

PURPOSE Aircraft Warning and Height Estimation.

FREQUENCY 86 Mc/s, 88 Mc/s or 90 Mc/s (spot frequencies).

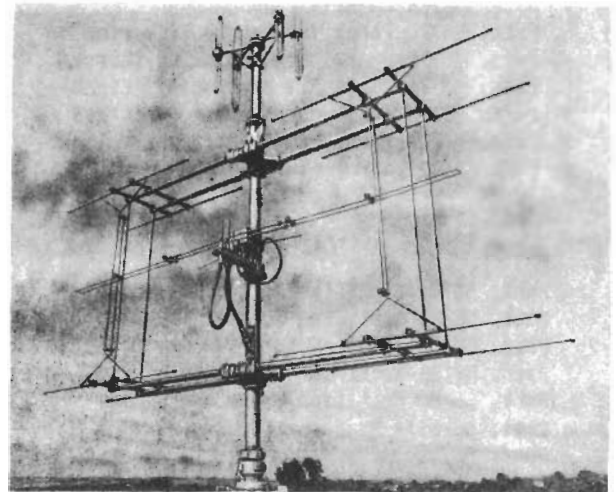
WAVELENGTH 3.5, 3.4 or 3.3 metres (approx.)

POWER OUTPUT 450 kW.

PULSE REPETITION FREQUENCY 250 pulses per second.

PULSE LENGTH 5 and 15 microseconds

BEAM-WIDTH 35° horizontal



AERIAL OUTFIT AQQ

AERIAL ROTATION SPEED 0-7 revs per minute clockwise
0-2 revs per minute anticlockwise

INTERMEDIATE FREQUENCY 8 Mc/s

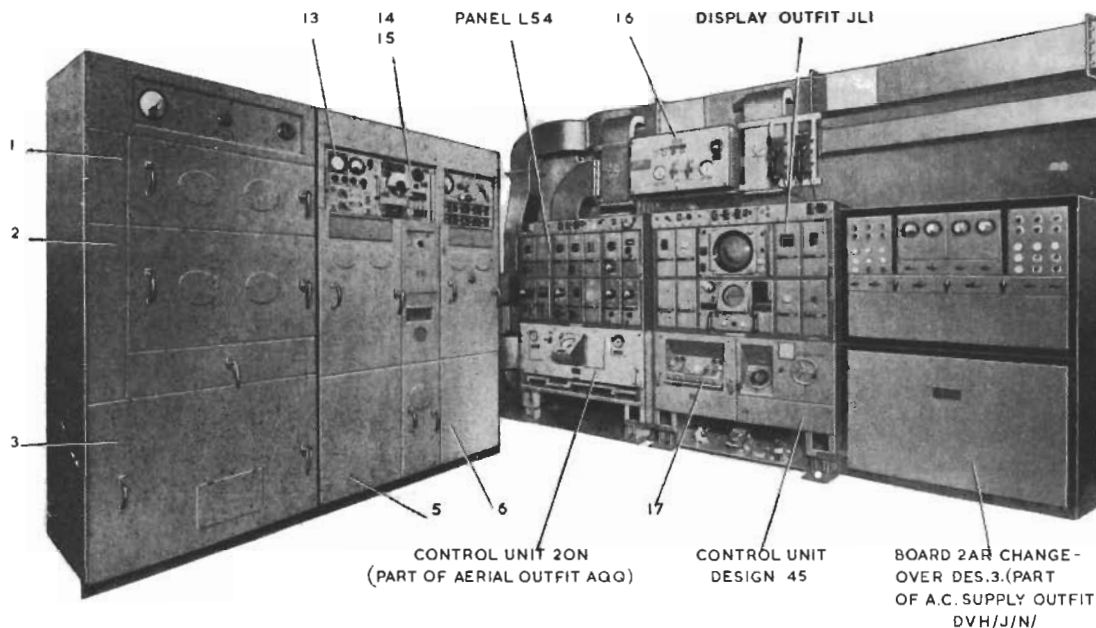
RECEIVER BANDWIDTHS (i) 65 kc/s for 15 μs (long) pulse
(ii) 500 kc/s for 5 μs (short) pulse
For group counting, bandwidth of 500 kc/s for 15 μs pulse is used.

