RESTRICTED

AIR PUBLICATION

2527Q

VOLUME 1

PART 2

RADAR TYPE 80, Mk. 1, 2 and 2A

TECHNICAL INFORMATION

Prepared by direction of the Minister of Aviation

Henry Hardman

Promulgated by Command of the Air Council

M. J. Dean.

AIR MINISTRY

(*A.L.42, June* 63)

Mr Herman

RESTRICTED

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RADAR TYPE 80 Mk. 1, 2 AND 2A

REMOVAL AND INSERTION OF LEAVES

Chapter

— CONTENTS sheet. *Remove* and *destroy* CONTENTS sheet (one leaf) and *substitute* new CONTENTS sheet (one leaf) attached.

SECTION 1

— Marker Card. After this marker card *insert* new Chapter 1 (one leaf) attached.

3 Para. 1 to 11. *Remove* and *destroy* para. 1 to 11 (one leaf) and *substitute* new para. 1 to 11 (one leaf) attached.

3 Para. 16 to 20. *Remove* and *destroy* para. 16 to 20 (one leaf) and *substitute* new para. 16 to 20 (one leaf) attached.

AMENDMENT RECORD SHEET

Record the incorporation of this Amendment list and *destroy* this instruction sheet.

SIGNALS

This amendment has been incorporated and the instruction sheet has been retained since AL 48 may affect it

NOTE TO READERS

The subject matter of this publication may be affected by Air Ministry Orders or by "General Orders and Modifications" leaflets in this A.P., in the associated publications listed below or even in some others. If possible, Amendment Lists are issued to correct this publication accordingly, but it is not always practicable to do so. When an Order or leaflet contradicts any portion of this publication, the Order or leaflet is to be taken as the over-riding authority.

The inclusion of references to items of equipment does not constitute authority for demanding the items.

Each leaf, except the original issue of preliminaries, bears the date of issue and the number of the Amendment List with which it was issued. New or amended technical matter on new leaves which are inserted when the publication is amended will be indicated by triangles, positioned in the text thus:— ◀————▶ to show the extent of amended text, and thus:— ▶◀ to show where text has been deleted. When a Part, Section or Chapter is issued in a completely revised form the triangles will not appear.

When Volume 1 was first issued, Parts 1 and 2 were contained under one cover. The number of pages per Chapter became greater than first envisaged, so it was decided to remove Part 2 and to put it in a separate cover. This was done by A.L.42. A.L's subsequent to A.L.42 are a separate series for each cover.

* * *

LIST OF ASSOCIATED PUBLICATIONS

Test rig (waveguide) 12242	2896*AP*
Test kits, (HPD) 12751 *and (aerial conductance)* 12733	2896*AQ*

LAYOUT OF A.P.2527Q

RADAR TYPE 80, Mk. 1, 2 and 2A

Heavy type indicates the books being issued under this A.P. number; when issued they will be listed in A.P.113

CONTENTS

CONTENTS

PRELIMINARIES

SECTION 1

SYSTEM TESTS

P29096 348995/8293 1/59 875 C & P G

Chapter 1

GENERAL

LIST OF CONTENTS

Introduction

1. The procedures described in this Section are carried out to ensure the correct operation and mechanical soundness of units comprising systems in the Radar Type 80, Mk. 1, 2 and 2A. In instances where a unit or chassis is replaced, the substitute item must be tested in accordance with its individual specification detailed in Volume 6 of this Air Publication before system tests are performed.

2. The test equipment required to perform the tests is listed in the Chapters corresponding to the particular tests. Except where otherwise stated, all figures given in this Section are acceptable if allowance is made for errors in the test equipment.

3. The preliminary setting-up procedures for each system test is given in the Chapter relevant to the test.

WARNING . . .

Personnel safety interlock switches are not fitted on this equipment. Two persons must always be present and great care taken, therefore, when the equipment is switched on and cabinet doors are open.

Personnel within a radius of 200 feet from the centre of the aerial system, must not look directly at the reflector especially if it is stationary when the transmitter is switched on. Prolonged exposure to radiation may have a damaging effect on the eyes. It follows that personnel must not work on the reflector or linear array when power is being radiated. When such work is necessary, the transmitter must be switched off.

To prevent the application of h.t. during system tests the local MASTER INTERLOCK **switch must be set to its** OFF **position.**

Mechanical checks

4. The following general mechanical checks must be carried out prior to, and during, tests:—

(1) Check that all cabinet doors close correctly.

(2) Ensure that all units mounted on sliding runners lock in the IN and OUT positions.

(3) Check the condition of painted surfaces and surfaces with other finishes.

(4) Check cableforms and cores for signs of insulation damage.

(5) Check soldering for signs of corrosion and dry joints.

(6) Inspect the pipe connections and unions of the water supply system for leakage.

Chapter 2

TRIGGER UNIT 4413 and POWER UNIT 4414

LIST OF CONTENTS

Introduction

1. Trigger unit 4413 initiates the two trains of pulses used by trigger unit 102 when it is being externally triggered. Power unit 4414 provides stabilized supplies of +350V and −500V to the trigger unit 4413. Both units are situated in rack assembly 4411 in the radar office and are described in Part 1, Sect. 8, Chap. 3, of this publication.

2. Test equipment required for carrying out the system tests on these units is:—

(1) Oscilloscope CT316
(2) Oscilloscope 9172
(3) Eight termination units 34 (68-*ohm dummy loads*).

Preliminary setting-up procedure

3. (1) Switch on the 230V, 50 c/s supply to the trigger unit 4413 and switch on power unit 4414 (*the switch is on trigger unit* 4413). Allow at least a 15 minutes warming-up period.

(2) Check the h.t. voltages on the built-in meter on power unit 4414. They should be within ± 2 per cent of the voltage marked on the switch calibration plate. If not, they should be corrected by adjustment of the preset controls on power unit 4414.

(3) Connect all outputs of trigger unit 4413 either to the units they normally supply, or to 68-ohm termination units.

Test procedure

4. (1) Using the oscilloscope 9172 and the CT316, monitor the waveforms at the test sockets on the trigger unit 4413 front panel and check the dividers as follows. (*The oscilloscope settings are given in tabular form at the end of the test procedure*).

(2) The dividers should be set so that the narrow negative part of the waveform is the width specified below, consistent with a correct and stable division ratio. The pulse width specified is that at 50 per cent of the peak amplitude as measured on the CT316.

(3) Commence with the ÷ 4 and compare this with the 32·34 kc/s waveform. Adjust the preset marked ÷ 4 for a negative-going pulse width of 25 ± 1 μs.

(4) Compare the ÷ 5 with the ÷ 4. Adjust with ÷ 5 preset for a negative-going pulse width of 65 ± 2 μs.

(5) Compare the ÷ 3 with the ÷ 5. Adjust the ÷ 3 preset for a negative-going pulse width of 275 ± 5 μs.

(6) Compare the ÷ 2 with the ÷ 3. Adjust the ÷ 2 preset for a negative-going pulse width of 330 ± 10 μs.

(7) Measure the amplitude of the 270 c/s sine-wave output. It must be between 60 and 100V peak-to-peak, and at least 15V negative, and coincident with the master trigger unit immediately following the primary sub-trigger pulse.

(8) Using the oscilloscope CT316 triggered from one of the prepulse outputs from the monitor socket on the front panel of trigger unit 4413, check the wide gate width. It must be 900 ± 100 μs. If it is incorrect, adjust the preset control.

Note . . .
The wide gate is the negative-going part of the waveform, and the width is measured at 50 per cent of peak amplitude.

(9) Using the oscilloscope CT316, triggered from one of the prepulse outputs from the monitor sockets on the front panel, examine the 270 c/s prepulse outputs. Amplitude must be greater than 15V. Switch the SIGNAL DELAY switch on the CT316 to DELAY and measure the pulse width. It must be 4 ± 1 μs at 50 per cent of maximum amplitude. Check that there are no spurious pulses in the output, *e.g.* double pulses or spikes breaking through between pulses. Reverse the oscilloscope trigger and monitor leads and repeat the test on the other prepulse output.

(10) Using the CT316 triggered from one of the 540 c/s transmitter trigger pulse outputs from the monitor sockets on the front panel, examine the 540 c/s transmitter trigger pulse output to the master trigger unit; the amplitude must be greater than 15V. Switch the SIGNAL DELAY switch on the CT316 to DELAY and measure the pulse width; it must be 4 ± 1 μs. Check that there are no spurious pulses in the output. Reverse the oscilloscope

monitor and trigger leads and repeat the test on the other transmitter trigger pulse output.

Note . . .

When using the internal calibration to calibrate the oscilloscope timebase for measuring pulse width, switch out the signal delay.

5. (1) Switch off the 230V, 50 c/s supply to the trigger unit 4413. Replace the trigger unit 4413 and power unit 4414 with the spare units.

(2) Test the spare units, as described in the preceding para. 3 and 4, then leave them switched on for two hours.

(3) Repeat the tests of sub-para. 4(7), 4(8), 4(9), and 4(10).

Trigger unit 4413 tests — oscilloscope settings

Oscilloscope 9172

6. Set the SYNC SELECTOR to REPETITIVE Y1. Other settings are as follows:—

Sub-para.	Time range	A1 volts range	A1 input	A2 volts range	A2 input
4. (3)	500 μs	15	32·34 kc/s	150	÷ 4
4. (4)	1500 μs	50	÷ 4	150	÷ 5
4. (5)	5 ms	50	÷ 5	150	÷ 3
4. (6)	15 ms	50	÷ 3	150	÷ 2
4. (7)	15 ms	50	prepulse and master trigger unit pulse	50	Sinewave

*Oscilloscope CT*316

7. High impedance input and triggered from the prepulse. Other settings are:—

Sub-para.	T.B. Coarse	Volts range	Delay Trigger	Trigger	Signal Delay	Remarks
4. (3)	4	100	100 μs	+	Out	
4. (4)	3	100	1 ms	+	Out	
4. (5)	3	100	10 ms	+	Out	
4. (6)	3	100	10 ms	+	Out	
4. (8)	2	100	—	+	Out	
4. (9)	2	30	—	+	Out	For checking p.r.f. and amplitude
4. (9)	4	30	—	+	In	For checking pulse width
4. (10)	2	30	—	+	Out	For checking p.r.f. and amplitude
4. (10)	3	30	—	+	In	For checking pulse width

Chapter 3

RECTIFIER 101, MODULATOR 101 AND TRANSMITTER T.3724 TESTS

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

Introduction

1. The tests described below are for the purpose of checking the performance of the rectifier, modulator and transmitter units on site after installation, periodic servicing, or repair.

2. Equipment required to carry out this series of tests is as follows:—

(1) Two multimeters, Type 1 (Ref. No. 10S/16411).

(2) Two slip gauges; one 0·35 in. ± 0·01 in., the other 0·8 in. ± 0·02 in. (These are in test kit (slipring) 6840).

(3) Kit (wattmeter calibration).

(4) Dummy load (modulator) 6007.

(5) Tester performance (AFC) 6008.

(6) Thermometer, 0-50°C.

(7) A 68-ohm $\frac{1}{2}$W resistor.

◀ (8) Fluxmeter CT447. ▶

◀ (9) Adaptor M1 (Ref. No. 10AD/4235). ▶

3. An oscilloscope, CT316, is also required for some of the tests, the one mounted in the modulator rack being used for tests in the modulator building and the one in rack assembly (test) 345 being used in the cabin. The oscilloscope is fully described in A.P.2563CA, Vol. 1.

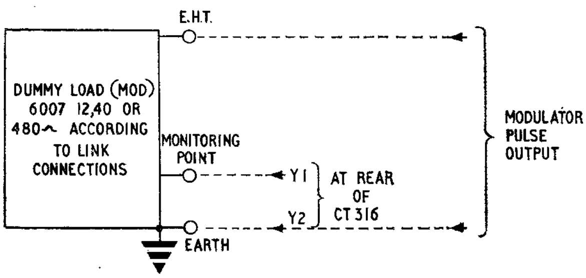

Fig. 1. Dummy load (mod) 6007: connections for system tests

4. Lengths of coaxial cable required for inter-connections are available from the spares racks or emergency connector kits. A lump of modelling clay such as plasticine is needed to secure the 0-50°C thermometer to the item under test.

PRELIMINARY SETTING-UP PROCEDURE

Modulator 101

5. Proceed as follows:—

(1) Short-circuit the 4-ohm mat resistor R19 on control unit 4139. Disconnect the high voltage pulse cable (uniradio 34) at the modulator 101 pulse output terminals (immediately after the pulse overload current transformer in the rear of the right-hand cabinet). Connect the dummy load (mod.) 6007 (fig. 7) to these terminals, through 38 ft of uniradio 34. Refer to the instruction plate on the dummy load and make link connections to provide a 40-ohm load with a 0·5-ohm monitor resistor at the earthy end.

Note . . .

The cable should be introduced into the modulator by removing the right-hand handle recess in the rear door adjacent to the pulse output terminals, and passing the cable through the aperture.

The pulse voltage across the 0·5 ohm resistor monitored on the CT316 will be 1/240 of the peak pulse voltage. This corresponds to $\frac{1}{6}$ of the peak pulse current.

(2) Use the Mk. 1 slip gauge from the test kit (slip-ring) 6840 to adjust the spark gap on modulation transformer T1 to 0·35 in. ± 0·01 in.

(3) Use the modelling clay to affix the 0-50°C thermometer to the base of the mercury pool switch tank, in such a manner that the thermometer indication will be unaffected by air flow or the modelling clay.

Calibration of oscilloscope CT316

6. Proceed as follows:—

(1) Remove the mask. Release and withdraw the CT316 on its runners. Turn the Y-plate selector switch S4 at the rear of the CT316 (screwdriver control) to mid-position, i.e. Y1 external, Y2 earthed. Connect Y2 input socket to chassis.

(2) Connect a coaxial cable carrying the waveform being monitored to Y1 and Y2 input sockets at the rear of the CT316. Terminate the cable with a 68-ohm $\frac{1}{2}$W resistor.

(3) Use the pen or chinagraph pencil to mark the limits of the waveform under examination on the CT316 screen.

(4) Remove the waveform monitoring leads from the Y1, Y2 input sockets. Remove the 68-ohm resistor.

(5) Connect the test voltage sockets on performance tester (AFC) 6008 to the Y1, Y2 sockets at the rear of CT316, ensuring that the polarity is correct.

(6) Connect across the Y1, Y2 sockets a multimeter Type 1 set to the 100-volt d.c. range.

(7) Switch on the performance tester (AFC) 6008 and turn the selector switch to position 6. Set RV3 approximately to its mid position.

(8) Use RV2 to adjust the voltage out from the performance tester until spot deflection on the CT316 coincides with the maximum amplitude marked in (3) above. Use RV3 for fine adjustment if required. Read off the pulse amplitudes as indicated on the multimeter.

(9) Set the output from the performance tester to 70 volts, indicated on the multimeter. Mark this level on the CT316 screen. This level will be required for setting the transmitter current pulse level (para. 27). It corresponds to 70A (70 volts across a 1-ohm resistor).

Note . . .

If the amplitude of the pulse to be measured is greater than the voltage available from performance tester (AFC) 6008, the latter may be replaced by a 120-volt battery across which is connected a 10 kilohm variable resistor, to give a voltage variable from 0-120V for calibration of the CT316.

Setting-up for operation

7. Set the equipment up for operation on the

LOCAL 2μS position with the exception of the overload relay setting in rectifier 101 which should be set to the 40A (5μS) position for the duration of the rectifier 101 test.

8. Proceed as follows:—

(1) Set the link on the overload relay in rectifier 101 to the 40A position.

(2) Set the links on the charging inductor in modulator 101 so that the two sections are connected in series.

(3) Open the link between charging capacitors C1 and C2 in modulator 101.

(4) Open the link between terminals C and D on the pulse-forming network X3 in modulator 101.

(5) Turn the selector switch on trigger unit 102 in modulator 101 to LOCAL 2μS. (Upper unit, the lower unit is spare.)

(6) Set the LOCAL-REMOTE switch on rectifier 101 front panel to LOCAL.

9. Use the Mk. 1 slip gauge from test kit (slip-ring) 6840 to check that the setting of the spark gap on the pulse transformer in transmitter T.3724 is 0·8 in. ± 0·02 in.

10. Close the CABINET HEATERS switch on the main switchboard in the modulator building.

FUNCTIONAL TESTS

Modulator 101

11. Close MODULATOR No. 1 switch on the main switchboard and check:—

(1) That the mercury pool switch (m.p.s.) blower has started up and that its direction of rotation is correct, i.e. blowing the air-stream over the m.p.s.

(2) That neon indicators MAIN CONTACTOR RELAY and TIMER 1 have struck. TIMER 1 should go out after 3 minutes ± 15 seconds, and restrike after a further period of 1 minute ± 15 seconds.

Note . . .

To achieve this may require resetting of the timer delays. To do this, open MODULATOR NO. 1 *switch. Timers* 1 *and* 2 *are on the right hand distribution board inside the lower doors of rectifier* 101. *Each timer has a circular dial graduated in minutes attached to the output shaft from the gear box. The shaft also carries the lever which operates the microswitch in the timer unit. The shaft can be rotated with respect to the gear box stud after slackening two screws. The dial can then be set until the required delay, e.g.* 3 *min, on the dial is opposite the red reference mark on the gear box mounting; the two screws should then be tightened. Timer* 2 *dial should be set to* 3 *min* ± 15 *s delay, and timer* 1 *dial to give* 1 *min* ± 15 *s delay. Close* MODULATOR NO. 1 *switch and re-check.*

(3) That the 12-phase mercury arc rectifier bulb in rectifier 101 has excited. If not, check the bulb position. It should be tilted so that the igniter arm at rest is approximately $\frac{3}{16}$ in. above the surface of the mercury.

Note . . .

To vary the tilt of the bulb, switch MODULATOR NO. 1 *off. Slacken off the wing nut on the frame immediately behind the rectifier bulb; this allows the cradle to rotate. When the correct tilt is obtained, tighten the wing nut. Close the* MODULATOR NO. 1 *switch.*

(4) That the 12-phase mercury-arc rectifier bulb cooling fan has started and is rotating correctly, *i.e.* blowing air over the bulb.

(5) That the neon indicator A.C. AVAILABLE, located on the modulator control panel 901 has struck.

12. (1) Close the MODULATOR AUXILIARIES switch, located on the main switchboard.

(2) Check that the duct inlet fan has started and that its rotation is correct, *i.e.* blowing air into the base of the modulator cubicle, and that the duct outlet fan has started and is extracting air at the top of the modulator.

(3) Check that the main mercury pool switch heaters have come on, *i.e.* relay RLA/1 in the mercury pool switch assembly is energized.

(4) Set the temperature control on the panel (mod. auxiliaries) 4520 to 18°C on the scale.

(5) Check that the upper red lamp on panel (mod. auxiliaries) 4520 has lighted, showing that the modulator heat exchanger is operating, *i.e.* water is flowing through the modulator transformer cooling circuit.

(6) Remove the MODULATOR OVERHEAT thermostat head from the air inlet duct. Using a source of warm water and a centigrade thermometer, adjust the thermostat control (*on panel,* (*mod. auxiliaries*) 4520), to operate at 33°C + 1°C − 2°C, *i.e.* so that the DUCT TEMP. NORMAL lamp on panel (mod. aux.) 4520 is extinguished. Replace the thermostat head in the inlet duct.

Note . . .

Allow the water used to cool slowly to the correct temperature so that the thermostat head follows closely the temperature indicated on the thermometer.

(7) Set blower air 112 temperature control to 25°C. Carefully remove the sensing element from the blower assembly and place it in a bucket of water warmed to a temperature of 20 to 22°C. Slowly raise the temperature of the water to 25°C ± 1°C. Check that the mercury tilt switch on the controller tilts to the OFF position at this temperature, *i.e.* the main m.p.s. heaters go off. If necessary, readjust the controller. Cool the water to 22°C, and check that at this temperature the tilt switch returns to the made position. Finally, replace the sensing element in the blower assembly.

(8) Check that the blower air filters are clean.

13. (1) Close the mains switch on trigger unit 102. Put the mains switch on the CT316 to L.T. On the panel (control) 901, set the A.C. TO MODULATOR switch to ON. Note that the AC. ON neon indicator on panel (control) 901 and the HEATERS ON neon on trigger unit 102 both strike.

(2) On trigger unit 102 the neon H.T. ON should strike after $2\frac{1}{2} \pm \frac{1}{2}$ min. If it does not, check the time delay (*controlled by RV* 1 *in power unit* 4593) and adjust it as required.

(3) (a) Set the mains switch on the CT316 to H.T.

(*b*) Set T.B. COARSE to position 3.

(*c*) Set Y SENSITIVITY to position 3 V. F.S.D.

(d) Set INPUT IMPEDANCE to 70 OHMS.

(*e*) Set INPUT to A.C.

(f) Set TRIGGER to +.

(4) Connect the TRIGGER lead to the PRI. trigger socket. Connect the SIGNAL INPUT socket to the SEC. GRID socket (*SK*.28) on panel (control) 901. Set CAL M C/S to 0·01. Adjust X SHIFT till the start of the trace coincides with the left-hand marker of the graticule. Adjust T.B. FINE until two divisions of the graticule coincide with one cycle of calibration. Each graticule division then represents 50 μs. Leave T.B. FINE at this setting and switch off CAL.

14. (1) Partly withdraw trigger unit 102 from the rack. Set RV2 to its mid-position (*approximately*). The secondary grid pulse should be visible on the CT316 trace. Set RV3 in trigger unit 102 to give delay between the start of the timebase waveform and the leading edge of this pulse of 250 ± 10μs.

(2) Set the selector switch on trigger unit 102 to LOCAL 5μs. Adjust RV4 to give a delay between the start of the timebase waveform and the leading edge of this pulse of 430 ± 10μs.

(3) On the CT316, disconnect the trigger pulse lead at the CT316 input trigger socket (*not at the CT* 316 *mounting frame*) and trigger from MASTER TRIGGER 1 on panel (control) 901. Connect the INPUT socket on the CT316 to MASTER TRIGGER 2 (*SK*.22) on panel (control) 901.

(4) (a) Set T.B. COARSE to position 2.

(b) Adjust X SHIFT until the start of the trace coincides with the left-hand marker on the graticule.

(c) Adjust T.B. FINE until one division of the graticule coincides with one cycle of calibration. Each graticule division then represents 100μs. Leave T.B. FINE at this position and switch off CAL.

(d) Check that the delay between the start of the timebase waveform and the leading edge of the pulse displayed (*Master Trigger* 2) is 688 ± 10μs.

Note . . .

The 20μs tolerance is given to allow for limitations in measuring technique. The actual variation is considerably less. Check that the minimum amplitude of the pulses is 15V positive, and that no spurious pulses are present.

(e) Remove the link from MASTER TRIGGER 1 to the CT316 trigger input socket and revert to PRIMARY TRIGGER.

(f) Set the CT316 as in para. 13 (3(a)). Connect the pulse from SEC. GRID on panel (control) 901 to the CT316 input socket.

(g) Set the selector switch on trigger unit 102 to EXTERNAL 5μs. and adjust RV5 to give a delay between the start of the timebase and the leading edge of this pulse of 430 ± 10μs.

(h) Set the selector switch on trigger unit 102 to EXTERNAL 2μs, and adjust RV6 to produce a delay between the start of the timebase and the leading edge of this pulse of 250 ± 10μs.

(5) (a) Still triggering the CT316 from the primary pulse, connect the pulse from PRIMARY GRID 1 (*SK*.24) on panel (control) 901 to SIGNAL INPUT (70 *ohms*) on the CT316.

(b) Set T.B. COARSE to position 5.

(c) Set Y SENSITIVITY to position 30 VOLTS F.S.D.

(d) Set CAL MC/S to position 1.

(e) Adjust X SHIFT until the start of the trace coincides with the left-hand marker on the graticule.

(6) (a) Adjust T.B. FINE until one division of the graticule concides with one cycle of CAL. Each graticule division then rppresents 1μs. Switch CAL off and set Y SENSITIVITY to position 1 VOLT F.S.D.

(b) Measure the pulse width at 50% of its amplitude. It should be 5·5 ± 0·5μs.

(*c*) Set Y SENSITIVITY to 3 VOLTS F.S.D. Measure the pulse amplitude. It should be greater than 1V.

(d) Connect the pulse from PRIMARY GRID 2 (*SK*.25 *on panel* (*control*) 901) to SIGNAL INPUT in place of that from PRIMARY GRID 1. Repeat the width and amplitude measurements as in sub-para. 14(6) (a) and (b).

(e) Connect CT 316 TRIGGER lead to the SEC. TRIGGER socket. Connect the pulse from SECONDARY GRID (*SK*.28) on panel (control) 901 to CT316 INPUT socket. Repeat the pulse width and amplitude measurements as in sub-para. 14(6) (a) and (b).

(f) Switch off the trigger unit 102. Measure the voltage between low voltage grid terminals 1 and 2 on control unit 4139, using a multimeter Type 1 on the 1kV d.c. range. The minimum voltage observed must be 350V negative with respect to ground.

(g) Repeat the measurement, between the high voltage grid terminal on control unit 4139 and ground. The reading observed should be 350V negative with respect to ground.

(h) Remove the multimeter Type 1. Switch on trigger unit 102.

(7) Check that the temperature at the base of the tank of the mercury pool switch (*CV*2294) is between 20°C and 32°C.

Note . . .

1. *Ensure that all modulator doors have been closed for at least* 15 *min, before checking this temperature.*

2. *The temperature should be read with the thermometer attached to the tank as described in sub-para.* 5(3).

(8) Check the protector unit 12196 as follows:—

(a) Set the CT316 to measure 50V amplitude pulses at a p.r.f. of 270. Check that the amplitude of the pulse at SK94 is within 50 ± 5V.

(b) Check that the pulse amplitude at SK93 is 200 ± 40V.

(c) After the equipment has been running for at least 5 min, check that the SECONDARY TRIGGER FAILURE neon (*on TU*102) is ionized when the SECONDARY TRIGGER PULSE RESET switch is pressed.

(9) Check the action of the secondary trigger failure indicator as follows:—

(a) Disconnect the cable from SK93 on the protector unit, and note that

(i) The SECONDARY TRIGGER FAILURE neon (*on TU* 102) ionizes.

(ii) H.t. is removed from V6 and V7 on TU102.

(b) Repeat the check of the foregoing operation (a) three times. It will be necessary to reset the relay by use of the SECONDARY TRIGGER PULSE RESET switch after the cable is reconnected to SK93.

(c) When the test is completed, reconnect the cable to SK93 on the protector unit.

TRANSMITTER T.3724

Preliminary operations

15. (1) Close the AERIAL CABIN MAINS switch on the main switchboard in the modulator building. Then close the following switches in the aerial cabin, and make checks as detailed below.

(2) RADAR MAINS and CABIN MAINS on the wall of the aerial cabin.

(3) T.3724 NO. 1 on panel (a.c. distribution) 4461. This should cause A.C. AVAILABLE neon indicator on panel (control) 903 in T.3724 to strike.

(4) A.C. SUPPLY on panel (control) 903. The neon, A.C. ON should strike.

(5) HEAT EXCHANGER on panel (a.c. distribution) 4461. The water pump should start and the neon, WATER FLOWING, on panel (control) 903, should strike.

(6) CABINET HEATERS on panel (a.c. distribution) 4461. This should cause internal lighting and cabinet heating to function.

(7) R.F. HEAD NO. 1 on panel (a.c. distribution) 4461.

(8) MAINS on power unit 4343 (in the r.f. head).

(a) Check that the keep-alive interlock has operated, this being indicated by striking of the neon on signal generator (noise) Type 2.
(b) Check that keep-alive current is flowing in both sections of both TR cells by switching their inputs to the ammeters on power unit 4343.
(c) Check that the signal generator (noise) Type 2 is switched off, that the waveguide attenuator is in, and that signal generator (noise) Type 2 launching probe is withdrawn from the waveguide, as indicated by the ionizing of the NOISE SOURCE OUT neon on the signal generator.

(9) MAGNETRON HEATERS on panel (control) 903.

(a) Check that the MAGNETRON HEATERS READY interlock, indicated by ionizing of the MAGNETRON HEATER neon on panel (control) 903, operates after a delay of between 3 and 4 min. If necessary adjust RV1 in control unit 922 to give the required delay.
(b) Check that the steady magnetron heater current is 9A ± 0·5A.

(10) AIR PUMP CABINET on panel (a.c. distribution) 4461. Check that the air pump is functioning, indicated by ionization of the AIR PUMP neon on signal generator (noise) Type 2.
(11) MASTER INTERLOCK on panel (a.c. distribution) 4461. Check that the MASTER INTERLOCK lamp on the panel lights.

16. Check that when all the interlocks in the transmitter and r.f. head are functioning normally, the neon ROTATING CABIN INTERLOCKS on panel (control) 901 in modulator 101 strikes. Check also that the lamp ROTATING CABIN INTERLOCKS, on panel (a.c. distribution) 4461, lights.

17. Proceed as follows.
(1) Check that RV1 in power unit 922 is set to 4·5 ohms. Set the A.C. switch on power unit 922 to ON. When all the interlocks are closed, as indicated by the neons on panel (control) 901, press H.T. ON for about one second and then release it.

(2) The three neons indicating mains input on power unit 922 and the neon, MAIN CONTACTOR on the rectifier 101 cabinet, should strike. If the m.p.s. (CV2294) excites, the EXCITER ON neon in power unit 922 should strike and the EXCITER CURRENT meter on panel, meter 900 should indicate 6A ± 0·25A. If necessary withdraw power unit 922 and adjust RV2 to achieve this value.

(3) Check that the d.c. input voltage is at the minimum of 50 ± 20 volts.

(4) If the CV2294 does not excite, again press the H.T. ON button. Repeat six times if the CV2294 still fails to excite. After this, check for faults, as the squirter coil at the base of the CV2294 is not continuously rated. The H.T. ON button must never be pressed for longer than one second during each operation.

(5) When the CV2294 has excited, the H.T. OFF button should be pressed and the operation repeated six times to ensure that the igniter-exciter system is operating satisfactorily.

18. Proceed as follows.

(1) With the h.t. on, check by visual inspection, that all twelve rectifier anodes are firing.

(2) Check that the H.T. RAISE and H.T. LOWER controls operate satisfactorily over the minimum range of 100 to 575 volts d.c. output from rectifier 101, from both local and remote stations.

(3) Check that it is possible to adjust the d.c. voltage level to within 5 volts of any desired figure.

Note . . .

To achieve this, it may be necessary to adjust the brake tension on the induction regulator.

(4) Check that, when the changeover switch on rectifier 101 is set to REMOTE, it is not possible to switch on the h.t. or operate the RAISE/LOWER controls from the LOCAL position on modulator 101.

(5) Check that when the control changeover switch on rectifier 101 is moved to LOCAL it is not possible to switch on the h.t. or operate the RAISE/LOWER controls from the REMOTE position, i.e. on transmitter T.3724.

(6) Check that in (4) and (5) above, it is always possible to switch off the h.t. at either station regardless of the position of the control changeover switch.

(7) Change the rectifier voltage control to

the hand operated position. Check that the hand control operates satisfactorily. Change back to auto control.

(8) Switch off the h.t. and No. 1 Modulator on the main switchboard. Disconnect the rectifier load at terminals 32 and 33 on panel (distribution) 902 in modulator 101. Reconnect cable 36, black and red leads to terminals 32 and 33 respectively. Reset the overload relay in rectifier 101 to the 15A position.

◀ Magnet 101 - flux density test

18A. The purpose of this test is to determine the flux density of the magnetic field produced by magnet 101 using fluxmeter CT447 and adaptor fluxmeter, M1 which are described in Vol. 1, Part 4, Sect. 9, Chap. 1 of this Air Publication. To achieve this proceed as follows:—

(1) Remove the magnetron (CV2319) as detailed in Vol. 1, Part 1, Sect. 5, Chap. 1, para. 17 of this Air Publication.

(2) Fit adaptor, fluxmeter, M1 between the polepieces of magnet 101.

(3) Use fluxmeter CT447 and check that the flux density is approximately 1·375 Kilogauss.

(4) Remove the fluxmeter and adaptor and replace the magnetron. ▶

Functional tests

19. Proceed as follows:—

(1) Switch on MODULATOR NO. 1 at the main switchboard.

(2) Set up the oscilloscope CT316 as follows:—

(a) Set T.B. COARSE to position 2.

(b) Set Y SENSITIVITY to 30 VOLTS F.S.D.

(c) Set INPUT IMPEDANCE to 70 OHMS

(d) Connect the TRIGGER lead to the PRIMARY TRIGGER socket.

(e) Connect the signal input socket on CT316 to the PRIMARY CHARGING CURRENT socket (SK23) on panel (control) 901.

(3) When all the interlocks are closed, switch on the h.t. to the modulator (sub-para. 17 (1) to (5)). Check that when the CV2294 has excited the h.t. is at minimum. Raise the h.t. and observe the primary charging current waveform on the CT316. When the h.t. is approximately 3kW, as indicated on panel (meter) 900, the discontinuity in the primary charging current waveform should be set to occur at 60 ± 5% of peak amplitude by adjusting RV3 in trigger unit 102. Run the modulator for one hour at this level and then recheck the above settings, i.e. for 2μs pulse width, d.c. input 3kW approximately, and discontinuity in waveform occurring at 60 ± 5% of peak amplitude.

20. Check that the following typical waveforms conform approximately to those obtained during the factory system tests (fig. 2 and 3). When comparing amplitude, allowance should be made for variance in discontinuity in the primary charging current and in d.c. input. The settings for CT 316 are given below.

Waveform	Input impedance	Y sensitivity	T.B. coarse	T.B. delay	Trigger	Input (signal)	Y-Input switch
(a) Primary charging current	70 ohms	30V F.S.D.	2	OFF	+ve	From primary charging socket on panel (control) 901	Counter-clockwise
(b) Secondary anode	High	100V F.S.D.	2	OFF	+ve primary	From secondary anode socket on panel (control) 901	Counter-clockwise
(c) Modulator Voltage pulse	High	As previously calibrated (para. 13(5) (a) to (e))	4	OFF	+ve secondary	From voltage monitor point on dummy load (mod) 6007 direct to Y plate at rear of CT316	Central
(d) Primary grid 1	70 ohms	3V F.S.D.	2	OFF	+ve primary	From primary grid 1 socket on panel (control) 901	Counter-clockwise
(e) Primary anode	70 ohms	3V F.S.D.	2	OFF	+ve primary	From primary anode 1 socket on panel (control) 901	Counter-clockwise
(f) Secondary grid	70 ohms	3V F.S.D.	2	OFF	+ve secondary	From secondary grid socket on panel (control) 901	Counter-clockwise
(g) Charging capacitor (C1) volts	High	500V F.S.D.	2	OFF	+ve primary	From voltage monitoring point on voltage divider across C1	Counter-clockwise

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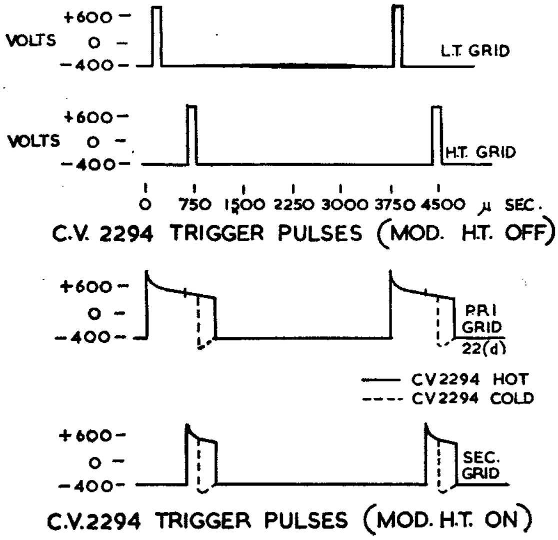


NOTE:- ALL AMPLITUDE VALUES QUOTED ARE TRUE VALUES. DIVIDER RATIOS MUST BE CONSIDERED WHEN EXAMINING WAVEFORMS ON C.T. 316

P.R.F. 270.
PULSE WIDTH 5 μ SEC.

C.T. 316 SETTINGS
SWITCH AND POSITIONS

INPUT IMPEDANCE	Y SENSITIVITY	T. B. COARSE	TRIGGER
70 OHMS	3	2	PRIMARY
70 OHMS	3	2	SECONDARY
HIGH	100	2	PRIMARY
HIGH	10	2	PRIMARY
70 OHMS	30	2	PRIMARY
HIGH	100	2	PRIMARY
HIGH	10	2	PRIMARY

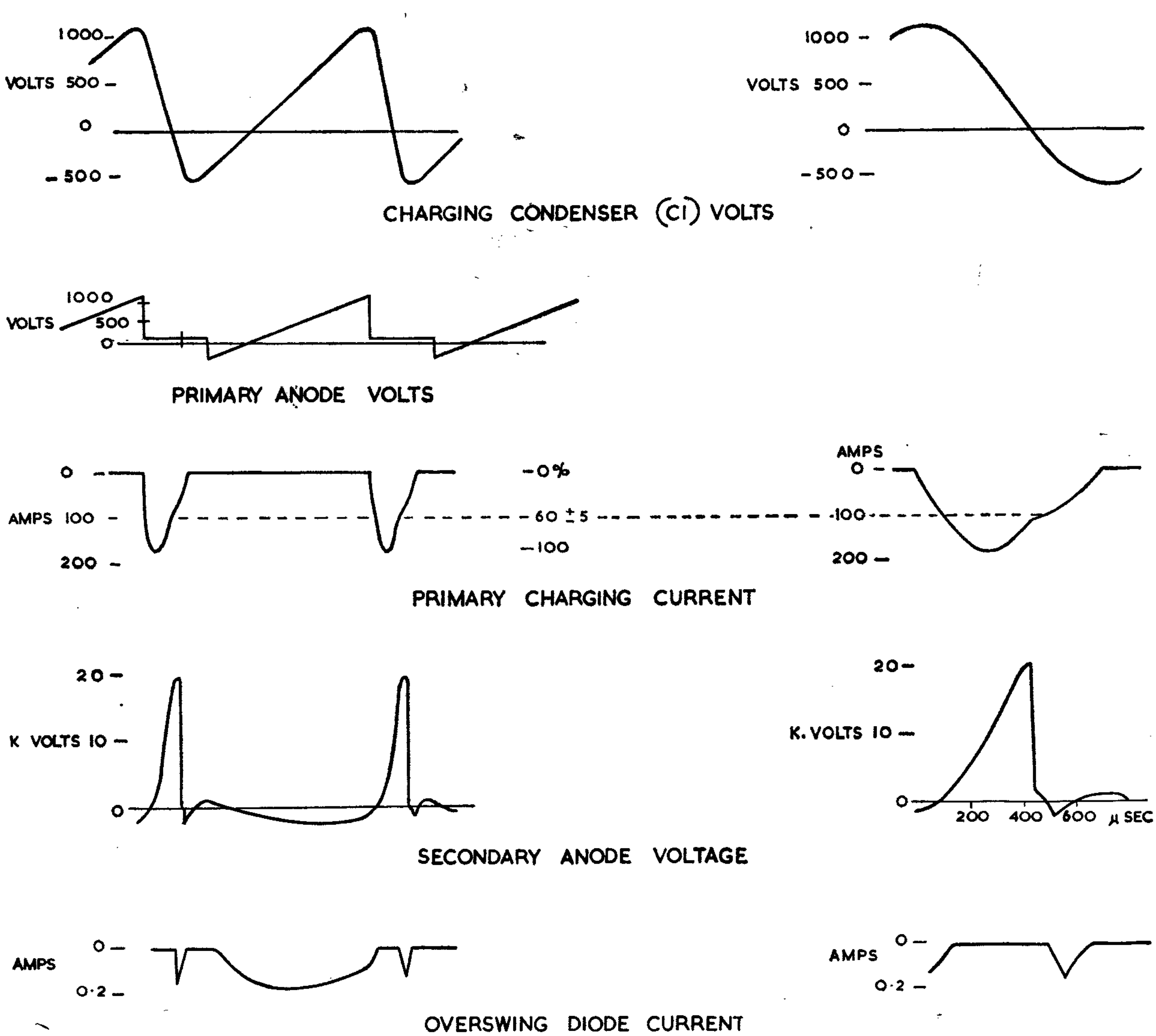
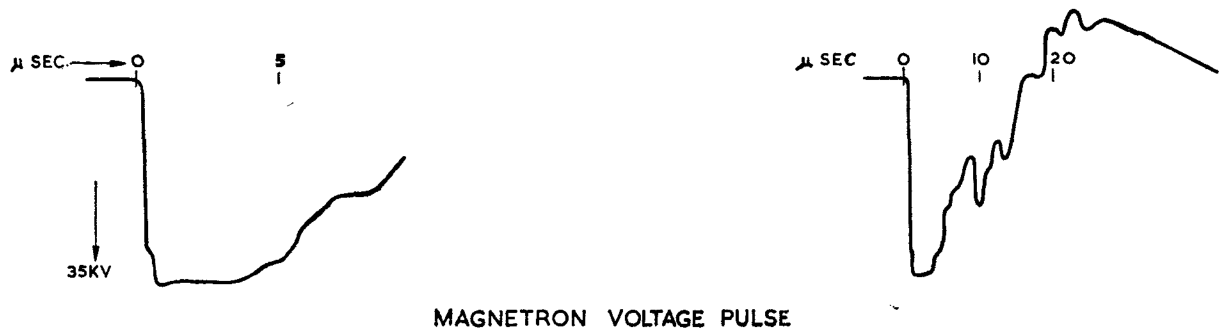
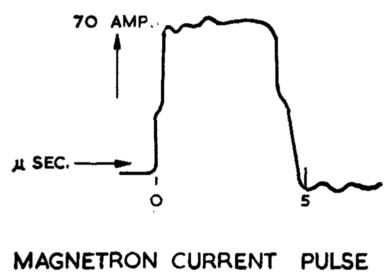


Fig. 2. Typical modulator waveforms into magnetron load





C.T. 316 SETTINGS
SWITCH AND POSITIONS

INPUT IMPEDANCE	SENSITIVITY	T.B. COARSE	TRIGGER
HIGH	500	4	SECONDARY
DIRECT TO Y PLATES AT REAR OF C.T.316 (S4 SET TO CENTRAL POSITION)		4	SECONDARY

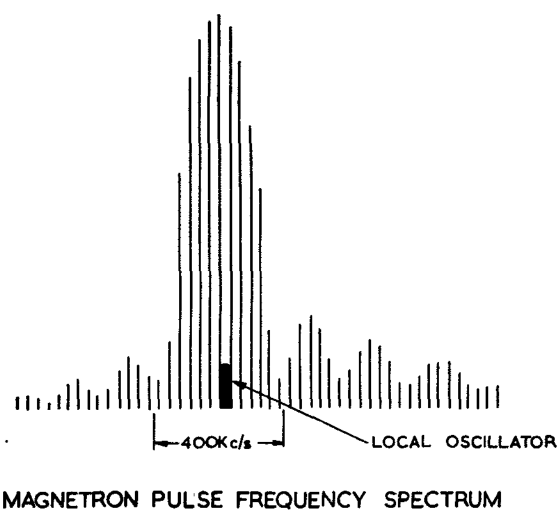


Fig. 3. Transmitter waveforms

21. (1) Switch off the h.t. supply on panel (control) 901. Set the control switch on trigger unit 102 to EXTERNAL 2μs, and recheck the waveforms, as described in sub-para. 20 (1) and (2), after running the modulator for one hour, or immediately para. 20 has been completed.

