B.R.333(1) VOL.1

SUMMARIES OF DATA OF RADIO EQUIPMENT (SHIPS AND SHORE STATIONS)

(SUPERSEDES BR333(1) DATED 1950)

BY COMMAND OF THE DEFENCE COUNCIL

J. T. Dunnett

OCTOBER 1971

MINISTRY OF DEFENCE
DIRECTOR GENERAL WEAPONS (NAVAL)
(N/W63718/71)

ANY SUGGESTIONS FOR AMENDMENTS OR ADDITIONS TO THIS BOOK SHOULD BE SUBMITTED TO THE DIRECTOR GENERAL, WEAPONS (NAVAL) THROUGH THE USUAL CHANNELS FOR ONWARD TRANSMISSION TO DWRDS.

FOREWORD

1. The object of this book dated 1971 is to provide a short descriptive Summary of all non Confidential Radio Equipment in current use in ships, and in some cases jointly in shore stations. Equipments solely used ashore are summarised in BR 333(4).

2. The book is one of a series with titles as follows:-

BR 333(1) Vols. 1 and 2	Summaries of Data of Radio Equipment (Ships and Shore Stations).
BR 333(2) and AP 116A-0102-1	Concise Details of Radio Equipment (Airborne) Including Naval Air Radio Equipment.
BR 333(3)	Obsolete.
BR 333(4)	Summaries of Data of Telecommunication Equipment (Ashore).

3. Unless required in respect of some obsolescent equipment still in use, the superseded publication BR 333(1) dated 1950 should be destroyed in accordance with local arrangements for the disposal of Classified waste.

4. Additionally, reference may be made to Summaries in the following books:-

(a) BR 222 The User's Guide to Wireless Equipment.

(b) BR 1982 Warning Radar User Instructions.

5. Summaries of Data for Common Range Electrical Testing Equipment - CRETE - are given in BR 1781.

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SECTION 1

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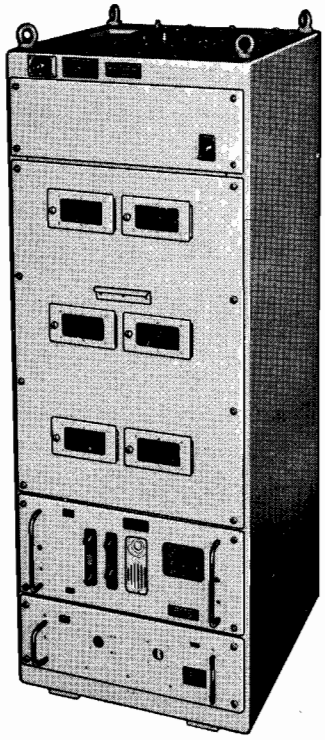
Skynet V Shipborne Terminal UK/SCC 001

Converter Electronic Frequency Outfits FTA Series

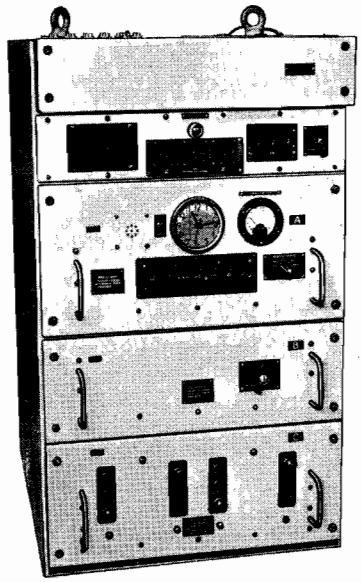
FREQUENCY STANDARD OUTFIT FSA(1)(2)

FSA(1)(2)

SUMMARY OF DATA



FREQUENCY STANDARD ASSEMBLY



FREQUENCY DIVIDER ASSEMBLY

PURPOSE

To provide highly accurate (1 in 10^{10}) and stable frequency output at 100 kHz, subsidiary outputs at 5 MHz and 1 MHz, and sub-multiple frequencies for use with external communication equipment.

BRIEF DESCRIPTION

The equipment consists of two cabinets, one containing Generator Frequency Standards, LF Receiver and Comparator, Comparator Signal and Power Supply. The other containing Frequency Dividers, a Selector Switch, a Clock and a Monitoring Panel. The Frequency Standard in use is selected. In the event of failure of the selected Standard, another standard is automatically switched in. Each Frequency Standard has a built in battery providing an automatic emergency supply to the Standard. Visual and audio alarm facilities are fitted.

MAJOR UNITS

AP or NSN No.	Description	Qty.	Physical Data			
			Height in	Depth in	Width in	Weight lb
	Frequency Divider Assembly					
5820-AP 164609)	Cabinet, Frequency Divider	1	39½	24	22	143
5820-AP 164610)	Frequency Divider	1	10	21	20	33
5820-AP 164605)	Frequency Divider	1	7	21	21	20
5820-AP 164611)	Power Supply	1	9	21	21	33
	Frequency Standard Assembly					
5820-AP 164647)	Cabinet, Frequency Standard	1	65½	27½	24	600 (With drawers)
)						
5820-99-580-7801)	Generator, Frequency Standard	3	7	13	19	20
5820-99-916-4684)	Receiving Set Radio	1	10	19	23	-
5820-99-916-4688)	Comparator Signal	1	7½	18½	19	31

POWER REQUIREMENTS

Cabinet, Frequency Divider	: 115/230 V	50/60 Hz			300 W
	115/230 V	50/60 Hz	Two anti-condensation heaters		
Cabinet, Frequency Standard	: 115/230 V	50/60 Hz	200 W (Single phase no break supply)		
	115/230 V	50/60 Hz	50 W Two anti-condensation heaters		

INPUTS

Aerial lead to LF Receiver

OUTPUTS

Selected Standard 100 kHz

Cabinet, Frequency Standard (if required) { 5 MHz / 1 MHz

Cabinet, Frequency Divider (to distribution system) { 100 kHz / 10 kHz / 1 kHz / 100 kHz

HANDBOOK

BR 2390

ESTABLISHMENT LIST

E1302

INSTALLATION SPECIFICATION

B919

FREQUENCY STANDARD OUTFIT FSA(4) FSA(4)

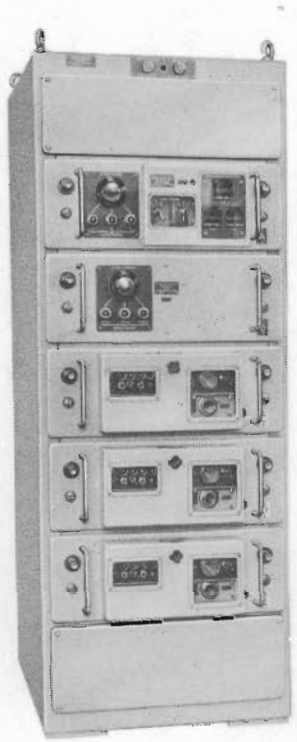
SUMMARY OF DATA

PURPOSE

To provide highly accurate (1 part in 10^9) and stable frequency outputs at 5 MHz, 1 MHz and 100 kHz. Only the 100 kHz output is used.

BRIEF DESCRIPTION

The equipment consists of a cabinet containing three Generator Frequency Standards, Distribution and Monitoring Drawer and a Frequency Comparator Drawer. Each Generator Frequency Standard has a built in battery providing an automatic emergency supply. Visual warning facilities are fitted to indicate a failure of the 100 kHz supply from the Generator Frequency Standard or a failure in one of the output circuits.



FREQUENCY STANDARD OUTFIT FSA(4)

MAJOR UNITS

Cabinet, Electrical Equipment	5895-99-972-5260
Generator, Standard Frequency	5895-99-972-5883
Frequency Distribution and Monitoring Drawer	5895-99-972-5262
Comparator Signal Drawer	5895-99-972-5261

PHYSICAL DATA

Cabinet, Electrical Equipment

Height	Width	Depth	Weight
5 ft 3 in	2 ft	2 ft 6 in	620 lb (including units)

POWER REQUIREMENTS

115 V 60 Hz 150 W

115 V 60 Hz)
or For Anti-Condensation Heaters
115 V d.c.)

HANDBOOK

BR 2427

ESTABLISHMENT LIST

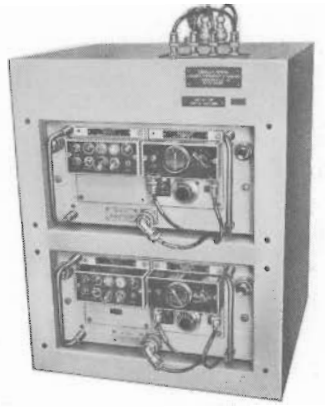
E.1476

INSTALLATION SPECIFICATION

B.984

FREQUENCY STANDARD OUTFIT FSA(3)(5)(6)(7)

SUMMARY OF DATA



FREQUENCY STANDARD OUTFIT FSA(3)
(WITH COVERS REMOVED)

PURPOSE

To provide highly accurate (1 part in 10^9) and stable frequency outputs at 5 MHz, and 100 kHz.

BRIEF DESCRIPTION

The equipments are as follows:

(i) FSA(3) or FSA(7) consist of one cabinet containing two Frequency Standard Sources.

(ii) FSA(5) consists of two cabinets each containing two Frequency Standard Sources.

(iii) FSA(6) consists of two cabinets containing a total of three Frequency Standard Sources.

Each Frequency Standard Source comprises an Oscillator, Radio Frequency and a Power Supply. The Power Supply has a built in battery providing an automatic emergency supply. In the event of a failure of the 'in use' standard an adequate safeguard of one 'standby' is provided in each equipment. Implementation of the standby necessitates manual unplugging and plugging up operations at the cabinet (FSA(3)) or at the distribution boxes (FSA(5)(6)(7)).

MAJOR UNITS

Frequency Standard Outfit	NSN or AP No.	Description	Quantity
FSA(3)	5820-AP 164778	Cabinet Frequency Standard	1
	5820-99-971-7054	Oscillator Radio Frequency	2
	5820-99-971-7055	Power Supply	2
FSA(5)	5820-99-972-7787	Cabinet Frequency Standard	2
	5820-99-971-7054	Oscillator Radio Frequency	4
	5820-99-971-7055	Power Supply	4
FSA(6)	5820-99-924-7787	Cabinet Frequency Standard	2
	5820-99-971-7055	Oscillator Radio Frequency	3
	5820-99-971-7054	Power Supply	3
FSA(7)	5820-99-924-7787	Cabinet Frequency Standard	1
	5820-99-971-7055	Oscillator Radio Frequency	2
	5820-99-971-7054	Power Supply	2

PHYSICAL DATA

Cabinet, Frequency Standard (5820-AP 164778 and 5820-99-924-7787).

Height	Width	Depth	Weight
23¼ in	18½ in	18 in	122 lbs (excluding units)

POWER REQUIREMENTS

115/230 V, 50/60 Hz, 50 W approximately per Frequency Standard Source.

HANDBOOK

BR 2445

ESTABLISHMENT LISTS

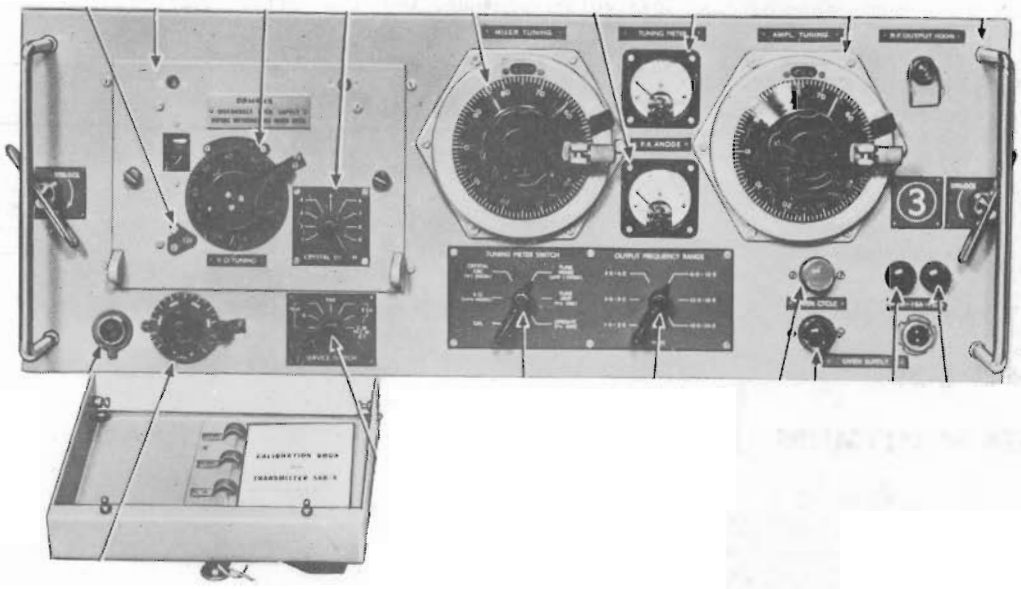
E1302 FSA(3)
S1554 FSA(5)(6)(7)

INSTALLATION SPECIFICATION

B919 FSA(3)
B1094 FSA(5)(6)(7)

TRANSMITTERS 5AB/A & 5AB/C SERIES

SUMMARY OF DATA



PURPOSE	H.F. Transmitter or r.f. driver unit.
FACILITIES	C.W., M.C.W., R/T (A.M.), F.S.K. and Facsimile Transmission. Calling/Working facility is available on Type 5 AB/C only.
FREQUENCY RANGE	1.5 to 24.0 MHz, continuously variable.
OUTPUT POWER	40 watts.
OUTPUT IMPEDANCE	100 ohms.
FREQUENCY TOLERANCE	Within 0.003% of assigned frequency (with oscillator oven temperature stable at 75 °C) for ambient temperature variations from 20 °C (68 °F) to 50 °C (122 °F) and ± 5% mains voltage variations.
FREQUENCY CONTROL	Partial crystal control over whole frequency range. Reactance capacitive component, set as required, controls frequency of variable Oscillator for fixed and variable shifts.
FREQUENCY SHIFT	Fixed. Any shift up to 1000 Hz symmetrically disposed about the assigned frequency. Choice of positive or negative going marks. Variable. A d.c. input of ± 1 V will vary the output frequency by approximately ±.500 Hz.
FREQUENCY SHIFT KEYING INPUT	30 to 150 V single current operation or ± 10 to ± 80 V double current operation.
KEYING SPEED	Normally up to 100 bauds. (With capacitor 3-C122 removed from circuit, up to 250 bauds).
OVEN TEMPERATURE	Automatically maintained at 75 °C.

POWER SUPPLIES

As for AP W8360 Unit 5AB obtained from Power Unit SE13, and 115/230 V 50/60 Ha a.c., 180 watts for oven heaters.

DIMENSIONS AND WEIGHT

Height	Width	Depth	Weight
10.5 in (26.7 cm.)	28 in (71.1 cm.)	14 in (35.6 cm.)	87 lb * (39.46 kg.)

*This weight includes that of the r.f. Oscillator unit which itself weighs 12.5 lb. (5.67 kg.)

BASIC COMPOSITION OF EACH TYPE

Type	Transmitter Drawer	Oscillator Unit	External C/W Switch
5AB/A	AP 164322	AP 164420	
5AB/AB	AP 164732	AP 164855	
5AB/AC	AP 164732	AP 164759	
5AB/C	AP 164732	AP 164759	AP 8283

HANDBOOK BR 2212

ESTABLISHMENT LIST

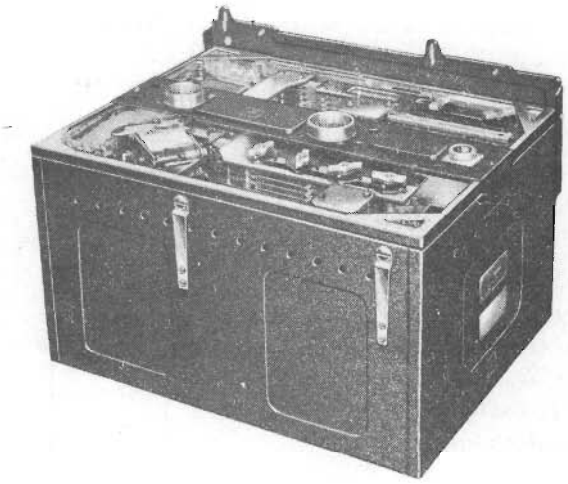
INSTALLATION SPECIFICATION

} Incincluded in Types 601-5 Series.

TYPE 86M

86M

SUMMARY OF DATA



TRANSMITTER–RECEIVER 78P

PURPOSE

A low power (6 – 8 watts) V.H.F. transmitter–receiver fitted in light craft and above.

TYPE OF TRANSMISSION

Voice.

FREQUENCY RANGE

100 – 156 MHz. (Four pre-set frequencies).

BRIEF TECHNICAL DESCRIPTION

Transmitter

Frequency	:	100–156 MHz. (Four pre-set frequencies any one of which may be selected by pressing the appropriate button in the Controller Electric Type 3).
Frequency Control	:	Crystal Oscillator
Output	:	6 – 8 watts.

The transmitter employs a crystal controlled oscillator circuit, the anode circuit of which is tuned to the second harmonic of the crystal frequency. Two trebler stages follow the oscillator and precede the final amplifier, thus making the output frequency greater than the crystal fundamental by a factor of eighteen. The final output stage is modulated by a push–pull modulator driven by a speech amplifier.

Receiver

Frequency	:	100–156 MHz. (Four pre-set crystal controlled frequencies any one of which may be selected by pressing the appropriate button in the Controller Electric Type 3).
Intermediate Frequency	:	12 MHz
Sensitivity	:	4 μV for a 10 dB Signal to Noise ratio.
System	:	Superheterodyne.

Controller Electric Type 3 – A.M. Ref. 10J/26

A small portable unit containing the push buttons for selecting the required frequency of transmitter and receiver and for switching off the equipment. Indicator lamps show the condition of the equipment (transmit or receive) and the particular channel being used.

Rectifier Unit SE8 – Patt. W7456/A

This unit has an input of 230/250 V 50 Hz and gives the following d.c. output voltages:

(a) 13 volts 3 amps (b) 320 volts 225 milliamps (c) 150 volts 10 milliamps

The approximate consumption is 300 watts.

MAJOR UNITS

Type 86M/MS comprises the following units:-

Patt. No. or A.M. Ref.	DESCRIPTION	PHYSICAL DATA			
		Height	Width	Depth	Weight
56695 or 71295	Transmitter-Receiver 7BP Transmitter-Receiver 7BP(A)	9¼"	1' 0½"	1' 4"	49 lb
65628	Dummy Load for Transmitter-Receiver 7BP	3"	1⅜" dia.		½ lb
10A/12650	Box Junction Type 17B	2½"	4⅛"	8½"	2¼ lb
W7456/A and/or 10K/37 or 110K/248	Rectifier Unit SE8 Power Unit Type 16 Power Unit Type 6016	11⅜"	1' 2¼"	1' 8"	107 lb
		6¼"	9"	1' 1"	37 lb
10J/26	Controller Electric Type 3	5⅞"	5⅝"	2½"	2½ lb
* W2926	Attenuator Unit Design 13				
* 57723	Loudspeaker Unit Design 2				
* 12554	Loudspeaker single horn Type G				

* These items are not fitted in coastal craft or ships fitted with W/T and Voice Control Outfits KHA-F or Fighter Direction Outfits KFD-G.

POWER SUPPLY ARRANGEMENTS

The power supply for the equipment is derived from either:-

(a) Rectifier Unit SE8 which needs an input of 230 V 50 Hz from ships mains with a consumption of 300 watts.

or

(b) A Power Unit Type 16 or 5016 which needs an input of 24 V derived from a battery outfit special to Type 86M. This battery outfit consists essentially of four Patt. W1469 Battery accumulator 6 volts 144 amp-hours. The consumption of the Power Unit is 12 amps.

CONTROL CIRCUITS

The equipment can be operated locally or remotely up to 60 feet using the Electric Controller Type 3 and can operate in conjunction with W/T and Voice Control Outfits KHA-Z or Fighter Direction Outfits KFA-G.

AERIAL SYSTEM

The following aerial outfits are used depending on class of ship fitted:

Aerial Outfit ARU - Aircraft Carriers. Aerial Outfit AJD used with Transmitter-Receiver 7BP(A)
Aerial Outfit AJA - Coastal Craft.
Aerial Outfit APH - Other Ships.
Aerial Outfit ANC - Cruisers and above. (Fitted in conjunction with Aerial Outfits AQD and AQB).
Aerial Outfit AGT - Royal Naval Air Stations.

In submarines a special aerial consisting essentially of a length of Patt. 4987 Cable.

REMARKS

The transmitter may be tuned without breaking wireless silence by using the Dummy Load Patt. 65628.

HANDBOOKS

BR 1401

ESTABLISHMENT LISTS

E604 (Type 86M) E879 (Type 86MS)
E607 (Aerial Outfits ARU, APH, AJA)
E884 (Aerial Outfit ANC)
E702 (Aerial Outfit AGT)

INSTALLATION SPECIFICATION

B342 (Type 86M with Control Outfits KFA-G, KHA-Z)
B603 (Type 86M in submarines)
B190 (Type 86M in destroyers and below)
B337 (Aerial Outfits ARU, APH)
B635 (Aerial Outfits ANC, ANZ)

TYPE 89Q

89Q

SUMMARY OF DATA

PURPOSE

A HF medium power (350 watts CW 250 watts Voice) transmitter fitted in light craft as the main set and in cruisers and above as a fighter direction set.

FREQUENCY RANGE

1.5 – 20 MHz.

TYPE OF TRANSMISSION

CW and Voice.

BRIEF TECHNICAL DESCRIPTION

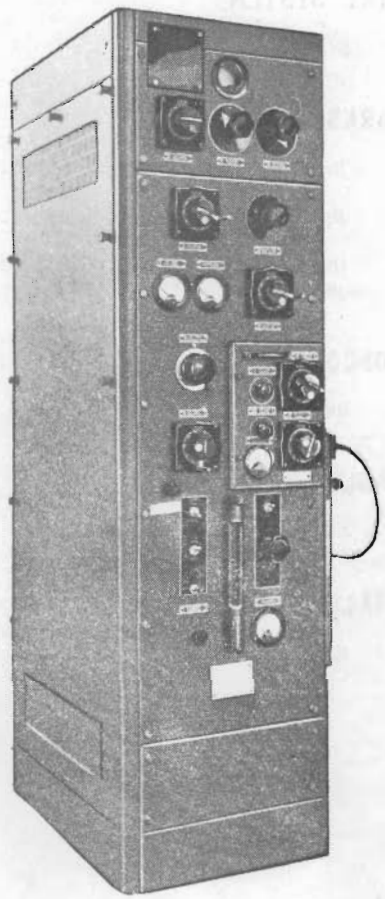
Transmitter 8M

Frequency	1.5 – 20 MHz
Frequency Control	(a) Crystal with provision for doubling or trebling the fundamental frequency. (b) Variable Frequency Oscillator.
Output	250 watts (Voice) 350 watts (CW)
Keying	Up to 100 words per minute

The transmitter consists of an oscillator stage followed by a Power Amplifier. Both stages are anode tuned. For Voice high level anode modulation is employed.

CONTROL UNIT DESIGN C

The primary function of this unit is to enable the American transmitters to work into British Control Systems and secondly to prevent the HT contactor making until about 60 seconds after the filament voltage has been applied to the mercury vapour rectifier valves.



Transmitter 8M

MAJOR UNITS

Patt. No. or U.S. Ref.	DESCRIPTION	PHYSICAL DATA			
		Height	Width	Depth	Weight
Type 89Q					
59593/A	Transmitter 8M	4 ft 11 in	1 ft 5¼ in	2 ft 1 in	550 lb
67818	Speech Amplifier	9 in	1 ft 5¼ in	11½in	38 lb
59594	Crystal Oscillator for Transmitter 8M	Plugs into front of Transmitter			
59595	Master Oscillator for Transmitter 8M	Plugs into front of Transmitter			
W7134A	Control Unit Design C	11½in	1 ft 9½ in	1 ft 1½ in	56 lb

POWER SUPPLY ARRANGEMENTS

The 230 volts 50 Hz single phase supply at 2 kW.

The 230 V 50 Hz supply is obtained from A.C. Supply Outfit DTC, DTD or DRD when a suitable supply cannot be obtained from existing sources.

CONTROL CIRCUITS

The equipment can be operated locally or remotely using any of the W/T and Voice Control Outfits KHA–Z.

HEAT DISSIPATION

600 watts.

AERIAL SYSTEM

Single wire.

REMARKS

The approximate range, 150 miles on Voice and CW is world wide at times.

The basic transmitter for Type 89Q is American produced – R.C.A. ET4336K.

In Type 89Q, a Master Oscillator Unit and a Crystal Unit have been incorporated. Either of these may be plugged in depending on which type of control, crystal or variable frequency oscillator is required.

HANDBOOK

BR 1426

ESTABLISHMENT LIST

E875

INSTALLATION SPECIFICATION

B381

TYPE 96

SUMMARY OF DATA

PURPOSE

Type 96 comprises a Transmitter Assembly, Microwave Multiband, NSN 5820-99-520-6500 and a Light Assembly Beacon, NSN 5820-99-522-7665. The equipment is used for the calibration of shipborne SHF DF equipment. The Transmitter Assembly, Microwave Multiband transmits a microwave signal in each of the L, S, C, X and J-bands. The Light Assembly, Beacon, provides a means of station identification.

MAJOR UNITS

NSN No.	DESCRIPTION
Transmitter Assembly, Microwave Multiband	
5820-99-520-8263	Modulator, Radar L-band
5820-99-521-8854	Power Supply (HT)
5820-99-521-8853	Power Supply (EHT)
A69-753-A3	Supply Unit
A69-1175-D	Modulator Unit, L-band
5820-99-520-8264	Modulator, Radar S-band
5820-99-521-8854	Power Supply (HT)
5820-99-521-8853	Power Supply (EHT)
A69-753-A3	Supply Unit
A69-1173-D	Modulator Unit, S-band
5820-99-520-8265	Modulator, Radar C-band
5820-99-521-8854	Power Supply (HT)
5820-99-521-8853	Power Supply (EHT)
A69-753-A3	Supply Unit
A69-1171-D	Modulator Unit, C-band
5820-99-529-8266	Modulator, Radar X-band
5820-99-521-8854	Power Supply (HT)
5820-99-521-8853	Power Supply (EHT)
A69-753-A3	Supply Unit
A69-1174-D	Modulator Unit, X-band
5820-99-520-8267	Modulator, Radar J-band
5820-99-521-8854	Power Supply (HT)
5820-99-521-8853	Power Supply (EHT)
A69-753-A3	Supply Unit
A69-1172-D	Modulator Unit, J-band
	Antennae Assembly
5820-99-522-7659	Fire Detection Unit
5820-99-522-7661	Alarm, Radio
	Meter Assembly, Remote
5820-99-522-7662	Stabilizer, Voltage
5820-99-522-7663	Dehydrator Unit
5820-99-522-7664	Tool Kit, Special
	Loudspeaker
Light Assembly, Beacon	
5820-99-522-7665	Light Assembly, Beacon
5820-99-522-7660	Control Unit, Beacon
	Beacon Lamp
6145-99-910-0008	Cables

PHYSICAL DATA

DESCRIPTION	PHYSICAL DATA			
	Height	Width	Depth	Weight
Modulator, Radar	4 ft 5 in	2 ft 2 in	1 ft 9 in	448 lb
Power Supply (HT)	12¼ in	22⅛ in	19½ in	75 lb
Power Supply (EHT)	14 in	22⅛ in	19½ in	120 lb
Fire Detection Unit	7 in	17 in	8¼ in	21 lb
Alarm, Radio	4⅜ in	6⅜ in	3 in	1 lb 6 oz
Meter Assembly, Remote	4⅝ in	7⅜ in	3 in	2 lb
Stabiliser, Voltage	12¼ in	15 in	11 in	106 lb
Dehydrator Unit	13¼ in	14⅞ in	7¼ in	40 lb
Loudspeaker	3¾ in	6 in	2⅛ in	2 lb
Control Unit, Beacon	7⅝ in	13 in	6 in	12 lb
Beacon Lamp	5 in	6 in	2⅛ in	2 lb 3 oz

POWER REQUIREMENTS AND CONSUMPTION

198 to 258 V (nominally 240 V), 50 Hz, single phase.
Maximum load 7kVA.

ASSOCIATED PUBLICATIONS

Operating and Service Manual for HP 432A

BR 1565 — Outfit 618
BR 2304, BR 2304(2) — Outfit 696

ESTABLISHMENT LIST

S1637

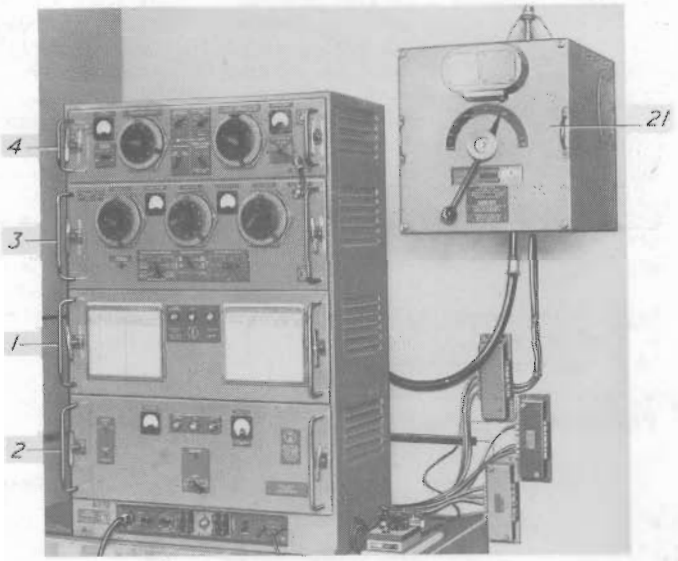
TYPES 601 & 601D

601
601D

SUMMARY OF DATA

PURPOSE

A general purpose low power (50 watts) HF AM transmitter for communication between ship/ship, ship/shore and ship/air. It is fitted as one of the main wireless transmitters and replaces the H/F side of Types 52 FHV, 60 FR and 60DR.



GENERAL VIEW OF EQUIPMENT

TYPE OF TRANSMISSION

CW, MCW, and Voice.

FREQUENCY RANGE

1.5 – 24.0 MHz.

MAJOR UNITS

Type 601 and 601D comprises the following units:-

Unit	Patt. No.	DESCRIPTION	PHYSICAL DATA			
			Height	Width	Depth	Weight
1	W8358	Rectifier	10½ in	2 ft 5 in	1 ft 5 in	130 lb
2	W8359	Modulator and Rectifier Unit Des. A	10⅞ in	2 ft 4¾in	1 ft $2\frac{13}{16}$in	140 lb
3	W8360	Transmitter 5AB	10½ in	2 ft 4¾in	1 ft 5 in	80 lb
4	W8361	Aerial Tuning Unit for TX 5AB	7½ in	2 ft 4¾in	1 ft 3½in	40 lb
6	W8357	Framework with Control Panel for Type 601	3 ft 8 in	2 ft 5½in	1 ft 3 in	200 lb
21	56770	Switch Aerial C.O. for Type 601, 602/E	1 ft 5 in	1 ft 4½in	11½in	110 lb

Units 1, 2, 3 and 4 are separate panels housed in Unit 6, Unit 21 is external.

ANCILLARY EQUIPMENT

Patt. No.	DESCRIPTION	REMARKS
53325	Rectifier Unit Des. 46	Only fitted in cruisers and above and ships fitted with Wireless and Voice Control Outfits KHA Series.
65416	Attenuator Unit Des. 29	Only fitted with Wireless and Voice Control Outfits KHA Series.

BRIEF DESCRIPTION OF MAJOR UNITS

Rectifier Unit SE13 – Provides the D.C. and A.C. supplies for Transmitter 5AB, Patt. 8358.

Modulator and Rectifier Unit Des. A, Patt. W8359 – A 50 watt modulator containing its own power pack which modulates the final stage of Transmitter 5AB with either a M.C.W. note (800 – 1200 Hz as desired) or Voice covering the audio band (200 – 700 Hz). Automatic Gain Control is incorporated and is preset to give 70% modulation on Voice. The voltage output of the M.C.W. oscillator is preset to give 90% modulation.

Transmitter 5AB, Patt. W8360

Frequency – 1.5 – 24 MHz.

Frequency Control – partial Crystal Control from 3.0 to 24.0 MHz.
– Variable-Frequency Oscillator from 1.5 to 3.0 MHz.
The frequency of the Crystal Oscillator is 0.5 MHz, and the Variable Oscillator frequency range is between 0.5 and 1.0 MHz.

Output – 50 watts (approximately) into load resistance of 100 ohms.

Keying – Maximum of 120 words per minute.

Aerial Tuning Unit for Transmitter 5AB, Patt. W8361 – Comprises a combination of inductors and capacitors, the circuit being tunable over a wide range to provide maximum transference of power from the transmitter to the aerial. This unit also contains a Dummy Load, with a meter for measuring R.F. current.

Aerial Change-over Switch, Patt. 56770 – A six-position switch giving the following facilities:– 1. Spare, 2. Connects Aerial to transmitter, 3. Earths Aerial through Resistor, 4. Isolates Aerial, 5. Connects Aerial to a Receiver, 6. Spare.

POWER REQUIREMENTS AND CONSUMPTION

Power Supply – 230 volts 50 Hz single phase

Power Consumption – 350 watts on CW
600 watts on MCW or Voice

CONTROL CIRCUITS

Type 601 can be operated in 'Local Control' or with any of the standard Voice and Wireless Control Outfits.

Type 601D works with the standard Central Wireless System Control Outfits (KDA Series).

HEAT DISSIPATION

500 watts

AERIAL SYSTEM

The Aerial Tuning Unit for Transmitter 5AB will accommodate any aerial of 30 ft or longer including whip aerials.

REMARKS

A 'Man Aloft' board is provided on the front of the Aerial Change-over Switch.

Wavemeter Outfit GN or GJ is not required for the calibration of Transmitter 5AB since the accuracy of the Partial Crystal Control Circuit is of the same order as these wavemeters. Calibration is effected by making use of the Crystal Oscillator

The Aerial circuit CANNOT be tuned without breaking wireless silence. Transmitter 5AB CAN be tuned and tested using the Dummy Load and the Aerial earthed.

HANDBOOK

BR 1466(1)(2)

ESTABLISHMENT LIST

E696

INSTALLATION SPECIFICATION

B647– General Fitting
B684 – Fitting in 'T' Class Submarines
B551 – Fitting in HMS VANGUARD.

TYPES 602, 602E, 602D & 602ED

602

SUMMARY OF DATA

PURPOSE

A general purpose low power (50 watts) MF and HF AM transmitter for communication between ship/ship, ship/shore and ship/air. It is fitted as one of the main wireless transmitters and broadly speaking, replaces Types 60 DR/FR/EQR and any other general purpose MF and HF low power transmitters.

TYPE OF TRANSMISSION

On HF CW, MCW or Voice (using Main Power Supply)

CW or ICW (using Emergency Power Supply)

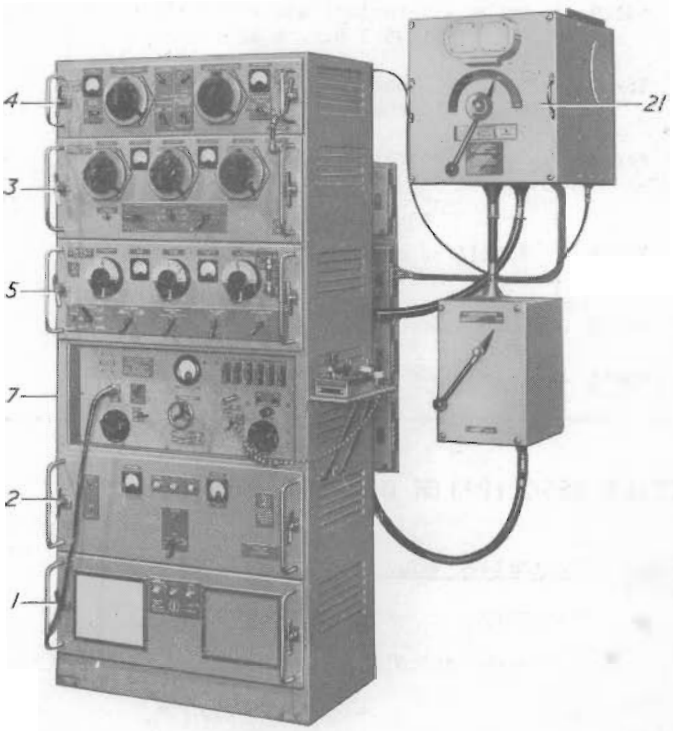
On MF CW or MCW (using Main Power Supply)

CW or ICW (using Emergency Power Supply)

FREQUENCY RANGE

200 – 500 kHz.

1.5 – 24 MHz.



GENERAL VIEW OF EQUIPMENT

MAJOR UNITS

Types 602, 602E, 602D and 602ED comprise the following units:–

Unit	Patt. No.	DESCRIPTION	PHYSICAL DATA			
			Height	Width	Depth	Weight
1	W8358	Rectifier Unit SE13	10½ in	2 ft 5 in	1 ft 5 in	130 lb
2	W8359	Modulator and Rectifier Unit Des. A	10½ in	2 ft 4¾ in	1 ft $2\frac{13}{16}$ in	140 lb
3	W8360	Transmitter 5AB	10½ in	2 ft 4¾ in	1 ft 5 in	80 lb
4	W8361	Aerial Tuning Unit for TX 5AB	7½ in	2 ft 4¾ in	1 ft 3½ in	40 lb
5	55055	Transmitter 4AD	10½ in	2 ft 4¾ in	1 ft 2⅛ in	69 lb
7	55056	Framework and Control Panel for Type 602	5 ft 6 in	2 ft 5½ in	1 ft 3 in	300 lb
21	56770	Switch Aerial CO for Types 601, 602/E	1 ft 5 in	2 ft 4½ in	11½ in	110 lb

Units 1, 2, 3, 4 and 5 are separate panels housed in Unit 7. Unit 21 is external.

ANCILLARY EQUIPMENT

Patt. No.	DESCRIPTION	REMARKS
–	Battery Outfit BBy	Only fitted with Types 602E – 602ED
55229	Motor Alternator, 450 watts 230 V 50 Hz, 21/30 V D.C. Supply.	
55230	Starter, Contactor Type for 500 watts Motor Alternator, 24 V D.C. Supply.	
W64358	Board Distributing, Single phase A.C.	Only fitted when Type 602E/ED is fitted as a main transmitter in an office not fitted with an A.C. Supply Outfit.
53325	Rectifier Unit, Des. 46	Only fitted in cruisers and above and ships fitted with Wireless and Voice Control Outfits (KHA Series)
58025	Condenser Unit, Des. 4	Only fitted in cruisers and above.
65416	Attenuator Unit, Des. 29	Only fitted with Wireless and Voice Control Outfits (KHA Series)

BRIEF DESCRIPTION OF MAJOR UNITS

Transmitter 4AD, Patt. 55055

Frequency – 200 – 500 kHz.

Frequency Control – Master Oscillator

Output – 40 watts (approx)

Keying – Maximum of 120 words per minute

The transmitter has four stages, Master Oscillator, Doubler, Amplifier and the Aerial Tuning Stage. For a brief description of the other major units see data sheet on Types 601 and 601D.

POWER REQUIREMENTS AND CONSUMPTION

Power Supply – 230 volts 50 Hz, single phase A.C. either from Main Power Supply or from Emergency Power Unit.

Power Consumption – 350 watts on CW or ICW.
600 watts on MCW or Voice.

CONTROL CIRCUITS

Type 602/E can be operated in 'Local Control' for use with any of the Standard Voice and Wireless Control Outfits.

HEAT DISSIPATION

500 watts

AERIAL SYSTEM

The Aerial Tuning circuits will accommodate any aerial of 30 ft or longer including whip aerials.

REMARKS

A 'Man Aloft' board is provided on the front of the Aerial Change-over Switch.

Wavemaster Outfit GN or GJ is not required for the calibration of Transmitter 5AB since the accuracy of the partial Crystal Control Circuit is of the same order as these wavemeters. Calibration is effected by making use of the Crystal Oscillator. A wavemeter is, however, required for calibrating Transmitter 4AD. Wavemeter Outfits GY or GN can be used for this purpose.

The Aerial circuit CANNOT be tuned without breaking wireless silence. The MF Transmitter 4AD CANNOT be tuned without breaking wireless silence, but the HF Transmitter 5AB can be tuned and tested using the Dummy Load and the Aerial earthed.

HANDBOOK

BR 1467(1)(3)

ESTABLISHMENT LIST

E696

INSTALLATION SPECIFICATIONS

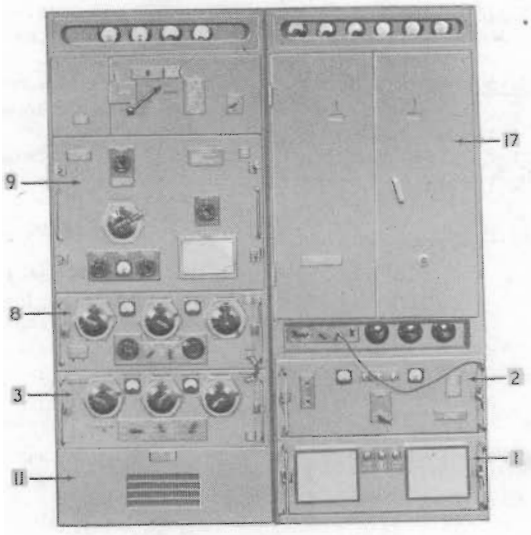
B657 – General Fitting
B551 – Fitting in HMS VANGUARD

TYPE 603 603

SUMMARY OF DATA

PURPOSE

A general purpose medium power (400 watts) HF transmitter for communication between ship/ship, ship/shore and ship/air. It is fitted as one of the main wireless transmitters and replaces Types 89M/P/Q, T8K and T8M.



GENERAL VIEW OF EQUIPMENT

TYPE OF TRANSMISSION

CW, MCW or Voice.

FREQUENCY RANGE

1.5 – 24 MHz.

MAJOR UNITS

Types 603 and 603D comprise the following units:–

Unit No.	Patt. No.	DESCRIPTION	PHYSICAL DATA			
			Height	Width	Depth	Weight
3	W8360	Transmitter 5AB	10½ in	2 ft 4¾ in	1 ft 5 in	80 lb
8	W9431	Amplifier M88	10¾ in	2 ft 5 in	2 ft 0 in	130 lb
9	W9439	Aerial Tuning Unit, 400 watt	1 ft 9 in	2 ft 3 in	1 ft 9 in	190 lb
11	53345A	Framework Design 1	6 ft 0 in	2 ft 5½ in	1 ft 11 in	500 lb
1	W8358	Rectifier Unit SE13	10½ in	2 ft 5 in	1 ft 5 in	130 lb
2	W8359	Modulator and Rectifier Unit Design A	10½ in	2 ft 4¾ in	1 ft 2⅞ in	140 lb
12	W9433	Transformer Unit Design 1	14¼ in	2 ft 3 in	1 ft 1 in	340 lb
13	54298	Rectifier Unit Design 45	1 ft 9 in	2 ft 3 in	8⅜ in	200 lb
14	W9432	Modulator Unit Design 2	10½ in	2 ft 3 in	1 ft 5 in	120 lb
15	57824	Contactor Unit Design 3	7½ in	2 ft 3 in	1 ft 2⅛ in	55 lb
16	55057	Bias Unit	8 in	2 ft 4 in	8 in	60 lb
17	57825	Framework Design 3	6 ft 9 in	2 ft 5½ in	1 ft 11 in	530 lb

Units 3, 8 and 9 are separate panels housed in Unit 11. Units 1, 2, 12, 13, 14, 15 and 16 are separate panels housed in Unit 17.

ANCILLARY EQUIPMENT

Patt. No.	DESCRIPTION	REMARKS
53325 65416	Rectifier Unit, Design 46 Attenuator Unit, Design 29	Only fitted in cruisers and above, and ships fitted with Wireless and Voice Control Outfits KHA Series.

BRIEF DESCRIPTION OF MAJOR UNITS

Amplifier M88 Patt. W9431 – This unit contains a single stage RF Amplifier designed to increase the output of the Transmitter 5AB from 50 watts to 650 watts on CW and to 450 watts, unmodulated carrier on MCW and Voice. It feeds the Aerial Tuning Unit Patt. W9439.

Aerial Tuning Unit, 400 watt Patt. W9439 – This unit consists of a generously proportioned tuned circuit to provide maximum transference of power to the aerial. It is capable of withstanding voltages up to 20 kV and a maximum current of about 20 amps. This unit also contains a Dummy Load for the transmitter with a meter for measuring the RF current.

Transformer Unit, Design 1 Patt. W9433 - This unit contains two identical transformers which provide power for the two sides of the Rectifier Units Design 45.

Rectifier Unit Design 45 Patt. 54298 - Consists of two separate full wave rectifier systems providing HT for the Amplifier M88 and the Modulator Unit, Design 2.

Modulator Unit, Design 2 Patt. W9432 - Designed to raise the power of the Modulator and Rectifier Unit Design A from 50 watts to 375 watts and modulates the Amplifier M88.

Contactor Unit, Design 3 Patt. 57824 - Contains relays and contactors for applying power to the various units comprising the transmitter.

Bias Unit Patt. 55057 - Provides the D.C. voltages used for:-

(a) operate the Interlock and Set-on relays
(b) operate the Delay contactor in the Contractor Unit. Design 3
(c) provide a fixed grid bias for Amplifier M88 and
(d) provide a variable grid for the Modulator Unit Design 2.

A brief description of Units 1, 2 and 3 may be found in the Data Sheet on Types 601 and 601D.

POWER REQUIREMENTS AND CONSUMPTION

Power Supply : 230 volts 50 Hz single or 3 phase A.C.

Power Consumption : 3 kW on CW
4.5 kW on MCW or Voice

CONTROL CIRCUITS

Type 603 can be operated in 'Local Control' or with any of the standard Wireless and Voice Control Outfits.

Type 603D works with the standard Central Wireless Control Outfits (DA Series)

AERIAL SYSTEM

The Aerial Tuning Unit will accommodate any aerial of 30 ft or longer, including whip aerials.

REMARKS

Wavemeter GN or GJ is not required for the calibration of Transmitter 5AB since the accuracy of the Partial Crystal Control circuit is of the same order as these wavemeters. Calibration is affected by making use of the Crystal Oscillator.

HANDBOOK

BR 1468(1)(2)

ESTABLISHMENT LIST

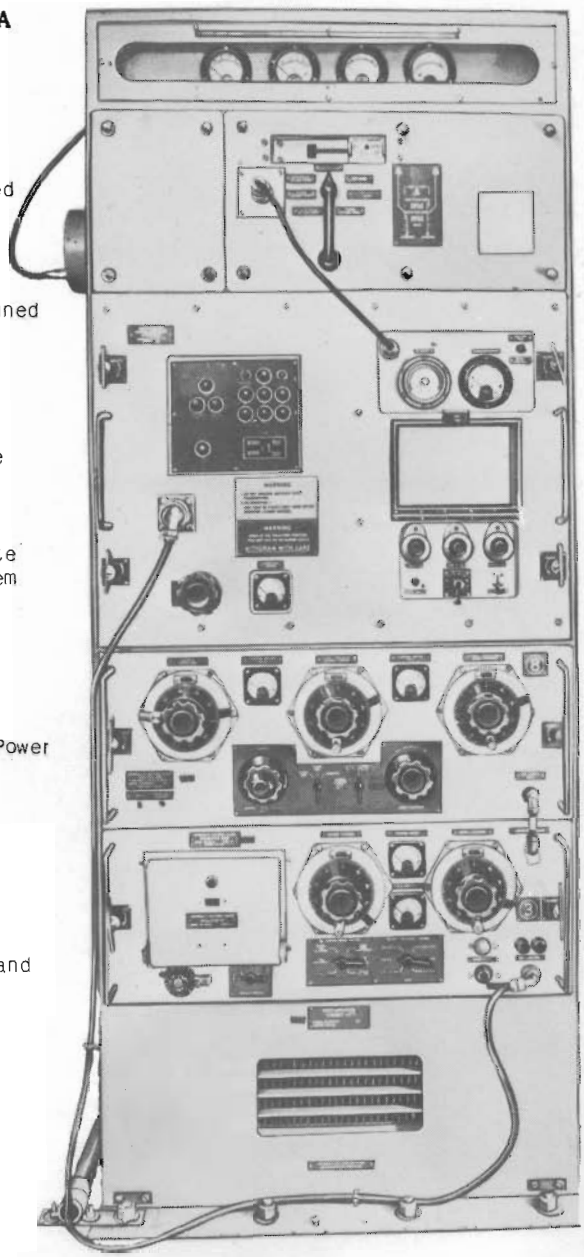
E696

INSTALLATION SPECIFICATION

B689

TYPE 603(5)

SUMMARY OF DATA



PURPOSE

Cabinet HF 5820–AP 164559 is used, in conjunction with transmitters Type 603/605, when operated with HF and MF base-tuned aerials.

The cabinet is a modified version of the Type 603 HF Cabinet AP 53345A, the main change being in the provision of a Control and Power Supply Unit that controls the remote, base-tuned aerial outfit ETA.

PRINCIPLE OF OPERATION

The aerial change-over switch selects the particular base tuner which is to be connected to either an HF or MF transmitter. Controls on the front of the Control and Power Supply Unit are set to readings, obtained from the tuning calibration charts and the required alteration of the aerial tuning circuit in the remote base tuned aerial unit is made automatically. An interlock system prevents changing aerial tuning when the transmitter is switched to an operating position.

MAJOR UNITS

Cabinet HF 5820–AP 164559 which contains the Control and Power Supply Unit 5820–AP 164560
Amplifier M88 AP W9431
Transmitter 5AB or 5AB/A AP W8360 or AP 164322.

POWER SUPPLY

115/230 V 50–60 Hz.
Voltage selection by a change-over switch in the Control and Power Supply Unit.

HANDBOOK

BR 2216
BR 1468(1) (2) Type 603
BR 1470(1) (2) (3) Type 605

ESTABLISHMENT LIST

E1321

INSTALLATION SPECIFICATION

B689 and B691

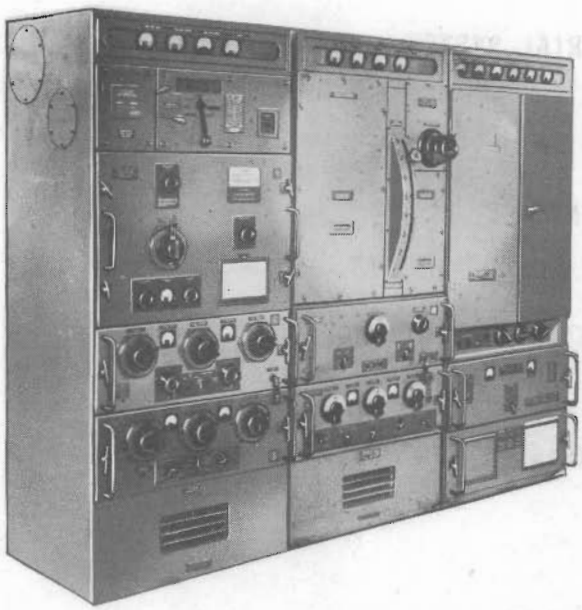
TYPES 605 AND 605D

605

SUMMARY OF DATA

PURPOSE

A general purpose medium power (400–500 W) HF and MF transmitter for ship/ship, ship/shore and ship/air communication. It replaces Types 49, TAJ, TBK and TBL.



GENERAL VIEW OF EQUIPMENT

TYPE OF TRANSMISSION

CW or MCW and Voice (HF only).

FREQUENCY RANGE

200–500 kHz and 1.5–24 MHz.