POWER REQUIREMENTS AND CONSUMPTION

180V 500 c/s 3.5 kW	220V D.C. 10½ kW
120/360V 250 c/s 7.5 kW	22V D.C. 0.15 kW
230V 50 c/s single phase 2½ kW	Gyro supplies to 4 - Patt. 9298 Motors.
50V 50 c/s single phase 0.2 kW	

HEAT DISSIPATION

Modulator and transmitter - 6½ kW
Receiver - 800 watts
U.D.U. - 1 kW



VIEW OF A TYPE 960 OFFICE

MAJOR UNITS

(a) Transmitter and Modulator (Panel 3BT)

Important Sub-Units

1. Patt. 58771 Panel 3BT Oscillating
2. Patt. 58772 Panel 3BT Amplifying
3. Patt. 58773 Panel 3BT Output
4. Patt. 58774 Panel 3BT Supply Filtering
5. Patt. 58775 Panel 3BT Modulating (Left)
6. Patt. 58776 Panel 3BT Modulating (Right)
7. Patt. 58777 Framework, Sprung, 6 ft x 3 ft
8. Patt. 58778 Air Duct Outlet for Panel 3BT
9. Patt. 58779 Air Duct Inlet for Panel 3BT
10. Patt. 58811 & 59194 T/R Switch and Aerial Filter (in 3)
11. Patt. 58812 Voltage Control and Trigger Unit (in 6)
12. Patt. 58813 Dummy Load, Design 9 (in 8)
13. Patt. 55833 Wavemonitor G301 (in 5)
14. Patt. W881 Wavemeter G69 (in 5)
15. Patt. W879 Supply Unit for G69 (in 5)
16. Patt. 65785 Board Watchkeeping Design 2
17. Patt. 58770 Trigger Unit Design 4

(b) Receiver

Patt. 58781/A Panel L54 (Receiving) consisting of:-

- | | |
|---|---|
| Patt. 58782 Amplifier Unit I.F. Design 8 | Patt. 58790 Auto Frequency Control Unit |
| Patt. 58783 Amplifier Unit I.F. Design 9 | Patt. 58791 Rectifier Unit, Design 102 |
| Patt. 58784 Filter-Unit (Video) | Patt. 58792 Rectifier Unit, Design 103 (2 in No.) |
| Patt. 58785 Rectifier Unit, Design 100 | Patt. 58793 Amplifier Unit (Power Video) |
| Patt. 58786 Rectifier Unit, Design 101 | Patt. 58794 Cathode Follower Unit, Design 13 |
| Patt. 58787/A Range Calibrator, Design 3 | Patt. 58796 Switch-Unit, Design 31 |
| Patt. 58788 Performance Meter, Design 8 | Patt. 58797 Switch-Unit, Design 32 |
| Patt. 58789 Amplifier Unit, R.F. Design 8 | Patt. 58798 Switch-Unit, Design 33 |

(c) Aerial Outfit AQQ

- Containing (i) Patt. 57604 Control Unit 20N
(ii) Patt. 57692 Pedestal Unit 19AL
(iii) Amplidyne Generator Set consisting of Patt. 59376 Motor Generator Servo and
Patt. 65293 Contactor Unit Des. 8
(See separate data sheet)

(d) Frequency Control Units

- | | |
|---|------------------------------|
| Patt. 58670 Control Unit, Design 45 local frequency | |
| Patt. 59708 Control Unit, Design 44 (Fitted in R.D.R. for remote control in Type 960/982 Ships) | Part of A.I.C. Outfit PDA |
| Patt. 59709 Control Unit, Design 46 (Fitted in R.D.R. for remote control in Type 960/277 Ships) | Part of A.I.C. Outfits PDB/C |

ASSOCIATED POWER SUPPLY OUTFIT

A.C. Supply Outfits DVH or DVJ or DVN. (see separate data sheets)

ASSOCIATED INTERROGATORS AND TRANSPONDERS

- (i) Type 940 (ii) Type 242P or 242Q (iii) Type 253Q

PHYSICAL DATA

- | | |
|--|--|
| Weight of office equipment (inclusive of power supply control and distribution panels) | - 57 cwt. |
| Weight of Amplidyne Set and Contactor (close to office) | - 3 cwt. |
| Weight of Aerial Outfit AQQ and Pedestal 19AL | - 13 cwt. |
| Dimensions of typical office | - 14' 6" x 11' (exclusive of stiffeners, lagging etc.) |

BRIEF DESCRIPTION

A long range aircraft warning set fitted in cruisers and above, as a replacement of the Type 281 series. Type 960 is normally fitted either in conjunction with Type 277 and 293 or with Types 982, 983 and 293. It employs the following displays in various positions - Display Outfit JE (P.P.I.) Display Outfit JL1 and JM1 (UD.U.) Display Outfit JK (Skiatron) and Display Outfit JN (Azicator). G-band interrogation is provided by Type 940 and normal interrogation by Types 242P or Q. Where fitted in conjunction with Type 277 and 293 Action Information Centre Outfit PDB is fitted with the various remote displays and where fitted with Types 982, 983, 293 A.I.C. Outfit PDA is fitted.