(2) Switch off the h.t. supply. Set up the equipment for operation on the LOCAL 5μs position as follows:—

(a) Set the link on the overload relay on the relay panel in rectifier 101 to the 40A position.

(b) Set the links on the charging choke in modulator 101 (*rear, left*) so that the two sections are connected in parallel.

(c) Replace the link between C1 and C2 in modulator 101 (*C1 and C2 in parallel*).

(d) Replace the link between terminals C and D on the pulse-forming network in modulator 101.

(e) Turn the selector switch on trigger unit 102 in modulator 101 to the LOCAL 5 μs position.

(f) Check that the separation between PRIMARY GRID 1 and SECONDARY GRID pulses is 430 $\pm$ 10μs. Reset if necessary as detailed in para. 14 *et seq.*

22. Re-apply the h.t. and raise it until the d.c. input level is approximately 7kW. Adjust RV2 in trigger unit 102 until the discontinuity in the primary charging current waveform occurs at 60 ± 5% of peak amplitude when the d.c. input is approximately 7 kW.

23. (1) Check that when the air recirculation system has reached equilibrium, the duct inlet thermometer indicator on the modulator auxiliaries panel reads 18°C ± 1°C. If necessary, adjust the controller setting.

Note . . .

If the external ambient temperature is greater than 18°*C, the duct inlet temperature must be within* 1°*C of the external ambient.*

(2) Vary the setting of the controller over its range and check that the duct inlet temperature follows. Finally, reset the controller to maintain the duct inlet temperature at 18°C. (*NOTE as in para.* 23 (1)).

(3) During the foregoing tests, check that when the duct inlet flap is fully open the main mercury pool switch heaters are switched off by the limit switch on the Teddington controller. This is indicated by the operation of relay RLA/1 on the mercury pool switch blower assembly.

(4) Run the modulator for one hour, then recheck the h.t. and discontinuity settings. Check the waveforms for 5 μs pulse operation as in para. 20 (2) (a) to (g).

24. (1) Switch off the h.t. supply on panel (control) 901. Set the control switch on trigger unit 102 to EXTERNAL 5 μs. Re-apply the h.t. and recheck the waveforms as in para. 20 after running the modulator for one hour or immediately after the first series of para. 20 tests is completed. Then switch off the h.t. supply.

(2) Replace the power unit 922 in use with the spare unit. Repeat the tests described in para. 17 (1), (3) and (4). Run the spare power unit 922 on load for at least one hour.

(3) Replace the trigger unit 102 in use by the spare unit. Set the spare unit up as detailed in para. 13 (1) to (6). Check that it operates satisfactorily on all ranges and that the output trigger pulses are correct as in para. (5) and para. (6) (a) to (e). Run the spare unit for at least one hour.

(4) Replace the mercury pool switch and cradle in use by the spare units from rack 187. Repeat the tests described in para. 17 (1), (3) and (4). Set up the modulator as described in para. 21 (2) (a) to (c) and 22. Run the spare mercury pool switch for at least one hour.

25. Set up the pulse overload protection unit (*P.U.* 4593) as follows:—

(1) Switch off modulator h.t. Re-arrange the links on dummy load (mod) 6007 to form a load of 12 ohms.

(2) Apply the h.t. and raise it until the maximum peak pulse shown on the monitor is 52·5 volts corresponding approximately to a peak current of 420A. The settings for the CT316 are as given in para. 20 (c). The time delay potentiometer RV3 in PU4593 should be set for zero delay. Adjust RV2 so that the modulator h.t. just trips at this level. Then readjust RV3 to give a time delay on the h.t. trip of 2 ± 1 seconds. Switch off the h.t.

(3) Replace the PU4593 in use with the spare unit. Repeat the tests described in para. 13(1), the first part of 13 (2), 13 (6) (f) and (g) and 25 (1) and (2). Then switch off the h.t. and restore the resistance of dummy load (mod) 6007 to its former value, as described in para. 5(1). Reapply the h.t. and raise it until the d.c. input level is approximately 7 kW. Run the spare PU4593 for at least one hour.

26. Disconnect the dummy load (mod) 6007 from modulator 101 output. Remove the short-circuit from the 4-ohm mat resistor R19 in control unit 4139. Reconnect the modulator output to transmitter T.3724 through the high-voltage pulse coupling, using the uniradio 34 cable provided. Prepare trigger unit 102, rectifier 101 and modulator 101 for operation in the LOCAL 5μs position as detailed in para. 21 (2).

27. (1) Connect the magnetron output through the r.f. head to either a dummy load or the linear array as for normal operation. Apply the h.t. Raise it slowly from the REMOTE position. (LOCAL/REMOTE *switch on rectifier* 101 *at* REMOTE). Check that the magnetron heater supply fails to approximately half-power for a mean magnetron current of 35 ± 5 mA and that, at this level, the waveguide attenuator unit 4140 in the r.f. head withdraws from the waveguide. If necessary, adjust RV2 in control unit 922 to ensure the withdrawal occurs at 35 ± 5 mA.

(2) Continue raising the h.t. until the magnetron peak current as monitored on the CT316 is 70 ± 2A. The discontinuity on the primary charging current waveforms in the modulator should be set, at this level, to 60 ± 5% of peak amplitude by adjusting RV2 in trigger unit 102.

Note . . .

If the magnetron current pulse jitter is excessive, it indicates a fault on either the transmitter or the test equipment.

(3) The CT316 settings for monitoring the magnetron current pulse are:—

(a) Input impedance	High
(b) Y Sensitivity	As previously calibrated (*para.* 6)
(c) T.B. Coarse	4
(d) T.B. Delay	Off
(e) Trigger	+ ve secondary

(f) Input (signal) — From magnetron current pulse socket on panel (dist.) 904 direct to Y plate socket at rear of CT316

(g) Y Input switch — Central

(4) The CT316 settings for monitoring the primary charging current are as in para. 20 (2) (a).

28. Check that no sparking occurs in any part of the high power waveguide system when feeding into the linear array.

29. Operate the system for at least one hour. Check the level of operation of the magnetron (70 $\pm 2A$, *peak*) and adjust the h.t. and discontinuity in the primary charging current waveform to maintain the conditions as in para. 27(2). Record the magnetron mean current at this level. This figure can then be used for setting-up in future tests. The setting must be checked at least once a week. The setting should also be checked immediately a magnetron is changed.

30. Monitor and record the following waveforms and check also that they conform approximately to the typical waveforms shown in fig. 3 and 4:—

(1) Primary changing current waveform. The CT316 settings are as in para. 20 (2) (a).

(2) Magnetron voltage pulse. CT316 settings are:—

(a)	INPUT IMPEDANCE	HIGH
(b)	Y SENSITIVITY	500V. F.S.D.
(c)	T.B. COARSE	4
(d)	T.B. DELAY	OFF
(e)	TRIGGER	+ VE SECONDARY
(f)	INPUT (SIGNAL)	Monitor at SK 235 on panel (control) 904 (divider ratio is within 2% of 400 : 1)
(g)	Y input switch	Counter-clockwise

(3) Magnetron current pulse CT316 settings are as in para. 27 (3).

(4) Spectrum of the magnetron pulse (*Refer to Chap.* 4 *of this Section*).

(5) Mean d.c. input power. Measure this at the voltmeter and ammeter on panel, meter, 900.

(6) Record the mean magnetron output power as measured on the built-in thermocouple wattmeter. This is indicated by the meter on panel (control) 903 in transmitter T.3724. The accuracy of the built-in thermocouples may be checked by using kit, wattmeter calibration as described in para. 36 to 44.

31. Switch off the h.t. Set the selector switch on trigger unit 102 to EXTERNAL 5 μs, and repeat the tests of para. 27 (2) to 30. Record the magnetron mean current at this level. This figure can then be used for setting-up in future tests. The setting must be rechecked once a week at least, or if the magnetron is changed.

32. Replace the power unit 4343 in use by the spare unit. Repeat the tests of para. 15 (8). Run the unit for at least one hour with the magnetron operating at normal level as described in para. 31.

33. Replace the control unit 922 in use by the spare unit. Repeat the tests described in para. 15 (9) and para. 27(1). Run the unit for at least one hour with the magnetron operating at normal level. This test may be carried out concurrently with that of para. 32.

34. Replace the magnetron and output section in use by the spare unit. Run the magnetron for at least one hour at normal level and repeat the tests described in para. 31.

35. Adjust the modulator and transmitter water tank thermostats so that the heat exchanger fan starts when the temperature of the water in the tanks reaches 45°C. This is to be carried out as follows:—

(1) Measure the water temperature with a thermometer. Note the reading.

(2) Adjust the thermostat to make contact and check that its dial now indicates the same value as the thermometer.

(3) If correspondence is not obtained in operation (2), slacken off and reposition the thermostat dial to read the correct value. Finally, set the dial to 45°C.

Note . . .
The thermostat dial is calibrated in degrees Fahrenheit but it is not a precision marked scale.

USE OF KIT (Wattmeter calibration)

36. The purpose of this kit is to measure the r.f mean power output of the transmitter by means of its heating effect on a water load. The r.f. mean power meters fitted to the transmitter and modulator cabinets may then be calibrated from the figures obtained. The kit consists of the water load, water flowmeter, thermometers for measuring the temperature change in the water load, and adaptor section, hoses and clips.

37. When using the equipment, personnel should restrict the spilling of anti-freeze mixture to a minimum. Any spilt on painted surfaces must be cleaned off as soon as possible. Also, care should be taken to make water pipe connections reasonably tight to avoid blow-outs which might spray antifreeze mixture over the cabinets.

38. Before installing the test gear personnel should refer to Vol. 1, Part 1, Sect. 4, Chap. 2, fig. 2 and 3, and also to the instruction label inside the lid of the test kit stowage case. The object of the following procedure is to substitute the water load for the normal load, *i.e.* the linear array and waveguide run. The water load is connected, in series with a flowmeter, to the transmitter cooling system.

Installing the test kit

39. (1) Switch off the transmitter.

(2) Switch off the air pump cabinet.

(3) Switch off the transmitter heat exchanger.
(4) Set the MASTER INTERLOCK to OFF.
(5) Dismantle the H-plane 90° bend and plain section run (*inside the cabin mounting column*) to the flexible section at the r.f. head.
(6) Fit the air adaptor waveguide section (*normally kept in rack* 188 *in the cabin*) to the flexible section. Couple the air pressure connection on the adaptor to the air pump cabinet air return line, *i.e.* the air adaptor is substituted for the waveguide run and linear array with respect to the air pressurization circuit. Temporarily support the adaptor.
(7) Attach the flowmeter to the cabin centre roof frame, adjacent to the water pipes. Adjust its position until the spirit level bubble is central.
(8) Ensure that the flow indicator and needle valve stop-cocks are shut off, then remove the hose connected between the two stopcocks.
(9) Connect the flow indicator stopcock to the bottom of the flowmeter, the outlet (*top*) of the latter to the INPUT connection on the water load, via a thermometer adaptor, then the OUTLET connection on the water load via the other thermometer unit to the needle valve. (*Note that the water load has not yet been fitted to the air adaptor section*).
(10) Ensure that all pipe connections are reasonably tight, then switch on the heat exchanger. Adjust the flow rate to about 1·5 litres/min, using the flow indicator stopcock. Ensure that the water flow neon indicator on the transmitter control panel has ionized. Carefully rotate the water load about its axis to dispel any trapped air. This should be seen emerging through the flowmeter and it may be necessary to continue the agitation for about 10 min before the water load circuit is air-free.
(11) When the circuit is air-free, offer up the water load to the air adaptor section, secure them together then support the water load in situ.
(12) Switch on the air pump cabinet.

Setting up the transmitter

40. Set up the transmitter (*5μs trigger normally*) in accordance with A.P.2527Q, VOL. 4, OPERATION 43 WSU 01. It is very important to operate the magnetron at a h.t. level producing a peak current pulse of 70 ± 2A, which is associated with a good spectrum.

Calculating the mean power

41. (1) Before taking any measurements, ensure that the following conditions exist:—

(a) The mixture of antifreeze and water in the header tank of the heat exchanger is 60/40, respectively, for which check a hydrometer and thermometer are needed. A graph of specific gravity against temperature for a 60/40 ethylene glycol and water mixture is inside the test kit stowage case lid.
(b) The flow of coolant through the flowmeter shows no signs of turbulence. The flow rate must be adjusted to give a smooth movement of coolant through the water load.
(c) The thermometer indications on the water load have become constant, *i.e.* the temperature gradient is stable. The coolant flow rate should be set to produce a fairly small gradient, about 10 to 15°C is sufficient.

(2) Once the conditions stated above exist, record the thermometer indications and the flow rate. Then, using the formula given below, calculate the mean r.f. power:—

$$\text{Mean Power} = \frac{(To - Ti) \times S1 \times S2 \times F \times 4{\cdot}2}{60} \text{kW}.$$

Where To = temperature of coolant leaving water load
Ti = temperature of coolant into water load
S1 = specific heat of antifreeze at the mean water load temperature
S2 = specific gravity of antifreeze at the mean water load temperature
F = flow rate of coolant through the water load in litres per minute.

(3) The variables S1, S2 and F depend upon the mixture of ethylene glycol and water used as the coolant. As the flowmeter is calibrated for a 60/40 mixture it is advisable to ensure that the coolant in the particular heat exchanger is a solution of this mixture. This ensures that the indicated flow rate is the true value, assuming that the coolant temperature is approximately the same as the flowmeter calibration temperature.

(4) To illustrate the effect of these variables specimen values are quoted below:—

Ethylene glycol/water solution = 60/40, specific heat (S1) at the mean temperature of approx. 50°C of the coolant in the water load = 0·85, specific gravity for the same conditions = 1·06. Feeding these values into the above formula shows that a mean power of 1 kW, measured when using water as the coolant becomes 0·901 kW if antifreeze is substituted for the water (provided, of course, that the flowmeter is in each case calibrated for the appropriate liquid).

Calibrating the r.f. mean power meters

42. The need for adjusting the thermocouples must be beyond dispute and care must be exercised when altering their positions. The thermocouple outputs are −ve and +ve with respect to earth, respectively, and should ideally be set up separately, each producing a similar d.c. voltage to the other.

43. Compare the indications of the r.f. mean power meter on the transmitter control panel with the value obtained from the water load calculation.

If the difference is greater than 2% adjustment is required and should be carried out as follows:—

(1) Disconnect the thermocouples and remove their outer cover.

(2) Connect the +ve meter lead of the mean power meter to the thermocouple coloured red. Earth the other meter lead at the waveguide, ensuring that good contact is made. Loosen the locking device, then slowly orientate the thermocouple until the mean power meter indicates exactly half the true mean power value (*i.e. the value determined in para.* 42). Lock the thermocouple and recheck the mean power meter indication.

(3) Reverse the connecting procedure for the other thermocouple and repeat the adjustment.

(4) Replace the outer covers, connect up the thermocouples and check the meter indication again.

(5) Compare the indication on the mean power meter in the transmitter control panel with that on the modulator. A small discrepancy can be expected owing to voltage drop in the connector to the latter meter.

Note . . .

1. *To identify the polarity of the thermocouple outputs, and also to ensure correct replacement, the thermocouple giving +ve output is coloured red and the one giving −ve output is coloured green.*

2. *Care must always be taken, when adjusting or replacing defective thermocouples, to ensure that the air seal is not disturbed.*

Typical power readings

44.

Pulse width	Approximately 5 μs
P.R.F.	273 p.p.s. (250 *on G.C.I. stations*)
Primary charge current discontinuity	60 ± 5%
Magnetron peak current	70 ± 2A
Mean power	Approximately 1·1 to 1·3 kW
Peak power	Approximately 1 MW
D.C. input power to modulator	Approximately 7 kW

These performance figures should be used reservedly when comparison is made with those obtained at a particular site.

P30040 458758/8391 3/60 875 C & P Gp 375

Chapter 4

SPECTRUM ANALYZER TESTS

LIST OF CONTENTS

Introduction

1. The spectrum analyzer comprises the three units (monitoring unit 106, analyzer spectrum 100 and power unit 923) on the left-hand side of rack assembly (test) 345 in the rotating cabin. The analyzer provides an indication of magnetron and a.f.c. performance by superimposing the local oscillator frequency on the magnetron pulse spectrum, the two being displayed on a cathode ray tube. With the receiver correctly on tune, the local oscillator output appears as a bright spot coincident with the peak deflection of the magnetron pulse spectrum. The spectrum analyzer is described in A.P.2527Q, Vol. 1, Part 1, Sect. 7, Chap. 2.

Preliminary setting-up procedure

2. (1) Switch on the power supplies to rack assembly (r.f. head) 344 and rack assembly (test) 345. The switches are on panel (a.c. distribution) 4461.

(2) Switch on both power units 923 in rack assembly (test) 345, and check the h.t. outputs on the built-in meters. Check that the receiver local oscillator is working, and that the a.f.c. crystal current is 1·75 ± 0·45 mA, indicated by the CRYSTAL CURRENT meter on receiver unit 303. If the local oscillator is not oscillating, adjust REFLECTOR VOLTS on control unit (AFC) 923. Insert the spectrum analyzer pick-up probes in their appropriate sockets in the waveguide.

(3) Run up the transmitter to its normal operating level (*Chap.* 3, *para.* 15 *et seq*). Ensure that the discontinuity in the primary charging current waveform occurs between 55 and 65 per cent of peak amplitude.

(4) Switch on the analyzer spectrum 100 and monitoring unit 106 in rack assembly (test) 345 (*left hand power unit* 923). In the spectrum analyzer 100 adjust i.f. amplifier gain (*RV*1 *on amplifying unit* (*i.f.*) 4329) to maximum (*clockwise*). On the l.f. amplifier in monitoring unit 106, set the SIGNAL GAIN (RV8) control to the middle of its travel and set the deviation control (RV14) three-quarters clockwise. Set CRYSTAL CURRENT GAIN (RV2) to maximum.

(5) On the analyzer spectrum 100 adjust REFLECTOR VOLTS to give maximum current on the CRYSTAL CURRENT meter and a smooth flat-topped horizontal crystal-current waveform on the smaller c.r.t. on monitoring unit 106. Remove any discontinuity in the waveform by using the REFLECTOR VOLTS control. If this fails, turn the DEVIATION control slowly counter-clockwise until a smooth waveform is obtained. Record the approximate setting of the control.

Test procedure

3. (1) Tune the spectrum analyzer local oscillator until the transmitter spectrum appears on the larger c.r.t. of monitoring unit 106. Adjust the REFLECTOR VOLTS control, if necessary, to maintain oscillation and a smooth-topped crystal-current waveform. It may prove necessary to readjust the transmitter sample probe, and to repeat the search for the transmitter spectrum.

(2) When the transmitter spectrum is tuned in, set the transmitter sample probe to give a signal of approximately 6 cm amplitude. Reduce the i.f. amplifier gain by approximately 12 dB (*signals at quarter amplitude*). Adjust the transmitter sample probe (*cable* 140) to give a signal 5 cm in amplitude. Adjust the REFLECTOR SWEEP control on monitoring unit 106 to give a spectrum analyzer frequency sweep of 1·2 to 1·5 Mc/s (*see Note*). Tune the receiver local oscillator in the rack assembly (r.f. head) 344, either manually or by using the a.f.c. system if it is working, until the local oscillator spike appears superimposed on the transmitter spectrum. Check that the a.f.c. crystal current as indicated by the meter on receiver unit 303 is between 1·6 and 2·0 mA. Adjust the local oscillator sample probe until the local oscillator spike displayed on the large c.r.t. on monitoring unit 106 is from 0·5 to 0·75 cm in amplitude. Lock both probes in position.

Note . . .

For the purpose of this test, the width of the main lobe of the transmitter spectrum at the first zero can be used as a frequency scale. For a 5 μs pulse the width is 400 kc/s. For a 2 μs pulse it is 1 Mc/s.

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Chapter 5

A.F.C. SYSTEM TESTS

(Completely revised)

LIST OF CONTENTS

Introduction

1. The function of the a.f.c. system is to maintain the local oscillator frequency at 13·5 Mc/s above (*or below*) the magnetron frequency. This is done by mechanically varying the volume of the local oscillator cavity, and by variation of the klystron reflector potential with respect to cathode. Each method causes variation in output power and, to maintain maximum output with varying frequency, it is necessary to use both methods. For details of the a.f.c. system, refer to Vol. 1, Part 1, Sect. 6, Chap. 6 of this Air Publication.

2. The tests described below cover the setting-up and checking of the complete a.f.c. system. Test equipment required is:—

(1) Two multimeters Type 1

(2) One tester (performance) 6008

(3) One CV2155 crystal with average d.c. output/r.f. input characteristics

Preliminary setting-up procedure

3. Set up the equipment as follows:—

(1) Set the modulator for a 5 μs transmitter pulse. Run the transmitter up to its normal operating level as detailed in Chap. 3, para. 21, with the discontinuity in the primary charging current waveform at 60 per cent of peak amplitude.

(2) Switch on the power supplies to rack assembly (test) 345 by means of the switch on panel (AC distribution) 4461. Switch on the spectrum analyser power unit 923, that is, the left-hand power unit in the rack. Switch on the power unit 923 and control unit (AFC) 923 in rack assembly (R.F. head) 344. Set the switch inside control unit (AFC) 923 to LONG PULSE.

(3) Check that the receiver local oscillator (*oscillator unit* (*L.O.*) 6126) is oscillating by noting the indication on the A.F.C. CRYSTAL CURRENT meter on the front panel of receiver unit 303.

(4) If the a.f.c. transmitter sample attenuator, mounted on waveguide 515 is calibrated at 40 and 44dB, adjust the setting to the inner, 40dB, mark for a transmitter power of 1MW and to the outer, 44dB, mark if the transmitter power is 2MW.

(5) Switch on the a.f.c. tuning motor; the switch is on control unit (AFC) 923. Adjust the spectrum analyser local oscillator tuning until the transmitter spectrum is displayed on monitoring unit 106.

(6) The a.f.c. system should lock on tune with the local oscillator tuning motor, in the receiver, hunting, and the a.f.c. crystal current rising and falling, at approximately two cycles per second. Examine the spectrum displayed on the monitoring unit 106 for the spike which indicates the frequency of the receiver local oscillator. If the spike is not visible, adjust the spectrum analyser local oscillator tuning to the other side of the transmitter frequency. The frequency of the receiver local oscillator must be above that of the transmitter frequency, i.e., it must appear on the left-hand spectrum.

(7) Switch off the a.f.c. tuning motor on a peak of crystal current and run down the transmitter. Adjust the oscillator unit (L.O.) 6126 reflector voltage for maximum local oscillator power shown by the CRYSTAL CURRENT meter. The control is on control unit (AFC) 923. Reduce the reflector voltage slightly but not by more than 5V, on the more stable side of the mode. The reflector voltage indicated by the meter on control unit (AFC) 923, at which noise power is obtained with a 3000Mc/s (*nominal*) magnetron, should be 140V ±10V; if it is not, change the CV2116 klystron. Record the final setting of the reflector voltage. Set the local

oscillator attenuator to give 1·75mA crystal current with an average crystal, that is, average for d.c. output/r.f. input. Lock the attenuator, run up the transmitter and switch on the tuning motor.

TEST PROCEDURE

General

4. Perform the tests detailed below:—

(1) With the a.f.c. tuning motor running, check that the frequency sweep of the receiver local oscillator is not greater than 150 kc/s. Record the frequency sweep.

Note . . .

During these tests, the distance between the minima of the main lobe of the transmitter spectrum can be used as a frequency scale. With a 5 μs transmitter pulse it is 400 kc/s, and with a 2 μs pulse it is 1 Mc/s.

(2) The centre of the frequency sweep must not be more than ±50 kc/s from the centre of the main lobe of the spectrum. Adjust the centre frequency as detailed in para. 8.

Note . . .

With the a.f.c. tuning motor on, the a.f.c. crystal current must not fall by more than 10%.

(3) Switch off the a.f.c. tuning motor on a peak of crystal current. The local oscillator frequency must be within 50 kc/s of the centre frequency of the main lobe of the transmitter spectrum.

(4) Switch on the motor, allow the hunting operation to become regular, then switch off and repeat the procedure in sub-para. (3). Repeat this test ten times.

(5) Measure the loop gain of the a.f.c. system as follows:—

(*a*) With the a.f.c. system working and the tuning motor running, switch off the tuning motor as nearly as possible on the peak of a.f.c. crystal current. Adjust the local oscillator tuning plunger manually for maximum a.f.c. crystal current by spinning the coupling. Record the reflector voltage indicated by the meter on control unit (AFC) 923.

(*b*) Switch off the control unit (AFC) 923, and also the left-hand power unit 923 in rack assembly (test) 345. Connect the performance tester in circuit as follows:—

(i) Remove PL130 from oscillator unit (L.O.) 6126.

(ii) Connect the performance tester to PL130 and SK130.

(iii) Connect the performance tester to the socket, on control unit (AFC) 923, labelled —250V REFLECTOR SUPPLY TO TESTER PERFORMANCE TYPE 6008.

(iv) Connect the multimeters Type 1, set to the ranges shown on the front panel of the performance tester, to the REFLECTOR VOLTAGE and DEVIATION VOLTAGE terminals.

(*c*) Switch the TESTER DEVIATION control, on the performance tester, to position 0, and adjust the REFLECTOR VOLTAGE CONTROLS on the tester until the multimeter connected to the REFLECTOR VOLTAGE terminals indicates the same voltage as that previously noted. Adjust the DEVIATION CONTROL to produce an indication of 1V on the multimeter connected to the DEVIATION VOLTAGE x10=1·0V terminals. One tenth of this is applied to the reflector.

(*d*) Switch on control unit (AFC) 923 and the left-hand power unit 923 on the rack assembly (R.F. head) 344, and allow one minute for warming up. Check the position of the local oscillator spike with respect to the centre of the main lobe of the transmitter spectrum. If the local oscillator is off tune, bring it on tune by adjusting the REFLECTOR VOLTAGE control on the performance tester.

(*e*) On the performance tester switch the TESTER DEVIATION control from 0 to +, then to 0, then to — and return to 0. Note, as accurately as possible, the reflector voltage indicated by the meter on control unit (AFC) 923 at each setting of the switch. Repeat the test five times and calculate the average reflector voltage deviation. Multiply this result by 10 and the product is the loop gain of the a.f.c. system. It should be greater than 150 and less than 600.

Note . . .

Sufficient time must be allowed after each movement of the TESTER DEVIATION *control for the reflector voltage to reach a stable state. If the transmitter spectrum is unstable it will be difficult to measure the loop gain, and, furthermore, if the reflector voltage applied to the klystron is incorrect the loop gain measured will be inaccurate. There is no variable adjustment of loop gain in the system.*

(*f*) After completing the tests of para. 4 (5) (*e*), restore the reflector voltage, indicated by the meter on control unit (AFC) 923, as described in para. 3 (7).

(6) With the a.f.c. system working and the tuning motor switched on, detune the receiver local oscillator by pushing the cam follower, attached to the push rod, away from the cam. Hold the oscillator off tune until the cam has travelled round to the position which permits the push rod to move to the maximum extension position. Release the cam follower and check that the local oscillator locks on again. Repeat this test five times.

(7) Interchange the cables connected to sockets SK131 and SK132 on amplifying unit (AFC) 4144, and adjust the spectrum analyzer local oscillator tuning to the opposite side of the transmitter frequency to that used in para. 3 (6). The a.f.c. system must lock on, but the tuning error may be greater than 50 kc/s due to the asymmetry of the magnetron spectrum. Do not adjust the discriminator unless it is an operational requirement that the local oscillator frequency is below that of the transmitter. Repeat this test with the spare amplifying units (AFC) 4144.

(8) Repeat the above tests with the transmitter operating on 2 μs pulses at its normal level (*Chap.* 3, *para.* 21), and the switch in control unit (AFC) 923 set to SHORT PULSE. The specification limits are as follows for 2 μs working:—

(*a*) Para. 4 (1), frequency sweep-motor on, —300 kc/s.

(*b*) Para. 4 (2), the centre frequency of sweep, —100 kc/s.

(*c*) Para. 4 (3), tuning error motor off, —100 kc/s.

(*d*) Para. 4 (5), the loop gain must be greater than 40 and less than 300.

(9) Repeat the tests of para. 3 (7) to 4 (8) with every possible combination of spare units, i.e., the two control units (AFC) 923, two oscillator units (L.O.) 6126 and three amplifying units (AFC) 4144, making twelve sets of tests.

Note . . .

The transmitter must be switched off when an amplifying unit is being changed, to avoid a.f.c. crystal burnout.

It is necessary to allow 30 min warming-up time after changing a unit. The test detailed in para. 3 (7) need only be repeated when an oscillator unit (L.O.) 6126 has been changed.

Switch Unit Timer 6128

5. Change the transmitter pulse length to 5 μs. Run the transmitter up to normal operating power. Switch on the timer unit in the r.f. head, and check that the following cycle takes place:—

(1) The tuning motor sweeps continuously for approximately 14 minutes and is then switched off.

(2) After a further 29 minutes the tuning motor is switched on again and the mechanical tuning operates in the hunt condition for one minute. The motor is then switched off.

(3) The timer then operates on a 30 minute cycle causing the tuning motor to be switched off for 29 minutes, and on and hunting for one minute.

6. Check that switching the transmitter off and then on, causes the sequence in sub-para. (1), (2) and (3) above to be repeated.

7. Check that the tuning motor does not over-shoot when the timer switches it off, i.e., that the oscillator spike is still within 50 kc/s of the centre frequency of the main lobe of the transmitter spectrum.

Receiver Local Oscillator adjustment with A.F.C. System working

8. The local oscillator frequency must not be adjusted by altering the reflector voltage when the a.f.c. system is working. The procedure to be followed is given below:—

(1) Allow a 30 min warming-up period before starting adjustment. Switch off the power unit 923 and control unit (AFC) 923 in the r.f. head. Remove the cover from amplifying unit (AFC) 4144. Switch the units on again.

(2) Switch off the a.f.c. tuning motor as near as possible to a peak of a.f.c. crystal current. Adjust the oscillator unit (L.O.) 6126 tuning plunger manually, by spinning the motor coupling, to obtain maximum a.f.c. crystal current.

(3) Note the reflector voltage indicated by the meter on control unit (AFC) 923.

(4) Break the a.f.c. feedback loop by disconnecting the video output lead from socket SK132 on amplifying unit (AFC) 4144.

WARNING . . .

The inner lead is at —400V with respect to earth.

(5) Adjust the reflector voltage to that noted in sub-para. (3). This will position the local oscillator spike in approximately the same position in the spectrum as when the feedback loop was complete. Finally, adjust the reflector voltage to place the spike in exactly the same position as when the loop was closed.

(6) Check that conditions have not changed, by temporarily reconnecting the lead to SK132 and checking that the local oscillator spike does not move.

(7) Using an insulated trimming tool, adjust C15 in the discriminator circuit of amplifying unit (AFC) 4144 to bring the local oscillator spike into the centre of the main lobe of the transmitter spectrum.

(8) Restore the connection to socket SK132, and check that the local oscillator spike is then in the centre of the spectrum. If it is not, repeat adjustment of C15 as in sub-para. (7).

(9) Switch on the a.f.c. tuning motor and check that the local oscillator frequency at the centre of the motor sweep is within ±50 kc/s of the centre of the spectrum.

(10) Switch off the power unit 923 and replace the lid of amplifying unit (AFC) 4144, switch on the power unit and check that the local oscillator is still on tune.

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Chapter 6

OVERALL NOISE FACTOR TESTS

LIST OF CONTENTS

Introduction

1. Signal generator (noise) 2 provides a reference noise source against which the performance of the radar receiver may be checked. The signal generator is described in Part 1, Sect. 6, Chap. 5 of this publication. The following paragraphs give details of tests by which the correct functioning of the system may be checked.

2. Test equipment required is:—

(1) A CV.2155 crystal with average d.c. output/r.f. input characteristics.

(2) Test set 223A.

(3) Six sets of CV.2154 and CV.2155 crystals that have been selected and paired for average noise factor on the S-band test bench held by Decca Radar Ltd.

(4) One 10 kilohm, ± 1 per cent, resistor.

3. Preliminary setting-up procedure

(1) Switch on the radar and cabin mains and the 240V a.c. supply to the r.f. head and rack assembly (test) 345. On rack assembly (r.f. head) 344, switch on both power units 923, the power unit 4343 and control unit (AFC) 923. Switch on the right-hand power unit 923 in rack assembly (test) 345. Fit the CV.2155 crystal with average r.f. input/d.c. output to the AFC mixer. Switch the bandwidth of the amplifying unit (lin.) 4141 in receiver unit 303 to NORMAL.

(2) Check that the a.f.c. crystal current, indicated by the meter on receiver unit 303 is 1·75 mA and that the neon indicators T.R.CELL and NOISE SOURCE OUT, on signal generator (noise) 2, have struck.

Note . . .
The spectrum analyzer 100 *and test oscillator* 102 *must be switched off during these tests.*

(3) On the signal generator (noise), turn the waveguide switch clockwise. Switch the signal generator (noise) on and off and check that the attenuator 4140 moves into the waveguide when the switch is off.

Note . . .
Check this by removing the cover and observing the attenuator. During subsequent use of this switch, check the operation of the attenuator and record any failure to operate.

(4) Check that, with the signal generator (noise) switched on, the total current shown by the two meters, OUTPUT NO. 1 and OUTPUT NO. 2, on the right hand power unit 923 in rack assembly (test) is 195 ±5mA, and that the NOISE SOURCE ON indicator lamp of signal generator (noise) lights.

(5) Allow 30 minutes warming up period for amplifiers 4141 and 4143.

Test procedure

4. (1) Using the six CV.2514 and six CV.2155 crystals that have been selected and checked for average noise factor at S-band, and the internal signal generator (noise), measure the overall receiver noise factor over the frequency band 2850 to 3050 Mc/s, at 25 Mc/s intervals, as follows.

(2) Switch on the signal generator (noise) in rack assembly (r.f. head) 344. Turn the waveguide switch on the signal generator (noise) fully clockwise.

(3) Check that the i.f. attenuator on receiver unit 303 is set to OFF, and switch the second detector current meter to ON.

(4) Switch off the signal generator (noise). Set the second detector current to 300 μA, indicated by the meter on receiver unit 303. Switch the i.f. attenuator to the 7 dB position and switch on the signal generator (noise).

(5) Check that the total current showing on both meters on the right-hand power unit 923 in rack assembly (test) is 195 ±5mA.

(6) Adjust the i.f. attenuator until the second detector current meter again reads 300 μA, and read off the noise factor, indicated by the i.f. attenuator calibration. By interpolation, it is possible to read noise factor to the nearest 0·25dB.

Note . . .

When changing frequency during this test it will be necessary to adjust LOCAL OSCILLATOR REFLECTOR *volts on control unit (AFC)* 923 *to maintain oscillation on the peak of the mode at the ends of the bands. The a.f.c. crystal current must be* 1·75*mA with the CV.*2155 *crystal having average r.f. input/d.c. output characteristics fitted in the a.f.c. mixer. Use test set* 233*A connected to the coaxial output on the r.f. head, which carries the local oscillator sample for spectrum analyzer socket SK.*224 *to check the frequency of the local oscillator. Use only the minimum amount of coupling into the waveguide necessary to produce an output from the test set.*

(7) (*a*) Record against the crystal serial numbers the noise factor obtained with the 36 possible combinations of crystal pairs at the 9 specified frequencies (324 *noise factor readings*).

(*b*) Calculate the average noise factor for each frequency (*add the noise factor results and divide by* 36). The maximum permissible average noise factor is:—

Freq. in Mc/s.	2850	2875	2900	2925	2950
Av. noise factor	8·5	8·5	8·5	8·5	8·3

Freq. in Mc/s.	2975	3000	3025	3050
Av. noise factor	8·6	8·8	9·1	9·3

(*c*) Record the spread in noise factor at each frequency (*subtract the minimum from the maximum*). The spread in noise factor at each frequency must not exceed 1·3dB.

(8) With the LINEAR GAIN control on receiver unit 303 set to maximum, measure and record the second detector current. It must be greater than 440μA. Disconnect cable 226 and connect a test lead between video output socket SK.123 at the r.f. head and the input to oscilloscope CT316. Measure the maximum video shoulder noise level. It must be greater than 1·0V. Set RECEIVER GAIN to give a second detector current of 110μA.

(9) Insert the spare amplifying unit (signal) 4143 in place of the one in use. After allowing a warming-up period of 15 minutes, check the noise factor at 3000 Mc/s with three pairs of crystals which gave a noise factor of less than 8·75 dB in the previous test. The noise factor measured with the spare unit must not be more than 0·25 dB greater than that obtained with the amplifying unit (signal) 4143 used in the test of para. 4 (7). When measuring noise factor with spare units, repeat the measurement six times with each pair of crystals and average the results.

(10) Replace the amplifying unit (lin.) 4141 with the spare unit and repeat the test of para. 4 (8).

Chapter 7

TR CELL TEST (OSCILLATOR TEST 102)

LIST OF CONTENTS

Introduction

1. Test oscillator 102 provides square-wave-modulated r.f. power for measurement of TR cell recovery time. Facilities for checking mixer crystals are also provided. It is mounted in rack assembly (test) 345 and is described in Part. 1, Sect. 7, Chap. 3 of this publication.

2. The only equipment required, other than that built into the test rack, is one 10 kilohm ± 1 per cent resistor.

Test procedure

3. (1) Switch on the power supplies to rack assembly (r.f. head) 344 and rack assembly (test) 345. On the former, switch on both power units 923, the control unit 923 and the power unit 4343 in the r.f. head. Switch on test oscillator 102 in rack assembly (test) 345, and switch SWB to OSCILLATOR ON. Switch the meter to OSCILLATOR OUTPUT.