MAJOR UNITS

Types 605 and 605D comprise the following units:–

Unit	Patt. No.	DESCRIPTION	PHYSICAL DATA			
			Height	Width	Depth	Weight
1	W8358	Rectifier Unit S.E.13	10½ in	2 ft 5 in	1 ft 5 in	130 lb
2	W8359	Modulator and Rectifier Unit Des. A	10 in	2 ft 4⅜ in	1 ft 2¾ in	140 lb
3	W8360	Transmitter 5AB	10½ in	2 ft 4⅜ in	1 ft 5 in	80 lb
5	55055	Transmitter 4AD	10½ in	2 ft 4⅜ in	1 ft 2 in	69 lb
8	W9431	Amplifier M88	10¾ in	2 ft 4⅜ in	2 ft	130 lb
9	W9439	Aerial Tuning Unit for M88	1 ft 9 in	2 ft 3 in	1 ft 9 in	200 lb
11	53345A	Framework Des. 1	6 ft	2 ft 5½ in	1 ft 11 in	500 lb
12	W9433	Transformer Unit Des. 1	1 ft 2¼ in	2 ft 3 in	1 ft 1 in	340 lb
13	54298	Rectifier Unit Des. 45	1 ft 9 in	2 ft 3 in	8½ in	200 lb
14	W9432	Modulator Unit Des. 2	10½ in	2 ft 3 in	1 ft 5 in	120 lb
15	57824	Contactor Unit, Des. 3	7½ in	2 ft 3 in	1 ft 2 in	55 lb
16	55057	Bias Unit	8 in	2 ft 4 in	8 in	60 lb
17	57825	Framework, Des. 3	6 ft	2 ft 5½ in	1 ft 11 in	530 lb
18	53347	Amplifier M89	10½ in	2 ft 4⅜ in	1 ft 11 in	96 lb
19	53346	Aerial Tuning Unit for M89	3 ft 1½ in	2 ft 5½ in	1 ft 11 in	273 lb
20	53349	Framework, Des. 4	2 ft10½ in	2 ft 5½ in	1 ft 11 in	274 lb
–	54772/A	Spark Quench Unit, Des. 1	–	–	–	–

BRIEF DESCRIPTION OF UNITS

Type 605/D is a composite transmitter comprising various units of Types 601–604. The detailed descriptions of these units are given in the Summary of Data sheets for these transmitters.

POWER REQUIREMENTS AND CONSUMPTION

230 V, 50 Hz 1 Ø or 3 Ø

3 kW on CW

4½ kW on MCW and Voice.

CONTROL CIRCUITS

Type 605 can be operated by 'Local Control' or by any of the standard Wireless Control Outfits.
Type 605D is fitted with the Centralized W/T System (CWS).

AERIAL SYSTEM

MF The Aerial Tuning Unit will accommodate any aerial of 550 pF to 1100 pF and 1 ohm to 4 ohms.

HF The Aerial Tuning Unit will accommodate any aerial of 30 ft or longer, including whip aerials.

HANDBOOK

BR 1470(1)(2)(3)

ESTABLISHMENT LIST

E696

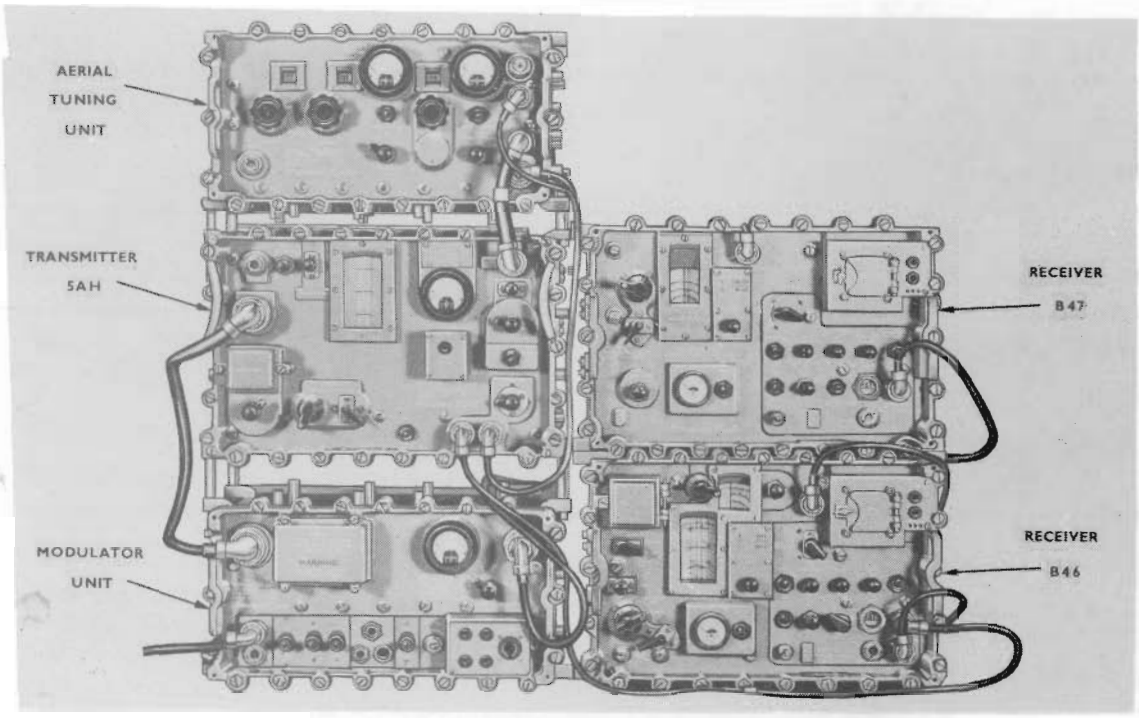
INSTALLATION SPECIFICATION

B691

TYPES 612E, 612F, 612EF and 612ET

612

SUMMARY OF DATA



TYPE 612E - GENERAL VIEW OF EQUIPMENT

PURPOSE

A general purpose low power HF AM transmitter, HF receiver and a M, L, and VLF receiver, the equipment being designed as a number of transportable watertight units.

Type 612E – emergency equipment in destroyers and replaces Types TCS and 607/8

Type 612EF/F – emergency transmitter in Bridge Wireless Office of cruisers and 2nd Wireless Office of Flotilla Leanders and replaces Type 60EQR

Type 612ET – temporary shore station used by landing parties etc. and replaces Type 52ERT. The equipment can be moved and erected by two men

TYPE OF TRANSMISSION AND RECEPTION

CW, MCW or Voice

FREQUENCY RANGE

Transmitter 5AH – 1.5 to 13.0 MHz
Receiver B46 – 1.4 to 15.0 MHz
Receiver B47 – 40.0 to 500 kHz and 15.0 to 27.0 kHz

BRIEF DESCRIPTION

Transmitter 5AH, Patt. 59517

Frequency – 1.5 to 13.0 MHz
Frequency Control – Master Oscillator self excited or crystal controlled
Output – 12 to 20 watts on Voice or MVW or 20 to 40 watts on CW, into a 100 ohm unbalanced line or Aerial Tuning Unit
Keying – Up to 20 words per minute with 'break-in' facilities

Anode Modulation is employed and unit incorporates a 100 kHz Crystal Calibrator

Modulator for Transmitter 5AH D.C. Supply, Patt 65169

Comprises the modulator circuits, control circuits and the D.C. power supply unit for itself and Transmitter 5AH. The MCW note is 800 Hz and the Audio Frequency response for Voice is 400 to 3000 Hz.

Aerial Tuning Unit, Patt. 65168

Comprises a combination of inductors and capacitors, the circuit being tunable over a wide range to provide maximum transference of power from the Transmitter 5AH to the aerial. This unit also contains a Dummy Load for the transmitter.

MAJOR UNITS

Patt. No.	DESCRIPTION	PHYSICAL DATA				ASSOCIATED WITH
		Height	Width	Depth	Weight	
59517	Transmitter 5AH	17 in	22¼ in	15 in	75 lb	Types 612E/F/EF/ET
65169	Modulator Unit	15¼ in	22¼ in	15 in	77 lb	
65168	Aerial Tuning Unit	15¼ in	22¼ in	15 in	59 lb	
58674	Receiver B46	17 in	20¼ in	13⅜ in	60 ln	Types 612E/EF/ET
58675	Receiver B47	17 in	20¼ in	13⅜ in	64 lb	Types 612E/ET

All physical data is inclusive of the tubular steel carrying crates.

NOTE: For further information on Receivers B46 and B47 see data sheet on Receiver Outfits CAJ, etc.

ANCILLARY EQUIPMENT

Patt. No.	DESCRIPTION	REMARKS
–	Battery Outfit BBn	Normal office battery supply for Type 612EF
66199	Supply Unit A.C. for Transmitter 5AH	Type 612EF/F only
66126	Aerial Change-over Switch	Fitted with all installations
–	Battery Outfit BCe	Type 612E/EF/ET
–	Aerial Outfit AWH	Not supplied to Coastal Craft
58408	Remote Control Unit	Type 612ET only

POWER REQUIREMENTS AND CONSUMPTION

By using appropriate power units Transmitter 5AH and Receivers B46 and B47 can be operated from 24 V D.C., 230 V 50 Hz with the following power consumptions :-

Transmitter 5AH – 250 watts; Receiver B46 – 42 watts; Receiver B47 – 26 watts.

CONTROL CIRCUITS

Ashore – Type 612ET can be operated in 'Local Control' or operated remotely up to a distance of 800 yards.

Ship – Types 612E/F/EF can be adapted for use with the Wireless Control Outfits KCH, KDA and KHA series.

HEAT DISSIPATION

– 250 watts

AERIAL SYSTEM

Transmitter 5AH – With the Aerial Tuning Unit any wire aerial 15 – 120 feet long or Whip Aerial Outfit AWG.
Receiver B46 – Any wire aerial 40 ft long of which at least half must be vertical or Whip Aerial Outfit AWG.
Receiver B47 – Any wire aerial 30-50 ft long of which at least half must be vertical or Whip Aerial Outfit AWG.

HANDBOOK

BR 1616(1)(2)

ESTABLISHMENT LIST

E981 (Type 612ET); E965 (Types 612E/F/EF)

INSTALLATION SPECIFICATION

3685

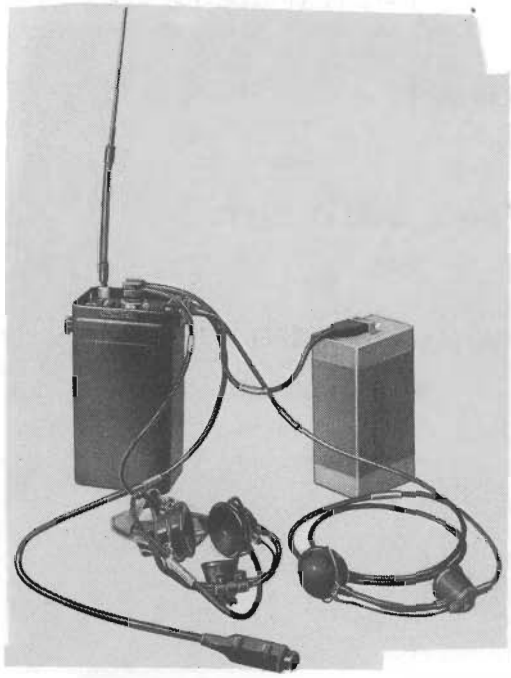
TYPE 615

615

SUMMARY OF DATA

PURPOSE

A short range tropicalised portable FM transmitter-receiver for Voice communication. (Army Wireless Set No. 88).



FREQUENCY RANGE

40-0 to 43 MHz with four spot frequencies 40.2, 40.9, 41.4 and 42.15 MHz.

BRIEF DESCRIPTION

A 14 valve UHF transmitter-receiver. The transmitter employs four valves, reactor, master oscillator, frequency doubler and power amplifier. A frequency stabilising circuit is included. The ten valves of the receiver are, RF amplifier, mixer, oscillator and frequency trebler, three IF amplifiers, limiter, discriminator and AF amplifier. The intermediate Frequency is 3 MHz. Four spot frequencies, crystal controlled are selected by a channel selector switch. The complete set including batteries can be carried in two satchels. The range is 1-1½ miles approximately with a four foot rod aerial.

MAJOR UNITS

Army Ref.	DESCRIPTION	PHYSICAL DATA			
		Height	Width	Depth	Weight
21/2A32972	Wireless Set No. 88 Types A	9¾ in	5¾ in	3¾ in	5 lb
W84133	Battery, dry HT/LT 94/1.3 V No. 1	9¾ in	5¾ in	3¾ in	4½ lb

The complete set weighs 11 lb.

PERFORMANCE

Receiver — Output 2 mW
Sensitivity 1.8 μV input for a 20 dB signal to noise ratio.

Transmitter — Output 9.25 W.

POWER REQUIREMENTS AND CONSUMPTION

	HT 90 V	LT 1.4 V
Transmitter	40 mA	1A
Receiver	10 mA	0.7A

The battery life is 24 hours (in three periods of 8 hours) with a transmit-receive ratio of 1 to 5.

AERIAL SYSTEM

(a) 4 ft vertical rod.

(b) 11 ft vertical rod - with ground spike - half wave aerial.

(c) An 'invisible' aerial - 4 ft (approx) of rubber covered wire.

REMARKS

There is an extension socket for an additional handset. The equipment is immersion-proof up to a depth of six feet for long periods.

HANDBOOK

BR 1827

ESTABLISHMENT LIST

E975

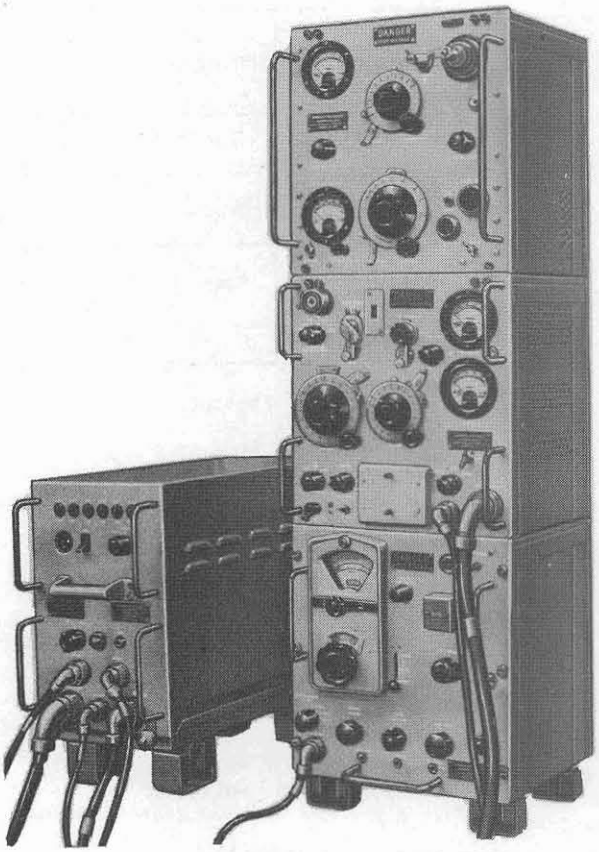
INSTALLATION SPECIFICATION

-

TYPE 618/H/L

618

SUMMARY OF DATA



TYPE 618, CAS AND POWER UNIT

PURPOSE

A general purpose low power transmitter fitted in all classes of ships to replace Types TCS, 607E, 608E and 60EQR.

TYPE OF TRANSMISSION

HF Transmitter CW, MCW and Voice.

MF Transmitter CW and MCW.

Maximum keying speed of both transmitters 30 bauds.

FREQUENCY RANGE

HF Transmitter 1.5–16 MHz.

MF Transmitter 330–550 kHz.

BRIEF TECHNICAL DESCRIPTION

HF Transmitter AP 100333

Frequency Control	Crystal or Master Oscillator	
Frequency Stability	Crystal	± 0.02%
	M.O.	± 0.1%
Output	40 Watts	
Audio Input	–15 dB to + 10 dB relative to 1 mW to 600 ohms.	

The oscillator stage is switchable between any of eight crystals or a variable frequency oscillator which covers the range in three bands. A buffer/multiplier stage feeds three CV428 valves in parallel which constitute the power amplifier. The AF section comprises a preamplifier, a driver and two CV428 modulator valves in push–pull. Modulation depth is maintained at a constant level by an automatic gain control circuit. An RC oscillator is provided for MCW working.

MF Transmitter AP 100334

Frequency Control	Master Oscillator.
Frequency Stability	± 0.1%.
Output	15 Watts

An electron coupled Hartley oscillator is used for the MO. A buffer amplifier stage precedes the power amplifier which comprises three CV428 valves in parallel. Anode modulation for MCW working is provided by a push–pull audio oscillator with a frequency of 800–1200 Hz.

Power Unit AP 100336

The Unit contains three conventional rectifier and smoothing circuits driven from two mains transformers and provides all the power supplies for the receiver and one or other of the two transmitters. The main operating controls are located on the Unit with a local/remote switch and an outlet for connections to a CCX, permitting full remote control of the equipment.

MAJOR UNITS

PATTERN NO.	DESCRIPTION	PHYSICAL DATA			
		Height	Width	Depth	Weight
1. 100333	Transmitter, HF	14-1/16 in	13-1/16 in	14½ in	70 lb
2. 100334	Transmitter, MF	14-1/16 in	13-1/16 in	14 in	73 lb
3. 100336	Power Unit	14-7/8 in	9-3/16 in	22 in	135 lb
		(Dimensions include rack)			

Type 618 comprises items 1, 2 and 3.
Type 618H comprises items 1 and 3.
Type 618L comprises items 2 anc 3.

The associated receiver is Receiver Outfit CAS AP 100335 which also takes its power from AP 100336 Power Unit.

POWER REQUIREMENTS AND CONSUMPTION

Input Voltage 110–120 V or 220–245 V A.C. 50 Hz single phase.

Loading Receiver 180 Watts Approx.
Stand by 240 Watts Approx.
TX Ready 410 Watts Approx.
Voice 555 Watts Approx.
Key down, MCW 600 Watts (maximum consumption)

When an A.C. 50 Hz supply is not directly available, A.C. Supply Outfits DWH, DWJ and DWK will be used from the 24 V, 110 V and 220 V D.C. supplies respectively.

CONTROL CIRCUITS

Type 618/H/L and Receiver Outfit CAB are designed to work with Control Outfits KH series.

HEAT DISSIPATION

Receiver, Power Unit and one Transmitter 550 Watts (max.) approximately.

AERIAL SYSTEM

Wire or whip depending on particular ship installation.

REMARKS

When the equipment is fitted for emergency purposes, the normal 230 V 50 Hz supply will be used with the facility to switch to emergency supply when necessary.

HANDBOOK

BR 1565 (Type 618 and Receiver Outfit CAS)

ESTABLISHMENT LISTS

E1049 (Type 618 and CAS)
E1051 (A.C. Supply Outfits DWH/J/K)

INSTALLATION SPECIFICATION

B767

TYPE 619/H/L & RECEIVER OUTFIT CAT

619 CAT

SUMMARY OF DATA

PURPOSE

A general purpose low power (40 Watts HF 15 Watts MF) transmitter and receiver fitted in all classes of ships replacing the Type TCS, 607E, 608E and 60EQR.

TYPE OF TRANSMISSION AND RECEPTION

CW, MCW, or Voice (No Voice on MF Transmitter). Maximum keying spded 30 Bauds.

FREQUENCY RANGE

HF Transmitter – 1.5 – 16 MHz in 3 ranges
MF Transmitter – 330 – 500 kHz in 1 range
Receiver – 60 kHz – 30 MHz in 8 ranges.

BRIEF TECHNICAL DESCRIPTION

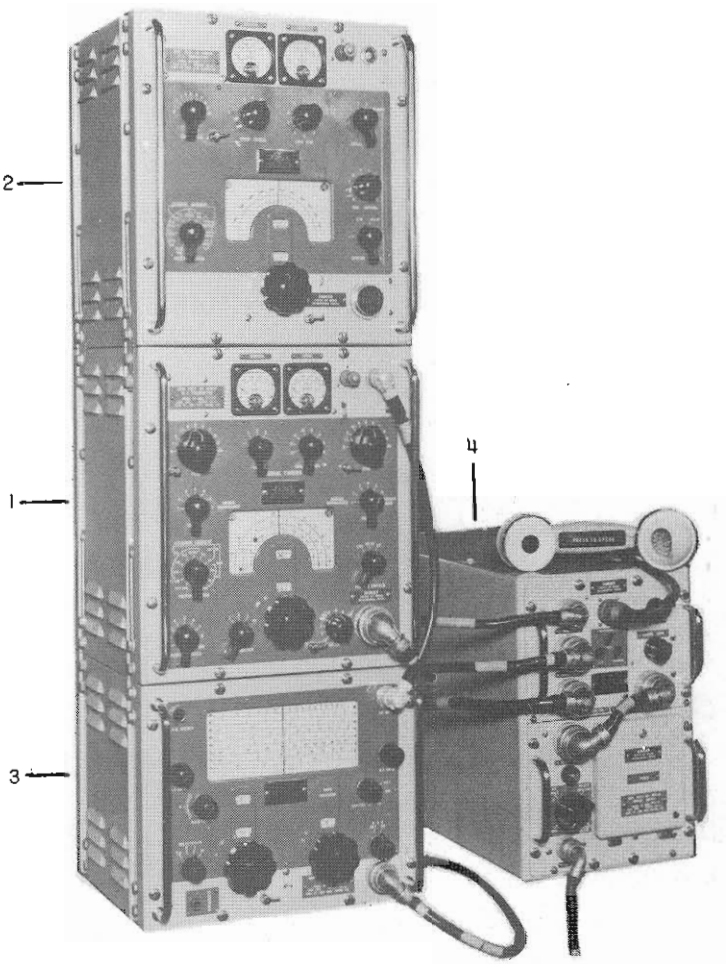
HF Transmitter AP 100337

Frequency Control	Crystal or Master Oscillator
Frequency Stability	Crystal ±0.02%) for ± 10% sup- MO ± 0.1%) ply voltage fluctuation
Output	40 Watts

The RF circuit has oscillator, frequency doubler, buffer, and power amplifier stages. The oscillator stage is switchable between any of eight crystals and a continuous coverage master oscillator. The modulation circuit has oscillator (MCW) or pre-amplifier (voice), limiter, phase-splitter, and power amplifier stages, the last modulating the anode and screen grid supplies to the RF power amplifier stage.

MF Transmitter AP 100338

Frequency Control	Master Oscillator
Frequency Stability	± 0.1% for ± 10% supply voltage fluctuation
Output	15 Watts



TRANSMITTER TYPE 619 & RECEIVER OUTFIT CAT

The RF circuit has oscillator, buffer amplifier, and power amplifier stages. The modulation circuit has oscillator, phase splitter and power amplifier stages, the last modulating the anode and screen grid supplies to the RF power amplifier stage.

Receiver AP 100339 (Receiver Outfit CAT)

Overall Sensitivity	: Input for 2 Watts output (depending on frequency)	CW 10–30 dB above 1 μV MCW 20–30 dB above 1 μV
Intermediate Frequency:	1.4 MHz and/or 460 kHz	
IF Selectivity	Band-width as single superheterodyne for 6 dB down Wide 6.5 kHz, intermediate 4–6 kHz, Narrow 1.0 kHz, Very Narrow 720 Hz	
Outputs	2 Watts into 600 Ohm load, and 60 mW into 100 ohms.	

The circuit is a single superheterodyne (460 kHz) on ranges 1, 2, 4, 5 and double (1.4 MHz and 460 kHz) on ranges 3, 6, 7, 8. It may be crystal or separate oscillator controlled and the IF selectivity is variable in 4 stages. AGC and noise limiter controls are pre-set. AF gain and alternative manual RF gain controls are provided. Radiation is less than 9.1 μV/metre at 1 nautical mile.

Power Unit AP 100340

The power unit is designed to operate on a single phase 50–60 Hz 110/240 V supply and takes 450 watts when supplying Type 619 and CAT or 400 Watts when supplying Type 619H or 619L only. The power unit is to be adjusted to suit the mains input voltage by means of tappings on the mains transformers, tapping voltages being 110, 115, 220, 230, 240V.

MAJOR UNITS

PATTERN NO.	DESCRIPTION	PHYSICAL DATA			
		Height	Width	Depth	Weight
1. 100337	Transmitter, HF (Type 619)	14½ in	13½ in	14 in	63 lb
2. 100338	Transmitter, MF (Type 619)	14½ in	13½ in	14 in	48 lb
3. 100339	Receiver HF, MF (Outfit CAT)	10½ in	13½ in	14 in	44 lb
4. 100340	Power Unit (Type 619)	14 in	9½ in	21½ in	118 lb

Type 619 has power unit and both transmitters
Type 619H has power unit and HF transmitter only
Type 619L has power unit and MF transmitter only

POWER REQUIREMENTS

110 V to 240 V 50 to 60 Hz

HF or MF Transmitter only connected 400 Watts

Receiver only connected 50 Watts

HF Transmitter and Receiver 450 Watts

When the above supplies are not directly available, A.C. Su ply Outfits DWH, DWJ and DWK are used from the 24 V, 110 V and 220 V D.C. supplies respectively.

CONTROL CIRCUITS

Type 619/H/L and Receiver Outfit CAT are designed to work with Control Outfits KH series.

HEAT DISSIPATION

Power Unit	50 Watts
Receiver	50 Watts
HF or MF Transmitter	350 Watts
Total	450 Watts Approx.

AERIAL SYSTEM

Wire or whip depending on particular ship installation.

REMARKS

When the equipment is fitted for emergency purposes, the normal 230 V 50 Hz A.C. supply will be used with the facility to switch to emergency supply when necessary. Aerial and power connections are changed over between transmitters.

HANDBOOK

BR 2169

ESTABLISHMENT LIST

E1065 (Type 619).
E1051 (A.C. Supply Outfits DWH, DWJ and DWK).

INSTALLATION SPECIFICATION

3775

TYPE 620

620

SUMMARY OF DATA

PURPOSE

A short range low power portable F.M. transmitter–receiver (Army Wireless Set No. 31) for voice communication.

FREQUENCY RANGE

40 to 48 MHz in 41 channels 200 kHz apart.

BRIEF DESCRIPTION

The set occupies the upper section of a weatherproof metal case. The lower section contains the dry battery. The receiver is a double superheterodyne. The first i.f. is 4.3 MHz the second i.f. is 2.515 MHz a.f.c. is incorporated. The transmitter consists of a F.M. reaction modulator, master oscillator doubler, crystal oscillator and power amplifier. The crystal oscillator may also be used as calibration check.

MAJOR UNIT AND PHYSICAL DATA

ZA31385 Wireless Set No. 31.

Height	Width	Depth	Weight
17"	11"	5½"	23½ lb

GENERAL VIEW OF EQUIPMENT

PERFORMANCE

Power Output:	Transmitter 0.5 W, Receiver 2 mW
Receiver Sensitivity:	3/uV for 20 dB Signal/noise ratio
Range:	3 to 5 miles

POWER REQUIREMENTS AND CONSUMPTION

The power supply is from a single battery (Army Ref. Y3/WB4134) which provides both h.t. and l.t. with a working life of 25 hours. The consumption is as follows:–

Transmit:	45 mA at 150 V 25 mA at 90 V 0.5 A at 4.5 V	Receiver:	25 mA at 90 V 0.3 A at 4.5 V

AERIAL SYSTEM

A vertical whip aerial:–

One in two sections giving a 2 ft 9 in. rod or
One in eight sections giving a 10 ft 8 in. rod.

HANDBOOK

BR 1772 E.M.E.R. Telcon F369, F362, F364 and ZA33743

ESTABLISHMENT LIST

E1936

INSTALLATION SPECIFICATION

TYPE 622

622

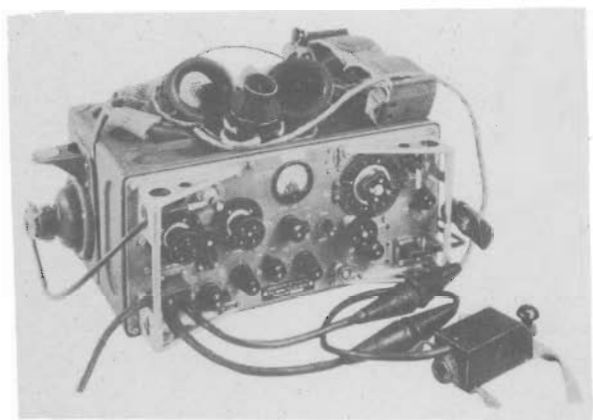
SUMMARY OF DATA

PURPOSE

A short range low power tropicalised portable transmitter–receiver (Army Wireless Set No. 62) for Voice and cw communication.

BRIEF DESCRIPTION

This Set is housed in an aluminium case with an internal power unit. The receiver is a normal eight valve superheterodyne, one r.f. mixer and separate local oscillator, two i.f's detector A.G.C. pentode output and beat oscillator for cw. The intermediate frequency is 460 kHz. The transmitter operates on the transmitter–mixer principle in which the local oscillator output is mixed with that from the beat oscillator. The signal frequency is selected from the mixer output amplifier and used to drive the power amplifier. The local oscillator may be crystal controlled.



GENERAL VIEW OF EQUIPMENT

FREQUENCY RANGE

1.6 to 10 MHz in two ranges 1.6 to 4 MHz and 4 to 10 MHz (8 to 10 MHz to be used only in emergency).

MAJOR UNIT AND PHYSICAL DATA

ZA39714 Army Wireless Set No. 62 Mk. 2

Height	Width	Depth	Weight
8½"	17½"	13½"	29 lb

PERFORMANCE

Sensitivity – 3 μV for 10 mW and Signal noise ratio of 20 dB.

Range – 14 miles on Voice and 20 miles on cw using a 14 ft Whip aerial.

POWER REQUIREMENTS AND CONSUMPTION

The power is derived from a 12 V battery driving a rotary transformer to provide h.t. at 300 V. The valve heaters are connected in series parallel to the 12 V supply.

Consumption – Receiver 3.4 amps
Voice 4.4 amps
C.W. 4.7 amps
Listening Watch 2.8 amps

AERIAL SYSTEM

8 to 32 ft whip aerial or 100 ft sectional wire aerial.

REMARKS

The set is immersion proof for five minutes and will float. Remote control facilities are available.

HANDBOOK

BR 1747 E.M.E.R. Telcon F510, F512, and F514.

ESTABLISHMENT LIST

E1038

ESTABLISHMENT LIST

TYPE 623

623

SUMMARY OF DATA

PURPOSE

Medium power HF communications transmitter for use in submarines to replace Type 55M.

TYPE OF TRANSMISSION

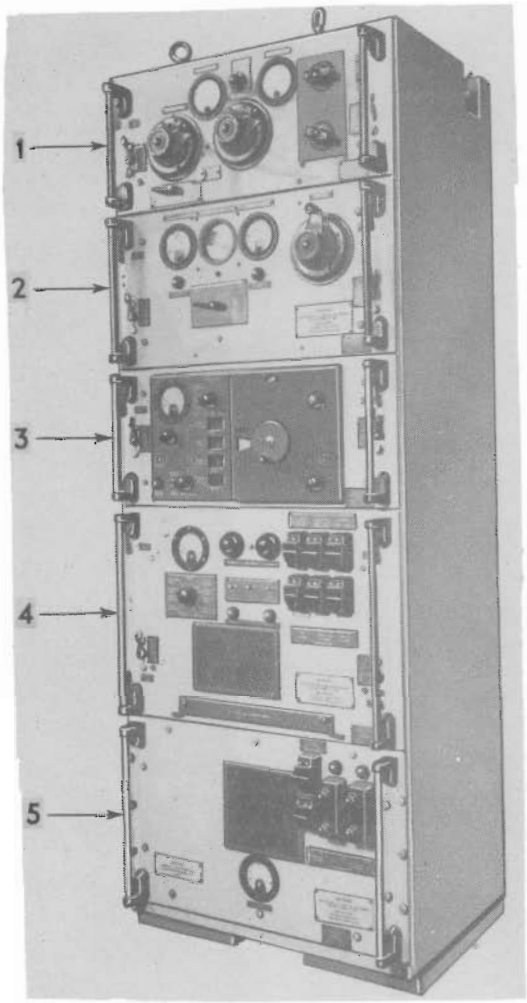
C.W.

FREQUENCY RANGE

1.5–24 MHz in four bands.

BRIEF DESCRIPTION

A variable frequency master oscillator covers the range 1.5–3 MHz with an accuracy of .02%. Frequency multipliers are used for higher frequencies up to 25 MHz. In addition, the transmitter may be crystal controlled on nine spot frequencies in the range 2–24 MHz with no restriction on the distribution of these frequencies within the band. The basic crystal frequencies are between 2 and 4 MHz. The anode, screen and bias power supplies to the oscillator and power amplifier stages are provided with comprehensive regulation and absorption systems. The power output is 400 watts into Aerial Outfit ALE.



TYPE 623

MAJOR UNITS

	Patt. No.	Description
1.	62155	Aerial Tuning Drawer, 42A
2.	62156	Power Amplifier Drawer
3.	62157	Master Oscillator Drawer
4.	62158	Power Supply Drawer, Design 6
5.	62159	Power Supply Drawer, Design 7
6.	62160	Cabinet, Design 79
7.	63296	Switch Unit, Design 80, Aerial Changeover

PHYSICAL DATA

The five drawers are housed in the Cabinet, Design 79, the overall dimensions of which are as follows:–

Height	Width	Depth	Weight
5 ft 1½ in.	1 ft 11 in.	1 ft 8 in.	857 lb

POWER REQUIREMENTS

115 V 1 ø 60 Hz or 230 V 1 ø 50 Hz 2.3 kW and 220 V d.c. 3A

HEAT DISSIPATION IN OFFICE

2.5 kW (approx.)

AERIAL SYSTEM

The transmitter is designed for operation with Aerial Outfits ALE, AWJ, AWO and wire aerials.

HANDBOOK	ESTABLISHMENT LIST	INSTALLATION SPECIFICATION
BR 2181	E1100	B792

TYPE 625 625

SUMMARY OF DATA

PURPOSE

A short range, lightweight, sub-miniature VHF F.M. Transmitter-Receiver, for Voice Communication. It is fully sealed for use anywhere, or to be parachute dropped, or for transport at altitudes up to 25 000 ft. It is provided with straps for carriage as a manpack. It is intended to be a replacement for Type 615. It is similar to Canadian Radio Set CPRC-26. It is also known as Army Wireless Set A40, the Naval versions (Models A and B) only differing from the A40 in the channel frequencies used. Model A is for general Naval use; Model B is more particularly for R.M. Commandos.

GENERAL VIEW

FREQUENCY RANGE

R.F. 47.0-54.4 MHz, with six spot frequencies - three channels common to both types.

Type A - 47.0, 47.2, 47.4, 47.6, 48.8, 54.2 MHz

Type B - 47.0, 47.4, 47.6, 47.8, 52.6, 54.4 MHz

I.F. 4.3 MHz

BRIEF DESCRIPTION

A 13 valve VHF F.M. transceiver, employing plug-in sub-assemblies and circuit stages. The receiver is a superhet., the stages being r.f., mixer, xtal controlled oscillator, 4-double tuned i.f. stages, limiter, discriminator, and a.f. amplifier. The transmitter stages are, P.A., M.O., Ferrite reactor modulator; it is held on frequency by an a.f.c. circuit referred to the receiver crystal oscillator. The set and battery share a common case.

PHYSICAL DATA

ARMY REF.	DESCRIPTION	HEIGHT	WIDTH	DEPTH	WEIGHT
ZA 53443	Wireless Set A40 Type A part of ZA 53444 Wireless Set A40 Type A, Set Kit No. 1	11 in.	3.5 in.	5.25 in.	10 lb
	or				
ZA 53445	Wireless Set A40 Type B part of ZA 53446 Wireless Set A40 Type B, Set Kit No. 1				

Note 1. Models will be identified by a disc bearing the type letter on the front panel and the Ref. No.

Note 2. Crystals are engraved with their nominal frequency. This will always be 4.3 MHz BELOW CHANNEL FREQUENCY.

PERFORMANCE

Receiver 2 µV input for 20 dB Signal/Noise with 15 kHz deviation at 1 kHz and 6 mW output.

Transmitter 300 mW r.f. output.

Deviation ± 15 kHz peak.

Range 1.0-2.0 miles over open country, between sets fitted with 4 ft rod aerials.

3.0-5.0 miles, between sets fitted with remote 10 ft aerials.

Gives good quality speech, free from interference.

POWER REQUIREMENTS AND CONSUMPTION

Dry battery	: volts	1.25	45	90	-2.5 bias	)	
Current receive	: mA	550	14	5	-	)	Battery life approximately 18 hours
Current send	: mA	900	8	35	-	)	under normal conditions.
Battery end point	: volts	1.05	34	68	-	)	

AERIAL SYSTEM

(i) 4-foot vertical rod.
(ii) 4-foot wire.
(iii) 4-foot vertical rod with earthed counterpoise wire.
(iv) A remote (up to 54 ft) half-wave aerial including matching unit and a ground spike.
(v) A portable homing loop. (Not yet available.)

SPECIAL FACILITIES

A test socket is provided which, together with a wireless set A40 functional tester, allows of the realignment and testing of the wireless set.

A number of sub-units and components are interchangeable with Canadian parts from CPRC-26.

Remote control operation, up to a distance of 60 ft, is possible by use of a.f. extension leads.

Remote battery operation is provided for use in arctic conditions, the battery being kept warm by the operator's body.

HANDBOOK

BR 1193

ESTABLISHMENT LIST

E1193

INSTALLATION SPECIFICATION

TYPE 629

629

SUMMARY OF DATA

PURPOSE

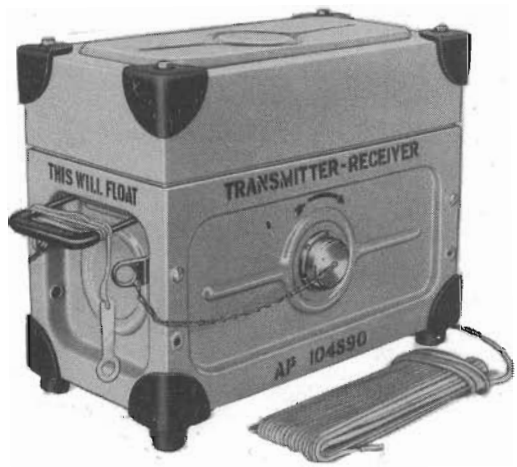
Self-contained portable wireless transmitter-receiver for use in 20-man NILE liferafts. Replaces the Type 611 lifeboat set.

FREQUENCY

Transmission	500 kHz and 8364 kHz
Reception	500 kHz

BRIEF DESCRIPTION

The main items of equipment are housed in a golden yellow watertight steel case which, with its lid firmly secured, will float in the sea until hauled on to the liferaft. A telescopic whip aerial and 4-section fibreglass mast are provided for use in the liferaft, and these, when not in use, are stowed in the lid of the steel case. Power supplies are provided by a hand-driven generator mounted in the bottom of the steel case, the handles for which are stowed in the lid when not in use. In addition to supplying power, the generator provides modulation of the transmitted carrier wave by the interrupted continuous wave (i.c.w.) method.



TYPE 629

The set is capable of transmitting i.c.w. on the two distress frequencies, 500 kHz and 8364 kHz. The receiver provides reception of modulated waves on 500 kHz only. Receiver output is fed into a pair of splash-proof headphones which are normally enclosed in the lid when the set is not in use. Keying of the transmitter may be performed manually or by an automatic clockwork mechanism which sends out distress signals. Two persons are normally required to operate the set, one to turn the generator handles and the other to set the controls.

POWER OUTPUT AND TYPE OF TRANSMISSION

3 watts interrupted continuous wave (i.c.w.).

POWER SUPPLIES

Provided by hand-driven generator built into the equipment.

PHYSICAL DATA

The complete equipment in its case measures 23 in. long, 11 in. wide and 17 in. high and weighs 65 lb approx. The length of the mast and aerial when fully extended is 21 ft.

RELEVANT PUBLICATIONS

Handbook	BR 1161
E List	E1210
Installation Specification	None

TYPE 633

633

SUMMARY OF DATA

PURPOSE

A self-contained single-sideband HF transmitter-receiver fitted in ships generally for medium range working.

TYPE 633

TYPE OF TRANSMISSION FREQUENCY

Voice and c.w. Power Output - 60 W.

Channels 1 and 2:- 3.0-6.7 MHz
Channels 3 and 4:- 6.7-15.0 MHz

BRIEF DESCRIPTION

The equipment is a commercial one (Type HSR21A) single sideband working, normally as simplex radio telephone on any one of four pre-tuned frequencies, with provision for three remote control positions.

In addition the set may be used for c.w. working, to existing A.M. equipment.

MAJOR UNITS

	Pattern No.	Description	Marconi Ref.
Type 633	AP 105470	Receiver-Transmitter, Radio	Type 4600 R.F. Unit (modified)
	AP 105471	Amplifier - Power Supply	Type 4601 Supply Unit
	AP 105472	Cabinet, Electrical Equipment	Cabinet Assembly (W61374)
	AP 105473	Cable Assembly, Coaxial	Type 3738A Lead Assembly
	AP 105474	Dummy Load, Electrical, R.F.	Type 3731A Load Unit
Outfit AWS	AP 105475	Turner, Radio-Frequency, Aerial matching	Type 3730B Aerial Matching Unit
	AP 105476	Indicator, Standing Wave Ratio	Type 3732A S.W.R. Meter Unit

PHYSICAL DATA

	Height	Width	Depth	Weight
Cabinet, Electrical Equipment	23½ in.	21¾ in.	18¼ in.	39 lb
Receiver-Transmitter Radio	8¾ in.	19 in.	15¾ in.	37½ lb
Amplifier-Power Supply	10½ in.	19 in.	16¾ in.	78½ lb

AERIAL SYSTEM

Aerial Outfit AWS.

POWER SUPPLIES

110-115 and 200-250 a.c. single phase 50/60 Hz.
Transmit (full c.w. output) - 330 W.
Receive (transmitter off) - 130 W.

HANDBOOK

BR 1188 (for Type 633 and Aerial Outfit AWS).

ESTABLISHMENT LIST

E1278 Type 633
E1279 Aerial Outfit AWS

INSTALLATION SPECIFICATION

B892

TYPE 634 634
(ARMY TYPE S.R. A43R MK.2)

SUMMARY OF DATA

PURPOSE

A UHF portable, Transmitter/Receiver with beacon facilities, designed for ARMY manpack or ground station use.

FREQUENCY RANGE

240–300 MHz (six spot frequencies).

CHANNEL SPACING

100 kHz.

TYPE OF EMISSION

Voice	A.M.	(A3)
Beacon	cw	(A0)
Beacon	mcw	(A2)

POWER SUPPLY

Rechargeable, sealed 12 V battery, or from an external 12 V supply. Battery life is 12 hours on RECEIVE only: 2 hours on normal voice operation. For beacon use an external supply should always be used.

POWER OUTPUT

2 Watts.

WORKING RANGES

Ranges in statute miles depend on the type of terrain, height of the distant station, and the aerial used. Using the manpack about 4 miles is normal, but if the distant station is at 5000 ft a range of 45 miles is possible. With the Discone Antenna, up to 160 miles has been obtained with the distant station at 30 000 ft high.

WEIGHT

For manpack use 24 lb (approx.).

RN HANDBOOK

BR 2365

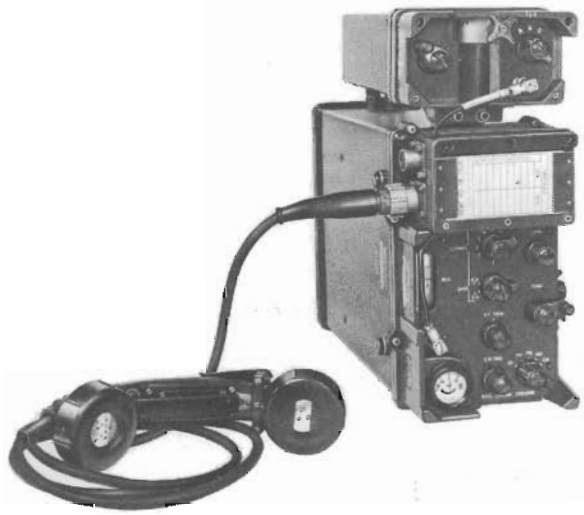
ESTABLISHMENT LIST

E1386

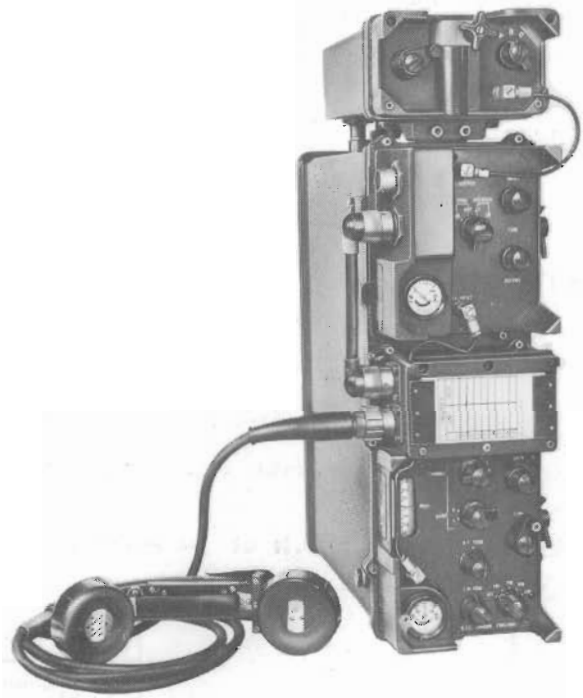
TYPE 635(1)(2)
(ARMY TYPE S.R. A14)

635(1)(2)

SUMMARY OF DATA



TYPE 635(1)LOW POWER TRANSMITTER-RECEIVER



TYPE 635 (2) HIGH POWER TRANSMITTER-RECEIVER

PURPOSE

An HF portable Transmitter-Receiver designed for manpack or ground station use. Two versions are available. Type 635(2), the high power set, consists of Type 635(1), the lower power set with additional units. Type 635(2) can be used in the low power mode. The set can also be installed in a vehicle.

BRIEF DESCRIPTION

Type 635 is fully transistorised and provides single frequency Simplex Voice or cw communication. The set is light, compact and designed for all world, all weather conditions. For long range working or under difficult conditions cw may be used. A miniature morse key with knee-strap is included.

MAJOR UNITS

5820-99-106-0365 Transmitter-Receiver (Type 635(2))
5820-99-106-0403 R.F. Amplifier No. 1 (only with 635(2))
5820-99-106-2104 Antenna Tuning Unit (ATU)

5820-99-106-2088 Transmitter-Receiver (Type 635(1))

FREQUENCY RANGE

2-8 MHz. 18 spot frequencies or continuous tuning.

TYPES OF EMISSION

A.M.	VOICE	(A3)
Ph.M	VOICE	(F3)
cw		(A1)

POWER SUPPLY

Rechargeable, sealed 12 V battery integral with the transceiver. The a.c. main battery charger can also power the set in low-power operation without any battery fitted. Battery life: 6 hours.

POWER OUTPUT

Low Power	2 W
High Power	20 W

ANTENNAE

Three antennae are supplied:

(a) An 8 ft rod, principally for the manpack role.

(b) A 27 ft, end-fed wire, that can be used with a 24 ft mast supplied with Type 635(2).

(c) A matched, horizontal wire dipole, for long range working.

WORKING RANGE (Ph.M or cw Modes)

Antenna	DAYTIME WORKING RANGE (miles)	
	High power set	Low power set
8 ft rod	25	10
27 ft wire, end-fed	300	300
Quarter wave dipole	525	350
Matched horizontal dipole	750	500

WEIGHT

For manpack use	Low Power	25½ lb
	High Power	38½ lb
Complete Station	Low Power	25½ lb
	High Power	48 lb

HANDBOOK

BR 2482

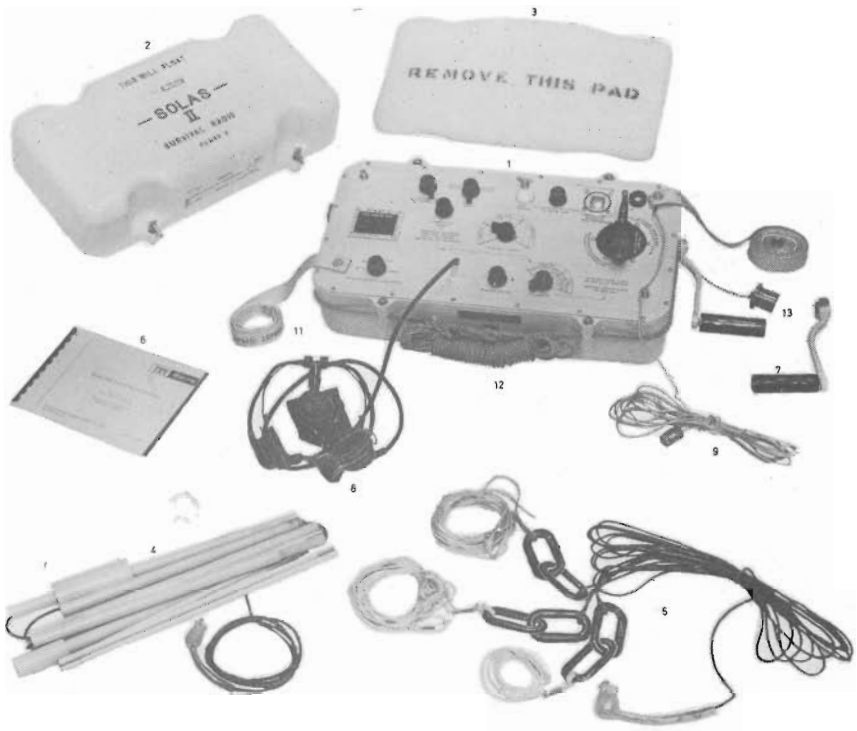
ESTABLISHMENT LIST

31437

TYPE 638
(NSN 5820-99-972-5618)

638

SUMMARY OF DATA



1. TRANSMITTER – RECEIVER.
2. LID CONTAINING SHEET OF OPERATING INSTRUCTIONS.
3. FOAM PLASTIC PAD.
4. WHIP ANTENNA.
5. WIRE ANTENNA.
6. OPERATING INSTRUCTIONS.
7. TWO GENERATOR HANDLES.
8. HEADSET.
9. EARTH LINE AND SINKER.
10. FOOT STRAP.
11. WAIST STRAP.
12. HEAVING LINE.
13. GENERATOR END CAPS. (ONE EACH SIDE.)

TYPE 638 COMPLETE OUTFIT

PURPOSE

A self-contained wireless station for communication between a survival craft and rescue services, meeting the requirements of the Safety of Life at Sea Convention. It is portable, buoyant and waterproof against shallow immersion. The civilian equivalent has the trade name SOLAS II SURVIVAL RADIO.

BRIEF DESCRIPTION

The set consists of an MF/HF Voice or MCW Transmitter operating on three spot distress frequencies, 500 kHz, 2182 kHz and 8364 kHz; a Receiver capable of Voice, MCW or CW reception at the two spot frequencies of 500 kHz and 2182 kHz, and variable between 8200 kHz and 8800 kHz.

OUTPUT POWER

1.5 – 3.5 W

KEYING

(a) Hand Morse
(b) Automatic Morse Alarm
(c) Automatic 2-tone Alarm

POWER SUPPLY

Integral 3-phase, ac hand generator, smoothed to 15 V dc. There is provision for connecting a battery at the front panel.

POWER CONSUMPTION

Not greater than 900 mA.

ANTENNAE

A folding, glass-fibre rod, Collapsed length 18½ inch: Erected length 17½ ft.