REMARKS

The maximum length of the aerial cable from the Type 960 office to the Aerial Outfit AQQ should not under any circumstances exceed 160 feet.

HANDBOOKS

B.R.1774(1)(2)(3) (960) B.R.1867 (AQQ)

ESTABLISHMENT LISTS

E.850 (960) E.851 (AQQ) E.852 (JL & JM)
E.919 (PDA & PDB)

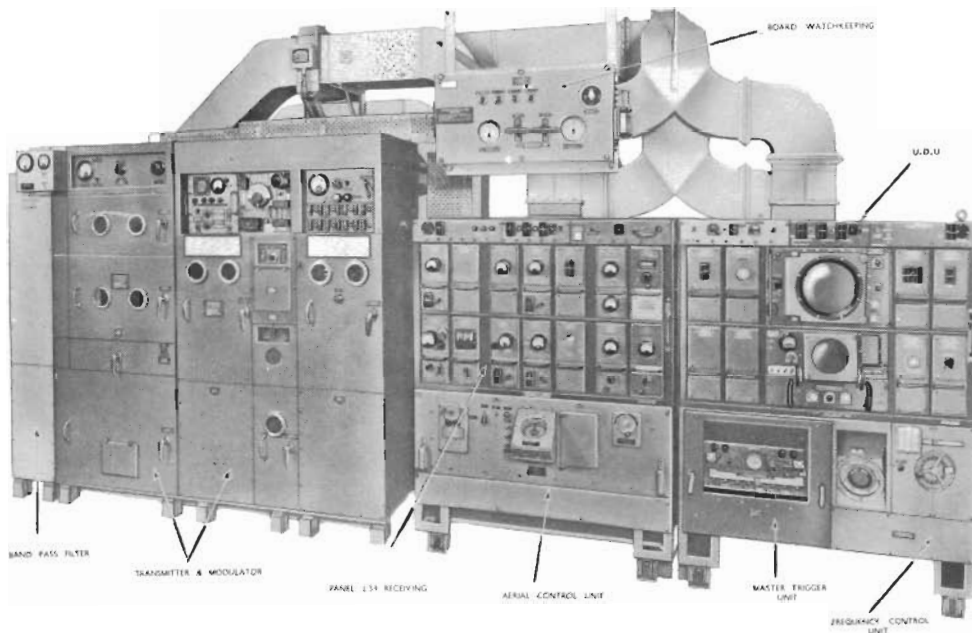
INSTALLATION SPECIFICATIONS

B.640 (960) B.527 (AQQ)
B.556 (JL & JM) B.699 (PDA)

TYPE 960

960

SUMMARY OF DATA



TYPE 960 GENERAL VIEW OF OFFICE EQUIPMENT

PURPOSE

Aircraft warning radar

BRIEF DESCRIPTION

Type 960 is a long range warning radar which is normally fitted in association with certain other radar sets such as Types 277P/Q, 293P/Q, 872, 983, 992 and I.F.F. to form an integrated warning system. In most cases all the sets in a combination are powered from a common supply system, and transmissions are synchronised by pulses from a master trigger unit. Anti-jamming circuits are incorporated, and remote control of switching for these circuits is provided, usually in the R.D.R. All operational information from Type 960 and associated sets is available from displays in the operations Room and R.D.R. A display panel is also fitted in the 960 office for setting-up purposes.

FREQUENCY

Spot frequencies within the band 80 to 90 MHz.

POWER OUTPUT

450 kW approximately

PULSE REPETITION FREQUENCY

250 pulses per second.

PULSE DURATION

5 or 15 microseconds.

INTERMEDIATE FREQUENCY

8 MHz

RECEIVER BANDWIDTH

- (a) 65 kHz for long pulse (15 μ s)
- (b) 500 kHz for short pulse (5 μ s)

RESTRICTED

MAJOR UNITS

(a) Transmitter and Modulator (panel 3 BT)

- | | | | |
|--------------|------------------------|--------------|-----------------------------|
| 1. AP 58771A | Panel 3 BT Oscillating | 4. AP 58774 | Panel 3 BT Supply Filtering |
| 2. AP 58772A | Panel 3 BT Amplifying | 5. AP 58775A | Panel 3 BT Modulating Left |
| 3. AP 58773A | Panel 3 BT Output | 6. AP 58776 | Panel 3 BT Modulating Right |

