### Type 960

#### Purpose
Aircraft Warning and Height Estimation.

#### Frequency
- 86 Me/s, 88 Me/s or 90 Me/s (spot frequencies).
- 5, 5.4, 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 Rotation Speed
0-7 revs per minute clockwise
0-2 revs per minute anticlockwise

#### Intermediate Frequency
8 Me/s

#### Receiver Bandwidths
- 1) 65 kHz for 15 μs (long) pulse
- 2) 900 kHz for 5 μs (short) pulse

#### Power Requirements and Consumption
- 180V 500 a/s 3.5 kW
- 120/360V 250 a/s 7.5 kW
- 220V 100 a/s single phase 25 kW
- 380V 50 a/s single phase 0.2 kW

#### Heat Dissipation
- Radio-alter and transmitter - 64 kW
- Receiver - 800 watts
- T.O.U. - 1 kW

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#### Aerial Outfit AQG

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#### View of a Type 960 Office

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MAJOR UNITS

(a) Generator Inverter (Ng a/c Drive)

1. P/N 5771 Panel 387 Conditioning
2. P/N 5772 Panel 387 Amplifying
3. P/N 5773 Panel 387 Outward
4. P/N 5774 Panel 387 Supply Filtering
5. P/N 5776 Panel 387 Modulating (Left)
6. P/N 5776 Panel 387 Modulating (Right)
7. P/N 5778 Provisions (Gimmick), 5 ft x 3 ft
8. P/N 5778 Air Duct Outlet for Panel 387
9. P/N 5779 Air Duct Outlet for Panel 387

(b) A/C Generator

P/N 5781/4 Panel 1574 (Receiving) consisting of:
- P/N 5785 Rectifier Unit I.P. Design 8
- P/N 5786 Rectifier Unit I.P. Design 9
- P/N 5787 Filter Unit (Video)
- P/N 5788 Rectifier Unit, Design 100
- P/N 5789 Rectifier Unit, Design 101
- P/N 5787/41 Microwave Calibrator, Design 3
- P/N 5790 Performance Meter, Design 0
- P/N 5789 Amplifier Unit, R.F. Design 8

- Part 57870 Auto Frequency Control Unit
- P/N 57871 Rectifier Unit, Design 102
- P/N 57872 Rectifier Unit, Design 103 (2 in set)
- P/N 57873 Amplifier Unit (Power Video)
- P/N 57874 Cashmore Filter Unit, Design 13
- P/N 57876 Switch Unit, Design 31
- P/N 57877 Switch Unit, Design 32
- P/N 57878 Switch Unit, Design 33

(c) A/c Generator A/C

- Containing (1) Part 57694 Control Unit A/C
  (ii) Part 57692 Control Unit A/C
  (iii) Amplifiers Generator Set consisting of Part 57875 Motor Generator Set and
  Part 69293 Control Unit Design B

(See separate data sheet)

(d) Frequency Control Unit

- P/N 57907 Control Unit, Design 16 (Local Frequency)
- Part of A/G Outfit P/D
- P/N 57909 Control Unit, Design 16 (Fitted in R/D for remote control in Type 960/982 ships)
- Part of A/G Outfit P/D

ASSOCIATED POWER SUPPLY OUTFIT

- A/C Supply Outfit 319 or 319 or 319 (see separate data sheets)

ASSOCIATED INTERROGATORS AND TRANSDUCERS

- (1) Type 360, (II) Type 260, or 262 (III) Type 280

PHYSICAL DATA

- Weight of office equipment (inclusive of power supply control and distribution panels) = 57 cm.
- Weight of Amplifiers Set and Container (close to office) = 3 cm.
- Weight of A/C Outfit A/C and Federal 194 = 13 cm.
- Dimensions of office building = 14' 5" x 11' (exclusive of antennas, landing, etc.)

BRIEF DESCRIPTION

A long range aircraft warning set fitted in cruisers and above, as a replacement of the Type 260 set. Type 360 is normally fitted either in conjunction with Type 277 or 293 or with Type 960, 963 and 973. It employs the following displays in various positions: Display Unit 21 (P.P.F.1) Display Unit 22 and 23 (R.D.1). Display Outfit 21 (Elektron) and Display Outfit 22 (Ladiator). C-Head Interrogation is provided by Type 960 and normal interrogation by Type 962 or 971. Where fitted in conjunction with Type 277 and 293 A/C Outfit Information Centre 210-98 is fitted with the various remote displays and where fitted with Type 960, 963, 973 A/GC Outfit P/D is fitted.

REMARKS

The maximum length of the aerial cable from the Type 960 office to the A/C Outfit 280 should not be more than 150 feet.