PHYSICAL DATA

Length	Width	Depth	Weight
22½ in (57.15 cm)	11½ in (29.21 cm)	9 in (22.86 cm)	32 lb (14.51 kg)

HANDBOOK

BR 2428

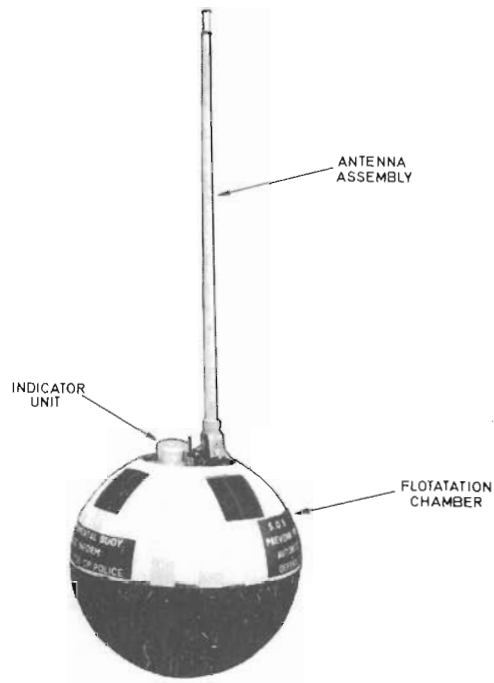
ESTABLISHMENT LIST

R1500

SUBMARINE INDICATOR BUOY
TYPE 639
NSN 5895-99-521-7733

639

SUMMARY OF DATA



SUBMARINE INDICATOR BUOY
TYPE 639

PURPOSE

To provide HF and UHF transmissions plus a flashing lamp indicating a submarine in distress at a recoverable depth.

DESCRIPTION

Type 639 is a submarine emergency transmitter operating in the HF and UHF bands. Normally housed in the casing superstructure it can be released to the surface from a submerged submarine.

The HF transmitter is a solid state electronic unit which transmits a distress message at a frequency of 4.340 MHz. The UHF transmitter is a crystal controlled mcw radio beacon transmitting at a frequency of 243 MHz to assist homing by UHF equipped aircraft. A Keyer Unit provides a coded sequence keying input to the HF transmitter while the Light Marker Distress Unit keys the UHF transmitter, flashes the lamp and switches the 12 V positive supply to the HF transmitter.

The Antenna Assembly, which is self erecting, is bolted to the cover assembly of the Indicator Unit.

Power is provided by a Mallory type battery divided into two networks to supply the lamp separately from the electronic units.

MAJOR UNITS

NSN	DESCRIPTION	PHYSICAL DATA			
		HEIGHT	WIDTH	DEPTH	WEIGHT
5825-99-521-5217	HF Transmitter Assembly	7 in.	2¾ in.	3⅜ in.	2¾ lb
5825-99-521-2547	UHF Transmitter Assembly	6 in.	2¾ in.	2¼ in.	¾ lb
6350-99-520-3685	Keyer Unit Assembly	6½ in.	3 2/5 in.	3 in.	2 lb
5895-99-520-5219	Light Marker Distress Unit	4½ in.	2⅞ in.	1¼ in.	½ lb
5895-99-521-7734	Isolator Radio Frequency	–	–	–	–
5895-99-520-5215	Antenna Assembly	–	–	–	–
5825-99-521-2548	Wiring Harness	–	–	–	–

PERFORMANCE

(1) Transmits on the 4.340 MHz distress frequency the following:-

(i)	Identification No.	3 times in 30 seconds
(ii)	Distress call SOS	6 times in 30 seconds
(iii)	Codeword SUB SUNK	3 times in 30 seconds
(iv)	DF transmissions Long Mark	Lasting for 30 seconds

(2) Transmits on the 243 MHz distress frequency a series of 1020 Hz tone bursts for DF purposes.

(3) A lamp, flashing synchronously with the tone bursts described in (2).

POWER SUPPLY

Battery, Mallory type, low temperature zinc mercuric oxide cells
Capacity 72 hours at 11 V – 13 V.

HANDBOOK

BR 4122

ESTABLISHMENT LIST

E1385

INSTALLATION SPECIFICATION

B1199

TRANSMITTER TYPE 640

640

SUMMARY OF DATA

PURPOSE

MF and HF transmitter for voice and telegraphic communication.

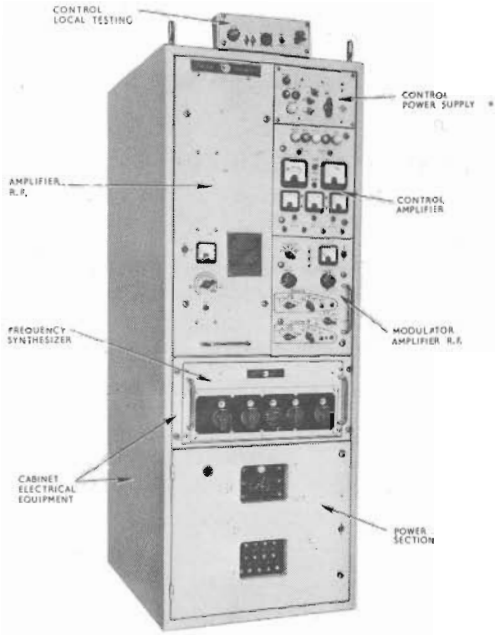
TYPES OF MODULATION AND TRANSMISSION

Single, independent or double sideband modulation in the following modes:-

CW or MCW telegraphy	Single channel
D.S.B. telephony	Single channel
I.S.B. telephony or keyed tone (suppressed or pilot carrier)	Two channels
External modulation (ie fst)	

FREQUENCY RANGE

MF 240 kHz to 3 MHz
HF 1.5 MHz to 24 MHz



TRANSMITTER TYPE 640

BRIEF DESCRIPTION

The carrier frequency is derived from an external high stability reference signal (usually from Outfit FSA or FSB) via a frequency synthesiser to give the stability and accuracy required for ssb and isb communication.

A 100 kHz carrier from the synthesiser is modulated in one of two channels from either a local control unit or one of two remote control positions. The output from the two modulation channels is combined and fed back to the synthesiser (with the carrier either suppressed or re-inserted at various preset levels).

The modulated synthesiser output is taken to the Drive Amplifier in the TRANSMIT condition or to an associated receiver in the RECEIVE condition. The Drive Amplifier is tunable and provides the correct signal level for the Amplifier R.F. which uses artificial transmission line techniques to give wide-band power amplification without using tuned circuits. The Amplifier R.F. has separate outputs for MF and HF, but it can be restricted to HF working only. The outputs are fed to the aerials via Aerial Tuning Outfits (eg ETC and ETB) which enable the transmitter output impedance to be matched to the aerial impedance.

Directional Couplers in the outputs provide the feed for peak power and V.S.W.R. monitoring.

The transmitter performance can be checked by means of monitoring facilities on the front panel.

MAJOR UNITS

1. 5820-99-580-1583 Cabinet, Electrical Equipment
2. 5820-99-580-1584 Control, Power Supply
3. 5820-99-580-1585 Transformer
4. 5820-99-580-1586 Power Supply (Auxiliary)
5. 5820-99-580-1587 Power Supply (H.T.)
6. 5820-99-580-1588 Control Amplifier
7. 5820-99-580-6739 Generator Modulation
8. Drive Amplifier

NOTE Units 7 and 8 together form a 5820-99-580-1589 Modulator Amplifier.

9. 5820-99-580-1590 Amplifier R.F.
10. 5820-99-580-1591 Frequency Synthesiser
11. 5820-99-580-1705 Control, Local Testing

PHYSICAL DATA

	Cabinet including Units 1 to 10	Control, Local Testing
Height	5 ft 3 in.	4¼ in.
Width	1 ft 11 11/16 in.	10 13/16 in.
Depth	2 ft 6½ in.	4½ in.
Weight	796 lb	4 in.

CONTROL CIRCUITS

The transmitter can be used with Wireless Control Outfits KH and KM series.

ELECTRICAL CHARACTERISTICS

Maximum r.f. power output:	Telegraphy, 30 Bauds	500 W
	Telegraphy, 200 Bauds	400 W
	I.S.B.	500 W P.E.P.
	D.S.B.	125 W carrier
Output impedance		50 ohms
Audio input impedance		600 ohms
Audio input level		0 dBm for 85% modulation
Modulation level		Up to 100%
Maximum Keying Speeds		CW 30 bauds FST 200 bauds I.S.B. tone 75 bauds (rise and fall times not less than 1.5 mS)
Tuning		By five decade selectors on the synthesiser
Carrier Suppression		−60 dB below P.E.P.
Pilot Carrier Levels		−26, −21, −16, −11 or −6 dB below P.E.P.

POWER REQUIREMENTS

400–450 V, 50–60 Hz, 3 phase 3 wire, 4 kW (on full power)
115 or 230 V a.c. or d.c. 150 W for anti-condensation heaters

HANDBOOK

BR 2328

ESTABLISHMENT LIST

E1353

INSTALLATION SPECIFICATION

B932

TYPE 689 689

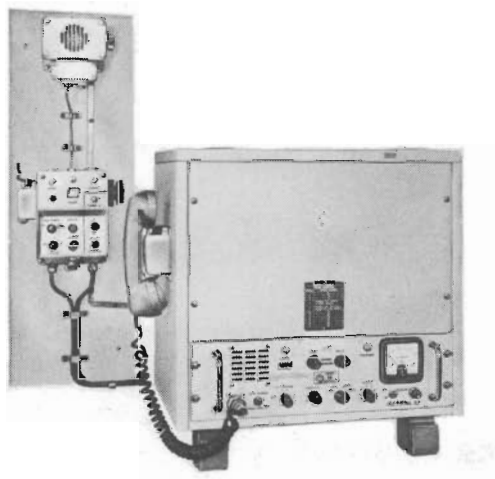
SUMMARY OF DATA

PURPOSE

To provide direct inter-ship communication and communication between ship and harbour, docking or pilot services.

TYPE OF TRANSMISSION AND RECEPTION

F3 (Frequency modulated telephony).



FREQUENCY RANGE

Receiver

Simplex 156.3–156.8 MHz
Duplex 160.65–162 MHz

Transmitter

156.05–157.4 MHz (A separate transmitter having a frequency coverage similar to that of the duplex receiver must be used when working on duplex channels).

BRIEF TECHNICAL DESCRIPTION

The equipment comprises a 14–20 watt VHF F.M. transmitter and a double superheterodyne receiver. The receiver employs separate simplex and duplex r.f. stages with separate mixers and second local oscillators, and common i.f. and a.f. stages. The first local oscillator frequencies are provided by the synthesiser, which also provides drive for the transmitter. The equipment operates on 28 channels, spaced by 50 kHz, and incorporates automatic reversion to channel 16.

MAJOR UNITS

NSN	
5820-99-972-7805	Transmitter-Receiver radio (main unit)
5820-99-972-7806	Transmitter radio sub-assembly
5820-99-972-7807	Receiver radio sub-assembly
5820-99-972-7808	Radio frequency head (r.f. head)
5820-99-972-7809	Control, radio set (comprising local control panel and main and 50 V power supply units
5820-99-972-7810	Synthesiser, electrical frequency
5820-99-972-7811	Power supply (50 V)
5820-99-972-7812	Duplexer
5820-99-972-7813	Control, radio set, remote (remote control box)
5985-99-972-7814	Aerial (antenna)
5965-99-972-7818	Handset
5820-99-972-7819	Power supply (main p.s.u.)
5915-99-975-7820	Filter, low pass (antenna filter)

PHYSICAL DATA

	Height	Width	Depth	Weight
Transmitter Receiver Unit	22¼ in.	20¾ in.	14 in.	100 lb
Control, Radio Set, remote	9 in.	6½ in.	3⅝ in.	10½ lb

ELECTRICAL CHARACTERISTICS

R.F. power output	10–12 watts with duplexer
Channel spacing	50 kHz
Frequency stability	± 0.002% over the temperature range −10 °C to +40 °C
Sensitivity	1 watt audio output for 2/uV r.f. input

CONTROL CIRCUITS

May be operated locally or remotely from either of two positions.

CONTROL FACILITIES

OFF/LOC/REM 1/REM 2 switch (Main Unit only)

LOW POWER/HIGH POWER switch (Main Unit only)

OFF/HIGH POWER/LOW POWER switch (Remote Control Box only)

CHANNEL SELECTION switches

CHANNEL 16 OUT/IN switch and RELEASE button

11 position METER switch (Main Unit only)

LS VOLUME control

SQUELCH control

Indicator lamp DIMMER control (Remote Control Box only)

Press-to-transmit switch in telephone handset

POWER REQUIREMENTS

Mains Input		Receive	Transmit
100–150 V) 190–240 V)	40–60 Hz	150 W	200 W (low power) 270 W (high power)

ANTENNA SYSTEM

Folded dipole.

HANDBOOK

BR 2305.

ESTABLISHMENT LIST

E1326.

INSTALLATION SPECIFICATION

B920.

MAINTENANCE SCHEDULE

TYPES 691, 691E, 691EF AND 691ET

691

SUMMARY OF DATA

PURPOSE

A low power (10 watts) UHF transmitting and receiving equipment used for ship/ship and ship/shore communication. The equipment, which provides either amplitude or frequency modulation, supersedes Type TBS and Type 682.

TRANSMITTER 75A

TYPE OF TRANSMISSION

F.M. or A.M. Voice and mcw. For mcw a 1000 Hz tone modulation is used, tone and carrier being keyed simultaneously with a limiting keying speed of 75 bauds.

FREQUENCY RANGE

10 switches crystal controlled frequencies in the range 277–283 MHz with facilities for replacing 6 of these by an alternative 5 by changing crystals.

BRIEF TECHNICAL DESCRIPTION

The r.f. section of the transmitter consists of a crystal oscillator followed by 8 further stages. There are, in order, a buffer amplifier, a phase modulated stage, an amplifier, two trebler stages, a further amplifier, a third trebler, and a power amplifier, giving a total frequency multiplication of 27 times. On A.M., the power amplifier is anode modulated, the phase modulated stage acting as an amplifier with less than unity gain.

The a.f. section of the transmitter consists of a push–pull amplifier stage feeding the modulator valve. A secondary winding of the modulation transformer feeds a double diode which provides delayed a.c. bias for the push–pull stage thus avoiding over modulation. To allow the use of mcw a 1000 Hz tone oscillator and tone amplifier are included in the circuit. In the F.M. position the modulation applied to the phase modulated stage first passes through a network whose response varies inversely as the frequency thus giving true frequency modulation. Metering facilities are incorporated in the transmitter.

The frequency band 225–400 MHz allocated to military services overlaps the internationally recognised VHF bands. By common consent between the Joint Services, this band will be known as the UHF band.

MAJOR UNITS

Transmitter 75A (Pattern No. 66925) is the main component of Types 691/EF and consists of units Pattern Nos. 67905 and 67909 fitted in a framework. Its total weight is 140 lb.

Transmitter/Receiver 74A (Pattern No. 66927) is the main component of Types 691E/ET and consists of units Pattern Nos. 67905 and 67907 fitted in a framework. Its total weight is 108 lb. The associated Receiver is Receiver Outfit CUH. For information on the receiver, power supplies and Aerial Outfits used, reference should be made to the relevant Data Sheets.

Patt. No.	Description	Physical Data				Associated with
		Height	Width	Depth	Weight	
67905	Transmitter Drawer 69A	7⅞ in.	13⅜ in.	19¼ in.	38 lb	Types 691/E/EF/ET
67909	Power Supply Drawer, Design 2	8⅛ in.	13⅜ in.	19⅝ in.	60 lb	Types 691/EF
67907	Receiver Drawer 62E	7⅝ in.	13¼ in.	16⅝ in.	27 lb	Types 691/E/EF/ET
67910	Power Supply Drawer, Design 3	6⅞ in.	13⅜ in.	17¼ in.	32 lb	Types 691/EF
66938	Power Unit D.C.	14½ in.	18 in.	15 in.	120 lb	Types 691E/ET

ELECTRICAL CHARACTERISTICS

Carrier:	R.F. Power Output	10 watts
	R.F. Load Impedance	75 ohms
	Output Frequency	Crystal Frequency X27
	Frequency Stability	< 15 parts in 10^6
	Fundamental Crystal Frequencies	10.28889–10.99815 MHz
	Basic Channel Spacing	100 kHz
	Minimum Channel Spacing	500 kHz
A.M.	Frequency response	Flat to within 4 dB from 300 to 10 000 Hz
	Audio Input for full modulation (threshold of A.G.C.)	0.25 V r.m.s.
	Normal Input	0.8 V ± 10 dB (0.25 V r.m.s.)
F.M.	Frequency response	Flat to ± 3 dB 600 Hz–10 000 Hz Flat to ± 300 Hz–10 000 Hz
	Maximum Deviation	12 kHz ± 3 kHz
	Audio Input for Maximum Deviation	0.25 V r.m.s.
	Normal Input	0.8 V ± 10 dB

CONTROL CIRCUITS

The equipment can be operated locally or remotely using any of Wireless and Voice Control Outfits KH Series or Fighter Direction Control Outfits KFF/G or the Interim Remote Control Outfit KH(Y).

POWER REQUIREMENTS

Transmitter 75 A requires 115 or 230 V 50 or 60 Hz single phase at 300 W. For Type 691EF this may be obtained from A.C. Supply Outfit DWH.

Transmitter/Receiver 74A requires 24 V d.c. at 720 W. This is obtained from Power Unit D.C. Pattern No. 66938.

Permissible tolerances are Voltage ± 5%, Frequency ± 7½%.

HEAT DISSIPATION

Transmitter 75A	300 W approximately
Transmitter/Receiver 74A Power Unit D.C.	720 W approximately

AERIAL SYSTEM

Aerial Outfit AJE(5).

Common Aerial Working can be employed using Common Aerial Outfit EAK. One EAK will combine three transmitters on one aerial. A second EAK will increase the number to five transmitters.

HANDBOOKS

BR 2062(1)(2)

ESTABLISHMENT LISTS

E1033 (Types 691/E/EF/ET and Receiver Outfit CUH)

PRODUCTION SPECIFICATION

12321

INSTALLATION SPECIFICATIONS

B756/R1	(Types 691/EF Receiver Outfit CUH and Common Aerial Outfit EAK) with Wireless Control Outfits KHA–Z (not KH(Y)) and KFF/G
B770	(Control Outfit KH(Y) to Type 691/EF and Receiver Outfit CUH with Aerial Outfit EAK)
B759	(Aerial Outfit AJE)
B704	(Battery Outfit BBY)
B694	(Wireless Control Outfits KHA–Z (not KH(Y))

TYPE 692

692

SUMMARY OF DATA

PURPOSE

Low power UHF (Voice) multi-channel transmitter primarily for ship-ship and ship-shore communication.

TYPE OF TRANSMISSION

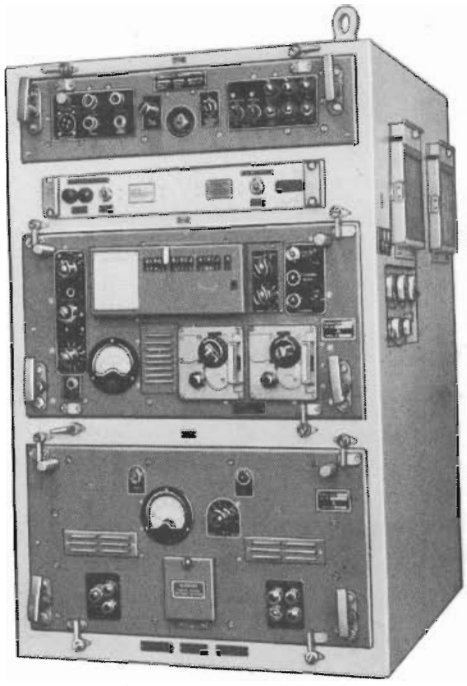
Amplitude modulated cw.

FREQUENCY RANGE

225.0 to 399.9 MHz.

BRIEF DESCRIPTION

The transmitter consists of five stages; a drive unit, doubler with oscillator, amplifier, trebler and final amplifier. The frequency range of 225.0 to 399.9 MHz is divided into 1750 channels each separated by 100 kHz. Ten of these channels can be preset to the required frequencies and any one of these ten channels can be automatically selected by either remote or local switching. The frequency of the master oscillator is controlled by a system which incorporates 32 built-in crystals. These crystals provide the necessary combinations to embrace all of the 1750 channels. When two or more Type 692's are working into a single aerial, aerial resonators are fitted; Outfits EAN, EAP and EAQ when hand tuning is used; Outfits EAG, EAH and EAJ when auto tuning is used.



TYPE 692

MAJOR UNITS

PATT. NO.	DESCRIPTION	PHYSICAL DATA			
		WIDTH	DEPTH	HEIGHT	WEIGHT
64814	Cabinet Design 119	24 in.	27 in.	36 in.	470 lb
64820	Control Drawer Design 2	21 in.	17 in.	5 in.	
64681	Relay Unit Design 90 (fitted in Control Drawer, if required)				
932-5704	Transmitter Unit Type 7703	23¼ in.	24 in.	13¼ in.	
932-5705	Power Unit Type 7097	23¼ in.	24 in.	13¼ in.	

ELECTRICAL CHARACTERISTICS

R.F. Power Output	10 watts
Output Impedance	75 ohms
Modulation	Up to 100%

CONTROL CIRCUITS

Normal link-up with Control Outfits of the KH series.

POWER REQUIREMENTS

Main Supply	115 V or 230 V 50/60 Hz	680 W hand tuned resonators 780 W auto tuned resonators
Anti-condensation heaters (only required when main equipment is OFF)	115 V 50/60 Hz or 220 V d.c.	60 W

HEAT DISSIPATION

Type 692 (including auto tune resonators)	760 W

AERIAL OUTFIT

AJE(1)

HANDBOOK

BR 1492A

ESTABLISHMENT LIST

E1162

INSTALLATION SPECIFICATION

B865

TYPE 693

693

SUMMARY OF DATA

PURPOSE

Medium power UHF multi-channel transmitter primarily for ship-air communication.

TYPE OF TRANSMISSION

Amplitude modulated cw.

FREQUENCY RANGE

225.0 to 399.9 MHz.

BRIEF DESCRIPTION

The transmitter consists of seven stages; a drive unit, doubler with oscillator, amplifier, a trebler and final amplifier followed by a power amplifier consisting of a tuned r.f. push-pull buffer stage driving the final r.f. push-pull power amplifier. The frequency range of 225.0 to 399.9 MHz is divided into 1750 channels each separated by 100 kHz. Ten of these channels can be preset to the required frequencies and any one of these ten channels can be automatically selected by either remote or local switching. The frequency of the master oscillator is controlled by a system which incorporates 33 built-in crystals. These crystals provide the necessary combinations to embrace all of the 1750 channels. When two or more Type 693's are working into a single aerial, aerial resonators are fitted; Outfits EAN, EAP and EAQ when hand tuning is used; Outfits EAG, EAH and EAJ when auto tuning is used.

ELECTRICAL CHARACTERISTICS

R.F. Power Output	100 watts
Output Impedance	75 ohms
Modulation	Up to 100%
Duty Cycle	Normally five minutes on transmit and ten minutes on stand by over the temperature range of -40° to 55 $^{\circ}$C.

CONTROL CIRCUITS

Normal link-up with Control Outfits of the KH series.

POWER REQUIREMENTS

Main Supply 115 V or 230 V 50/60 Hz 1600 W

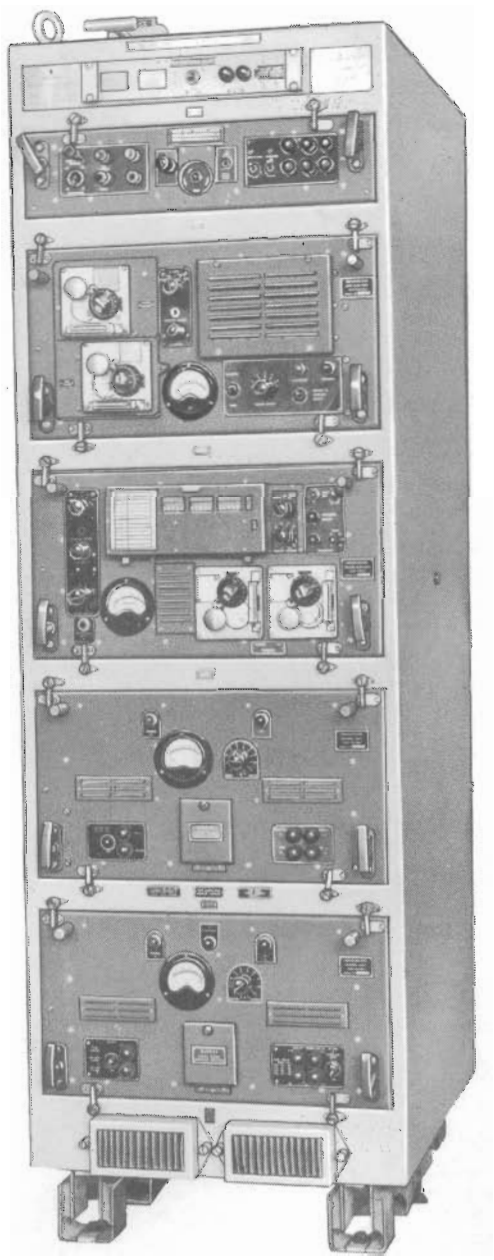
Anti-condensation heaters 115/230 V 50/60 Hz or 220 V d.c. 100 W
(only required when main equipment is OFF)

HEAT DISSIPATION

Type 693 (including auto tune resonators) 1600 W

AERIAL OUTFIT

AJE(1)



TYPE 693

MAJOR UNITS

PATT. NO.	DESCRIPTION	PHYSICAL DATA			
		WIDTH	DEPTH	HEIGHT	WEIGHT
64816	Cabinet Design 121	24 in.	24¼ in.	64 in.	)
64820	Control Drawer Design 2	21 in.	17 in.	5 in.	)
64681	Relay Unit Design 90 (fitted in Control Drawer if required)				)
932-5704	Transmitter Unit Type 7703	23¼ in.	24 in.	13¼ in.	) 900 lb
932-5705	Power Unit Type 7097	23¼ in.	24 in.	13¼ in.	)
932-5708	Amplifier Unit Type 9201	23¼ in.	24 in.	13¼ in.	)
932-5707	Power Unit Type 9202	23¼ in.	24 in.	13¼ in.	)

HANDBOOK

BR 1492A

ESTABLISHMENT LIST

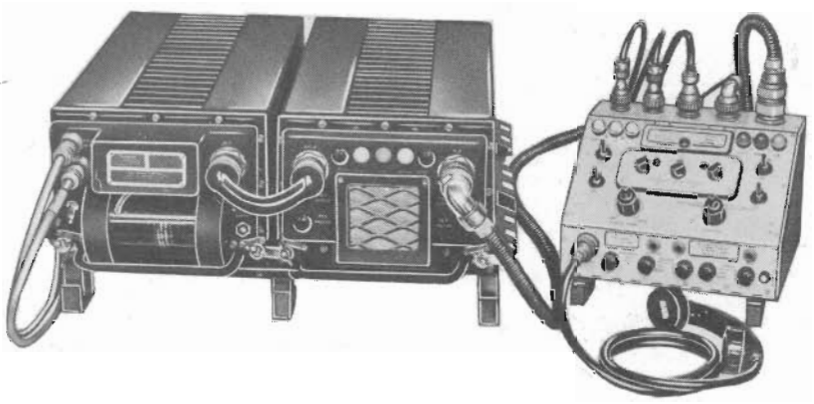
E1162

INSTALLATION SPECIFICATION

B877

TYPE 696 696

SUMMARY OF DATA



PURPOSE

A general purpose multi-channel UHF transceiver for voice and mcw communication. It replaces Type 86M.

FREQUENCY RANGE

1750 channels at 100 kHz intervals (crystal controlled) in the frequency range 225-399.9 MHz. Frequency error not more than 10 kHz after 15 minutes operation.
CHANNEL SELECTION TIME. The maximum channel selection time is 6 seconds.

BRIEF DESCRIPTION

The Transmitter-Receiver consists of eleven separate modules which plug into a main chassis assembly. This is contained in a pressurised, double-walled case, which by the use of internal and external blowers, acts as a heat exchanger. Some of the frequency generation circuits are common to both transmitter and receiver. The 1750 channels, spaced at 100 kHz intervals, are obtained from a crystal-controlled frequency synthesiser. Channel selection is made by setting-up the required frequency on the Control Unit which is connected to the electro-mechanical tuning unit in the transceiver. This selects the required crystals and tunes the appropriate circuits. The modulator unit can accept signals from either a local or remote microphone, or from an associated HI-FI unit and also contains a 1 kHz tone oscillator which is externally keyed during mcw operation. Amplitude modulated signals at the desired carrier frequency between 225 and 399.9 MHz are fed from the power amplifier to the aerial system. Sidetone, at a reduced audio level, is obtained by rectification of the r.f. carrier and is available for loudspeaker or telephones on both voice and mcw.

The receiver uses a double superhet. circuit. The first i.f. is variable between the limits 20-29.9 MHz and the second i.f. is fixed at 1.85 MHz. From the second mixer, the signal is applied to a band-pass filter and fed to the i.f. amplifier, detector, A.G.C. and noise limiter stages. The A.G.C. controls the gain of the r.f., first i.f. and second i.f. stages. The audio stages include a muting circuit, loudspeaker amplifier and HI-FI amplifier. The HI-FI facility gives extended bandwidth in both transmission and reception and can be utilised for data transmission.

MAJOR UNITS

Item	Part No.	Description	Physical Data			
			Height	Width	Depth	Weight
1	5820-AP 164407	Transmitter-Receiver, Radio	9 in.	10½ in.	22 in.	50 lb
2	5820-AP 164408	Control, Radio Set	8 in.	11 in.	9 in.	25 lb
3	5820-AP 164410	Power Supply	9 in.	10½ in.	22 in.	60 lb
4	5820-AP 164412	Tray, Mounting, Double	6 in.	22 in.	23 in.	15 lb
5	5820-AP 164413*	Tray, Mounting, Single	6 in.	11½ in.	23 in.	7½ lb

*Only required where a spare Item 1 or Item 3 is required.

RECEIVER PERFORMANCE

Sensitivity:	Input for 8 dB S+N:N not more than 5/uV o.c. from 75 ohm source, 30% mod. at 1 kHz.
Audio Output:	VOICE – Local and remote loudspeaker in parallel, 1 watt per 600–ohm loudspeaker. Local or remote 600 ohm phones.
	MCW – Local phones only.
	HI–FI – 0.2 V peak–to–peak into 150 ohm HI–FI output.
Frequency Response:	VOICE 300–3000 Hz
	MCW 920–1120 Hz
	HI–FI 40 Hz–20 kHz
Harmonic Distortion (VOICE):	Not more than 12% for 2 W output.
Noise Limiter (VOICE and MCWL:	Instantaneous peak clipping.
Mute:	Signal–to–noise operated with manual switch override.

TRANSMITTER PERFORMANCE

R.F. Output:	Not less than 14 W into 75 ohms.
Transmitter Keying:	VOICE – Local Local and remote by completion of microphone circuit.
	MCW – By carrier switch and tone key.
	HI–FI – By external lines.
Modulation:	VOICE – Not less than 65% with input of 0.8 V r.m.s. ± 10 dB from 600 ohm source.
	MCW – Not less than 65%, 1 kHz tone, keyed up to 30 w.p.m.
	HI–FI – Not less than 65% with a 1 kHz sinc wave input at 1 V peak–to–peak, 150 ohm source.
Frequency Response:	VOICE – 300–3000 Hz.
	MCW – Nominal 1 kHz tone.
	HI–FI – 128–30 000 Hz.
Sidetone:	By means of rectified carrier.
	VOICE – Local and remote phones and loudspeakers.
	MCW – Local phones only.
Duty Cycle:	Nominally 5 minutes transmission in any 15 minute period.

POWER SUPPLIES AND CONSUMPTION

115 V or 230 V (± 5%) 45–65 Hz

Receive 300 W
Transmit 490 W
Channel Change 250 W

ESTABLISHMENT LIST

E1293

ASSOCIATED TEST EQUIPMENT

5905–AP 189014	Attenuator 120 dB
6625–AP 197034	Test Kit UHF
6625–99–943–6904	Pump, Pressurising

INSTALLATION SPECIFICATION

B904

HANDBOOK

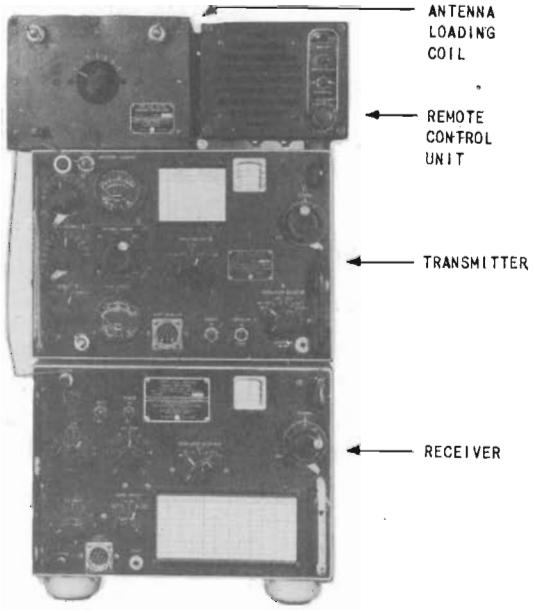
BR 2304

ASSOCIATED AERIAL OUTFITS

AJE for surface craft
ALG or AMK for submarines

TYPES TCS, TCS(E), TCS(E) 12 V AND TCS(F) TCS

SUMMARY OF DATA



TYPE TCS – FRONT VIEW

PURPOSE

A low power HF transmitter-receiver fitted in all classes of ships. In certain ships the receiver is not fitted.

TYPE OF TRANSMISSION

CW and Voice.

TYPE OF RECEPTION

CW, MCW and Voice.

FREQUENCY RANGE

1.5 to 12 MHz in three ranges.

BRIEF TECHNICAL DESCRIPTION

Transmitter

Frequency	1.5 to 12 MHz
Frequency Control	Master Oscillator or Crystal Oscillator
Output	40 watts cw. 20 watts voice

The circuit consists of an oscillator stage, buffer stage and power amplifier. When voice is used, the anode and screen grid of the power amplifier valve are modulated by a push pull modulator circuit. The oscillator stage is duplicated, one being a master oscillator, which provides continuous coverage over the whole frequency range, the other is a crystal oscillator which may be used with any one of four crystals. The buffer stage may be operated as a straight amplifier or as a frequency multiplying stage.

Receiver

Frequency	1.5 to 12 MHz
Intermediate Frequency	455 kHz
Sensitivity	15 mW output with 15 μV input
Output	2.5 watts with a 600 ohms headphone or speaker in remote control unit

The set consists of a superheterodyne circuit and is either crystal controlled or a separate oscillator circuit may be introduced which is timable over the whole frequency range. The bandwidth is 6 kHz at 6 dB down.

MAJOR UNITS

Type TCS is an American set.

U.S. Navy Ref. No.	Description	Physical Data			
		Height	Width	Depth	Weight lb
COL52245	Transmitter Unit	11¾ in.	13¾ in.	11⅞ in.	41¾
COL46159	Receiver Unit	11¾ in.	13¾ in.	11⅞ in.	36¾
COL23270	Remote Control Unit	5¼ in.	7⅞ in.	3½ in.	6
COL47205	Antenna Loading Coil	6⅝ in.	9½ in.	6¾ in.	3¾
COL21770	Dynamotor Power Supply	6 in.	13 in.	8 in.	28½
COL21881	Dynamotor Power Supply	7¼ in.	12¾ in.	7⅝ in.	27
COL211035	Power Unit 12/24 volts	9⅝ in.	12¼ in.	8¾ in.	35
COL21826	Motor Generator 24 volts	11¼ in.	23 in.	17½ in.	115
COL21776	Motor Generator 115 volts d.c.	11½ in.	23 in.	17½ in.	115
COL21827	Motor Generator 230 volts d.c.	11½ in.	23 in.	17½ in.	115
COL20242	Power Supply Unit 230 volts a.c.	10¼ in.	18 in.	18 in.	115
211330A	Power Unit 12/24 volts	9 in.	12¾ in.	8¾ in.	30

Type TCS has 110 or 220 volts d.c. supply and requires U.S. Ref. COL21776 (115 volts) or U.S. Ref. COL21827 (220 volts)

Type TSC(E) has 24 volts d.c. supply and requires U.S. Ref. COL21826

Type TCS(E) has 12 volts d.c. supply and requires U.S. Ref. COL21779, COL21881 or COL211035

Type TCS(F) has 230 volts 50/60 Hz a.c. supply and requires U.S. Ref. COL20242

CONTROL CIRCUITS

The Remote Control Unit which may be mounted up to 20 feet away contains a loudspeaker, transmitter on/off switch, jack for microphone or morse key, phone jack, receiver on/off switch, speaker/phones switch and volume control for phones or loudspeaker. Type TCS may be fitted without the Remote Control Unit in which case it is modified for use with Control Outfits KHA or KCH series.

POWER REQUIREMENTS AND CONSUMPTION

Type	Voltage	With Receiver Watts	Without Receiver Watts
TCS	110 V d.c.	397	253
TCS	220 V d.c.	385	245
TCS(E)	24 V d.c.	445	270
TCS(E)12V	12 V d.c.	205	150
TCS(F)	230 V a.c.	243	160

Types TCS(E), TCS(E)12V derives their supply either from ships 24 V supply system or a suitable Battery Outfit.

AERIAL SYSTEM

Four inch Trunk Outfit TF or eight inch Trunk Outfit TA with wire aerial.

REMARKS

A crystal adaptor (Patt. 53246) is necessary if standard 'A' naval type crystals are used.

HANDBOOK

U.S. Navy

ESTABLISHMENT LIST

AE2

INSTALLATION SPECIFICATION

B224 (TCS/E/E(12V)/F in surface ships)
B732 (TCS/E/E(12V)/F with KHA-KHZ)
B603 (TCS fitted in submarines)

TRANSMITTER DRIVE OUTFIT TDA

TDA

SUMMARY OF DATA

PURPOSE

Spot-frequency generator and modulator to drive a transmitter or receiver.

TYPE OF TRANSMISSION

Upper Sideband, U.S.B.
Double Sideband, D.S.B.
Lower Sideband, L.S.B.
Independent Sideband, I.S.B.

BRIEF DESCRIPTION

From an external standard-frequency input of 100 kHz, the transmitter drive outfit produces, by frequency synthesis, frequencies at 100 Hz steps within the range 240 kHz to 24 MHz. The output frequencies have the same stability as the standard frequency. Nine modes of modulation are available.

(1) Upper sideband - carrier suppressed.

(2) Upper sideband - carrier preset.

(3) Upper sideband - carrier controlled.

(4) Double sideband - carrier suppressed.

(5) Double sideband - full carrier.

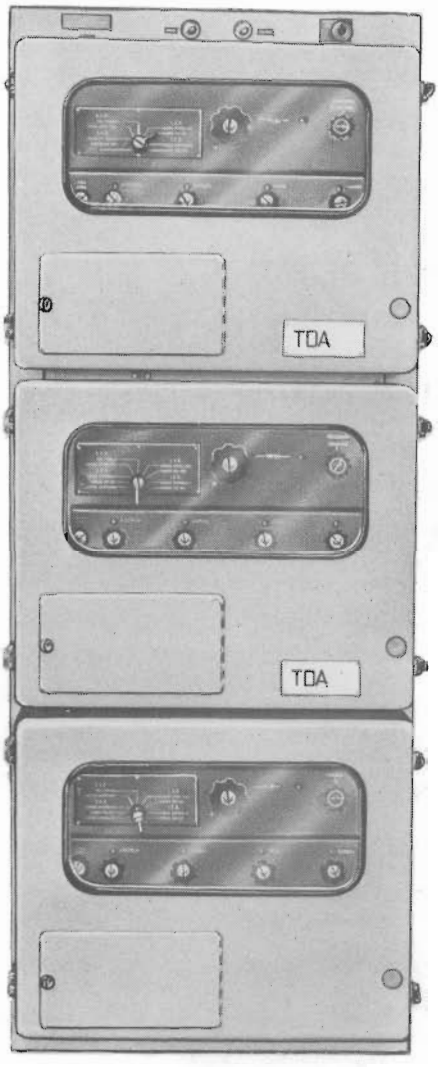
(6) Lower sideband - carrier suppressed.

(7) Lower sideband - carrier preset.

(8) Independent sideband - carrier suppressed.

(9) Independent sideband - carrier preset.

The output can be attenuated in 1 dB steps from 0 dB to 31 dB, referred to the nominal output level, by remote control. Comprehensive metering of r.f. and h.t. levels is provided by an internal valve-voltmeter.



TRANSMITTER DRIVE OUTFIT TDA

R.F. INPUT

100 kHz at a level of 1 V r.m.s. into 70 ohm; short-term accuracy: one part in 100 million; long-term accuracy: one part in 10 million; spurious contents: at least -80 dBV.

A.F. INPUT

Two balanced 600-ohm lines; level controlled to 1 mW peak over frequency range 300-3300 Hz.

FREQUENCY RANGE

240 kHz-24 MHz in 100 Hz steps.

FREQUENCY ACCURACY

Equal to that of the r.f. input.

R.F. OUTPUT

To transmitter:
spot-frequency at a level of 25 mW nominal into 70 ohm.
To receiver:
spot-frequency at a level of 250/uW nominal into 70 ohm.

SPURIOUS OUTPUTS (referred to nominal r.f. output)

(a) Within the information bandwidth : −35 dB

(b) Within 2% of set frequency but outside the information bandwidth : −55 dB

(c) Beyond 2% of set frequency : −65 dB

HARMONIC REJECTION

Better than 45 dB.

PHYSICAL DATA

A transmitter drive Outfit TDA comprises three drawers:

(a) Synthesiser and Modulator Drawer, 5820-AP 164488

(b) Synthesiser Drawer, 5820-AP 164487

(c) Power Supply Drawer, 5820-AP 164489

Three outfits can be housed in one standard Cabinet, 5820-AP 164486 (ICS). 5895-99-972-5272 (SSBN). Overall dimensions of the major units and cabinet are:-

			Height	Width	Depth	Weight
	ICS					
(a)	5820-AP 164486	Cabinet	65⅜ in.	24 7/16 in.	28 3/16 in.	510 lb
(b)	5820-AP 164488	Synthesiser and Modulator Drawer	6 21/32 in.	21 11/16 in.	26 3/16 in.	58 lb
(c)	5820-AP 164487	Synthesiser Drawer	4 7/16 in.	21 11/16 in.	26 3/16 in.	52 lb
(d)	5820-AP 164489	Power Supply Drawer	6 1/16 in.	21 11/16 in.	25 11/16 in.	88 lb
(e)	5820-AP 164186	Cover, Cabinet	18 15/16 in.	23⅜ in.	4⅞ in.	14 lb
	SSBN					
(f)	5895-99-972-5272	Cabinet Electrical Equipment	66 in.	24 in.	27 in.	lb
(g)	5895-99-519-1538	Cover, Cabinet	29¼ in.	28⅜ in.	4 11/16 in.	lb

and (b), (c), (d) as above.

POWER REQUIREMENTS

Input:	115/230/240 V ± 5% r.m.s., single phase, 50/60 Hz
Consumption:	420 VA
Anti-condensation heater supply:	115/230 V ± 5% d.c. or a.c., single phase, 50/60 Hz
Anti-condensation heater consumption:	172 VA

HANDBOOK	ESTABLISHMENT LIST	INSTALLATION SPECIFICATION
BR 2385(1)(2)	E1301	Part of 3919

AMPLIFIER OUTFIT WBA

WBA

SUMMARY OF DATA

PURPOSE

Medium power HF amplifier, used in conjunction with Transmitter Drive Outfit (TDA) for integrated Communication Systems. Provides unattended operation with rapid changes in transmitted frequency.

TYPE OF TRANSMISSION

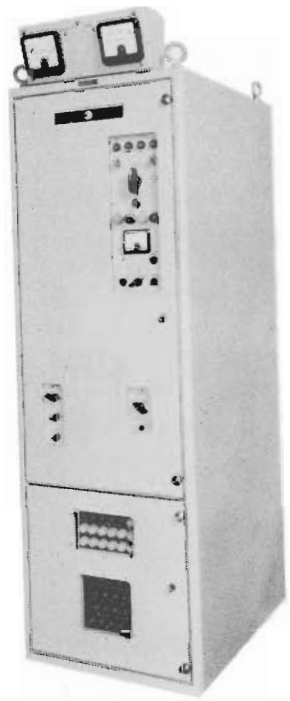
ISB, FST and CW.

FREQUENCY RANGE

1.5 to 24 MHz.

BRIEF DESCRIPTION

The amplifier is a two stage balanced distributed amplifier, using nine pairs of CV3998 valves in the penultimate stage and eight pairs of CV2487 valves in the final stage. The output is taken through an appropriate aerial exchange outfit to the selected aerial.



CABINET ELECTRICAL EQUIPMENT

MAJOR UNITS

NSN or AP No.	Title
5820-99-971-8858 104850	Cabinet, Electrical Equipment
5820-99-580-1078 104852	Control, Amplifier
5820-99-580-1079 104853	Amplifier, Radio Frequency (Penultimate Stage)
5820-99-580-1080 104854	Amplifier, Radio Frequency (Final Stage)
5820-99-580-1077 104851	Coupler Directional
5820-99-580-1081 104855	Meter Assembly, Electrical
5820-99-580-1082 104856	Power Supply
5820-99-580-1083 104857	Power Supply (E.H.T. Power Supply)
5820-99-580-1084 104858	Transformer Power Distribution

PHYSICAL DATA

Cabinet, Electrical Equipment Height 5 ft 9½ in. Width 1 ft 8½ in. Depth 2 ft 3 in. Weight 720 lb.

POWER REQUIREMENTS

380 to 450 V, 50 or 60 Hz, three phase.

POWER CONSUMPTION

Standby - 600 W Power on 4 kW (No r.f. output)
6 kW (with r.f. output)
5.2 kW (Peak envelope power two-tones)

AERIAL SYSTEM

The amplifier is designed to operate through an Aerial Exchange Outfit via a 50 ohm coaxial feeder, to the elected aerial.

HANDBOOK

BR 2362

ESTABLISHMENT LIST

E1299

INSTALLATION SPECIFICATION

B919/PRE2

AMPLIFIER OUTFIT WBB

WBB

SUMMARY OF DATA

PURPOSE

For unattended operation with rapid changes in operating frequency, in both the MF and HF ranges.

TYPE OF TRANSMISSION

ISB, FST, CW or any normal form of data transmission.

FREQUENCY RANGE

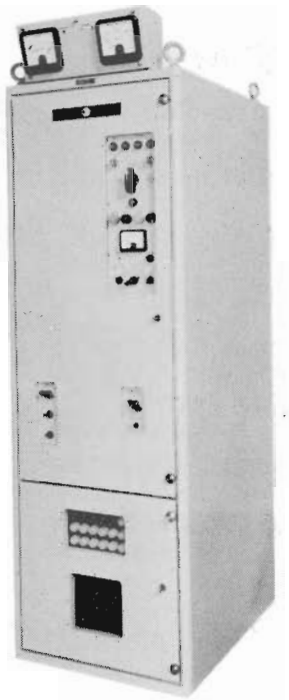
MF: 240 to 3000 kHz
HF: 1.5 to 24 MHz

BANDWIDTH

The bandwidth extends from 240 kHz to 24 MHZ. Inside the spectrum the power gain is constant to within ± 3.0 dB.

BRIEF TECHNICAL DESCRIPTION

The amplifier is a two-stage balanced distributed amplifier, using nine pairs of CV3998 valves in the penultimate stage and eight pairs of CV2487 in the final stage.



CABINET ELECTRICAL EQUIPMENT

MAJOR UNITS

NSN	Title
5820-99-580-7635	Cabinet, Electrical Equipment
5820-99-580-7638	Control, Amplifier
5820-99-580-7637	Amplifier, Radio Frequency (Penultimate Stage)
5820-99-580-7636	Amplifier, Radio Frequency (Final Stage)
5820-99-580-7642	Coupler Directional HF
5820-99-580-7643	Coupler Directional MF
5820-99-580-7641	Meter Assembly, Electrical
5820-99-580-7639	Power Supply (Power Supply)
5820-99-580-7640	Power Supply (E.H.T. Power Supply)
5820-99-580-1084	Transformer Power Distribution

PHYSICAL DATA

Cabinet, Electrical Equipment:	Height:	5 ft 9½ in. (176 cm)
	Width:	1 ft 8½ in. (54 cm)
	Depth:	2 ft 3 in. (69 cm)
	Weight:	720 lb (330 kg approx.)

ELECTRICAL CHARACTERISTICS

Input Impedance:	70 ohm
Power Input:	Approx. 20-80 mW for 1 kW P.E.P.
Output Impedance:	59 ohm
Power Output:	On HF range: 1 kW P.E.P. 700 W FST or CW
	On MF range: 500 W P.E.P. FST or CW
Control Circuits:	Sequenced delay by thermal relay

POWER REQUIREMENTS

380 to 450 V +3½% -2½%, 3 phase 3 wire 50 or 60 Hz ± 2½%.

POWER CONSUMPTION

Standby:	600 W
On (no r.f. output)	4 kW
On (with r.f. output) 5.2 kW P.E.P. two-tones	Approx. 6 kW at peak signal power (for 1 kW mean hand keyed)

HEAT DISSIPATION

Dust filtered air flow cooling is required of 250 cu ft/min at 38 °C or 400 cu ft/min at 55 °C.

AERIAL SYSTEM

The amplifier is designed to operate via a 50 ohm coaxial feeder, to the selected aerial.

HANDBOOK

BR 2389

ESTABLISHMENT LIST

E1299

INSTALLATION SPECIFICATION

Part of B919

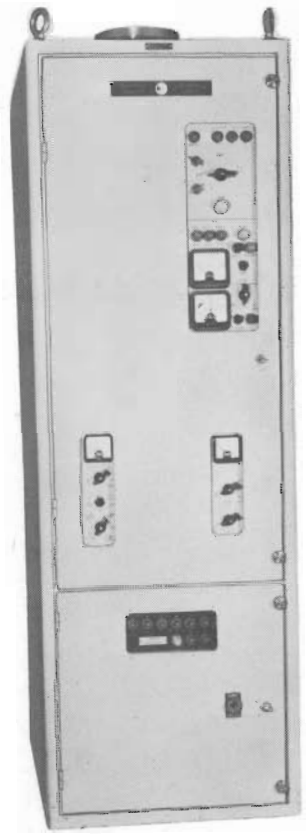
AMPLIFIER OUTFIT WBC

WBC

SUMMARY OF DATA

PURPOSE

Medium Power HF Amplifier, used in conjunction with Transmitter Drive Outfit (TDA) for Integrated Communication Systems. Provides unattended operation with rapid changes in transmitted frequency.



TYPE OF TRANSMISSION

ISB, FST and CW.

FREQUENCY RANGE

2 to 28 MHz.

BRIEF DESCRIPTION

The amplifier is a two stage balanced distributed amplifier, using six pairs of CV5809 valves in the Drive Stage and ten pairs of CV8973 valves in the Final Stage. The amplifier has three modes of operation, but only Mode 1 operation is covered in this book. In Mode 1 the amplifier will deliver up to 1 kW into a 50 ohm load. The output is taken through an appropriate aerial exchange outfit to the selected aerial.

MAJOR UNITS

NATO Stock Number	Title
5820-99-972-3005	Cabinet, Electrical Equipment
6120-99-972-3006	Transformer Power Distribution
5820-99-972-3007	Relay Assembly
5820-99-972-3008	Power Supply
5820-99-972-3009	Amplifier, Radio Frequency (Drive)
5820-99-972-3010	Amplifier, Radio Frequency (Final Stage)
5820-99-972-3011	Coupler Directional
5820-99-972-3012	Control, Amplifier
5820-99-972-3013	Control, Power Supply

PHYSICAL DATA

Cabinet, Electrical Equipment

Height	Width	Depth	Weight
64¾ in.	20⅝ in.	27½ in.	288 lb (without units) 786 lb (complete with units)

POWER REQUIREMENTS

Nominal 440 V, 50/60 Hz, 3 phase for the transmitter

Voltage limits are 435 V to 455 V

Frequency limits are 48 Hz to 61.5 Hz

115/230 V, 50/60 Hz a.c.
or
115/230 V d.c.

} For anti-condensation heaters

POWER CONSUMPTION

6½ kW at full power output (Mode 1).