(2) Monitor the video output from the r.f. head at LIN. VIDEO OUTPUT (SK 123). Remove cable 226 and connect a screened test lead to oscilloscope CT316 in the rack assembly (test) 345.

(3) Tune the test oscillator 102 for maximum amplitude of signal on the CT316, adjusting the REFLECTOR VOLTAGE control on test oscillator 102 for maximum output as shown on the meter OSCILLATOR OUTPUT. Turn the RECEIVER GAIN control on receiver unit 303 down until the noise output from the receiver is just not visible on the CT316 with sensitivity set to the 1V. range. Adjust the waveguide attenuator in the test oscillator 102 to give a video output from the receiver of 2·5 ± 0·5V when the test oscillator is returned for a maximum signal.

(4) The CT316 settings are:—

Input impedance	70 ohms.
Y sensitivity	3V f.s.d. (for 2·5 ± 0·5V test) 1V f.s.d. (for 1V test)
T.B. coarse	2
T.B. delay	Off
Trigger	Secondary +ve
Input (signal)	From SK123 LIN VIDEO OUTPUT
Y input (S4)	Counter-clockwise.

(5) Put switch SWB to OSCILLATOR OFF. Switch the meter to CRYSTAL CURRENT. Connect a 10K ± 1 per cent resistor across each crystal socket in turn. The meter must indicate 100 ± 10μA.

Chapter 8

AMPLIFYING UNIT (VIDEO) 4416 AND POWER UNIT 4415

LIST OF CONTENTS

Introduction

1. Amplifying unit (video) 4416 and power unit 4415 are situated in the radar office. The power unit supplies stabilized inputs of +250V and −250V to the amplifying unit. The amplifying unit contains two similar, but separate, video amplifier channels. These accept and amplify the outputs of amplifying unit (lin) 4141 and amplifying unit (log) 4142 before passing the outputs to the display consoles. The units are described in Part. 1, Sect. 8, Chap. 5 of this publication.

2. Items required to perform system tests on the units are:—

(1) Oscilloscope CT316 built into rack assembly (test) 345.

(2) Oscilloscope 6877 (10S/16926) or oscilloscope 9172 (10S/16817).

(3) Five termination units 34 (68-ohm dummy loads).

Preliminary setting up procedure

Rotating cabin

3. Before testing the units, signals must be available at the input to amplifying unit (video) 4416, and the receiver in the rotating cabin set up as follows:—

(1) With the local oscillator on tune and the tuning motor switched off, switch off the transmitter. Check that the noise factor of the radar Type 80 is satisfactory, *i.e.* below 9·0dB.

(2) Adjust the LINEAR RECEIVER GAIN control on receiver unit 303 for 110μA second detector current.

(3) Set up the logarithmic receiver as follows. Using the CT316 oscilloscope in rack assembly (test) 345 (with SENSITIVITY set to 1v., T.B. COARSE to position 2, and INPUT IMPEDANCE to 70Ω), monitor the output of the log. receiver. Turn the I.F.SIGNAL control on the front end of the log. receiver chassis to zero (*fully counter-clockwise*), then slowly increase the signal level until the noise output appears to limit, (*usually about position* 2). Return all leads to normal. Run up the transmitter and use the spectrum analyzer to check that the local oscillator is on tune. Switch off the spectrum analyzer.

Radar office

4. (1) Switch on the 230V, 50c/s supplies to amplifying unit (video) 4416 and switch on power unit 4415 (*the switch is on amplifying unit* 4416). Allow a warming-up period of 15 minutes.

(2) Check the h.t. voltages on power unit 4415, using the built-in meters. The readings should be within ± 2 per cent of the voltages marked on the switch calibration scale. Adjust the preset controls on power unit 4415, if necessary, to obtain correct readings.

(3) Terminate all the linear channel outputs of the amplifying unit (video) 4416 with 68-ohm loads on the head selector unit input.

(4) The logarithmic channel output of amplifying unit (video) 4416 connected to SK7 must be terminated with a 68-ohm load. Outputs SK8, SK9 and SK10 must NOT be loaded, i.e. they must be left open-circuited.

(5) To carry out the subsequent tests, it may be necessary to remove the earth lead connections from the CT316 3-pole mains connector.

Test procedure

5. The term 'shoulder noise level' refers to that level where the grass appears to thicken when the video signal is viewed on a CT316 oscilloscope set to COARSE TB position 2. The CT316 is triggered from the PREPULSE MONITOR point on trigger unit 4413 or, where trigger unit 4890 is used, from the TYPE 80 SUB TRIGGER 1 or 2 monitor points. The accuracy of settings required in the following paragraphs is that obtainable by visual inspection of the CT316.

Shoulder noise level checks

6. (1) With the CT316 set to 1V, monitor LIN. INPUT. It must be between 0·25V and 0·5V shoulder noise level.

(2) Transfer the CT316 to LOG. INPUT. The shoulder noise level must be between 0·18V and 0·5V.

Lin. channel

7. (1) Set the VIDEO GAIN AFTER LIMITER and SET LIMITER controls for maximum output (*fully clockwise.*) The SET LIMITER control is inside the unit.

(2) Adjust the VIDEO GAIN BEFORE LIMITER control to give a shoulder noise level of 0·5V.

(3) Adjust the SET LIMITER control for a maximum limited signal level of 2V.

(4) Set the VIDEO GAIN AFTER LIMITER control for a maximum limited signal on permanent echoes of 1·8V, or 1·6V on flight test.

(5) Readjust, if necessary, the VIDEO GAIN BEFORE LIMITER control for 0·6V shoulder noise level.

Log. channel

8. (1) Transfer the CT316 to monitor the log. output. Set the log. channel VIDEO GAIN BEFORE LIMIT, VIDEO GAIN AFTER LIMIT, VIDEO NOISE CLIPPER and SET LIMITER controls for maximum signal output.

(2) Measure the shoulder noise level. It must be greater than 4·5V.

(3) Adjust the VIDEO GAIN BEFORE LIMIT control for 4·5V shoulder noise level.

(4) Adjust the VIDEO NOISE CLIPPER control for a shoulder noise level of 0·6V.

(5) Adjust the SET LIMIT control for a peak signal level of 1·8V on permanent echoes, or 1·6V on flight test.

(6) Readjust, if necessary, the VIDEO GAIN BEFORE LIMIT control to restore the shoulder noise level to 0·6V.

(7) Transfer the 68-ohm load to the other log. outputs in turn, and check that the noise output is 0·6 ± 0·1V. If it is not, change the cathode follower output valves to equalize the outputs.

(8) Disconnect the coaxial i.f. signal leads from the inputs to the linear and logarithmic amplifiers in receiver unit 303.

(9) Using the oscilloscope 6877 with TB set to REPETITIVE 2: 1 and 50 ms, the input lead connected to A1 AC input, and SENSITIVITY set to 0·3V, measure the hum output of the lin. and log. channels at the monitor point on the front panel of amplifying unit (video) 4416. The hum must be less than 80 mV peak to peak.

Spare units

9. Replace the amplifying unit (video) 4416 and power unit 4415 by the spare units and repeat the setting-up procedure of para. 3 and all the test procedure.

Final setting-up

10. The final setting of the VIDEO GAIN BEFORE LIMIT controls on the lin. and log. channels is determined by matching the noise on a PPI display on the console Type 64. The shoulder noise levels should be adjusted within the range 0·6 ± 0·1V to give equal noise brightness on the display when switched from log. to lin. It is essential to ensure that the pedestal waveforms in the console Type 64 are correct before this adjustment is made.

Chapter 9

V.S.W.R. AND ATTENUATION MEASUREMENT

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

Introduction

1. Test rig (waveguide) 12242 is used for measuring the voltage standing-wave ratio (v.s.w.r.) and attenuation of the various components of the waveguide system on radar Type 80. Losses introduced by the components must be within the limits quoted in the appropriate specifications. Information on the test rig and its methods of use are given in A.P.2896 AP, Vol. 1. The various ways of setting-up the waveguide test bench are described in Part 4, Sect. 7 of this publication.

2. The standing-wave indicator, test oscillator and variable attenuators are precision made and must, therefore, be handled only with the greatest care. Provision is made for locking the controls on the attenuators for transit, and it must be determined, before use, that the controls are free.

3. Dowel studs are used in the centre hole of the short side of flexible section flanges. These flexible sections must be handled with care when dismantling and assembling. It is important that the gaskets and shims used for sealing junctions are correctly fitted. There should be *one* shim fitted between *two* rubber gaskets, which may be held together by a spot of Bostik to simplify the task; these parts should be aligned and then placed over the dowel studs fitted to the waveguide flange, after which the flexible section should be offered up and secured.

4. Exposed waveguide ends must be sealed with the appropriate plug. or with clean rag, to prevent ingress of moisture while tests are being made.

5. It is recommended that the initial v.s.w.r. and insertion loss tests are made before, or simultaneously with, the start of aerial alignment checks if the latter are called for during the same overhaul period. Any necessary repair work can then be carried out with the co-operation of the personnel doing the alignment measurements. This will reduce the time expended on servicing.

Setting up

6. The object of this procedure is to assemble the test equipment on the tables provided, in the rotating cabin, so that direct connection can be made to the vertical waveguide run in the cabin mounting column.

7. (1) Switch off the transmitter by pressing the HT SUPPLY OFF button on the transmitter control panel.

(2) Switch off the air pump cabinet. Release the waveguide air pressure by means of the valve in the cabin roof.

(3) On the cabin distribution panel, set the MASTER INTERLOCK switch to OFF.

(4) Dismantle the horizontal waveguide run from the r.f. head rack assembly, *viz* the flexible section, plain section and H-plane 90° bend leading to the vertical run.

(5) Erect the tables, place together and arrange them so that one end is approximately in line with the vertical waveguide run.

(6) Place the waveguide bench rails on the tables, attach the supports to the rails, then carefully

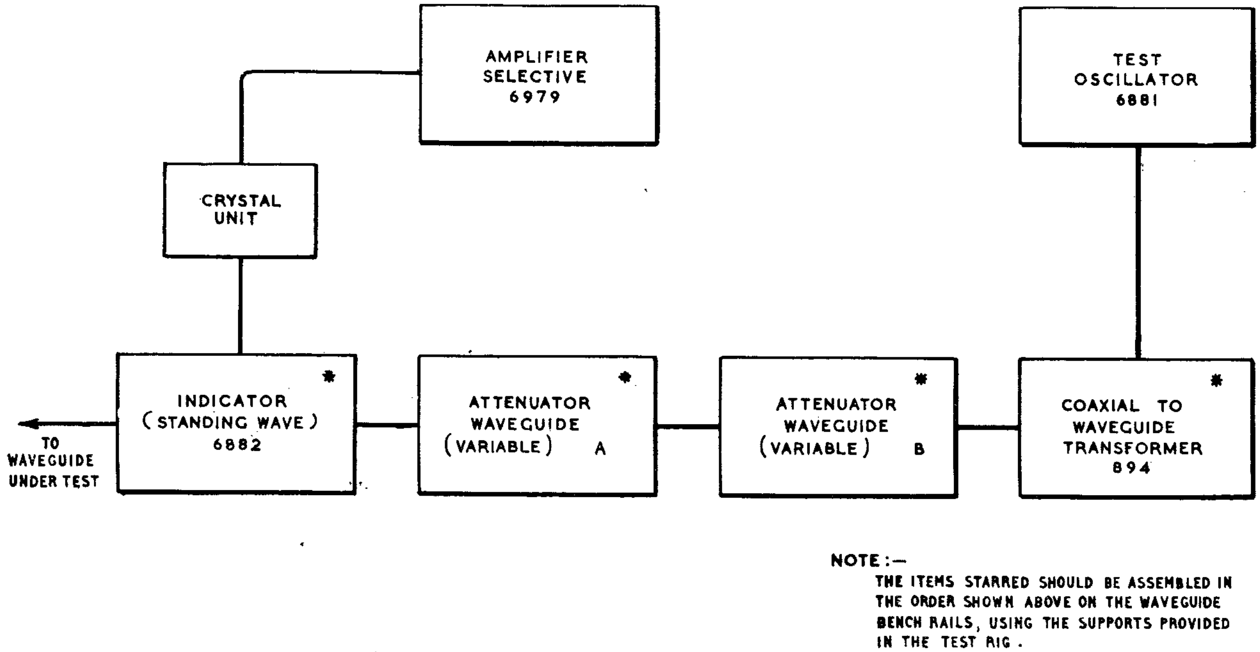

Fig. 1. Waveguide bench: block schematic diagram

assemble the equipment on the supports in the order shown in fig. 1. The test oscillator and selective amplifier may then be placed conveniently adjacent to the coaxial-to-waveguide transformer and standing wave indicator respectively.

(7) Couple the standing wave indicator to the vertical waveguide run using the flexible section, plain waveguide 90° E-plane bend and adaptor sections as required. Alignment can be obtained by using the adjustments provided on the supports and/or the tables to alter the height of the waveguide bench.

(8) Set attenuator B to produce at least 10dB attenuation, and set all attenuator controls on the selective amplifier to maximum.

(9) Switch on the test oscillator and selective amplifier and allow a delay of at least 15 minutes for them to reach optimum working temperature.

Note . . .

It is most important that the total h.t. input power to the Heil tube should not exceed 15W. To confirm this, calculate the product of cathode voltage and current, using the built-in meter (f.s.d. 500V and 100mA) *and the selector switch The product should be not less than* 13 *and not more than* 15*W. If the input power is outside these limits, adjust RV*1 *so that, with a cathode voltage of* 300*V, the cathode current is just below* 50*mA.*

Initial v.s.w.r. measurement

8. (1) At the end of the waveguide run (*at the input to the transition section feeding the linear array*) replace the 90° E-plane bend with the waveguide (conversion section) 808 and attach the matched load to this adaptor section.

(2) Switch on the oscillator modulation.

(3) Tune the oscillator to a wavelength of 9·95 cm by firstly setting the wavemeter thimble to this wavelength (*determined by the chart*), setting the meter switch to CRYSTAL CURRENT and adjusting the oscillator thimble for minimum indication on the built-in meter. The SCREEN VOLTS control should then be adjusted for maximum indication (*resetting the meter sensitivity as required to keep the meter movement on the scale*). This process should be repeated until the oscillator output and fiequency are stable.

(4) Reduce the attenuation on the selective amplifier until the built-in meter shows a reading. Then turn the MODULATION control for maximum indication.

(5) Tune the standing-wave indicator probe for maximum signal, adjusting the attenuation to keep the meter indication almost full scale.

(6) Move the standing-wave indicator caıriage whilst simultaneously observing the variation on the v.s.w.r. meter. Finally, position the carriage and the attenuation of attenuator A so that the probe is picking up a signal maximum and the meter is indicating.

(7) Move the carriage to the position producing minimum signal and record the v.s.w.r. as indicated on the meter. This value should be not less than 0·8.

(8) Repeat the v.s.w.r. measurement at the other wavelengths quoted below and record the results as shown:—

Wavelength (cm)	9·95	9·96	9·97	9·98	9·99	10·0
v.s.w.r.						

Wavelength (cm)	10·01	10·02	10·03	10·04	10·05
v.s.w.r.					

Initial insertion loss measurement

9. (1) Replace the matched load used for the v.s.w.r. measurement with the adjustable short-circuit (*waveguide* 815) and set the adjuster on the latter to 0·00 cm.

(2) Tune the oscillator to 10·00 cm. Tune the standing-wave indicator and oscillator modulation for maximum indication on the selective amplifier meter as in para. 8.

(3) Adjust the standing-wave indicator carriage for minimum signal, correcting the attenuation of attenuator B (*with attenuator A set for zero attenuation*), if necessary, so that the selective amplifier meter indicates between half and full scale deflection. Adjust attenuator A until the meter indication is at a whole number on the scale. Record the setting of attenuator A.

(4) Adjust the standing-wave indicator carriage for maximum signal, simultaneously adjusting attenuator A until the meter indication is *exactly* the same as that in operation (3). Record the new setting of attenuator A.

(5) Calculate the attenuation in the system, using the charts provided with the test kit, for both maximum and minimum signal conditions and record the values together with the difference figure. The attenuation of the waveguide run may then be obtained from the graph in fig. 2.

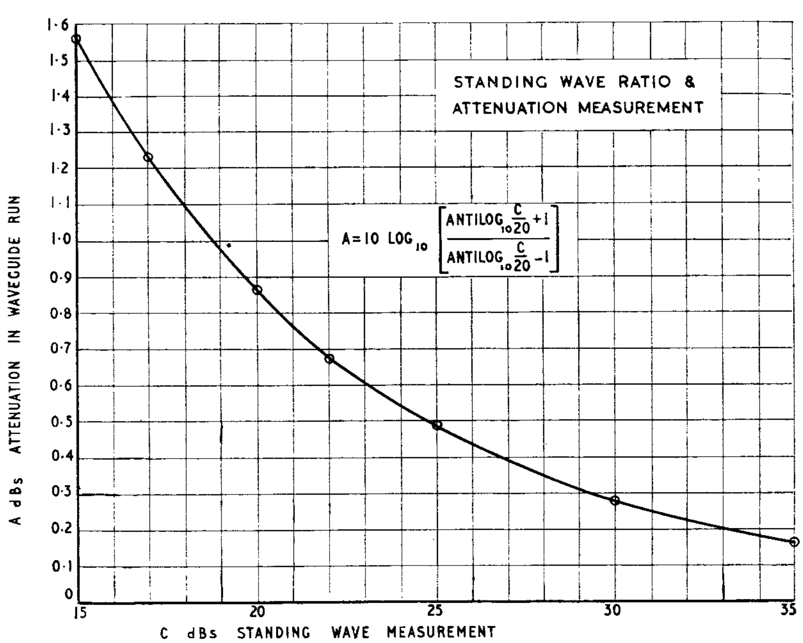

Fig. 2. Graph: insertion loss

(6) Repeat operations (3) (4) and (5) for SHORT positions 1 to 10 in 1 cm steps. Record the results as shown below and plot a graph of attenuation against SHORT position. The mean value of the graph should not be greater than 0·8 dB.

Short position	0·0	1·0	2·0	3·0	4·0	5·0
Attenuation						

Short position	6·0	7·0	8·0	9·0	10·0
Attenuation					

Inspection of waveguide system

10. In general, although oxidization of the inner surfaces of a waveguide is not, in itself, unduly detrimental, corrosion due to the ingress of moisture requires investigation because it indicates that the system is leaky or that the air driers in the air pump cabinet are not functioning properly.

11. The inspection procedure for the waveguide system is as follows:—

(1) Thoroughly examine the three flexible sections in the external run from the r.f. head. Flexible sections which have cracked or perished outer covers should be discarded and new ones fitted. If new sections are not available, exchange with the flexible used in the rotating cabin should be considered—on the understanding that the unsatisfactory flexible is renewed at the earliest opportunity.

(2) Thoroughly examine the plain waveguide sections for distortion and cracks, especially at flanges. Physically check that all flanges are properly aligned, and replace corroded nuts and bolts with new ones. The latter should be coated with protective grease after fitting.

(3) Thoroughly examine the transmitter-receiver in the r.f. head, paying special attention to the following:—

(*a*) Oscillator unit 4145 coupling flange.

(*b*) Flexible waveguide section.

(*c*) Waveguide attenuator operating mechanism.

(*d*) Noise source probe actuating mechanism.

(*e*) Air leaks past the thermocouples.

(*f*) Pre-TR cell mounts.

Note . . .

(1) *Extreme care must be exercised when removing pre-TR cells, as*

they are liable to expand after considerable use and are then prone to disintegration on withdrawal from the waveguide mount. If a cell does burst during removal, the associated waveguides must be dismantled and cleaned out.

(2) *Take care not to disturb the thermocouples during the inspection for air leaks.*

Final v.s.w.r. measurement

12. Repeat the v.s.w.r. measurements as detailed in para. 8. The results should not be inferior to the initial ones, and should be recorded.

Final insertion loss measurement

13. The insertion loss measurements should also be repeated and the results recorded. Depending on the extent of the repair work carried out following the inspection of the system, the results may show an improvement on the initial attenuation measurement.

Linear array inspection

14. (1) Remove the artificial load and examine it internally for corrosion and signs of arcing.

(2) Examine the inner surfaces of the ends of the slotted waveguide in the linear array for corrosion. Unless absolutely necessary, cleaning the slotted waveguide by 'pulling-through' is not recommended.

(3) Ensure that the bolts securing the sealing strips along the upper and lower edges of the array windows are tight. If not, tighten down the strips commencing at the centre of each section of the array and then working outwards; this method should ensure linear compression and avoid crimping of the weather seal.

Reassembling waveguide components

15. Reassemble the waveguide run components, paying particular attention to joints. New gaskets should be smeared with protective grease.

Note . . .

If practicable the waveguide run should be pressurized either by the air pump cabinet 4186 *or the test kit (pressurizing)* 6839, *and the air leakage rate checked to ensure that it has not deteriorated due to the previous dismantling and reassembling of waveguide sections. Methods for checking the air leakage rate are given in Chap.* 10.

Recording the results.

16. Both sets of measurements, initial and final, should be permanently recorded in the station records, together with details of any repairs undertaken. A copy of the above details should be retained by the servicing party.

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Chapter 10

PRESSURE TESTING OF LINEAR ARRAY AND WAVEGUIDE RUN

LIST OF CONTENTS

Introduction

1. The following tests are those capable of being performed on site by using test kit (pressurizing) 6839. The kit provides for:—

(1) Leakage rate measurements on the air system external to the air pump cabinet.

(2) Leakage checks within the air pump cabinet.

(3) Air flow rate measurements.

(4) Calibration of the built-in hygrometer.

(5) Determination of the overall efficiency of the system.

2. The kit provides means for pressurizing the waveguide or internal pressurized systems independently of the built-in compressor, thus simplifying fault location.

External air circuit-leakage rate test

3. In this test, the external air system (comprising waveguide run, linear array and connecting pipes and hoses) is pressurized to the specified level. The rate at which the air leaks away is then measured. If the leakage rate is greater than that specified, the leak detectors should be employed to locate the leak(s). The procedure is:—

(1) Switch off the air pump cabinet.

(2) Reduce the system pressure to atmospheric by opening the air release valve in the cabin roof, then close the valve.

(3) Disconnect the air outlet hose at the rear of the air pump cabinet, and connect the hose to the air outlet pipe on the test kit.

(4) Disconnect the air inlet hose to the air pump cabinet and blank it off with a blanking plug and hose clip.

(5) Close the air supply valve on the test kit and switch the compressor on. Adjust the relief valve until the RESERVOIR meter indicates approximately 12 lb/in^2.

(6) Open the air supply valve. When the TEST meter reading is stable, readjust the relief valve, if necessary, until this meter indicates exactly 12 lb/in^2.

(7) Close the air supply valve. Wait five minutes, then record the TEST meter reading. The difference between this recorded value and 12 lb/in^2 should not exceed 2 lb/in^2. If the leakage rate per five minutes is greater than this figure, the air leak(s) must be located and eliminated.

Note . . .

Although the following instructions deal with leak detection using a halogen tracer and the electronic leak detector, the soap solution may be used to locate leaks. Generally, however, leaks easily detected by soap solution are of sufficient magnitude to be aurally detectable. The magnitude of leaks should be gauged from the result of the leakage rate test, before deciding which method—aural, soap solution or leak detector—is to be used.

(8) If the leak appears to be large, aurally check the entire system, paying particular attention to the sealing on the linear array windows, and to flexible waveguide sections. If this method fails, continue searching with the leak detector as detailed below.

(9) Release the air pressure in the external circuit. Using the cap fitted to the carbon tetrachloride bottle supplied with the test kit, pour three caps-full of CTC into the air intake of the pneumatic compressor.

(10) Open the air supply valve on the test kit. When the external air system is pressurized, adjust, if necessary, the relief valve to maintain the TEST meter indication about 12 lb/in^2.

Note . . .

Leak detector type 12920 is supplied with the kit and is described in A.P.2563EH. Before it is used, the cabin should be cleared of fumes by use of the extractor fan. To avoid spurious triggering, personnel should not smoke in the vicinity of the detector, nor operate it if their hands are heavily stained with nicotine.

(11) Switch on the leak detector and allow about five minutes for it to warm up. During this time the sensitivity control should be turned back from the fully clockwise position as "clicking" starts. The final setting for the control is when the instrument just ceases to "click" (*under clean air conditions*).

(12) Fit either the rigid or flexible probe to the detector, depending on the accessibility of the suspected leak area, and search for the leak. The detector should respond to the presence of halogen within five seconds; this presence being verified by removing the detector to a 'clean' area, when the clicking should cease within 15 seconds (*using the flexible probe*), or 5 seconds (*rigid probe*). Returning the detector to the suspect area should cause the clicking to recommence.

4. All sources of air leakage must be eliminated or at least reduced in size until the leakage rate is below 2 lb/in^2 per five minute period.

5. The sealing between the flanges of a flexible section and a plain waveguide section consists of a shim positioned between two rubber gaskets. To simplify the fitting of these items it is suggested they be held together by a trace of adhesive such as Bostik. When offering up the flanges, they must be pre-aligned, using the dowel studs which fit into the centre holes of the short sides of the flanges. If it is necessary to tighten the bolts along the outer edges of the linear array windows, the sequence should be outward from the section centres. This reduces the probability of crimping the sealing which may cause air leakage at a later date.

Air pump cabinet 4136 tests

6. The subject of the following tests is to check for air leakage within the cabinet, check the action and setting of the blow-off valve, and check the flow delivery of the pneumatic compressor. Proceed as follows:—

(1) Release the air pressure in the waveguide run.

(2) Connect the air outlet from the test kit to the OUTLET pipe on the air pump cabinet. Blank off the end of pipe No. 8 (*inlet*) inside the cabinet, using the blanking plug and hose clip provided. Blank off the blow-off valve.

(3) Pour half a cap-full of CTC into the air intake of the pneumatic compressor. Start the compressor motor and pressurize the cabinet to 12 lb/in^2. Test the internal air circuit for leakage, using the leak detector, with the combination valve in each of its two positions in turn.

(4) Reduce the reservoir pressure of the test kit to minimum. Remove the blanking plug from the blow-off valve. Increase the reservoir pressure until the blow-off valve operates. The pressure at which air is released to atmosphere should be 6 lb/in^2. Adjust the blow-off valve setting, if required, and repeat the test until the valve is adjusted correctly.

(5) Switch off the test kit. Release the internal pressure in the cabinet by means of the blow-off valve. Remember afterwards to reset it to its original position. Disconnect the test kit from the cabinet, remove the blanking plug from the inlet hose and then ensure that this hose is securely reconnected to the metal INLET pipe at the rear of the cabinet.

(6) Attach the air flowmeter to the cabin roof girder and adjust until its position is vertical. Connect the top (outlet) of the flowmeter via the screwed hose adaptor and hose to the metal INLET pipe on the air pump cabinet. Secure this connection with a hose clip. Connect the bottom (*inlet*) of the flowmeter to the return air pipe of the external circuit. (*This hose is normally connected to the metal INLET pipe on the cabinet*).

Note . . .

It is important that the hoses connecting the flowmeter in series with the system are kept free of kinks.

(7) Switch on the air pump cabinet and allow the system to become pressurized. After a few minutes the flowmeter should indicate air flow and the magnetic valve should open to permit air circulation. When this happens, there will be a drop in the noise level of the built-in pneumatic compressors.

(8) Record the indication shown by the flowmeter and then, by means of the graph provided, determine the true air flow, this should be approximately 1 cu.ft/min at 4 lb/in^2.

Hygrometer calibration

7. The object of this procedure is to calibrate the built-in hygrometer against the whirling hygrometer supplied with the test kit.

(1) Switch off the air pump cabinet. Release the air pressure. Remove the hygrometer from its housing by first releasing the six screws holding the bezel to the mounting panel and then withdrawing the hygrometer unit.

(2) Expose the hygrometer, for at least 20 minutes, to the atmosphere of a shaded area outside the cabin. During this time prepare the whirling hygrometer by sliding the wick over the bulb of the longer thermometer.

(3) When the built-in hygrometer indication is stationary, the wick previously fitted to the whirling hygrometer should be dampened with distilled water (*or rain-water, if available*). The whirling hygrometer must not be exposed to direct sunlight but should be whirled vigorously in the same atmosphere to which the hair hygrometer is exposed. To ensure accuracy, the rotation should be smooth and reasonably fast.

(4) Read quickly and record the indications of both thermometers. Repeat the foregoing operation (3) several times and determine the average thermometer readings. The relative humidity can then be determined from these readings by using the tables in the test kit.

(5) Compare the relative humidities determined by the hair hygrometer and the whirling hygrometer. If they differ by more than 5 per cent, the hair hygrometer indication should be carefully adjusted to the correct reading by means of a small screwdriver inserted through the access hole in the side of the hygrometer unit.

(6) Carefully mount and secure the instrument in its housing. Stow the test gear in the test kit.

Overall system test

8. The object of this test is to pressurize the external air circuit using the air pump cabinet (*normal operating condition*), and then determine the overall efficiency of the system.

(1) Ensure that the inlet and outlet hoses are correctly connected and secured. Ensure that the air release valve in the external circuit is fully closed.

(2) Switch on the air pump cabinet and check that the internal air circuit is switched to the circulate condition when the built-in pressure meter indicates approximately 4 lb/in^2. This condition is immediately indicated by a reduced level of noise from the pneumatic compressor. Check that when the pressure falls to some value between 2·5 and 3·5 lb/in^2, approximately, the compressor commences to "make-up" again, the pressure builds-up to approximately 4 lb/in^2, and the cycle repeats itself.

(3) Using the stop-watch, time the 'circulate' and 'make-up' periods and determine their ratio. The duration of the 'circulate' period should be at least three times that of the 'make-up' period.

(4) Recheck the ratio after the air pump cabinet has been operating continuously for one hour. The ratio should be unchanged.

Note . . .

Before the air pump cabinet is put into operational service the time switch must be synchronized. The setting-up procedure for this is detailed in A.P.2527Q, Vol. 4, App. A4.

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Chapter 11

HORIZONTAL POLAR DIAGRAM MEASUREMENT

LIST OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

Introduction

1. Test kit (HPD) 12751 is used to determine the horizontal polar diagram of all marks of radar Type 80. As the kit may be used for other radars of a similar nature, it has been fully described, with the method of use, in A.P.2896AQ. A camera and oscilloscope form part of the kit and the polar diagram is recorded on film. A magnified image of the film is projected and from the projection a detailed graph is prepared. The items comprising the test kit are listed in Table 1.

Principles

2. Since a radar aerial is essentially a directional device, the overall performance of the radar will depend largely on the aerial characteristics. The plotting of a horizontal polar diagram shows the performance of the aerial system in the horizontal plane, and is defined as the variation in strength of the electric field vector at some distant point as the aerial is rotated.

3. The principle employed is that of a simulated point source of microwave energy located at a predetermined remote position and height. This is scanned by the Type 80 aerial which is connected to a special receiver and recording unit. The receiver has a bandwidth of 6 Mc/s and, as its output is proportional to the received signal, any variation in output signal level as the radar aerial scans the uniform field of the forementioned point source will be due entirely to the horizontal polar diagram of the Type 80. The recording unit comprises an oscilloscope and camera. Video signals from the receiver, and azimuth markers (0·5° *and* 3°) which are generated by an electronic unit synchronized with the 30:1 selsyn on the radar aerial head, are fed to the oscilloscope and recorded on a 35 mm film, which traverses the oscilloscope c.r.t. face at a preselected speed. From the projected film a graph can be produced. This graph of —dB levels (*from* 0 *dB*) plotted against azimuth degrees, allows detailed examination of the main lobe width and comparison of the main and side lobes.

4. The polar diagram produced by any aerial system is a function of the arrangement of the radiating element and the shape of the reflector. Any electrical or mechanical change in the radiator or reflector, or physical change in their mutual relationship, will modify the polar diagram and the extent of the change will depend on what alteration is made. Probably the most important use of polar diagrams is in determining the width of the main lobe and the magnitude of the (*usually unwanted*) side lobes.

Table 1

Test kit (HPD) 12751: contents

Item	Nomenclature	Ref. No.	Qty.
(1)	Receiver unit 12684	10D/21457	1
(2)	Aerial system 12861	10B/19272	1
(3)	Kit, amplifying unit	10S/17430	1
(4)	Calibrator, aerial azimuth	10S/17429	1
(5)	Table, WG servicing	10AQ/687	1
(6)	Kits, WG mixer	10S/17407	1
(7)	Transformer WG894	10B/19106	3
(8)	Attenuator, WG (variable)	10B/18359	2
(9)	Matched load	10S/16933	1
(10)	Test oscillator 6881	10S/16932	3
(11)	Kits, WG bench	10S/17448	1
(12)	Kits, connector	10S/17460	1
(13)	Petrol electric set 05G1	—	1
(14)	Kits, film processing	—	1
(15)	Kits, projector	10S/17457	1
(16)	Kits, film recording	10S/17457	1
(17)	FGRI.18135/2D (v.h.f. R/T)	10D/22104	1
(18)	MGRI.18138/3C (v.h.f. R/T)	—	1
(19)	Kits, WG directional coupler	10S/17414	1
(20)	Attenuator WG, semi-adjustable	10B/19288	1
(21)	Oscilloscope 6877 (Cossor 1049)	10S/16926	1
(22)	Kits, WG conversion	—	1

Remote site: general

5. Those items required for the remote transmitter assembly are:—

(1) Aerial system 12861
(2) Test oscillator 6881
(3) Petrol-electric set
(4) MGRI.18138/3C
(5) V.H.F. aerial.

6. The tower should be located at the same map reference used for the original h.p.d. measurement. The height of the dish above the ground should also be the same, in fact only on specially nominated sites will it be necessary to increase the height of the three-section tower supplied with the kit. Details of aerial height and position, together with relevant film records and graphs, should be obtained from the appropriate G.R.S.S. or from H.Q. Signals Command.

7. If these standard conditions cannot be met, the tower should be placed as close as possible to the original site. In this situation, the following parameters are issued for guidance. They should be disregarded (*except for dipole alignment*) if the h.p.d. is being plotted to appreciate the effect of new buildings.

8. The minimum range for the remote transmitter is five miles from the Type 80, and there must be direct line of sight without power or telephone lines intervening. A suitable site is usually the side of a hill facing the radar head. The aerial reflector dish should be mounted as high as possible (*but not lower than* 200 *ft below the Type* 80). The dipole aerial must be horizontal within $\pm 5°$; this may be checked using the spirit level mounted on the dipole feed unit.

9. When positioning the tower, especially if the radar head is obscured through poor visibility, a landing compass should be used. Binoculars or a telescope are useful items and these and a compass should be added to the kit before despatch from the G.R.S.S.

10. The v.h.f. R/T aerial should be mounted on the tower above the dish, in such a position as will not introduce directional problems.

11. The vehicle used to transport the equipment to a remote site should remain on site (*behind the dish*), as it provides a convenient location for the test oscillator (*which must be kept at as constant a temperature as possible*), and also for the R/T set and its battery supply.

12. If possible, a test set 288 should be added to the h.p.d. kit for use in checking that the dish is being illuminated.

Rotating cabin: general

13. The following equipment is used in the cabin. A block diagram of its layout is given in fig. 1, and a view of the items disposed for use in fig. 5.

(1) R.F. system (*i.e. attenuators, directional coupler and mixer*).

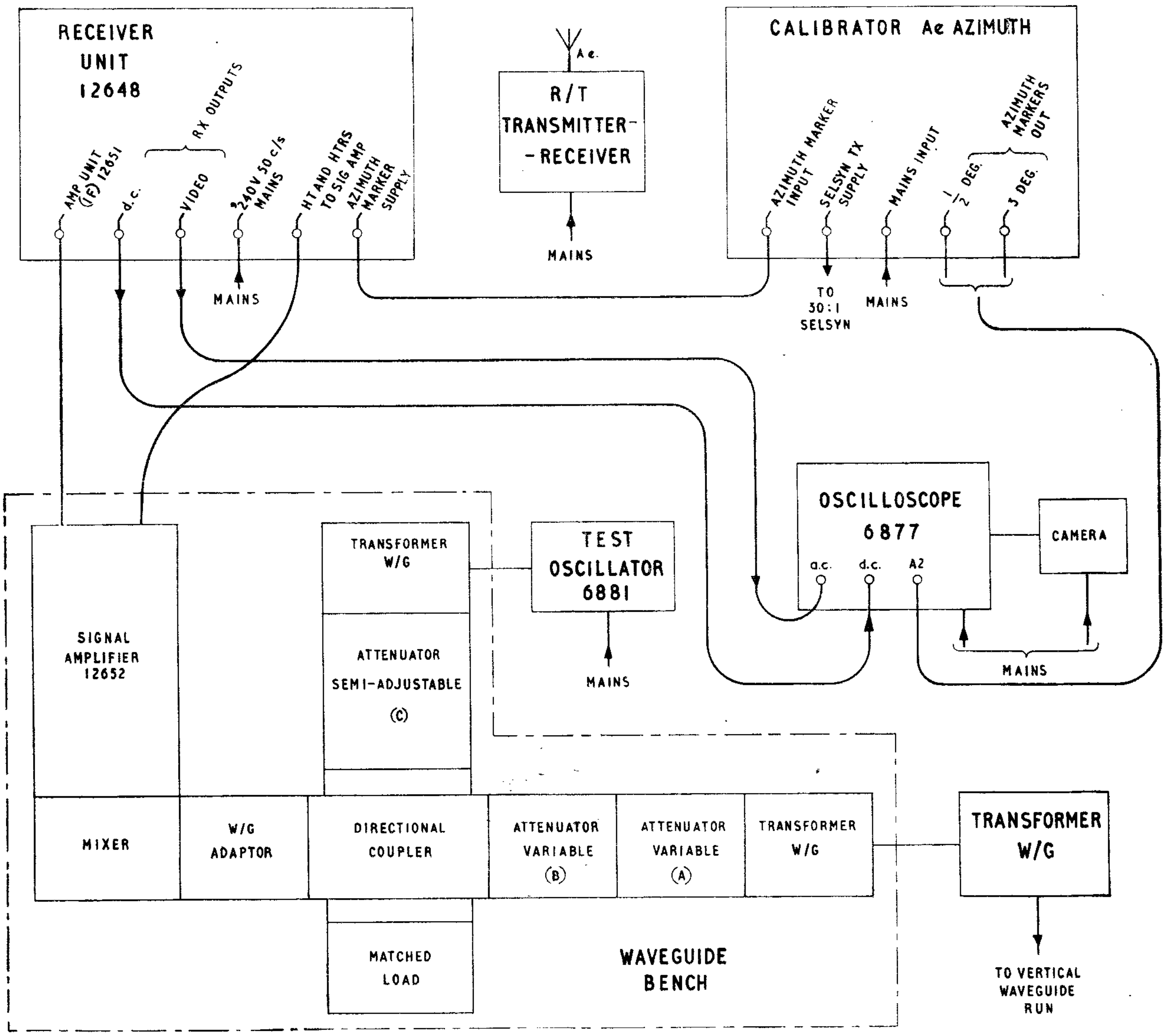

Fig. 1. Rotating cabin equipment: block schematic diagram

(2) Superheterodyne receiver (*test oscillator* 6881 *used as the local oscillator and head amplifier, and receiver unit* 12648).

(3) Calibrator, aerial azimuth (0·5° *and* 3° *markers*).

(4) Oscilloscope and camera.

14. The FGRI.18135/2D (v.h.f. R/T) should also be located in the cabin to enable transmission of instructions to the remote site while the radar head is rotating. The coaxial cable from the v.h.f. aerial (*which should ideally be placed at one of the radar reflector upper corners*) will have to be passed down the cabin support column. A length of weighted string will assist in feeding the cable past the cowl at the top of the column.

15. It is recommended that before taking the test oscillator 6881 (*used to energize the dipole*) and the MGRI.18138/3C (v.h.f. R/T) to the remote site, they are functionally tested at the radar head. The test oscillator should be used as a signal source for the microwave receiver, and tuned to the mid-point of the wavelengths to be used for the h.p.d. measurements. For this test it will be necessary to insert about 70 dB r.f. attenuation (*before the mixer*). When setting up the test oscillators (*i.e. simulated signal source and local oscillator*) do not forget to detune the wavemeters once the initial rough tuning is accomplished. The i.f. frequency employed is 30 Mc/s. The positions of the oscillator thimbles should be recorded for future reference.