HANDBOOKS

- B-17/11 (12) (3) (96) (2) B-18/8 (499)

ESTABLISHMENT LISTS

- B-5/6 (961) B-5/8 (492) B-5/5 (18) B-5/9 (499)

INSTALLATION SPECIFICATIONS

- B-5/56 (18) B-5/57 (492) B-5/56 (18) B-5/56 (492)
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 277/70, 297/70, 472, 983, 992 and I.F. to form an integrated warning system. In most
cases all the sets in a station are powered from a common auxiliary 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.O.N. All operational information from Type 960 and
associated sets is available from displays in the operations room and R.O.N. A display panel is also fitted
in the R.O.N. office for setting-up purposes.

FREQUENCY
Spot frequencies within the band 80 to 90 MHz.

POWER OUTPUT
450 kW approximately

PULSE REPEITION FREQUENCY
250 pulses per second.

PULSE DURATION
5 or 15 microseconds.

INTERMEDIATE FREQUENCY
18 MHz

RECEIVER BANDWIDTH
(a) 65 kHz for long pulse (15 µs)
(b) 300 kHz for short pulse (5 µs)
MAJOR UNITS

(a) Transmitter and Modulator (panel 2 BT)
1. AP 587724 Panel 3 BT Oscillating
2. AP 587724 Panel 3 BT Amplifying
3. AP 587724 Panel 3 BT Output

(b) Panel LRU Receiving AP 587824
   R11 AP 587824 Amplifier Unit I.F. Det. 8 (Narrow Band)
   R12 AP 587824 Amplifier Unit I.F. Det. 9 (Wide Band)
   R31 AP 587824 Filter Unit Video Det. 16
   R41 AP 587824 Rectifier Unit Det. 120
   R51 AP 587824 Rectifier Unit Det. 100
   R61 AP 587824 Range Calibrator Det. 7
   R71 AP 587824 Performance Meter Det. 6
   R81 AP 587824 Amplifier Unit P.F. Det. 8
   R91 AP 587824 Auto Frequency Control Unit

(c) Miscellaneous
   1. AP 56367C Filter Unit Det. 6A
   2. AP 56368A Meter Unit Det. 21
   3. SSD-AP 57233 Automatic Protection Unit
   4. AP 567870 Control Unit Det. 85 (Local Frequency)
   5. AP 567870 Trigger Unit Det. 9 (Meter Trigger Unit)
   6. AP 567870 Board, Watchkeeping, Det. 7 (d.c. only)
   7. AP 61590 Board, Watchkeeping, Det. 3 [a.c. ships]

ASSOCIATED AERIAL OUTFIT

ASSOCIATED DISPLAY OUTFITS

ASSOCIATED I.F.F. SETS

Type 944M(1) Interrogator, Type 95WM(1) or Type 95WM(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, 31 ft. wide, 12 ft. high.

POWER SUPPLIES

(a) D.C. Ships

220 V d.c. 10.25 kW 24 V d.c. 200 W
120 V 70 Hz 3 phase 2.25 kVA 50 V 50 Hz single phase 200 VA
720 250 Hz 2 single phase 3.5 kW

(b) A.C. Ships

380 V 60 Hz 3 phase 10.75 kW
220 V d.c. 380 W 24 V d.c. 200 W
230 V 60 Hz 3 phase 1.45 kW
60 V 60 Hz single phase 200 VA
120-380 V and 380 V as for D.C. Ships

HEAT DISSIPATION IN OFFICE

78 kW approxiately

HANDBOOK

BR 1871(1) and (2)

ESTABLISHMENT LIST

E 690

INSTALLATION SPECIFICATION

840

RE: 690

RESTRICTED
## Purpose

The transmitter and receiver, with aerial output, AN and associated equipment, 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
- **Externally-triggered:** 400 - 2000 p/s

## V.S.W.R.

Not less than 0.67 over the frequency band.

## Pulse Length

0.5 microsecond \(\pm 0.0\%\)

## Beam Width

<table>
<thead>
<tr>
<th>Horizontal (to half power)</th>
<th>Vertical (to half power)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6(\pm 0.2)</td>
<td>1.69(\pm 0.4)</td>
</tr>
</tbody>
</table>

Elevation angle of beam has a 3.5\(\pm 0.2\) deflection from the boresight between 2\(\degree\) and 4\(\degree\).

## Receiver Sensitivity

9 watts peak pulse r.f. input to receiver gives 1 volt peak pulse video output into 70 ohms.