AERIAL SYSTEM

The amplifier is designed to operate through an Aerial Exchange Outfit via a 50 ohm coaxial feeder, to the selected aerial.

HANDBOOK

BR 2431
CB 4951

ESTABLISHMENT LIST

E1472

INSTALLATION SPECIFICATION

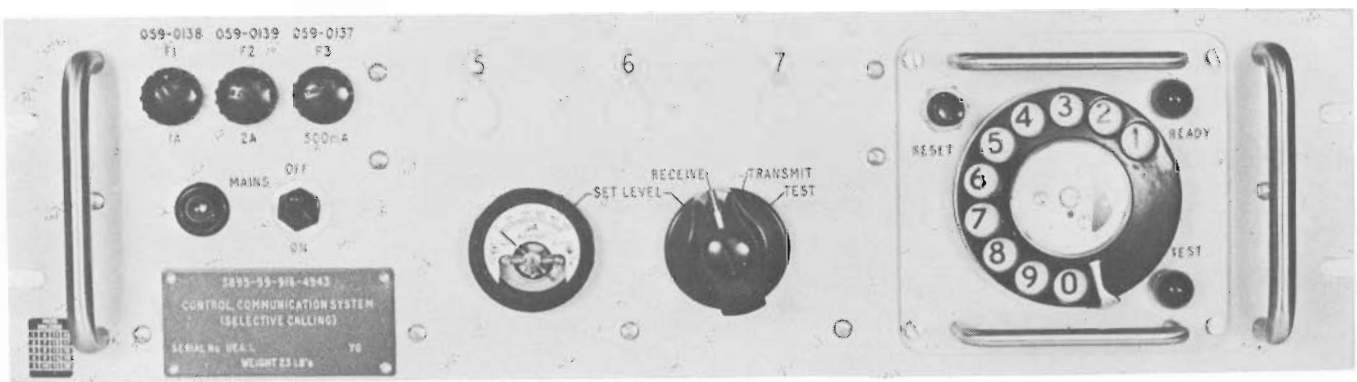
B984

SELECTIVE CALLING AND RESPONDING OUTFIT SPA

SPA

5895-99-916-4943

SUMMARY OF DATA



PURPOSE

The outfit provides coded selective calling and responding facilities between a possible 1000 station addresses on a radio network or line network. A station may also make a collective call to all other stations of a group.

BRIEF FUNCTIONAL DESCRIPTION

To transmit a selective call an operator dials the identity code of a selected station. The initial movement of the dial may be used to switch on a transmitter associated with the outfit, allowing reception of the carrier frequency at the remote station and providing sufficient time for the receiver A.G.C. circuits to stabilise before the receipt of the selective call. Full dialling operation keys the associated cw carrier (or modulates a voice transmitter at 1 kHz) with the selected code signal. The received radio signal activates the responding circuits of the required remote station to give an alarm indication.

The local unit is then set manually to RECEIVE. An internal connection sets the local code for the first digit (normally 0) and three preset switches set the remaining digits. These latter are accessible from the front panel which also has visual indicators. After an alert the unit is returned to the normal responding mode by resetting a push-button.

In addition to individual station selection a code setting is provided for the inclusion of a group by an 'all-stations' call. The code setting for this purpose is usually the 'clear signal' first digit followed by another digit repeated thrice.

For test purposes the external lines are disconnected and the unit output is fed back to its input.

PHYSICAL DATA

Height	Width	Depth	Weight
5¼ in. (26.6 cm)	19 in. (48.5 cm)	10 in. (25.5 cm)	23 lb (10 kg)

ELECTRICAL CHARACTERISTICS

Input : 1 mW into 600 ohms (balanced but not earthed) having not less than 5 kohms impedance at 300 Hz to 3 kHz.

Sensitivity	:	± 10 dBm
Signal/Noise	:	6 dB or better
Meter	:	0–500 uA. At SET LEVEL there is centre scale deflection for 0 dB input at 1 kHz ± 50 Hz
Alarm Switch	:	Two-pole relay contacts. 1 A at 50 V a.c. or d.c.
Tx. Switch	:	Single-pole relay contacts. 300 mA at 50 V.
Identity Code	:	The first digit is a preset internal connection. The second, third and fourth digits are selected by three switches at the front.
Calling Period	:	10 seconds from dialling the first digit.

POWER REQUIREMENTS

100 V or 250 V, 48 to 61.5 Hz a.c. Consumption less than 250 VA.

HANDBOOK

BR 2486 Handbook for Selective Calling and Responding Outfit SPA.

ESTABLISHMENT LIST

E1482

INSTALLATION SPECIFICATION

SKYNET V SHIPBORNE TERMINAL UK/SCC 001

SUMMARY OF DATA

PURPOSE

To provide simultaneous two way communication with other Skynet stations and with stations using Interim Defence Communication Satellite Programme (I.D.C.S.P.) satellites.

BRIEF DESCRIPTION

The Skynet sub system incorporates transmission and reception equipment together with satellite acquisition and tracking facilities. The station consists essentially of two self-contained transportable compartments relying on a minimum of ship support services. The antenna mounting utilises a six foot parabolic reflector which handles circularly polarised communication and tracking signals in the frequency band 7.25–8.4 GHz. The three axis mount is stabilised and steered in roll, pitch and yaw by servo control systems employing a gyroscope and accelerometer cluster. Dry air and cooling are provided for the waveguide.

FACILITIES OF STATION

(a) F.D.M.E. capability, multiplex in:–

MODE 1 – One speech plus 3 x 75 baud f.s.k. telegraph channels
MODE 2 – 6 x 100 baud plus 3x 75 baud f.s.k. telegraph channels.

NOTE The 6 x 100 baud telegraph channels use the same frequency spectrum as the speech channel MODE 1.

(b) Terminal Equipment Availability:–

Limited to 3 x 75 baud telegraph transmit/receivers at the M.C.O. and 1 x 75 baud transmit receiver for an engineering link at the S.C.C.O.

(c) Satellite Power:–

Down link power sharing between the various Skynet terminals

TRANSMISSION

(a) Input – baseband

(b) Modulation – F.M.

(c) Frequency – synthesised carrier 7.9–8.4 GHz

(d) R.F. Power source 0–100 mW (Phase locked klystron oscillator).

(e) Power output 0.1–5 kW

RECEPTION

(a) Inputs – Communication and Beacon

(b) R.F. Range 7.25–7.3 GHz (processed by Monopulse Comparator)

(c) Amplification

(i) Sum signal uses low noise parametric amplifier and phase locked klystron local oscillator.

(ii) Azimuth and elevation signals use low noise tunnel diodes.

(d) I.F. Range 45–95 MHz.

MAJOR UNITS & PHYSICAL DATA

Description	NSN	Weight	Length	Width	Height
Antenna Power Supply Office, Satellite Communication (comprises Antenna Mounting and Antenna Support Cabin)	5820-99-520-5179	8½ tons	12 ft 6 in	8 ft 0 in	7 ft 1⅝ in
Satellite Communications Control Office	5820-99-520-5178	13 tons	16 ft 6 in	8 ft 0 in	8 ft 9 in

ANTENNA DETAILS

(a) Training angle ± 270° from Ship's Head

(b) Elevation angle + 115° to −25°

(c) 3 dB point at 1½° from centre beam

(d) Side lobes 15 dB

POWER REQUIREMENTS

(a) S.C.C.O.

(i) 440 V, 3 phase 60 Hz 55 kVA

(ii) 115 V, 3 phase 60 Hz 8 kVA

(iii) 115 V, 1 phase 400 Hz 1 kVA

(b) M.C.O., Local Speech Position and Remote Speech Position each require via isolating transformer 115 V, 1 phase, 60 Hz.

SHIP SERVICES TO BE PROVIDED

(a) Salt water coolant:

(i) S.C.C.O. ½ gal/min

(ii) M.S.C. 17 gal/min (max. temp. 95 °F)

(b) Fresh Water (small quantity for transmitter klystron)

(c) Waveguide and Pannier air supply – 12 standard ft^3/min at 100 lb/in^2 minimum

(d) Compass transmission to S.C.C.O., Bridge, Operations Room and Flying Control

(e) Standard Frequency Outfit FSA 1 MHz to S.C.C.O.

HANDBOOKS

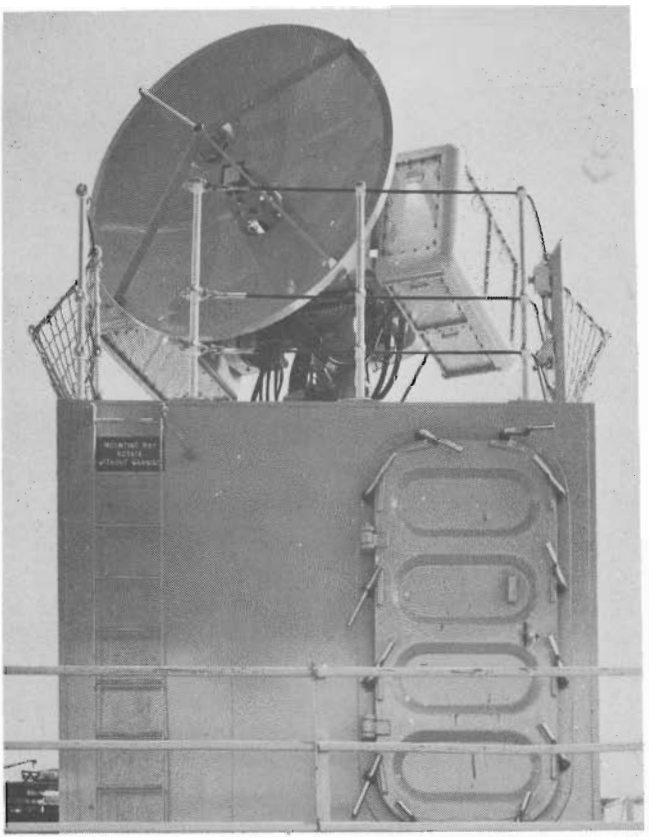
AP 116S–0204–1 Series

INSTALLATION SPECIFICATION

B1131(1) & (2).

ESTABLISHMENT LISTS

1320



CONVERTER ELECTRONIC FREQUENCY OUTFIT FTA

FTA 1
FTA 2
FTA 3

SUMMARY OF DATA

PURPOSE

To precede an HF receiver and extend its frequency range into the LF/MF bands: 7 kHz to 2.2 MHz.

FREQUENCY RANGE

Input : 7.0 kHz to 2.2 MHz

Output : 5.007 MHz to 7.2 MHz

BRIEF TECHNICAL DESCRIPTION

The converter receives LF/MF signals in the frequency range 7.0 kHz to 2.3 MHz; these are mixed with an internally or externally generated frequency of 5 MHz to produce HF output signals in the frequency range 5.007 to 7.2 MHz. The unit is broadband over the input frequency range.

MAJOR UNITS

5820-99-520-4391	CONVERTER FREQUENCY ELECTRONIC with alternative mountings as follows:
5820-99-520-4393	CABINET ELECTRICAL EQUIPMENT – As Outfit FTA1
5820-99-520-4392	COVER ANTENNA SWITCH – As Outfit FTA2
5820-99-520-4395	CABINET ELECTRICAL EQUIPMENT – As Outfit FTA3

ELECTRICAL CHARACTERISTICS

LOCAL OSCILLATOR

Stability	:	Better than 2 pts. in 10^5 over the operational temperature range.
Input	:	7 kHz to 2.2 MHz balanced into 200 ohms or 7 kHz to 2.2 MHz unbalanced into 200 ohms
Output	:	5.007 MHz to 7.2 MHz unbalanced, designed to work into 75 ohms.

INPUT SIGNAL

Protection	:	Protection is effective up to 20 V peak-to-peak.
Noise Figure	:	Less than 10 dB
Frequency Response	:	Within ± 1 dB over the entire frequency range.
Power Supply	:	115 V ± 5% at 60 Hz ± 3% or 230 V ± 6% at 50 Hz ± 4%.
Power Consumption	:	20 watts.
Climatic Conditions	:	The unit is designed to meet the requirements laid down in DEF Specification 133N1 (excluding tests Nos. 4, 6, 7, 8, 9, 10, 13 and 16).

PHYSICAL DATA

Dimensions:	Height : 8 inches	(20.3 cm)
	Width : 8¾ inches	(22.23 cm)
	Depth : 5¼ inches	(13.3 cm), including handles
Weight:	8.5 lb (3.85 kg). (Converter only).	

HANDBOOK

BR 4126

ESTABLISHMENT LIST

S1597

INSTALLATION SPECIFICATION

B1100

SECTION 2

CONTENTS LIST

RECEIVER OUTFIT CAS

CAS

SUMMARY OF DATA

PURPOSE

A general purpose receiver outfit for the reception of A.M. signals in the HF and MF bands, fitted in conjunction with Type 618 in all classes of ships.

RECEIVER HF MF

TYPE OF RECEPTION

CW, MCW and Voice.

FREQUENCY RANGE

59–555 kHz and 1.47–30 MHz in five bands.

BRIEF TECHNICAL DESCRIPTION

The receiver is a conventional superheterodyne communications set, employing two r.f. stages, followed by a mixer with separate local oscillator, three i.f. stages and three audio stages. Aerial connection is made via the HF or MF transmitter giving common aerial and break-through working in each case. Power is obtained from the Power Unit, Patt. 100336, and the receiver audio output is taken back to it for connection to remote headphones or loudspeakers. Facilities are afforded for selectivity switching, (giving four bandwidths including a 200 Hz audio filter), optional A.G.C. switched b.f.o. tuning and crystal calibration checking on bands 3 and 4. The receiver may also be operated on a single crystal-controlled spot frequency by means of a plug-in crystal accessible from the front panel.

MAJOR UNITS

Patt. No.	Description	Physical Data			
		Height	Width	Depth	Weight
100335	Receiver HF MF	14 1/16 in.	13 1/16 in.	14¼ in.	64 lb
100336	Power Unit (Part of Type 618)	14⅞ in.	9 3/16 in.	22 in.	135 lb

ELECTRICAL CHARACTERISTICS

		Control Position		Bandwidth
Selectivity	at 6 dB down	8 kHz	–	± 4 kHz from 1.5 MHz to 30 MHz
		3 kHz	–	± 1.5 kHz from 160 kHz to 30 MHz
		1 kHz	–	± 0.5 kHz from 100 kHz to 30 MHz
		200 Hz	–	± 100 Hz audio filter
I.F.	800 kHz			
Image Rejection				
	Below 7 MHz	–	at least 80 dB	
	7–15 MHz	–	at least 60 dB	
	Over 15 MHz	–	at least 40 dB	
I.F. Rejection				
	High impedance input over 80 dB			

Sensitivity	10–30 uV for 20 dB signal/noise ratio	
Power Output	Headphones	62 mW in 100 ohms
	Loudspeakers	2 W in 600 ohms

CONTROL CIRCUITS

When fitted with Type 618, the KH series Control Outfits will be used.

POWER REQUIREMENTS

150 V d.c.)
250 V d.c.) Obtained from Power Unit
400 V d.c.) AP 100336
6.3 V a.c.)

Total consumption 75 watts approx.

HEAT DISSIPATION

60 watts approx.

AERIAL SYSTEM

A wire or whip aerial common to receiver and transmitter.

HANDBOOK

BR

ESTABLISHMENT LISTS

E1049 (Type 618 and CAS)

E1051 (A.C. Supply Outfits DWH/J/K)

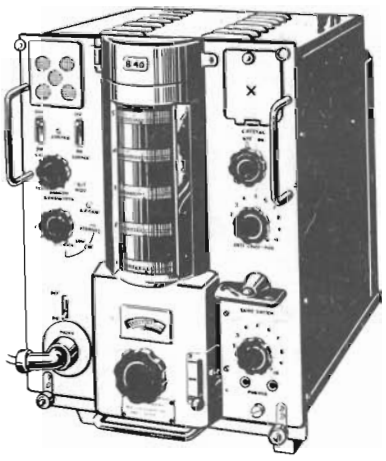
INSTALLATION SPECIFICATION

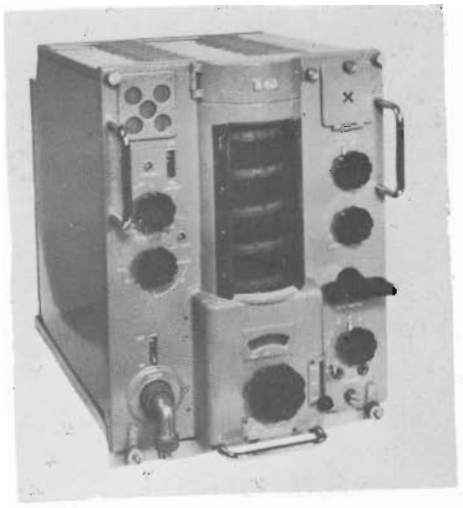
8767

RECEIVER OUTFITS CDW, CAQ

CDW CAQ

SUMMARY OF DATA





PURPOSE

Receiver B40 is the main unit in Receiver Outfits CDW and CAQ fitted in HM Ships and RN Shore Wireless Stations respectively. Five versions of the receiver are in service – Patterns 57140/A/B/C and D.

TYPE OF RECEPTION

CW and A.M. Voice.
Pattern 57140D is suitable for the reception of FST.

FREQUENCY RANGE

Five ranges, giving continuous coverage from 650 kHz to 30 MHz. Intermediate frequency – 500 kHz.

BRIEF TECHNICAL DESCRIPTION

The receiver is divided into three separate units as follows:–

R.F. Unit (All patterns)

Stage 1 R.F. Amplifier, incorporating anti-cross-modulation control and harmonic frequency feed from the B.F.O. for calibration purposes.

Stage 2 R.F. Amplifier, A.G.C. voltage applied.

Stage 3 Mixer, employing a separate oscillator which can be crystal controlled. Fine adjustment of oscillator is provided in Pattern 57140D.

Note: Patterns 57140C/D has the input circuit modified for Common Aerial Working.

I.F. Unit (Patterns 57140/A)		Patterns 57140B/C/D
Stage 4	I.F. Amplifier A.G.C. voltage applied	I.F. Amplifier A.G.C. voltage applied
Stage 5	I.F. Amplifier A.G.C. voltage applied	I.F. Amplifier, with crystal band-pass filter (1 kHz) A.G.C. voltage applied

Stage 6	I.F. Amplifier, second detector noise limiter and B.F.O.	I.F. Amplifier, second detector, noise limiter and B.F.O. In D Patterns, B.F.O. is modified to give additional "high" and "low" positions for FST working on "wide" position.

Note: The B.F.O. is crystal controlled for calibrating.

A three position bandwidth switch allows for I.F. passbands of 8 kHz (wide) and 3 kHz (narrow) in all patterns. The third position of this switch incorporates an audio note filter (band-pass 200 Hz, centre frequency 1000 Hz) in Patterns 57140/A; the 1 kHz crystal band-pass filter is substituted in Patterns 57140B/C/D.

A.F. and Power Unit

Stage 7 A.F. Amplifier

Stage 8 Output

PHYSICAL DATA

(including resilient mounts and tray)

Height	Width	Depth	Weight
19½ in.	13½ in.	16 in.	114 lb

ELECTRICAL CHARACTERISTICS

Sensitivity: Voice 2/uV for a 20 dB signal and noise to noise ratio.
CW 1/uV for a 20 dB signal and noise to noise ratio.

Selectivity:
Wide-band ± 4 kHz for 6 dB
Narrow Band ± 1.5 kHz for 6 dB
Crystal Filter ± 0.5 kHz for 6 dB – Patterns 57140B/C/D only.

Image Rejection:
@ 23 MHz: better than 40 dB
@ 1.05 MHz: better than 95 dB

A.G.C. Performance: For 77 dB change in input voltage, output change is less than 3.5 dB.

Noise Limiter: Effective between modulation depths of 10% and 60%.

Max. Power Output:
Loudspeaker – 2.5 watts.
Ship's control system – 35 mW
Telephone – 14 mW

POWER REQUIREMENTS AND CONSUMPTION

Power Supply: 115/230 V 40/60 Hz a.c.
Power Consumption: 80 watts

AERIAL SYSTEM

Facilities are available for connecting both low impedance (80 ohms) and high impedance aerials to Patterns 57140/A/B and low impedance aerials to Patterns 57140C/D. The aerial system normally comprises standard wire or whip aerials.

REMARKS

Pattern 57140D contains later type valves replacing the obsolescent types fitted in the earlier patterns.

HANDBOOK

BR 1617

ESTABLISHMENT LIST

E935 (Ship) E995 (Shore)

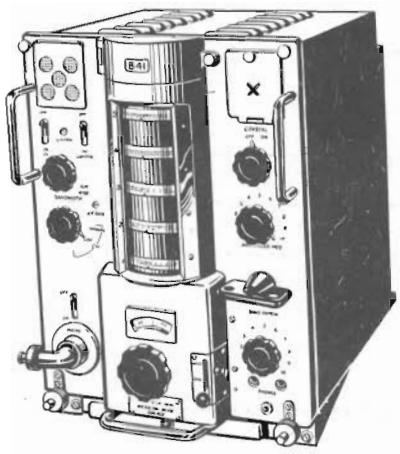
INSTALLATION SPECIFICATION

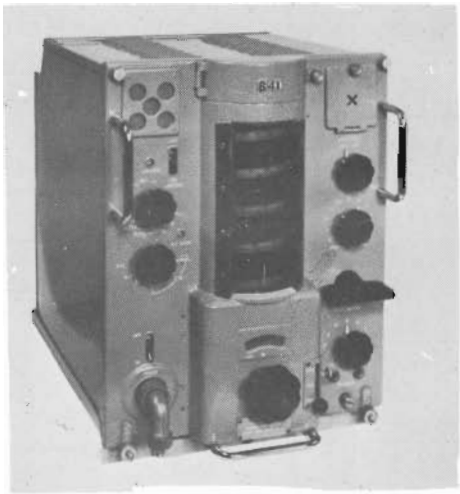
M649 (Ship) M705 (Shore)

RECEIVER OUTFITS CDY AND CAR

CDY
CAR

SUMMARY OF DATA





PURPOSE

Receiver B41 is the main unit in Receiver Outfits CDY and CAR fitted in HM Ships and RN Shore Wireless Stations respectively. Four versions of the receiver are in service – Patterns 57141/A/B/C.

TYPE OF RECEPTION

CW and A.M. Voice.

FREQUENCY RANGE

Five ranges, giving continuous coverage from 14.7 kHz to 720 kHz. Intermediate frequency is 800 kHz.

BRIEF TECHNICAL DESCRIPTION

The receiver is divided into three separate units as follows:–

R.F. Unit (all patterns)

Stage 1 Band-pass aerial input circuit, followed by r.f. amplifier with anti-cross-modulation control in the grid circuit.

Stage 2 Mixer employing a separate oscillator which can be crystal-controlled. Harmonics from the B.F.O. crystal oscillator are fed to the grid for calibration purposes. A.G.C. is applied.

I.F. Unit

	Patterns 57141/A	Patterns 57141B/C
Stage 3	I.F. Amplifier, A.G.C. voltage applied	I.F. Amplifier, A.G.C. voltage applied
Stage 4	I.F. Amplifier, A.G.C. voltage applied	I.F. Amplifier with crystal band-pass filter (1 kHz) A.G.C. applied
Stage 5	I.F. Amplifier, second detector, noise limiter and B.F.O.	I.F. Amplifier, second detector, noise limiter and B.F.O.
	Three bandwidths are available as follows:– 8 kHz (wide) 3 kHz (narrow) and 3 kHz (followed by a 200 Hz note filter)	Three bandwidths are available as follows:– 3 kHz, 1 kHz (crystal filter) and 1 kHz (followed by a 200 Hz note filter)

A.F. and Power Unit

Stage 6 A.F. Amplifier

Stage 7 Output

Power supply circuits are incorporated in this unit.

ELECTRICAL CHARACTERISTICS

Sensitivity: 1/uV for 500 mW output, signal + Noise to noise ratio 22 dB

Selectivity:

	Pattern 57141/A		Pattern 57141B/C	
	Wide	Narrow	3 kHz	1 kHz
−6 dB	>6.5 kHz	>2.5 kHz	>3.5 kHz	>1 kHz
−30 dB	–	–	–	<5 kHz
−40 dB	<17 kHz	<9.5 kHz	<15 kHz	–

A.G.C. Performance: For 70 dB change in input voltage, the output change is less than 3.5 dB.

Noise Limiter: Effective between modulation depths of 10% and 60%.

Max. Power Output: Loudspeaker 2.5 W, ship's control system 35 mW, telephones 14 mW.

PHYSICAL DATA

(including resilient mounts and tray)

Height	Width	Depth	Weight
19½ in.	13 in.	16 in.	114 lb

POWER REQUIREMENTS AND CONSUMPTION

Power Supply 115/230 V 40/60 Hz.

Consumption 80 W

AERIAL SYSTEM

Standard wire or whip aerial.

REMARKS

Pattern 57141 series receivers are also used in the LF receiver common aerial working system (Outfit EAL). It is then the main unit in Outfit CAZ.

HANDBOOK

BR 1618

ESTABLISHMENT LIST

E935

INSTALLATION SPECIFICATION

8649

RECEIVER OUTFIT CFA

CFA

SUMMARY OF DATA

PURPOSE

VLF reception in submarines.

TYPE OF RECEPTION

Telegraphy.

FREQUENCY RANGE

14 to 22.5 kHz.

BRIEF TECHNICAL DESCRIPTION

The required r.f. signal, in the range 14 to 22.5 kHz, is amplified and then mixed with the output from a local oscillator to produce an i.f. of 5.5 kHz. The i.f. amplifier output is mixed with a fixed 6.5 kHz signal from a beat frequency oscillator, and the resulting 1 kHz output is fed, after amplification, to a monitor loudspeaker, two headphone jacks and a 600 ohm output jack. Delayed A.G.C. is applied to the r.f. and i.f. amplifiers.

5820-AP 164474 RECEIVER, RADIO

MAJOR UNITS

1. 5820-AP 164474 Receiver, Radio - Height 10¼ in., Width 13 in., Depth 19 in. (including handles and plugs), Weight 46 lb.
2. AP 58549A Mount, Sprung, for Receiver.

ELECTRICAL CHARACTERISTICS

Sensitivity:	600 ohm output: not less than 300 mW, for 1/uV input. When the 600 ohm output is set to 10 mW with a 0.4/uV input, the signal plus noise to noise ratio is not less than 10 dB. Audio outputs: not less than 150 mW into 3 ohms for 1/uV input.
Bandwidth:	150 Hz.
Outputs:	Two low impedance headphone jacks. One monitor loudspeaker. One 600 ohm output jack for the use of a teleprinter or other auxiliary equipment. The outputs to the headphone jacks and monitor loudspeaker are controlled by a single adjustment and a separate control is provided for the 600 ohm output.
Scale Accuracy:	± 0.2 kHz.

POWER SUPPLIES

115 V 50/60 Hz single phase a.c.
80 W including the supplies to the aerial system.

AERIAL SYSTEM

Aerial Outfit ALK
Aerial Outfit ALL

HANDBOOK

BR 2366

ESTABLISHMENT LIST

E1287

INSTALLATION SPECIFICATION

8914

RECEIVER OUTFITS CJA & CJC SERIES

SUMMARY OF DATA

CJA
CJC

PURPOSE

Receiver Outfits CJA & CJC are HF communications receiver outfits designed for use in the ICS. Outfit CJA consists of a Receiver, Radio, 5820-99-916-9679 and a Synthesiser, Electrical Frequency, 5820-99-916-4675 to be used for unattended reception. Outfit CJC consists of the Receiver without the Synthesiser. The outfits are housed in appropriate cabinets.

RECEIVER RADIO 5820-99-916-4679

SYNTHESISER ELECTRICAL FREQUENCY
5820-99-916-4675

TYPE OF RECEPTION

A.M. DSB

SSB) USB
SSB) LSB

CW

FREQUENCY

2-30 MHz in eight bands.

BRIEF TECHNICAL DESCRIPTION

Receiver. The Receiver, Radio, 5820-99-916-9679 is a single superhet. receiver designed for CAW. It has two stages of r.f. amplification incorporating six tuned circuits. The local oscillator, feeding the mixer via a wide-band amplifier, is controlled by a reactance modulator, biased by a fine tuning control or locking the oscillator to an external synthesised frequency. The i.f. is supplied to two channels in the receiver, through crystal filters, selected by the receiver controls according to the supplementary characteristic of the reception. The i.f. amplifiers and demodulators of the two channels are identical. One channel is used for USB, DSB and CW reception, the other for LSB reception. There are four stages of i.f. amplification, three of which have A.G.C., set according to the supplementary characteristic or set externally. Demodulation is effected by an envelope detector for DSB reception, and by frequency translation for SSB reception. The i.f. oscillation, for frequency translation, is derived from a re-insertion oscillator which also provides frequencies 1 kHz above or below i.f. for CW reception. For SSB and ISB reception the re-insertion oscillation may be derived from an external standard frequency of 100 kHz. In both channels the a.f. is amplified and passed to a push pull output stage with an a.f. monitoring facility. The channel outputs are passed to two outputs of the receiver which may be switched such that one output carries information from USB, LSB, DSB or CW reception. For ISB reception the other output gives the LSB content. A third output of the receiver is available directly from the USB, DSB, CW channel. Voltage and current monitoring circuits are built in.

Synthesiser. The Synthesiser, Electrical Frequency, 5820-99-916-4675 is designed for use with the Receiver, Radio, 5820-99-916-9679 in Outfit CJA. Harmonics of an external standard source of 100 kHz are filtered and selected by an amplifier tuned by the setting of 10 MHz, 1 MHz and 100 kHz controls to be mixed with an input from the receiver local oscillator to produce the synthesiser i.f. By frequency division, and three decades of triple frequency change, with the decades set by 10 kHz, 1 kHz and 100 Hz controls, the 100 kHz standard frequency input is also reduced to the interpolation frequency, specified in discrete steps of 100 Hz. The synthesiser i.f. and interpolation frequency are compared by a phase detector the output of which is used to bias the reactance modulator of the receiver local oscillator. Monitoring facilities are provided by a built-in valve voltmeter.

ELECTRICAL CHARACTERISTICS

Receiver.	Sensitivity:	DSB 0.5/uV aerial e.m.f. to give 2.5 V o/p in nominal 600 ohm line SSB 0.5/uV e.m.f. to give same output as above
	Selectivity:	Image rejection Bands 1-6 >120 dB 7 >116 dB 8 >112 dB
	Noise Factor:	Bands 1-5 10.5 dB ± 2.5 dB 6-8 8-17 dB

	Input Impedance:	91 ohms for CAW
	A.G.C. Characteristic:	80 dB increase from 0.5 μV aerial e.m.f. to give 6 dB increase from 2.5 V a.f. output
	A.F. Response:	1 dB down on 1 kHz at 200 Hz and 15 kHz 30 dB down on 1 kHz at 110 Hz and 30 kHz } into a load of 100 ohms
Synthesiser.	Frequency Range:	Controls receiver oscillator from 3.6 to 31.6 MHz.
	Detector Sensitivity:	Capture range of ± 10 kHz.

PHYSICAL DATA

	Height	Width	Depth	Weight
Receiver, Radio, 5820-99-916-9679	1 ft	1 ft 5½ in.	2 ft 0½ in.	150 lb
Synthesiser, Elec. Freq., 5820-99-916-4675	8½ in.	1 ft 5½ in.	2 ft 0½ in.	140 lb
Power Supply, (Component of Synthesiser) 5820-99-916-4672	8¾ in.	4½ in.	2 ft 0¾ in.	42 lb

POWER REQUIREMENTS

Receiver	115, 125, 230 or 240 V a.c. 50 to 60 Hz
Synthesiser	115, 125, 230 or 240 V a.c. 50 to 60 Hz 100 kHz at 0.75 V; spurious content to be not greater than −40 dB compared with the voltage at 100 kHz

HEAT DISSIPATION

Receiver	200 W
Synthesiser	180 W

HANDBOOK

BR 2414
ICS Handbooks

ESTABLISHMENT LIST

E1300

INSTALLATION SPECIFICATION

8919

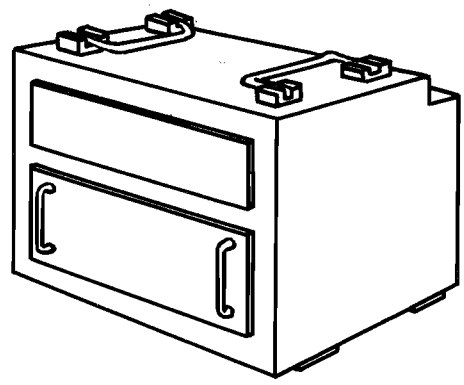
RECEIVER OUTFITS CJD SERIES

CJD

SUMMARY OF DATA

PURPOSE

Receiver Outfits CJD(1) (Single-Receiver Cabinet) and CJD(2) (Five-Receiver Cabinet) are attended or unattended communications receivers for the reception of voice, C.W., single and multi-channel RATT and facsimile signals in the L.F. band. CJD(3) is fitted in SSNs. CJD(4) is as CJD(1) but using the CJD(3) Cabinet.



SINGLE RECEIVER CABINET

FREQUENCY RANGE

Five bands giving continuous coverage from 10 kHz to 200 kHz. Intermediate frequencies 61.5 and 21.5 kHz (Band 1) and 21.5 kHz (Bands 2-5)

POWER REQUIREMENTS AND CONSUMPTION

Single-receiver Cabinet 115/230 V 50/60 Hz ± 6% at 130 W.
Five-receiver Cabinet 115/230 V 50/60 Hz ± 6% at 650 W.

Anti-condensation heaters;-

Single-receiver Cabinet 115/230 V 50/60 Hz ± 6% at 30 W
Five-receiver Cabinet 115/230 V 50/60 Hz ± 6% at 150 W.

ELECTRICAL CHARACTERISTICS

Sensitivity: 1 μV for 10 mW output.
Signal + Noise to Noise ratio
21 dB, bands 1-5, CJD(3)
bands 2-5, CJD(1)(2)(4)
24 dB, band 1, CJD(1)(2)(4)

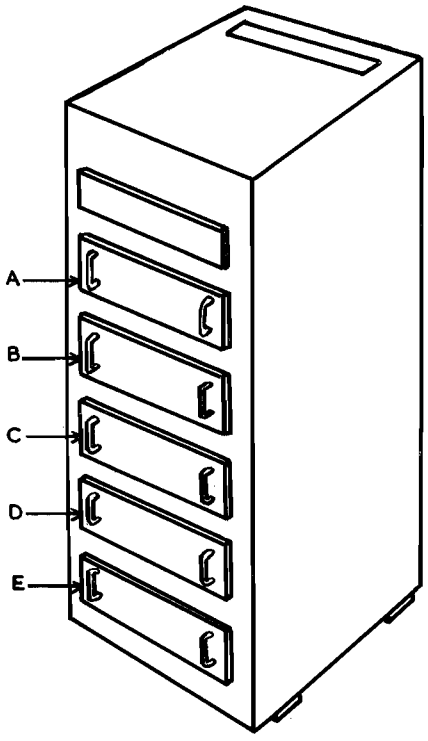
Selectivity: Switched to 3000 Hz, 1000 Hz, 300 Hz or 120 Hz. (Bands 2-5); limiter to 300 Hz (Band 1).

A.G.C. Performance : Delayed and amplified; for 80 dB increase in input voltage above 0.1 μV the output voltage change is less than 6 dB.

Stability : Frequency stability over 24 hours for a temperature change of ± 10 °C:-

(1) Local oscillator locked: ± 5 Hz.

(2) Local oscillator free-running; 1 part in 1000.



FIVE RECEIVER CABINET

PHYSICAL DATA

	Height	Width	Depth	Weight
5820-99-916-4905				
Five-receiver Cabinet	5 ft 3 in	2 ft	2 ft 3 in	362 lb (without receivers)
(with lifting eyebolts)	5 ft 5½ in			
5820-99-916-4904				
Single-receiver Cabinet	1 ft 8¼ in	1 ft 11 in	1 ft 5 in	63 lb
Receiver chassis for single receiver chassis	1 ft 4¾ in	1 ft 9¾ in	1 ft 6¼ in	140 lb
Receiver chassis for five-10½ in. receiver cabinet		1 ft 9¾ in	2 ft 1½ in	140 lb

BRIEF DESCRIPTION

R.F.

Amplifiers : Switched; One amplifier with a high-efficiency aerial, two with low efficiency aerial, feeding two frequency conversion stages (Band 1) or one frequency conversion stage (Bands 2-5).

I.F.

Amplifier : Three stages of amplification, bandwidth controlled by two sets of four band-pass filters (Bandwidths 120 Hz, 300 Hz, 1000 Hz, or 3000 Hz) switched to any one of ten combinations to provide variable selectivity. Also provides an external output at the I.F. of 21.5 kHz.

Synthesiser : Consists of a variable oscillator 11.5 - 21.5 kHz, internal crystal-controlled 10 kHz oscillator, or a switched 10 kHz standard frequency input, and a harmonic selector, which produce a frequency 40 kHz above the local oscillator to lock the local oscillator to the synthesiser. A 40 kHz output is taken to provide the Band 1 I.F. of 61.5 kHz. Operated by a three-position switch:-

(1) LOCKED: local oscillator locked to synthesiser.

(2) UNLOCKED: local oscillator free-running.

(3) CALIBRATED: calibrates the variable-frequency oscillator.

B.F.O. Provides two crystal-controlled tones (1 kHz and 1.5 kHz) and a variable tone ± 3 kHz.

Audio output: 10 mW into a 600-ohm line, via A.F. output amplifier. An additional amplifier feeds either a loudspeaker or headphones for monitoring.

AERIAL SYSTEM

Common aerial working, standard wire or whip aerial. Receiver input impedance 100 ohms.

HANDBOOK

BR 2407(1)(2).

ESTABLISHMENT LIST

E1373.

INSTALLATION SPECIFICATION

Part of B919.

RECEIVER OUTFIT CJK

CJK

SUMMARY OF DATA

PURPOSE

Unattended or attended HF receiver for use as part of COMIST equipment.

FREQUENCY

Discrete 1 kHz frequencies in the range 1–30 MHz. Interpolation of the 1 kHz can be made.

I.F.

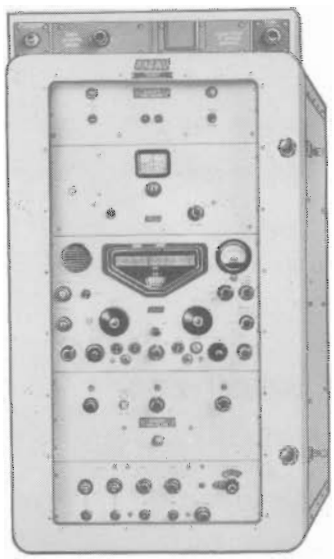
100 kHz.

I.F. BANDWIDTHS

13 kHz, 6.5 kHz, 3 kHz, 1.2 kHz, 300 Hz, 100 Hz.

BRIEF DESCRIPTION

For unattended reception the r.f. input, from common aerial working via aerial selector switch, is passed to the receiver via a pre-selector. The MHz content of the wanted signal frequency is selected by a MHz control, the kHz content is selected on a synthesiser. The wanted frequency is selected and held to the accuracy and stability of an internal or external frequency standard. The signal output is taken from a sideband converter which converts the i.f. into SSB or ISB audio frequency. The DSB audio is produced in the receiver.



RECEIVER OUTFIT CJK

In emergency the CJK can be used as an attended receiver with a second VFO taking the place of the synthesiser.

INPUTS

R.F. signal from Common Aerial working via an aerial selector switch fitted in the cabinet 100 kHz from Frequency Standard.

OUTPUTS

I.F. at 100 kHz
1 MHz
1.7 MHz
A.F. Two outputs 3 mW at 600 ohms SSB, ISB or DSB
One output 10 mW at 600 ohms SSB, ISB or DSB

A.G.C.

SHORT	Charge 2.0 ms	Discharge 200 ms
LONG	Charge 3.0 ms	Discharge 5 seconds

POWER SUPPLY

100–115 V, 200–250 V, 40 Hz to 65 Hz, 500 W
Consumption 330 W (100 W approximately for Receiver only)
115 or 230 V, 100 W a.c. or d.c. for anti-condensation heaters

PHYSICAL DETAILS

The five major units are contained in drawers which fit into a main cabinet.

		Height	Depth	Width	Weight
5820-99-580-1650	Cabinet	41¼ in.	25 in.	21½ in.	197 lb
5820-99-580-1595	Power Supply (for synthesiser)	5¼ in.	19 in.	19 in.	44 lb
5820-99-580-1596	Selector Protector, Radio Receiver (Pre-selector)	7 in.	19 in.	19 in.	45 lb
5820-99-580-1597	Receiver Radio	10½ in.	18 in. (Chassis)	19 in.	67 lb
5820-99-580-1598	Synthesiser Electrical Frequency	7 in.	19½ in.	19 in.	33 lb
5820-99-580-1599	Converter, Sideband-Tuner Radio Frequency (sideband Converter)	5¼ in.	13½ in.	19 in.	28 lb

HANDBOOK

BR 2396

ESTABLISHMENT LIST

E1354

INSTALLATION SPECIFICATION

B931

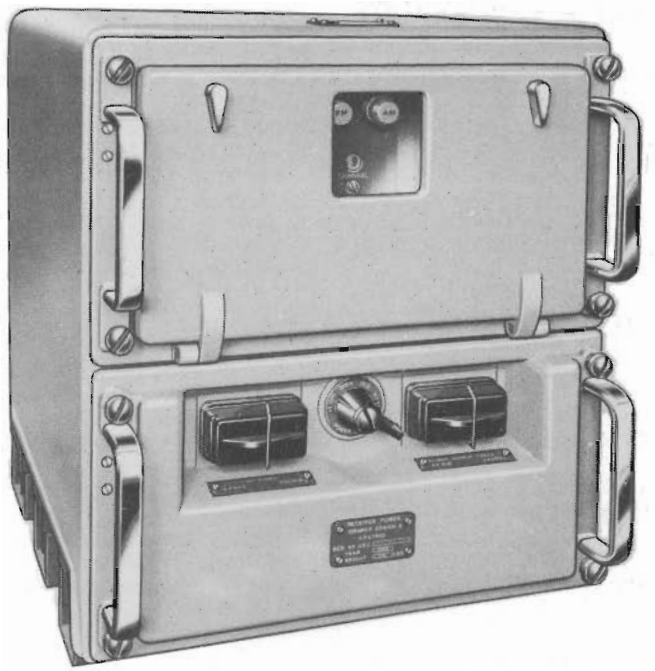
RECEIVER OUTFIT CUH

CUH

SUMMARY OF DATA

PURPOSE

A UHF receiver outfit designed for reception of A.M. or F.M. and fitted in conjunction with Types 691/EF.



AP 66926 RECEIVER P116

TYPE OF RECEPTION

Voice and MCW A.M. or F.M.

FREQUENCY RANGE

Ten switched crystal controlled frequencies in the range 277–283 MHz with facilities for replacing six of these by an alternative five by changing crystals.

BRIEF TECHNICAL DESCRIPTION

Receiver P116 is a double superheterodyne receiver with crystal controlled local oscillators. The input from the aerial is fed to a grounded grid r.f. amplifier stage which is followed by the first mixer. There are two stages of i.f. amplification at 25 MHz followed by a second mixer and then three further stages of i.f. amplification at 3.25 MHz. A double diode functions as A.M. detector; for F.M. reception a limiter and discriminator stage is provided. A switchable noise limiter circuit follows the A.M. detector. Muting circuits may also be switched in if required. There is one stage of a.f. amplification followed by the power output stage. The first local oscillator comprises a single valve crystal oscillator operating on 3rd overtone followed by a buffer amplifier, two trebler stages and a further amplifier stage giving a total frequency multiplication of nine. The second local oscillator consists of a single valve crystal oscillator only.

MAJOR UNITS

Receiver P116 Pattern No. 66926, which is the main component of the unit, consists of the two units listed below fitted in a framework. Its total weight is 94 lb.

Patt. No.	Description	Physical Data				Associated with
		Height	Width	Depth	Weight	
67907	Receiver Drawer 62E	7⅝ in.	13⅛ in.	16⅝ in.	27 lb	Types 691/E/EF/ET
67910	Power Supply Drawer Design 3	6⅞ in.	23⅛ in.	17¼ in.	32 lb	Types 691/EF

ELECTRICAL CHARACTERISTICS

Sensitivity:	4 μV for 20 dB signal/noise ratio.
Selectivity:	± 40 kHz for 3 dB
A.F. Response:	Flat within 3 dB between 300 Hz and 3000 Hz
Maximum Power Output:	24 into 600 ohm line for local loudspeaker 10 mW for loudspeaker amplifier 10 mW for local monitor

CONTROL CIRCUITS

The equipment has been designed to work into any of the W/T and Voice Control Outfits KH Series or Fighter Direction Control Outfits KFF/G or the interim Remote Control Outfit KH(Y).

POWER REQUIREMENTS

The outfit requires 115 or 230 V 50 or 60 Hz single phase at 140 W. When the equipment is fitted in conjunction with Type 691EF this may be obtained from A.C. Supply Outfit DWH.

Permissible tolerances are voltage ± 5% frequency ± 7½%.

HEAT DISSIPATION

140 W.

AERIAL SYSTEM

Aerial Outfit AJC or AJE. Aerial Outfit AJE will later completely supersede AJC.

Common Aerial Working can be employed using Common Aerial Outfit EAK. One EAK will combine three receivers. A further EAK will increase the number to five receivers on one aerial.

REMARKS

The frequency band 225–400 MHz allocated to military services overlaps the internationally recognised VHF and UHF bands. By common consent between the Joint Services, this band will be known as the UHF band.

HANDBOOKS

BR 2062(1)(2)

ESTABLISHMENT LISTS

E1033 (Type 691/E/EF/ET and Receiver Outfit CUH)
E1062 (Aerial Outfit AJC)
E775 (Battery Outfit BBY)
E1051 (A.C. Supply Outfits DWH, DWJ and DWK)
E1074 (Aerial Outfit AJE)

INSTALLATION SPECIFICATIONS

B756 (Type 691/EF Receiver Outfit CUH and Common Aerial Outfit EAK with Wireless Control Outfits KHA/Z (not KH(Y)) and KFF/G)

B770 (Control Outfit KH(Y) to Type 691/EF and Receiver Outfit CUH with Aerial Outfit AJC and Common Aerial Outfit EAK)

B757 (Aerial Outfit AJC)

B759 (Aerial Outfit AJE)

B769 (A.C. Supply Outfits DWH, DWJ, DWK)

B704 (Battery)

B758 (Transmitter Receiver 691E)

B694 (Wireless Control Outfits KHA–Z (not KH(Y))

PRODUCTION SPECIFICATION

12339

RECEIVER OUTFITS CUJ AND CUL

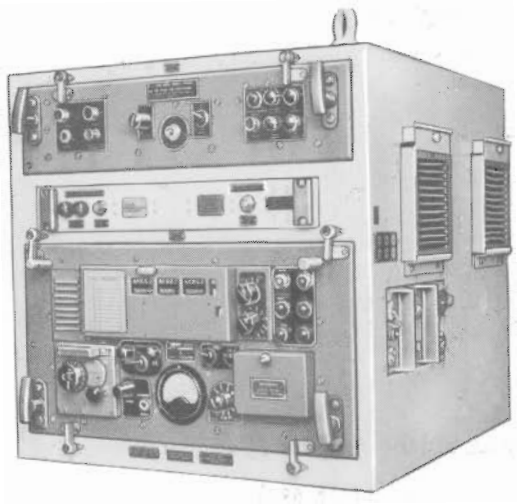
CUJ
CUL

SUMMARY OF DATA

PURPOSE

Receiver Outfits CUJ and CUL are multi-channel communication receivers designed to operate in conjunction with Type 692/693 series of transmitters.

Receiver Outfit CUJ is the shipborne version and Receiver Outfit CUL the shore based version of the equipment.



RECEIVER OUTFIT CUJ

TYPE OF RECEPTION

CW and A.M. Voice.

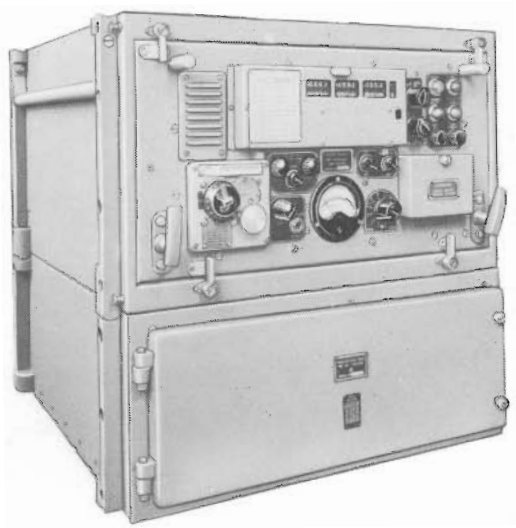
FREQUENCY RANGE

225.0 MHz to 399.9 MHz, in steps of 100 kHz.
Intermediate frequencies 24 MHz and 1.975 MHz.

ELECTRICAL CHARACTERISTICS

Receiver Sensitivity – 1 uV input modulation 30% at 1000 Hz
Noise Factor less than 12 dB

Power Output – 5 uV input modulation 100% at 1000 Hz
Monitor output – 2 watts
Line output – 125 milliwatts



RECEIVER OUTFIT CUL

BRIEF DESCRIPTION

The receivers are of the double hetrodyne type with two grounded grid r.f. amp stages, employing UHF triodes preceding the first mixer. Two separate a.f. outputs are available, up to 2 watts of audio power for loudspeaker operation and 125 milliwatts, against variation in load resistance, can be taken from the time output. Twelve chosen frequencies can be set up on the receiver and selected by a 12 position switch on the front panel, 10 of these can also be selected by a remote channel selection system.

Ventilation of the Receiver Outfit CUJ is by means of two axial flow blowers fitted in the cabinet.

Receiver Outfit CUL is ventilated by forced air cooling provided by a fan fitted in the back of the receiver cabinet.

PHYSICAL DATA

	Height	Width	Depth	Weight
Receiver Unit Type 9095	13¼ in.	23¼ in.	24 in.	110 lb

CUJ (Control Drawer Design 3
CUJ (Cabinet Design 120 Weight 35 lb

CUL (Cabinet, A.M. Type R7109 (containing
CUL (Receiver Unit 9095)
CUL (Mounting Plinth A.M. Type 7877

POWER SUPPLIES

230 V/115 V 50 Hz single phase 250 watts.

AERIAL SYSTEM

AJE(1) or Common Aerial Working.

HANDBOOK

BR 1492B.

ESTABLISHMENT LISTS

CUJ – E1157
CUL – E1217

INSTALLATION SPECIFICATIONS

CUJ B877 (Type 692)
B865 (Type 693)
CUL B874

RECEIVER OUTFIT QRI AND QR2

QRI
QR2

SUMMARY OF DATA

PURPOSE

Reception of VHF a.m. and f.m. signals.

TYPE OF RECEPTION

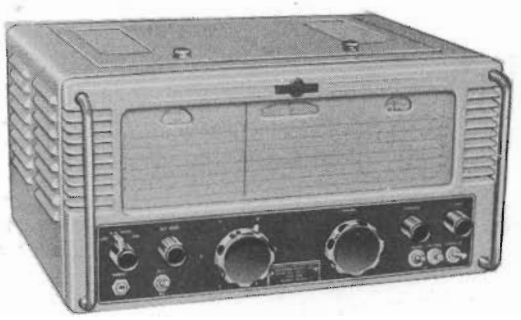
C.W. and A.M. Voice
F.M. and N.F.M. Voice

FREQUENCY RANGE

19 Mc/s to 165 Mc/s in six bands.
Intermediate Frequency 5.2 Mc/s.

MAJOR UNIT

A.P.103930 Receiver 770R VHF and
5820-99-971-8329 Receiver Radio VHF



Height	Width	Depth	Weight
9¼ in	17½ in	13⅜ in	58 lb

BRIEF TECHNICAL DESCRIPTION

The receiver is a conventional superheterodyne having an r.f. stage, mixer, local oscillator, 4 i.f. amplifiers, limiter, discriminator, noise limiter, noise muting stage, b.f.o. push-pull drivers and push-pull output. In addition, there is a control valve associated with the tuning meter, to make a total valve complement of nineteen, excluding three germanium diodes for a.m. detection and noise limiting. Range-changing is effected by switching a coil turret assembly. The ganged tuning capacitor is driven through a 140:1 reduction gear, the effective scale length of each range being 34 ft. A mode switch selects the appropriate circuits for c.w., a.m., narrow band f.m. or wide band f.m. reception. No internal loudspeaker is fitted; there is a phone jack on the front panel for high resistance phones and 600 ohm output terminals at the rear. Pick-up terminals are fitted. A stabilised h.t. supply is provided for the r.f. stages and other critical circuits. Receiver Outfit QR2 is fitted with a Crystal Calibrator Unit to facilitate dial alignment together with an associated mechanical cursor shift.