16. Wiring alterations to the 30:1 selsyn circuit must be made so that the aerial azimuth calibrator can be synchronized to the radar aerial rotation. These alterations (*fig.* 2) consist of re-routing the rotor and stator connections of the 30:1 selsyn in the modulator building to the rotating cabin, via the slipring cubicle, instead of to the radar office. Check that the correct voltage supplies reach the calibrator unit, otherwise damage may be caused to the selsyn.

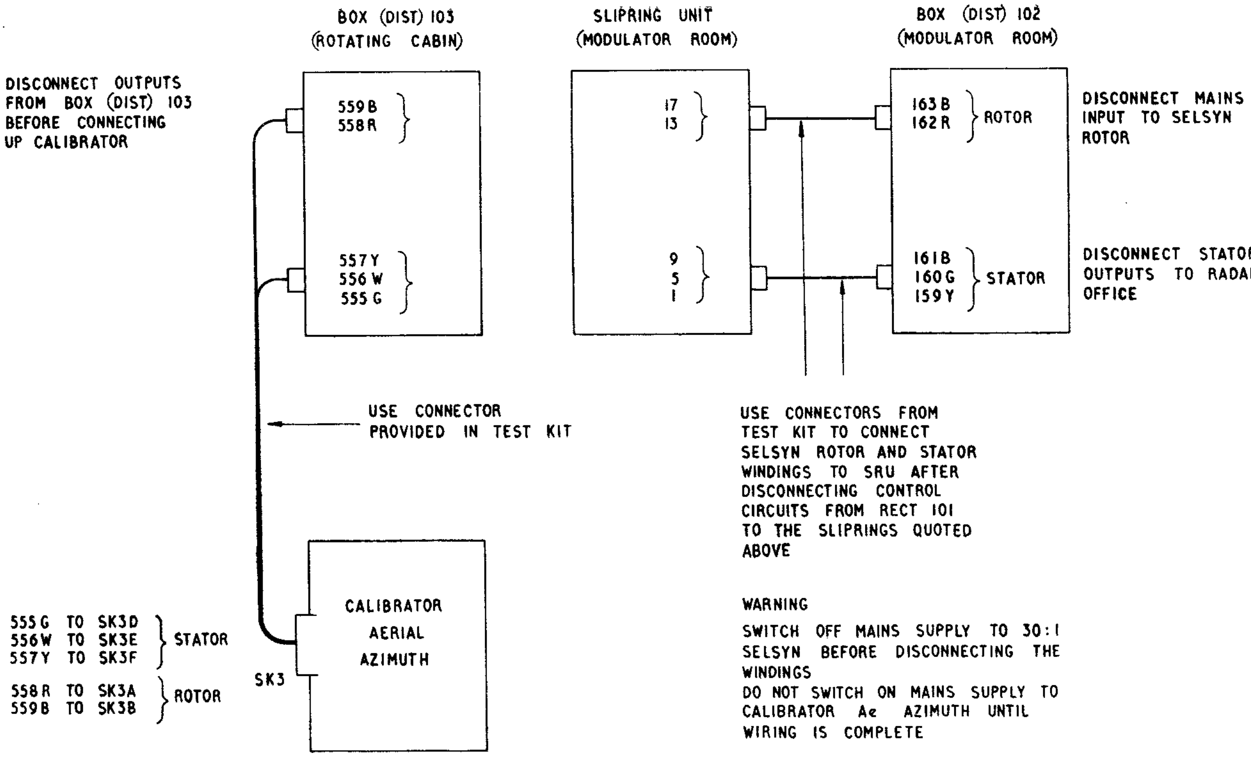

Fig. 2. 30:1 selsyn: wiring alterations

17. Before commencing measurements, it is advisable to ensure that both azimuth indicators (*one in the rotating cabin, the other on the controller electronic* (*Emotrol*) *in the modulator room*) are are approximately aligned with the radar beam. These indicators provide a rapid check on the approximate position of the radar reflector with respect to the remote site when, for example, initially locating the bearing for maximum signal and, later, when operating the camera shutter for the recording sequence.

18. The recording equipment consists of an oscilloscope 6877 (*Cossor* 1049), to which is fitted a Cossor oscillograph camera 1428. The fitting of the latter to the oscilloscope face is purposely tight (*for light-exclusion*) and the camera should be carefully positioned before tightening the retaining screws.

19. The special connectors required for both remote and radar head installations are supplied in one box. It is recommended, therefore, that the following connectors be removed from the box and placed with the tower equipment for transfer to the remote site:

(1) 40 ft of UR 65 coaxial cable for the dipole feed.

(2) 3 ft of 3-core flexible, Bulgin plug to watertight Duraplug.

(3) 30 ft of flexible cable, 2-pole to watertight Duraplug socket.

20. The variable attenuator B (*fig.* 1) should have been calibrated against a standard within three months of the h.p.d. measurement. The calibration graph should bear the stamp of the approved inspection authority. It should also bear the serial number of the attenuator to which it belongs. Before any measurements are recorded users must ensure that the correct graph for the attenuator in use is available.

Siting and installing the remote transmitter

21. (1) Before commencing to install the tower, the map references (*and a copy of the map concerned*) of both the remote site and the radar head must be obtained from the records mentioned earlier. The azimuth bearings of each site to the other can then be plotted. These are required for the initial alignment of the dish with the radar head. Final alignment of the dish is done later by orientating the swivel frame which is adjustable over 15 degrees in azimuth.

(2) Either visually, or using a landing compass, align two spikes with the site map reference and the radar head. The spikes should be about 10 yards apart and the nearest spike 10 yards from the map reference point.

(3) Position the tower base feet at the map reference point such that a line drawn through the spikes is normal (*i.e. at right angles*) to one of the broad sides of the tower base.

(4) Locate the first section of the tower on the feet and visually align it in the vertical and horizontal plane. Add the second and subsequent sections (*the number will depend on the height stipulation*), then assemble the guy wires so that they cross over on the narrow sides of the tower. The tower platforms should all be on the tower side nearest the Type 80 site.

(5) Using any convenient weight and string,

plumb the tower. When correctly aligned, tighten the guy wires. The plumb line will be required again later.

(6) Fit the back frame lower support members on to the top section.

(7) Attach the swivel frame to the back frame. Ensure that the pip pins are correctly located in each case, then temporarily secure the swivel frame to prevent it swinging when being hoisted. Hoist the combined framework, using the davit fitted to the top section, and secure it to this section. Fit the diagonal braces and then the four position control braces between the swivel and back frames.

(8) Stand the dish upright on the ground. Assemble the dipole feed unit on to it by sliding it through the dish back frame and the Tufnol sleeve. Secure it at the back frame with the four bolts provided. Screw the dipole unit into the feed tube and ensure that the attached locking screw can be inserted through the side of the tube to locate the dipole correctly. A groove on the barrel of the dipole unit should always be in line with a radial mark on the flange which bears the spirit level. This alignment ensures that when the spirit level bubble is central, the dipole is horizontal. If the spirit level flange has been inadvertently re-oriented, it must be correctly positioned before the dish is hoisted.

(9) Using the hooks at the top of the dish rear framework (*and a tag line attached to the bottom of the framework to hold it clear of the tower*) hoist the dish up to the swivel frame. Locate the dish on the swivel frame by means of the hooks (*which fit into slots on the swivel frame*) and lock the frames together, firstly with the two pip pins (*normally attached to the dish rear framework*) and finally by the eight bolts supplied.

(10) Re-check the tower alignment. Adjust as necessary. Tighten the guy wires.

(11) Note that the bubble in the dipole feed unit spirit level is central. If not, unlock the feed tube and re-orientate the flange until the bubble is central. Lock the feed tube in this position.

(12) Connect the appropriate coaxial feeder to the dipole feed unit and, using the clips provided, secure the cable neatly to the tower down to ground level.

(13) Mount the v.h.f. aerial at the top of the tower and, using the clips provided, feed the aerial connector to ground level.

(14) Position the vehicle behind the tower, facing the prevailing wind. Install in it the test oscillator and MGRI.18138/3C (v.h.f. R/T). Connect these to their respective aerials and connect the power supplies (*petrol electric set for the test oscillator and 12V battery for the v.h.f. R/T set*). The v.h.f. R/T set may have to be temporarily located at the top of the tower while adjustments to the angle of the dish are made on instructions from the radar head.

Calibrator (ae. azimuth): connection to 30:1 selsyn

22. The following procedure describes a method of connecting the calibrator to the 30:1 selsyn on the turntable assembly via the slipring cubicle (*fig.* 2).

23. (1) In the modulator room at panel 4833, switch off the mains supply to the 30:1 selsyn.

(2) In box (distribution) 102, disconnect the mains input to 162 and 163. Disconnect the selsyn stator outputs (*to radar office*) on 159, 160 and 161.

(3) On the power slipring unit in the slipring cubicle disconnect the inputs (*from rectifier* 101) on 1, 5, 9, 13 and 17.

(4) Using the two connectors provided, connect 162 and 163 (30:1 *selsyn rotor*) to 13 and 17 on the slipring unit. Connect 159, 160 and 161 (30:1 *selsyn stators*) to 1, 5 and 9, respectively, on the slipring unit.

(5) In the rotating cabin remove the floorboards in front of the r.f. head to expose box (distribution) 103. In this box, disconnect ferrule-ended outputs to box, junction 4686 on 555, 556, 557, 558 and 559.

(6) Connect SK3 on the calibrator to these terminals, as follows:—

Calibrator SK3	Box (dist.) 103
A	558
B	559
D	555
E	556
F	557

(7) Replace the floorboards.

Note . . .

A gap between the base of rack assembly (test) and the floorboards will allow passage of the cable from the box (junction) to the calibrator.

Rotating cabin: equipment assembly

24. A schematic diagram of the layout of the equipment used in the cabin is shown in fig. 1, and a view of the equipment in fig. 5. Assemble the items in the following sequence:—

25. (1) Lay out the waveguide components on the table, as shown in fig. 5, using the bench rails and supports of the test rig (waveguide) 12242 but with two additional supports to take the weight of the head amplifier and matched load. A feature of the bench is the directional coupler. This is correctly installed when the local oscillator output crosses, as it were, an imaginary line joining two opposite corners of the centre section and which passes through the diameter of the hole coupling the waveguide arms, as shown in fig. 3.

(2) Install the rest of the cabin equipment and connect up as shown in fig. 1 and 5.

(3) Remove the 90° H-plane bend which connects the horizontal waveguide run (*from the r.f.*

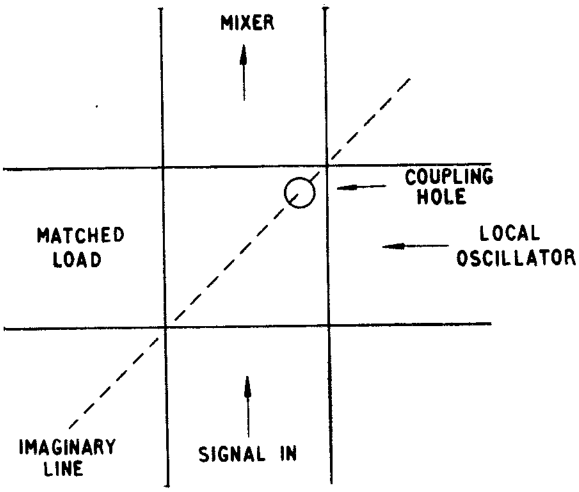

Fig. 3. Directional coupler: orientation

head) to the vertical waveguide run which passes up the cabin support column. Connect a coaxial-to-waveguide transformer to the vertical waveguide run and couple it to the similar transformer on the microwave receiver, using the connector provided.

(4) Mount the v.h.f. aerial on the radar aerial superstructure. Feed the aerial connector down through the cabin support column and connect to the FGRI.18135/2D.

Cabin equipment: preliminary setting-up

26. (1) Reference should be made to fig. 1 which identifies the attenuators A, B and C mentioned in the text.

(2) Switch on the equipment and allow at least 15 minutes for it to reach optimum working temperature.

(3) If the test oscillator (*acting as local oscillator*) has not been tuned as recommended earlier, set it up to approximately 10 cm, remembering afterwards to detune the wavemeter. Setting-up instructions are given in A.P.2896AP, Vol. 1.

(4) Adjust attenuator C for an indication of between 200 and 400 μA on the XTAL CURRENT meter on receiver unit 12648.

(5) Set the attenuators A and B to zero.

(6) Connect a multimeter Type 1 (100 *mA d.c. range*) into the 2ND DETECTOR CURRENT socket on the receiver unit. Set the 2ND DETECTOR CURRENT meter switch to OFF.

(7) Set the BAND switch to WIDE and the GAIN controls to maximum, on receiver unit 12648.

(8) Set the oscilloscope A1 gain control to maximum.

(9) Disconnect the d.c. input (*from the receiver unit*) at the oscilloscope, and connect the video output to the oscilloscope.

(10) Remove the alloy casting surrounding the c.r.t. face and fit the camera. The camera hood must be carefully fitted to ensure that the intentional tight fit (*to exclude light*) is not destroyed. Open the viewing hood.

(11) Set the oscilloscope INT TRIG to 500 μS and SENSITIVITY to 1V/MM.

(12) Inform the remote site that the receiving equipment is ready to receive signals, and request them to ensure that their test oscillator modulation is switched on.

(13) Switch on the radar Type 80 turning gear and set the aerial rotation at about 1 rev/min. Check that when the aerial sweeps through the remote site bearing, a change in 2nd detector current is observed and also that a signal appears on the oscilloscope.

Note . . .

The procedure for switching on the turning gear is given in A.P.2527Q, Vol. 4.

Adjustments for maximum signal

27. It is assumed that the aerial is rotating at a fixed speed of between 0 and 1 rev/min. Ideally the aerial should be held stationary on the maximum signal bearing but, because of wind, this can rarely be done and rotation under power at a slow speed is the only alternative. This makes the procedure more exacting to perform.

28. Each of the steps mentioned below should be carried out on successive sweeps of the radar aerial. The azimuth indicator provides the means for estimating when a maximum signal can be expected and the operations should be repeated until the condition of maximum signal is achieved.

29. (1) Adjust the receiver gain controls and also attenuator A, if required, so that the 2nd detector current does not exceed 4 mA (*meter switched to* 10 *mA range*). Adjust the oscilloscope gain to obtain an undistorted square-wave.

(2) Adjust the local oscillator tuning for maximum displayed signal amplitude, adjusting attenuator C, if necessary, to maintain crystal current at between 200 and 400 μA. Adjust the oscilloscope T.B. FREQ. and SYNC controls until there is no perceptible shift of the square-wave.

(3) Instruct the remote site to adjust the dish in azimuth and in elevation in small steps. Check the effect of each adjustment. The receiver gain should be reduced (*simultaneously increasing the multimeter sensitivity*) until the position of the dish which produces maximum received signal is found. The dish should then be locked in this position. The 2nd detector current should be rechecked to ensure that the maximum signal condition has not been affected.

(4) Disconnect the video input to the oscilloscope.

(5) Connect the d.c. output from the receiver to the oscilloscope.

(6) Set up the oscilloscope as follows:—

A1 VOLTS	3
A2 SENSITIVITY	1 V/MM
TIME RANGE	EXT. T.B.
TIME SCALE	Adjusted to centre the spot

Note . . .

During the above procedure the appearance of azimuth markers should be noted on the *oscilloscope. They should be separated from the displayed signal by means of the shift controls.*

Recording the polar diagram: preliminaries

30. (1) The polar diagram should be recorded at three wavelengths, *viz.* 9·8, 10·0, 10·2 cms. Close the viewing hood. Start the camera and engage the clutch (*Refer to A.P.2896AQ*).

(2) The diagram should be recorded on film down to −39 dB. This range should be covered in three steps with at least 6 dB overlap between the steps, *i.e.* 0 to −18 dB, −12 to −30 dB, and −24 to −39 dB. Signal calibration marks are to be recorded in 3 dB steps between the ranges mentioned above, *i.e.* at 0, 3, 6, 9, 12, 15 and 18 dB.

(3) Azimuth calibration marks are to be recorded at 0·5° except for the 540° run when 3° markers are to be used.

(4) The radar aerial should be rotated smoothly at a speed between 0·25 and 1·0 rev/min.

(5) All films should be marked, before exposure, with the site identity, reel number, wavelength and date. **This is most important.**

(6) Notes should be made, during exposure, of the wavelength, dB range, film speed and aerial speed. These notes must be identified with the real number. The date, and the site and map reference of the remote transmitter must also be recorded. **This is most important.**

(7) Until experience is gained, it is recommended that when the first recording run is accomplished the exposed film should be cut, removed from the camera, developed and fixed before carrying out the remaining recordings. From this initial recording, the optimum brilliance level may be determined for future recordings.

(8) In order to avoid the superimposition of different dB level signal marks, users are advised to adopt the following procedure when recording the signal calibration marks: Set the attenuator to the stipulated figure (*para.* 31), open the camera shutter 2° before the maximum signal azimuth bearing, close it 2° afterward, rotate the film by hand one quarter turn. Set the attenuator to the new attenuation figure, turn the film another quarter turn and repeat the camera shutter operations.

(9) To avoid non-linearity in the recording, the 2nd detector current must not deviate beyond 0·2 to 2·0 mA for minimum and maximum signal, respectively.

Recording the polar diagram

31. Set attenuator B to 39 dB and attenuator A to approximately 3 dB. Adjust the receiver gain until a small deflection is noticeable on the oscilloscope as the radar aerial sweeps through the maximum signal bearing.

32. The oscilloscope brilliance should be set such that the zeros between lobes are recorded but the other recorded signals are kept halo-free. This may be achieved by making the first recording run a trial one.

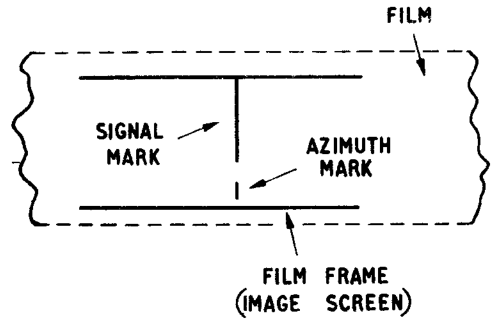

Fig. 4. Film frame: marker positions

33. (1) Set attenuator B to 0 dB and adjust attenuator A until the spot deflection occupies the height of the film frame (*fig.* 4). Ensure that the azimuth marker amplitude is not too great (*fig.* 4) by adjusting the gain of the appropriate oscilloscope amplifier.

(2) Load the film into the camera. A slip of paper may assist in easing the leading edge of the film through to the receiving cassette.

(3) Calibrate the film from 0 to −18 dB in 3 dB steps, using attenuator B, turning the film by hand between exposures.

(4) Record two more signal calibration marks at 0 dB.

(5) Record the main beam at a film speed of 5 in/s for not less than 3° either side of the maximum signal azimuth bearing.

(6) Record two more signal calibration marks at 0 dB.

(7) Set attenuator B to 12 dB and adjust attenuator A until the spot deflection fills the film frame as in (1) above.

(8) Calibrate the film from 12 to 30 dB in 3 dB steps using attenuator B. Release two more 12 dB calibration marks.

(9) Return attenuator B to zero and record the major side lobes at a film speed of 5 in/s for ±5° minimum. Further record side lobes at a film speed of 1 in/s for ±60° minimum.

(10) Record two more signal calibration marks at 12 dB.

(11) Set attenuator B to 24 dB and adjust attenuator A until the spot deflection fills the film frame.

(12) Calibrate the film from 24 dB to 39 dB in 3 dB steps with attenuator B. Record two more calibration marks at 24 dB.

(13) Return attenuator B to zero dB and record the side lobes at a film speed of 1 in/s for ±90° minimum.

(14) Further record 540° of rotation to include two main beams at a film speed of 0·1 in/s, using the 3° azimuth markers.

(15) Record two more calibration marks at 24 dB.

(16) Remove the film receive cassette and develop the film.

Notes . . .

1. *If interfering signals are suspected, arrange for the remote transmitter to be switched off, then record 720° rotation at a film speed, of 0·1 in/s, using 3° azimuth markers.*
2. *After processing the film, check that any difference between the level of the check calibration marks at the beginning and end of each run does not exceed 0·5 dB.*

Production of the h.p.d. graph

34. The scales to be used on the graph are:—

(1) Azimuth range (*X co-ordinate*) 7½° from the main lobe.

(2) Azimuth scale (*X co-ordinate*) 1°/in.

(3) Decibel scale (*Y co-ordinate*) 6 dB/in.

35. (1) Using the projector provided, project the film results in turn on the graph paper, marking off sufficient salient points on each projection for a polar diagram to be accurately drawn in later. Annotate the graph sufficiently to identify it.

(2) Repeat this procedure for each of the other two wavelengths.

(3) Compare the completed graphs with the originals. If the new h.p.d. shows discrepancies, the graph(s) should be analysed as detailed below. Failure to meet the stated requirements at a particular wavelength automatically rejects the diagram, which should be repeated at that particular wavelength only. Before any such repetition all equipment should be thoroughly checked. If the results of the repeated measurement do not meet the limits quoted, all the results (*including original ones*) and any relevant information should be forwarded to H.Q. Signals Command for consideration and action.

Polar diagram limits

36. The figures quoted below refer to angles and levels measured with respect to the peak of the main lobe taken as 0° and 0 dB.

37. (1) The diagrams obtained at the three wavelengths should be considered separately. The main beam should not exceed:—

(*a*) 0·3° at −3 dB

(*b*) 0·5° at −9 dB

(*c*) 0·7° at −21 dB

Note . . .

The width of the main lobe at the three levels should be determined from the film as follows:— Find the average length of one marker by measuring at least 12 markers. Then measure the width of the main lobe at each level and convert to degrees.

(2) The higher of the first two side lobes should not exceed −15 dB.

(3) No other lobes between ±1° should exceed −18 dB.

(4) Between 1° and 5° on either side of the main lobe, no lobes should be above the lines joining the −18 dB and −36 dB levels.

(5) Outside ±5° there should be no lobes exceeding −36 dB with the possible exception of those noted in sub-para. (6).

(6) Outside ±7½° the general level should not exceed −39 dB with the following exceptions:—

(*a*) Narrow lobes at approximately 1·8° intervals out to ±40° may rise to a maximum of −36 dB.

(*b*) Two single narrow lobes, each lying between 40° and 45° on either side of the main beam may rise to a maximum of −30 dB.

(*c*) A single lobe at approximately 180° to the main lobe may rise to a maximum of −36 dB.

38. A total of 12 peaks only may exceed −39 dB at each wavelength, with the proviso that the number may increase to 16 for any one wavelength, provided that the total number, for all three wavelengths, together does not exceed 36.

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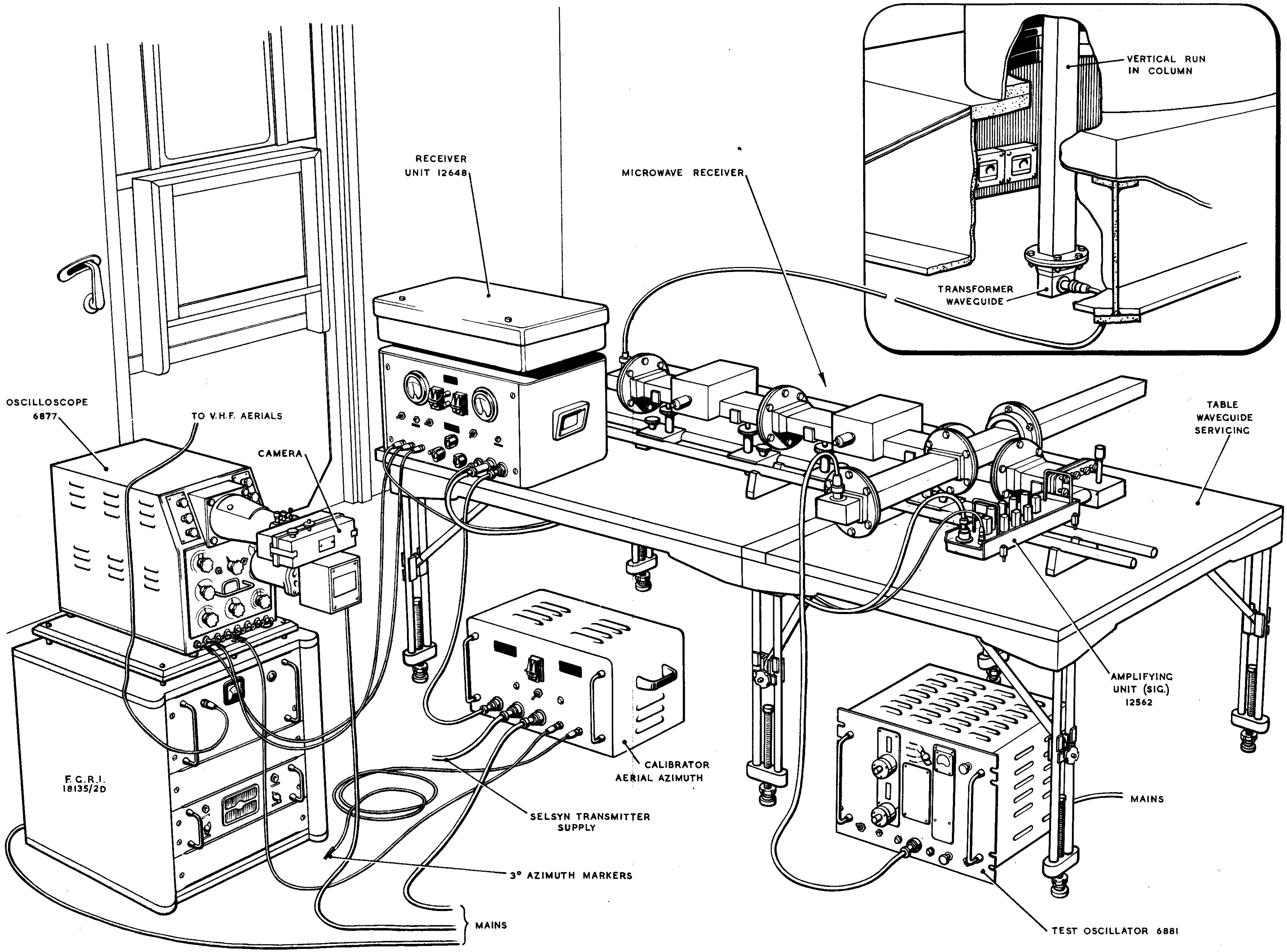

Fig.5 Rotating cabin equipment set up for use Fig.5

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Chapter 12

AERIAL AZIMUTH ALIGNMENT

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

Introduction

1. The aerial azimuth alignment check is carried out to ensure that:—

(1) The remote azimuth bearing indicators (*in the modulator building and the radar office*) are synchronized with, and indicating correctly, the true bearing of the radar beam.

(2) The auto-align circuits are functioning correctly.

2. The equipment required to perform the check is:—

(1) Test set 223A.

(2) Medium landing compass (*Ref. No.* 6*B*/34).

Preliminary operations

3. (1) Ensure that the indicator, electrical 102 has been plugged into the Type 80 Mk. 1 position on the panel (selsyn distribution) 648A in the radar office.

(2) Rotate the aerial until a position is reached where it is possible for an observer, standing at a distance of 150 yd. minimum from the centre of the aerial, to sight along the gap between the back frame and the reflector frame. Apply the brakes to the turntable motors.

(3) Using the medium landing compass at the minimum distance of 150 yd, sight along the gap (*sub-para.* (2)). Align the compass with the gap and record bearing.

(4) Obtain the magnetron frequency as follows:—Measure the local oscillator frequency using test set 223A. Subtract from this 13·5 Mc/s. (*Check that plugs* 131 *and* 132 *are in their correct sockets on amplifier unit* (*AFC*) 4144. *This will ensure that the local oscillator is on the high frequency side of the magnetron frequency*). Record the (magnetron) frequency obtained.

(5) Compute the true bearing of the radar beam from the following formula:—

True bearing = x − (90 + magnetic variation + squint angle).

Where x is the bearing obtained in (3) above, when taken at the load end of the reflector. Magnetic variation may be obtained from a current Ordnance Survey map of the local area. Squint angle may be obtained from fig. 1.

Note . . .
If the compass bearing is taken from the feed end of the reflector the above formula gives the reciprocal of the true bearing.

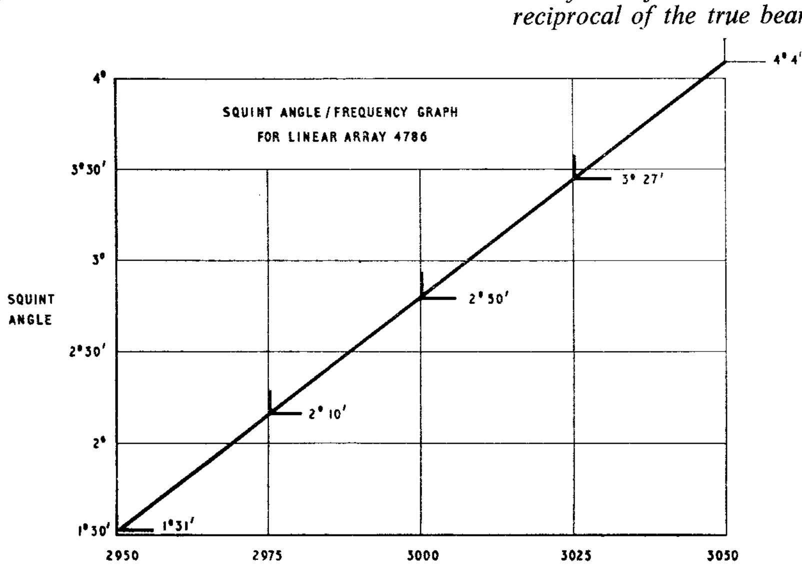

Fig. 1. Graph: squint angle/frequency

(6) Mark a thin vertical line on the outer edge of the turntable directly opposite the auto-align micro switch roller. Knowing the true bearing of the radar beam, measure the circumference of the turntable and position the auto-align cam so that its centre will be directly opposite the roller of the auto-align micro switch when the radar beam is in the auto-align position (*normally looking North or South*).

(7) Rotate the aerial at 4 rev/min for 3 minutes and check that the auto-align system operates. Stop the aerial in the position given in (2) above.

(8) Take a further compass bearing as detailed in (3) above, and compute the true bearing from the formula in (5).

(9) Unlock the clamping ring on the 30 : 1 selsyn and rotate the shaft until the bearing shown on the indicator, electrical 102 coincides with the true bearing (*sub-para.* (8)) with a tolerance of $\pm \frac{1}{4}°$. Lock the clamping ring.

(10) Unlock the clamping ring on the turntable magslip and rotate the shaft until the true bearing is indicated within $\pm \frac{1}{2}°$ on the magslip indicator in the rotating cabin. Lock the clamping ring.

(11) Adjust the pointer on the magslip indicator (*mounted on the controller, electronic* (*Emotrol*) *in the modulator building*) until it shows coincidence in bearing with the other indicators.

Functional test

4. (1) Rotate the aerial at 1 rev/min and check that the indicator, electrical 102 follows smoothly.

(2) Switch off the mains supply to the selsyns, thus halting the bearing indicator, for 90° of aerial rotation. Close the selsyn mains supply switch and check that the bearing indicator pointer jumps into coincidence with the radar beam position when the auto-align circuits operate.

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Chapter 13

AERIAL CONDUCTANCE MEASUREMENT

LIST OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

Introduction

1. Test kit (aerial conductance) 12733 is provided to measure radiation loss (*conductance*) of the linear arrays used on the various marks of radar Type 80. The substitution method, using a microwave superhet receiver with a calibrated attenuator and an r.f. signal source, is employed. The reference level is 2nd detector current, which is reduced by the inclusion of the linear array in the r.f. circuit and restored to its former value by reduction of the attenuation. The reduction in attenuation required is thus a measure of the radiation loss, or conductance, of the linear array.

2. Microwave measurements which can be made on the waveguide run are v.s.w.r. and insertion loss or attenuation and, on the linear array, radiation loss (*aerial conductance*).

3. These measurements are made at low power levels and they provide the desired information on the transfer of r.f. power from the r.f. head in the rotating cabin to the reflector and vice versa. The conductance test provides the most comprehensive data obtainable from a single test. It is not convenient to measure the conductance of individual sections of the linear array. A conductance figure obtained from the single test, even if within the specified limits, does not, therefore, preclude the possibility of deterioration in conductivity of the windows. This may be checked by measuring the horizontal polar diagram in conditions as nearly identical to the previous h.p.d. test as possible. Any random deterioration in window conductivity will manifest itself by abnormal side lobe patterns.

Test kit: general

4. The test kit is fully described in A.P.2896AQ. The contents of the kit, together with associated items from other kits and common test gear items, are listed in Table 1.

5. Some sites have a linear array modification embodied. This modification, so far as conductance measurements are concerned, entails a different method of coupling the samplers into the waveguide. Fig. 1 shows the different layouts, which will be discussed later.

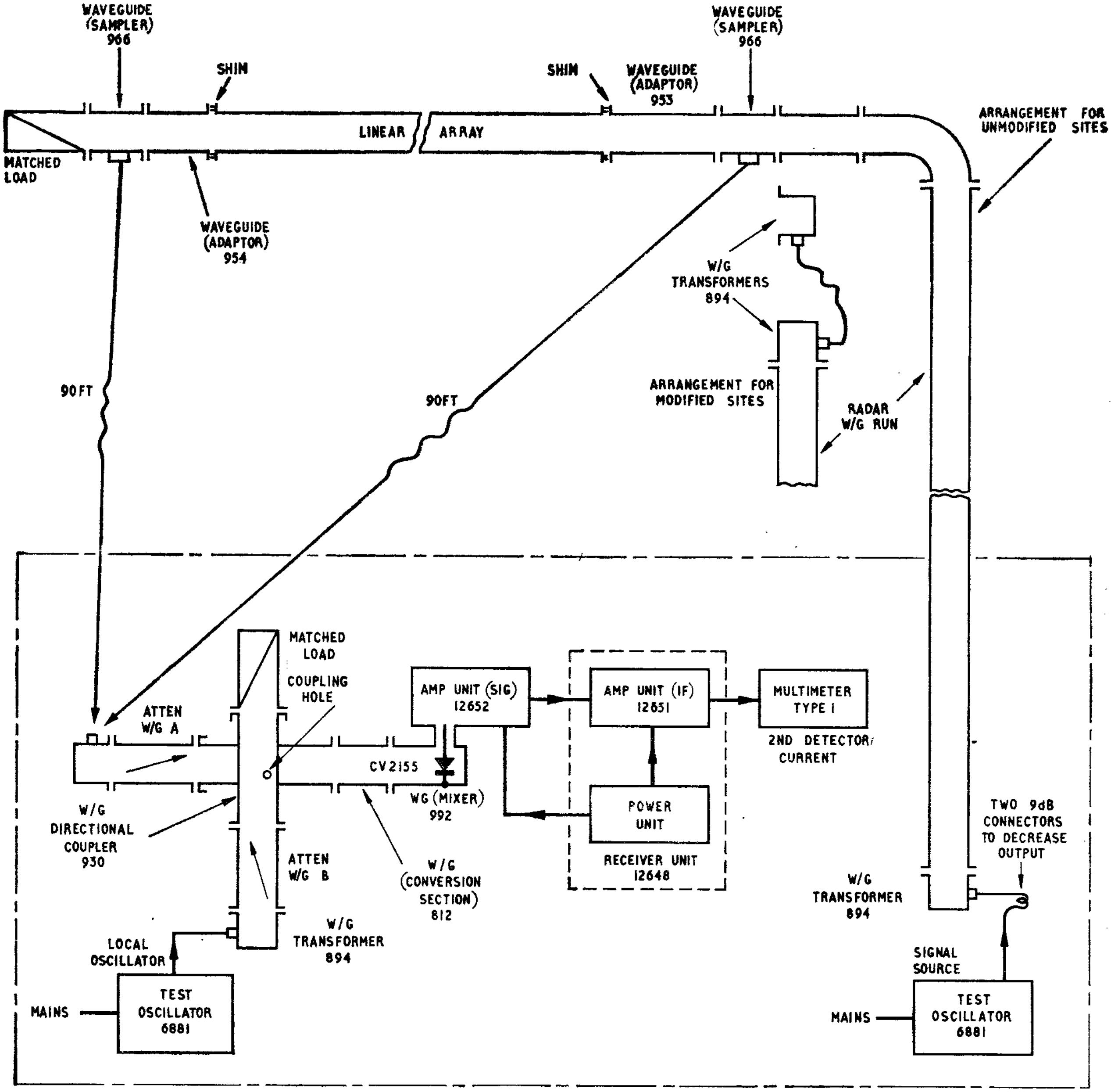

Fig. 1. Aerial conductance measurement: block schematic

Table 1

Test kit (aerial conductance) 12733 and associated equipment

Item	Nomenclature	Ref. No.	Qty.	Remarks
1	Receiver unit 12648, *containing*	10D/21457	1	
1·1	Amp. unit (signal) 12652	10U/17426	1	
1·2	Amp. unit (IF) 12651	10U/17425	1	
1·3	Connectors	10S/17443	1	
1·4	Dummy mixer	10S/17482	1	For head amplifier tests only
2	Kits, connector, *containing*	10S/17411	1	
2·1	Drum assemblies 100	10AD/3520	2	
2·2	Connectors	10HS/1465	1	}90 ft coaxial
2·3	Connectors	10HS/1464	1	

Table 1—*continued*

Test kit (aerial conductance) 12733 and associated equipment

Item	Nomenclature	Ref. No.	Qty.	Remarks
3	Kits (waveguide sampler) *containing*	10S/17409	1	
3·1	Waveguide (sampler) 966	10B/19267	2	
4	Kits, waveguide (directional coupler) *containing*	10S/17414	1	
4·1	Waveguide (directional coupler) 930	10B/19196	1	
5	Kits, waveguide mixer *containing*	10S/17407	1	
5·1	Waveguide 992	10B/19534	1	
5·2	Valves, CV2155		6	
6	Waveguide transformer 894	10B/19106	4	
7	Kits accessories (aerial conductance) *containing*	10S/17410	1	
7·1	Connectors	10HS/1461	2	
7·2	Connectors	10HS/1459	1	
7·3	Connectors	10HS/1460	1	
7·4	Tools, shim reforming	10AG/855	1	
7·5	Gaskets 530	10AL/834	6	
7·6	Gaskets 558	10AL/879	6	
7·7	Gaskets 574	10AL/879	6	
7·8	Contacts shim 118	10AS/2808	6	
8	Attenuators, waveguide	10B/18359	2	
9	Rails, waveguide bench	10AS/2890	1	Set
10	Test kit (v.s.w.r. ancillaries) 12565	10S/17317	1	
11	Waveguide 811	10B/18323	2	
12	Waveguide (conversion section) 812	10B/18324	1	
	Items from test kit (waveguide) 12242			
13	Waveguide (transformer) 894	10B/19106	1	
14	Table (waveguide servicing)	10AQ/687	1	
15	Test oscillator 6881	10S/16932	2	
16	Matched load	10S/16933	1	
	Common test equipment			
17	Multimeters Type 1	10S/16411	1	

6. The accessories kit (*item* 7 *in Table* 1) contains linear array flange gaskets for all marks of radar Type 80. Those for Mk. 1, 2 or 2A are *Ref. No.* 10AL/834. The kit will require re-stocking with these after each conductance test. New gaskets must always be used for each test but they may be re-employed when the waveguide is restored to the operational condition, provided they have retained their initial compressibility.

7. The tool, shim reforming is for use on the inner edges of shims prior to fitting them to waveguide 10 adaptor flanges, to ensure good electrical contact between adjacent waveguide sections.

8. The waveguide samplers and their associated 90 ft coaxial connectors are individually identified in order to avoid confusion when they are interchanged during the conductance measurement procedure. Interchanging is done to compensate for irregularities of characteristic between pairs of samplers and connectors, which would otherwise cause error in the measured conductance value.

9. Each sampler carries an engraved plate which states the amount of signal sampled, in dB, at three wavelengths. This figure is related to the signal power entering the sampler. Serviceability therefore may be checked on a microwave bench, and this must be done if a sampler has been dropped or otherwise damaged.

10. The receiver used is similar to that used for horizontal polar diagram measurement. The installation is also similar and, for this reason, it is convenient to carry out the two measurements consecutively. The two kits are not, however, completely complementary and the aerial conductance kit should be supplemented by items from test rig (waveguide) 12242. This will leave test kit (HPD) independent of all other test kits or rigs.