## Receiver Bandwidth

16 dB

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:

<table>
<thead>
<tr>
<th>Unit</th>
<th>AP No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CABINET ASSEMBLY, DESIGN 76, TRANSMITTER consisting of:</td>
<td></td>
</tr>
<tr>
<td>Cabinet, Design 103, Transmitter</td>
<td>62300</td>
</tr>
<tr>
<td>Sub Modulator Chassis</td>
<td>62301</td>
</tr>
<tr>
<td>Control Unit, Design 99, Transmitter</td>
<td>62304</td>
</tr>
<tr>
<td>Rectifier Chassis, 6205, Alarm</td>
<td>62307</td>
</tr>
<tr>
<td>2. The following are associated with AP 62300, and are first-fitting items:</td>
<td></td>
</tr>
<tr>
<td>Transmitter Chassis, 64T</td>
<td>62305</td>
</tr>
<tr>
<td>Rectifier Chassis, 62CA, Transmitter</td>
<td>62306</td>
</tr>
</tbody>
</table>
### RESTRICTED

#### UNIT

<table>
<thead>
<tr>
<th>Description</th>
<th>AP No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabinet, Design 102, Receiver</td>
<td>62310</td>
</tr>
<tr>
<td>Receiver Drawer, 42L</td>
<td>62311</td>
</tr>
<tr>
<td>Waveguide Milling Stock, Size 16</td>
<td>62312</td>
</tr>
<tr>
<td>Head-Amplifier Unit</td>
<td>62704</td>
</tr>
<tr>
<td>Amplifier Unit, 45 W</td>
<td>62318</td>
</tr>
<tr>
<td>A.F.C. Unit, Design 2</td>
<td>62319</td>
</tr>
<tr>
<td>Waveguide Chassis, Design 2</td>
<td>62700</td>
</tr>
<tr>
<td>Rectifier Chassis, 220A, Receiver</td>
<td>62701</td>
</tr>
</tbody>
</table>

#### ANCELLARY EQUIPMENT, consisting of:

<table>
<thead>
<tr>
<th>Description</th>
<th>AP No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch, Waveguide, Design 3, Changeover</td>
<td>62666</td>
</tr>
<tr>
<td>Dummy Lamp, Design 28</td>
<td>62674</td>
</tr>
<tr>
<td>Switch, Sinc and Xdss, Changeover</td>
<td>62667</td>
</tr>
<tr>
<td>Switch Unit, Design 86, Blind Sector</td>
<td>62666</td>
</tr>
<tr>
<td>Phase Changes</td>
<td>62675</td>
</tr>
<tr>
<td>Resistance Panel, Alarm</td>
<td>62348</td>
</tr>
<tr>
<td>Waveguide Unit, Design K</td>
<td>62644</td>
</tr>
</tbody>
</table>

#### RECEIVER TEST CABINET consisting of:

<table>
<thead>
<tr>
<th>Description</th>
<th>AP No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabinet, Design 102, Receiver</td>
<td>62311</td>
</tr>
<tr>
<td>Receiver Drawer, 42L</td>
<td>62312</td>
</tr>
<tr>
<td>Receiver Chassis, 2X3B, Receiver</td>
<td>62333</td>
</tr>
<tr>
<td>Head Amplifier Unit</td>
<td>62318</td>
</tr>
<tr>
<td>Amplifier Unit, 45 W</td>
<td>62339</td>
</tr>
<tr>
<td>Amplifier Unit, 450, 4X3</td>
<td>62700</td>
</tr>
<tr>
<td>A.F.C. Unit, Design 9</td>
<td>62701</td>
</tr>
<tr>
<td>Base, Mounting, Aluminium</td>
<td>62702</td>
</tr>
<tr>
<td>Waveguide Chassis, Design 2</td>
<td>62703</td>
</tr>
</tbody>
</table>

#### WEIGHT OF MAJOR ASSEMBLIES

<table>
<thead>
<tr>
<th>Description</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABINET ASSEMBLY, DESIGN 79, TRANSMITTER, AP 62390, plus Transmitter Chassis, 65C, AP 62305, and Rectifier Chassis, 2X3A, Transmitter, AP 62306</td>
<td>540 lb</td>
</tr>
</tbody>
</table>

#### POWER REQUIREMENTS AND CONSUMPTION

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 V, 400/500 Hz</td>
<td>Filaments, h.t. and e.h.t. transformers, and blowers if 200 V blowers are incorporated.</td>
</tr>
<tr>
<td>50 V, d.c.</td>
<td>Control unit for transmitter switching relays and warning lights</td>
</tr>
<tr>
<td>220 V, 60 Hz, single-phase</td>
<td>Anti-condensation heaters in a.c. ships</td>
</tr>
<tr>
<td>200 V, 400/500 Hz</td>
<td>Transmitter, 1200 VA</td>
</tr>
<tr>
<td>200 V, 60 Hz, single-phase</td>
<td>Receiver, 300 VA</td>
</tr>
</tbody>
</table>

#### AERIAL SYSTEM

<table>
<thead>
<tr>
<th>Description</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial Outfit ANX</td>
<td></td>
</tr>
</tbody>
</table>

#### HANDBOOK

<table>
<thead>
<tr>
<th>Design</th>
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<tbody>
<tr>
<td>880</td>
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</table>

#### ESTABLISHMENT LIST

<table>
<thead>
<tr>
<th>Design</th>
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<tbody>
<tr>
<td>E 1191</td>
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</table>

#### INSTALLATION SPECIFICATION

<table>
<thead>
<tr>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>B 540</td>
</tr>
</tbody>
</table>

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