(b) Panel L54 Receiving AP 58781A

- | | | | | | |
|-----|-----------|--|------|----------|-------------------------------|
| RU1 | AP 58782 | Amplifier Unit I.F. Des. 8 (Narrow Band) | RU10 | AP 58791 | Rectifier Unit Des. 102 |
| RU2 | AP 58783 | Amplifier Unit I.F. Des. 9 (Wide Band) | RU11 | AP 58792 | Rectifier Unit Des. 103 |
| RU3 | AP 58784 | Filter Unit Video Des. 16 | RU12 | AP 58793 | Amplifier Unit Power Video |
| RU4 | AP 58785 | Rectifier Unit Des. 100 | RU13 | AP 58794 | Cathode Follower Unit Des. 13 |
| RU5 | AP 58786 | Rectifier Unit Des. 101 | RU14 | AP 58792 | Rectifier Unit Des. 103 |
| RU6 | AP 58787A | Range Calibrator Des. 3 | RU15 | AP 58786 | Switch Unit Des. 31 |
| RU7 | AP 58788 | Performance Meter Des. 6 | RU16 | AP 58797 | Switch Unit Des. 32 |
| RU8 | AP 58789 | Amplifier Unit R.F. Des. 8 | RU17 | AP 58798 | Switch Unit Des. 33 |
| RU9 | AP 58790 | Auto Frequency Control Unit | RU18 | - | Main Frame |

(c) Miscellaneous

- | | | | | |
|--------------|---|--|-------------------------------|---------------------------|
| 1. AP 63697C | Filter Unit Des. 64 | 6. AP 58680 | Board 2AR Distributing Des. 1 | |
| 2. AP 62861A | Meter Unit Des. 21 | or | AP 68669 | Board Distributing Des. 8 |
| | 5340-AP 172339 | Automatic Protection Unit | 7. AP 58780 | Switch Unit Local/Remote |
| 3. AP 58670 | Control Unit Des. 45 (Local Frequency) | | 8. AP 65644 | Rack, Stowage Des. 13 |
| 4. AP 58779 | Trigger Unit Des. 4 (Master Trigger Unit) | | | (for spares) |
| 5. AP 65785A | Board, Watchkeeping, Des. 2 (d.c. ships) | | | |
| | or | | | |
| | AP 61530 | Board, Watchkeeping, Des. 3 (a.c. ships) | | |

ASSOCIATED AERIAL OUTFIT

AQQ(2) or AQQ(3)

ASSOCIATED DISPLAY OUTFITS

JL/JM series

ASSOCIATED I.F.F. SETS

Type 944M(1) Interrogator, Type 954M(1) or Type 954M(2) Transponder

PHYSICAL DATA

Weight of office equipment (including local display panel, aerial control unit and power distribution board - 3 tons approximately. Dimensions of typical office 14 ft 6 in long, 11 ft wide, 7 ft high.

POWER SUPPLIES

(a) D.C. Ships

- 220 V d.c. 10.25 kW 24 V d.c. 200 W
- 230 V 50 Hz 3 phase 2.25 kVA 50 V 50 Hz single phase 200 VA
- 120-360 V 250 Hz single phase 9 kVA
- 180 V 500 Hz single phase 3.5 kVA

(b) A.C. Ships

- 440 V 60 Hz 3 phase 10.75 kVA
- 220 V d.c. 200 W 24 V d.c. 200 W
- 230 V 60 Hz 3 phase 2.45 kVA
- 60 V 60 Hz single phase 200 VA
- 120-360 V and 180 V as for D.C. Ships

HEAT DISSIPATION IN OFFICE

7 kW approximately

HANDBOOK

BR 1181(1) and (2)

ESTABLISHMENT LIST

E 850

INSTALLATION SPECIFICATION

B640

RESTRICTED

RESTRICTEDBR 333(1)
Original**TYPE 963 TRANSMITTER AND RECEIVER****963****SUMMARY OF DATA****PURPOSE**

The transmitter and receiver, with aerial outfit AKN and associated equipments, form part of the Carrier Controlled Approach system. This is a 3 cm radar system used for aircraft carrier landing operations.

FREQUENCY

9350 to 9800 MHz

POWER OUTPUT

200 kW peak (nominal)

PULSE REPETITION FREQUENCY

Free running : 200 p/s
(+ 0% - 20%)
Externally-triggered : 400 - 2000 p/s

V. S. W. R.

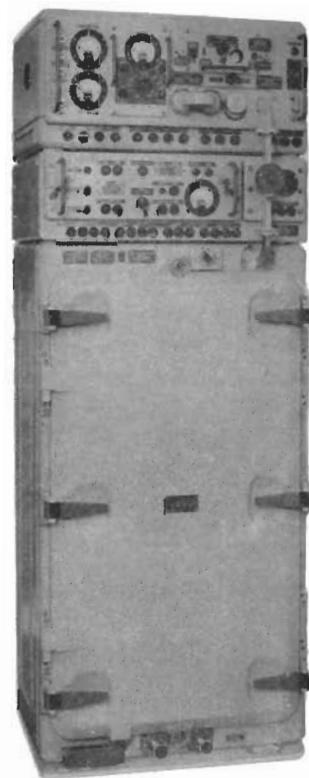
Not less than 0.67 over the frequency band.