Rotating Cabin installation

11. (1) Set up the microwave bench (*fig.* 2) in the cabin on the servicing table and bench rails provided in test rig (waveguide) 12242.

(2) Connect receiver unit 12648 and the test oscillator 6881 (*acting as the local oscillator*) to the microwave bench (*fig.* 2).

(3) At the foot of the vertical waveguide run, replace the 90° E-plane bend with a coaxial-to-waveguide transformer. Connect this transformer to the test oscillator 6881 (*acting as the r.f. signal source*) via the two attenuating connectors supplied in the accessories kit.

Linear array: sampler installation

12. As previously mentioned, some sites have a modification embodied in the waveguide run to the linear array. This requires a different procedure when fitting the samplers. Fig. 1 shows the difference and should be referred to when installing the relevant items.

13. (1) At the feed end of the linear array fit the waveguide adaptor and sampler as follows:—

(*a*) *For unmodified sites.* Remove the 90° bend and flexible and transition sections from the end of the waveguide run. Discard the old flange gasket. Fit waveguide 953 to the linear array using a new gasket. Add waveguide (sampler) 966 and waveguide 812. Refit the 90° bend and flexible sections to complete the waveguide run.

(*b*) *For modified sites.* Remove the flexible section and 90° bend coupling the waveguide run to the linear array using a new gasket. Add waveguide (sampler) 966, then fit a coaxial-to-waveguide transformer to the sampler. Fit another coaxial-to-waveguide transformer to the waveguide run. Connect the transformers with the connector supplied in the kit.

(2) At the load end of the linear array, replace the artificial load with the waveguide (adaptor) 954, waveguide (sampler) 966 and matched load (10S/16933) as shown in fig. 1. Secure the artificial load to the catwalk so that the air return hose curvature is as near normal as possible. The hose need not then be disconnected.

(3) To each of the waveguide samplers connect a 90 ft. coaxial connector. Feed the free ends into the cabin. Each connector has an identification label (*e.g.* "*input end*") and should initially be connected to the appropriate end of the array. For the test it is accepted that the feed and load ends of the array become the input and output ends, repsectively.

(4) Record the identification number and location of each sampler and connector.

Linear array: measurement of radiation loss

14. Before carrying out the measurements detailed below, allow 15 minutes after swtiching on for the equipment to reach optimum working temperature.

15. (1) Set attenuator A to maximum attenuation and the receiver unit gain controls to minimum.

(2) Set up test oscillator A to a wavelength 0·05 cm. below the lowest wavelength to be used during the test. Detune the wavemeter. The tuning procedure for the test oscillator is given in Part 4, Sect. 7 of this publication.

(3) Connect the coaxial cable from the sampler at the input end of the linear array to the receiver system.

(4) Set up test oscillator B to a frequency 30 Mc/s above or below that of test oscillator A. Adjust attenuator B for a crystal current of between 200 and 400 μA.

(5) Plug the multimeter Type 1 (10 *mA d.c. range*) into the receiver unit. Ensure that 2ND DETECTOR METER switch is set to OFF.

(6) Set attenuator A to approximately 30dB and adjust the receiver unit gain controls for a 2nd detector current of 1mA. Switch the multimeter to its 1mA range and readjust gain, if necessary, to maintain the 2nd detector current at 1mA. If this current cannot be obtained, reduce the attenuation of attenuator A to not less than 25dB. If the required current is still unobtainable, remove one or both of the attenuating connectors in series with the r.f. input to the waveguide run. Readjust the crystal current as necessary and record the position of the attenuator micrometer.

(7) Disconnect the input to the receiver system and connect the other 90 ft coaxial cable. Reduce the attenuation of attenuator A until the 2nd detector current is restored to exactly 1 mA. Record the micrometer setting of the attenuator. The difference between the two positions of the attenuator in dB is the radiation loss.

(8) Reconnect the coaxial cable from the sampler at the input end of the linear array to the receiver and check that the r.f. attenuation required to restore the 2nd detector current to 1mA does not differ by more than 0·05 dB from that needed in sub-para. (6). If necessary, repeat the above measurements and recordings.

(9) Interchange the samplers and coaxial cables and repeat the above measurements and recordings.

(10) Repeat sub-para. (2) to (9) at wavelengths 0·05 cm. apart over the range of the linear array, finishing with a check at a wavelength 0·05 cm. beyond the normal range.

(11) Convert the attenuator micrometer settings to dB and calculate the mean of the radiation loss of the array, *e.g.*

If Z = radiation loss of array

X = loss of sampler No. 1 and cable A

Y = loss of sampler No. 2 and cable B

Then one measurement of attenuation is $(Z + Y) - X$

With reversed samplers and cables attenuation is $(Z + X) - Y$

The mean of these two measurements is

$$\frac{(Z + Y) - X + (Z + X) - Y}{2} = \frac{2Z}{2} = Z$$

Results

16. (1) Construct a graph of radiation loss against wavelength. The mean value obtained from the curve should lie within the limits of 12·5 dB and 18·5 dB. At any one wavelength the radiation loss should not differ by more than 2dB from the mean value over the whole range.

Note . . .

The radiation loss values obtained at wavelengths 0·05 cm. beyond the operational range should not be included when deriving the mean figure. They should be recorded only for such purposes as indicating gradual or rapid deterioration of a linear array over a period of time.

(2) An array which does not meet the specification quoted in (1) should be renewed. The unserviceable array should be checked section by section at the G.R.S.S. to determine the reasons for unserviceability. Radiation loss figures can be found in A.P.2527Q, Vol. 6.

P30032 458760/8394 3/60 875 C & P

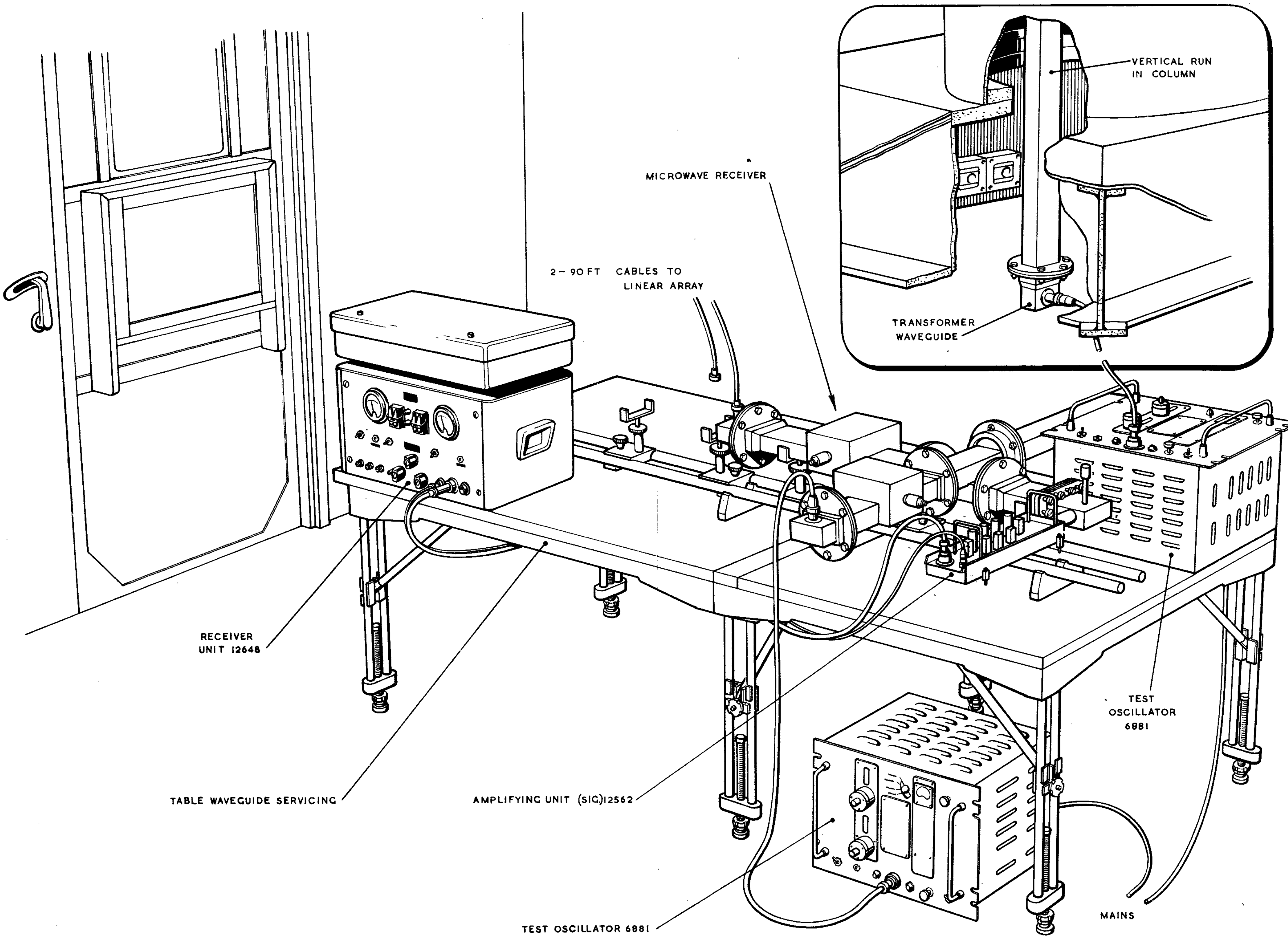

Fig. 2 **Aerial conductance measurement: cabin equipment** Fig. 2

PP8624 458761/8395 1/60 880 C & P Gp. 924 (4)

SECTION 2

INTERCABLING

Chapter 1

RADAR INTERCONNECTIONS

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

Identification of cables

1. All cables throughout the equipment, whether coaxial or multicore, have been allotted a number, and twin-lay markers (numbered and coloured sleeves of PVC or rubber substitute) are slipped over each cable at each end for ready identification as shown in fig. 1. This system applies to the radar interconnections for all equipments; but on early equipments the electrical installation cables, dealt with in Chapter 3, carry lead instead of twin-lay markers on the cables. The colour of the sleeve and the number on it follow the resistance colour coding system e.g. *black* is 0, *brown* 1, *white* 9. The number is read from the end nearer the termination.

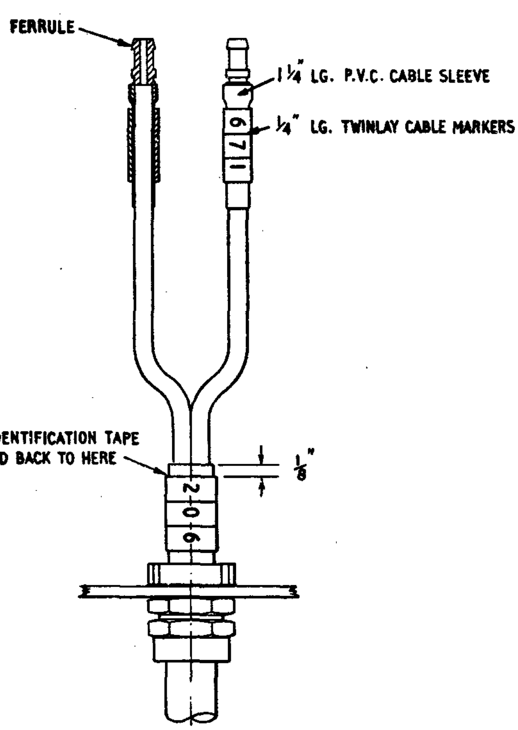

Fig. 1. Identification markers

2. It will be seen in Chapter 3 that in some instances the same number has been allotted to two different cables in radar Type 80, one in the electrical installation and the other in the radar interconnection system; but there is little possibility of confusion as the locations are quite remote and the two sets of cables, i.e. radar and electrical installation (which includes mains AC supplies to rotating cabin and gantry and electrical control of the turning gear), should be readily separated. The only two points where they run into the same unit are in box, distribution, 102, which connects the radar information and turning gear control functions with the radar office in the operations room, and in the slip ring cubicle connections (including box, distribution, 103 in the rotating cabin). At neither of these points does the same cable number appear twice.

Core identification

3. New lead covered cables are supplied with the cores identified by coloured or numbered tapes, but as the tapes perish rapidly the cores also are identified by twin-lay markers similar to those employed for cable identification. A three-digit numbering system is used here and, to avoid confusion, blocks of numbers have been allotted to the electrical installation cores and to the radar cores. Core numbers up to 400 belong to the electrical installation. Core numbers above 500 belong to the radar interconnection system. As shown in fig. 1, the identification tapes are bared back and covered over by cable identification twin-lay markers with ⅛ in. overlap. The core number is then slipped on and held in place by PVC sleeving. In both cable and core identifications the number is read from the end nearer the termination.

4. Where a quadramet PVC cable is terminated by a Plessey Mk. 4 plug or socket the 3-digit core identification system is impracticable and identification is by core colour only. As it may facilitate replacing of cables, the tape colour or single digit numbers on the tape (applicable only on lead covered cables) has been included on the interconnection diagram, but connections are normally better traced using the 3-digit core number.

5. Some quadramet PVC cables carry a 3-digit core identification number—specifically those where the core is easily visible, for instance on terminal blocks. An example of this is given in fig. 2 which shows terminal block label marking in junction box 4487. The *red, yellow, blue* and *green* cores on cable number 254 are connected direct to terminals 7, 8, 9 and 10 and carry numbered markers 634 to 637 respectively. It will be noted that terminals 1 to 6 are connected to pins A to F of a Plessey Mk. 4 socket, and the cores of cable 286 do not carry numbered sleeves. It should be noted that the plugs and sockets are referred to by the number of cable which they terminate or mate with, e.g. cable 286 is terminated with plug 286 which mates with socket 286 on junction box 4487. In this way connections may readily be traced from a unit circuit to an interconnection diagram and vice versa.

Junction boxes

6. No separate wiring diagrams of junction boxes have been prepared in this Air Publication. The terminal blocks in junction boxes and on distribution panels are labelled with the core identification number, terminal strip number and plug or socket pin number or letter as shown in fig. 2. Wiring diagrams of the junction boxes are shown inside each cover.

Slip ring connections

7. The slip ring cubicle makes connections between the modulator building and the rotating cabin. Three slip ring units are contained within it; a 40-way unit (slip ring unit 4836), a 20-way screened unit (slip ring unit 103) and a high voltage coupler (coupling unit, H.V., 4137). The 40-way unit will be replaced by 46-way slip ring unit 6053. The three units are separated in the diagram of the complete equipment (*fig.* 11) but for convenience are shown in one block in figs. 9 and 10, the diagrams for the modulator building

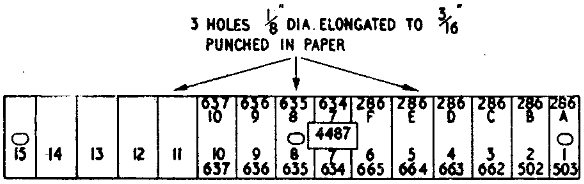

Fig. 2. Terminal block label

and roating cabin respectively. The particular unit to which a slip ring belongs is identified by putting SCR after the number in the case of the screened slip ring unit. For convenience in tracing connections from the modulator building to the rotating cabin, figs. 9 and 10 overlap so that box distribution 103 appears in fig. 9 and the slip ring cubicle base connections appear in fig. 10.

8. It should be noted that in slip ring unit 103 the rings have separate screens which are also electrically separate and none is taken to earth. Thus the positive and negative of the RF mean power voltage on screened slip ring number 20 are carried on the slip ring and on the screen.

9. In the modulator building the brushes are taken to terminations, terminal blocks for the unscreened unit and coaxial socket/sockets for the screened unit, at the foot of the slip ring cubicle. Then, from the rings, the connections are taken up the trunking to correspondingly numbered terminations in box distribution 103 in the rotating cabin. Coaxial cable is used in making connections to the screened slip rings and these have been given cable numbers, the same number being used for the length from the base termination to the brush and for the length from the slip ring to box distribution 103.

10. The high voltage coupler connections are direct from control unit 4139 in modulator 101 and direct to the pulse transformer in transmitter T.3724. It is emphasized that the HV pulse does *not* go through the distribution boards, the base termination in the slip ring unit or box distribution 103. This has been difficult to show on the interconnection diagrams where it may appear, in particular, that the HV pulse line is routed through panels distribution 902 and 904 in modulator 101 and transmitter T.3724. In fact the cable is supported on brackets attached to the distribution boards.

Mains supplies

11. It should be noted that the AC supplies to the rotating cabin are routed from the main distribution board via the slip rings and the connections appear in the diagrams of the electrical installation (*Chap.* 3). From box distribution 103 the cables carrying the 3-phase AC supplies are routed to panel, distribution, 4834 which carries a 20-amp rotary isolator switch and the 3-phase supply is taken through this to panel (AC distribution) 4461. AC supplies are then distributed to the radar equipment via switches on this distribution board, cabling connections from which are shown on the rotating cabin interconnection diagram (*fig.* 10).

12. Modulator building AC supplies are taken direct from the main distribution board in front of modulator 101. For the Emotrol, however, supplies may be taken direct from the mains or via a motor alternator set whose function is to smooth out the load, variation in which is caused mainly by the varying torque required from the turning gear motors, especially in a high wind. The motor alternator set is located in the modulator building annexe.

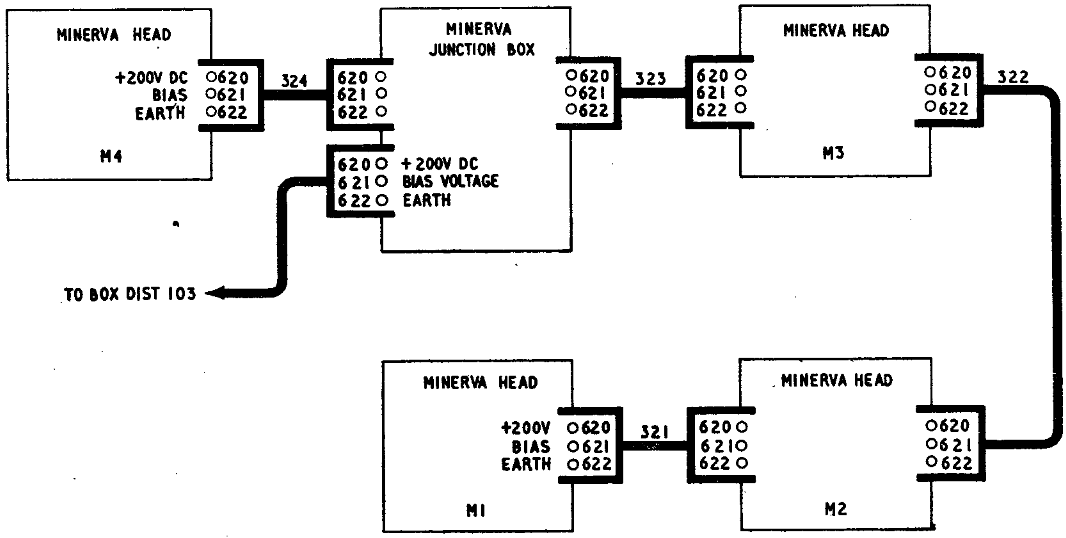

Fig. 3. Minerva interconnections

Minerva equipment

13. This equipment has been installed to detect the presence of smoke in case of fire in the rotating cabin, which is normally left unattended. From four identical detector heads disposed round the cabin, connections are made via the slip rings to the warning panel in the modulator building. The panel is attached to the wall behind the main distribution board. Connections to the four heads are shown in fig. 3.

Radar office connections

14. The connections from the modulator building to the radar office in the operations room come under the site wiring system, involving a new system of core and cable numbering. The link up between the two systems in box distribution 102 is described in Chapter 5.

Plug and socket orientations

15. Plessey Mk. 4 plugs and sockets can have the key or spigot in six different positions relative to the pins. Two plugs with the same number of pins cannot be mated with the same socket if the orientation is different, and risks of cross connections are reduced in this way. In the emergency connector kit (*Chap.* 6) to reduce the number of connectors, the various orientations have been ignored by filing away the spigot on all but the three-pin plugs and sockets. Due to the symmetry of the three-pin terminations it would be possible to locate a plug or socket in the wrong orientation so the spigot has been retained in these. Accordingly the orientations for 3-pin terminations only have been included on the interconnection diagrams. They are denoted by the numbers in circles close to the termination. Orientations for all plugs and sockets are given in the cabling schedule in Chapter 2 and they also appear on the circuit diagrams of the units.

HT interlock system

16. Since, if a fault occurs, one of the interlock contacts should open, a diagram showing the position of each interlock contact in the interlock circuit, the unit in which it is located, how it is connected in (e.g. cable number) and an indication of how it is operated (in general by giving it a functional name) is given in fig. 4. The system operates by switching off the DC supply to modulator 101, thereby preventing the pulsing of the magnetron, if one of the contacts or the HT OFF button is opened. Each contact has an indicator associated with it. A description of interlocks and indicators in the modulator building and in the rotating cabin is given in Sections 3 and 4 respectively.

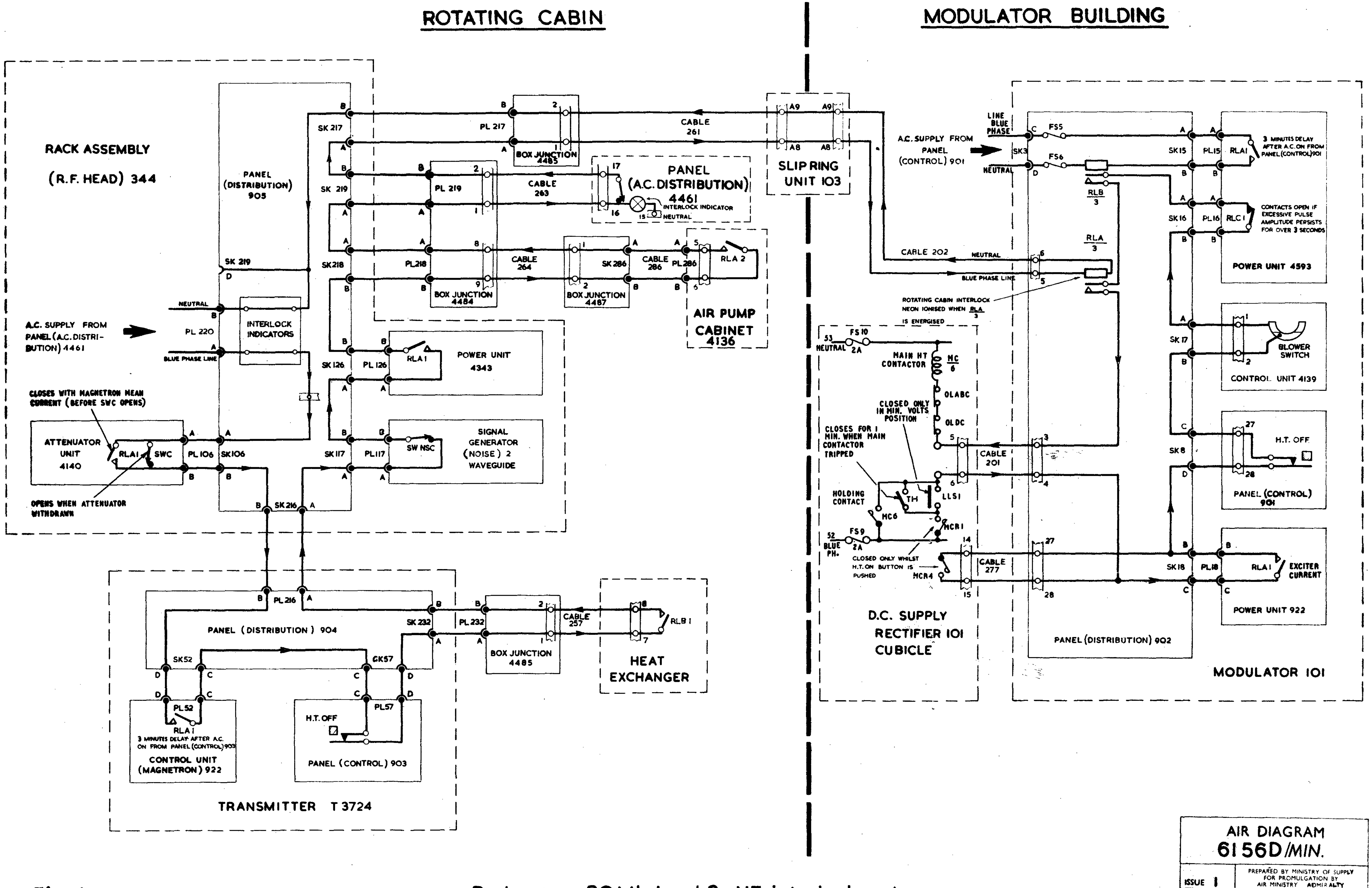

Fig.4 Radar type 80 Mk.1 and 2: HT interlock system

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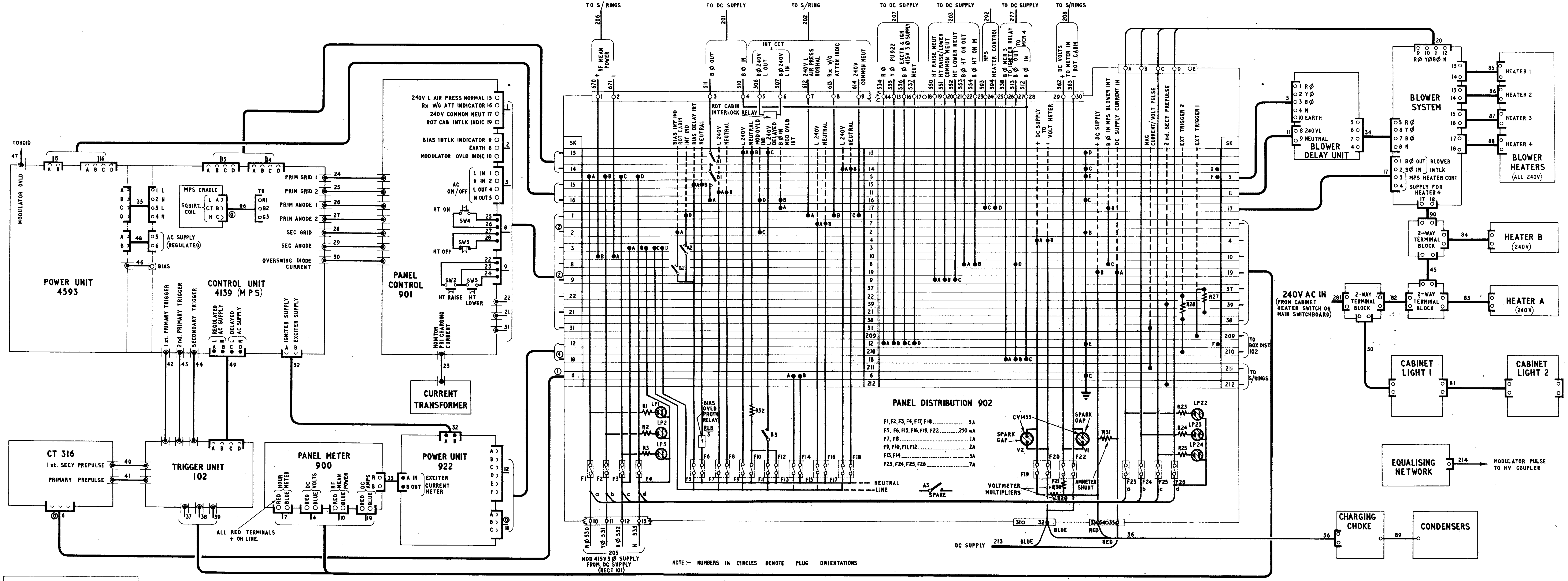

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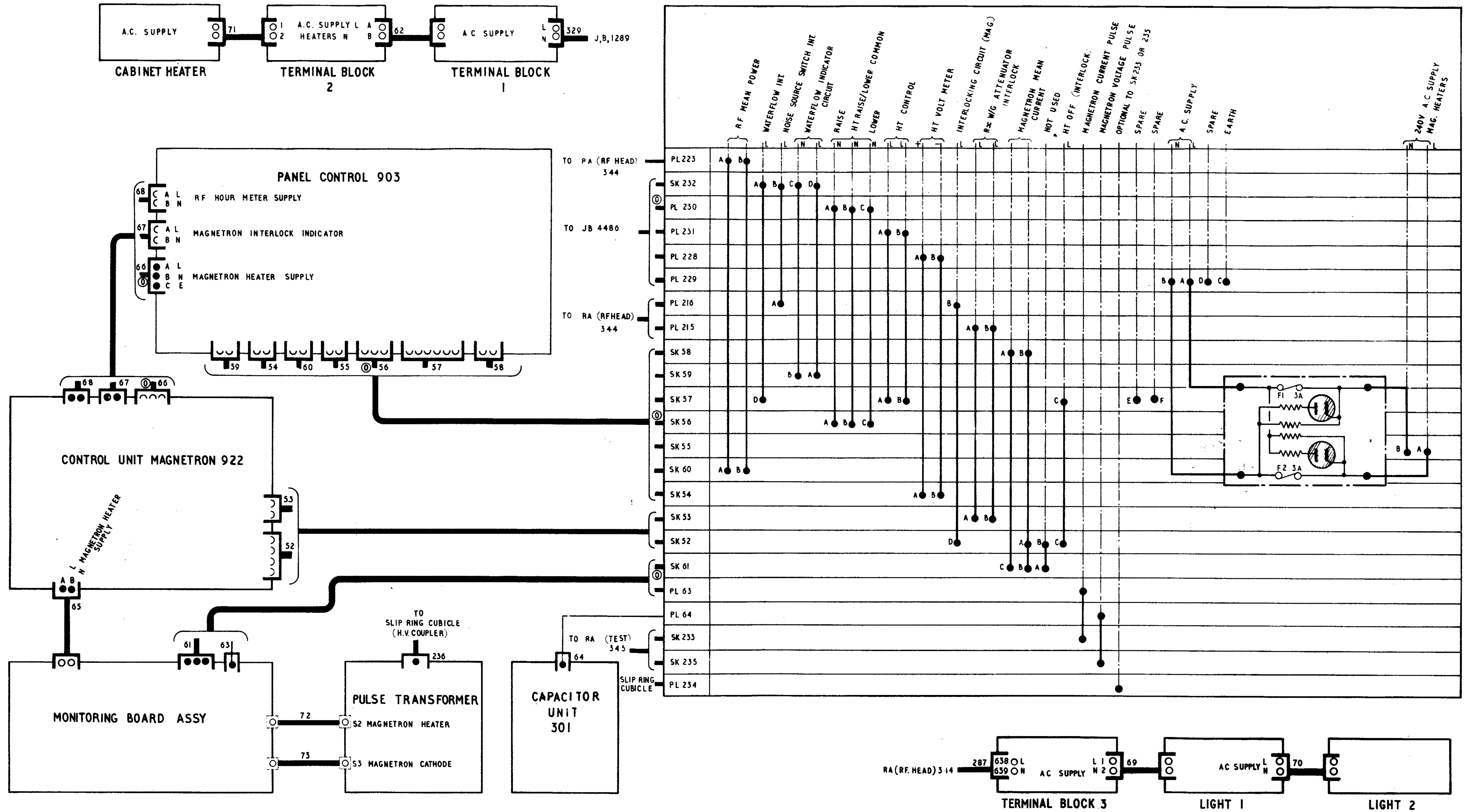
Radar type 80 Mk.1 and 2: Modulator 101 – interconnections

Fig. 5

(AL.5 May 55)

PP7980 146222/3107 9/56 375 C&P Gp.959(4)



Radar type 80 Mk I and 2: transmitter T.3724 - interconnections

Fig.6

AIR DIAGRAM
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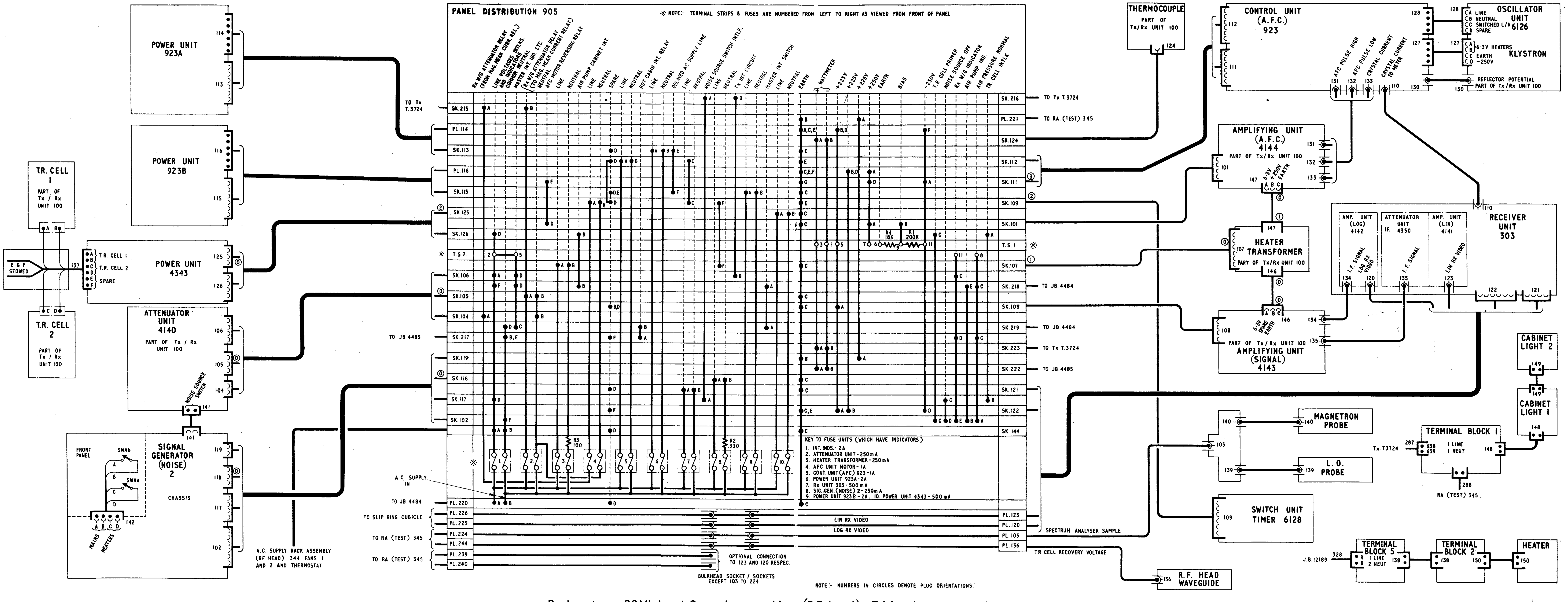

Radar type 80Mk.1 and 2: rack assembly (RF head) 344 — interconnections.

Fig. 7

AIR DIAGRAM
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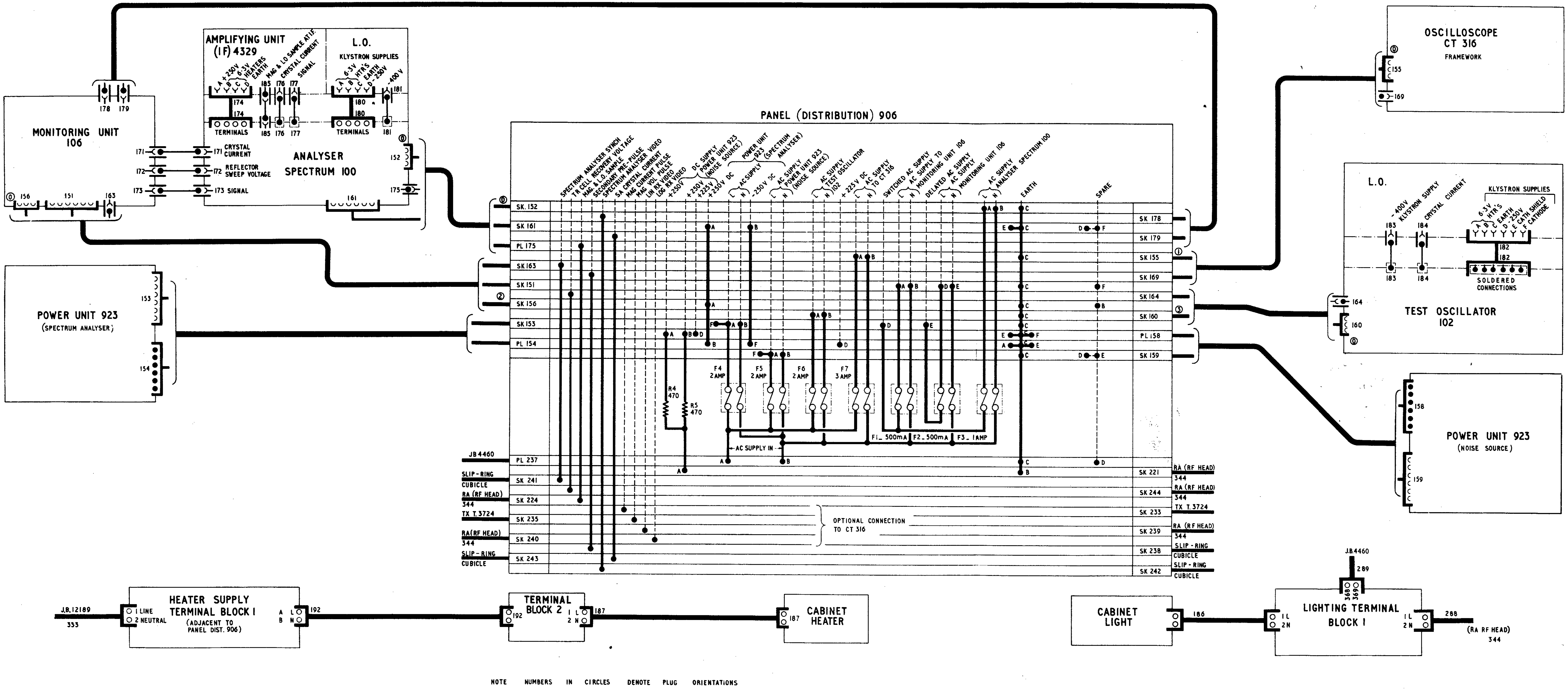
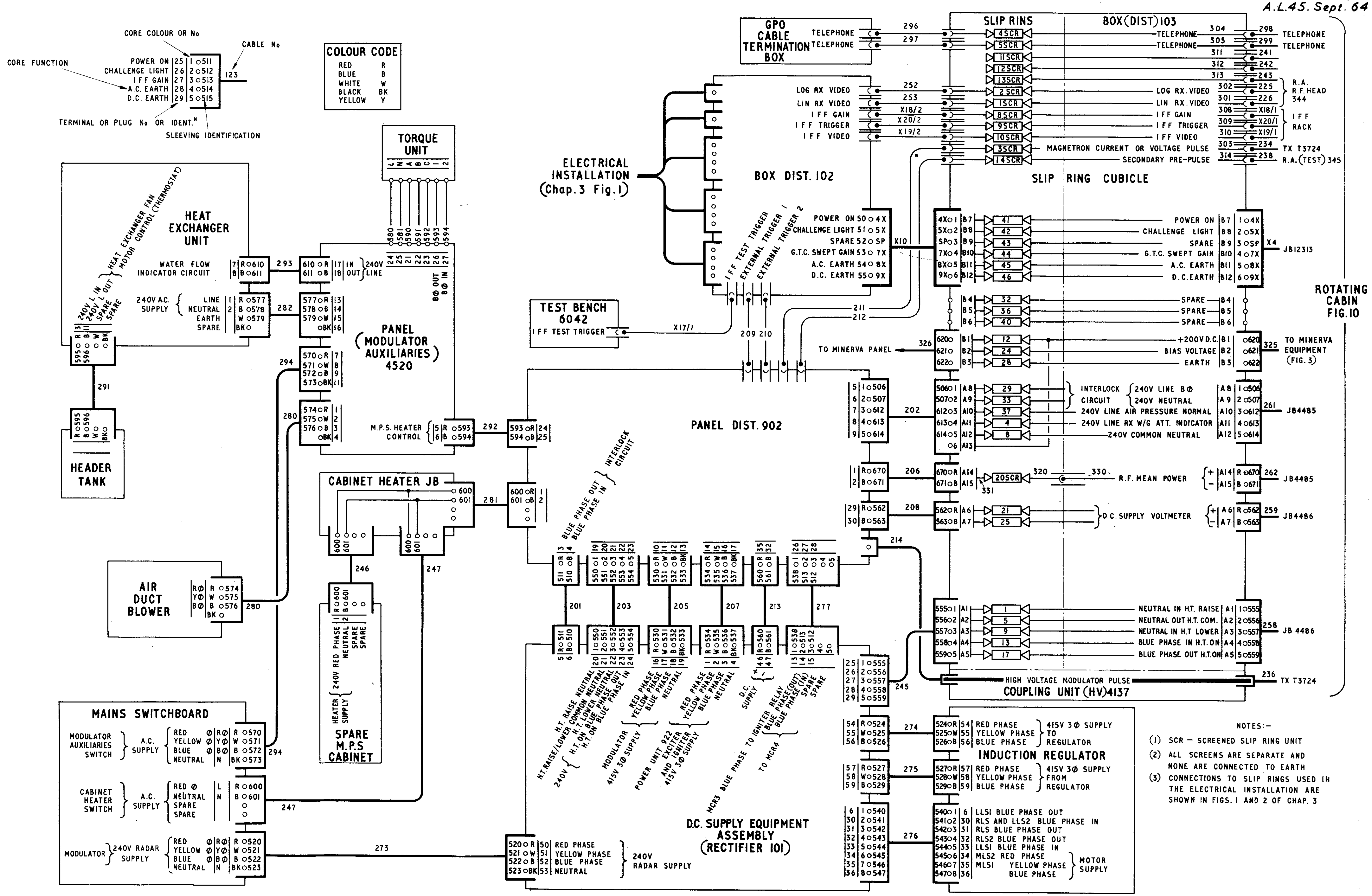
305/372634/21/5/64 J. T. & S.