ELECTRICAL CHARACTERISTICS

Sensitivity	:	7μV above 114 Mc/s) for 15 dB signal to noise ratio and 50 mW 5μV below 114 Mc/s) output
Selectivity	:	A.M. and C.W. 40 dB down, 50 kc/s off resonance Narrow F.M. 40 dB down, 80 kc/s off resonance Wide F.M. 40 dB down, 175 kc/s off resonance
Noise Factor	:	Range 1 (114 – 165 Mc/s) ≤15 dB Range 2 (78 – 114 Mc/s) ≤10 dB Range 3 (54 – 78 Mc/s) < 8 dB Range 4 (39 – 54 Mc/s) < 6 dB Range 5 (27 – 39 Mc/s) < 5 dB Range 6 (19 – 27 Mc/s) < 5 dB
Image Ratio	:	Better than 15 dB at 160 Mc/s and correspondingly greater at lower frequencies.
A.G.C.	:	The audio level does not change by more than 12 dB when the input is varied 60 dB above 5μV.
Frequency Stability:		Drift is less than 0.003 of one per cent per degree centigrade and less than 0.003 of one per cent for a five per cent change in mains voltage.

F.M. Deviation:: The discriminator is designed for a deviation of 15 kc/s in the narrow position and 75 kc/s in the wide position.

Muting :: The sensitivity of the muting circuit can be varied to operate on signals above 5μV.

Input Impedance: 72 ohms unbalanced.

Output : 2 W into 600 ohms. High impedance output for phones.

A.F. Response : ±4 dB over range 50 c/s to 12 kc/s.

POWER REQUIREMENTS AND CONSUMPTION

110 V, 200 V or 230 V, 40–60 c/s, 90 VA.

HEAT DISSIPATION

90 watts approx.

REMARKS

Aerial Outfit APH will be fitted initially and another aerial (Outfit ACH, 27–100 Mc/s) at a later date. Filter Unit Des. 18 (issued as part of Outfit QR) is part of the installation and suppresses signals below 100 Mc/s when in circuit.

COMMERCIAL EQUIVALENT

A.P.103930 and 5820-99-971-8329 Receivers are respectively the Naval versions of Stratton Models 770R 770R/1 and 770RII/1 VHF Communications Receiver.

HANDBOOKS

B.R.1147 Receiver Outfits QR1 and QR2
B.R.1610(1) Aerial Outfit APH

ESTABLISHMENT LIST

E.1205

INSTALLATION SPECIFICATION

B.849

RECEIVER OUTFIT QS(1) & QS(2)

QS(1)
QS(2)

SUMMARY OF DATA

PURPOSE

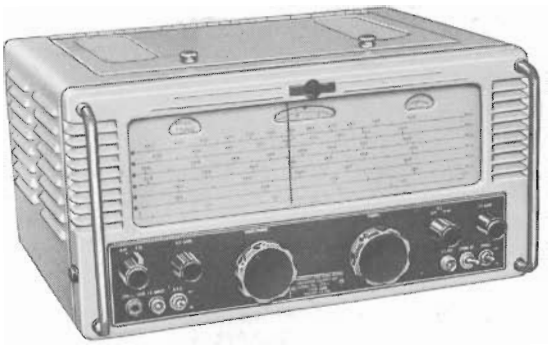
Reception of UHF A.M. and F.M. signals.

TYPE OF RECEPTION

A.M. or F.M. MCW or Voice.

FREQUENCY RANGE

150 MHz to 400 MHz in six bands. First i.f. 50 MHz, second i.f. 5.2 MHz.



AP 103990 RECEIVER

BRIEF TECHNICAL DESCRIPTION

The receivers are double superheterodyne comprising grounded-grid r.f. amplifier, germanium diode mixer, local oscillator, two stages of i.f. amplification at 50 MHz, frequency changer, two stages of i.f. amplification at 5.2 MHz, F.M. limiter, discriminator, A.M. demodulator, a.f. amplifier and output stage. In addition, there is a cathode follower output stage at 5.2 MHz, a tuning meter control valve, and A.G.C. and noise limiter circuits. Range-changing is effected by switching a coil turret assembly and the tuning capacitor is driven through a 140:1 reduction gear. Indicator lamps on the dial show the range selected. Signals at 50 MHz may be injected into the first i.f. amplifier and the cathode follower output enables the 5.2 MHz i.f. signal to be displayed on an oscilloscope. No loud-speaker is fitted but a phone jack for high impedance phones is mounted on the front panel and 2.5 ohm and 600 ohm outputs are available at the rear. Pick-up terminals are provided. A stabilised h.t. supply is used for the r.f. stages and other critical circuits. Receiver Outfit QS(2) is fitted with a crystal calibrator unit to facilitate dial alignment together with an associated mechanical cursor shift.

MAJOR UNIT

	Height	Width	Depth	Weight
AP 103990 Receiver 770U UHF and 5820-99-972-1465 Receiver	8¾ in.	16¾ in.	15 in.	54 lb

ELECTRICAL CHARACTERISTICS

Sensitivity:	Better than 10/uV on all ranges for a 15 dB signal to noise ratio and 50 mW output
I.F. Selectivity: (5.2 MHz)	3 dB ± 2 dB down 15 kHz off resonance 6 dB ± 2 dB down 20 kHz off resonance 20 dB ± 3 dB down 50 kHz off resonance At least 40 dB down 100 kHz off resonance
Image Ratio:	400 MHz Range 1 better than 20 dB 400 MHz Range 2 better than 25 dB 200 MHz Range 5 better than 40 dB
A.G.C.:	The audio level does not change by more than 12 dB when the input is varied 60 dB above 10/uV
Discriminator:	Designed for narrow band F.M. deviation of 15 kHz
Input Impedance:	75 ohms unbalanced
Output:	0.5 watts to the 2.5 ohm speaker terminals and to the 600 ohm line terminals. High impedance output to telephone
A.F. Response:	± 6 dB from 100 Hz to 10 kHz

POWER REQUIREMENTS AND CONSUMPTION

110, 115, 125, 200, 220, 230, 240 or 250 V, 40-60 Hz, 90 VA.

HEAT DISSIPATION

90 watts approx.

AERIAL SYSTEM

Aerial Outfit AQA for frequencies up to 210 MHz
Aerial Outfit AJE for frequencies between 210 and 500 MHz

A balance to unbalance Transformer Unit, R.F., AP 71000 is fitted with Aerial Outfit AQA.

REMARKS

AP 103990 and 5820-99-972-1464 Receivers are the Naval versions of Stratton Model 770U Mk. I and Mk. II UHF Communications Receiver respectively.

HANDBOOKS

BR 1153 Receiver Outfit QS(1) and QS(2)
BR 2062(1) Aerial Outfit AJE

ESTABLISHMENT LIST

E1205

INSTALLATION SPECIFICATION

B849

RECEIVER OUTFIT DAS2

DAS2

SUMMARY OF DATA

PURPOSE

A shipborne Long Range Navigational Aid consisting of a receiver and C.R.T. indicator.

BRIEF DESCRIPTION

The principle of operation of the Loran Navigational System is based on the measurement of the time interval between the reception of pulse radio signals from transmitting stations spaced several hundred miles apart.

If two stations (say "master" A and "slave" B) transmit a pulse simultaneously, an observer sited on the perpendicular bisector of the straight line joining the two stations will also receive the pulses simultaneously. However, if the observer is at a point nearer to A than to B, the signals from A will be received before those from B, and in general, the loci for observation points of given time differences are represented by hyperbolas with the two transmitting stations A and B at the Foci. In order to identify the pulses (which are similar in shape) and hence establish on which side of the perpendicular bisector the pertinent hyperbola lies, the signal from the B station is delayed by a known amount so that the first signal received in a sequence is always the A station. The received signals are displayed on a C.R.T. indicator having an upper and a lower trace, the former showing the A station pulse, the latter carrying the B station pulse. The traces are calibrated in time against an internal crystal oscillator so that, by normal practice, the time intervals may be measured to a high degree of accuracy. Similar measurements are made using a second "slave" station and the readings obtained are referred to specially prepared Loran Tables or Charts, from which the normal navigational "fix" is obtained.

Transmission of the signals is in the frequency range 1.7–2.075 MHz and reception on one of four channels in that band. Pairs of stations are identified by their pulse recurrence frequencies, the P.R.F. of the indicator scan being selected by an eight-position switch to give stationary pulses on the screen. The position of this switch is included in the notation of the Loran Tables so that the complete navigational information is provided.

PHYSICAL DATA

	Height	Width	Depth	Weight
Receiver–Indicator Outfit (Including Power Supply)	17⅞ in.	28⅛ in.	22⅝ in.	210 lb
Coil, Antenna, Loading	11⅛ in.	7 in.	5½ in.	8 lb

POWER SUPPLY AND CONSUMPTION

115 V or 230 V, 50–60 c/s single phase. 0.96 pF, 300 watts. If this supply is not already available A.C. Supply Outfit DQB is required.

AERIAL

A vertical wire between 40 and 125 ft long. The aerial is matched to the receiver by a loading coil mounted in a weather-proof box conveniently located near the base of the aerial.

REMARKS

This is American equipment.

HANDBOOK

US Handbook

ESTABLISHMENT LIST

AE6

INSTALLATION SPECIFICATION

B491/R1

RECEIVER OUTFIT QM10

QM10

SUMMARY OF DATA

PURPOSE

A Navigational Aid using the Decca Navigator System.

GENERAL DESCRIPTION

The Decca Navigator System is a system of a navigation using as its basis the geometry of the hyperbola. This principle is derived from the fact that between any two fixed points, a series of lines may be drawn which have the property that at any point of each line, the difference in the distance between any two fixed points has the same value. The lines thus formed take the form of hyperbolic curves. The distance difference between the receiver and two fixed transmitting stations some distance apart was the measurement used in earlier navigational aids such as Gee and Loran.

The Decca system is, however, somewhat different; it consists of a number of groups or chains of transmitting stations. Each chain consists of four stations – a master and three slaves (known as the purple, red and green slaves respectively). The approved range of the system is approximately 240 nautical miles radius from the master station so that a series of chains could give continuous coverage. All the stations radiate cw, each on a prescribed frequency. The four frequencies are harmonically related to a common fundamental frequency and the phase of each slave's transmission is controlled at all times, by the master transmission. The chain should be regarded as three pairs of stations, each pair consisting of the master and one slave.

The radio waves sent out by the master and each slave station are converted in four separate channels in the receiver to a common frequency and their phase relationships are compared. This comparison of phase achieves a similar but more accurate result than that of difference distance measurement already discussed. Each phase change of 360° produces a separate lane, a fixed number of lanes (different for each pair) constituting a zone. The width of these lanes varies greatly from 400–600 yards on the base line to 3 miles at the edge of the coverage.

In Outfit QM10, a system of lane identification is embodied so that a continuous check may be kept of lane numbers. A "freezing" circuit prevents jitter of the decometer pointers during the lane identification transmissions.

Provision is made for reception of 9 chains. The frequencies allocated in any one operational area may be re-used in other areas providing there is sufficient geographical separation to prevent mutual interference between two chains on the same set of frequencies.

The chains currently receivable on the nine settings of the chain switch are:

Chain 1: S.W. British. Master Station at Kingsbridge in Devon.
South Persian Gulf. Master Station at Das Island.

Chain 2: East Newfoundland. Master Station at Port Blandford.

Chain 3: N.W. British. Master Station at Kircudbright.

Chain 4: Swedish Baltic. Master Station at Nyaeshamn.

Chain 5: English. Master Station at Puckeridge. 18 miles N. of London.
North Persian Gulf. Master Station at Bandar Delam.

Chain 6: North Scottish. Master Station at Kirkwall.
Cabot Straits. Master Station at Magdalen Island.

Chain 7: Danish. Master Station on Island of Samso.
Nova Scotia. Master Station at Chester Basin.
India (West). Master Station at Savarkundia, Nr. Bombay.

Chain 8: French. Master Station at Montlucen.
South Bothnian. Master Station at Njwanda (Red/Green patterns only).
East India. Master Station at Balasore, S.W. of Calcutta.

Chain 9: German. Master Station at Brielen.
Anticosti. Master Station at Port Menier, Anticosti, Canada.

MAJOR UNITS

PATTERN NO.	DESCRIPTION	PHYSICAL DATA		
		HEIGHT	WIDTH	DEPTH
AP 102443A	Receiver (Decca Navigator Marine Model Mk. VM) Type 133, 9 chain	2 ft 10 in.	1 ft 8 in.	10½ in.
AP 10244	Decometer Display Unit (Decca Marine Model Mk. VM) Type 134, 9 chain	2 ft 2 in.	1 ft 5½ in.	1 ft 1 in.

Total weight of Outfit QM10 – 127 lb (approximately)

FREQUENCIES

The nominal frequency groups represented by Chains 1 to 9 are as listed below. Where two or more chains share the same nominal frequency groups, a change of +5 Hz or –5 Hz at master frequency with proportional change in slave frequencies may be made to minimise residual mutual interference. To identify the precise frequencies, suffix letters A, B or C are normally appended to the chain number. These suffix letters signify:

A – Master frequency 5 Hz low.
B – Standard master frequency as listed below.
C – Master frequency 5 Hz high.

These suffix letters will appear in due course on Decca navigational charts but may be ignored for QM10 operation; the outfit will operate satisfactorily on, for example, Chain 5A or 5C when the chain selector is set to '5'.

	BLACK (MASTER)	RED (SLAVE)	GREEN (SLAVE)	PURPLE (SLAVE)
CHAIN 1	84.280 kHz	112.373 kHz	126.420 kHz	70.233 kHz
CHAIN 2	84.460 kHz	112.6133 kHz	126.690 kHz	70.3833 kHz
CHAIN 3	84.645 kHz	112.860 kHz	126.968 kHz	70.537 kHz
CHAIN 4	84.825 kHz	113.100 kHz	127.2375 kHz	70.6875 kHz
CHAIN 5	85.000 kHz	113.333 kHz	127.500 kHz	79.833 kHz
CHAIN 6	85.180 kHz	113.5733 kHz	127.770 kHz	70.9833 kHz
CHAIN 7	85.365 kHz	113.820 kHz	128.048 kHz	71.137 kHz
CHAIN 8	85.545 kHz	114.060 kHz	128.318 kHz	71.288 kHz
CHAIN 9	85.720 kHz	114.293 kHz	128.580 kHz	71.433 kHz

POWER REQUIREMENTS

85 to 250 V, 40–60 Hz at 250 watts.

POWER SUPPLY OUTFITS

A.C. Supply Outfit DQB when no suitable power supply is available.

AERIAL

The aerial consists of Pattern 611A Insulated Cable approximately 30 feet in length and a special concentric feeder. Whip Aerial Outfit AWM is fitted on small ships where a 30 ft aerial cannot be supported.

HANDBOOKS

BR 2017, BR 2383

ESTABLISHMENT LIST

E1000

INSTALLATION SPECIFICATION

B686

RECEIVER ADAPTOR OUTFIT FAZ

FAZ

SUMMARY OF DATA

5820-99-971-7205 CONVERTER, SINGLE-SIDEBAND

PURPOSE

Outfit FAZ enables Receivers B40 and B41 to receive either upper or lower, single-sideband transmissions. It allows attended or nominally unattended reception of the following types of signal:-

(a) Wide-shift RATT (FST)

(b) Narrow-shift RATT (FST)

(c) SSB Voice

BRIEF DESCRIPTION

The i.f. signal from the Receiver is fed to the Adaptor which converts it to a lower frequency and extracts the SSB information. The conventional method of demodulation involves the insertion in the receiver of a stable reference frequency, to replace the 'carrier'. Outfit FAZ uses the tuned circuits in the a.f. discriminator as an 'error detecting' device to tune the local oscillator so as to maintain:

(a) the correct output tones in the case of RATT

(b) an a.f. output spectrum centred on 815 Hz in the case of SSB voice, the median spectral frequency

SIGNAL INPUTS

10 mV r.m.s. at 500 kHz or 800 kHz.

MAJOR UNITS

5820-99-971-7205 Converter, Single sideband contains four, replaceable printed circuit boards:-

(a) 5820-99-972-2760 Mixer Stage R.F.

(b) 5820-99-972-2758 Amplifier I.F.

(c) 5820-99-972-2759 Amplifier A.F. Loop

(d) 5820-99-972-2761 Corrector A.F.

POWER SUPPLIES

230 V or 115 V, 50 or 60 Hz, single phase

PHYSICAL DATA

Width	Depth	Height	Weight
16½ in. (41.91 cm)	13 in. (33.02 cm)	3½ in. (8.89 cm)	17 lb (7.71 kg)

INSTALLATION

See BR 2432(5B), Chap. 2.

HANDBOOK

BR 2432

ESTABLISHMENT LIST

E1449

PRODUCTION SPECIFICATION

25500

S E C T I O N 3

CONTENTS LIST

TELEPRINTER NO. 12 MK. 4

T.P. No. 12

SUMMARY OF DATA

PURPOSE

To transmit and receive messages (typed characters) employing the International telegraph code at speeds of 50 or 75 bauds (66 or 100 words per minute). When fitted with a reperforator this will provide additionally a record of outgoing and/or incoming messages on paper tape.

BRIEF DESCRIPTION

The machine is of unit construction consisting of a common base upon which are mounted the following main units:

Motor	Transmitter	Platen
Selector	Keyboard	
Translator	Typehead	

It is capable of either single- or double-current operation using the 7½ unit code.

PHYSICAL DATA

When fitted with standard cover, the dimensions are:

	Height	Width	Depth	Weight
Receiver only	11 in. (28 cm)	16 in. (40 cm)	13½ in. (53.3 cm)	36½ lb including cords and paper roll
With Reperforator and tape drawer	12½ in. (32 cm)	18½ in. (47 cm)	14 in. (35.4 cm)	46½ lb including cords and tape roll
Transmitter/ Receiver	11 in. (28 cm)	16 in. (40 cm)	16 in. (41.5 cm)	55¼ lb including cords and tape roll

With Reperforator the width is increased to 18½ in.

POWER REQUIREMENTS

100 to 125 V a.c./d.c., 50 to 60 Hz or
200 to 250 V a.c./d.c., 50 to 60 Hz

Consumption per machine is less than 100 W.

HANDBOOKS

BR 2443(1) to (3) Handbook for Teleprinter No. 12 Mk. 4.

ESTABLISHMENT LISTS

E1388 Teleprinter Outfits
R1546 Outfits TGA, TGB, TGL
R1547 Outfits TGC and TGD
S1568 Outfits TGE(1)-(7)

INSTALLATION SPECIFICATION

B965 Teleprinter No. 12 Outfits TGA/B/L series
B972 Teleprinter No. 12 Outfits TGC/D/E series

MAINTENANCE SCHEDULE

Cat. No. 5500/R3

TABLE OF TELEPRINTER OUTFITS

Outfit	NSN of Teleprinter	Mark	Voltage	1	2	3	4	5	6	7	8	9	10
TGA(2)	5815-99-580-5118	3	115	x	–	–	x	–	–	–	–	–	x
TGA(2)	5815-99-972-4926	4	115	x	–	–	x	–	–	–	–	–	x
TGA(3)	5815-99-920-6002	3	115	x	–	–	x	x	–	–	–	–	x
TGA(3)	5815-99-972-4934	4	115	x	–	–	x	x	–	–	–	–	x
TGA(4)	5815-99-971-7359	3	115	–	x	–	x	–	–	–	–	–	x
TGA(4)	5815-99-972-4930	4	115	–	x	–	x	–	–	–	–	–	x
TGB(2)	5815-99-580-5119	3	115	x	–	x	x	–	–	–	–	–	x
TGB(2)	5815-99-973-4927	4	115	x	–	x	x	–	–	–	–	–	x
TGB(3)	5815-99-920-6003	3	115	x	–	x	x	x	–	–	–	–	x
TGB(3)	5815-99-972-4935	4	115	x	–	x	x	x	–	–	–	–	x
TGB(4)	5815-99-971-7361	3	115	–	x	x	x	–	–	–	–	–	x
TGB(4)	5815-99-972-4931	4	115	–	x	x	x	–	–	–	–	–	x
TGB(5)	5815-99-972-4927	4	115	x	–	x	x	–	–	–	–	–	x
TGC(2)	5815-99-580-5116	3	240	x	–	–	x	–	–	–	–	–	x
TGC(2)	5815-99-972-4924	4	240	x	–	–	x	–	–	–	–	–	x
TGC(3)	5815-99-920-6000	3	240	x	–	–	x	x	–	–	–	–	x
TGC(3)	5815-99-972-4932	4	240	x	–	–	x	x	–	–	–	–	x
TGC(4)	5815-99-971-7358	3	240	–	x	–	x	–	–	–	–	–	x
TGC(4)	5815-99-972-4928	4	240	–	x	–	x	–	–	–	–	–	x
TGC(5)	5815-99-519-9880	4	240	x	–	–	x	–	x	–	–	–	x
TGD(2)	5815-99-580-5117	3	240	x	–	x	x	–	–	–	–	–	x
TGD(2)	5815-99-972-4925	4	240	x	–	x	x	–	–	–	–	–	x
TGD(3)	5815-99-920-6001	3	240	x	–	x	x	x	–	–	–	–	x
TGD(3)	5815-99-972-4933	4	240	x	–	x	x	x	–	–	–	–	x
TGD(4)	5815-99-971-7360	3	240	–	x	x	x	–	–	–	–	–	x
TGD(4)	5815-99-972-4929	4	240	–	x	x	x	–	–	–	–	–	x
TGE(1)	5815-99-972-4924	4	240	x	–	–	x	–	–	–	x	x	–
TGE(2)	5815-99-972-4924	4	240	x	–	–	x	–	–	–	–	x	–
TGE(3)	5815-99-972-4928	4	240	–	x	–	x	–	–	–	x	x	–
TGE(4)	5815-99-972-4928	4	240	–	x	–	x	–	–	–	–	x	–
TGE(5)	5815-99-972-4929	4	240	–	x	x	x	–	–	–	x	–	x
TGE(6)	5815-99-972-4925	4	240	x	–	x	x	–	–	–	x	–	x
TGF(1)	5815-99-520-3016	4	240	–	x	–	x	–	–	–	x	–	–

Key to columns:
1 Transmit/Receive machine
2 Receive only machine
3 Reperforator attachment 5815-99-920-5016
4 Automatic carriage return/line feed
5 Who are you and Answer back unit 5815-99-920-6004
6 Character release pulse (C.R.P.)
7
8 Page winder
9 Silence cover (small)
10 Silence cover (large)

The type of machine is identified by two labels; one indicates the NSN and motor voltage, the other indicates the mode of signalling for which the machine is adjusted. These labels are located on the rear of the main base.

PRINTING REPERFORATOR PR76R

PR76R

5815-99-972-4916

SUMMARY OF DATA

PURPOSE

This printing reperforator records a message received in the International Telegraph Alphabet No. 2. Coded perforations are punched, and corresponding characters are printed, on standard $\frac{7}{8}$ in. (17.5 mm) paper tape.

PR76R

BRIEF TECHNICAL DESCRIPTION

An incoming signal energises a polarised electro-magnet whose armature responds by moving between active and idle contacts. The Selector Unit converts these movements into a static code setting of a group of five pins. When the translator clutch is triggered its camshaft revolves and the code setting on the pins is sensed by the Translator Unit. The bellcranks of the translator unit cause the typehead to lift and rotate so as to bring a selected character to the printing point. The translator unit continues its cycle of operations to feed the tape forward and to print the selected character. It also actuates the mechanism that punches the selected combination holes in a tape. Push buttons control a run-out facility and a back-space facility (used to erase a faulty character by punching the letter shift (all-mark) combination on an incorrect perforation).

Conversion from double- to single-current operation is made by hooking an additional pair of springs to the armature of the electromagnet. A 50-baud machine will switch off automatically 60 to 100 seconds after a transmission ends; for the 75-baud machine the period is 40 to 75 seconds after.

PHYSICAL DATA

Height	Width	Depth	Weight
13½ in. 34.3 cm	17½ in. 44.4 cm	14 in. 35.6 cm	34 lb 15.4 kg

CHARACTERISTICS

Line Current: Single-current: 120 V d.c., 50 mA
Double-current: ± 80 V d.c., 25 mA (20 mA if a limiting resistor is shunted by a 2/uF capacitor)

Telegraph Code: 7½ unit start-stop. Can be modified for parallel 5-wire input.

Telegraph Rate: 50 or 75 bauds (dual-speed gearbox)

Teleg. Margin: Greater than ± 40% at 50 bauds; greater than ± 35% at 75 bauds.

Motor: Series-wound, a.c., dual 50 to 60 Hz, or single-frequency 50 or 60 Hz. 4200 revs/min

POWER REQUIREMENTS

100 to 125 V or 230 to 250 V, 50 to 60 Hz. Consumption 100 W or less.

HANDBOOKS

BR 4124 Handbook for Printing Reperforator PT76R
BR 2443(1) Handbook for Teleprinter No. 12 Mk. 4 – Technical Description

ESTABLISHMENT LIST

R1505

INSTALLATION SPECIFICATION

B965

ACCESSORIES

5815-99-924-1133	Cover, acoustic
5815-99-924-1134	Acoustic base
5815-99-924-1135	Installation kit

RADIO TELETYPE (RATT) IN HM SHIPS (RATT(I)) RATT(I)

SUMMARY OF DATA

PURPOSE

Radio Teletype (RATT) equipment in HM Ships is used in conjunction with wireless equipment to enable messages to be transmitted and received by automatic printing machines.

BRIEF DESCRIPTION

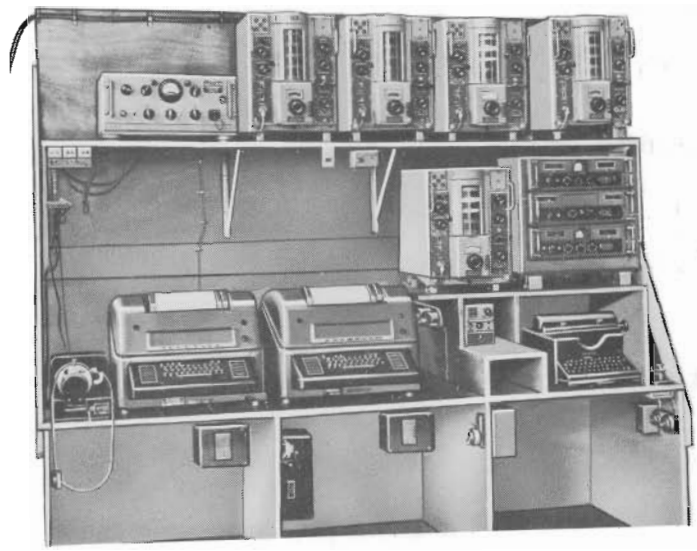
(a) Broadcast RATT Reception

The audio output of a B40D receiver, or of two B40D, or one B40D and one B41, receivers is fed to the converter-comparator. The latter automatically selects the output which, at any instant, is contributing the greater amplitude, and converts it into current pulses for operating the teletypewriter in accordance with a definite code.

(b) UHF RATT Transmission and Reception

When transmitting, operation of the teletypewriter keyboard causes pulses of current peculiar to each character to be fed to the Radio Teletype Terminal Set AN/SGC-1A where they are converted into "mark" and "space" tones. These tones are fed into the microphone circuit of the transmitter.

When receiving, the two-tone output from the receiver is converted into current pulses in the terminal set. These are used for operating the teletypewriter, causing it to print in accordance with the code received.



TYPICAL UHF AND BROADCAST RATT BAYS

MAJOR UNITS

(a) Broadcast Reception Bay

(i) Frequency-Shift Converter Comparator Group AN/URA-8B (American).

(ii) Teletypewriter TT-70A/UG (American).

(iii) Rectifier PP-424/U (American) AP 28070 or AP F1/163279.

(iv) Receivers B40D and B41 (part of Receiver Outfits CDW and CDY or CAY and CAZ).

(b) UHF Transmission and Reception Bay

(i) Radio Teletype Terminal Set AN/SGC-1A (American).

(ii) Teletypewriter TT-70A/UG (American).

(iii) Rectifier PP-414/U (American) AP 28070 or AP F1/163279.

(iv) Transmitter Auto 6S/5 or 6S/6. } Cruisers and above

(v) AP 27922 Teleprinter Type 7BP/N3 with Perforating Attachment, or AP 28085 Teleprinter Keyboard Perforator 7P/N3. } Cruisers and above

(vi) KH Control Unit (for connecting any transmitter and receiver to the RATT equipment).

PRINCIPAL POWER REQUIREMENTS

Converter–Comparator AN/URA–8B	115 V 50/60 Hz 166 W
Teletypewriter TT–70A/UG	115 V 50/60 Hz 95 W
Terminal Set AN/SOC–1A	115 V 50/60 Hz 86 W
Rectifier PP–424/U	115 V/230 V 50/60 Hz 300 W

REMARKS

The main items of RATT terminal equipment are of American design and have been supplied under the Mutual Defence Aid Programme. These items will eventually be replaced by British equipment.

HANDBOOK

BR 2133

E LIST

E1120

INSTALLATION SPECIFICATION

B794

RADIO TELETYPE (RATT) IN HM SHIPS (RATT (2)) RATT(2)

SUMMARY OF DATA

PURPOSE

The RATT(2) system is an extension of the original RATT (now known as RATT(1)). It retains the normal RATT facilities and provides further facilities including HF FST transmissions and HF simplex or duplex channel working. Simultaneous reception and HF or UHF Two Tone retransmission of the HF Broadcast is obtainable, also simultaneous transmission on HF FST and Two Tone signal circuits. Combination of these facilities and further minor facilities are obtainable in most RATT installations.

BRIEF DESCRIPTION

Teletypewriter Distribution Panel

The panel is fitted with a number of jack sockets and two switches, by means of which the teletypewriters can be plugged into any of six independent loop circuits to provide the flexibility required from the system.

Transmit-Receive Switch Box

A double pole single throw switch employed in the TRANSMIT position to bring up the transmitter carrier and make the keying line via the KH Control circuits. In the RECEIVE position it connects the teletypewriter into the correct converter output circuit.

HF FST Transmission

RATT signals in the teletypewriter loop circuit are passed to the Frequency Shift Keyer. This instrument acts as the HF transmitter exciter and shifts the transmitted frequency a small amount between two fixed frequencies in sympathy with the keyed signals.

MAJOR UNITS

(a) Additional equipment to that used for RATT:-

1. AP 163000 Distribution Panel Teletypewriter.
2. AP 163001 Switch Box, Transmit-Receive, 2 in No.
3. Frequency Shift Keyer Type GK185A
   or
   Frequency Shift Keyer Type KY-75-SRT.
4. A second line Rectifier (Standard RATT Bay only).
5. Transmitter Auto Model 6S/5 or 6S/6.

(b) Teleprinter No. 12. In lieu of Teletypewriter TT-70A/UG.

PRINCIPAL POWER REQUIREMENTS

Frequency Shift Keyer GD185A 100-125 V or 200 V/250 V 50/60 Hz 250 watts

Frequency Shift Keyer KY-75-SRT 115 V/230 V 50/60 Hz 470 watts

Teleprinter No. 12 115 V 50/60 Hz 50 watts

HANDBOOK

BR 2133 Part 2

ESTABLISHMENT LIST

E1120

INSTALLATION SPECIFICATION

3794

RATT OUTFIT RWA (INCLUDING RATT(2A))

RWA
RATT(2A)

SUMMARY OF DATA

PURPOSE

Outfits RWA and RATT(2A) equipments form Radio Automatic Telegraph Terminals and in conjunction with wireless equipment provide tactical (RWA only), and broadcast communication facilities, (ON-LINE, PLAIN LANGUAGE OR MORSE).

BRIEF DESCRIPTION OF EQUIPMENTS

Auto-Transmitter 6S6 and Teleprinter No. 12

These instruments are the telegraphy units for the outfits.

BID580 and 660 refer to the systems book.

Distribution Panels provide patching facilities for Outfit RWA. AP 2411 Jack Boxes are used in Outfit RATT (2A).

Frequency Shift Converter CV89A converts a two-tone broadcast signal to a 1000 Hz tone on/off. Keying sense is TONE OFF-ACTIVE.

Terminal Telegraph, Voice Frequency (Broadcast) this has the same function as the CV89A but with the Keying Sense, TONE ON-ACTIVE.

Keyer Converter A.P.106068 accepts a two-tone signal and converts it to a keyed d.c. voltage suitable for keying the transmitter Type 5AB/A.

Keyer Converter AP 106069 is a modification kit fitted to the AP 104590 Frequency Shift Keyer (when used in Outfit RWA). It converts a two-tone signal to a keyed d.c. voltage to operate the FSK.

Selector Unit, Broadcast allows various receiver audio outputs to be selected by means of two-way switches.

Switch Unit, Radio acts as a SEND/RECEIVE switch, automatically switching the transmitter on when the outgoing two-tone signal passes through.

Terminal Telegraph, Voice Frequency (Tactical) has three main functions:-

(i) To convert the outgoing 1000 Hz tone on/off to a two-tone signal.

(ii) To convert the incoming two-tone signal to a 1000 Hz tone on/off.

(iii) To control the operation of the system in relation to the tactical network by sensing incoming and outgoing signals.

Terminal Teleprinter, Tactical converts the tone on/off signals to d.c. pulses for the teleprinter to produce page copy. It also converts the outgoing teleprinter signals to tone on/off.

Terminal Teleprinter, Broadcast converts received tone on/off signals to d.c. current pulses to produce page copy.

MAJOR UNITS

Outfits RWA and RATT(2A)

NOTE Some of these units are not common to both outfits.

PHYSICAL DATA

			Height	Width	Depth	Weight
(1)	5815-99-580-7644	Auto-Transmitter 6S6	8¾ in.	20¼ in.	22 in.	35 lb
(2)		BID580	10½ in.	20⅜ in.	26¼ in.	88 lb
(3)		BID660	10½ in.	20⅜ in.	26¼ in.	100 lb
(4)	5815-AP 163003	Distribution Panel, Broadcast (Three line)	8 23/32 in.	19 in.		6½ lb
(5)	5815-AP 163012	Distribution Panel, Broadcast (Single line)				5 lb
(6)	5815-AP 163004	Distribution Panel, Tactical (Three line)	8 23/32 in.	19 in.		6½ lb

			Height	Width	Depth	Weight
(7)	5815-AP 163013	Distribution Panel, Tactical (Single line)				5 lb
(8)	5815-AP 163005	Distribution Panel, Teleprinter Tactical	6 31/32 in.	9½ in.	3⅜ in.	6½ lb
(9)	5815-AP 163006	Distribution Panel, Broadcast	6 31/32 in.	9½ in.	2⅞ in.	6½ lb
(10)	5815-AP 163007	Distribution Panel, Remote	6 31/32 in.	9½ in.	4⅛ in.	6½ lb
(11)	5820-00-642-7467	Frequency Shift Converter CV89A	5 7/32 in.	19 in.	21 in.	50 lb
or	5805-99-919-7642	Terminal Telegraph, Voice Frequency (Broadcast)	7 in.	19 in.	22½ in.	80 lb
(12)	AP 106068	Keyer Converter GK198	–	–	–	–
(13)	AP 106069	Keyer Converter GK199 in AP 10459 FSK Unit	20¾ in.	21⅜ in.	16 in.	
(14)	5815-AP 163008	Selector Unit, Broadcast (6-way)	5¼ in.	19 in.	5 in.	11½ lb
(15)	5815-AP 163018	Selector Unit, Broadcast (3-way)	–	–	–	9 lb
(16)	5815-AP 106070	Switch Unit, Radio	6½ in.	3¼ in.	14⅜ in.	9 lb
(17)	5805-99-919-7700	Terminal Telegraph, Voice Frequency (Tactical)	7 in.	19 in.	25 in.	80 lb
(18)	5815-99-580-2722	Terminal Teleprinter, Broadcast	3 in.	10 in.	19½ in.	20 lb
(19)	5815-99-580-2721	Terminal Teleprinter, Tactical	3 in.	10 in.	19½ in.	20 lb
(20)	5815-AP 163010	Rack, Radio Teletype 4 ft 11 in.	5 ft 7⅜ in.	22¼ in.	26 1/16 in.	126 lb
(21)	5815-AP 163011	Rack, Radio Teletype 5 ft 6 in.	6 ft 2⅜ in.	22¼ in.	26 1/16 in.	142 lb
(22)		Teleprinter, Type 12	16 3/16 in.	19¼ in.	19½ in.	80 lb

PRINCIPAL POWER REQUIREMENTS

Auto-Transmitter 6S6	115 or 230 V, 50 to 60 Hz, 50 W
BID580	115 or 230 V, 50 to 60 Hz, 45 W
BID660	115 or 230 V, 50 to 60 Hz, 70 W
Frequency Shift Converter CV89A	115 or 230 V, 50 to 60 Hz, 60 W
Keyer Converter GK198	115 or 230 V, 50 to 60 Hz,
Keyer Converter GK199	115 or 230 V, 50 to 60 Hz,
Switch Unit, Radio	115 or 230 V, 50 to 60 Hz, 10 W
Terminal Telegraph VF(T)	115 or 230 V, 50 to 60 Hz, 20 W
Terminal Telegraph VF(B)	115 or 230 V, 50 to 60 Hz, 20 W
Terminal Teleprinter, Tactical	115 or 230 V, 50 to 60 Hz, 25 W
Terminal Teleprinter, Broadcast	115 or 230 V, 50 to 60 Hz, 20 W
Teleprinter, Type 12	115 or 230 V, 50 to 60 Hz, 100 W

HANDBOOKS

BR 2384 – Outfit RWA (including RATT(2A)) – Equipments

CB – Outfit RWA (including RATT(2A)) – System

ESTABLISHMENT LISTS

Outfit RWA	E1402
Outfit RATT(2A)	E1120
Auto-Transmitter 6S6	E1369
BID580	E1393
Teleprinter Outfits	E1340/E1388

INSTALLATION SPECIFICATION

Outfit RWA	B947
Outfit RATT(2A)	B794

TERMINAL, TELEGRAPH VOICE FREQUENCY (TACTICAL) TTVF(T)

SUMMARY OF DATA

PURPOSE

The Terminal Telegraph Voice Frequency (Tactical) equipment is part of Outfit RWA. It provides the two-tone signals to modulate the transmitter for radio teletype working and it demodulates the two-tone output from a receiver of radio teletype signals. A control unit provides switching for radio teletype simplex net operation.

The equipment can be used for either HF or UHF working into present day nets.

BRIEF DESCRIPTION

(a) Transmitter, Terminal Telegraph. The tone on/off signal is amplified, detected and then converted into two rectangular waveforms of opposite phase. The waveforms are used to gate the outputs of two oscillators, one producing the "active" frequency, the other the "inactive" frequency. The outputs are mixed in a two-tone combiner, amplified, and then fed via a compound emitter follower to the line. An input gating circuit is inhibited by the Control Unit if there is an incoming signal on the Receive line.

TTVF (TACTICAL)

(b) Receiver, Terminal Telegraph. The two-tone signal input is separated into "active" and "inactive" tones. They are then demodulated and assessed. Demodulator and assessor outputs ("active" and "inactive") are added and fed to a common channel for shaping and d.c. restoration. The resultant waveform is used to gate the output of a 1 kHz oscillator (tone on/off). The Receiver Unit is muted by the Control Unit when there is no signal input.

(c) Control, Terminal Telegraph. The control of signal traffic is effected by the TX/RX AUTO switch. In AUTO (the terminal is at stand-by), the Transmitter Unit is inhibited during reception of incoming signals, however, transmission is allowed in the absence of receiver traffic and can continue up to three seconds after removal of the tone on/off input to the Transmitter Unit. A muting circuit (effective on automatic or manual operation) prevents the Receiver Unit operating the teleprinter from noise or spurious signals when there is no incoming signal traffic.

MAJOR UNITS

1. 5805-99-919-7700, Terminal Telegraph, Voice Frequency (Tactical)
2. 5805-99-919-7717, Transmitter, Terminal Telegraph
3. 5805-99-919-7722, Receiver, Terminal Telegraph
4. 5805-99-919-7727, Control, Terminal Telegraph
5. 5805-99-919-7728, Power Supply
6. 5805-99-919-7734, Case, Terminal Telegraph

POWER REQUIREMENTS

115 V or 230 V, 50-60 Hz, 28 W.

HANDBOOK

BR 2412

ESTABLISHMENT LIST

E1402

INSTALLATION SPECIFICATION

B947

SECTION 4

CONTENTS LIST

D/F OUTFIT FH4

FH4

SUMMARY OF DATA

PURPOSE

A HF Direction Finder giving a visual indication of the bearing. It is installed in specially selected surface ships.

FREQUENCY RANGE

1–24 MHz.

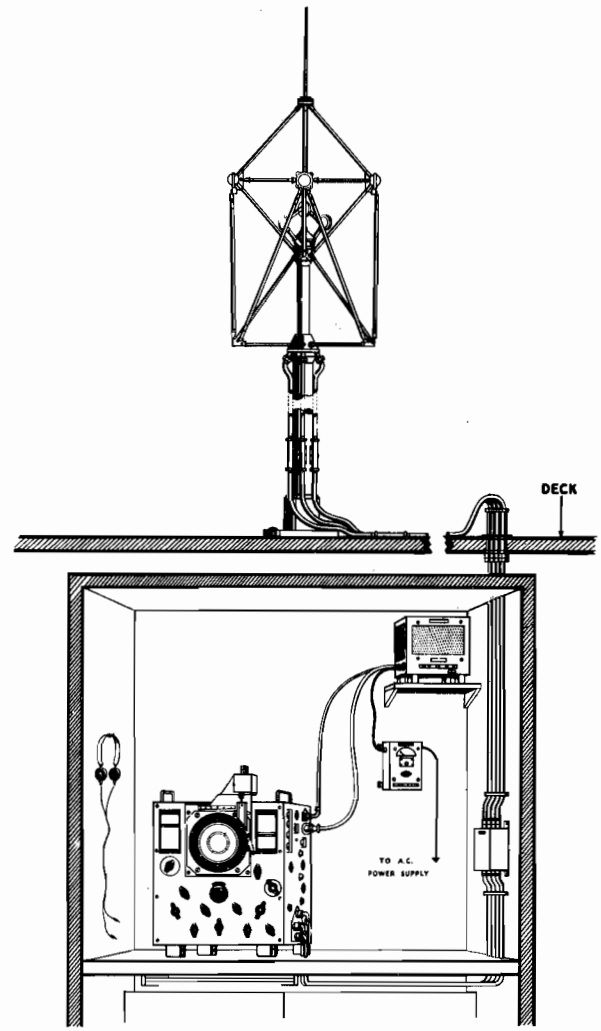
BRIEF DESCRIPTION

Direct reading cathode-ray tube direction finder. The receiver unit consists principally of two similar superheterodyne receivers having a common local oscillator. These two receivers are connected to the fore and aft and athwart ships aerial loops.

Each of the two amplifying channels contain one r.f. stage, one F.C. stage and three i.f. stages. Each of the output i.f. circuits is connected to a pair of defector plates of the cathode-ray tube. A portion of the output i.f. signals from both stages is taken to the audio detector valve common to both receivers and then amplified in the audio amplifier which consists of three valves. The last valve operating the audio stage is in the Power Unit.

MAJOR UNITS

Patt. No.	Description	PHYSICAL DATA			
		Height	Width	Depth	Weight
54535	Receiver Unit FHB Des. 3	19½"	17½"	21½"	200 lb
55663	Power Unit FHB Des. 2	11½"	12"	18"	100 lb
W6118A	Framecoil S25B	7'	4' 4"	4' 4"	130 lb



GENERAL VIEW OF EQUIPMENT

PERFORMANCE

The normal operating range is 30 to 150 miles depending on frequency, radiated power etc. The maximum value of the instrumental errors is of the order ± 2^{o} to ± 3^{o}.

POWER REQUIREMENTS AND CONSUMPTION

200/240 V, 40/60 Hz supply with a consumption of 300 watts.

AERIAL SYSTEM

Framecoil S25B consisting of a pair of screened single turn Bellini-Tosi loops and a vertical sense aerial.

REMARKS

Bearings are indicated correctly only for transmissions arriving by direct propagation along the sea surface; bearings obtained by reflected waves (sky waves) are unreliable. The ground and sky waves can be easily discriminated. Bearings are indicated directly relative to the Fore and Aft line of the ship. True bearings are obtained from a rotating gyro scale, controlled by the ship's gyro compass.

HANDBOOK

BR 1613

ESTABLISHMENT LIST

E551

INSTALLATION SPECIFICATION

B621

H.F. D.F. OUTFIT FH5

FH5

SUMMARY OF DATA

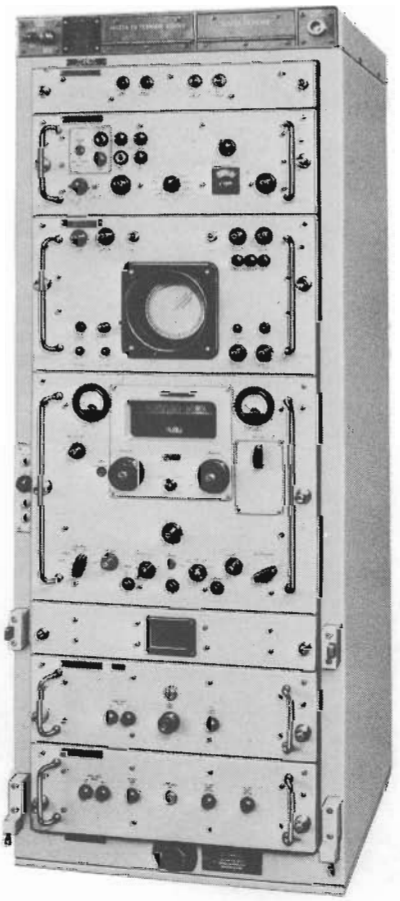
DESCRIPTION

D.F. Outfit FH5 is a direct reading CRDF/Intercept Receiver Terminal for use in surface ships. The D.F. aerial system used is such that bearings are indicated correctly for those signals arriving by direct propagation along the sea surface (groundwave) only. The D.F. application of the Outfit is thus limited to the working of transmitters within a range of the order of 30 to 150 miles. Facilities for rapid band changing, semi-automatic sense determination, video and audio outputs are incorporated.

COMPOSITION OF OUTFIT

The Outfit comprises the following main items of equipment:

Frame Coil	5985-A.P.186478
Aerial Transformer Unit	5825-99-971-6872
Cabinet (wired) containing	5825-99-971-6865
Control, Aerial Switching	5825-99-971-6866
Control, Demodulator	5825-99-971-6867
Indicator, Bearing	5825-99-971-6868
Receiver, Dual-channel	5825-99-971-6869
(Receiver) Power Supply	5825-99-971-6870
(General Purpose) Power Supply	5825-99-971-6871



FREQUENCY RANGE

1 - 30 MHz

RECEPTION FACILITIES

Double Sideband
Single Sideband
Frequency modulated

D.F. DISPLAY

Vectorial display on cathode ray tube

AUDIO OUTPUTS

10 mW into 600 ohms
3 mW into 600 ohms

POWER REQUIREMENTS

Main Equipment Supply	115 V or 230 V, 50 or 60 Hz, 500 W
Anti-Condensation Heater Supply	115 V or 230 V, 50 or 60 Hz, 300 W (From circuits maintained at all times)
Gyro Supply	115 V - 400 Hz Reference Voltage
Fire Detector	(+210 V dc stabilised) obtained from A.P.164246 Power Supply, Fire (+24 V dc) Detection

HEAT DISSIPATION

680 W approximately

VENTILATION

Airflow 150 ft^3/min at 1.35 - 1.8 inches estimated W/G

PHYSICAL DATA

Height	Width	Depth	Weight
63½ in – (161.3 cm) less mounts	24 in – (61.9 cm)	30 in – (76.2 cm)	700 lb – (158.76 kg)

INSTALLATION SPECIFICATION

B 946/PRE 2

ESTABLISHMENT LIST

S1427

HANDBOOK

BR 2465(1)(2)

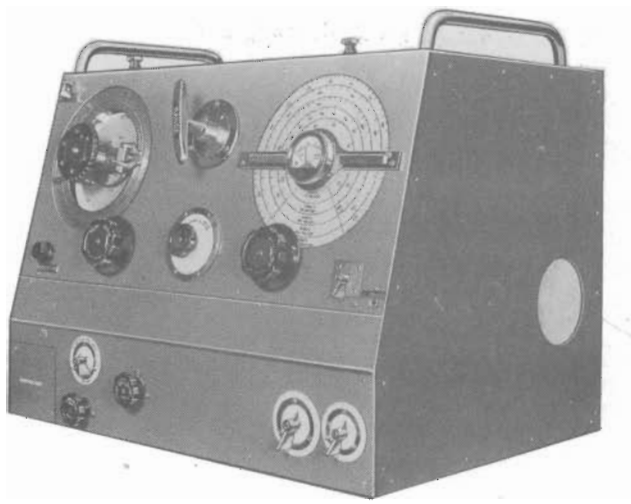
D/F OUTFITS FM11 AND FM12

FM11 AND 12

SUMMARY OF DATA

PURPOSE

D/F Outfit FM11 is a MF Direction Finder fitted in submarines superseding D/F Outfit FM4. D/F Outfit FM12 is fitted in trawlers and above and also in Royal Naval Air Stations as a MF Direction Finder superseding D/F Outfit FM7.



D/F ASSEMBLY FMB

FREQUENCY RANGE

D/F Outfit FM11 – 15 to 580 kHz in five ranges.

D/F Outfit FM12 – 42 to 1060 kHz in five ranges.

BRIEF DESCRIPTION

D/F Outfits FM11 and 12 are direction finding sets which work on the Bellini-Tosi principle and employ fixed frame aerial systems.

D/F Assemblies FMA and FMB are completely self contained D/F assemblies and each include a receiver, Patt. 5471 Radiogoniometer S33, power pack, inductance correcting unit and gyro motor etc. The receiver comprises three r.f. stages, detector, beat frequency oscillator and one stage of a.f. amplificationl A single tuning control tunes all stages including the beat frequency oscillator. A built-in loudspeaker is incorporated and provision is made for the connection of an external loudspeaker and headphones to the set.

MAJOR UNITS

D/F Outfit FM11		Height	Width	Depth	Weight
Patt. W5482/A	D/F Assembly FMA	23½"	25"	18"	235 lb
Patt. W1953	Framecoil S21				224 lb
D/F Outfit FM12					
Patt. W5483/a	D/F Assembly FMB	23½"	25"	18"	235 lb
Patt. 1912	Framecoil S22				118 lb
or					
Patt. W1998	Framecoil S19				132 lb

Framecoil S19 is fitted in cruisers and above.

POWER REQUIREMENTS AND CONSUMPTION

230 volts 50 Hz supply with a consumption of 75 watts.

The supply is taken from an existing A.C. Supply Outfit, if this is not available A.C. Supply Outfit DRB, DQB or DJB is fitted.

AERIAL SYSTEM

A fixed framecoil system with a 30–40 ft vertical single wire sense aerial.

D/F Outfit FM11 – Framecoil S21 (submarine's fixed aerial is used as sense aerial).

D/F Outfit FM12 – Framecoil S19 or S22.