PULSE LENGTH

0.5 microsecond +0% -20%

BEAM WIDTH

Horizontal (to half power) $1^{\circ} \pm 0.2$
Vertical (to half power) $1.65^{\circ} - 1.85^{\circ}$
Elevation angle of beam axis 3.5° but adjustable by
Dockyard between 2° and 4° .



TRANSMITTER AND RECEIVER

RECEIVER SENSITIVITY9 μ watts peak pulse r.f. input to receiver gives 1 volt peak pulse video output into 70 ohms.**RECEIVER NOISE FACTOR**

16 dB

RECEIVER BANDWIDTH"The 3 dB bandwidth" is 5 MHz \pm 1 MHz**INTERMEDIATE FREQUENCY**30 MHz \pm 1 MHz**MAJOR UNITS**

The following table lists the major units in or associated with the transmitter and receiver assemblies:-

UNIT	AP No.
1. CABINET ASSEMBLY, DESIGN 78, TRANSMITTER consisting of:	62300
Cabinet, Design 103, transmitter	62301
Sub Modulator Chassis	62304
Control Unit, Design 99, Transmitter	62307
Rectifier Chassis, 63CP, Alarm	62676
2. The following are associated with AP 62300, and are first-fitting items:	
Transmitter Chassis, 69C	62305
Rectifier Chassis, 63CA, Transmitter	62306

RESTRICTED

RESTRICTED

UNIT	AP NO.
3. CABINET ASSEMBLY, DESIGN 79, RECEIVER consisting of:	62310
Cabinet, Design 102, Receiver	62311
Receiver Drawer, 62L	62312
Waveguide Milled Block, Size 16	62704
Head-Amplifier Unit	62318
Amplifier Unit, I.F., 45 W	62319
Amplifier Unit, Video, 47J	62700
A.F.C. Unit, Design 9	62701
Wavemonitor Chassis, Design 2	62703
Rectifier Chassis, 63CB, Receiver	62313
4. ANCILLARY EQUIPMENT, consisting of:	
Switch, Waveguide, Design 3, Changeover	62666
Dummy Load, Design 20	62674
Switch, Sync and Video, Changeover	62667
Switch Unit, Design 88, Blind Sector	62668
Phase Changer	62675
Resistance Panel, Alarm	64348
Wavemonitor Unit, Design 4	64641
5. RECEIVER TEST CABINET consisting of:	
Cabinet, Design 102, Receiver	62311
Receiver Drawer, 62L	62312
Receiver Chassis, 63CB, Receiver	62313
Head Amplifier Unit	62318
Amplifier Unit, I.F., 45 W	62319
Amplifier Unit, Video, 47J	62700
A.F.C. Unit, Design 9	62701
Base, Mounting, Aluminium	62702
Wavemonitor Chassis, Design 2	62703

WEIGHT OF MAJOR ASSEMBLIES

CABINET ASSEMBLY, DESIGN 78, TRANSMITTER, AP 62300, plus Transmitter Chassis, 69C, AP 62305, and Rectifier Chassis, 63CA, Transmitter, AP 62306	540 lb
CABINET ASSEMBLY, DESIGN 79, RECEIVER	120 lb

POWER REQUIREMENTS AND CONSUMPTION

REQUIREMENTS

200 V, 400/500 Hz	: filaments, h.t. and e.h.t. transformers, and blowers if 200 V blowers are incorporated.
500 V d.c.	: control unit for transmitter switching relays and warning lights
220 V d.c.	: anti-condensation heaters in d.c. ships
or	
440 V, 60 Hz, single-phase	: anti-condensation heaters in a.c. ships

CONSUMPTION

200 V, 400/500 Hz	: transmitter, 1250 VA receiver, 300 VA
220 V d.c.	: transmitter, 100 W receiver, 30 W
or	
440 V, 60 Hz, single-phase	

AERIAL SYSTEM

Aerial Outfit AKN

HANDBOOK

BR 1557

ESTABLISHMENT LIST

E 1138

INSTALLATION SPECIFICATION

B 840

RESTRICTED