Radar type 80 Mk. 1 and 2 : Rack assembly (test) 345 — interconnections

Fig. 8



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ISSUE 2

Radar type 80 Mk.I and 2: Modulator building – intercabling

Fig. 9

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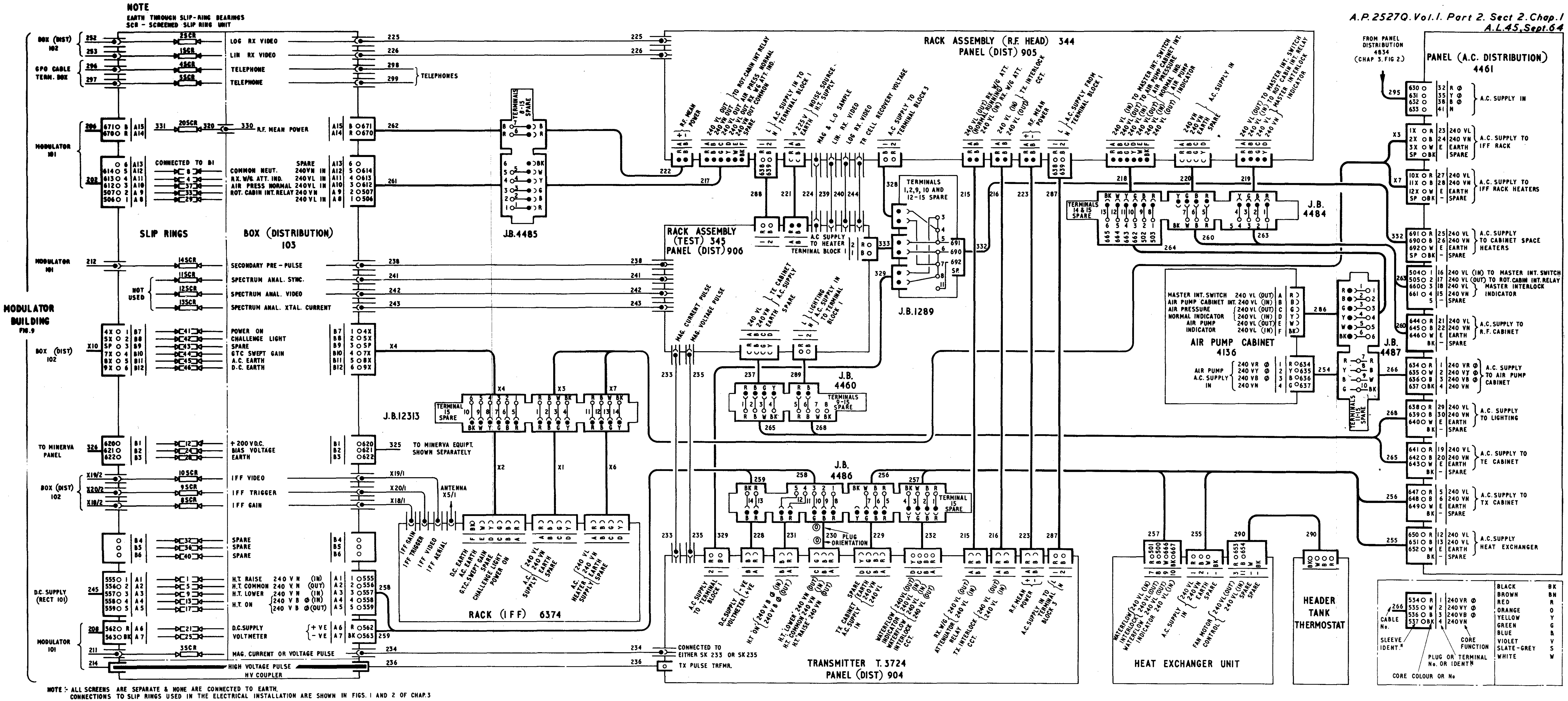

Radar type 80 Mk.I and 2: rotating cabin — interconnections

Fig.10

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Radar Type 80 Mk.1 and 2 – intercabling

Fig.11

AIR DIAGRAM 6156/L/MIN.
ISSUE 2

1242/373745/2/10/64 J. T. & S.

Chapter 2

RADAR CONNECTOR TABLES

LIST OF CONTENTS

LIST OF TABLES

General

1. The Tables in this chapter list the cables running between units in the radar cabinets, and between cabinets in the modulator building and rotating cabin. The information in the tables is complementary to the information in Chapter 1.

2. The Tables give the following information:—

Cable number

Termination at each end

Type of cable

Core colour and connection

Core function

Core identity number (where applicable).

Note . . .

All cable numbers with the prefix X are IFF equipment cables.

TABLE 1 — Modulator 101 : connector Table

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function	
1	Panel (Dist.) 902	Plug	A	Quadrametvin 2·5	Red	15	Terminals	Panel (Control)901	Air Pressure	Interlock Indicators
			B		Blue	16			W/G Attenuator	
			C		Green	17			Common	
			D		Yellow	19			Rotating Cabin	
2	Panel (Dist.) 902	Plug	A	Trimetvin 2·5	Red	9	Terminals	Panel (Control)901	Bias	Interlock indicators
			B		Blue	8				
			C		Green	10			Damping resistor overload unit	
3	Panel (Dist.) 902	Plug	A	Quadrametvin 16	Red	11	Terminals	Panel (Control)901	L	A.c. on/off
			B		Blue	2			N	
			C		Green	4			L	
			D		Yellow	5			N	
4	Panel (Dist.) 902	Plug	A	Dumetvin 2·5	Red	+	Terminals	Panel (Meter)900	+	D.c. volts
			B		Blue	—			—	
5	Panel (Dist.) 902	Plug	A	Sextocoremetvin 2kV	Red	5	Terminals	Blower System	Rϕ	Blower supply
			B		Blue	6			Yϕ	
			C		Green	8			Bϕ	
			D		Yellow	—			Spare	
			E		Black	7			E	
			F		White	—			Spare	
6	Panel (Dist.) 902	Plug	A	Trimetvin 2·5	Red	A	Socket	Monitoring Unit XT 316	L	A.c. supply
			B		Blue	B			N	
			C		Green	C		Framework	E	
7	Panel (Dist.) 902	Plug	A	Dumetvin	Red	—	Terminals	Panel (Meter)900	L	Hour meter supply
			B		Blue	—			N	
8	Panel (Dist.) 902	Plug	A	Quadrametvin 2·5	Red	25	Terminals	Panel (Control)901	On	H.t. control
			B		Blue	26			On	
			C		Green	27			Off	
			D		Yellow	28			Off	
9	Panel (Dist.) 902	Plug	A	Trimetvin 2·5	Red	22	Terminals	Panel (Control)901	Raise	H.t. control
			B		Blue	23			Common	
			C		Green	24			Lower	

TABLE 1—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function
10	Panel (Dist.) 902	Plug	A B	Dumetvin 2·5	Red Blue	+ —	Terminals	Panel (Meter)900	R.f. mean power
12	Panel (Dist.) 902	Plug	A B C D E F	Sextocoremetvin 2kV	Red Blue Green Yellow Black White	A B C D E F	Socket	Power unit 922	RØ YØ BØ N E Spare 3Ø supply
13	Panel (Dist.) 902	Plug	A B C D	Quadrametvin 2·5	Red Blue Green Yellow	A B C D	Socket	Control unit 4139	L N L E A.c. supply A.c. supply delayed
14	Panel (Dist.) 902	Plug	A B C D	Quadrametvin 16	Red Blue Green Yellow	A B C D	Socket	Control unit 4139	L } A.c. N } supply Earth Spare
15	Panel (Dist.) 902	Plug	A B	Dumetvin 2·5	Red Blue	A B	Socket	Bias and overload protection unit	L } Bias L } interlock
16	Panel (Dist.) 902	Plug	A B C D	Quadrametvin 2·5	Red Blue Green Yellow	A B C D	Socket	Protection unit 12196	Int. Int. E Ind. Interlock and indicator circuits
17	Panel (Dist.) 902	Plug	A B C D	Quadrametvin 2·5	Red Blue Green Yellow	1 2 3 4	Terminals	Blower system	Int. } Blower Int. } interlock L } Heater L } control
18	Panel (Dist.) 902	Plug	A B C	Trimetvin 2·5	Red Blue Green	A B C	Socket	Power unit 922	Switch BØ Int. Int. Igniter and interlock
19	Panel (Dist.) 902	Plug	A B	Dumetvin 16	Red Blue	+ —	Terminals	Panel (Meter)900	+ } D.c. — } Amps.
20	Panel (Dist.) 902	Terminals	A B C D	Quadrametvin 16	Red Blue Green Yellow	— — 11 12	Terminals	Blower system	Spare Spare BØ N Heater supply

TABLE 1—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function
21	Panel (Dist.) 902	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Panel (Control)901	Primary-sub-trigger pulse +10
22	Panel (Dist.) 902	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Panel (Control)901	Secondary-sub-trigger pulse + 10
23	Current transformer	Flying lead		UR 70			T.R.E. coax. plug	Panel (Control)901	Primary charging current
24	Control unit 4139	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Panel (Control)901	Primary grid 1
25	Control unit 4139	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Panel (Control)901	Primary grid 2
26	Control unit 4139	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Panel (Control)901	Primary anode 1
27	Control unit 4139	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Panel (Control)901	Primary anode 2
28	Control unit 4139	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Panel (Control)901	Secondary grid
29	Control unit 4139	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Panel (Control)901	Secondary anode
30	Control unit 4139	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Panel (Control)901	Overswing diode
31	Panel (Dist.) 902	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Panel (Control)901	Magnetron pulse
32	Power unit 922	Plug	A B	Dumetvin 16	Red Blue	A B	Socket	Control unit) 4139	Igniter } D.c. Exciter } supply
33	Power unit 922	Plug	A B	Dumetvin 16	Red Blue	+ —	Terminals	Panel (Meter)900	+ } Exciter — } Amps
35	Control unit 4139	Terminals	1 2 3 4	Quadrametvin 2·5	Red Blue Green Yellow	A B C D	Socket	Bias and overload Protection unit	L N } A.c. supply L N
36	Panel (Dist.) 902	Terminals	33 32	91/·018 PVC covered	Red Blue	+ —	Terminals	Charging choke	+ } H.t. — } supply

TABLE 1—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function
37	Panel (Dist.) 902	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Trigger unit 102	Primary sub-trigger pulse
38	Panel (Dist.) 902	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Trigger unit 102	Secondary sub-trigger pulse
39	Panel (Dist.) 902	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Trigger unit 102	Secondary pre-pulse 2
40	Trigger unit 102	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Mon. unit XT 316 framework	Secondary pre-pulse 1
41	Trigger unit 102	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Mon. unit XT 316 framework	Primary pre-pulse
42	Trigger unit 102	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Control unit 4139	Primary pulse 1
43	Trigger unit 102	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Control unit 4139	Primary pulse 2
44	Trigger unit 102	T.R.E. coax. plug		UR 70			T.R.E. coax. plug	Control unit 4139	Secondary pulse
45	Heater terminal block (2)	Terminals	1 2 — —	Quadrametvin 2·5	Red Blue Green Yellow	9 10 — —	Terminals	Blower system	L } A.c. N } supply Spare Spare
46	Bias and overload Protection unit	T.R.E. plug	—	UR 70			Flylead	Control unit 4139	Bias supply
47	Bias & overload Protection unit	T.R.E. plug		UR 70			T.R.E. coax. plug	Toroid	Pulse sample
48	Control unit 4139	Terminals	5 6	Dumetvin 2·5	Red Blue	A B	Socket	Bias & overload Protection unit	L } A.c. supply, regulated
49	Control unit 4139	Plug	A B C D	Quadrametvin 2·5	Red Blue Green Yellow	A B C D	Socket	Trigger unit 102	L } A.c. supply, N } regulated L } A.c. supply, N } delayed
50	Heater supply terminal block(1)	Terminals	1 2	Dumetvin 2·5	Red Blue	— —	Terminals	Cab. light 1	L } A.c. N } supply

TABLE 1—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function
81	Cab. light 1	Terminals	—	Dumetvin 2·5	Red	—	Terminals	Cab. light 2	L } A.c.
			—		Blue	—			N } supply
82	Heater supply	Terminals	1	Dumetvin 16	Red	1	Terminals	Heater terminal	L } A.c.
	terminal block(1)		2		Blue	2		Block (2)	N } supply
83	Heater terminal	Terminals	1	70/·0076 beaded		—	Terminals	Heater 'A'	L } A.c.
	Block(2)		2	connector (2 off)		—			N } supply
85	Blower system	Terminals	13	70/·0076 beaded			Terminals	Heater 1	L } A.c.
			14	connector, 2 off					N } supply
86	Blower system	Terminals	13	70/·0076 beaded			Terminals	Heater 2	L } A.c.
			14	connector, 2 off					N } supply
87	Blower system	Terminals	15	70/·0076 beaded			Terminals	Heater 3	L } A.c.
			16	connector, 2 off					N } supply
88	Blower system	Terminals	17	70/·0076 beaded			Terminals	Heater 4	L } A.c.
			18	connector, 2 off					N } supply
89	Charging choke	Terminal		14/·0076 P.V.C.			Terminals	Capacitors	Smoothing connection
				covered Type 3					
91	Protection unit	Socket	A	Sextocoremetvin	Red		Plug	Trigger unit 102	+350V H.t. supply,
	12196		B	Small No. 1	Blue				V6.V7 anode switching TU.102
			C		Dark Green				−150V bias
			D		Yellow				Reset
			E		Black				Earth
			F		White				Spare
92	Protection unit	Socket	A	Quadrametvin 2·5	Red		Plug	Trigger unit 102	L } Trig. failure
	12196		B		Blue				SL } reset indicator
			C		Dark green				L } Heater supply
			D		Yellow				N } 240V a.c.
93	Protection unit	Plug		Uniradio 70			Plug	Control unit 4139	Sec. trig. pulse
	12196								
94	Protection unit	Plug		Uniradio 70			Plug	Control unit 4139	Pri. trig. pulse
	12196								
95	Protection unit	Plug	A	Quadrametvin 2·5	Red		Socket	Power unit 4593	} Interlock
	12196		B		Blue				}
			C		Dark green				} Interlock
			D		Yellow				}
96	M.P.S. cradle	Socket	A	Trimetvin 2·5	Red	1	Terminals	Control unit 4139	Squirter coil supply
			B		Blue	2			
			C		Green	3			

TABLE 2 — Modulator building : connector Table

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Ident. Sleeve	Pin or Term. No.	Cable End	Termination	Core Function
201	Panel (Dist.)902	Terminals	3	V.R.I.L.C. ·0015	Red	511	5	Terminals	D.c. rectifier	230V } Interlock
			4	1/·044 two core	Black	510	6			230V } circuit
202	Panel (Dist.)902	Terminals	5	V.R.I.L.C. ·0015	1 Red	506	A 8	Terminals	Slip rings	230V Interlock circuit
			6	1/·044 five core	2 White	507	A 9			230V
			7		3 Blue	612	A10			230V L, air pressure indicator
			8		4 Black	613	A11			230V L,Rx.W/G att. indicator
			9		5 Green	614	A12			230V N, common indicator
203	Panel (Dist.)902	Terminals	19	V.R.I.L.C. ·0015	1 Red	550	25	Terminals	D.c. rectifier	230V L, BØ h.t. raise
			20	1/·044 five core	2 White	551	26			230V N, h.t. common
			21		3 Blue	552	27			230V L, BØ h.t. lower
			22		4 Black	553	28			230V L, BØ h.t. on
			23		5 Green	554	29			230V N h.t. on
205	Panel (Dist.)902	Terminals	10	V.R.I.L.C. ·0045	Red	530	16	Terminals	D.c. rectifier	230V L, RØ } Mod-
			11	7/·029 four core	White	531	17			230V L, YØ } ulator
			12		Blue	532	18			230V L, BØ } a.c.
			13		Black	533	19			230V N, } supply
206	Panel (Dist.)902	Terminals	1	V.R.I.L.C. ·0015	Red	670	A14	Terminals	Slip rings	} R.f. mean
			2	1/·004 two core	Black	671	A15			} power
207	Panel (Dist.)902	Terminals	14	V.R.I.L.C. ·0045	Red	534	1	Terminals	D.c. rectifier	230V L, RØ } Exciter
			15	7/·029 four core	White	535	2			230V L, YØ } and igniter
			16		Blue	536	3			230V L, BØ } A.c.
			17		Black	537	4			230V N, } supply
208	Panel (Dist.)902	Terminals	29	V.R.I.L.C. ·0015	Red	562	A 6	Terminals	Slip rings	+ } D.c.
			30	1/·044 two core	Black	563	A 7			− } volts
209	Panel (Dist.)902	T.R.E. plug	—	UR70	—	—	—	T.R.E. plug	Box (Dist.)102	Primary sub-trigger pulse
210		T.R.E. plug	—	UR70	—	—	—	T.R.E. plug	Box (Dist.)102	Secondary sub-trigger pulse
211		T.R.E. plug	—	UR70	—	—	3	T.R.E. plug	Slip rings	Magnetron pulse

TABLE 2—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Ident. Sleeve	Pin or Term. No.	Cable End	Termination	Core Function
212		T.R.E. plug	—	UR70	—	—	14	T.R.E. plug	Slip rings	Secondary pre-pulse
213		Terminals	35	V.R.I.L.C. ·0145	Red	560	46	Terminals	D.c. rectifier	+ } D.c. supply
			32	7/·052 two core	Black	561	47			—
214	Modulator equalising network	Terminal	—	UR34	—	—	—	H.V. coupling	Slip rings	High voltage pulse
			—		—	—	—			
245	D.c. rectifier	Terminals	20	V.R.I.L.C. ·0015	1 Red	555	A 1	Terminals	Slip rings	230V L, BØ h.t. raise
			21	1/·044 five core	2 White	556	A 2			230V N, h.t. common
			22		3 Blue	557	A 3			230V L, BØ h.t. lower
			23		4 Black	558	A 4			230V L, BØ h.t. on
			24		5 Green	559	A 5			230V N h.t. on
246	Cabinet heater switch junction box	Terminals	1	V.R.I.L.C. ·0045	Red	600	1	Terminals	Spare M.P. 5W cabinet	230V L } Heater supply
			2	7/·029 four core	Blue	601	2			230V N
			—		White	—	—			—
			—		Black	—	—			—
247	Cabinet heater 5W	Terminals	L	V.R.I.L.C. ·0045	Red	600	1	Terminals	Cabinet heater switch junction box	230V L } Heater supply
			N	7/·029 four core	Blue	601	2			230V N
			—		White	—	—			—
			—		Black	—	—			—
248	Spare									
249	Spare									
250	Spare									
251	Spare									
252	Slip rings	T.R.E. plug	2	UR70	—	—	—	T.R.E. plug	Box (Dist.)102	Log. rx. video
253	Slip rings	T.R.E. plug	1	UR70	—	—	—	T.R.E. plug	Box (Dist.)102	Lin. rx. video
273	Radar switch	Terminals	RØ	V.R.I.L.C. ·04	Red	520	50	Terminals	D.c. rectifier	230V L, RØ } Radar supply
			YØ	19/·052 four core	White	521	51			230V L, YØ
			BØ		Blue	522	52			230V L, BØ
			N		Black	523	53			230V N

TABLE 2—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Ident. Sleeve	Pin or Term. No.	Cable End	Termination	Core Function
274	D.c. rectifier	Terminals	54	V.R.I.L.C. ·04	Red	524	54	Terminals	Regulator	230V L, RØ — Supply to regulator
			55	19/·052 three core	White	525	55			230V L, YØ
			56		Blue	526	56			230V L, BØ
275	D.c. rectifier	Terminals	57	V.R.I.L.C. ·007	Red	527	57	Terminals	Regulator	230V L, RØ — Supply from regulator
			58	7/·036 three core	White	528	58			230V L, YØ
			59		Blue	529	59			230V L, BØ
276	D.c. rectifier	Terminals	6	V.R.I.L.C. ·0015	1	540	6	Terminals	Regulator	Regulator control
			30	1/·044 eight core	2	541	30			
			31		3	542	31			
			32		4	543	32			
			33		5	544	33			
			34		6	545	34			
			35		7	546	35			
			36		8	547	36			
277	D.c. rectifier	Terminals	13	V.R.I.L.C. ·0015	1 Red	538	26	Terminals	Panel (Dist.)902	BØ — Igniter supply contacts
			14	1/·044 five core	2 White	513	27			Int.
			15		3 Blue	512	28			Int.
			—		4 Black	—	—			—
			—		5 Green	—	—			—
278	Spare									
X10	Slip rings	Terminals	B7	V.R.I.L.C. ·0015	1	4X	50	Terminals	Box (Dist.)102	Power on — I.F.F. remote control
			B8	1/·044 six core	2	5X	51			Challenge light
			B9		3	SP	52			Spare
			B10		4	7X	53			G.T.C.
										Swept gain
			B11		5	8X	54			A.c. earth
			B12		6	9X	55			D.c. earth
280	Panel mod. aux. 4520	Terminals	1	V.R.I.L.C. ·0015	Red	574	RØ	Terminals	Blower No. 2	230V L, RØ — A.c. supply
			2	1/·044 four core	White	575	YØ			230V L, YØ
			3		Blue	576	BØ			230V L, BØ
			—		Black	—	—			—
281	Cabinet heater switch junction box	Terminals	1	V.R.I.L.C. ·0045	Red	600	1	Terminals	Modulator heater terminal block	230V L — A.c. supply
			2	7/·029 four core	Blue	601	2			230V N
			—		White	—	—			—
			—		Black	—	—			—

TABLE 2—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Ident. Sleeve	Pin or Term. No.	Cable End	Termination	Core Function
282	Panel mod. aux. 4520	Terminals	13 14 15 —	V.R.I.L.C. ·0045 7/·029 four core	Red Blue White Black	577 578 579 —	1 2 E —	Terminals	Heat exchanger unit	230V L 230V N Earth — } A.c. supply
X20/2	Slip rings	T.R.E. plug	9	Coax. UR70	—	—	QE44	F&E plug	Box (Dist.) 102	I.F.F. trigger
X19/2	Slip rings	T.R.E. plug	10	Coax. UR70	—	—	QE45	F&E plug	Box (Dist.) 102	I.F.F. video
291	Heater tank thermostat	Terminals	—	V.R.I.L.C. ·0045 7/·029 four core	Red Blue White Black	595 596 — —	3 11 — —	Terminals	Heat exchanger unit	Heat exchanger Fan control — —
293	Heater exchanger	Terminals	7 8 — —	V.R.I.L.C. ·0045 7/·029 four core	Red Blue White Black	610 611 — —	17 18 — —	Terminals	Panel mod. aux. 4520	Indicator circuit — —
294	Modulator aux. switch	Terminals	RØ YØ BØ N	V.R.I.L.C. ·0045 7/·029 four core	Red White Blue Black	570 571 572 573	7 8 9 11	Terminals	Panel mod. aux. 4520	RØ YØ BØ N } A.c. supply
296	Slip rings	T.R.E. plug	4	Coax. UR70	—	—	—	Terminals	G.P.O. cable termination box	Telephone
297	Slip rings	T.R.E. plug	5	Coax. UR70	—	—	—	Terminal	G.P.O. cable termination box	Telephone
326	Panel mod. aux. 4520	Terminals	16 17 19 —	V.R.I.L.C. ·0015 1/·044 four core	White Red Blue —	598 610 597 —	3 1 2 —	Terminals	Panel warning 4987	Relay L N
327	Blower No. 2	Terminals	RØ YØ RØ —	V.R.I.L.C. ·0015 1/·044 four core	Red White Blue Black	574 575 576 —	RØ YØ BØ —	Terminals	Blower No. 1	230V L, RØ 230V L, YØ 230V L, BØ — } A.c. supply
X17/1	I.F.F. test bench 6042			Coax UR70	—	—	QE53	F&E plug	Box (Dist.) 102	I.F.F. test trigger
X18/2	Slip rings	T.R.E. plug		Coax UR70	—	—	QE54	F&E plug	Box (Dist.) 102	I.F.F. gain

TABLE 3—Transmitter 3724 : connector Table

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function
52	Panel (Dist.)904	Plug	A	Quadrametvin 2·5	Red	A	Socket	Control unit	Relay } Magnetron mean current
			B		Blue	B		Magnetron 922	IA
			C		Green	C			Int. } Magnetron interlock circuit
			D		Yellow	D			Int.
53	Panel (Dist.)904	Plug	A	Dumetvin 2·5	Red	A	Socket	Control unit	L } Rx. w/g attenuator Interlock
			B		Blue	B		Magnetron 922	N
54	Panel (Dist.)904	Plug	A	Dumetvin 2·5	Red	A	Socket	Panel control 903	+ } H.t. volts
			B		Blue	B			—
55	Panel (Dist.)904	Plug	A	Dumetvin 2·5	Red	A	Socket	Panel control 903	L } 230V a.c. supply
			B		Blue	B			N
56	Panel (Dist.)904	Plug	A	Trimetvin 2·5	Red	A	Socket	Panel control	Raise } H.t. raise/lower
			B		Blue	B			Common
			C		Green	C			Lower
57	Panel (Dist.)904	Plug	A	Sextometvin 2·5	Red	A	Socket	Panel control	On } H.t. control
			B		Blue	B			On
			C		Green	C			Off
			D		Yellow	D			Off
			E		White	E			Spare
			F		Black	F			Spare
58	Panel (Dist.)904	Plug	A	Dumetvin 2·5	Red	A	Socket	Panel control 903	} Magnetron mean current
			B		Blue	B			
59	Panel (Dist.)904	Plug	A	Dumetvin 2·5	Red	A	Socket	Panel control	L } Water flow interlock indicator
			B		Blue	B			N
60	Panel (Dist.)904	Plug	A	Dumetvin 2·5	Red	A	Socket	Panel control 903	} Wattmeter supply
			B		Blue	B			
61	Panel (Dist.)904	Plug	A	Trimetvin 2·5	Red	A	Terminals	Monitoring board assembly	Spare } Magnetron mean current
			B		Blue	B			Spare
			C		Green	C			
62	Heater supply terminal block 1	Terminals	A	Dumetvin 16	Red	A	Terminals	Heater terminal block 2	L } A.c. supply, heaters
			B		Blue	B			N

TABLE 3—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function
63	Panel (Dist.)904	Min. coax. plug	—	Uniradio 70	—	—	Flylead	Monitoring board assembly	Magnetron current pulse
64	Panel (Dist.)904	Min. coax. plug	—	Uniradio 70	—	—	Flylead	Potential divider	Magnetron voltage pulse
65	Control unit magnetron 922	Plug	A B	Dumetvin 2·5	Red Blue	D E	Terminals	Monitoring board assembly	L } Magnetron heater supply
66	Control unit magnetron 922	Socket	A B C	Trimetvin 2·5	Red Blue Green	A B C	Plug	Panel control 903	L N } Magnetron heater supply E
67	Control unit magnetron 922	Plug	A B	Dumetvin 2·5	Red Blue	A B	Socket	Panel control 903	L } Magnetron Interlock indicator
68	Control unit magnetron 922	Plug	A B	Dumetvin 2·5	Red Blue	A B	Socket	Panel control 903	L N } R.f. hour meter supply
69	Lightning supply terminal block 3	Terminals	1 2	Dumetvin 2·5	Red Blue	— —	Terminals	Cabinet light 1	L N } A.c. supply
70	Cabinet light 1	Terminals	— —	Dumetvin 2·5	Red Blue	— —	Terminals	Cabinet light 2	L N } A.c. supply
71	Heater terminal block 2	Terminals	1 2	70/·0076 beaded connectors (2 off)	— —	— —	Flyleads	Cabinet heater	L N } A.c. supply
72	Monitoring board assembly	Terminals	S2	70/·0076 P.V.C. wire Type 3 to DEF 12	Pink	S2	Flyleads	Transformer pulse	Magnetron heater
73	Monitoring board assembly	Terminals	S3	70/·0076 P.V.C. wire Type 3 to DEF 12	Pink	S3	Flylead	Transformer pulse	Magnetron cathode

TABLE 4—Rack assembly (R.F. head) 344 : connector Table

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function
101	Panel (Dist.)905	Plug	A	Quadrametvin 2·5	Red	A	Socket	Amplifying unit (A.F.C.) 4144	+250V } D.c. supplies
			B		Blue	B			Bias
			C		Green	C			E
			D		Yellow	D			Relay
102	Panel (Dist.)905	Plug	A	Sextometvin 2·5	Red	A	Socket	Signal generator (Noise) 2	Air press. N } Inter-lock Indica-tors
			B		Blue	B			Air press. L
			C		Green	C			TR cell
			D		Yellow	D			Noise source
			E		White	E			Rx.W/G
			F		Black	F			Common
103	Panel (Dist.)905	RAE Coax. socket	—	UR 70	—	—	Min. coax. plug	'T' Junction	Mag & LO sample
104	Panel (Dist.)905	Plug	A	Dumetvin 2·5	Red	A	Socket	Attenuator unit 4140	L } Relay supply
			B		Blue	B			N
105	Panel (Dist.)905	Plug	A	Trimetvin 2·5	Red	A	Socket	Attenuator unit 4140	L } A.c. supply
			B		Blue	B			N
			C		Green	C			E
106	Panel (Dist.)905	Plug	A	Quadrametvin 2·5	Red	A	Socket	Attenuator unit 4140	Int. } Interlocks and indica-tor
			B		Blue	B			Int.
			C		Green	C			Ind.
			D		Yellow	D			Ind.
107	Panel (Dist.)905	Plug	A	Sextometvin 2·5	Red	A	Socket	Heater trans-former	L
			B		Blue	B			N
			C		Green	C			E
			D		Yellow	D			Spare
			E		White	E			Spare
			F		Black	F			Sum signal
108	Panel (Dist.)905	Plug	A	Quadrametvin 2·5	Red	A	Socket	Amplifying unit (Signal) 4143	+225V } D.c. supply
			B		Blue	B			Spare
			C		Green	C			Earth
			D		Yellow	D			Spare
109	Panel (Dist.)905	Plug	A	Sextometvin 2·5	Red	A	Socket	Timer unit (A.F.C.) 6128 10F/18625	L
			B		Blue	B			N
			C		Green	C			L
			D		Yellow	D			N
			E		White	E			E
			F		Black	F			Sum signal

TABLE 4—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function
110	Control unit (A.F.C.) 923	Min. coax. plug	—	UR 70	—	—	Min. coax. plug	Receiver unit 303	Crystal current
111	Panel (Dist.)905	Plug	A	Sextocoremetvin No. 1	Red	A	Socket	Control unit (A.F.C.) 923	−250V
			B		Blue	B			Spare
			C		Green	C			Earth
			D		Yellow	D			+250V
			E		White	E			Earth
			F		Black	F			Motor control
112	Panel (Dist.)905	Plug	A	Sextometvin 2·5	Red	A	Socket	Control unit (A.F.C.) 923	L } A.c. supply
			B		Blue	B			N }
			C		Green	C			L } motor
			D		Yellow	D			N }
			E		Black	E			Earth
			F		White	F			Spare
113	Panel (Dist.)905	Plug	A	Sextometvin 2·5	Red	A	Socket	Power unit 923 A	L } A.c. supply
			B		Blue	B			N }
			C		Green	C			E }
			D		Yellow	D			— }
			E		White	E			F on BPU }
			F		Black	F			L
114	Panel (Dist.)905	Socket	A	Sextocoremetvin	Red	A	Plug	Power unit 923 A	E } D.c. supply
			B		Blue	B			+250 }
			C		Green	C			E }
			D		Yellow	D			+225 }
			E		Black	E			E }
			F		White	F			−250 }
115	Panel (Dist.)905	Plug	A	Sextometvin 2·5	Red	A	Socket	Power unit 923 B	L } A.c. supply
			B		Blue	B			N }
			C		Green	C			E }
			D		Yellow	D			— }
			E		White	E			— }
			F		Black	F			E on APU }
116	Panel (Dist.)905	Socket	A	Sextocoremetvin No. 1	Red	A	Plug	Power unit 923 B	+250V } D.c. supply
			B		Blue	B			+250 }
			C		Green	C			E }
			D		Yellow	D			+225 }
			E		Black	E			E }
			F		White	F			E }

TABLE 4—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function
117	Panel (Dist.)905	Plug	A B C D	Quadrametvin 2·5	Red Blue Green Yellow	A B C D	Socket	Signal generator (Noise) 2 W/G	Int. Int. Ind. Ind. } Interlock and Indicator
118	Panel (Dist.)905	Plug	A B C	Trimetvin 2·5	Red Blue Green	A B C	Socket	Signal generator (Noise) 2	L N E } A.c. supply
119	Panel (Dist.)905	Plug	A B	Dumetvin 2·5	Red Blue	A B	Socket	Signal generator (Noise) 2	+250 Earth } D.c. supply
120	Panel (Dist.)905	Min. coax. plug	—	UR 70	—	—	Min. coax. plug	Amp. unit log. 4142	Video log. rx.
121	Panel (Dist.)905	Plug	A B C D	Quadrametvin 2·5	Red Blue Green Yellow	A B C D	Socket	Receiver unit 303	L N E Spare } A.c. supply
122	Panel (Dist.)905	Plug	A B C D E F	Sextocoremetvin No. 1	Red Blue Green Yellow Black White	A B C D E F	Socket	Receiver unit 303	+225V +225V Earth −250V Earth Spare } D.c. supply
123	Panel (Dist.)905	Min. coax. plug	—	UR 70	—	—	Min. coax. plug	Amp. unit lin. 4141	Video lin. rx.
124	Panel (Dist.)905	Plug	A B	Dumetvin 2·5	Red Blue	A B	Terminals	Thermocouple	} R.f. mean power
125	Panel (Dist.)905	Plug	A B C	Trimetvin 2·5	Red Blue Green	A B C	Socket	Power unit 4343	L N E } A.c. supply
126	Panel (Dist.)905	Plug	A B C D	Quadrametvin 2·5	Red Blue Green Yellow	A B C D	Socket	Power unit 4343	Int. Int. Ind. Ind. } Inter-lock and indicator
127	Control unit (A.F.C.) 923	Plug	A B C D	Quadrametvin 2·5	Red Blue Green Yellow	A B C D	Socket	Oscillator unit 4145	6·3V 6·3V E −250V } L.o. supplies

TABLE 4—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function
128	Control unit (A.F.C.) 923	Plug	A B C D	Quadrametvin 2·5	Red Blue Green Yellow	A B C D	Socket	Oscillator unit 6126	L } Tuning N } motor S/L } supply Spare
129	Fan terminal block 3	Terminals	1 2 3 3	Quadrametvin 2·5	Red Blue Green Yellow	1 2 3 3	Terminals	Fan 2	L } N } Fan E } supply Spare }
130	Control unit (A.F.C.) 923	Min. coax. plug	—	UR 70	—	—	Min. coax. plug	Osc. unit 6126	−400V Klystron reflector supply
131	Control unit (A.F.C.) 923	Min. coax. plug	—	UR 70	—	—	Min. coax. plug	Amplfying unit A.F.C. 4144	A.f.c. pulse high
132	Control unit (A.F.C.) 923	Min. coax. plug	—	UR 70	—	—	Min. coax. plug	Amplifying unit A.F.C. 4144	A.f.c. pulse low
133	Control unit (A.F.C.) 923	Min. coax. plug	—	UR 70	—	—	Min. coax. plug	Amplifying unit A.F.C. 4144	Crystal current
134	Amplifying unit signal 4143	Min. coax. plug	—	UR 70	—	—	Min. coax. plug	Amplifying unit log. 4142	I.f. log. rx.
135	Amplifying unit signal 4143	Min. coax. plug	—	UR 70	—	—	Min. coax. plug	Attenuator unit I.F. 4350	I.f. lin. rx.
136	Panel (Dist.)905	Min. coax. plug	—	UR 70	—	—	Min. coax. plug	R.f. head waveguide	Tr. cell rec. output
137	Power unit 4343	Plug	A B C D E F	Sextocoremetvin small No. 1	Red Blue Green Yellow Black White	A B C D E F	Terminals	TR. cells	} Tr. cell 1 } Tr. cell 2 } Spare
138	Heater supply term. Block 5	Terminals	1 2	Dumetvin 16	Red Blue	1 2	Terminals	Heater term. block 2	L } A.c. N } supply
139	L.O.S.A. probe	Probe	—	SAL2M	—	—	Min. coax. plug	'T' junction	LO. sample
140	MAG. S.A. probe	Probe		SAL2M			Min. coax. plug	'T' junction	MAG. sample

TABLE 4—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function
141	Attenuator unit 4140	Plug	A B	Dumetvin 2·5	Red Blue	A B	Socket	Signal generator (Noise) 2	 Noise Source "ON"
143	Thermostat term. block 4	Terminals	4 2 5 5	Quadrametvin 2·5	Red Blue Green Yellow	1 2 3 3	Terminals	Fan term. block 3	L N E Spare } Fan supply
144	Panel (Dist.)905	Plug	1 2 3 4	Quadrametvin 2·5	Red Blue Green Yellow	1 2 3 3	Terminals	Thermostat term. block 4	L N E Spare } Fan supply
145	Fan terminal block 3	Terminals	1 2 3 3	Quadrametvin 2·5	Red Blue Green Yellow	1 2 3 3	Terminals	Fan no. 1	L N E Spare } Fan supply
146	Heater transformer	Plug	A B C	Trimetvin 2·5	Red Blue Green	A B C	Socket	Amplifying unit (Signal) 4143	6·3V 6·3V E } Heater supply
147	Heater transformer	Plug	A B C	Trimetvin 2·5	Red Blue Green	A B C	Socket	Amplifying unit (A.F.C.) 4144	6·3V Relay E } Heater supply
148	Light supply term. Block 1	Terminals	1 2	Dumetvin 2·5	Red Blue	— —	Terminals	Cab. light 1	L N } A.c. supply
149	Cab. light 1	Terminals	— —	Dumetvin 2·5	Red Blue	— —	Terminals	Cab. light 2	L N } A.c. supply
150	Heater term. block 2	Terminals	1 2	70/·0076 beaded connector (2 off)	— —	— —	Terminals	Heater	L N } A.c. supply

TABLE 5—Rack assembly (test) 345 : connector Table

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function	
151	Panel (Dist.)906	Plug	A	Sextometvin 2·5	Red	A	Socket	Monitoring unit 106	L	
			B		Blue	B			N	
			C		Green	C			E	A.c. supply
			D		Yellow	D			L	230V
			E		White	E			N	
			F		Black	F			Spare	
152	Panel (Dist.)906	Plug	A	Trimetvin 2·5	Red	A	Socket	Analyser spectrum 100	L	
			B		Blue	B			N	A.c. supply 230V
			C		Green	C			E	
153	Panel (Dist.)906	Plug	A	Sextometvin 2·5	Red	A	Socket	Power unit 923	L	
			B		Blue	B			N	
			C		Green	C			E	A.c. supply
			D		Yellow	D			S/L	230V
			E		White	E			D/L	
			F		Black	F			L	
154	Panel (Dist.)906	Socket	A	Sextocoremetvin No. 1	Red	A	Plug	Power unit 923	E	
			B		Blue	B			+250V	
			C		Green	C			E	D.c.
			D		Yellow	D			+225V	supply
			E		Black	E			E	
			F		White	F			−250V	
155	Panel (Dist.)906	Plug	A	Trimetvin 2·5	Red	A	Socket	Monitor unit CT 316	L	
			B		Blue	B			N	A.c. supply
			C		Green	C			E	
156	Panel (Dist.)906	Plug	A	Trimetvin 2·5	Red	A	Socket	Monitor unit 106	+250V	D.c.
			B		Blue	B			Spare	supply
			C		Green	C			E	
157	Spare									
158	Panel (Dist.)906	Socket	A	Sextocoremetvin No. 1	Red	A	Plug	Power unit 923	+250V	
			B		Blue	B			+250V	
			C		Green	C			E	D.c
			D		Yellow	D			+225V	supply
			E		Black	E			E	
			F		White	F			−250V	