HANDBOOK

3R 1370

ESTABLISHMENT LIST

E550

INSTALLATION SPECIFICATIONS

B233 (D/F Outfit FM11)
B213 (D/F Outfit FM12)

MF DF OUTFIT FM16

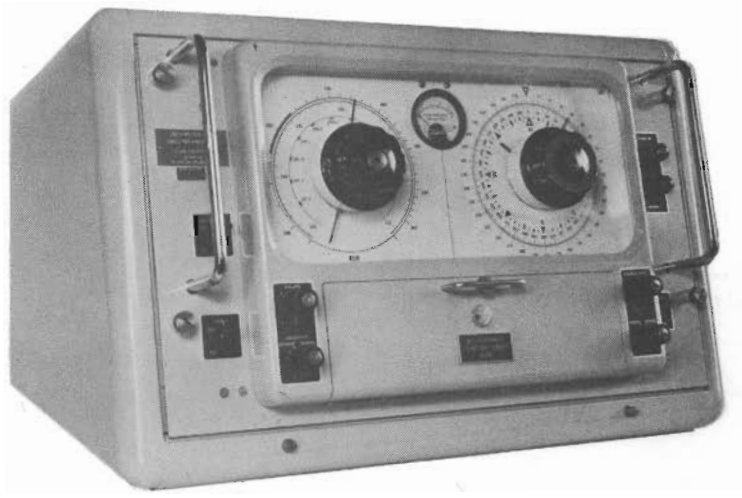
(MARCONI TYPE N5020)

FM16

SUMMARY OF DATA

PURPOSE

A Ship's Automatic, MF direction finder of the servo-driven type, with switching facilities for reversion to manual operation if required. The single act of tuning in a signal displays an unambiguous bearing.



BRIEF DESCRIPTION

The equipment embodies the Bellini-Tosi, fixed loop system, the rotatable element being a servo-driven goniometer Coil. In auto operation a signal from the loop system, present only when the gonio is displaced from the null point, is used in conjunction with a signal from a vertical aerial, to produce a low frequency error signal. This error signal drives a servo motor that rotates the gonio so as to remove the error ie towards the null point. The vertical aerial is to be shared with Alarm, Radio Outfit SQA, to which it is normally connected, but is automatically switched to FM16 when the latter is brought into operation.

FREQUENCY

250–550 kHz

I.F.

110 kHz

POWER SUPPLY

115/230 V, 50/60 Hz, 115 W for D.F. set
and
24 V d.c., 3 A for Quadrantal Correction Box
115/230 V, 50/60 Hz, 30 W – Anti-Con Heater

Heat Dissipation of the order of 150 W

PHYSICAL DATA

	Height	Width	Depth	Weight
D.F. Set 5825-99-520-1078	15¾ in (40.0 cm)	22 in (55.9 cm)	17½ in (44.4 cm)	110 lb (50 kg)
Correction, Quadrantal 5825-99-520-1079	9¼ in (23.3 cm)	13 in (33 cm)	3¾ in (9.5 cm)	10 lb (4.5 kg)
Antenna 5985-99-519-9975	40 in (101.6 cm)	30½ in (77.5 cm)	30½ in (77.5 cm)	60 lb (27.2 kg)

AERIAL OUTFIT (WHIP)

Either AWN or AWT will be allocated to act as the vertical aerial for outfit FM16. If a rigged wire aerial is to be used, an outfit in the Series AHR–AHY may be specified.

COMPASS SAFE DISTANCES

The minimum safe distances from the appropriate Grades of Compass is:

	Grade		
	I	II and III	IV
D.F. set	12 ft	7½ ft	6 ft
Loop Antenna	2 ft	1½ ft	1 ft

ESTABLISHMENT LIST

S1571

HANDBOOK

BR 2494

INSTALLATION SPECIFICATION

B1021

D/F OUTFIT FUI

FUI

SUMMARY OF DATA

PURPOSE

D/F Outfit FU1 is a Commutated Aerial Direction Finder System which gives instantaneous visual presentation of the bearing of an aircraft transmitting within its range and on one of its preset frequencies. Aircraft Carriers will be fitted with a two channel equipment; all other types of ship requiring this system will have one channel equipment.

FREQUENCY RANGE

225–399.9 MHz.

Any one of ten frequencies can be pre-selected from 1750 available in each D/F channel.

BRIEF DESCRIPTION

The bearing information is presented on the C.R.T. as a radial trace, developed from the phase comparison of signals received by adjacent dipoles or unipoles in the electronically commutated aerial array. Normal scale indication of the bearing is relative to true north, in addition there is an outer scale driven from the ships gyro compass system.

Commutation imposes a phase modulation on the incoming signal carrier, the modulation is converted to a low frequency amplitude waveform and compared with a reference waveform of identical frequency, in a phase meter. Output from the phase meter proportional to the sine and cosine components of the bearing angle are applied to the C.R.T. producing the radial trace.

MAJOR UNITS

Receiver Cabinet	Height 5 ft	Width 2 ft	Depth 1 ft 10½ in.	Weight 600 lb
D/F Cabinet	Height 5 ft 6½ in.	Width 2 ft 3 in.	Depth 1 ft 7 in.	Weight 400 lb

Unipole D/F Aerial Array (Two-channel)	Diameter of Counterpoise	7 ft 6 in.
	Diameter of Array	3 ft 9 in.
	Weight	400 lb
Dipole D/F Aerial Array (One-channel)	Diameter of Array	5 ft
	Weight	1000 lb

Azimuth, Indicator

PERFORMANCE

D/F Range	UHF communication range (minimum)
Instrumental Error	Maximum 2^{o} (exclusive of site error)
I.F. Bandwidth	For 6 dB down. Not less than 60 kHz For 60 dB down. Not greater than 140 kHz
Receiver Sensitivity (With r.f. input of 1/uV modulated to depth of 30% at 1000 Hz)	Signal-plus-noise to noise ratio is greater than 10 dB
A.F. Output (With r.f. input of 5/uV modulated to depth of 100% at 1000 Hz)	Monitor Output 200 mW Line Output between 2.0 and 3.5 V for any load from 100 to 1800 ohms.

Attenuated line output 1 mW (maximum) into 600 ohms.

POWER REQUIREMENTS

230 or 110 V ± 45–65 Hz single phase. One channel 1420 watts. Two channel 2720 watts.

AERIAL SYSTEM

Dipole D/F Aerial Assembly or
Unipole D/F Aerial Assembly

HANDBOOK

BR 2303(1)(2)(3)(4)

ESTABLISHMENT LIST

E1215

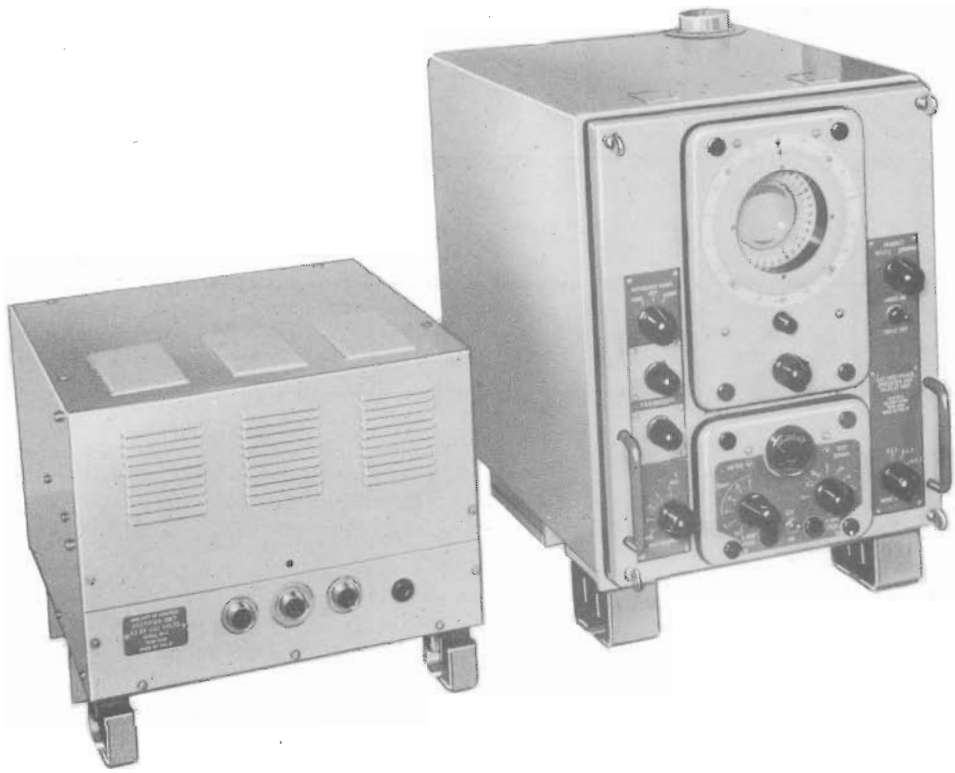
INSTALLATION SPECIFICATION

B862

RADIO SEARCH AND D/F OUTFIT UA2

UA2

SUMMARY OF DATA



OFFICE EQUIPMENT

PURPOSE

A radio search and D/F equipment fitted in submarines and surface vessels to determine the bearing and characteristics of a target radar.

TYPE OF RECEPTION

Pulsed r.f. signals from target radar.

FREQUENCY RANGE

2500–11 500 MHz. For range of associated aerial outfits, see below.

BRIEF DESCRIPTION

This equipment is used in conjunction with Aerial Outfits AYC, AYD, AYE and AYF. The aerial outfits consist of the appropriate horns and signal rectifier systems, the UA2 being the video amplifier and display unit. Four video frequency amplifiers amplify the signals from the port, starboard, fore and aft aerial collectors respectively and feed them to the output chassis. This in turn drives the deflection plates of a C.R.T. to produce a radial trace denoting the bearing of the target radar. In addition, the output chassis provides for the mixing of the signals from the individual channels for pulse brightening and aural monitoring. The audio component is fed via an audio output chassis to a specially designed headset with split earphones to enable the operator to listen to both target radar signals and speech from an external voice channel.

An input selector switch selects video signals from any one of the aerial outfits fitted.

The unit also includes a built-in generator which simulates audibly a received signal and provides a visual test signal on any octantal relative bearing. A dial bearing indicator is fitted in front of the C.R.T. and, when fed with "M" type compass transmission, indicates true bearing of the target radar.

The power supply circuits are embodied in a separate unit.

ELECTRICAL PERFORMANCE

Input Impedance to v.f. amplifiers 75 ohms
Input Level 5 μV Peak (minimum)
Output Level 18 V Peak (maximum)
Overall Gain of v.f. Amp 100 dB ± 3 dB
Frequency Response to 20 dB down, 6 kHz to 1 MHz
Audio Line Impedance 600 ohms

MAJOR UNITS

Pattern No.	Description	Physical Data			
		Height	Width	Depth	Weight
62620	Amplifier and Display Unit Des. 2	19 in.	13¼ in.	18½ in.	110 lb
62625	Rectifier Unit 638X	11⅜ in.	13¼ in.	14 in.	61 lb

POWER SUPPLY AND CONSUMPTION

115–230 V 50–60 Hz, single phase, 250 watts.

HEAT DISSIPATION

250 watts. (The Display Unit can be air cooled by exhaust from main trunking).

ASSOCIATED AERIAL OUTFITS

Aerial Outfit AYC 2500–4100 MHz)
Aerial Outfit AYD 4100–7000 MHz) For fitting in surface vessels
Aerial Outfit AYE 7000–11 500 MHz)

Aerial Outfit AYF 8000–10 500 MHz – For fitting in submarines

ASSOCIATED TEST EQUIPMENT

Pattern 61640 Test Set Design 15 (For AYC)
Pattern 63369 Test Set Design 19 (For AYD)
Pattern 64261 Test Set Design 21 (For AYE and AYF)
Pattern 61695 Test Set Design 18 (Video Test Set)

HANDBOOKS

BR 2348 (Radio Search and D/F Outfit UA2)
BR 2354(1) (Aerial Outfits AYC, AYD, AYE)
BR 2354(2) (Aerial Outfit AYF)

ESTABLISHMENT LIST

E1111

INSTALLATION SPECIFICATIONS

8805 Radio Search and D/F Outfit UA2
8806 Aerial Outfit AYC, AYD, AYE
8807 Aerial Outfit AYF

RADIO SEARCH AND D/F OUTFIT UA3

UA3

SUMMARY OF DATA

PURPOSE

A radio search and D/F equipment fitted in surface vessels to determine the bearing and characteristics of an intercepted radar, with facilities for continued operation in the presence of own-ship or other strong local radar transmissions.

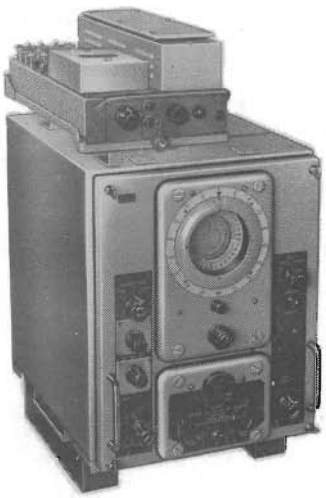
TYPE OF RECEPTION

Pulsed r.f. signals from target radar.

FREQUENCY RANGE

2500-11 500 MHz depending on associated aerial outfit (see below).

BRIEF DESCRIPTION



AMPLIFIER AND DISPLAY UNIT WITH SWITCHING AND R.I.S. UNIT

The Radio Search and D/F Outfit UA3 is the office equipment used to display the bearing of a radar and to determine its characteristics. The associated Aerial Outfits are AYC, AYD and AYE. Each aerial outfit covers a specific frequency band and has four horn collectors, one mounted on each of the Port, Starboard, Fore and Aft bearings. Signal rectification takes place in the aerial outfit, the video frequency signals being passed to the office equipment by coaxial cable. Selection of the required outfit is made by a 3-way INPUT SELECTOR SWITCH on the Switching and R.I.S. Unit and the video signals are then amplified in the Port, Starboard, Fore and Aft v.f. amplifier chassis which are located in the main Amplifier and Display Unit. The wide-band v.f. amplifiers are followed by output stages which drive the deflection plates of a C.R.T. to produce a radial trace indicating the bearing of the intercepted radar. The video output chassis also mixes the signals from the individual channels and amplifies the composite signal for pulse brightening and audio indication. The audio signal enables an experienced operator to identify the type of radar under observation; this is fed via an audio output chassis to a specially designed headset with split earphones so that the operator can listen to radar signals and superimposed speech from an external voice channel simultaneously. Own-ship or strong local radars above a preset signal level, initiate blanking pulses in the Switching and R.I.S. Unit and these operate gating circuits in the video output chassis to prevent masking of weaker target signals. The Amplifier and Display Unit also includes a built-in generator which simulates a received signal on any octantal relative bearing, a bearing indicator dial is fitted in front of the C.R.T. and, when fed with 'M' type compass transmission, indicates the true bearing of the intercepted radar.

ELECTRICAL PERFORMANCE

Amplifier and Display Unit

Input Impedance to V.F. Amplifiers 75 ohms
Input Level 5/uV Peak (minimum)
Output Level 12 V Peak (maximum)
Overall Gain of V.F. Amplifier 106 dB ± 3 dB
Frequency Response to 20 dB down 60-90 kHz to 1.2 MHz
Audio Line Impedance 600 ohms

Switching and R.I.S. Unit

Input Impedance 75 ohms
Minimum Level of Sync from Own-ship to Operate Blanking 6 V (+ve or -ve) 0.1/usec duration
Minimum Output Level +1.5 V peak across inputs to Output Chassis
Output Pulse Length 20/usec
Output Pulse Rise-time Less than 0.4/usec
Cross-talk between Quadrantal Channels Lower than -30 dB

MAJOR UNITS

Pattern No.	Description	Physical Data			
		Height	Width	Depth	Weight
AP 71472	Amplifier and Display Unit, Des. 4	19 in.	13¼ in.	18½ in.	117 lb
AP 62625	Rectifier Unit 63BX, 300 V	11¼ in.	13¼ in.	14 in.	61 lb
AP 71474	Switching and R.I.S. Unit	6 in.	8½ in.	17 in.	13¼ lb
AP 71473	Rectifier Unit 63EQ, 300 V	6 in.	5¼ in.	10½ in.	11½ lb

POWER SUPPLY AND CONSUMPTION

Amplifier and Display Unit 115–230 V, 50–60 Hz, 1 Ø, 250 W
Switching and R.I.S. Unit 110–250 V, 50–60 Hz, 1 Ø, 70 W

HEAT DISSIPATION

Amplifier and Display Unit 250 W (The Display Unit can be air-cooled by exhaust from main trunking)
Switching and R.I.S. Unit 70 W (Natural ventilation)

ASSOCIATED AERIAL OUTFITS

Aerial Outfit AYC 2500–4100 MHz
Aerial Outfit AYD 4100–7000 MHz
Aerial Outfit AYE 7000–11 500 MHz

ASSOCIATED TEST EQUIPMENT

Patt. 61640 Test Set Des. 15 (For AYC)
Patt. 63369 Test Set Des. 19 (For AYD)
Patt. 64261 Test Set Des. 21 (For AYE)
Patt. 61695 Test Set Des. 18 (Video Test Set)

HANDBOOKS

BR 2349 (Radio Search and D/F Outfit UA3)
BR 2354(1) (Aerial Outfits AYC/D/E)

ESTABLISHMENT LIST

E1231

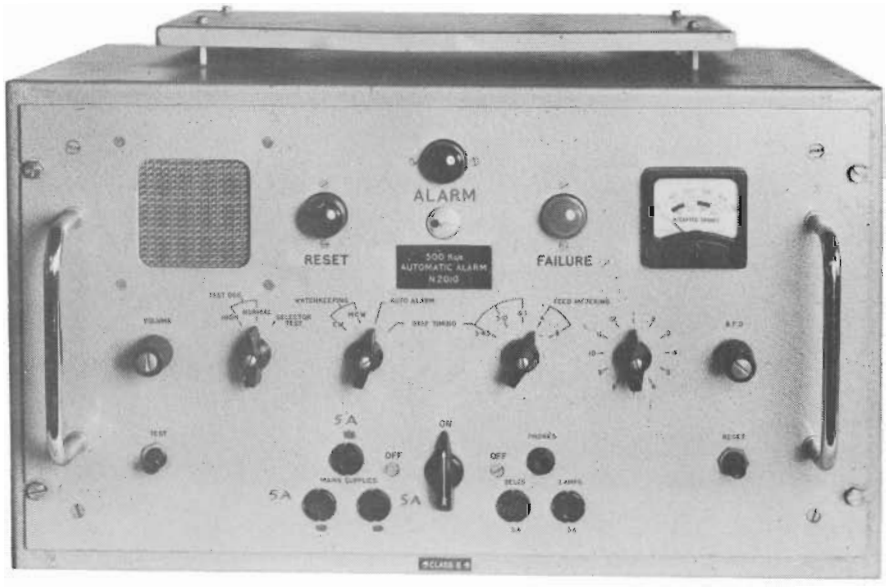
INSTALLATION SPECIFICATIONS

B861 Radio Search and D/F Outfit UA3
B806 and Addm. Aerial Outfits AYC, AYD, AYE

AUTO-ALARM OUTFIT SQA 5820-99-971-8429

SQA

SUMMARY OF DATA



PURPOSE

For use in ships to give audible warning of the receipt of any radio telegraph distress signal on 500 kHz, even in the presence of powerful signals of either A2 or A1 type. It is an unattended receiver.

BRIEF DESCRIPTION

The alarm system is actuated after registration of three consecutive correctly-timed dashes and spaces, followed by a fourth dash of 3.5 sec or greater duration. Audible warning is given by alarm bells as required in any part of the ship, and visual warning on the equipment by indicator lamp. The equipment is bench mounted. A FAILURE lamp is included.

POWER SUPPLIES

110 V d.c. or 220 V d.c. or 115 V or 230 V 50 Hz, 1 Ø a.c.

24 V d.c. is also needed to operate the indicator lamps and alarm bell system. This supply is not otherwise used in this equipment.

PHYSICAL DATA

Width	Height	Depth	Weight
19¾ in. 50.2 cm	12 5/8 in. 32.1 cm	9½ in. 24.1 cm	41¼ lb 18.7 kg

HANDBOOK

BR 2446

ESTABLISHMENT LIST

R1507

INSTALLATION SPECIFICATION

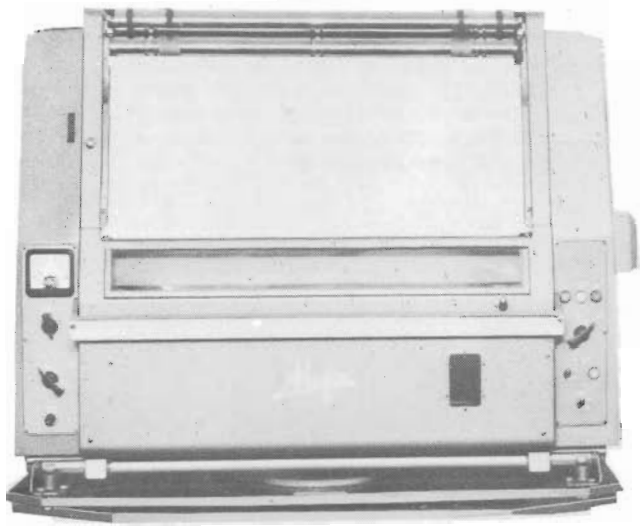
8967

RECORDING OUTFIT RED(1) AND RED(2) RED(1)(2)

SUMMARY OF DATA

PURPOSE

The facsimile set, NSN 5815-99-971-8698 provides a picture 18 inches by 22 inches of chart information received by line. It supersedes the Mufax Model D-649-L.



MODE OF OPERATION

Amplitude modulation in the band 1 to 5 kHz.

BRIEF DESCRIPTION

The chart recorder amplifies and detects amplitude modulated signals. Its d.c. output is used to "burn" an electro-sensitive paper in a series of horizontal lines of varying intensity, thus reproducing the chart.

DIMENSIONS

Height	22⅜ in.
Width	28½ in.
Depth	12½ in.
Weight	150 lb

PRINCIPAL CHARACTERISTICS

Input Signal	:	A.M. sub-carrier (1800 to 4000 Hz)
Input Level	:	+5 dBm to −40 dBm (normally 0 dBm is black)
Input Impedance	:	600 ohms balanced 2-wire
Control Signals	:	5 secs Start signal; 300 Hz at 96 lines/inch 675 Hz at 48 lines/inch 5 secs Stop signal 450 Hz
Phasing Signals	:	'A' fully automatic, black 95% white 5%, minimum duration 15 s 'B' semi-automatic, black 50% white 50%, minimum duration 20 s
Helix Speeds	:	60, 90 and 120 revs/min Automatic or manual selection
Line Definition	:	96 line/inch 48 line/inch
Fork Frequency	:	100 Hz adjustable by 40 parts in 10^6

POWER REQUIREMENTS

105 to 125 V, or 200 to 240 V, 50 to 60 Hz. Consumption 150 W.

HANDBOOKS

BR 2493 Handbook for Recording Outfits RED(1) and RED(2)

ESTABLISHMENT LIST

S1490 Recording Outfits RED(1) and (2)

INSTALLATION SPECIFICATION

B996/PRE.1 Mufax Equipment
B1117/PRE.1 Outfits RED(1) and (2)

COMMERCIAL EQUIVALENT

Muirhead Model D-649-L!E1 Chart Recorder (MUFAX)
Muirhead Model K-156-B FST-A.M. Converter

NOTE The corresponding shipborne receiving equipment is Recording Outfit RED(2). This is similar to the Outfit RED(1) but has additionally a Converter F.S. 5815-99-971-8699. The signals are received by radio, using FST or F.M. sub-carrier, and the output of the receiver is at a mean frequency of 2550 Hz. When receiving LF there is a shift of ± 150 Hz; when receiving HF the shift is ± 400 Hz. (The higher frequency corresponds to a white signal). The receiver output is connected to the FST/A.M. Converter which passes on intelligence as an amplitude modulation on 1800 Hz for processing as in line operation.

RECORDING OUTFITS REH(1) AND REH(2)

REH

SUMMARY OF DATA

AP 100322 TAPE RECORDER AND REPRODUCER A/F

PURPOSE

Magnetic tape recording outfits for various monitoring requirements and other uses.

BRIEF DESCRIPTION

Outfit REH(1) is a commercially produced tape recorder mounted on a standard P.O. 19 in. rack. Outfit REH(2) is identical but is not rack mounted. Any recording may be played back immediately or stored for later use. A recording may be played back an almost indefinite number of times or be erased and the tape used again. Three speeds are available giving a choice between long playing time with limited frequency response, short playing time good response or a compromise. Two recordings can be accommodated on one tape. The total recording time per reel may be 1 hour at 7½ in. per sec. 2 hours at 3¾ in. per sec. or 4 hours at 1⅞ in. per sec. During playback six different frequency response characteristics can be selected according to particular speed, operation or Service required. Provision is made for remote switching or voice operated control.

The instrument is intended for operation from and into 600 ohm lines. A high gain stage is provided however to allow recording direct from a suitable microphone via the microphone matching transformer supplied.

On the output side, provision is made for 2 watts to be fed to an external 600 ohm load in addition to the 2.5 volts available for feeding 600 ohm lines. An internal speaker allows monitoring both during recording and playback and can be switched off when not required.

MAJOR UNITS

Patt. No.	Description	Physical Data			
		Height	Width	Depth	Weight
54819	Rack 19" Design 1	5' 5⅝"	1' 8½"	2' 4"	96 lb
100322	Tape Recorder and Reproducer A/F	11½"	16¾"	13½"	56 lb
100325	Fittings, set of, for rack mounting REH(1)	–	–	–	13½ lb
100326	Voice-Operated Switching Unit REH(1)(2)	3¼"	7¼"	6"	3¾ lb
100327	Box, for Working and Spare Components REH(1)(2)	8½"	1' 4½"	8½"	15 lb
100328	Tape, magnetic recording 1200 ft on 7" Spool	–	–	–	–
101253	Tape, magnetic recording 200 ft on 3¾" Spool	–	–	–	–
100323	Tape Deck for AP 100322	Part of Patt. 100322			
100324	Amplifier and Power Unit for AP 100322				
13321A	Microphone Hand	–	–	–	–

Notes:- 1. Patts. 54819 and 100325 are not supplied with Outfit REH(2).
2. Where rack is mounted on wooden floor a steel base plate (weight 30 lb) is supplied.

POWER REQUIREMENTS

Power Supply:- 100–120 V or 200–250 V 50 Hz (60 Hz supply may be used with special pulley)

Power Consumption:- 110 watts approximately

HEAT DISSIPATION 110 watts approximately

RECORDING MEDIUM Standard Category A tape on 7" reels of 1200 ft or 3¾" reels of 200 ft. Tape width 0.25". Tape thickness 0.0024".

TRACK WIDTH 0.1" displaced to one edge.

NUMBER OF TRACKS Two consecutive recordings can be accommodated side by side.

RUNNING TIME (60 HZ SUPPLY) 30 mins. each track at 7½" per sec. ie 1 hour per reel. Pro rata for other speeds. Rewind time less than 1 min. per full reel.

FREQUENCY RESPONSE

(a) at 7½" per sec. 70–8000 Hz
(b) at 3¾" per sec. 70–4000 Hz ± 3 dB
(c) at 1⅞" per sec. 70–2000 Hz

INPUT IMPEDANCES AND LEVELS

(a) Line Input – 600 ohms balanced by P.O. Gauge "A" jack via built–in isolating transformer.
Minimum signal level 0.07 V peak.

(b) Microphone Input – 1 Megohm unbalanced or using external plug in matching transformer, 25 ohms balanced.
Minimum signal level 0.002 V at high impedance socket.

OUTPUT IMPEDANCES AND LEVELS

(a) Main Output – 2 watts available into 600 ohm load, balanced through P.O. Gauge "A" jack. Dummy 600 ohm load connected when plug is removed.

(b) Line Output – 2.5 V available across internal 4 ohm load, for feeding lines, balanced, P.O. Gauge "A" jack.

(c) Monitor Loudspeaker – 500 mW to internal 5" Speaker.

SIGNAL TO NOISE RATIO In the range 200–8000 Hz, without distortion and at 7½" per sec. – 50 dB (approx.)

HANDBOOK BR 1431

ESTABLISHMENT LIST E1040

INSTALLATION SPECIFICATION 8744

RECORDING OUTFITS REH(3) AND REH(4)

REH(3)
REH(4)

SUMMARY OF DATA

PURPOSE

Magnetic tape recording outfits for various monitoring requirements and other uses.

BRIEF DESCRIPTION

Outfit REH(3) is a commercially produced tape recorder mounted in a portable case. Outfit REH(4) is identical but is mounted on a standard P.O. 19 in. rack. Any recording may be played back immediately or stored for later use. A recording may be played back an almost indefinite number of times or be erased and the tape used again. Three speeds are available giving a choice between long playing time with limited frequency response, short playing time with good response, or a compromise. Two full length recordings can be accommodated on one reel of tape. The continuous recording time per Pattern 943-6981 reel is 1 hour at 7½ in. per second, 2 hours at 3¾ in. per second, or 4 hours at 1⅞ in. per second. During playback six different frequency response characteristics can be selected according to a particular speed operation or Service requirement. Provision is made for remote switching or voice-operated control.

943-8235 RECORDER-REPRODUCER, SOUND

The instrument is intended for operation from and into 600 ohm lines at zero level ± 10 dB approximately. A high gain stage input socket is provided however to allow recording direct from a suitable microphone matching transformer supplied. (Pattern 943-7003 Interconnecting Box.)

On the output side, provision is made for 2 watts to be fed to an external 600 ohm load in addition to the 2.5 volts available for feeding 600 ohm lines. An internal speaker allows monitoring both during recording and playback and can be switched off when not required.

MAJOR UNITS

J.S. Cat. No. or A.P.	Description	Physical Data			
		Height	Width	Depth	Weight
943-8235	Recorder-Reproducer, Sound	11½ in.	16¾ in.	13¼ in.	56 lb
943-8238	Recorder-Reproducer, Sub-assy., Sound	–	–	–	–
943-8230	Amplifier, Power Supply	–	–	–	–
943-6987	Installation Kit	–	–	–	13½ lb
54819	Rack 19 in. Design 1 (for REH(4))	5 ft 5 in.	1 ft 8½ in.	2 ft 4 in.	96 lb
972-6181	Microphone, dynamic	–	–	–	–
943-7003	Interconnecting Box	–	–	–	–
943-8232	Control, Sound Recorder-Reproducer	3¼ in.	7¼ in.	6 in.	3¾ lb
943-6981	Tape, Sound Recording (1200 ft)	–	–	–	–
943-8239	Tape, Sound Recording (200 ft)				
943-8229	Maintenance Kit, Electronic Equipment	9 in.	16½ in.	9 in.	28 lb

Notes:- 1. Patterns 54819 and 943-6987 are not supplied with Outfit REH(3).

2. Where the rack is mounted on a wooden floor a steel base plate (weight 30 lb) is supplied.

3. Patterns 943-8238 and 943-8230 are part of 943-8235 Recorder-Reproducer, Sound.

MAIN PARAMETERS

Power Supply	100–120 V or 200 250 V 50 Hz (60 Hz may be used with special pulley)
Power Consumption	110 watts (approx.)
Recording Medium	Standard Category A tape on 7 in. reels of 1200 ft or 3½ in. reels of 200 ft. Tape width 0.25 in. Tape thickness 0.0024 in.
Track Width	0.1 in. displaced to one edge.
Number of Tracks	Two consecutive recordings can be accommodated side by side.
Running Time (50 Hz Supply)	32 minutes each track at 7½ in./sec., ie 64 minutes per reel of Pattern 943–6981. Rewind–time less than 1 minute per full reel. 2 h each track at 1⅞ in./sec., ie 4 h per reel. 1 h each track at 3¾ in./sec., ie 2 h per reel.
Frequency Response	(a) at 7½ in./sec., 60–10 000 Hz ± 3 dB (b) at 3¾ in./sec., 60–5000 Hz ± 3 dB (c) at 1⅞ in./sec., 60–2000 Hz ± 6 dB
Input Levels and Impedances	(a) Line Input. Minimum 0.125 V (peak) into 5000 ohms (approx.) balanced. (b) High Z Input. Minimum 0.0035 V into 1 Megohm unbalanced. Pattern 943–7003 converts this to 25 ohms, balanced, for use with a dynamic microphone.
Output Levels and Impedances	(a) Main Output – 2 watts available into 600 ohm load, balanced through P.O. Gauge 'A' jack. (b) Line Output – 2.5 V available across internal 4 ohm impedance source, balanced. NOTE: For feeding into B.P.O. (British Post Office) lines a suitable impedance matching Transformer should be used. (c) Monitor Loudspeaker – 500 mW to internal 5 in. speaker; Dummy 2.5 ohm load connected when switched off.
Signal to Noise Ratio	This is approximately 50 dB, in the range 200–8000 Hz, without distortion and at 7½ in./sec.

HANDBOOK

BR 1174

ESTABLISHMENT LIST

E1191

INSTALLATION SPECIFICATION

B774/R1

RECORDING OUTFIT REH(5)

REH(5)

SUMMARY OF DATA

PURPOSE

General purpose magnetic tape recording outfit for use in HM Ships and shore establishments.

BRIEF DESCRIPTION

Outfit REH(5) is a commercially produced tape recorder mounted in a portable case. Any recording may be played back immediately or stored for later use. A recording may be played many times or be erased and the tape used again. Three speeds are available, giving a choice between long playing time with limited frequency response, short playing time with good response, or a compromise. Two full length recordings can be accommodated on one reel or tape. The recording time per Pattern 943-6981 reel is one hour at 7½ in./sec., two hours at 3¾ in./sec., or four hours at 1⅞ in./sec. Provision is made for remote switching or voice operated control.

The instrument is intended for operating from and into 600 ohms lines, but a high gain input socket is provided to allow recording direct from a suitable microphone. With the microphone selector switch in the HIGH-IMP position, high impedance microphones may be used, while with the switch in the LOW-IMP position, a matching transformer is inserted which permits the use of 25 ohms microphones (Pattern 972-6181).

On the output side, provision is made for feeding 1 mW into 600 ohms lines and 2.5 watts into an external 600 ohms load or into the internal 15 ohms loudspeaker.

Record pre-emphasis and playback equalisation for each speed are selected by means of a switch on the front panel.

MAJOR UNITS

NSN	Description	NSN	Description
5835-99-580-1624	Recorder-Reproducer, Sound, Includes:	5835-99-943-6981	Tape, sound recording (1200 ft)
5835-99-580-7506	Power Supply-Oscillator	5835-99-972-0164	Tape, sound recording (1800 ft)
5835-99-580-7507	Tape Deck	7740-99-943-6978	Record Tape
5835-99-580-7508	Control Amplifier	5950-99-972-9845	Demagnetiser
5835-99-972-6181	Microphone, dynamic	5995-99-580-8454	Cable Assembly, Power Electrical

PHYSICAL DIMENSIONS

Height 9½ in. Width 16¾ in. Depth 18¼ in. Weight 56 lb

FUNCTIONAL CHARACTERISTICS

Recording Medium: Standard Category 'A' tape on 7 in. reels of 1200 ft or 3¾ in. reels of 200 ft. Extended play on 7 in. reels of 1800 ft. 8¼ in. commercial reels can be accommodated. Tape width 0.25 in. Tape thickness 0.0024 in.

Track Width: 0.1 in. displaced to one edge.

Number of Tracks: Two consecutive recordings can be accommodated side by side.

Running Time:	32 minutes each track at 7½ in./sec., ie 64 minutes per reel of Pattern 943–6981. Rewind–time less than 1 minute per full reel. 2 hours per track at 1⅞ in./sec., ie 4 hours per reel. 1 hour per track at 3¾ in./sec., ie 2 hours per reel.
Frequency Response:	(a) at 7½ in./sec., 40–15 000 Hz ± 3 dB (b) at 3¾ in./sec., 40–10 000 Hz ± 3 dB (c) at 1⅞ in./sec., 40–5000 Hz ± 3 dB
Input Levels and Impedances:	(a) Input, Line Level – Minimum signal 0.150 V r.m.s. Input Impedance 600 ohms. P.O. Gauge 'A' 3 point jack. (b) Input, Mic, Level (selected by means of toggle switch). (1) High Imp. – Input impedance q Megohm – Minimum Signal 0.003 V r.m.s. P.O. Gauge 'A' 3 point jack. (2) Low Imp. – Suitable for 25 ohms microphone. Minimum signal 50/uV r.m.s. P.O. Gauge 'A' 3 point jack.
Output Levels and Impedances:	(a) 600 ohms Line Level – 1 mW into 600 ohms. P.O. Gauge 'A' 3 point jack. (b) Internal Speaker – 2.5 W into 15 ohms. (c) 600 ohms L/S Level – 2.5 W into 600 ohms (as an alternative to (b)). P.O. Gauge 'A' 3 point jack.
Signal to Noise Ratio:	Approx. 50 dB in the range 200–15 000 Hz at 7½ in./sec. Unweighted, including hum, approx. 45 dB.

POWER SUPPLY

100 to 120 V or 200 to 250 V, 50 Hz (with special pulley 60 Hz may be used).
Consumption approx. 100 W.

HANDBOOK

BR 2395

ESTABLISHMENT LIST

E1379

INSTALLATION SPECIFICATION

Not issued

RECORDING OUTFIT REJ

REJ

SUMMARY OF DATA

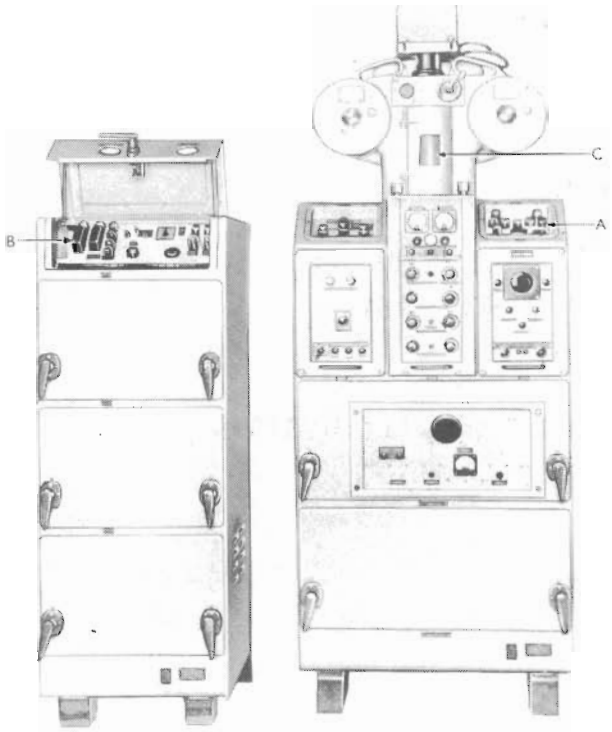
PURPOSE

Provides facilities for recording on film the video response from radars (such as Types 960, 982, 984, 978, 293, 277) which have a continuously rotating aerial, together with facilities for simultaneous recording on tape of relevant audio information. Playback of film can be made to Displays (such as JE, JC, JZA, JG40, JDA) with synchronised playback of tape.

BRIEF DESCRIPTION

Record — Radar video is used to intensity modulate a small C.R.T., whilst radar aerial drives the film continuously past the C.R.T. screen. A series of Type B pictures having no gaps between them is thus produced on the film. Radar aerial also drives the tape in synchronism with the film by means of the Master Drive Unit.

Playback — The same C.R.T. scans the positive film, and resulting video is fed to displays, together with a sync-pulse and rotation.



RECORDING OUTFIT REJ

MAJOR UNITS

(A) AP 63959 Cabinet Design 126. (Operational Cabinet).

(B) AP 63967 Cabinet Design 127. (Power Cabinet).

(C) AP 63954 Film Unit.

PHYSICAL DATA

	Height	Breadth	Depth	Weight
Cabinet Design 126	72 in.*	26½ in.	22 in.	490 lb*
Cabinet Design 127	62 in.θ	18½ in.	22 in.	405 lb*

*Including associated units.

θWith lid open, as illustrated.

PERFORMANCE

The equipment will give a realistic reproduction of the radar display, but due to photographic processes some increase of contrast and degradation of echo characteristics may be expected, particularly with short range or other high discrimination sets.

POWER REQUIREMENTS AND CONSUMPTION

Power Supplies	115-230-440 V a.c. 50-60 Hz single-phase	1.2 kW
	220 V d.c.	1.1 kW (peak)
	180-200 V a.c. 400-500 Hz single-phase	400 W
	24 V d.c.	288 W (peak, when 'M' type transmission is in use)
Anti-condensation heaters	115-230 V a.c.-d.c.	200 W

HEAT DISSIPATION

Cabinet Design 126	500 W
Cabinet Design 127	1 kW

REMARKS

Ancillary equipment is AP 70958 Aerial Simulator and AP 71046 Pulse Shaping Unit (used only in conjunction with Type 984/C.D.S. equipments), also AP 62862 Remote Control Unit and a radar selector switch.

HANDBOOK

BR 1168

ESTABLISHMENT LIST

E1117

INSTALLATION SPECIFICATION

8857

RECORDING OUTFIT REO

REO

SUMMARY OF DATA

PURPOSE

General purpose, portable, magnetic-tape recording outfit, for use in HM Ships and Shore Establishments, superseding Outfit REH(5).

Available to Frigates and above and in Submarines.

TECHNICAL DATA

1. A four-track system.
2. Suitable for both stereo and mono recording and playback.
3. Suitable for duoplay and multiplay.
4. Three tape speeds, 4.75, 9.5 and 19 cm/sec.
5. Frequency Response

   At 19 cm/sec 40 Hz to 18 kHz within 6 dB
   At 9.5 cm/sec 40 Hz to 15 kHz within 6 dB
   At 4.75 cm/sec 40 Hz to 8 kHz within 6 dB
6. Suitable for tape reels from 8 to 18 cm diameter.
7. Fast winding and re-winding: 540 m of tape in less than 200 sec.
8. Suitable for ambient temperatures from 15-45 °C.
9.

Four Inputs	Four Outputs
Microphones	Internal loudspeaker
Radio	Radio, or Record Player
Record Player	Headphones
Telephone Coil	External loudspeakers

10. Maximum playing time, 4 x 4 hours with 18 cm reels and double-play tape.

PARTS KIT

Parts Kit, Recorder Unit 5835-99-522-5760 together with two common user items constitute Outfit REO (a total of 12 items of which 7 are spare parts).

MAIN ITEMS OF OUTFIT REO

1.	5835-99-522-5759	Recorder, Reproducer, Sound (includes a Microphone and Recording Lead)
2.	5835-99-522-6567	Lead, Recording (5-pin plug at one end, 'tails' at the other)
3.	5835-99-971-7012	Tape, Magnetic Recording (6 per outfit)
*4.	5935-99-110-2004	Plug, Electrical, 3-pin 5 A
*5.	5935-99-940-1759	Plug, Telephone

(*Common User Items)

PHYSICAL DIMENSIONS

49.6 cm x 40.7 cm x 22.9 cm Weight 19.5 kg

POWER SUPPLY

Adjustable to mains a.c. voltages of 110 (100–120), 127 (120–130), 220 (200–230) and 245 (235–250) volts, 50 or 60 Hz.

POWER CONSUMPTION

50 W

HANDBOOK

BR 4206(2) and BR 4206(5)

ESTABLISHMENT LIST

S1641

INSTALLATION SPECIFICATION

B1092

PROCUREMENT SPECIFICATION

80318

RECORDING OUTFIT REP(1) AND REP(3)

REP(1)
REP(3)

SUMMARY OF DATA

PURPOSE

General purpose recording equipment. Outfit REP(3) has a redesigned tapedeck but is otherwise similar to Outfit REP(1).

DESCRIPTION

Recording Outfit REP is a four-speed twin-channel solid state transportable tape recorder for high fidelity mono and stereophonic recording and reproduction of sound. It is capable of recording or replaying on both channels simultaneously, or recording on one channel while replaying on the other. Included are facilities for remote control of Start and Stop functions and photo-electrical indication of approaching end of tape.

MAIN SUB-UNITS

5835-99-523-8550	Recorder (REP 3)
5835-99-520-6809	Recorder (REP 1)
AP 65339	Exchange Unit
AP 62636	Rack Stowage Des. 17
AP 62637	Rack Stowage Des. 18

DIMENSIONS

	Height	Width	Depth	Weight
Recorder	25.4 cm 10 in	50.8 cm 20 in	50.8 cm 20 in	44 kg 97 lb
Exchange Unit	15.8 cm 6¼ in	25.4 cm 10 in	19.1 cm 7½ in	–
Rack Des. 17	41.2 cm 16¼ in	21.6 cm 8½ in	15.2 cm 6 in	–
Rack Des. 18	36.8 cm 14½ in	22.8 cm 9 in	8.8 cm 3½ in	–

ELECTRICAL CHARACTERISTICS

Tape : The magnetic tape used is 0.246 in. (6.25 mm) wide and of the following thicknesses:

Standard	0.002 in (0.05 mm)
Long play	0.0015 in. (0.038 mm)
Extra long play	0.001 in. (0.025 mm)

Recording is on two tracks each of 0.080 in. (2 mm) nominal width

Tape Spool Diameter: : Maximum 8¼ in (209.5 mm)
Minimum 3 in (76.3 mm)

Running Time : Tape speeds and running time for a 1200 ft (365 metre) tape are:

15 in/s (38.1 cm/s)	15 minutes
7.5 in/s (19.05 cm/s)	30 minutes
3.75 in/s (9.53 cm/s)	1 hour
1.875 in/s (4.775 cm/s)	2 hours

Input Sensitivity:	(a) 600 ohm line input (i) When preset to Remote – 1 mW for reference recording level (ii) Variable ± 6 dB for reference recording level (b) Fixed Microphone input – either 3 mV r.m.s. into 20 kilohm or 1 mV r.m.s. into 2 kilohm for a noise cancelling microphone
Output Level:	Into 600 ohm. (a) When preset to Remote – 1 mW for reference recording level (b) Variable – ± 6 dB for reference recording level
Peak Programme Meters (2):	When switched to Record or Replay a reading of 0 dB indicates reference recording level.
Record/Replay Frequency Response:	Using good quality tape 15 in./s (38.1 cm/s) 40 Hz to 18 kHz ± 3 dB 7.5 in./s (19.05 cm/s) 40 Hz to 10 kHz ± 3 dB 3.75 in./s (9.53 cm/s) 40 Hz to 6 kHz ± 3 dB 1.875 in./s (4.775 cm/s) Adequate speech quality
Wow and Flutter:	Measured on r.m.s. reading instrument. 15 in./s (38.1 cm/s) 0.10% 7.5 in./s (19.05 cm/s) 0.15% 3.75 in./s (9.53 cm/s) 0.20% 1.875 in./s (4.775 cm/s) 0.25%
Signal to Noise Ratio:	50 dB per channel reference maximum recording level

POWER SUPPLY

100–125 V or 200–250 V a.c., 50 or 60 Hz
Power consumption – Record/Replay 110 W
Spooling 170 W

HANDBOOK

BR 4141

ESTABLISHMENT LIST

S1607

COMMERCIAL EQUIVALENT

Hartley Electromotives Model TS4301 (Outfit REP(1))

PROCUREMENT SPECIFICATION

ASWE No. 27452

INSTALLATION SPECIFICATION

B1128/PRE.1

SHIPBORNE TELEMETRY AND RECORDING OUTFIT MBA MBA

SUMMARY OF DATA

PURPOSE

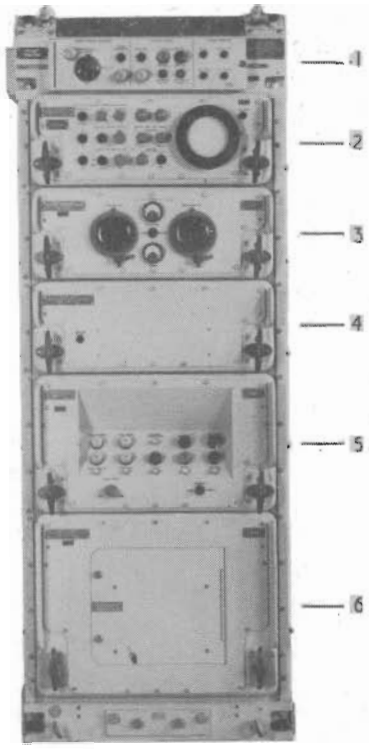
Reception of telemetry signals transmitted from an Inter Service 24-channel Telemetry Sender fitted in a Seaslug missile and the recording of the sub-carrier waveform on magnetic tape for post flight analysis in Outfit MBN. A 24-channel test signal and monitoring facilities are also provided for system checking.

BRIEF TECHNICAL DESCRIPTION

24-channel telemetry signals, time division multiplex (T.D.M.) modulated on a carrier in the band 432.5-460 MHz are received by the associated aerial (Outfit AJH) and fed to a superheterodyne receiver which extracts the F.M. sub-carrier waveform. A.F.C. and A.G.C. circuits ensure a stabilised output.

The sub-carrier waveform is reduced in frequency for recording purposes and amplitude modulation is suppressed. Recorded signals may be monitored during recording or by playing back, the reduced waveform being converted into a d.c. waveform (histogram) by a discriminator and filter circuit.

A timing ruler and drone timing signal are generated and fed to frequency modulators for recording on two of the seven tracks of the magnetic tape recorder. Discriminator and filter circuits permit monitoring during recording or playback. Tape protection and tension controlling circuits ensure consistent recording and replay speeds, with automatic stop when the end of the tape is reached. Pod camera timing signals transmitted to the drone target aircraft are also recorded and monitored.



CABINET, TELEMETRY RECEIVING AND RECORDING

MAJOR UNITS

Item No.	Pattern No.	Description	Physical Data			
			Height	Width	Depth	Weight
1	5820-AP 164367	Cabinet, Telemetry, Receiving and Recording	5 ft 5 in.	2 ft	2 ft 3 in.	835 lb
2	5820-AP 164368	Monitor, Telemetric Data				
3	5820-AP 164369	Receiver, Telemetric Data				
4	5820-AP 164371	Amplifier Modulator Assembly				
5	5820-AP 164372	Power Supply				
6	5820-AP 164370	Recorder, Telemetric Data				
7	5820-AP 186266	Aerial, UHF				
8	5985-AP 186264	Aerial, UHF				
9	5985-AP 186265	Pedestal, Aerial				

Items 2-6 are contained in Item 1; the weight of Item 1 is inclusive.
Items 8 and 9 are part of Aerial Outfit AJH.

POWER REQUIREMENTS

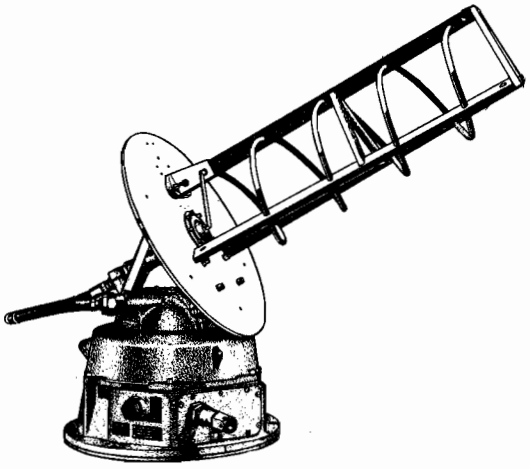
115 V 60 Hz 1 Ø 1 kW (Receiver and Timing Generator)
115 V 60 Hz 1 Ø 125 W (Anti-condensation Heater)

HEAT DISSIPATION

1 kW

ASSOCIATED AERIAL OUTFIT

Aerial Outfit AJH. This comprises a 4-turn helix mounted on a pedestal which can be remotely trained through 360° in azimuth (but not continuously) at a fixed elevation of 30° or 45°. The aerial has a power gain of 8 dB and is circularly polarised with a 60° beamwidth which makes stabilisation unnecessary. The helical array gives a wide bandwidth viz 432.5-460 MHz, ie the frequency coverage of the receiver.



