screen
C39	Remote Indicator No. 1	E1	Earth Bus			Earth
C40	Remote Control Unit	E1	Earth Bus			Earth
C41 3-Core 32/0.2	Remote Indicator No. 2	J1-A	Mains Dist. Board	L	BN	Mains Supply-Line
		J1-B		N	B	Mains Supply-Neut
		J1-C		E	G/Y	Mains Supply-Earth
C42 4-pair 1 screened pair	Remote Indicator No.2	J2-R	Remote Control Unit	J3-R	BN	Master Display Tellback
		J2-P		J3-S	W/BN	Return
		J2-S		J3-	Braid	Screen
		J2-U		J3-A	R	Norm/Log FTC Select
		J2-V		J3-B	W/R	Return
		J2-W		J3-C	B	Sensitivity Time Control
		J2-X		J3-D	W/B	Return
		J2-Y		J3-E	G	Star Select
		J2-Z		J3-F	W/G	Return
		J2-a		J3-	Braid	Screen

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TABLE 13 SYSTEM INTERCONNECTIONS (OPS CENTRE) (continued)

Cable No. and Type	Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C43 7-pair screened	Remote Indicator No. 2	J3-A	Remote Control Unit	J3-X	R	MTI Interval
		J3-B		J3-Y	W/R	Return
		J3-T		J3-	Braid	Screen
		J3-C		J3-V	B	MTI Gain Control
		J3-D		J3-W	W/B	Return
		J3-U		J3-	Braid	Screen
		J3-E		J3-T	G	Norm/Log Gain Control
		J3-F		J3-U	W/G	Return
		J3-V		J3-	Braid	Screen
		J3-P		J3-J	Y	Antenna-Down
		J3-a		J3-K	W	Return
		J3-R		J3-G	BN	Antenna-Up
		J3-S		J3-H	W/BN	Return
		J3-W		J3-N	V	Antenna-Right
		J3-G		J3-P	W/V	Return
		J3-X		J3-L	O	Antenna-Left
		J3-Y		J3-M	W/O	Return
		J3-Z		J3-	Braid	Screen
C44 4-pair screened (20 AWG)	Remote Indicator No.2	J4-A	Remote Control Unit	J3-e	R	Auto(Map)Control
		J4-B		J3-d	W/R	Auto(Map)Control
		J4-G		J3-	Braid	Screen
		J4-C		J3-b	B	EL Servo Data
		J4-D		J3-c	W/B	Return
		J4-L		J3-	Braid	Screen
		J4-E		J3-g	G	Auto(Map)Control
		J4-F		J3-f	W/G	Auto(Map)Control
		J4-G		J3-	Braid	Screen

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TABLE 13 SYSTEM INTERCONNECTIONS (OPS CENTRE) (continued)

Cable No. and Type		Connector A Identity	Pin	Connector B Identity	Pin	Colour	Function
C44	4-pair screened (20 AWG)	Remote Indicator No.2	J4-J J4-H J4-K	Remote Control Unit	J3-Z J3-a J3-	BN W/BN Braid	AZ Servo Data Return Screen
C45		Remote Indicator No.2	E1	Earth Bus			Earth