TABLE 5—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function
159	Panel (Dist.)906	Plug	A	Sextometvin 2·5	Red	A	Socket	Power unit 923	L
			B		Blue	B			N
			C		Green	C			E } A.c. supply 230V
			D		Yellow	D			Spare
			E		White	E			Spare
			F		Black	F			L
160	Panel (Dist.)906	Plug	A	Trimetvin 2·5	Red	A	Socket	Test oscillator 102	L } A.c. supply 230V
			B		Blue	B			N
			C		Green	C			E
161	Panel (Dist.)906	Plug	A	Sextocoremetvin No. 1	Red	A	Socket	Analyser spectrum 100	+250V
			B		Blue	B			−250V
			C		Green	C			Earth } D.c. supply
			D		Yellow	D			Spare
			E		Black	E			Earth
			F		White	F			Spare
162	Spare								
163	Panel (Dist.)906	Min. coax. plug	—	UR 70	—	—	Min. coax. plug	Monitoring unit 106	S.A. sync.
164	Panel (Dist.)906	Min. coax. plug	—	UR 70	—	—	Coax. socket R.A.E.	Test oscillator 102	TR cell recovery O.P.
165	Spare								
166	Spare								
167	Spare								
168	Spare								
169	Panel (Dist.) 906	Min. coax. plug	—	UR 70	—	—	Min. coax. plug	Monitoring unit CT 316	Secondary pre-pulse
171	Analyser spectrum 100	Min. coax. plug	—	UR 70	—	—	Min. coax. plug	Monitoring unit 106	Crystal current
172	Analyser spectrum 100	Min. coax. plug	—	UR 70	—	—	Min. coax. plug	Monitoring unit 106	Reflector switch
173	Analyser spectrum 100	Min. coax. plug	—	UR 70	--	—	Min. coax. plug	Monitoring unit 106	Signal

TABLE 5—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function
174	Analyser spectrum 100	Flylead	— — — —	Quadrametvin 2·5	Red Blue Green Yellow	A B C D	Socket	6·75 Mc/s amp.	+250V 6·3V 6·3V E } A.c. and D.c. supplies
175	Panel (Dist.)906	Coax. socket R.A.E.	—	UR 70	—	—	Coax. socket R.A.E.	Analyser Spectrum 100	Mag. & l.o. sample
176	Analyser spectrum 100	Flylead	—	UR 70	—	—	Min. coax. plug	6·75 Mc/s amp.	Crystal current
177	Analyser spectrum 100	Flylead	—	UR 70	—	—	Min. coax. plug	6·75 Mc/s amp.	Signal
178	Panel (Dist.)906	Coax. plug	—	UR 70	—	—	Min. coax. plug	Monitoring unit 106	SA video
179	Panel (Dist.)906	Coax. plug	—	UR 70	—	—	Min. coax. plug	Monitoring unit 106	SA crystal current
180	Analyser spectrum 100	Flylead	— — — —	Quadrametvin 2·5	Red Blue Green Yellow	A B C D	Socket	Manual tuning unit	6·3V 6·3V E −250V } Klystron supplies
181	Analyser spectrum 100	Flylead	—	UR 70	—	—	Min. coax. plug	Manual tuning unit	−400V Klystron supply
182	Test oscillator 102	Flylead	— — — —	Quadrametvin 2·5	Red Blue Green Yellow	A B C D	Socket	Manual tuning unit	6·3V 6·3V E −250V } Heater Klystron heater supplies Cathode and shield
183	Test oscillator 102	Flylead	—	UR 70	—	—	Min. coax. plug	Manual tuning unit	−400V Klystron supply
184	Test oscillator 102	Flylead	—	UR 70	—	—	Min. coax.	Waveguide unit	Crystal current
185	Analyser spectrum 100	Coax. plug R.A.E.	—	UR 70	—	—	Coax. socket R.A.E.	Directive feed	Mag. & l.o. sample

TABLE 5—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Pin or Term. No.	Cable End	Termination	Core Function
186	Lighting supply term. block 1	Terminals	1 2	Dumetvin 2·5	Red Blue	— —	Terminals	Cabinet light	L } A.c. N } supply
187	Heater terminal block 2	Terminals	1 2	70/·0076 beaded connectors (2 off)	— —	— —	Terminals	Heater	L } A.c. supply N } supply
192	Heater supply term. block 1	Terminals	A B	Dumetvin small 16	Red Blue	A B	Terminals	Heater terminal block 2	L } A.c. supply N } heaters

TABLE 6—Rotating cabin : connector Table

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Ident. Sleeve	Pin or Term. No.	Cable End	Termination	Core Function
215	Panel (Dist.)905	Plug	A B	Dumetvin 2·5	Red Blue		A B	Socket	Panel (Dist.)904	230V } Rx. W/G 230V } interlock
216	Panel (Dist.)905	Plug	A B	Dumetvin 2·5	Red Blue		A B	Socket	Panel (Dist.)904	230V } Interlock 230V } cct.
217	Panel (Dist.)905	Plug	A B C D E F	Sextometvin 2·5	Red Blue Green Yellow White Black		A B C D E F	Socket	Box junction 4485	230V Interlock 230V cct. 230V L, Air pressure indicator 230V L, Rx. W/G att. indicator 230V N, common —
218	Panel (Dist.)905	Plug	A B C D E F	Sextometvin 2·5	Red Blue Green Yellow White Black		A B C D E F	Socket	Box junction 4484	230V } Interlock 230V } circuit 230V L } High pressure 230V N } indicator 230V L } Low pressure 230V N } indicator

TABLE 6—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Ident. Sleeve	Pin or Term. No.	Cable End	Termination	Core Function
219	Panel (Dist.)905	Plug	A B C D	Quadrametvin 2·5	Red Blue Green Yellow		A B C D	Socket	Box junction 4484	230V L } Interlock 230V } circuit 230V L } Master interlock 230V N } indicator
220	Panel (Dist.) 905	Socket	A B C D	Quadrametvin 16	Red Blue Green Yellow		A B C D	Plug	Box junction 4484	230V L } R.f. cabinet 230V N } A.c Earth } supply —
221	Panel (Dist.)905	Socket	A B	Dumetvin 2·5	Red Blue		A B	Plug	Panel (Dist.)906	Earth } Noise source +225V } H.t. supply
222	Panel (Dist.)905	Plug	A B	Dumetvin 2·5	Red Blue		A B	Socket	Box junction 4485	R.f. mean power
223	Panel (Dist.)905	Plug	A B	Dumetvin 2·5	Red Blue		A B	Socket	Panel (Dist.)904	Tx. wattmeter supply
224	Panel (Dist.)905	Coax. socket R.A.E.	—	Coax. UR 70	—		—	Coax. socket R.A.E.	Panel (Dist.)906	Mag. & l.o. sample
225	Panel (Dist.)905	T.R.E. plug	—	Coax. UR 70	—		—	T.R.E. plug	Box dist.103	Log. rx. video
226	Panel (Dist.)905	T.R.E. plug	—	Coax. UR 70	—		—	T.R.E. plug	Box dist.103	Lin. rx. video
228	Panel (Dist.)904	Socket	A B	Dumetvin 16	Red Blue		A B	Plug	Box junction 4486	+ } Tx. d.c. − } voltmeter
229	Panel (Dist.)904	Socket	A B C D	Quadrametvin 16	Red Blue Green Yellow		A B C D	Plug	Box junction 4486	230V L } Tx. cabinet 230V N } A.c. Earth } supply —
230	Panel (Dist.)904	Socket	A B C	Trimetvin 2·5	Red Blue Green		A B C	Plug	Box junction 4486	230V ,BØ H.t. "Raise" 230V, N H.t. common 230,BØ H.t. "Lower"
231	Panel (Dist.)904	Socket	A B	Dumetvin 2·5	Red Blue		A B	Plug	Box junction 4486	230V, BØ H.t. "ON" 230V, BØ

TABLE 6—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Ident. Sleeve	Pin or Term. No.	Cable End	Termination	Core Function
232	Panel (Dist.)904	Plug	A B C D	Quadrametvin 16	Red Blue Green Yellow		A B C D	Socket	Box junction 4486	230V } Interlock 230V } circuit 230V L } Waterflow 230V N } indicator
233	Panel (Dist.)904	T.R.E. plug	—	Coax. UR 70	—		—	T.R.E. plug	Panel (Dist.)906	Mag. current pulse
234	Panel (Dist.)904	T.R.E. plug	—	Coax. UR 70	—		—	T.R.E. plug	Box dist.103	Mag. current pulse
235	Panel (Dist.)904	T.R.E. plug	—	Coax. UR 70	—		—	T.R.E. plug	Panel (Dist.)906	Mag. voltage pulse
236	Tx. Pulse xfmr.	Terminals	—	Coax. UR 34	—		—	H.V. coupler	Box dist.103	High voltage pulse
237	Panel (Dist.)906	Socket	A B C D	Quadrametvin 16	Red Blue Green Yellow		A B C D	Plug	Box junction 4460	230V L } T.e. cabinet 230V N } A.c. Earth } supply —
238	Panel (Dist.)906	T.R.E. plug	—	Coax. UR 70	—		—	T.R.E. plug	Box dist.103	Secondary pre-pulse
239	Panel (Dist.)906	T.R.E. plug	—	Coax. UR 70	—		—	T.R.E. plug	Panel (Dist.)905	Lin. rx. video
240	Panel (Dist.)906	T.R.E. plug	—	Coax. UR 70	—		—	T.R.E. plug	Panel (Dist.)905	Log. rx. video
241	Panel (Dist.)906	T.R.E. plug	—	Coax. UR 70	—		—	T.R.E. plug	Box dist.103	Spectrum anal. sync.
242	Panel (Dist.)906	T.R.E. plug	—	Coax. UR 70	—		—	T.R.E. plug	Box dist.103	Spectrum anal. video
243	Panel (Dist.)906	T.R.E. plug	—	Coax. UR 70	—		—	T.R.E. plug	Box dist.103	Spectrum anal. Xtal current
244	Panel (Dist.)906	T.R.E. plug	—	Coax. UR 70	—		—	T.R.E. plug	Panel (Dist.) 905	Time recovery tester O/P

TABLE 6—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Ident. Sleeve	Pin or Term. No.	Cable End	Termination	Core Function
254	Air pump unit 4136	Terminals	1	Quadrametvin 16	Red	634	7	Terminals	Box junction 4487	230V RØ } Air pump A.c. supply
			2		Yellow	635	8			230V YØ
			3		Blue	636	9			230V BØ
			4		Green	637	10			230V N
255	Heat exchanger unit	Terminals	1	V.R.I.L.C.	Red	650	12	Terminals	Panel (A.C.Dist.) 4461	230V L } Heat exchanger A.c. supply
			2	·0045	Blue	651	13			230V N
			E	7/·029 four core	White	652	E			Earth
			—		Black	—	—			—
256	Box junction 4486	Terminals	5	V.R.I.L.C.	Red	647	5	Terminals	Panel (A.C.Dist.) 4461	230V L } Tx cabinet A.c. supply
			6	·0045	Blue	648	6			230V N
			7	7/·029 four core	White	649	E			Earth
			—		Black	—	—			—
257	Box junction 4486	Terminals	1	V.R.I.L.C.	Red	501	7	Terminals	Heat exchanger unit	230V } Interlock circuit
			2	·0045	Blue	500	8			230V
			3	7/·029 four core	White	666	9			230V L } Waterflow indicator
			4		Black	667	10			230V N
258	Box junction 4486	Terminals	8	V.R.I.L.C.	1 Red	555	A1	Terminals	Box dist.103	230V BØ H.t. "Raise"
			9	0·015	2 White	556	A2			230V N H.t. Common
			10	1/·044 five core	3 Blue	557	A3			230V BØ H.t. "Lower"
			11		4 Black	558	A4			230V BØ } H.t. "ON"
			12		5 Green	559	A5			230V N
159	Box junction 4486	Terminals	13	V.R.I.L.C. ·0015	Red	562	A6	Terminals	Box dist.103	+VE } Tx. d.c. voltmeter
			14	1/·044 two core	Black	563	A7			−VE
260	Box junction 4484	Terminals	5	V.R.I.L.C.	Red	644	21	Terminals	Panel (A.C.dist.) 4461	230V L } R.f. cabinet
			6	·0045	Blue	645	22			230V N
			7	7/·029 four core	White	646	E			Earth
			—		Black	—	—			—
261	Box junction 4485	Terminals	1	V.R.I.L.C.	1	506	A8	Terminals	Box dist.103	230V } Interlock circuit
			2	·0015	2	507	A9			230V
			3	1/·044 six core	3	612	A10			230V L Air press ind.
			4		4	613	A11			230V L Rx W/G att. ind.
			5		5	614	A12			230V N Common
			—		6	—	—			—

TABLE 6—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Ident. Sleeve	Pin or Term. No.	Cable End	Termination	Core Function
262	Box junction 4485	Terminals	6	V.R.I.L.C. ·0015	Red	670	A14	Terminals	Box dist.103	R.f. mean power
			7	1/·044 twin core	Black	671	A15			
263	Box junction 4484	Terminals	1	V.R.I.L.C.	1 Red	504	16	Terminals	Panel (A.C.dist.)	230V L } Interlock
			2	·0015	2 White	505	17		4461	230V N } circuit
			3	1/·044 five core	3 Blue	660	18			230V L } Master interlock
			4		4 Black	661	15			230V N } indicator
			—		5 Green	—	—			—
264	Box junction 4484	Terminals	8	V.R.I.L.C.	1	503	1	Terminals	Box junction 4487	230V L } Interlock
			9	·0015	2	502	2			230V N } circuit
			10	1/·044 six core	3	662	3			230V L } High pres.
			11		4	663	4			230V N } indicator
			12		5	664	5			230V L } Low pres.
			13		6	665	6			230V N } indicator
265	Box junction 4460	Terminals	1	V.R.I.L.C.	Red	641	19	Terminals	Panel (A.C.dist.)	230V L }
			2	·0045	Blue	642	20		4461	230V N } T.e. cabinet
			3	7/·029 four core	White	643	E			Earth } A.c. supply
			—		Black	—	—			—
266	Box junction 4487	Terminals	7	V.R.I.L.C.	Red	634	1	Terminals	Panel (A.C.dist.)	230V RØ }
			8	·0045	White	635	2		4461	230V YØ } Air pump
			9	7/·029 four core	Blue	636	3			230V BØ } cabinet
			10		Black	637	4			230V N } a.c. supply
X4	Box junction 12313	Terminals	5	V.R.I.L.C.	1	4X	B7*	Terminals	Box dist.103	Power ON
			6	·0015	2	5X	B8*			Challenge light
			7	1/·044 six core	3	SP	B9*			Spare
			8		4	7X	B10*			G.t.c. swept gain
			9		5	8X	B11*			A.c. earth
			10		6	9X	B12*			D.c. earth
268	Box junction 4460	Terminals	5	V.R.I.L.C.	Red	638	29	Terminals	Panel (A.C.dist.)	230V L } Cabinet
			6	·0045	Blue	639	30		4461	230V N } lighting
			7	7/·029 four core	White	640	E			Earth } a.c. supply
			—		Black	—	—			

*These connections for 46-way slip ring unit.

TABLE 6—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Ident. Sleeve	Pin or Term. No.	Cable End	Termination	Core Function
X18/1	I.F.F.	T.R.E. plug	—	Coax. UR 70	—	—	—	T.R.E. plug	Box dist.103	I.F.F. gain
X19/1	I.F.F.	T.R.E. plug	—	Coax. UR 70	—	—	—	T.R.E. plug	Box dist.103	I.F.F. video
X20/1	I.F.F.	T.R.E. plug	—	Coax. UR 70	—	—	—	T.R.E. plug	Box dist.103	I.F.F. trigger
X1	I.F.F.	Socket	A B C D	Quadrametvin 16	Red Blue Green Yellow		A B C D	Plug	Box junction 12313	L N I.F.F. cabinet E A.c. supply
X2	I.F.F.	Socket	A B C D E F	Sextometvin 2·5	Red Blue Green Yellow White Black		A B C D E F	Plug	Box junction 12313	Power ON Challenge light Spare G.t.c. swept gain A.c. earth D.c. earth
X3	Box junction 12313	Terminals	1 2 3 4	V.R.I.L.C. ·0045 7/·029 four core	Red Blue White Black	1X 2X 3X SP	23 24 E —	Terminals	Panel (A.C.Dist.) 4461	L N I.F.F. cabinet E A.C. supply
286	Box junction 4487	Plug	A B C D E F	Sextometvin 2·5 [redacted]	Red Blue Green Yellow White Black		A B C D E F	Socket	Air pump unit 4136	230V Int. circuit 230V 230V L, High pressure 230V N, Ind. 230V L, Low pressure 230V N, Ind.
287	Tx. cabinet lighting term. block	Terminals	1 2	Dumetvin 16	Red Blue	638 639	1 2	Terminals	R.f. cabinet lighting terminal block	L } A.c. N } supply
288	R.f. cabinet lighting term. block	Terminals	1 2	Dumetvin 16	Red Blue	638 639	1 2	Terminals	Test equipment cabinet lighting terminal block	L } A.c. N } supply
289	Box junction 4460	Plug	A B	Dumetvin 16	Red Blue	638 639	1 2	Terminals	Test equipment cabinet lighting terminal block	L } Cabinet lighting N } supply

TABLE 6—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Ident. Sleeve	Pin or Term. No.	Cable End	Termination	Core Function
290	Heat exchanger	Terminals	3	V.R.I.L.C. ·0045	Red	653	—	Terminals	Heater tank	L Fan motor
			11	7/·029 four core	Blue	654	—		thermostat	N control
			—		White	—	—			—
			—		Black	—	—			—
295	Radar switch fuse	Terminals	RØ	P.V.C. ·010	—	630	32	Terminals	Panel (A.C.Dist.)	RØ } A.c. supply
			YØ	7/·044 single	—	631	35		4461	YØ
			BØ	core four connectors	—	632	38			BØ
			N		—	633	41			N
298	Box dist.103	T.R.E. plug	—	Coax. UR 70	—		—	Terminal	G.P.O. telephone junction box	Telephone
299	Box dist.103	T.R.E. plug	—	Coax. UR 70	—		—	Terminal	G.P.O. telephone junction box	Telephone
300	Panel (A.C. Dist.) 4461	Terminals	32	V.R.I.L.C. ·0045	Red	630		Terminals	Switch fuse	RØ } 3Ø & N
			35	7/·029 four core	White	631				YØ Supply to
			38		Blue	632				BØ air pump
			41		Black	633				N test equip.
301	Switch fuse	Terminals		V.R.I.L.C. ·0045	Red	630		Terminals	3-phase socket	RØ } 3Ø & N
				7/·029 four core	White	631			outlet	YØ supply to
					Blue	632				BØ air pump
					Black	633				N test. equip.
321	Minerva head 1	Terminals	Red	V.R.I.L.C. ·0015	Red	620	Red	Terminals	Minerva head 2	+200V } Minerva
			Blue	three core 1/·044	Blue	621	Blue			Bias detector
			Green		Green	622	Green			Earth supplies
322	Minerva head 2	Terminals	Red	V.R.I.L.C. ·0015	Red	620	Red	Terminals	Minerva head 3	+200V } Minerva
			Blue	three core 1/·044	Blue	621	Blue			Bias
			Green		Green	622	Green			Earth detector
323	Minerva junction box	Terminals	Red	V.R.I.L.C. ·0015	Red	620	Red	Terminals	Minerva head 3	+200V } Minerva
			Blue		Blue	621	Blue		bias	Bias detector
			Green		Green	622	Green			Earth supplies
324	Minerva junction box	Terminals	Red	V.R.I.L.C. ·0015	Red	620	Red	Terminals	Minerva head 4	+200V } Minerva
			Blue		Blue	621	Blue			Bias detector
			Green		Green	622	Green			Earth supplies

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TABLE 6—continued

Cable No.	Termination	Cable End	Pin or Term. No.	Cable Type	Core Colour	Ident. Sleeve	Pin or Term. No.	Cable End	Termination	Core Function
325	Box dist. 103	Terminals	B1 B2 B3	V.R.I.L.C. ·0015	Red Blue Green	620 621 622	Red Blue Green	Terminals	Minerva junction box	+200V Bias Earth } Minerva detector supplies
328	Box junction 12189	Plug	B A	Dumetvin 16	Blue Red	690 691	1 2	Terminals	R.f. cabinet heater term block	N L } Space heater supply
329	Box junction 12189	Plug	B A	Dumetvin 16	Blue Red	690 691	1 2	Terminals	Tx. cabinet heater term. block	N } Space heater supply
332	Panel (A.C. Dist.) 4461	Terminals	25 26 — —	V.R.I.L.C. ·0045 7/·029 four core	Red Blue White Black	691 690 692 —	5 6 11 —	Terminals	Box junction 12189	230V L 230V N Earth Spare } Cabinet space heaters a.c. supplies
333	Box junction 12189	Plug	B A	Dumetvin 16	Blue Red	690 691	1 2	Terminals	Test cabinet heater term. block	N L } Space heater supply
X5/1	I.F.F. Rack	Plug UG495-U	—	Coax. UR 74	—		—	Socket UG334-U	Column entry plate	I.F.F. aerial
X6	Box junction 12313	Plug	A B C D	Quadrametvin	Red Blue Green Yellow		A B C D	Socket	I.F.F. rack	L N Sp } I.F.F. cabinet heater supply
X7	Box junction 12313	Terminals	11 12 13 14	V.R.I.L.C. ·0015 1/·044 four core	Red Blue White Black	10X 11X 12X SP	27 28 E —	Terminals	Panel (A.C.Dist) 4461	L N E } I.F.F. cabinet heater supply Spare

Chapter 3

(This chapter supersedes that issued with A.L.7)

AERIAL MOUNT AND TURNING GEAR INTERCONNECTIONS

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

General

1. The interconnections dealt with in this Chapter concern the turning gear and the power and lighting wiring to the gantry and rotating cabin for 2-motor (A) and 4-motor (B) installations. For convenience each installation is given in two diagrams. Fig. 1 and 2 deal with the 2002A installation, fig. 3 and 4 with the 2002B. Gantry wiring leaves the modulator building via the gantry termination board, situated behind the "Emotrol" cubicle. Cabin wiring is, of course, via the 46-way unit (or 40-way unit) in the slipring cubicle. It should be noted that other slipring connections (for the radar) are shown in the radar interconnection diagrams in Chapter 1.

Cable and core identification

2. Cables and cores are numbered by twinlay, numbered and coloured PVC or rubber substitute sleeves, similar to those employed for the radar interconnections (*Chap.* 1). The numbers and colours follow the colour coding for resistors, i.e. *black* is 0, *brown* 1, *white* 9, etc. On early installations, due to non-availability of twinlay markers, lead markers, stamped with the appropriate number have been used for cable identification and yellow neoprene sleeves with black numbering for the cores.

3. In all four illustrations, since core and cable numbers overlap, cable numbers have been underlined. Since all cables used are lead covered, all cores carry ident. numbers. In fig. 2 and 4 the letters inside the dotted blocks in the right-hand bottom corners relate to the terminal block identifications inside box (distribution) 103 in the rotating cabin.

Microswitches

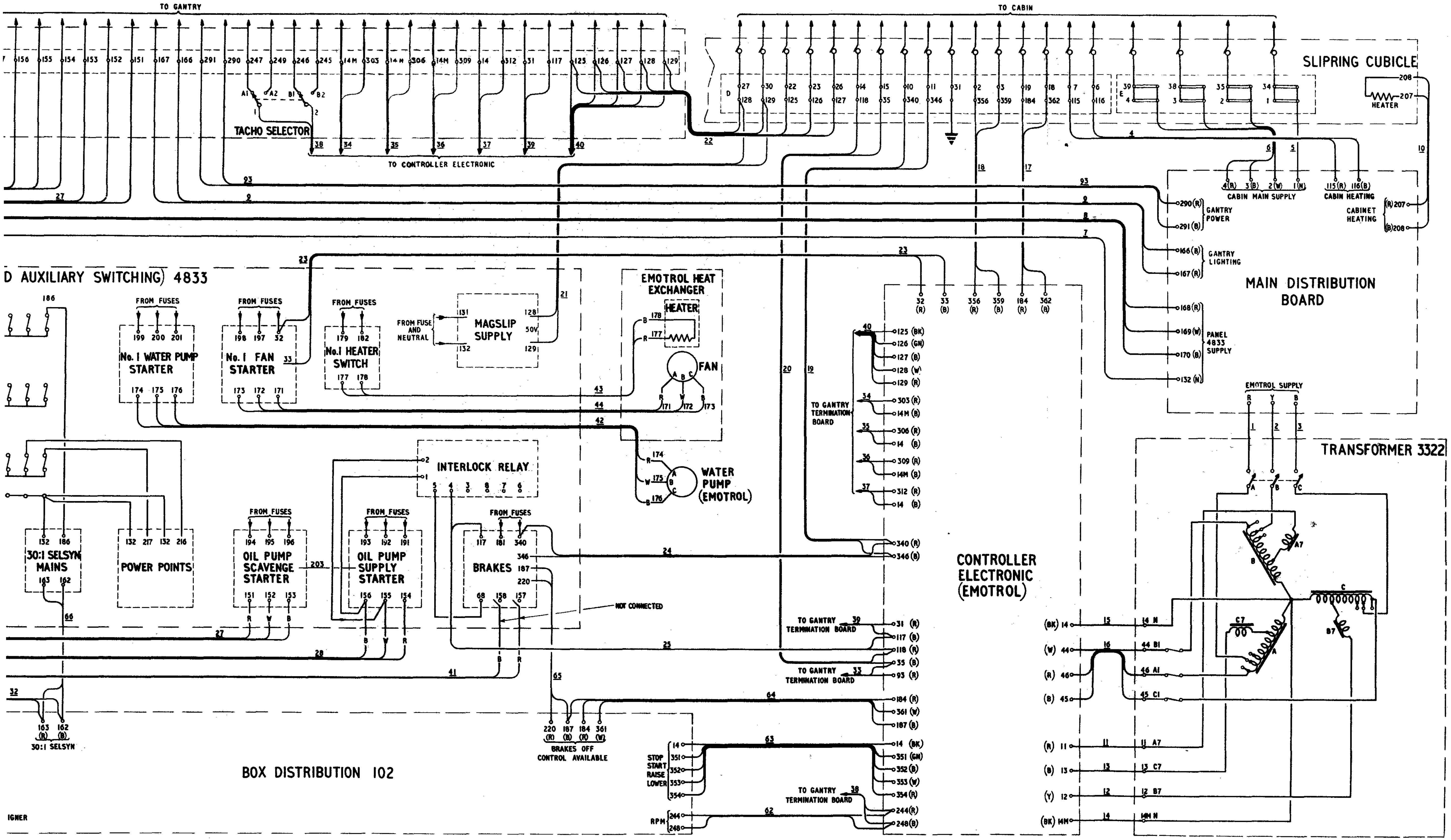
4. The two microswitches shown in fig. 2 and 4 are operated by the hand turning lever. When the lever is pulled down switch A is opened, breaking the interlock circuit for the motor contactors in the "Emotrol" or controller electronic. When the lever is pushed over to engage the gearing, switch B closes. Switch B is in the line to the perigrip brake contactors but, pending a decision on the use of the perigrip brakes, cable 41 (*fig.* 1) has been disconnected, removing the supply.

Note . . .
The brakes are also normally kept locked off mechanically.

Mains supplies

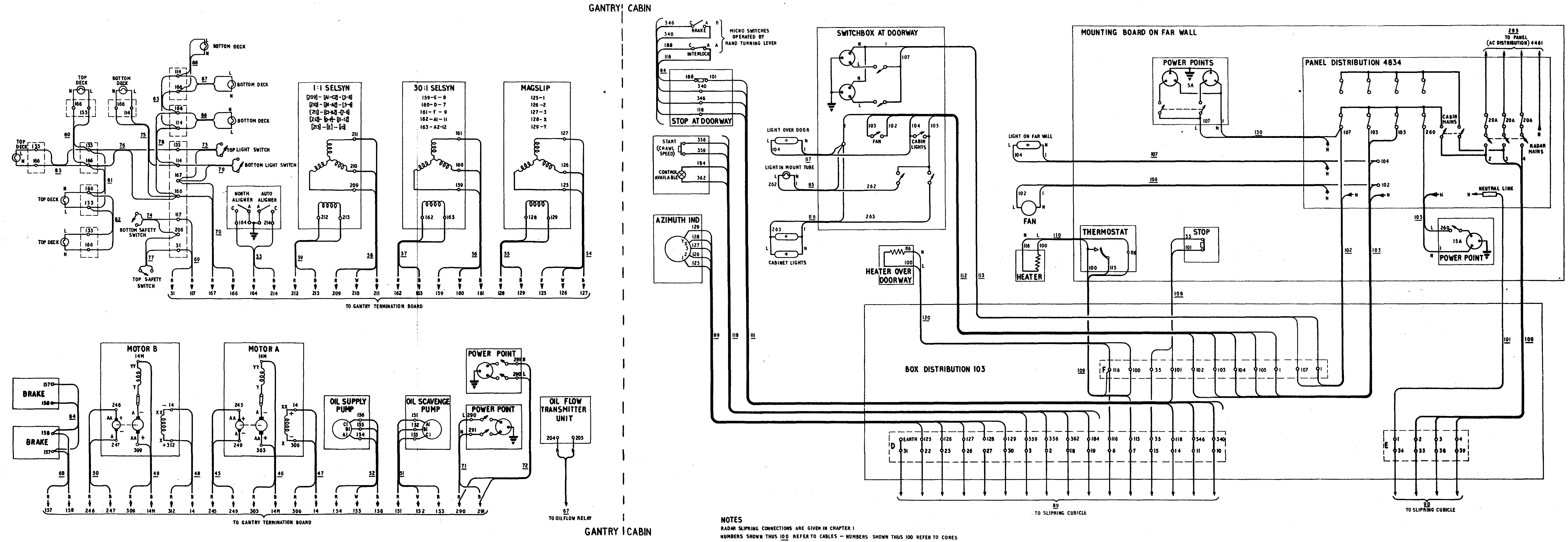
5. Sliprings 34, 35, 38 and 39 carry the 440V, 3-phase and neutral supply to the rotating cabin. The supply is taken to panel, distribution, 4834, on which are two rotary switches. One routes single phase supplies to power points, cabin lights, fan and heaters. The other takes the 3-phase supply to panel (AC distribution) 4461 for distribution to the cabinets associated with the radar equipment.

P28322 144591/3302 9/56 625 C & P C



AM and TG 2002A (modulator building) : interconnections

Fig. 1



NOTES

RADAR SLIPRING CONNECTIONS ARE GIVEN IN CHAPTER 1

NUMBERS SHOWN THUS 100 REFER TO CABLES – NUMBERS SHOWN THUS 100 REFER TO CORES

AM and TG 2002A (cabin and gantry) : interconnections

Fig.2

(A.L.18, July 56)

AIR DIAGRAM 6156R/MIN.	RADAR TYPE 80
ISSUE 2 — PREPARED BY MINISTRY OF SUPPLY FOR PROMULGATION BY AIR MINISTRY ADMIRALTY	

PP7976 144592/3303 8/56 625 C & P Gp. 959 (4)

AIR DIAGRAM 6156AJ/MIN.

ISSUE 1 — PREPARED BY MINISTRY OF SUPPLY FOR PROMULGATION BY AIR MINISTRY

RADAR TYPE 80

AM and TG 2002B (modulator building) : interconnections

Fig. 3

PP7976 144592 8/56 C & P Gp. 959 (4)

NOTES
RADAR SLIPRING CONNECTIONS ARE GIVEN IN CHAPTER 1
NUMBERS SHOWN THUS 100 REFER TO CABLES – NUMBERS SHOWN THUS 100 REFER TO CORES

AIR DIAGRAM 6156AK/MIN.	RADAR TYPE 80
ISSUE 1 — PREPARED BY MINISTRY OF SUPPLY FOR PROMULGATION BY AIR MINISTRY	

AM and TG 2002B (cabin and gantry) : interconnections

Fig. 4

(A.L. 18, July 56)

P77976 144592/ 8/56 C & P Gp. 959 (4)

Chapter 4

AERIAL MOUNT AND TURNING GEAR CONNECTOR TABLES

LIST OF CONTENTS

LIST OF TABLES

General

1. The information given in the following tables applies to the aerial mount and turning gear 2002A and 2002B installations which have two-motor and four-motor drives respectively. Tables 1 and 2 cover the 2002A installation and tables 3 and 4, the 2002B installation. Slipring connections, other than those given in these tables, for the electronic and other sections of the radar, are shown in the radar connector tables in Chapter 2 of this Section. The information in these tables is complementary to the information in Chapter 3.

Cable and core identification

2. Cables and cores are numbered by twinlay, numbered and coloured P.V.C. or rubber substitute sleeves, which are similar to those used for the radar interconnections (Chap. 1). The numbers and colours follow the colour coding for resistors, i.e. black is 0, brown 1, red 2 etc. On early installations, due to shortage of twinlay markers, lead markers stamped with the appropriate number, have been used for cable identification and yellow neoprene sleeves with black numbering have been used to identify cores.

Note . . .

Spare cable cores are not listed in these tables. The presence of spare cores is indicated by the number of cores in the 'Cable Type' column, for a specific cable, not tallying with the number of cores shown.

TABLE 1

AM and TG 2002A (modulator building): connector table

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
1	Main distribution board	1	V.R.I.L.C. 37/·083 single-core	Red	1	Transformer 3322	36 ft	a.c. supply to transformer 3322
2	Main distribution board	2	V.R.I.L.C. 37/·083 single-core	Yellow	2	Transformer 3322	36 ft	
3	Main distribution board	3	V.R.I.L.C. 37/·083 single-core	Black	3	Transformer 3322	36 ft	
4	Main distribution board	115	V.R.I.L.C. 7/·029 two-core	Red	115	Slipring cubicle	29 ft	a.c. to cabin heaters
	Main distribution board	116		Black	116	Slipring cubicle		
5	Main distribution board	1	V.R.I.L.C. 7/·044 single-core		E1	Slipring cubicle	29 ft	N — a.c. supply to cabin
6	Main distribution board	2	V.R.I.L.C. 7/·044 three-core	White	E2	Slipring cubicle	29 ft	Wφ
		3		Black	E3			B φ
		4		Red	E4			R φ
7	Main distribution board	132	V.R.I.L.C. 7/·044 single-core		132	Panel (T.G. and Aux. switching) 4833	45 ft	N — a.c. supply
8	Main distribution board	168	V.R.I.L.C. 7/·044 three-core	Red	168	Panel (T.G. and Aux.	45 ft	Rφ
		169		White	169	switching) 4833		Wφ
		170		Black	170			B φ
9	Main distribution board	166	V.R.I.L.C. 7/·029 two-core	Black	166	Gantry termination board	52 ft	Gantry lights
		167		Red	167			

Table 1—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
10	Main distribution board	207	V.R.I.L.C. 7/·029 two-core	Red	207	Slipring cubicle	29 ft	Supply to slipring cubicle heater
		208		Black	208			
11	Transformer 3322	A7	V.R.I.L.C. 37/·072 single-core		11	Controller Electronic (Emotrol)	58 ft	Aφ } 660V supply to Controller Electronic (Emotrol)
12	Transformer 3322	B7	V.R.I.L.C. 37/·072 single-core		12	Controller Electronic (Emotrol)	58 ft	Bφ } 660V supply to Controller Electronic (Emotrol)
13	Transformer 3322	C7	V.R.I.L.C. 37/·072 single-core		13	Controller Electronic (Emotrol)	58 ft	Cφ } 660V supply to Controller Electronic (Emotrol)
14	Transformer 3322	N	V.R.I.L.C. 37/·072 single-core		14M	Controller Electronic (Emotrol)	58 ft	N
15	Transformer 3322	N	V.R.I.L.C. 7/·029 single-core	Black	14	Controller Electronic (Emotrol)	58 ft	440V neutral supply to Controller Electronic (Emotrol)
16	Transformer 3322	B1	V.R.I.L.C. 7/·029 three-core	White	44	Controller Electronic (Emotrol)	58 ft	440V a.c. supply to Controller Electronic (Emotrol)
		C1		Blue	45			
		A1		Red	46			
17	Controller Electronic (Emotrol)	184	V.R.I.L.C. 3/·029 two-core	Red	D184	Slipring cubicle	27 ft	50V supply to control available lamp
		362		Blue	D362			
18	Controller Electronic (Emotrol)	356	V.R.I.L.C. 3/·029 two-core	Red	D356	Slipring cubicle	27 ft	Turning gear "crawl" control
		359		Blue	D359			
19	Controller Electronic (Emotrol)	340	V.R.I.L.C. 3/·029 two-core	Red	D340	Slipring cubicle	27 ft	Turning gear control interlock circuit
		346		Blue	D346			

Table 1—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
20	Controller Electronic (Emotrol)	35	V.R.I.L.C. 3/·029 two-core	Blue	D35	Slipring cubicle	27 ft	Turning gear control, stop and interlocking circuit
		118		Red	D118			
21	Panel (Turning Gear and Aux. switching) 4833	128	V.R.I.L.C. 3/·029 two-core	Red	D128	Slipring cubicle	38 ft	50V: magslip energizing supply
		129		Blue	D129			
22	Gantry termination board	125	V.R.I.L.C. 1/·044 five-core	Black	D125	Slipring cubicle	35 ft	Azimuth indicator interconnections
		126		Green	D126			
		127		Blue	D127			
		128		White	D128			
		129		Red	D 129			
23	Controller Electronic (Emotrol)	32	V.R.I.L.C. 3/·029 two-core	Red	32	Panel (Turning gear and Aux. switching) 4833	30 ft	Fan starter Pilot control
		33		Blue	33			
24	Controller Electronic (Emotrol)	340	V.R.I.L.C. 3/·029 two-core	Red	340	Panel (Turning gear and Aux. switching) 4833	30 ft	Brake contactor
		346		Blue	346			
25	Controller Electronic (Emotrol)	117	V.R.I.L.C. 3/·029 two-core	Blue	117	Panel (Turning gear and Aux. switching) 4833	30 ft	Brake interlock for Emotrol
		118		Red	4			
26	Panel (Turning gear and Aux. switching) 4833	132	V.R.I.L.C. 3/·029 two-core	Blue	132	Gantry termination board	23 ft	a.c. supply to oil flow unit
		150		Red	150			
27	Panel (Turning gear and Aux. switching) 4833	151	V.R.I.L.C. 7/·029 three-core	Red	151	Gantry termination board	26 ft	a.c. supply to oil scavenge pump
		152		White	152			
		153		Blue	153			

Table 1—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
28	Panel (Turning gear and Aux. switching) 4833	154	V.R.I.L.C. 7/·029 three-core	Red	154	Gantry termination board	26 ft	a.c. supply to oil supply pump
		155		White	155			
		156		Blue	156			
29	Box (Dist.) 102	22	V.R.I.L.C. 7/·029 three-core	Red	209	Gantry termination board	34 ft	1:1 Selsyn stator
		23		White	210			
		24		Blue	211			
30	Box (Dist.) 102	20	V.R.I.L.C. 7/·029 two-core	Red	212	Gantry termination board	34 ft	1:1 Selsyn rotor
		21		Blue	213			
31	Box (Dist.) 102	63	V.R.I.L.C. 7/·029 three-core	Red	159	Gantry termination board	34 ft	30:1 Selsyn stator
		64		White	160			
		65		Blue	161			
32	Box (Dist.) 102	61	V.R.I.L.C. 7/·029 two-core	Blue	162	Gantry termination board	34 ft	30:1 Selsyn rotor
		62		Red	163			
33	Controller Electronic (Emotrol)	35	V.R.I.L.C. 3/·029 two-core	Blue	35	Gantry termination board	30 ft	Interlock circuit from oil flow unit
		93		Red	93			
34	Controller Electronic (Emotrol)	14M	V.R.I.L.C. 19/·083 two-core	Blue	14M	Gantry termination board	28 ft	Motor A armature circuit
		303		Red	303			
35	Controller Electronic (Emotrol)	14	V.R.I.L.C. 7/·029 two-core	Blue	14N	Gantry termination board	28 ft	Motor A field circuit
		306		Red	306			