AERIAL OUTFIT AJH

HANDBOOK

BR 2219(1) and (2) Handbook for Shipborne Telemetry Receiver and Recording Outfit MBA and Aerial Outfit AJH.

ESTABLISHMENT LIST

E1264

INSTALLATION SPECIFICATION

Preliminary information contained in ASWE Publication M.5145/60/IX3 Appendix E.

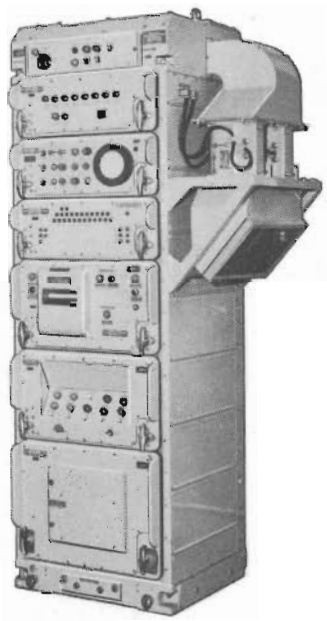
TELEMETRY PLAYBACK, DECODE AND DISPLAY OUTFIT MBN

MBN

SUMMARY OF DATA

PURPOSE

Analysis of the telemetry signals received from an inter-service 24 channel Telemetry Sender fitted in a SEASLUG Missile. The equipment is fitted ashore and converts the magnetic tape record obtained by the ship into a paper chart record which can be used for analysing missile performance.



CABINET, TELEMETRY PLAYBACK DECODE

BRIEF TECHNICAL DESCRIPTION

The ships magnetic tape record is played back through an identical tape recorder in Outfit MBN. The sub-carrier signal is passed through a frequency discriminator so that the original voltage levels fed into the 24 channel sender switch are recovered. The 24 channels are separated by a de-multiplexing circuit and can be selected as required for recording on paper. This is done by an 8 channel mirror galvanometer which reflects ultra-violet light on to a light sensitive paper, producing a dark trace, the deflection of which is proportional to the telemetered data on the channel.

MAJOR UNITS

Item No.	Pattern No.	
1	5820-AP 16442	Cabinet, Telemetry Playback, Decode and Display
2	5820-AP 164368	Monitor Telemetric Data
3	5820-AP 164888	Power Supply (De-multiplexer)
4	5820-AP 164445	De-multiplexer Telemetric Data
5	5820-AP 164444	Indicator Galvo Recorder
6	5820-AP 164372	Power Supply
7	5820-AP 164370	Recorder Telemetric Data

POWER REQUIREMENTS

115 V 60 Hz single phase 3 A

PHYSICAL DATA

	Height	Depth	Width	Weight
Cabinet, Telemetry Playback, Decode and Display	5 ft 5 in.	2 ft 3 in.	2 ft 10½ in.	410 lb

NOTE: Items 2-7 are contained in Item 1.
The weight of item 1 is exclusive of drawer assemblies.

HANDBOOK

BR 2299(1)(2)

ESTABLISHMENT LIST

E1372

INSTALLATION SPECIFICATION

SECTION 5

CONTENTS LIST

Control Outfit KHH
Control Outfit KHJ
Control Outfit KHK (see Types 619/623 - Section 1) (To be issued later)

Control Outfits KMM(1-6) (To be issued later)
Control Outfit KMM(7) (To be issued later)
Control Outfit KMP (To be issued later)

Guidance and Control Outfit MAA
Control and Termination Outfits EUA Series

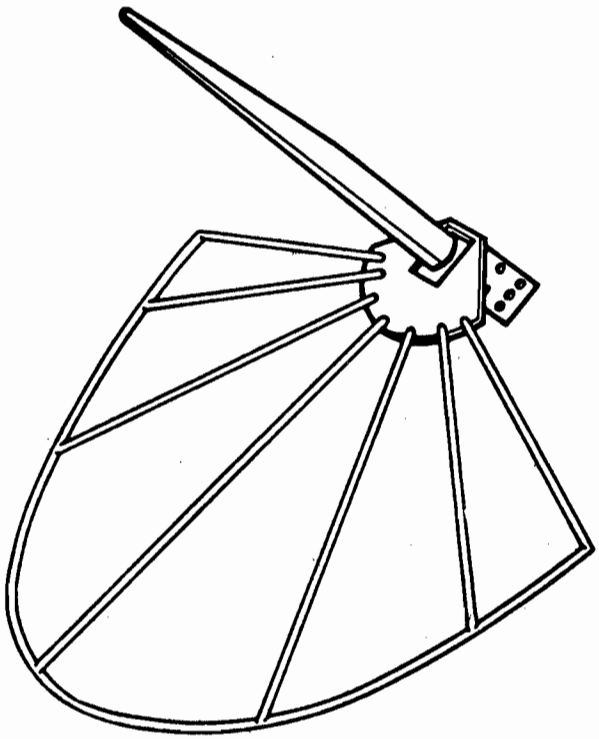
AERIAL OUTFIT ACH

SUMMARY OF DATA

ACH

PURPOSE

A VHF aerial for mounting on a yard arm or spur.



MAJOR UNITS

AP 186034 Aerial
AP 61338 Junction Box

BRIEF DESCRIPTION

A ground-plane, quarter-wave monopole, normally mounted to accept both vertically and horizontally polarised radiations.

FREQUENCY BAND

27–100 MHz

WEIGHT

Aerial	60 lb
Junction Box	7 lb

IMPEDANCE

75 ohm nominal

HANDBOOK

BR 1610

ESTABLISHMENT LIST

E1240

INSTALLATION SPECIFICATION

B876

AERIAL OUTFIT AGG

AGG

SUMMARY OF DATA

PURPOSE

Aerial Outfit AGG provides a free standing HF Broadband transmitting aerial designed to cover a frequency range of 8 to 24 MHz for use when suitable ships structure is not available.

BRIEF DESCRIPTION

The outfit consists of a pedestal which supports a 25 foot high insulated tubular mast fitted with spreaders to accommodate wire rigging in a bi-conical form. The aerial is held erect by six radial stay wires, and prevented from rotating by two pairs of crossed over stay wires, all of which terminate on a pitch circle of approximately 9 ft diameter. The mast may be toppled over about a hinge fitted in the pedestal.

Feeder Connectors. Three alternative entries are provided, anyone of which may be fitted with a Gland Assembly AP 71276 to accept Pyrotenax cable AP 180382 terminating or with a cover accepting a Plug 5935-99-580-1685 Flexwell cable. Blank plates are provided for the two unused positions.

Protection. A non-metallic personnel protection barrier (not part of the Outfit) approximately 4 ft high and greater than 9 ft diameter may be sited about the aerial.

MAJOR COMPONENTS

The major components of the outfit are provided in three packages which have the following pattern numbers:-

AP 186518 AP 186519 AP 186520

DIMENSIONS (erected)

Height 26½ ft Diameter 9 ft (approx.) Weight 110 lb

HANDBOOK

BR 2420

ESTABLISHMENT LIST

E 1254

INSTALLATION SPECIFICATION

B 943

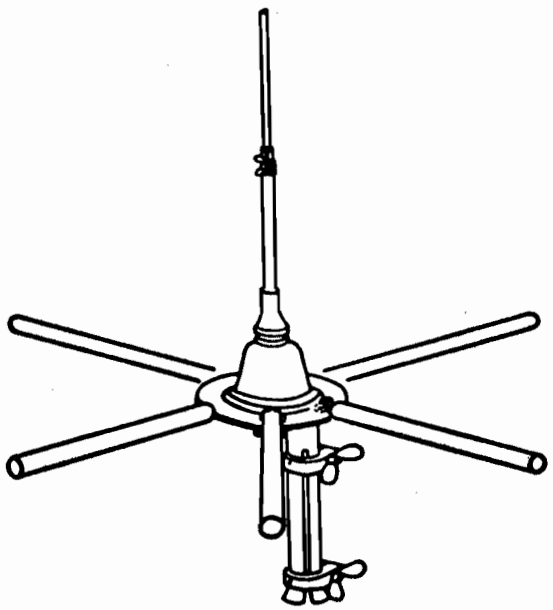
AERIAL OUTFIT AGT

SUMMARY OF DATA

AGT

PURPOSE

A VHF aerial for mounting on a 78 ft mast.



MAJOR UNITS

A.M. 10B/1490 Aerial Type 220A

BRIEF DESCRIPTION

A ground-plane, quarter-wave monopole. The radiating element may be adjusted in length to suit the frequency in use. Normally for vertically polarised radiation.

FREQUENCY BAND

100-156 MHz

WEIGHT

Aerial 12 lb

IMPEDANCE

45 ohm nominal

HANDBOOK

BR 1610

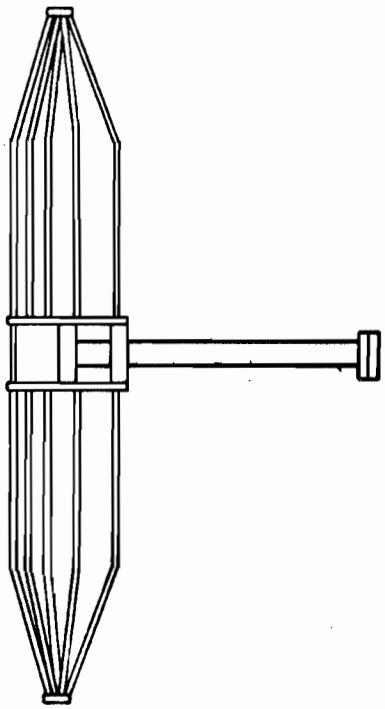
ESTABLISHMENT LIST

E702

AERIAL OUTFIT AJD

SUMMARY OF DATA

AJD



PURPOSE

A VHF aerial for mounting in groups of 4 on a yard arm or spur.

MAJOR UNITS

AM 10B/2455	Aerial Dipole Type 24
AP 61338	Junction Box
AP 53300B	Extension Tube

BRIEF DESCRIPTION

A broadband, half-wave dipole, containing a built-in balancing unit of the sheath type, normally for vertically polarised radiation. Equates with AGR/AGS which are used ashore.

FREQUENCY BAND

100-156 MHz

WEIGHT

Aerial	13.5 lb
Extension Tube	19.0 lb
Junction Box	7.0 lb

IMPEDANCE

75 ohm nominal

HANDBOOK

BR 1610

ESTABLISHMENT LIST

E1046

INSTALLATION SPECIFICATION

B876

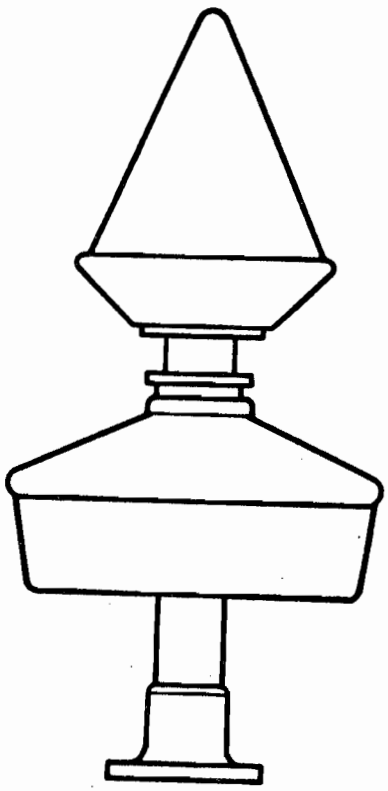
AERIAL OUTFIT AJE(5)

SUMMARY OF DATA

AJE

PURPOSE

A UHF aerial suitable for ship or shore application and for direct connection to unbalanced feeders.



MAJOR UNITS

5985-99-519-7609	Aerial
AP 61338	Junction Box

BRIEF DESCRIPTION

A broadband, quarter-wave monopole, normally fitted for vertically polarised radiation.

FREQUENCY BAND

225-449 MHz

WEIGHT

Aerial	8¼ lb
Junction Box	7 lb

IMPEDANCE

75 ohm nominal

HANDBOOK

BR 1610

ESTABLISHMENT LIST

E1558

INSTALLATION SPECIFICATION

B1032

AERIAL OUTFIT AJP AJP

SUMMARY OF DATA

PURPOSE

Aerial Outfit for use in Improved VALIANT Class Submarines as a combined HF/UHF Communication aerial, and for NAVAID reception.

BRIEF DESCRIPTION

Aerial Outfit AJP is part of a telescopic mast assembly that may be used when the submarine is either surfaced or at periscope depth. On the mast assembly, which is raised by hydraulic ram hoists in a fashion similar to that used for raising a periscope, the UHF aerial surmounts the HF aerial.

HF

HF working is possible only when the mast is fully raised, since only then will the aerial feeder line be completed.

UHF AND NAVAIDS

UHF working and NAVAID reception is possible with the mast in any position.

WEIGHTS

AJP(1) 2 ton 8 cwt
AJP(2) 3 ton

HANDBOOK

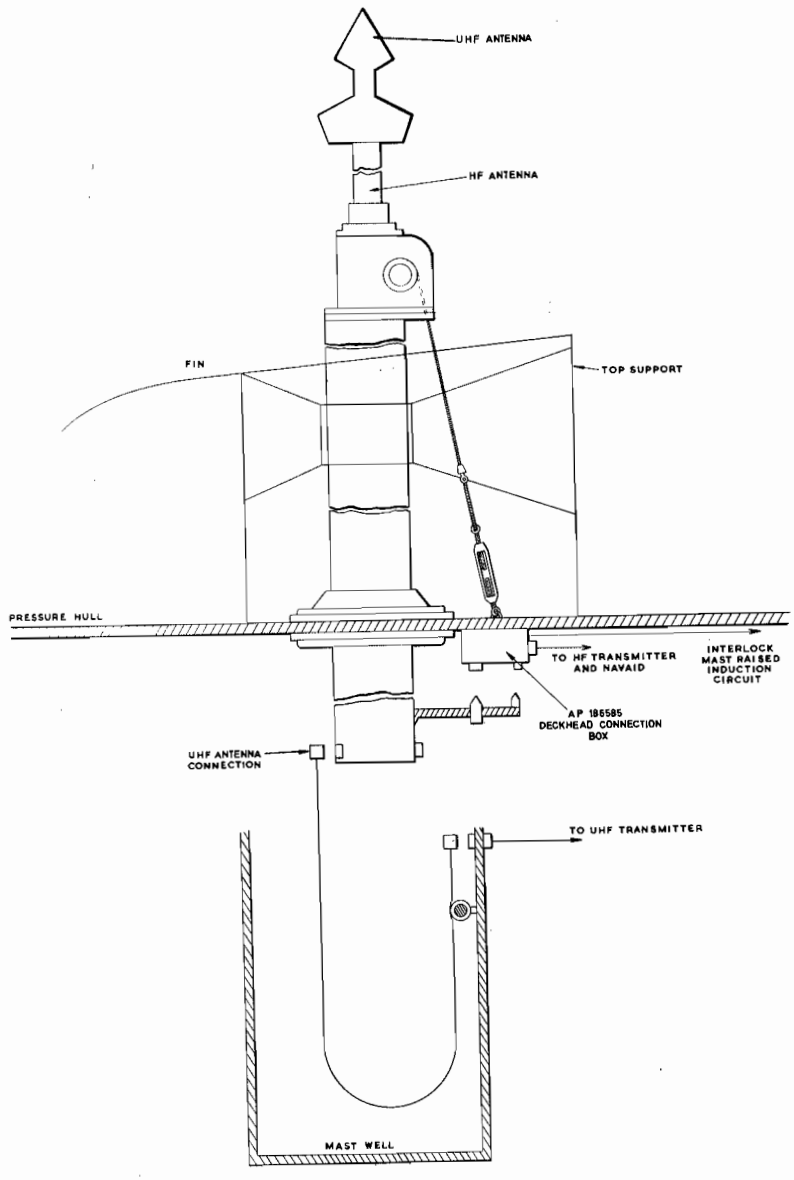
BR 2923

ESTABLISHMENT LIST

S1549

INSTALLATION SPECIFICATION

B1183



TYPE 609

609

SUMMARY OF DATA

PURPOSE

Type 609 equipment is fitted into the existing submarine indicator buoys to enable them to transmit radio distress signals as well as the flashing light signal.

BRIEF DESCRIPTION

Each Indicating Unit is a cylindrical, pressure-tight (550 lb/sq.in) container housing the transmitting unit, timing mechanism, light-pulser, batteries and ancillary items. The radio aerial assembly, light dome and ON/OFF seal mechanism are mounted on the top cover. The hinged whip aerial is automatically erected when the buoy is released and this action switches on the Unit.

The transmitter consists of a 4.34 MHz crystal-controlled master oscillator driving a power output stage comprising four neutralised triodes in parallel. A 1350 Hz (± 30%) tone generator grid-modulates the power amplifier stage to produce a modulation depth of 65%, and the output power is 30 mW at 4.34 MHz. Automatic keying is provided by the Timing Unit which combines a spring-driven clock movement with a cam system driven by an electric motor. The sequence of operations, which repeats over a 10 min. cycle, is as follows:-

1.	Identification No. eg '001'	3 times in 30 secs.
2.	Distress Call 'S O S'	6 times in 30 secs.
3.	Codeword 'SUBSUNK'	3 times in 30 secs.
4.	D.F. Transmission Long Mark	Lasting for 30 secs.
5.	Repeat 1-4	
6.	Silent period of 6 mins.	

The Indicating Unit will operate from approx. 37 hr. in bad weather conditions up to 60 hr in good weather. The range is approx. 50 miles and may be increased up to 200 miles under favourable propagation conditions. For d.f. purposes, the short distance ground wave range is 20 miles.

The Light-pulser Unit is a separate electromechanical device which flashes the light at one second intervals for at least 60 hours.

The Monitoring Unit consists of a long tube which can be clamped into position over the whip aerial to enable functional monitoring of the Indicating Unit to be carried out without radiating r.f. signals. The signal is picked up by an internal probe which feeds a tuned circuit, rectifier and meter. Meter readings give an indication of radiated power and correct keying.

TYPE 609 FITTED IN SUBMARINE BUOY

MAJOR UNITS

		Quantity
AP 61764	Indicating Unit for Submarine Buoy (Radio and Light)	3
AP 61784	Monitor Unit, Des. 18	1

NOTE: Two indicating Units are installed in buoys in each submarine (fitted fore and aft) and the third is retained in the depot ship as a spare. Each of these Units comprises the following sub-units:-

-	Radio Transmitting Unit	1
AP 61765	Container, aluminium	1
AP 61766	Cover assembly for AP 61765 Container	1
AP 61767	Aerial Unit, Des. 46	1
AP 61769	Timing Unit	1
6135 - 101109	Battery, dry, 3 V (for Light)	4
AP 14245	Battery, Mallory type (for Radio)	1
AP 17243	Light-pulser Unit	1

PHYSICAL DATA

Diameter of cylindrical container (excluding flange)		9¾	in
Length of container to the hinge centre line		2 ft 6	in
Length of aerial (tip of the whip to end of feeder)		5 ft 9	in
Position of centre of gravity	Approx	1 ft 3	in below flange.
Total weight (including 13 lb of internal ballast)		90	lb

POWER SUPPLIES

Radio Transmitting Unit: Mallory Type battery rated at 120 V, 150 mA; 4 V, 330 mA; −16 V, 0.144A.
Light-pulser Unit: 4 x 3 V dry batteries.

HANDBOOK

BR 2182(1958)

ESTABLISHMENT LIST

E1112

INSTALLATION SPECIFICATION

B839

AERIAL OUTFIT ALE

ALE

SUMMARY OF DATA

PURPOSE

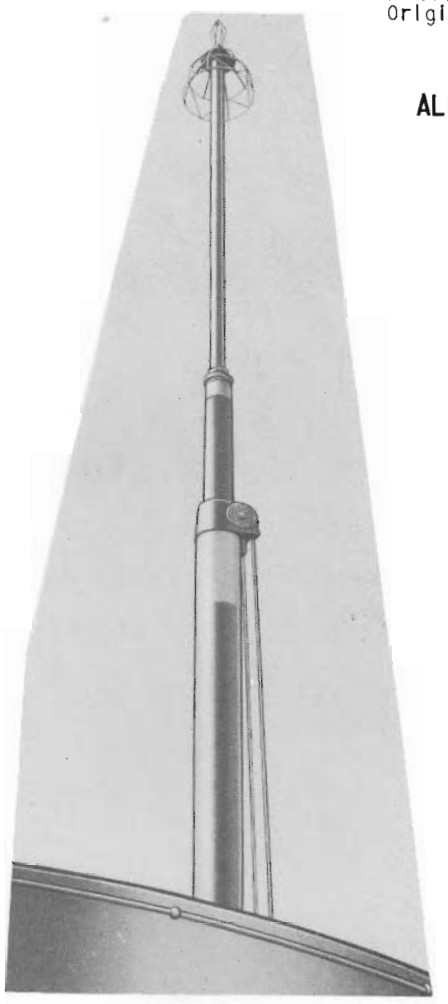
Retractable H.F. and V.H.F. transmitting and receiving aerial for submarines. Can be used with submarines either surfaced or at periscope depth. Suitable for simultaneous H.F. and V.H.F. operation.

FREQUENCY RANGE

H.F. 1.5 to 24 MHz
V.H.F. 100 to 156 MHz

BRIEF DESCRIPTION

The aerial outfit consists of telescopic stainless steel tubes, two insulated sections of which comprise an H.F. and V.H.F. aerial respectively. The aerial mast is raised by means of a hydraulic ram. At periscope depth, with the mast fully raised, the top of the V.H.F. aerial is 20 ft above the surface of the sea. H.F. reception and transmission are only possible when the mast is fully raised, but V.H.F. operation is possible whether the mast is fully raised or not. Associated with the aerials are concentric air dielectric feeder systems. The V.H.F. aerial is mounted on top of the H.F. aerial, and is a conical monopole with a skirt-shaped counterpoise. An "isolator unit" is fitted in the W/T office.



MAJOR UNITS

AERIAL OUTFIT ALE

AP No.	Description	Weight
67000	V.H.F. Aerial	Total weight of moving parts (lifted out for maintenance) 2 tons 13 cwt.
67001	Aerial Counterpoise	
67152A or 61312A	Main Mast Assembly (including Junction Box AP 67078 and Feeder Connector, hinged AP 67002)	
67003	Connector, H.F., V.H.F. (Trunk)	
67004	Connector, V.H.F. (Travelling)	
67005	Isolator Unit	35 lb
67156	Guide channel and bearing support Assembly including vertical shaft	202 lb
61592	Connection, flexible, 20' with 2 plugs	
68667	Weight, tensioning for AP 61592 connection	

NOTE: Pattern 67152A is fitted in "T" Class Conversion Submarines and Pattern 61312A in "Porpoise" Class.

HANDBOOK

BR 2183(1)(2)

ESTABLISHMENT LIST

E 1014

INSTALLATION SPECIFICATION

B 727

AERIAL OUTFIT ALF ALF

SUMMARY OF DATA

PURPOSE

Aerial Outfit ALF is a loop aerial system for the frequency range 15 to 550 kHz designed for use in certain submarines in conjunction with Receiver Outfit CDY (Receiver B41). The two loops are designed for fitting within the submarine's fin; one, the Port-Starboard loop, being fitted at the after end and the other, the Fore-Aft loop, being fitted at the forward end. In some submarines, the forward loop (F-A loop) is wound in two halves installed in each side of the fin; the inner ends of the two halves being connected together by means of a Pattern 67750 Plug and Pattern 67749 Socket.

COMPONENT ITEMS

Loop aerial having turns lying fore and aft (F-A loop) with tail leads.

Loop aerial having turns lying athwartships (P-S loop) with tail leads.

Pattern 68664 Loop Coupling Unit 9 in by 9½ in by 13 in weight 33 lb

Junction box, two way, Pattern 4881 (2 in number)

Feeder cables Pattern 13806

FREQUENCY RANGE

15 to 550 kHz	selecting either F-A loop or P-S loop. This is covered in 5 sub-ranges corresponding with those of Receiver B41 of Outfit CDY.
15 to 20 kHz	using both loop aerials so as to provide reception on all relative bearings.

POWER REQUIREMENTS OF COUPLING UNIT

230 volt 50 Hz single phase 30 watts

HANDBOOK

BR 1163

ESTABLISHMENT LIST

E 1039

INSTALLATION SPECIFICATION

B 726

AERIAL OUTFITS ALK(2)/(3) ALK

SUMMARY OF DATA

PURPOSE

Buoy mounted Outfits for the reception of VLF/LF transmissions, navigational or broadcast.

FREQUENCY RANGE

10 - 40 kHz ALK(2)
10 - 200 kHz ALK(3)

BRIEF DESCRIPTION

The buoy is streamed from the submerged submarine to any required depth. The Antenna and Head Amplifier are mounted in the buoy. Signals are passed from the amplifier to Aerial Control and Termination Outfit EUA(1)/(2)/(3) in the submarine. The antenna consists of two loops giving port/starboard (P/S) or fore/aft (F/A) Coverage.

MAJOR UNITS

	ALK(2)	ALK(3)
Antenna Assembly	5895-99-519-8937	5985-99-924-5073
Antenna Sub-Assembly	5985-99-521-3312	-
Amplifier, Head	5985-99-519-7947	5895-99-972-4077
Pressure Transducer	5895-99-519-1176	-
Cable Assembly	5995-99-924-7736	5895-99-972-4076

OPERATING MODES

Outfit ALK(3) has two modes of operation, dependent on depth.

(a) BROAD-BAND mode. At depths between 0 and 25 ft the outfit operates in the VLF/LF band, 10-200 kHz.

(b) VLF Mode. With increasing depth, auto switching occurs at 25 ft to give operation in the VLF band 10 - 40 kHz. Manual switching is also available.

HANDBOOK

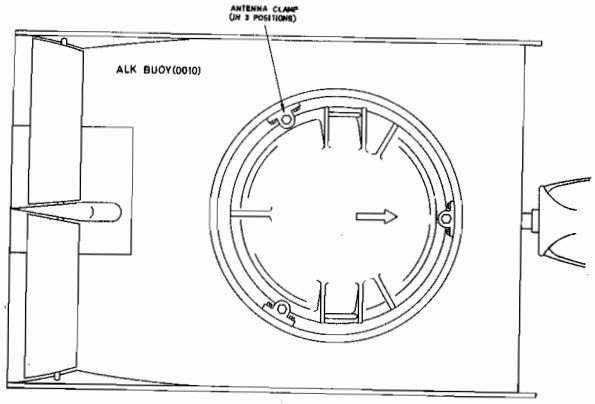
BR 2475

E LIST

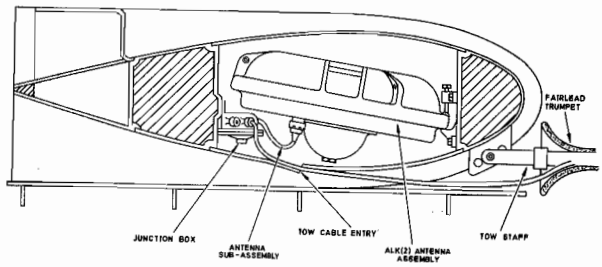
1286

INSTALLATION SPECIFICATION

B1147 - ALK(3)
B916(R2) - ALK(2)

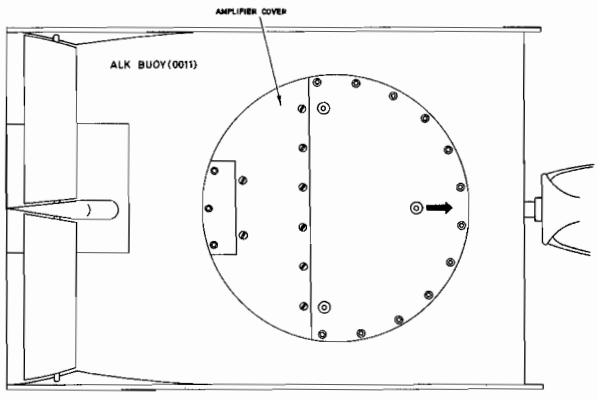


TOP VIEW (ANTENNA COVER REMOVED)

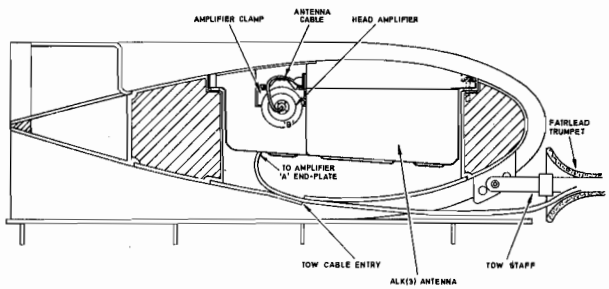


SIDE VIEW (BUOY SHOWN IN SECTION)

ALK(2) IN 0010 BUOY
GENERAL ARRANGEMENT



TOP VIEW



SIDE VIEW (BUOY SHOWN IN SECTION)

ALK(3) IN 0011 BUOY
GENERAL ARRANGEMENT

AERIAL OUTFITS ALM(1)/(2)

ALM

SUMMARY OF DATA

PURPOSE

Fin-mounted Outfits that can be used on the Surface or when the submarine is not deep enough to stream the buoy outfit. Used to receive VLF/LF transmissions, eg LORAN C at 100 kHz.

FREQUENCY RANGE

10 – 200 kHz.

BRIEF DESCRIPTION

The Antenna and Head Amplifier are mounted in the fin, and a special purpose Cable passes the received signals from the amplifier to Aerial Control and Termination Outfit EUA(1)/(2)/(3) in the submarine. The antenna consists of two ferrite-Cored loops, accurately located at right angles to each other, giving P/S and F/A Coverage. ALM(2) has two pressure transducers: one for depths from 0 to 50 ft, the other from 50 to 800 ft. ALM(1) has only one pressure transducer, from 0 to 50 ft.

MAJOR UNITS

	ALM(1)	ALM(2)
Antenna	5820-99-972-4571	5985-99-519-8547
Amplifier, Head	5820-99-972-4576	5895-99-972-4077
Cable Assy., R.F.	5995-99-520-0899	5995-99-520-0899
or Cable Assy., R.F.	5820-99-972-4572	5820-99-972-4572
Cable Assy., Special Purpose	5895-99-972-4171	5895-99-972-4171

OPERATING MODES

The outfits have two modes of operation, dependent on the depth.

(a) BROAD-BAND Mode. At depths between 0 and 25 ft., the outfit operates in the VLF/LF band, 10 – 200 kHz.

(b) VLF Mode. With increasing depth, auto Switching occurs at 25 ft, to give operation in the VLF band 10 – 40 kHz. Manual Switching is also available.

HANDBOOK

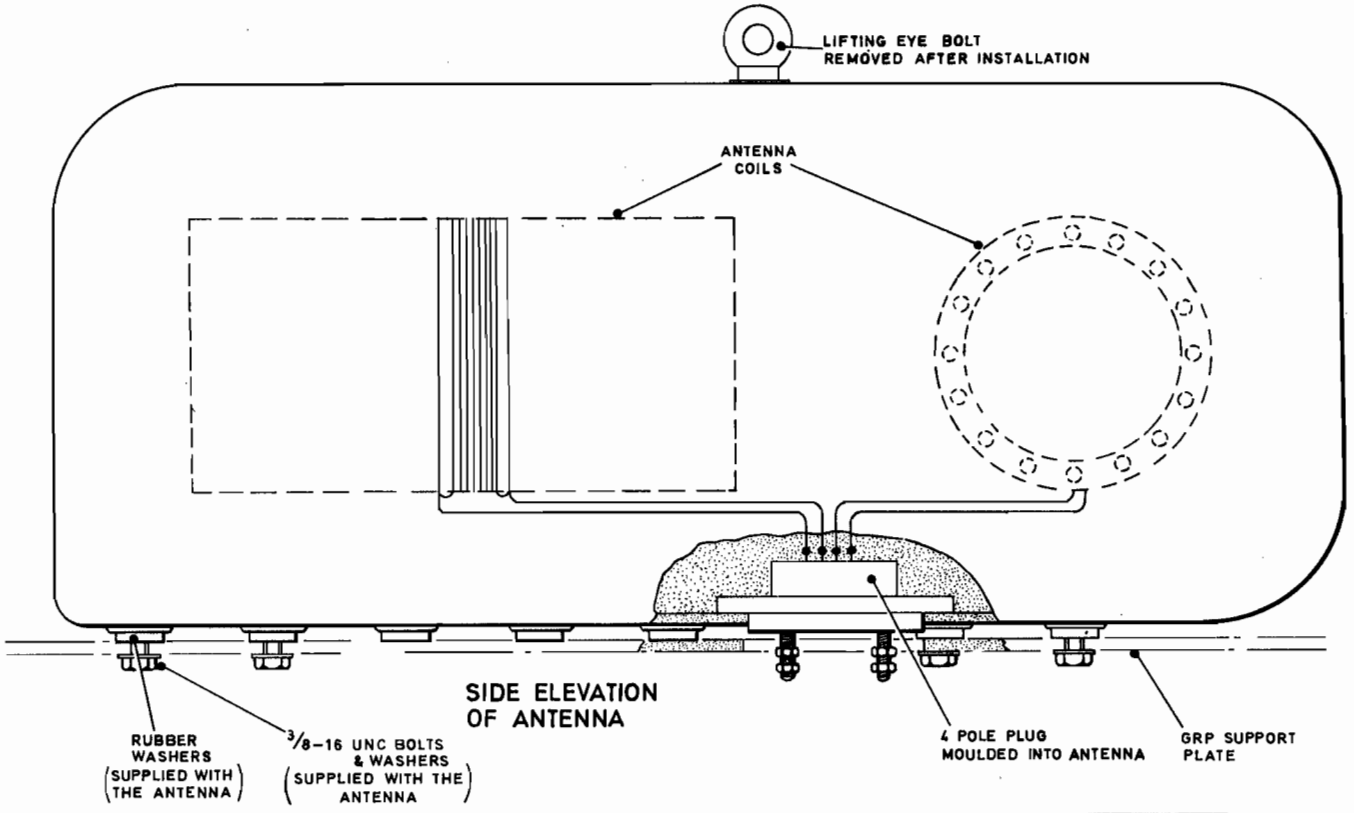
BR 2475

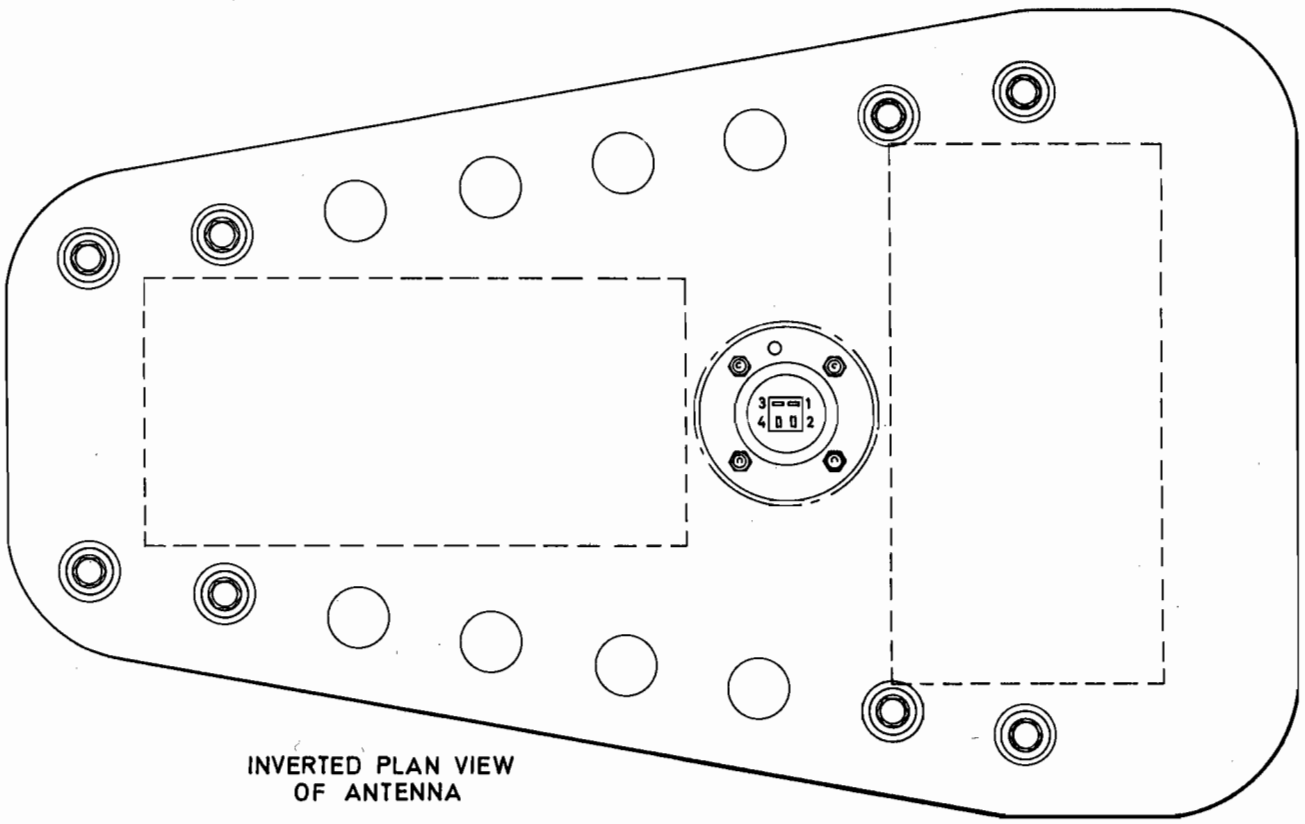
E LIST

1419

INSTALLATION SPECIFICATION

B986





ALM 1 & 2 ANTENNA
GENERAL ASSEMBLY

AERIAL OUTFIT ALN

ALN

SUMMARY OF DATA

PURPOSE

Retractable HF and UHF transmitting and receiving aerial for use in submarines can be used when the submarine is surfaced or at periscope depth. Suitable for simultaneous HF and UHF operation.

FREQUENCY RANGE

HF 2–25 MHz

UHF 225–399.9 MHz

BRIEF DESCRIPTION

The aerial outfit consists of telescopic stainless steel tubes, the upper portion of the top tube forms the HF radiating element; the UHF aerial is mounted on top of the assembly. The aerial mast is raised by means of a hydraulic ram. At periscope depth, with the mast fully raised, the UHF aerial is 20 ft above the surface of the sea. HF transmission and reception are possible only when the mast is fully raised, but, UHF operation is possible with the mast in any position. Associated with the aerials are feeder systems consisting of flexible coaxial uni-radio cable. Alternative UHF aerials are fitted, the type of aerial being dependent upon the class of submarine. An r.f. isolator unit is fitted within the tube assembly.

MAJOR UNITS

Admiralty Pattern Number	Unit	Fitted In Conventional/ Nuclear Submarines
AP 186568	Mast Assembly ALN(1)	Conventional
AP 186569	Mast Assembly ALN(2)	Conventional
AP 186570	Mast Assembly ALN(3)	Nuclear
5985-99-520-9327	Antenna	Conventional
5985-99-520-9327	Antenna	Nuclear
AP 181148	Cable Assembly UHF	Both
AP 186591	Cable Assembly HF	Conventional
AP 186590	Cable Assembly HF	Both
AP 186585	Box Deck head connecting	Both
AP 186596	Plug Assembly HF Crosshead	Both
AP 186580	Isolator Unit RF	Both

WEIGHT

Total weight of the moving parts (lifted out for maintenance) 2 tons 13 cwt approx.

HANDBOOK

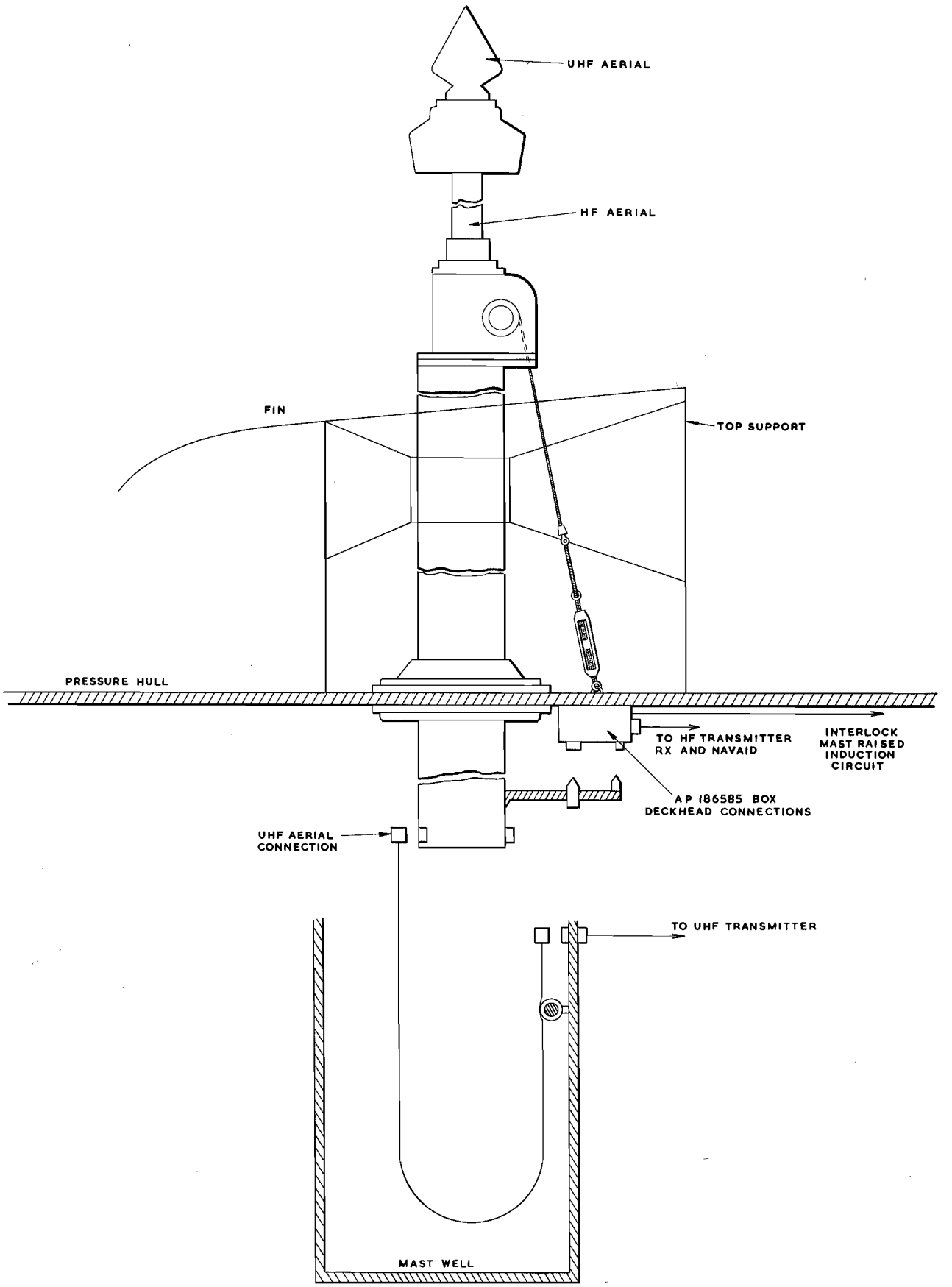
BR 2416

ESTABLISHMENT LIST

E 1407

INSTALLATION SPECIFICATION

B 952



AERIAL OUTFIT ALN
SIMPLIFIED DIAGRAM

AERIAL OUTFIT ALY

ALY

SUMMARY OF DATA

PURPOSE

Fin-mounted Outfit, for the reception of VLF/LF transmissions.

FREQUENCY RANGE

10 – 200 kHz.

BRIEF DESCRIPTION

The antenna is mounted on the fore and aft line of the fin. Signals from the amplifier are passed to Aerial Control and Termination Outfit EUA(3), in the submarine.

MAJOR UNITS

Antenna	5820-99-519-1182
Amplifier, Head	5895-99-972-4077
Cable Assy., R.F.	5995-99-520-0899
Cable Assy., Special purpose	5895-99-972-4171

OPERATING MODES

Two modes dependent on the depth.

(a) BROAD-BAND Mode. At depths between 0 and 25 ft., the outfit normally operates in the VLF/LF range 10 – 200 kHz.

(b) VLF Mode. With increasing depth, auto switching occurs at 25 ft., to give optimum sensitivity in the VLF range 10 – 40 kHz. Manual switching is also available to select the mode most suitable for the reception conditions.

HANDBOOK

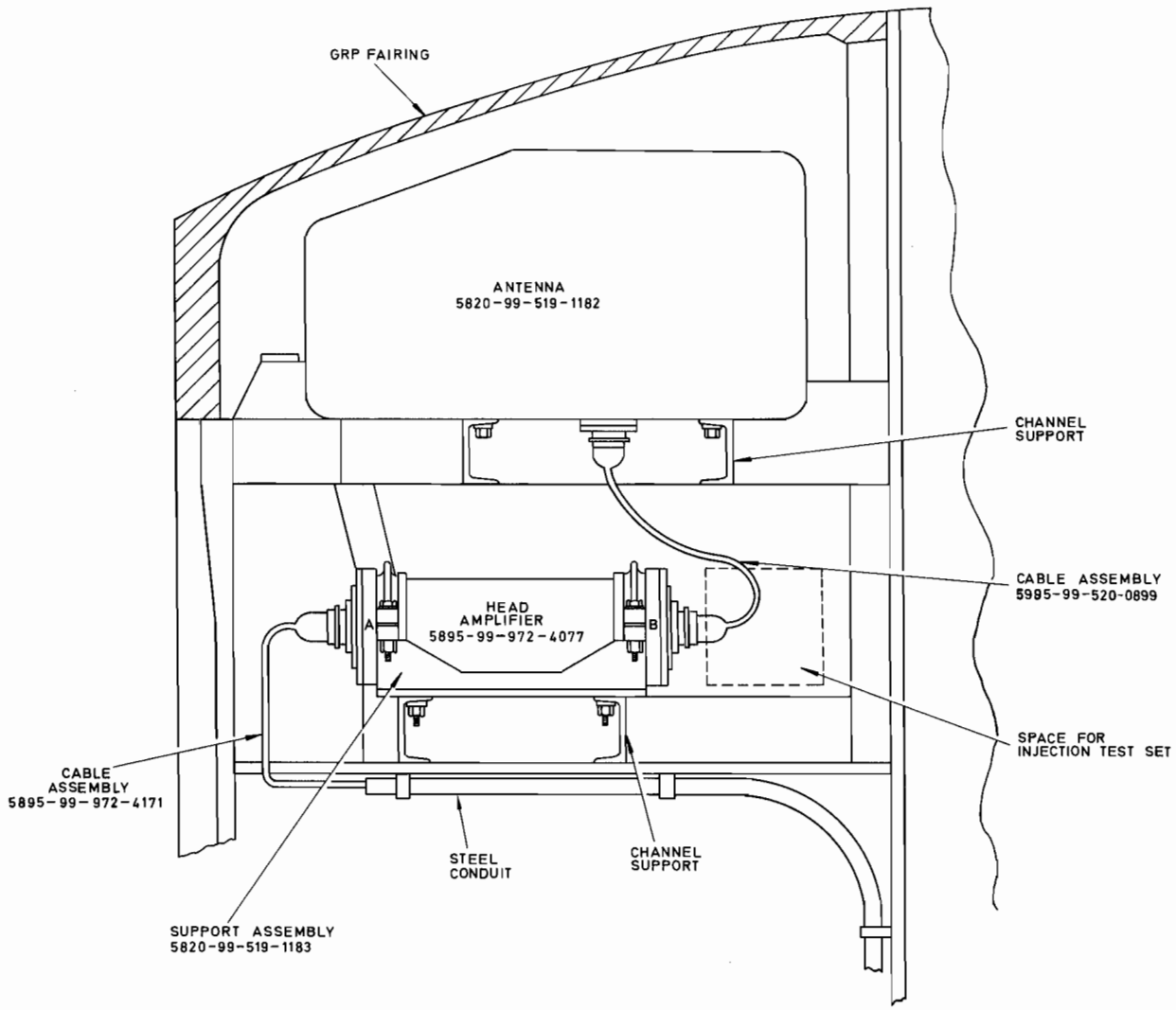
BR 2475

E LIST

1516

INSTALLATION SPECIFICATION

B1039



AERIAL OUTFIT ALY
TYPICAL FITTING ARRANGEMENT

AERIAL OUTFIT ALZ

ALZ

SUMMARY OF DATA

PURPOSE

Fin-mounted Outfit, for the reception of VLF/LF transmissions.

FREQUENCY RANGE

10 – 200 kHz

BRIEF DESCRIPTION

The antenna is mounted on the fore and aft line at the after end of the fin. Signals from the amplifier are passed to Aerial Control and Termination Outfit EUA(3) in the Submarine. The P/S and F/A Signals can be used separately or combined in EUA(3) to give omni-directional coverage.

MAJOR UNITS

Antenna	5985-99-924-5126
Amplifier, Head	5895-99-972-4077
Cable Assembly, R.F.	5995-99-520-0899
Cable Assembly, Special purpose	5895-99-972-4171

OPERATING MODES

Two modes dependent on the depth.

(a) BROAD-BAND Mode. At depths between 0 and 25 ft., the outfit normally operates in the VLF/LF range 10 – 200 kHz.

(b) VLF Mode. With increasing depth, auto switching occurs at 25 ft., to give optimum sensitivity in the VLF range 10 –40 kHz. Manual switching is also available to select the mode most suitable for the reception conditions.

HANDBOOK

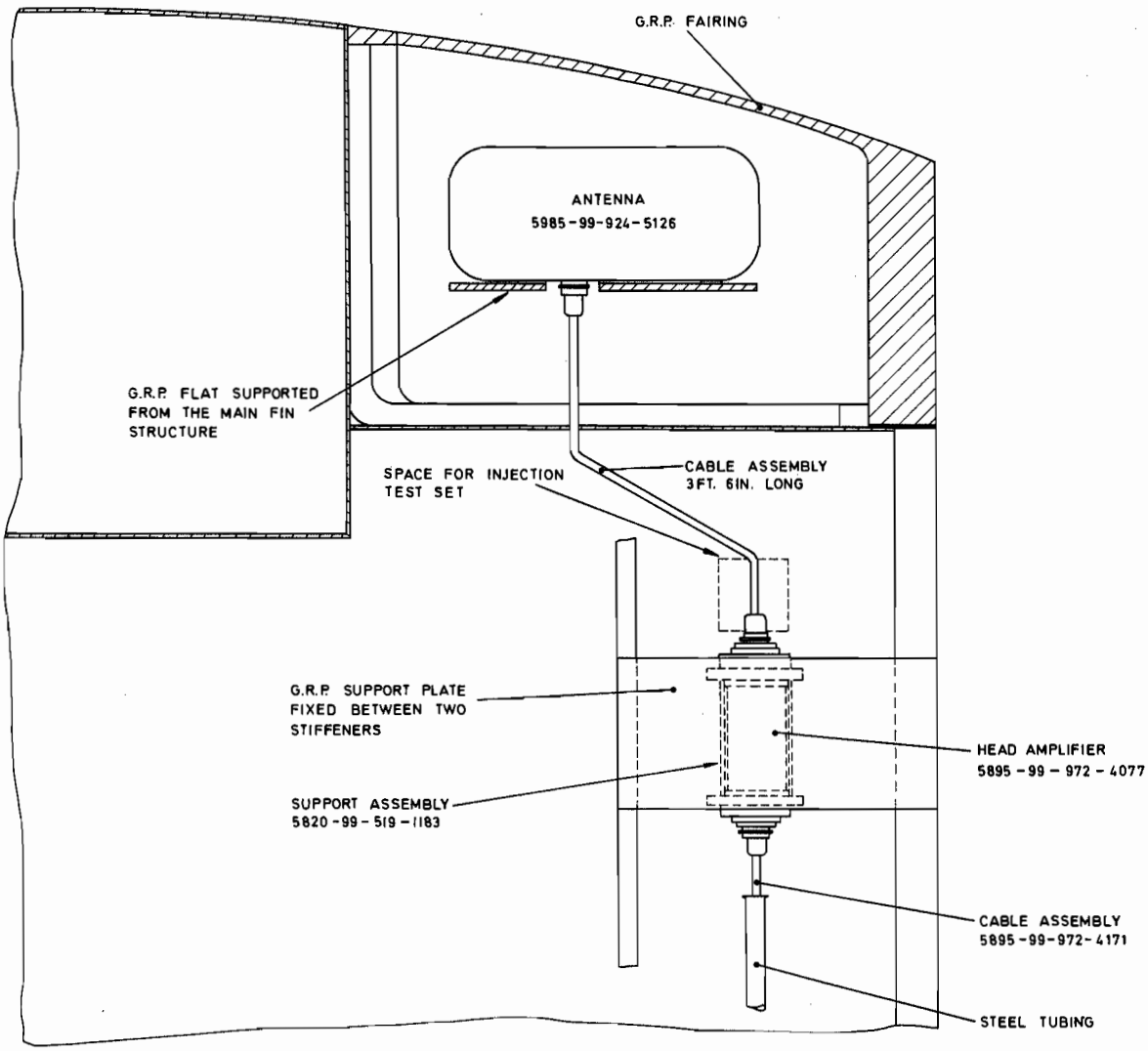
BR 2475

E LIST

S1517

INSTALLATION SPECIFICATION

B1057



PART ELEVATION OF BRIDGE FIN LOOKING TO STARBOARD

AERIAL OUTFIT ALZ

TYPICAL FITTING ARRANGEMENT

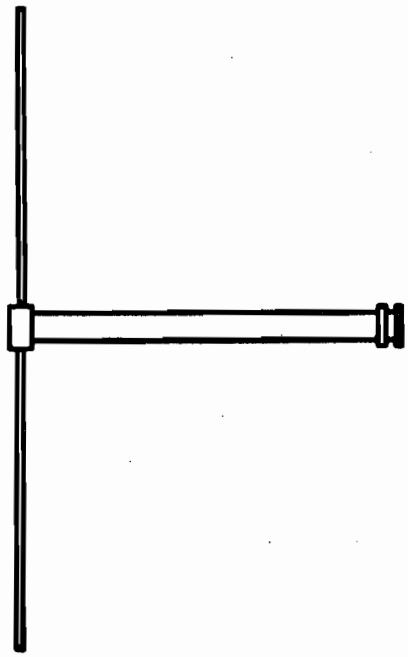
AERIAL OUTFIT APH

APH

SUMMARY OF DATA

PURPOSE

A VHF aerial for mounting on a yard-arm or spur.