Table 1—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
36	Controller Electronic (Emotrol)	14M	V.R.I.L.C. 19/·083 two-core	Blue	14M	Gantry termination board	28 ft	Motor B armature circuit
		309		Red	309			
37	Controller Electronic (Emotrol)	14	V.R.I.L.C. 7/·029 two-core	Blue	14	Gantry termination board	28 ft	Motor B field circuit
		312		Red	312			
38	Controller Electronic (Emotrol)	244	V.R.I.L.C. 7/·029 two-core	Red	2	Gantry termination board	20 ft	Tachogenerator
		248		Blue	1			
39	Controller Electronic (Emotrol)	31	V.R.I.L.C. 3/·029	Red	31	Gantry termination board	28 ft	Gantry safety switches
		117	two-core	Blue	117			
40	Controller Electronic (Emotrol)	125	V.R.I.L.C. 1/·044 five-core	Black	125	Gantry termination board	20 ft	Azimuth indicator
		126		Green	126			
		127		Blue	127			
		128		White	128			
		129		Red	129			
41	Panel (Turning gear and Aux. switching) 4833	157	V.R.I.L.C. 7/·044 two-core	Red	157	Gantry termination board	28 ft	Brake supply
		158		Blue	158			
42	Panel (Turning gear and Aux. switching) 4833	174	V.R.I.L.C. 7/·029 three-core	Red	A	Water pump (Emotrol)	36 ft	a.c. supply to water pump
		175		White	B			
		176		Blue	C			

Table 1—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
43	Panel (Turning gear and Aux. switching) 4833	177	V.R.I.L.C. 7/·029 two-core	Red	177	Heat Exchanger (Emotrol)	30 ft	a.c. supply to rad. heater
		178		Blue	178			
44	Panel (Turning gear and Aux. switching) 4833	171	V.R.I.L.C. 7/·029 three-core	Red	A	Fan	36 ft	a.c. supply to fan
		172		White	B			
		173		Blue	C			
61	Box (Dist.) 102	48	V.R.I.L.C. 3/·029 two-core	Red	164	Gantry termination board	30 ft	Aerial alignment switches
		49		Blue	214			
62	Box (Dist.) 102	2	V.R.I.L.C. 3/·029 two-core	Red	244	Controller Electronic (Emotrol)	31 ft	Aerial speed indication
		4		Blue	248			
63	Box (Dist.) 102	16	V.R.I.L.C. 1/·044 five-core	Black	14	Controller Electronic (Emotrol)	36 ft	Turning gear remote control
		17		Green	351			
		13		Blue	352			
		14		White	353			
		15		Red	354			
64	Box (Dist.) 102	18	V.R.I.L.C. 3/·029 three-core	Red	184	Controller Electronic (Emotrol)	31 ft	Indicator lamps
		26		Blue	187			
		19		White	361			
65	Box (Dist.) 102	26	V.R.I.L.C. 3/·029 two-core	Blue	187	Panel (Turning gear and Aux. switching) 4833	24 ft	Brakes off—pilot control
		25		Red	220			

Table 1—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
66	Box (Dist.) 102	61	V.R.I.L.C. 7/·029 two-core	Blue	162	Panel (Turning gear and Aux. switching) 4833	24 ft	30:1 Selsyn a.c. supply
		62		Red	163			
93	Main distribution board	290	V.R.I.L.C. 7/·029 two-core	Red	290	Gantry termination board	52 ft	Gantry power
		291		Blue	291			

TABLE 2

AM and TG 2002A (cabin and gantry): connector table

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
45	Gantry termination board	245	V.R.I.L.C. 7/·029 two-core	Red	AA	Tachogenerator A	66 ft	Tachogenerator A supply
		249		Blue	A			
46	Gantry termination board	14M	V.R.I.L.C. 19/·083 two-core	Blue	YY	Motor A	60 ft	Motor A armature circuit
		303		Red	AA			
47	Gantry termination board	14	V.R.I.L.C. 7/·029 two-core	Blue	XX	Motor A	60 ft	Motor A field circuit
		306		Red	X			
48	Gantry termination board	14	V.R.I.L.C. 7/·029 two-core	Blue	XX	Motor B	74 ft	Motor B field circuit
		312		Red	X			
49	Gantry termination board	14M	V.R.I.L.C. 19/·083 two-core	Blue	YY	Motor B	74 ft	Motor B armature circuit
		309		Red	AA			

Table 2—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
50	Gantry termination board	246	V.R.I.L.C. 7/·029 two-core	Red	AA	Tachogenerator B	78 ft	Tachogenerator B supply
		247		Blue	A			
51	Gantry termination board	151	V.R.I.L.C. 7/·029 three-core	Red	A1	Oil scavenge pump	60 ft	Oil scavenge pump supply
		152		White	B1			
		153		Blue	C1			
52	Gantry termination board	154	V.R.I.L.C. 7/·029 three-core	Red	A1	Oil supply pump	60 ft	Supply to oil supply pump
		155		White	B1			
		156		Blue	C1			
53	Gantry termination board	164	V.R.I.L.C. 3/·029 two-core	Red	164	Aerial alignment switches	72 ft	Aerial alignment circuits
		214		Blue	214			
54	Gantry termination board	125	V.R.I.L.C. 3/·029 three-core	Red	1	Magslip transmitter	60 ft	Magslip transmitter stator supply
		126		White	2			
		127		Blue	3			
55	Gantry termination board	128	V.R.I.L.C. 3/·029 two-core	Red	X	Magslip transmitter	60 ft	Magslip transmitter rotor supply
		129		Blue	Y			
56	Gantry termination board	159	V.R.I.L.C. 7/·029 three-core	Red	E-8	30:1 Selsyn	77 ft	30:1 Selsyn stator supply
		160		White	D-7			
		161		Blue	F-9			

Table 2—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
57	Gantry termination board	162 163	V.R.I.L.C. 7/·029 two-core	Red Blue	A1-11 A2-12	30:1 Selsyn	77 ft	30:1 Selsyn rotor supply
58	Gantry termination board	209 210 211	V.R.I.L.C. 7/·029 three-core	Red White Blue	(A1-C2)-(3-8) (B1-A2)-(5-4) (C1-B2)-(7-6)	1:1 Selsyn	78 ft	1:1 Selsyn stator supply
59	Gantry termination board	212 213	V.R.I.L.C. 7/·029 two-core	Red Blue	(O-P)-(1-12) (E)-(10)	1:1 Selsyn	78 ft	1:1 Selsyn rotor supply
67	Oil flow relay	204 205	V.R.I.L.C. 3/·029 two-core	Red Blue	204 205	Oil flow transmitter unit	66 ft	Interlock circuit-oil flow unit
68	Gantry termination board	157 158	V.R.I.L.C. 7/·044 two-core	Red Blue	157 158	Perigrip brake	59 ft	a.c. supply to Perigrip brakes
69	Gantry termination board	31 117	V.R.I.L.C. 3/·029 two-core	Red Blue	31 117	Junction box G	17 ft	Gantry safety switches
70	Gantry termination board	166 167	V.R.I.L.C. 7/·029 two-core	Blue Red	166 167	Junction box G	17 ft	Gantry lighting supply
71	Gantry termination board	290 291	V.R.I.L.C. 7/·029 two-core	Red Blue	290 291	Power point	21 ft	L N Gantry power point supply
72	Gantry termination board	290 291	V.R.I.L.C. 7/·029 two-core	Red Blue	290 291	Power point	33 ft	L N Gantry power point supply

Table 2—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
73	Junction box G	133	V.R.I.L.C. 3/·029			Top light switch	28 ft	Top deck lighting circuit
		167	two-core					
74	Junction box G	117	V.R.I.L.C. 3/·029			Bottom safety switch	28 ft	Bottom safety switch circuit
		206	two-core					
75	Junction box G	114	V.R.I.L.C. 3/·029		114	Junction box B	28 ft	Bottom deck swan-neck light circuit
		166	two-core		166			
76	Junction box G	133	V.R.I.L.C. 3/·029		133	Junction box F	20 ft	Top deck lights supply
		166	two-core		166			
77	Junction box G	31	V.R.I.L.C. 3/·029			Top safety switch	28 ft	Top safety switch circuit
		206	two-core					
78	Junction box G	114	V.R.I.L.C. 3/·029		114	Junction box D	10 ft	Bottom deck bulkhead lights supply
		166	two-core		166			
79	Junction box G	114	V.R.I.L.C. 3/·029			Bottom light switch	11 ft	Bottom deck light circuit
		167	two-core					
80	Junction box F	133	V.R.I.L.C. 3/·029		133	Junction box A	30 ft	Interconnections for top deck swan-neck lights
		166	two-core		166			
81	Junction box F	133	V.R.I.L.C. 3/·029		133	Junction box H	30 ft	Interconnections for top deck swan-neck lights
		166	two-core		166			

Table 2—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
82	Junction box H	133 166	V.R.I.L.C. 3/·029 two-core		133 166	Junction box J	30 ft	Interconnections for top deck swan-neck lights
83	Junction box F	133 166	V.R.I.L.C. 3·/029 two-core		133 166	Junction box E	30 ft	Interconnections for top deck swan-neck lights
84	Brake	157 158	V.R.I.L.C. 7/·029 two-core		157 158	Brake	33 ft	Perigrip brakes interconnection
85	Junction box D	114 166	V.R.I.L.C. 3/·029 two-core		114 166	Junction box C	33 ft	Lighting interconnection
86	Junction box D	114 166	V.R.I.L.C. 3/·029 two-core			Bottom deck bulkhead light	13 ft	Bulkhead light supply
87	Junction box C	114 166	V.R.I.L.C. 3/·029 two-core			Bottom deck bulkhead light	13 ft	Bulkhead light supply
88	Junction box C	114 166	V.R.I.L.C. 3/·029 two-core			Bottom deck bulkhead light	45 ft	Bulkhead light supply
100	Box (Dist.) 103	E2 E3 E4	V.R.I.L.C. 7/·044 three-core	White Blue Red		RADAR MAINS switch on panel (Dist.) 4834		three-phase supply
101	Box (Dist.) 103	E1	V.R.I.L.C. 7/·029 three-core	Cores connected		Neutral link on panel (Dist.) 4834		Neutral conductor
102	Box (Dist.) 103	F1 F107	V.R.I.L.C. 7/·029 two-core	Blue Red	N 107	Panel (Dist.) 4834		5A power points supply

Table 2—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
103	Box (Dist.) 103	F1	V.R.I.L.C. 1/·044 five-core	Blue	N	Panel (Dist.) 4834		Lights neutral
		F102		White	102			Fan switch circuit
		F103		Black	103			
		F104		Red	104			Wall light, switch circuit
		F105		Green	105			Supply to light switches
105	Panel (Dist.) 4834	260	V.R.I.L.C. 7/·029 two-core	Red	260	Power point		L } 230V a.c. supply
		N		Blue	1			N
106	Box (Dist.) 4834	102	V.R.I.L.C. 3/·029 two-core	Red	102	Fan		L } 230V a.c. fan supply
		N		Blue	1			N
107	Panel (Dist.) 4834	104	V.R.I.L.C. 3/·029 two-core	Red	104	Light on far wall of cabin		L } 230V a.c. light supply
		N		Blue	1			N
108	Stop button	35	V.R.I.L.C. 3/·029 two-core	Red	F35	Box (Dist.) 103		Interlock circuit
		101		Blue	F101			
109	Thermostat	100	V.R.I.L.C. 7/·029 three-core	Blue	F100	Box (Dist.) 103		Heater circuit
		115		Red	F115			
		116		White	F116			
110	Thermostat	100	V.R.I.L.C. 7/·029 two-core	Blue	100	Heater		230V a.c. heater supply
		116		Red	116			

Table 2—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
111	Box (Dist.) 103	F101	V.R.I.L.C. 1/·044 five-core	Blue	101	Stop at doorway		Hand turning gear interlock circuit
		D118		Green	118			
		D340		White	340			Brake contactor circuit
		D346		Black	346			
112	Box (Dist.) 103	F1	V.R.I.L.C. 1/·044 five-core	Blue	1	Switchbox at doorway		Lights neutral
		F102		White	102			Fan switch circuit
		F103		Black	103			
		F104		Red	104			Wall light switch circuit
		F105		Green	105			Supply to light switches
113	Box (Dist.) 103	F1	V.R.I.L.C. 7/·029 two-core	Blue	1	Switchbox at doorway		N: 230v supply to 5A power points
		F107		Red	107			L
114	Stop at doorway	118	V.R.I.L.C. 1/·044 five-core	Green	A	Microswitch A		Hand turning interlock circuit
		188		Red	C	Microswitch A		
		340		White	A	Microswitch B		Brake contactor operating circuit
		346		Black	C	Microswitch B		
115	Switchbox at doorway	1	V.R.I.L.C. 3/·029 two-core	Blue	1	Light in mount tube		H: 230V supply
		262		Red	262			L
116	Switchbox at doorway	1	V.R.I.L.C. 3/·029 two-core	Blue	1	Cabinet lights		N: 230V supply
		263		Red	263			L

Table 2—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
117	Switchbox at doorway	1	V.R.I.L.C. 3/·029 two-core	Blue	1	Light over door		N } 230V supply
		104		Red	104			L }
118	Start and control available station	184	V.R.I.L.C. 1/·044 five-core	Blue	D184	Box (Dist.) 103		} Control available indicator circuit
		362		White	D362			}
		356		Black	D356			} Start button circuit
		359		Green	D359			}
119	Azimuth indicator	X	V.R.I.L.C. 1/·044 five-core	White	D128	Box (Dist.) 103		} Azimuth indicator stator circuit
		Y		Red	D129			}
		1		Black	D125			} Azimuth indicator rotor circuit
		2		Green	D126			}
		3		Blue	D127			}
120	Heater over doorway	100	V.R.I.L.C. 7/·029 two-core	Blue	F100	Box (Dist.) 103		L } 230V heater supply
		116		Red	F116			N }
130	Panel (Dist.) 4834	N	V.R.I.L.C. 7/·029 two-core	Black	1	Power points on mounting board		N } 230V supply to 5A power points
		107		Red	107			L }
290	Heat exchanger	3	V.R.I.L.C. 7/·029 four-core	Red	653	Header tank thermostat		L } Fan motor control circuit
		11		Blue	654			N }

Table 2—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
295	Panel (Dist.) 4834	Rφ	P.V.C. 7/·044 single-core, four conductors		32	Panel (a.c. Dist.) 4461		Rφ } Radar a.c. supply
		Yφ			35			Yφ
		Bφ			38			Bφ
		N			41			N

TABLE 3

AM and TG 2002B (modulator building): connector table

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
1	Main distribution board	N	V.R.I.L.C. 37/·083 single-core	Red	1	No. 1 auto transformer	36 ft	} a.c. supply to No. 1 auto transformer
2	Main distribution board	2	V.R.I.L.C. 37/·083 single-core	Yellow	2	No. 1 auto transformer	36 ft	
3	Main distribution board	3	V.R.I.L.C. 37/·083 single-core	Black	3	No. 1 auto transformer	36 ft	
4	Main distribution board	115	V.R.I.L.C. 7/·029 two-core	Red	115	Slipring cubicle	29 ft	a.c. to cabin heaters
		116		Black	116	Slipring cubicle		

Table 3—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
5	Main distribution board	1	V.R.I.L.C. 7/·044 single-core		E1	Slipring cubicle	29 ft	N (a.c. supply to cabin)
6	Main distribution board	2	V.R.I.L.C. 7/·044 three-core	White	E2	Slipring cubicle	29 ft	Wφ (a.c. supply to cabin)
		3		Black	E3			Bφ (a.c. supply to cabin)
		4		Red	E4			Rφ (a.c. supply to cabin)
7	Main distribution board	132	V.R.I.L.C. 7/·044 single-core		132	Panel (T.G. and Aux. switching) 4833A	45 ft	N (a.c. supply)
8	Main distribution board	168	V.R.I.L.C. 7/·044 three-core	Red	168	Panel (T.G. and Aux. switching) 4833A	45 ft	Rφ (a.c. supply)
		169		White	169			Wφ (a.c. supply)
		170		Black	170			Bφ (a.c. supply)
9	Main distribution board	166	V.R.I.L.C. 7/·029 two-core	Black	166	Gantry termination board	52 ft	Gantry lights
		167		Red	167			Gantry lights
10	Main distribution board	207	V.R.I.L.C. 7/·029 two-core	Red	207	Slipring cubicle	29 ft	Supply to slipring cubicle heater
		208		Black	208			Supply to slipring cubicle heater
11	No. 1 auto transformer	A7	V.R.I.L.C. 37/·072 single-core		11	No. 1 electronic controller	58 ft	Aφ (660V supply to No. 1 electronic controller)
12	No. 1 auto transformer	B7	V.R.I.L.C. 37/·072 single-core		12	No. 1 electronic controller	58 ft	Bφ (660V supply to No. 1 electronic controller)
13	No. 1 auto transformer	C7	V.R.I.L.C. 37/·072 single-core		13	No. 1 electronic controller	58 ft	Cφ (660V supply to No. 1 electronic controller)
14	No. 1 auto transformer	N	V.R.I.L.C. 37/·072 single-core		14M	No. 1 electronic controller	58 ft	N (660V supply to No. 1 electronic controller)

Table 3—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
15	No. 1 auto transformer	N	V.R.I.L.C. 7/·029 single-core	Black	14	No. 1 electronic controller	58 ft	440V neutral supply to No. 1 electronic controller
16	No. 1 auto transformer	B1	V.R.I.L.C. 7/·029 three-core	White	44	No. 1 electronic controller	58 ft	440V a.c. supply to No. 1 electronic controller
		C1		Blue	45			
		A1		Red	46			
17	No. 1 electronic controller	184	V.R.I.L.C. 3/·029 two-core	Red	D184	Slipring cubicle	27 ft	50V supply to control available lamp
		362		Blue	D362			
18	No. 1 electronic controller	356	V.R.I.L.C. 3/·029 two-core	Red	D356	Slipring cubicle	27 ft	Turning gear "crawl" control
		359		Blue	D359			
19	No. 1 electronic controller	340	V.R.I.L.C. 3/·029 two-core	Red	D340	Slipring cubicle	27 ft	Turning gear control interlock circuit
		346		Blue	D346			
20	No. 1 electronic controller	35	V.R.I.L.C. 3/·029 two-core	Blue	D35	Slipring cubicle	27 ft	Turning gear control, stop and interlock circuit
		118		Red	D118			
21	Panel (Turning Gear and Aux. switching) 4833A	128	V.R.I.L.C. 3/·029 two-core	Red	D128	Slipring cubicle	38 ft	50V: magslip energizing supply
		129		Blue	D129			
22	Gantry termination board	125	V.R.I.L.C. 1/·044 five-core	Black	D125	Slipring cubicle	35 ft	Azimuth indicator interconnections
		126		Green	D126			
		127		Blue	D127			
		128		White	D128			
		129		Red	D129			

Table 1—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
26	Panel (Turning Gear and Aux. switching) 4833A	132	V.R.I.L.C. 3/·029 two-core	Blue	132	Gantry termination board	23 ft	a.c. supply to oil flow unit
		150		Red	150			
27	Panel (Turning Gear and Aux. switching) 4833A	151	V.R.I.L.C. 7/·029 three-core	Red	151	Gantry termination board	26 ft	a.c. supply to oil scavenge pump
		152		White	152			
		153		Blue	153			
28	Panel Turning (Gear and Aux. switching) 4833A	154	V.R.I.L.C. 7/·029 three-core	Red	154	Gantry termination board	26 ft	a.c. supply to oil supply pump
		155		White	155			
		156		Blue	156			
29	Box (Dist.) 102	22	V.R.I.L.C. 7/·029 three-core	Red	209	Gantry termination board	34 ft	1:1 Selsyn stator
		23		White	210			
		24		Blue	211			
30	Box (Dist.) 102	20	V.R.I.L.C. 7/·029 two-core	Red	212	Gantry termination board	34 ft	1:1 Selsyn rotor
		21		Blue	213			
31	Box (Dist.) 102	63	V.R.I.L.C. 7/·029 three-core	Red	159	Gantry termination board	34 ft	30:1 Selsyn stator
		64		White	160			
		65		Blue	161			
32	Box (Dist.) 102	61	V.R.I.L.C. 7/·029 two-core	Blue	162	Gantry termination board	34 ft	30:1 Selsyn rotor
		62		Red	163			

Table 2—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
34	No. 1 electronic controller	14M	V.R.I.L.C. 19/·083 two-core	Blue	14M	Gantry termination board	28 ft	Motor A armature circuit
		303		Red	303			
35	No. 1 electronic controller	14	V.R.I.L.C. 7/·029 two-core	Blue	14N	Gantry termination board	28 ft	Motor A field circuit
		306			306			
36	No. 1 electronic controller	14M	V.R.I.L.C. 19/·083 two-core	Blue	14M	Gantry termination board	28 ft	Motor B armature circuit
		309		Red	309			
37	No. 1 electronic controller	14	V.R.I.L.C. 7/·029 two-core	Blue	14	Gantry termination board	28 ft	Motor B field circuit
		312		Red	312			
40	Control console	125	V.R.I.L.C. 1/·044 five-core	Black	125	Gantry termination board	20 ft	Azimuth indicator
		126		Green	126			
		127		Blue	127			
		128		White	128			
		129		Red	129			
41	Panel (Turning Gear and Aux. switching) 4833A	157	V.R.I.L.C. 7/·044 two-core	Red	157	Gantry termination board	28 ft	Brake supply
		158		Blue	158			
42	Panel (Turning Gear and Aux. switching) 4833A	174	V.R.I.L.C. 7/·029 three-core	Red	A	No. 1 water pump	36 ft	a.c. supply to No. 1 water pump
		175		White	B			
		176		Blue	C			
43	Panel (Turning Gear and Aux. switching) 4833A	177	V.R.I.L.C. 7/·029 two-core	Red	177	No. 1 heat exchanger	30 ft	a.c. supply to No. 1 rad. heater
		178		Blue	178			

Table 2—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
44	Panel (Turning Gear and Aux. switching) 4833A	171	V.R.I.L.C. 7/·029 three-core	Red	A	No. 1 fan	36 ft	a.c. supply to No. 1 fan
		172		White	B			
		173		Blue	C			
61	Box (Dist.) 102	48	V.R.I.L.C. 3/·029 two-core	Red	164	Gantry termination board	30 ft	Aerial alignment switch circuit
		49		Blue	214			
62	Box (Dist.) 102	2	V.R.I.L.C. 3/·029 two-core	Red	244	Console 6035	31 ft	Aerial speed indication
		4		Blue	248			
63	Box (Dist.) 102	16	V.R.I.L.C. 1/·044 five-core	Black	14	Console 6035	36 ft	Turning gear remote control
		17		Green	351			
		13		Blue	352			
		14		White	353			
		15		Red	354			
64	Box (Dist.) 102	18	V.R.I.L.C. 3/·029 three-core	Red	184	Console 6035	31 ft	Indicator lamps
		26		Blue	187			
		19		White	361			
65	Box (Dist.) 102	26	V.R.I.L.C. 3/·029 two-core	Blue	187	Panel (Turning Gear and Aux. switching) 4833A	24 ft	Brakes off—pilot control
		25		Red	220			
66	Box (Dist.) 102	61	V.R.I.L.C. 7/·029 two-core	Blue	162	Panel (Turning Gear and Aux. switching) 4833A	24 ft	30:1 Selsyn a.c. supply
		62		Red	163			

Table 3—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
93	Main distribution board	290	V.R.I.L.C. 7/·029 two-core	Red	290	Gantry termination board	52 ft	Gantry power
		291		Blue	291			
94	Gantry termination board	31	V.R.I.L.C. 1/·044 five-core	White	31	Console 6035	20 ft	Oil system interlock circuit
		35		Blue	35			
		93		Green	93			
		117		Black	117			
95	Gantry termination board	245	V.R.I.L.C. 1/·044 five-core	Green	245	Console 6035	20 ft	Tachogenerators A & B circuits
		246		White	246			
		247		Black	247			
		249		Blue	249			
96	Gantry termination board	250	V.R.I.L.C. 1/·044 five-core	Black	250	Console 6035	20 ft	Tachogenerators C & D circuits
		251		White	251			
		252		Blue	252			
		253		Green	253			
126	No. 2 electronic controller	14M	V.R.I.L.C. 19/·083 two-core	Blue		Armature D circuit-switch C	32 ft	Motor D armature circuit
		303		Red				
127	No. 2 electronic controller	14M	V.R.I.L.C. 19/·083 two-core	Blue		Armature D circuit-switch D	32 ft	Motor D armature circuit
		209		Red				

Table 3—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
128	No. 2 electronic controller	14	V.R.I.L.C. 7/·029 two-core	Blue	14	Gantry termination board	32 ft	Motor C field circuit
		306		Red	306			
129	No. 2 electronic controller	14	V.R.I.L.C. 7/·029 two-core	Blue	14	Gantry termination board	32 ft	Motor D field circuit
		312		Red	312			
131	No. 2 auto transformer	A7	V.R.I.L.C. 37/·072 single-core		11	No. 2 electronic controller	66 ft	Aφ } 660V supply to No. 2 electronic controller
132	No. 2 auto transformer	B7	V.R.I.L.C. 37/·072 single-core		12	No. 2 electronic controller	66 ft	Bφ
133	No. 2 auto transformer	C7	V.R.I.L.C. 37/·072 single-core		13	No. 2 electronic controller	66 ft	Cφ
134	No. 2 auto transformer	N	V.R.I.L.C. 37/·083 single-core		14M	No. 2 electronic controller	66 ft	N
135	No. 2 auto transformer	14	V.R.I.L.C. 7/·029 single-core		14	No. 2 electronic controller	66 ft	440V supply to No. 2 electronic controller
136	No. 2 auto transformer	44	V.R.I.L.C. 7/·029 three-core	Blue	44	No. 2 electronic controller	66 ft	
		45		White	45			
		46		Red	46			
137	Main distribution board	21	V.R.I.L.C. 37/·083 single-core		21	No. 2 auto transformer	36 ft	a.c. supply to No. 2 auto transformer
138	Main distribution board	22	V.R.I.L.C. 37/·083 single-core		22	No. 2 auto transformer	36 ft	
139	Main distribution board	23	V.R.I.L.C. 37/·083 single-core		23	No. 2 auto transformer	36 ft	

Table 3 —*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
140	Console 6035	32	V.R.I.L.C. 1/·044 five-core	Green	32	No. 1 fan starter	22 ft	Fan contactors pilot circuits
		33		Blue	33			
		43		Blue	43			
		272		White	272			
141	Console 6035	117	V.R.I.L.C. 1/·044 five-core	White	117	Brakes	22 ft	Brake contactor pilot and interlock circuits
		340		Black	340			
		346		Green	346			
		118		Blue	4	Interlock relay		
142	Panel (Turning Gear and Aux. switching) 4833A	60	V.R.I.L.C. 7/·029 three-core	Red	A	No. 2 water pump	32 ft	a.c. supply to No. 2 water pump
		61		White	B			
		62		Blue	C			
143	Panel (Turning Gear and Aux. switching) 4833A	66	V.R.I.L.C. 7/·029 two-core	Red	66	No. 2 heat exchanger	32 ft	a.c. supply to No. 2 rad. heater
		67		Blue	67			
144	Panel (Turning Gear and Aux. switching) 4833A	63	V.R.I.L.C. 7/·029 three-core	Red	63	No. 2 heat exchanger	32 ft	a.c. supply to No. 2 rad. fan
		64		White	64			
		65		Blue	65			

TABLE 4

AM and TG 2002B (cabin and gantry): connector table

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
45	Gantry termination board	245	V.R.I.L.C. 7/·029 two-core	Red	AA	Tachogenerator A	66 ft	Tachogenerator A supply
		249		Blue	A			
46	Gantry termination board	14M	V.R.I.L.C. 19/·083 two-core	Blue	YY	Motor A	60 ft	Motor A armature circuit
		303		Red	AA			
47	Gantry termination board	14	V.R.I.L.C. 7/·029 two-core	Blue	XX	Motor A	60 ft	Motor A field circuit
		306		Red	X			
48	Gantry termination board	14	V.R.I.L.C. 7/·029 two-core	Blue	XX	Motor B	74 ft	Motor B field circuit
		312		Red	X			
49	Gantry termination board	14M	V.R.I.L.C. 19/·083 two-core	Blue	YY	Motor B	74 ft	Motor B armature circuit
		309		Red	AA			
50	Gantry termination board	246	V.R.I.L.C. 7/·029 two-core	Red	AA	Tachogenerator B	78 ft	Tachogenerator B supply
		247		Blue	A			
51	Gantry termination board	151	V.R.I.L.C. 7/·029 three-core	Red	A1	Oil scavenge pump	60 ft	Oil scavenge pump supply
		152		White	B1			
		153		Blue	C1			
52	Gantry termination board	154	V.R.I.L.C. 7/·029 three-core	Red	A1	Oil supply pump	60 ft	Supply to oil supply pump
		155		White	B1			
		156		Blue	C1			

Table 4—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
53	Gantry termination board	164	V.R.I.L.C. 3/·029 two-core	Red	164	Aerial alignment switches	72 ft	Aerial alignment circuits
		214		Blue	214			
54	Gantry termination board	125	V.R.I.L.C. 3/·029 three-core	Red	1	Magslip transmitter	60 ft	Magslip transmitter stator supply
		126		White	2			
		127		Blue	3			
55	Gantry termination board	128	V.R.I.L.C. 3/·029 two-core	Red	X	Magslip transmitter	60 ft	Magslip transmitter rotor supply
		129		Blue	Y			
56	Gantry termination board	159	V.R.I.L.C. 7/·029 three-core	Red	E-8	30:1 Selsyn	77 ft	30:1 Selsyn stator supply
		160		White	D-7			
		161		Blue	F-9			
57	Gantry termination board	162	V.R.I.L.C. 7/·029 two-core	Red	A1-11	30:1 Selsyn	77 ft	30:1 Selsyn rotor supply
		163		Blue	A2-12			
58	Gantry termination board	209	V.R.I.L.C. 7/·029 three-core	Red	(A1-C2)-(3-8)	1:1 Selsyn	78 ft	1:1 Selsyn stator supply
		210		White	(B1-A2)-(5-4)			
		211		Blue	(C1-B2)-(7-6)			
59	Gantry termination board	212	V.R.I.L.C. 7/·029 two-core	Red	(O-P)-(1-12)	1:1 Selsyn	78 ft	1:1 Selsyn rotor supply
		213		Blue	(E)-(10)			
67	Oil flow relay	204	V.R.I.L.C. 3/·029 two-core	Red	204	Oil flow transmitter unit	66 ft	Interlock circuit—oil flow unit
		205		Blue	205			

Table 4—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length		Core Function
68	Gantry termination board	157	V.R.I.L.C. 7/·044 two-core	Red	157	Perigrip brake	59 ft		a.c. supply to Perigrip brakes
		158		Blue	158				
69	Gantry termination board	31	V.R.I.L.C. 3/·029 two-core	Red	31	Junction box G	17 ft		Gantry safety switches
		117		Blue	117				
70	Gantry termination board	166	V.R.I.L.C. 7/·029 two-core	Blue	166	Junction box G	17 ft		Gantry lighting supply
		167		Red	167				
71	Gantry termination board	290	V.R.I.L.C. 7/·029 two-core	Red	290	Power point	21 ft	L	Gantry power point supply
		291		Blue	291			N	
72	Gantry termination board	290	V.R.I.L.C. 7/·029 two-core	Red	290	Power point	33 ft	L	Gantry power point supply
		291		Blue	291			N	
73	Junction box G	133	V.R.I.L.C. 3/·029 two-core			Top light switch	28 ft		Top deck lighting circuit
		167							
74	Junction box G	117	V.R.I.L.C. 3/·029 two-core			Bottom safety switch	28 ft		Bottom safety switch circuit
		206							
75	Junction box G	114	V.R.I.L.C. 3/·029 two-core		114	Junction box B	28 ft		Bottom deck swan-neck light circuit
		166			166				
76	Junction box G	133	V.R.I.L.C. 3/·029 two-core		133	Junction box F	20 ft		Top deck lights supply
		166			166				
77	Junction box G	31	V.R.I.L.C. 3/·029 two-core			Top safety switch	28 ft		Top safety switch circuit
		206							

Table 4 —*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
78	Junction box G	114 166	V.R.I.L.C. 3/·029 two-core		114 166	Junction box D	10 ft	Bottom deck bulkhead lights supply
79	Junction box G	114 167	V.R.I.L.C. 3/·029 two-core			Bottom light switch	11 ft	Bottom deck light circuit
80	Junction box F	133 166	V.R.I.L.C. 3/·029 two-core		133 166	Junction box A	30 ft	Interconnections for top deck swan-neck lights
81	Junction box F	133 166	V.R.I.L.C. 3/·029 two-core		133 166	Junction box H	30 ft	Interconnections for top deck swan-neck lights
82	Junction box H	133 166	V.R.I.L.C. 3/·029 two-core		133 166	Junction box J	30 ft	Interconnections for top deck swan-neck lights
83	Junction box F	133 166	V.R.I.L.C. 3/·029 two-core		133 166	Junction box E	30 ft	Interconnections for top deck swan-neck lights
84	Brake	157 158	V.R.I.L.C. 7/·029 two-core		157 158	Brake	33 ft	Perigrip brakes interconnection
85	Junction box D	114 166	V.R.I.L.C. 3/·029 two-core		114 166	Junction box C	33 ft	Lighting interconnection
86	Junction box D	114 166	V.R.I.L.C. 3/·029 two-core			Bottom deck bulkhead light	13 ft	Bulkhead light supply
87	Junction box C	114 166	V.R.I.L.C. 3/·029 two-core			Bottom deck bulkhead light	13 ft	Bulkhead light supply

Table 4—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
88	Junction box C	114	V.R.I.L.C. 3/·029 two-core			Bottom deck bulkhead light	45 ft	Bulkhead light supply
		166						
100	Box (Dist.) 103	E2	V.R.I.L.C. 7/·044 three-core	White		RADAR MAINS switch on Panel (Dist.) 4834		Three phase supply
		E3		Blue				
		E4		Red				
101	Box (Dist.) 103	E1	V.R.I.L.C. 7/·029 three-core	Cores connected		Neutral link on Panel (Dist.) 4834		Neutral conductor
102	Box (Dist.) 103	F1	V.R.I.L.C. 7/·029 two-core	Blue	N	Panel (Dist.) 4834		5A power points supply
		F107		Red	107			
103	Box (Dist.) 103	F1	V.R.I.L.C. 1/·044 five-core	Blue	N	Panel (Dist.) 4834		Lights neutral
		F102		White	102			Fan switch circuit
		F103		Black	103			
		F104		Red	104			Wall light, switch circuit
		F105		Green	105			Supply to light switches
105	Panel (Dist.) 4834	260	V.R.I.L.C. 7/·029 two-core	Red	260	Power point		L — 230V a.c. supply
		N		Blue	1			N
106	Panel (Dist.) 4834	102	V.R.I.L.C. 3/·029 two-core	Red	102	Fan		L — 230V a.c. fan supply
		N		Blue	1			N
107	Panel (Dist.) 4834	104	V.R.I.L.C. 3/·029 two-core	Red	104	Light on far wall of cabin		L — 230V a.c. light supply
		N		Blue	1			N

Table 4—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
108	Stop button	35	V.R.I.L.C. 3/·029 two-core	Red	F35	Box (Dist.) 103		Interlock circuit
		101		Blue	F101			
109	Thermostat	100	V.R.I.L.C. 7/·029 three-core	Blue	F100	Box (Dist.) 103		Heater circuit
		115		Red	F115			
		116		White	F116			
110	Thermostat	100	V.R.I.L.C. 7/·029 two-core	Blue	100	Heater		230V a.c. heater supply
		116		Red	116			
111	Box (Dist.) 103	F101	V.R.I.L.C. 1/·044 five-core	Blue	101	Stop at doorway		Hand turning gear interlock circuit
		D118		Green	118			
		D340		White	340			Brake contactor circuit
		D346		Black	346			
112	Box (Dist.) 103	F1	V.R.I.L.C. 1/·044 five-core	Blue	1	Switchbox at doorway		Lights neutral
		F102		White	102			Fan switch circuit
		F103		Black	103			
		F104		Red	104			Wall light switch circuit
		F105		Green	105			Supply to light switches
113	Box (Dist.) 103	F1	V.R.I.L.C. 7/·029 two-core	Blue	1	Switchbox at doorway		N 230V supply to 5A power points
		F107		Red	107			L
114	Stop at doorway	118	V.R.I.L.C. 1/·044 five-core	Green	A	Microswitch A		Hand turning interlock circuit
		188		Red	C	Microswitch A		

Table 4—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
		340		White	A	Microswitch B		Brake contactor operating circuit
		346		Black	C	Microswitch B		
115	Switchbox at doorway	1	V.R.I.L.C. 3/·029 two-core	Blue	1	Light in mount tube	N	230V supply
		262		Red	262		L	
116	Switchbox at doorway	1	V.R.I.L.C. 3/·029 two-core	Blue	1	Cabinet lights	N	230V supply
		263		Red	263		L	
117	Switchbox at doorway	1	V.R.I.L.C. 3/·029 two-core	Blue	1	Light over door	N	230V supply
		104		Red	104		L	
118	Start and control available station	184	V.R.I.L.C. 1/·044 five-core	Blue	D184	Box (Dist.) 103		Control available indicator circuit
		362		White	D362			
		356		Black	D356			Start button circuit
		359		Green	D359			
119	Azimuth indicator	X	V.R.I.L.C. 1/·044 five-core	White	D128	Box (Dist.) 103		Azimuth indicator stator circuit
		Y		Red	D129			
		1		Black	D125			Azimuth indicator rotor circuit
		2		Green	D126			
		3		Blue	D127			
120	Heater over doorway	100	V.R.I.L.C. 7/·029 two-core	Blue	F100	Box (Dist.) 103	L	230V heater supply
		116		Red	F116		N	
130	Panel (Dist.) 4834	N	V.R.I.L.C. 7/·029 two-core	Black	1	Power points on mounting board	N	230V supply to 5A power points
		107		Red	107		L	

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Table 4—*continued*

Cable No.	Termination	Pin or Term No.	Cable Type	Core Colour	Pin or Term No.	Termination	Cable Length	Core Function
145	Gantry termination board	250	V.R.I.L.C. 7/·029 two-core	Blue	A	Tachogenerator C	76 ft	Tachogenerator C supply
		251		Red	AA			
146	Gantry termination board	303	V.R.I.L.C. 19/·083 two-core	Red	AA	Motor C	73 ft	Motor C armature circuit
		14M		Blue	YY			
147	Gantry termination board	14	V.R.I.L.C. 7/·029 two-core	Blue	XX	Motor C	73 ft	Motor C field circuit
		306		Red	X			
148	Gantry termination board	14	V.R.I.L.C. 7/·029 two-core	Blue	XX	Motor D	65 ft	Motor D field circuit
		312		Red	X			
149	Gantry termination board	309	V.R.I.L.C. 19/·083 two-core	Red	AA	Motor D	65 ft	Motor D armature circuit
		14M		Blue	YY			
150	Gantry termination board	252	V.R.I.L.C. 7/·029 two-core	Blue	A	Tachogenerator D	68 ft	Tachogenerator D supply
		253		Red	AA			
151	Brake A	157	V.R.I.L.C. 7/·029 two-core		157	Brake C	18 ft	Perigrip brakes interconnection
		158			158			
152	Brake B	157	V.R.I.L.C. 7/·029 two-core		157	Brake D	18 ft	Perigrip brakes interconnection
		158			158			
290	Heat exchanger	3	V.R.I.L.C. 7/·029	Red	653	Header tank thermostat		L — Fan motor control circuit
		11	four-core	Blue	654			N
295	Panel (Dist.) 4834	Rφ	P.V.C. 7/·044 single core		32	Panel (A.C. Dist.)		Rφ — Radar a.c. supply
		Yφ	four conductors		35	4461		Yφ
		Bφ			38			Bφ
		N			41			N