MAJOR UNITS

AM10B/11	Aerial Dipole Type 3
AP 53300B	Extension Tube
AP 61338	Junction Box

BRIEF DESCRIPTION

A simple half-wave dipole, containing a built-in balancing unit of the parallel-tube type. Normally for vertically polarised radiation.

FREQUENCY BAND

100-144 MHz

WEIGHT

Aerial	7 lb
Extension Tube	19 lb
Junction Box	7 lb

IMPEDANCE

75 ohm nominal

HANDBOOK

BR 1610

ESTABLISHMENT LIST

E1046

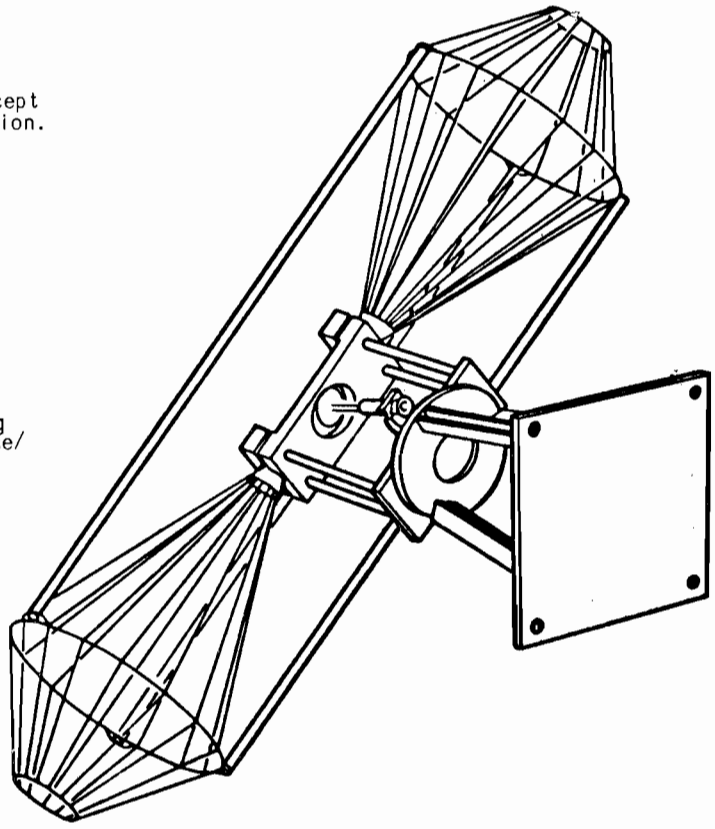
INSTALLATION SPECIFICATION

B876

AERIAL OUTFIT AQA

AQA

SUMMARY OF DATA



PURPOSE

A VHF aerial, normally mounted to accept vertically and horizontally polarised radiation.

MAJOR UNITS

AP 56130	Aerial Unit Design 7
AP 71292	Junction Box
AP 71000	R.F. Transformer
AP 57155	Pedestal Unit Design 3

BRIEF DESCRIPTION

A broadband, half wave dipole, having no provision in the aerial itself for balance/unbalance transformation.

FREQUENCY BAND

130–210 MHz

WEIGHT

Aerial	30 lb
Junction Box	5 lb
R.F. Transformer	13½ lb
Pedestal Unit	12 lb

IMPEDANCE

75 ohm nominal

HANDBOOK

BR 1610

ESTABLISHMENT LIST

E1209

INSTALLATION SPECIFICATION

B854/R1

AERIAL OUTFITS AWN/AWO/AWQ

AWN
AWO
AWQ

SUMMARIES OF DATA

AERIAL OUTFIT AWN

DESCRIPTION

This is an entirely lightweight, monopole, Whip Aerial Outfit, designed primarily for use with the new C.A.W. system for receivers. Four tubes, when assembled together, form a 30 ft Whip Aerial of 2¼ in outside diameter at base and tapering to 1 in diameter at the top. Each tube is of different diameter and so designed that it either rejects or fits a tube of the next diameter. Unified screw threads are used.

MAJOR UNITS

Pattern No.	Description	Weight
61828 to 61831 inclusive	Four aerial rods Design 21, 22, 23, 24	31½ lb
61835	Base, insulating, Design 3 for whip aerial (includes two AP 61836 insulators)	50 lb
61836	Insulator, Porcelain	
61838	Cover, Protecting, for AP 61835 Base (anti-icing)	11 lb

AERIAL OUTFIT AWO

BRIEF DESCRIPTION

Aerial Outfit AWO is an HF aerial for transmission and reception in submarines at periscope depths. It operates in the 1.5–24 MHz band and is used in conjunction with Type 623 and Outfit QM Series. A support mast which carries a whip aerial 11 ft long is clamped to an hydraulic erecting mechanism which raises the mast from a horizontal trailing position to a vertical position when required for use. The erecting mechanism, which is operated from inside the submarine, is mounted inside the fin with a shaft projecting outside to carry the aerial.

MAJOR UNITS

Pattern No.	Description	Weight
5985–A.P.186791	Mast	130 lb
5985–A.P.186795	Insulator	
5985–A.P.186003	Whip Aerial	
5985–A.P.186793–7	Fairings	
5985–A.P.186002	Coaxial Cable with Hull Gland	
5985–A.P.186362	Joint for Transmission Line	

AERIAL OUTFIT AWQ

DESCRIPTION

Aerial Outfit AWQ is designed to replace Outfit AWH in small craft where the distance between transmitter and the aerial base does not exceed 20 ft. The four inch trunk of the AWH is replaced by a coaxial cable 6145–100291 (U.R.63)

MAJOR UNITS

As for Aerial Outfit AWH(M).

HANDBOOK

BR 1625

ESTABLISHMENT LISTS

E829(AWA) E899(AWC) E955(AWF) E960(AWG/H) E1041(AWJ) E1016(AWK)
E1050(AWM) E1104(AWN) E1202(AWQ) E1254(AWO)

INSTALLATION SPECIFICATIONS

B614(AWA) B676(AWC) B654(AWF) B667(AWG/H) B725(AWJ) B765(AWM)
B797(AWN) B853(AWQ) B896(AWO)

AERIAL OUTFIT AYC

AYC

SUMMARY OF DATA

PURPOSE

A fixed SHF DF aerial outfit in surface vessels in conjunction with Aerial Outfits AYD and AYE for use with Radio Search and DF Outfits UA2/3.

TYPE OF RECEPTION

Pulsed RF Signals from target radar.

FREQUENCY RANGE

2500 – 4100 Mc/s.

POLARISATION

Horizontal and vertical.

POWER GAIN

Approx. 8 dB.

BRIEF DESCRIPTION

The Outfit comprises four Aerial Units and four RF Units with interconnecting cables. The Aerial Units are arranged so that their horns face Fore and Aft, Port and Starboard. Each horn collector is designed to have a cosine 2θ radiation pattern in the horizontal plane and to receive both horizontal and vertically polarised transmissions. Transformation to common horizontal polarisation is achieved by a twist section of guide at the throat of the horn feeding a waveguide–to–cable termination. The RF signals to the RF Unit situated at the base of the mast are carried by coaxial cable having an aluminium sheath and helical polythene dielectric.

In the RF Unit, the signal progressively passes through a cable–to–waveguide transformer, a section of waveguide containing three passive protection gas cells, a taper matching section and a waveguide filter before detection by a crystal detector in a broadband bar and post type crystal holder. The detector is a CV7181, 7182 or 7183 biased silicon cartridge crystal and the video output is connected by a short length of coaxial cable to a line matching transformer to step the impedance down to 75 ohms. Connection to the office equipment is made by ⅜ in Pyrotenax cable.

The gas cells (CV2488) protect the crystals from accidental burn out in the presence of strong radar signals. They require a priming voltage of 1.5 kV d.c. and this is derived from a 115 V to 500 V transformer and Rectifier Unit 63DX which are contained within the casting of the RF Unit. The 115 V a.c. mains is switched on manually by a Control Power Supply, A.P.186176 located in the office.

MAJOR UNITS

Patt. No.	Description	Qty.	Physical Data			
			Length	Breadth	Height	Weight
61559	Box, junction, for one Patt. 13941 and one Patt. 13832 cables.	4	2½ in	2 in	1½ in	1 lb
5985–A.P.186486	Aerial Unit.	4	36 in	12 in	8 in	40 lb
5985–A–P–186532	RF Unit, Video	4	30¼ in	8½ in	10 in	40 lb
186176	Control, Power Supply	1	5¼	4½ in	8 in	–

SPECIAL TEST EQUIPMENT

Pattern 61640 Test Set Design 15 (with Pattern 62855 Aerial Injection Unit Design 2).

A.P.62840 Cable. CT540 Signal Generator.

HANDBOOKS

B.R.2354(1) Handbook for Aerial Outfits AYC/D/E. C.B. Handbook for Reciprocal Intercept in Submarines.

B.R.2348 Handbook for Radio Search and DF Outfit UA2

B.R.2349 Handbook for Radio Search and DF Outfit UA3

INSTALLATION SPECIFICATION

B.806/R2

ESTABLISHMENT LIST

E.1182

AERIAL OUTFIT AYD

AYD

SUMMARY OF DATA

PURPOSE

A fixed SHF DF aerial outfit fitted in surface vessels in conjunction with Aerial Outfits AYC and AYE for use with Radio Search and DF Outfit UA2/3

TYPE OF RECEPTION

Pulsed RF signals from target radar.

FREQUENCY RANGE

4100 to 7000 Mc/s.

POLARISATION

Horizontal and vertical.

POWER GAIN

Approx. 8 dB.

BRIEF DESCRIPTION

The Outfit comprises four Aerial Units and four RF Units with interconnecting cables. The Aerial Units are mounted at the top of the mast with their horns facing Fore and Aft, Port and Starboard and the associated RF Units at a distance not greater than 20 ft cable run from the aerial. The horns are designed to give reception of both horizontally and vertically polarised waves. For each horn, the radiation pattern in a horizontal plane approximates to a cosine 2θ law, the beam width in the vertical plane being 30°. Bar and post type transformers effect transition from the aerial unit waveguide tail-piece to the RF cable and from the RF cable to the RF Unit. The latter comprises a low-pass waveguide filter preceded and followed by taper matching sections to feed a ridge-type crystal holder. Here the RF signals are detected by a biased silicon cartridge crystal (CV7181, 7182 or 7183) and the resulting video signal passed via a line matching transformer and Pyrotenax cable to the office equipment.

MAJOR UNITS

Patt. No.	Description	Qty.	Physical Data			
			Length	Breadth	Height	Weight
61559	Box, junction for one Patt. 13941 and one Patt. 13832 cables	4	2½ in	2 in	1½ in	1 lb
5985-A.P.186487	Aerial Unit	4	20½ in	5¼ in	6⅜ in	7 lb
5985-A.P.186488	RF Unit Video	4	40 in	9½ in	8 in	30 lb

SPECIAL TEST EQUIPMENT

Patt. 63369 Test Set Des. 19 (with Patt. 62856 Aerial Injection Unit Des. 3).

A.P.62840 Cable CT538 Signal Generator.

HANDBOOKS

B.R.2354(1) Handbook for Aerial Outfits AYC/D/E.

B.R.2348 Handbook for Radio Search and DF Outfit UA2.

B.R.2349 Handbook for Radio Search and DF Outfit UA3. C.B. Handbook for Reciprocal Intercept in Submarines.

INSTALLATION SPECIFICATION B.806/R2

ESTABLISHMENT LIST E.1182

AERIAL OUTFIT AYE

AYE

SUMMARY OF DATA

PURPOSE

A fixed SHF DF aerial outfit fitted in surface vessels in conjunction with Aerial Outfits AYC and AYD for use with Radio Search and DF Outfits UA2/3.

TYPE OF RECEPTION

Pulsed RF signals from target radar.

FREQUENCY RANGE

7000 to 11 500 Mc/s.

POLARISATION

Horizontal and vertical.

POWER GAIN

Approx. 8 dB.

BRIEF DESCRIPTION

The Outfit comprises four Aerial Units Video, 5985-A.P.186489 orientated to face Fore and Aft, Port and Starboard. Each unit has a polystyrene-sealed horn collector capable of receiving both horizontally and vertically polarised signals in X-band. This is followed by a short twist and taper section of waveguide feeding a ridge-type crystal holder. The detector is a biased silicon cartridge crystal, CV7181, 7182 or 7183. Video signals are fed through a line-matching transformer and Pyrotenax cable to the UA2 office equipment. Provision is made for the application of a small positive bias voltage to the crystal. The horizontal polar diagram for each unit approximates to a cosine $^{2}\theta$ law and the beam width in the vertical plane is approx. 30°.

MAJOR UNITS

Patt. No.	Description	Qty.	Physical Data			
			Length	Breadth	Height	Weight
61559	Box, junction, for one Patt. 13941 and one Patt. 13832 cables	4	2½ in	2 in	1½ in	1 lb
5985-A.P.186489	Aerial Unit	4	26 in	5 in	6 in	12 lb

SPECIAL TEST EQUIPMENT

Patt. 64261 Test Set Des. 21 (with Patt. 62857 Aerial Injection Unit Des. 4).

A.P.62840 Cable. CT541 Signal Generator.

HANDBOOKS

B.R.2354(1) Handbook for Aerial Outfits AYC/D/E.

B.R.2348 Handbook for Radio Search and DF Outfit UA2.

B.R.2349 Handbook for Radio Search and DF Outfit UA3.

INSTALLATION SPECIFICATION B.806/R2

ESTABLISHMENT LIST E.1182

C.B. Handbook for Reciprocal Intercept in Submarines.

AERIAL OUTFIT AYF

AYF

SUMMARY OF DATA

PURPOSE

A fixed SHF D.F. aerial fitted in submarines for use with Radio Search and D.F. Outfit UA2.

TYPE OF RECEPTION

Pulsed r.f. signals from target radar.

FREQUENCY RANGE

8000–10 000 MHz.

POLARISATION

Horizontal.

BRIEF DESCRIPTION

The Outfit consists of four free-flooding horn collectors spaced equally around the circumference of a cylindrical, pressurised, R.F. box. This contains the crystal detectors and line-matching transformers which feed video signals to the UA2 office equipment. It also houses four passive protection gas cells, one mounted in each waveguide feed, to prevent accidental crystal burn-out by strong local radar transmissions. A voltage doubling Rectifier Unit 63DX (AP 70193) mounted in the R.F. box, provides a -1 kV priming voltage for the gas cells from a 6.3 V a.c. supply switched on (a) by the seaguard radar when at sea or (b) manually when in harbour.

The aerial can be supported on a 3 ft tubular pedestal, (identical to the ANF pedestal) which may be fitted in place of the ANF pedestal or directly on the snort tube, the head of which has been suitably modified. It is orientated on installation so that the horns face Port, Starboard, Fore and Aft, the radiation pattern in the horizontal plane approximating to a cosine law for each horn. Pyrotenax cables feed the video signals to the office equipment.

MAJOR UNITS

Pattern No.	Description	Qty.	Physical Data			
			Length	Breadth	Height	Weight
61802	Aerial Unit Design 47	4	8 in	2 in	6 in	31 lb
70102	Switch Unit Design 108	1	8 in	8 in	8 in	
70103	Rectifier Unit 63 DX*	1				
70104	R.F. Unit Design 6 Pressurised	1	16 in Dia.		12 in	50 lb
61805	Pedestal Unit 58D ("T" Class conversions only)	1	3 in	7 in Dia.		20 lb

* Installed in the R.F. Unit Design 6

POWER SUPPLY REQUIREMENTS

115/230 V 50/60 Hz 5 W for priming voltage originated by a switching voltage of (a) 180 V 500 Hz in the case of Type 1000 radar and (b) 24 V d.c. in the case of Type 267P/W.

SPECIAL TEST EQUIPMENT

AP 64261 Test Set Design 21.
AP 62858 Aerial Injection Unit Design 5.
AP 62860 Flexible Connector 30 ft

HANDBOOKS

BR 2354(2) Handbook for Aerial Outfit AYF
BR 2348 Handbook for Radio Search and D.F. Outfit UA2.

ESTABLISHMENT LIST

E 1111.

INSTALLATION SPECIFICATION

B 807

COMMON AERIAL OUTFIT EAL

EAL

SUMMARY OF DATA

PURPOSE

Common Aerial Outfit EAL enables six or more H.F. and M.F. receivers to be worked from a common wire or whip aerial over the frequency range 15 kHz to 30 MHz. The associated receiver outfits are CAY (B40, AP 57140C/D) and CAZ (B41, AP 57141A/B/C).

BRIEF DESCRIPTION

The Outfit is an integral part of a system of Common Aerial Working (C.A.W.) designed to give all-round coverage by the use of a single wire aerial for L.F./M.F. and two suitably sited whip aerials for H.F. R.I.S. filters (Item 1) are fitted in the downleads which terminate at junction boxes (Item 5) on an aerial exchange panel in the B.W.O. This panel carries the majority of the units comprising EAL, including a cross-over filter (Item 4) which provides L.F./M.F. and H.F. outputs simultaneously from one whip aerial. Two L.F./M.F. feeder lines, one from the wire aerial, the other from the low pass output of the cross-over filter, are provided for the Receiver Outfits CAZ and a further two feeders carrying H.F. signals from the two whip aerials connect to the Receiver Outfits CAY. All receiver outfits incorporate a three-way aerial selector switch and receivers of the same type are series connected. Two positions of the switch select one or other of the associated feeders, the third position is operative in the main wireless offices only and connects to a test line. This line is used for routine checking, the test signal coming from CT 82 Noise Generators installed in the offices for this purpose.

Interconnections on the aerial exchange panel are made by flexible connectors (Items 2 and 7) are through-terminate switch units (Item 3) are fitted in each line. These switches enable signals to be passed to subsequent offices or terminate the line by means of resistors (Item 6) thus isolating part of the chain for fault-finding purposes. They also permit emergency connections in the event of breakdown.

Common Aerial Outfit EAL also provides two emergency whip aerial positions, the aerial rods being stowed in the office until required.

MAJOR UNITS

Item	Pattern No.	Description	Quantity	
			Cruisers and above	Destroyers Frigates etc.
1	56152	Filter Unit, H.F., Design 12	5	5
2	62124	Connector, flexible, 12 in long, with two AP 62150 plugs	9	3
3	62126	Switch Unit, Design 75	8	4
4	62127	Filter Unit, Design 62, cross-over, 640 kHz	2	1
5	62128	Box, Junction, screened, single way for AP 13845 cable	37	22
6	62129	Resistor Unit, terminating	9	6
7	62147	Connector, flexible, 21 in long, with two AP 62150 plugs	2	2
8	63210	Connector, flexible, screened, 12 in long, with plug AP 62150 and plug 10H/181	10	10
9	64143	Connector, flexible, 4 ft long	2	1

In addition, two Emergency Aerials (Whip) comprising AP 66065 Base, insulating; AP 64031, Base for Aerial Rod; AP 68601/4/5/6/7/8, Aerial Rods and AP 23681A, Box, junction, are supplied with Outfit EAL. The aerial rods will be superseded by improved Patts. 64794/7/8/9 and 64895/6.

NOTE: For Aircraft Carriers, the quantities are increased above those for cruisers etc. in some cases.

Weights: The approximate weight of the items of office equipment associated with Outfit EAL are:-

Cruisers and above	60 lb
Destroyers and Frigates	40 lb

The weight of an emergency aerial is 22½ lb.

ASSOCIATED AERIALS

(a) Aerial Outfit AWN (Whip).
(b) Main Wire Aerial with Deck Insulator, Group OA.

HANDBOOK

BR 1615

ESTABLISHMENT LIST

E 1110

INSTALLATION SPECIFICATION

B 793.

COMMON AERIAL OUTFIT EAM — EAM

SUMMARY OF DATA

PURPOSE

Common Aerial Outfit EAM enables up to nine HF transmitters to work into any one of three aerials over the frequency range 2 to 24 MHz. The outfit is only fitted in cruisers.

BRIEF DESCRIPTION

The Outfit comprises equipment to provide a system of HF transmitter common aerial working in cruisers. It consists of a specially designed aerial system and the ancillary equipment for up to nine transmitters of the Type 601-5 series to work into it. The transmitters are standard, although in the LTR they are housed in special "half size" cabinets. R.F. outputs from the transmitters are routed through transmission lines to filter cabinets (one filter cabinet per transmitter). The filter cabinets are the main units in this common aerial, the r.f. current passing through them is measured, switched and filtered, the line impedance (65 ohms) being maintained throughout. The switching ensures that the output is routed to the filter and aerial corresponding to the transmitted frequency. The output current is passed out of the filter to the common line and aerial via special busbars situated at the rear of the filter cabinets. The aerials are as follows:

Aerial	Description	Frequency
A1	Functions as a shunt-fed folded monopole with the main mast as the earthed element	2-4.5 MHz
A2	Functions as a shunt-fed folded monopole with the funnel as the earthed element	4.5-17.5 MHz
A3	Specially designed dipole mounted on the main mast.	17.5-24 MHz

Emergency arrangements include dual feeders port and starboard, from each busbar to each aerial for substitution in emergency. Two whip aerials are provided for emergency use, one with Type 602 HF portion in the UTR and the other with any of the transmitters in the LTR. These aerials are not normally rigged, but this can be done quickly as the bases and feeders are already installed.

MAJOR UNITS

Item	Pattern	Description	Qty.	Physical Data			
				Height	Width	Depth	Weight lb
1	63354	Cabinet, design 108	10	6' 8"	1' 8"	2' 4"	420
2	63355	Cabinet, design 109	1*	2' 6"	1' 10"	3'	280
3	63356	Cabinet, design 110	1ø	2' 6"	1' 10"	3'	265
4	63357	Cabinet, design 111	1≠	2' 6"	1' 10"	3'	305
5	63358	Aerial-switch drawer	10	2' 4"	1' 6"	1' 3"	98
6	63359	Filter Drawer 17.5-24 MHz	10	2' 3"	1' 5"	1'	63
7	63360	Filter Drawer, design 2	10	2' 1"	1' 4"	1'	70
8	63361	Filter Drawer, design 3	10	2'	1' 2"	1' 4"	82
9	63362	RF Wattmeter-drawer	10	1' 6"	1' 11"	8"	53
10	63363	Storage Drawer	1	2' 4"	1' 2"	9"	28½
11	64182	Aerial-matching transformer	1	1' 10⅜"	1' 4¼"	1' 11½"	74½
12	64183	Aerial-matching transformer design 2	1	1' 10⅜"	1' 4¼"	1' 11½"	75
13	64184	Aerial-matching transformer design 3	1	1' 8½"	1' 5"	10¼"	60
14	64185	Dipole-unit design 83	2	8'	3' 2"	1' 11"	49
15	64886	Box junction	6	9⅝"	5¾"	8⅝"	11¾
16	64888	Aerial Bus Bar Assembly	3	8'	8"	10"	15

* One Item 2 is supplied for each associated Type 603(2)

ø One Item 3 is supplied for each 2 (or part of 2) associated Types 601(2)

≠ One Item 4 is supplied for each associated Type 601(2).

In addition, two Whip Aerial Outfits (Emergency) for Common Aerial Outfit EAM, comprising AP 66065 Base, Insulating; AP 63041 Base for Aerial Rod; AP 64794/7/8/9 and AP 64895/6 Aerial Roads; AP 70936 Coaxial Socket, are supplied with Outfit EAM. The weight of the emergency aerial is 22½ lb.

HANDBOOK

BR 1380

ESTABLISHMENT LIST

E 1121

INSTALLATION SPECIFICATION

B 814

COMMON AERIAL OUTFIT EAO(4) EAO(4)

SUMMARY OF DATA

PURPOSE

Common Aerial Outfit EAO(4) provides the receiver aerial and common aerial line distribution required for a number of Receivers Outfit CJM, Transmitter-Receiver Type 641 and VLF/LF/MF to HF Frequency Converter, Outfit FTA(1) as used in the integrated Communication System (ICS2) Mixed Fit, or Reduced ICS2. The common Aerial outfit is suitable for ships with limited receiver communication requirements such as RFA's and Trial Ships.

BRIEF DESCRIPTION

The outfit utilizes three receiver aerials from which it provides three common aerial lines consisting of two HF and one VLF/LF/MF line. The three lines are fitted with radar suppression filters to prevent interference from local radar and the two HF lines are fittrd with tunable HF filters to prevent interference from the ship's own radio transmitters, these latter filters being controlled by the offending transmitter's keying circuitry.

An additional feature of Outfit EAO(4) is the fitting of a Ship-Shore CALL/WORK switch to the ships Ship/Shore communication bay. This switch introduces either of two tunable suppression filters into the appropriate common aerial line and saves the operator from having to leave the bay and retune a filter to either the Ship/Shore calling or working frequency due to a change of transmitter frequency at the dictates of the shore station.

MAJOR UNITS

NSN	Description	No. Fitted	Weight
5915-99-519-8188	Filter, Low Pass	3	2½ lb
5915-99-412-8135	Filter, Band Suppression Tunable	2	18½ lb
5915-99-412-8129	Control, Voice/c.w.	2	9 lb
5195-99-412-8125	Filter, Band Suppression Limited Tuning	2	18 lb
AP 64390	Rectifier Unit 63CZ	1	21 lb
5905-99-924-1365	Resistor, Terminating 68 ohm	6	
5895-99-519-9352	Switch, R.F. Transmission Line	3	
AP 62124	Connector, Flexible 12 inches	2	
or			
AP 62147	Connector, Flexible 21 inches	2	
AP 2411	Jack Box	4	
5935-99-940-1759	Plug, Telephone	1	
5910-99-580-5110	Bulkhead Suppressor	A/R	
5930-99-051-0551	Switch, Single Pole	2	
AP 403681	Box, Junction	A/R	
	Group OA Insulator	A/R	
	Group OC Insulator	A/R	
6625-99-943-1524	Multimeter 8SX	1	

HANDBOOK

BR 4216

ESTABLISHMENT LIST

B 1101/PRE.1

INSTALLATION SPECIFICATION

E 1380

COMMON AERIAL OUTFIT EAT(1) EAT(1)

SUMMARY OF DATA

PURPOSE

Distribution of radio signals from a single aerial to a large number of private broadcast receivers. Outfit EAT(1) can accommodate up to 400 receivers.

FREQUENCY RANGE

150 kHz to 350 kHz, 550 kHz to 1500 kHz and 6 to 28 MHz.

BRIEF DESCRIPTION

The amplifier unit contains two wide-band amplifiers, one for medium and long wavebands, the other for the short waveband. Both amplifiers feed into four output sockets which are connected to 75 ohm distribution cables routed to interconnection Boxes in cabins and mess decks as required. Output sockets not in use are fitted with terminating resistor AP 105877. The final interconnecting box on each output socket is fitted with a 75 ohm terminating resistor, NSN 5905-99-022-1095. Not more than 100 connections should be made from any one output socket.

COMMON AERIAL OUTFIT EAT(1)

MAJOR UNITS

5820-AP 105879 Cabinet Electrical Equipment containing
- 5820-AP 105870 Amplifier, Signal Distribution A.C. (400 way)
- 5820-AP 105875 Power Supply

5820-AP 105873 Interconnecting Box
5820-AP 105874 Cable Assembly R.F.

PHYSICAL DATA

	Height	Width	Depth	Weight
5820-AP 105870 Amplifier 5820-AP 105875 Power Supply	25 in	22 in	24 in	96 lb
5820-AP 105873 Interconnecting Box	2¾ in	2¾ in	1½ in	–

POWER SUPPLIES

100/125 V or 200/250 V, 50/60 Hz, 220 watts

HANDBOOK

BR 2360(1)

INSTALLATION SPECIFICATION

Equipment sponsored by DGS (DEE).

COMMON AERIAL OUTFIT EAT(2) EAT(2)

SUMMARY OF DATA

PURPOSE

Distribution of radio signals from a single aerial to a large number of private broadcast receivers. Outfit EAT(2) can accommodate up to 40 receivers.

FREQUENCY RANGE

150 kHz to 350 kHz, 500 kHz to 1500 kHz and 6 to 28 MHz.

BRIEF DESCRIPTION

The Panel, Signal Distribution Unit, contains three wide-band amplifiers, one for medium and long wavebands, another for short wavebands and the third for combined outputs.

Distribution is arranged from four output sockets to Interconnecting Boxes fitted in cabins and messdecks, up to a maximum of 10 from each socket. Output sockets not in use are fitted with terminating resistor AP 105877. The final interconnecting box on each output socket is fitted with a 75 ohm terminating resistor. NSN 5905-99-022-1095.

COMMON AERIAL OUTFIT EAT(2)

MAJOR UNITS

5820-AP 105871 Panel, Signal Distribution Unit
6130-AP 105872 Power Supply (a.c. to d.c.)
5820-AP 105873 Interconnecting Box
5995-AP 105874 Cable Assembly R.F.

PHYSICAL DATA

	Height	Width	Depth	Weight
5820-AP 105871 Panel	21 in	10 in	9¼ in	32 lb
5820-AP 105873 Interconnecting Box	2¾ in	2¾ in	1½ in	–

POWER SUPPLIES

110 V d.c. or 220 V d.c. (with 260 ohm dropping resistor) – 0.47 amp.

NOTE: In a.c. ships, AP 105872 Power Supply (a.c. to d.c.) unit is used,, with tapped input of 115 V, 200 V, 210 V, 220 V, 230 V or 240 V a.c. providing 110 V d.c. 0.5 amp.

HANDBOOK

BR 2360(2)

INSTALLATION SPECIFICATION

Equipment sponsored by DGS (DEE).

COMMON AERIAL OUTFITS EAW(1), (2) AND (3)
(ICS 1)

EAW(1)(2)(3)

SUMMARY OF DATA

PURPOSE

Common Aerial Outfits of the EAW Series enable a number of the transmitters in an Integrated Communication System to work into any one of a number of aerials provided to cover the frequency range 2–24 MHz.

BRIEF DESCRIPTION

For each aerial of an Outfit the aerial impedance is matched (where matching is necessary) by an r.f. transformer to the nominal 50 ohms of the system, such that a V.S.W.R. of better than 0.33 to 1 is obtained over the frequency band for that aerial. The feed to the transformer (or aerial) is taken from an aerial busbar to which a number of transmitters may be connected simultaneously, each through a tunable filter and switchable transformer in a filter drawer. The tunable filter prevents the degradation of the output of one transmitter due to the connection of other transmitters and with the switchable transformer improves the matching to achieve a V.S.W.R. of better than 0.85 to 1. The cables between the busbars and the r.f. transformers or aerial feedpoints are duplicated for emergency use.

AERIALS

The ship's superstructure may be used to provide aerials equivalent to the folded monopole or sleeve type: alternatively, biconical aerials (Aerial Outfit AGG) or Aerial Outfit AWF(M) may be fitted.

MAJOR UNITS

NSN or other Ref. No.	DESCRIPTION	PHYSICAL DATA				QUANTITY FITTED			
		HEIGHT	WIDTH	DEPTH	WEIGHT	EAW (1) A	EAW (1) B	EAW (2)	EAW (2)
5820-99-418-1219 (A.P.164500)	Cabinet HF Filter	1 ft 3 in	2 ft	2 ft 3 in	455 lb	4	4	4	1
5820-99-418-1220 (A.P.164501) 5820-99-418-1309 (A.P.164788)	Filter Drawer 2–6 MHz				84 lb	8	9	8	–
5820-99-418-1413 (A.P.164663) 5820-99-418-1310 (A.P.164789)	Filter Drawer 3–11 MHz				84 lb	8	5	8	6
5820-99-418-1221 (A.P.164503)	Filter Drawer 8–24 MHz				84 lb	8	9	8	3
5820-99-418-1400 (A.P.164646)	Cabinet Power and Dummy Load	5 ft 3 in	2 ft	2 ft 3 in	320 lb	1	1	1	1
5820-99-418-1856 (A.P.164205)	Drawer Power Supply				8 lb	2	2	2	2
5820-99-916-4683	Cooler Air				74 lb	1	1	1	1
5985-99-918-6524	Dummy Load Assembly				68 lb	1	1	1	1

HANDBOOKS

BR2420(2)

ESTABLISHMENT LIST

E1306

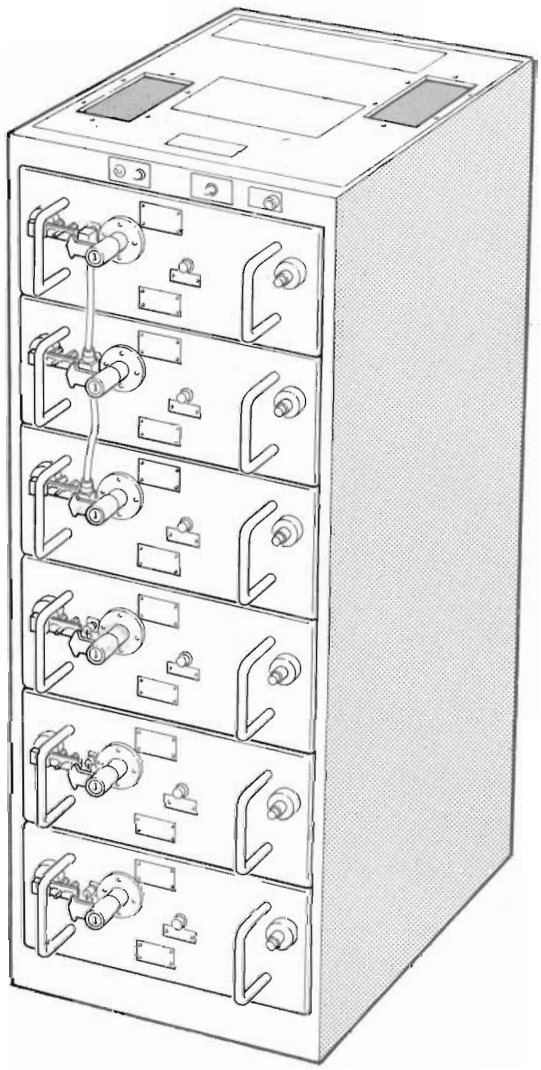
INSTALLATION SPECIFICATION

3919

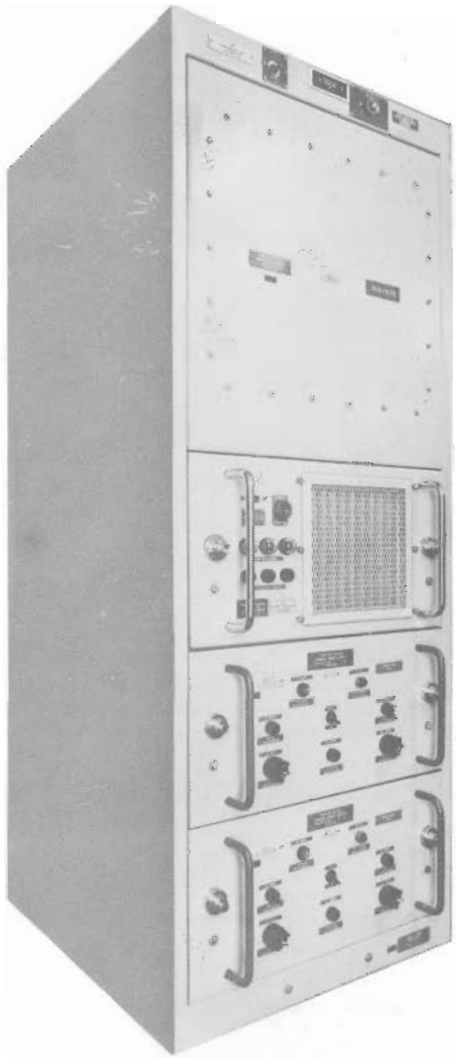
COMMON AERIAL OUTFITS EAW SERIES.
(ICS 2)

EAW(4)(5)(6) & (7)

SUMMARY OF DATA



FILTER CABINET



POWER SUPPLY
AND DUMMY LOAD CABINET

PURPOSE

Outfit EAW allows up to 8 ICS 2 transmitters to radiate simultaneously from any one of a number of broadband aerials utilizing the ship's superstructure, in the frequency range 2 to 24 MHz, with a minimum of degradation to the individual transmitter outputs.

BRIEF DESCRIPTION

An Outfit EAW consists of one or more identical cabinets, each housing up to six filter drawers connected to a common aerial feeder by busbar assemblies attached to the rear of the cabinet. The aerial feeder is connected to the broadband aerial via an r.f. matching transformer or antenna to transmitter adaptor. A separate cabinet provides d.c. supplies and two dummy load assemblies, these two latter assemblies allow the individual filters to be remotely tuned to their selected frequency prior to actual radiation from the broadband aerial. The two d.c. supplies are utilized by Outfit EAW and the 24 V d.c. supply by Transmitter Aerial Exchange EY.

MAJOR UNITS

NSN Or Other Ref. No.	DESCRIPTION	PHYSICAL DATA				QUANTITY FITTED			
		HEIGHT	WIDTH	DEPTH	WEIGHT	EAW (4)	EAW (5)	EAW (6)	EAW (7)
5820-99-418-1219 (5820-AP 164500)	Cabinet, HF Filter	5' 3"	2'	2' 3"	455 lb	2	2	1	1
5820-99-418-1220 (5820-AP 164501)	Filter Drawer 2-6 MHz	9½"	1' 9¾"	1' 10"	88 lb	*	*	*	*
5820-99-418-1221 (5820-AP 164503)	Filter Drawer 8-24 MHz	9½"	1' 9¾"	1' 10"	84 lb	3	1	–	–
5820-99-418-1413 (5820-AP 164663)	Filter Drawer 3-11.5 MHz	9½"	1' 9¾"	1' 10"	74 lb	*	*	*	*
5820-99-418-1309 (5820-AP 164788)	Filter Drawer 2-6 MHz	9½"	1' 9¾"	1' 10"	84 lb	5	–	–	–
5820-99-418-1310 (5820-AP 164789)	Filter Drawer 3-11.5 MHz	9½"	1' 9¾"	1' 10"	84 lb	4	8	6	6
5820-99-418-1400 (5820-AP 164646)	Cabinet, Power and Dummy Load	5' 3"	2'	2' 3"	320 lb	1	1	1	1
5820-99-418-1856 (5820-AP 164805)	Drawer, Power Supply	10 9/16"	1' 9¾"	1' 5"	81 lb	2	2	2	2
5820-99-916-4683	Cooler, Air Electronic Equipment	11¾"	1' 9¾"	1' 10"	76 lb	1	1	1	1
5985-99-918-6524	Dummy Load Assembly	1' 11½"	1' 9¾"	(FRONT COVER)	56 lb	1	1	1	1

	EAW(4)	EAW(5)	EAW(6)	EAW(7)
APPROXIMATE TOTAL WEIGHT OF THE FOUR OUTFITS	2830 lb	2600 lb	1720 lb	1725 lb

* These filter drawers may still be fitted for Single Drive Working in lieu of 5820-AP 164788/9 until present stocks are exhausted.

ELECTRICAL POWER REQUIREMENTS

Cabinet, HF Filter – 115 V/230 V a.c. (single phase) or d.c. 300 W Anti-Condensation Heaters.

Cabinet, Power and Dummy Load – 440 V, 60 Hz 3 phase 200 W – Fans Cooler Air Electronic.
115 V/230 V a.c. (single phase) or d.c. 300 W Cabinet Anti-Condensation Heaters

Overheating and Smoke Detection – 115 V/230 V 50/60 Hz 54 W (Un-Switched)

HEAT DISSIPATION (Individual Cabinets)

Cabinet, HF Filter 1200 Watts (Full power intermittent per Cabinet)

Cabinet, Power and Dummy Load 1000 Watts (Intermittent)

HANDBOOKS

BR 4176(3) and (4) Integrated Communication System. Stage 2 (ICS 2) System Information

BR 4171 Common Aerial Outfit EAW Series (ICS 2)

ESTABLISHMENT LISTS

EAW(4)(5)(6) and (7) – E1306

INSTALLATION SPECIFICATION

B1073 – For the Office Equipment
B1072 – For the Aerial Equipment

COMMON AERIAL OUTFIT EAZ

EAZ

SUMMARY OF DATA

COMMON AERIAL OUTFIT EAZ

PURPOSE

Common Aerial Outfit EAZ enables up to eight receivers with low impedance inputs to be fed from a common high impedance wire aerial without reducing receiver performance.

PRINCIPLE OF OPERATION

A high impedance wire aerial is coupled to the M.C.U.1 through the cathode follower unit which transforms the impedance down to 75 ohms. In the M.C.U.1, the input is fed via a high pass filter with cut-off frequency of 2 MHz. This filter is followed by an artificial line terminating in a 750 ohm resistor. The eight cathode followers are distributed along the line, the grid circuits forming part of the lumped shunt capacitance. The outputs, at 75 ohms impedance unbalanced are taken from coaxial sockets at the rear of the unit. A built-in milliammeter enables the anode current of each valve to be measured. Each unit is fitted with an internal power supply.

MAJOR UNITS

AP 102280	Multi-receiver Coupling Unit, Redifon Type M.C.U.1	Height 7 in, Width 19 in, Depth 11 in, Weight 32 lb
AP 102303	Aerial Cathode Follower Unit, Redifon Type C.F.1	Length 10 in, Width 4½ in, Depth 5 in, Weight 6½ lb

ELECTRICAL PERFORMANCE

	C.F.1	M.C.U.1
Frequency Range	95 kHz to 27 MHz	2 to 27 MHz
Input Impedance	High impedance	75 ohms unbalanced
Output Impedance	75 ohms unbalanced	75 ohms unbalanced
Gain	0.45 over frequency range when fed into 75 ohm line	Within the following limits:- 2 to 20 MHz 0 dB to −6 dB for each output 20 to 27 MHz 0 dB to −10 dB for 4 outputs only (SKTS 2 to 5)
Signal to Noise Ratio	Substantially unaffected by insertion of unit up to 20 MHz	Substantially unaffected by insertion of unit up to 20 MHz.
Cross Modulation	A wanted signal of 1 mV will be modulated to a depth of 1% by an unwanted signal of 0.4 V modulated 80%.	A wanted signal of 1 mV will be modulated to a depth of 1% by an unwanted signal of 0.25 V modulated 80%.

POWER SUPPLY AND CONSUMPTION

C.F.1	100 to 125 or 200 to 250 V in 5 V steps. 50 to 60 Hz. 12 watts.
M.C.U.1	100 to 125 or 200 to 250 V in 5 V steps. 50 to 60 Hz. 70 watts

HANDBOOK

BR 2063

ESTABLISHMENT LIST

E 1143

AERIAL EXCHANGE OUTFIT EY(1)
(ICS 1)

EY(1)

SUMMARY OF DATA

PURPOSE

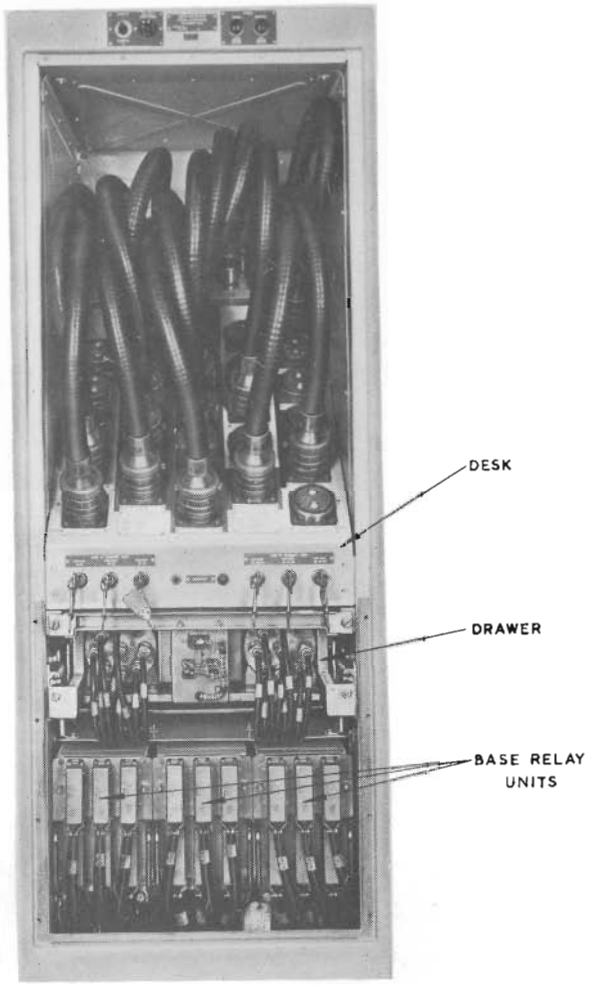
Outfit EY(1), fitted in conjunction with a common-aerial outfit and base-tuning outfits enables the outputs of 14 single-drive transmitters, each supplied to a plug of the (Jransmitter) Aerial Exchange to be connected to aerials supplied from the sockets of the exchange. When fitted for Triple Drive, 8 transmitter inputs provide 14 transmitter channels. Provision is made for the connection of six aerials A1-A6:-

A1)
A2) Up to eight transmitters connected
A3) simultaneously via tunable Filters to each aerial.

Transmitters connected to aerial filter sockets may alternatively be connected to one of two external dummy loads.

A4)
A5) One transmitter connected to each of the base-tuned HF aerials.

A6 One transmitter connected to the MF base-tuned aerial.



BRIEF DESCRIPTION

The outfit comprises a cabinet containing 14 flexible conduits terminated with the transmitter multi-pole plugs hanging conveniently for manual connection to the 27 aerial sockets. Association of a particular transmitter control equipment with the selected aerial circuits is effected by the multi-circuit connection of a plug and socket and by two groups of relays. The 7 relay units concerned with the transmitters are in a drawer, and the 2 relay units concerned with the aerials slide into the base of the cabinet. Two coaxial switches in the drawer are driven by motors of the rotary solenoid and ratchet type to perform the connection to dummy load.

MAJOR UNITS

5895-A.P.164606 Aerial Exchange, Transmitter
5895-99-418-1259 (A.P.164718) Relay Unit (7 in No.)
5895-99-418-1398 (A.P.164644) Switch Unit Coaxial (2 in No.)
5895-99-418-1381 (A.P.164623) Relay Unit (3 in No.)

ELECTRICAL CHARACTERISTICS

The r.f. connections within the exchange are by UR.67 cable (Z_0 = 50 ohms).

PHYSICAL DATA

	Height	Width	Depth	Weight
5985-A.P.164606 Aerial Exchange, Transmitter	5 ft 6 in	2 ft 0 in	2 ft 3 in	

POWER REQUIREMEMENTS

Two supplys of 24 V d.c. at 5 amps (used as alternatives).

INSTALLATION SPECIFICATION

B919

HANDBOOKS

BR 2420(1)(2) Transmitter Aerial Systems for I.C.S.

ESTABLISHMENT LIST

E1304

AERIAL EXCHANGE OUTFIT EY(2) (ICS 1)

EY(2)

SUMMARY OF DATA

PURPOSE

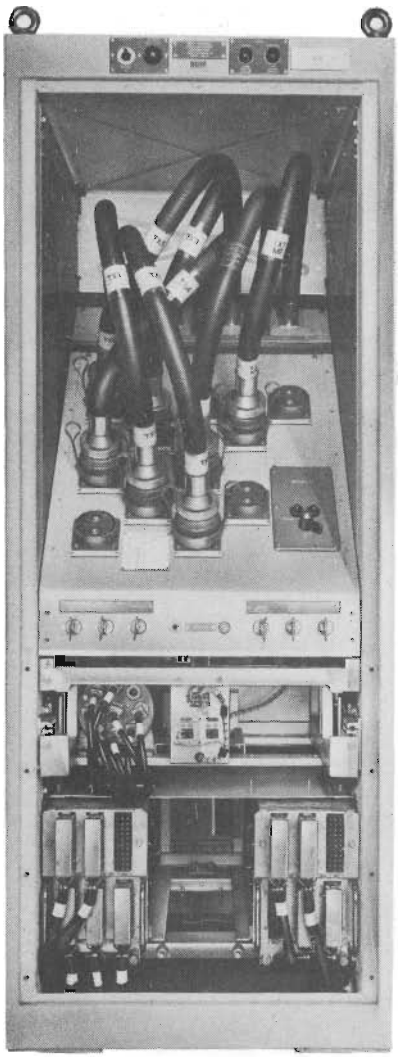
Outfit EY(2), fitted in conjunction with a common aerial Outfit and base-tuning outfits enables the outputs of 7 single drive transmitters each supplied to a plug of the (Transmitter) Aerial Exchange to be connected to aerials supplied from the sockets of the exchange. When fitted for Triple Drive, 4 transmitter inputs provide 7 transmitter channels. Provision is made for the connection of six aerials A1-A6:-

A1 Up to 6 transmitters connected simultaneously via tunable Filters to the aerial.

Transmitters connected to aerial filter sockets may alternatively be connected to one of two external dummy loads.

A2)
A3) One transmitter connected to each of the
A4) base-tuned HF aerials.
A5)

A6 One transmitter connected to the MF base-tuned aerial.



BRIEF DESCRIPTION

The outfit comprises a cabinet containing 7 flexible conduits terminated with the transmitter multi-pole plugs hanging conveniently for manual connection to the 11 aerial sockets. Association of a particular transmitter control equipment with the selected aerial circuits is effected by the multi-circuit connection of a plug and socket and by two groups of relays. The 4 relay units concerned with the transmitters are housed in the drawer, and 2 relay units concerned with the aerials slide into the base of the cabinet. One coaxial switch in the drawer is driven by a motor of the rotary solenoid and ratchet type to perform the connection to dummy load.

MAJOR UNITS

5895-99-418-1395 (5985-A.P.164606) Aerial Exchange, Transmitter
5895-99-418-1259 (5985-A.P.164718) Relay Unit (4 in No.)
5895-99-418-1398 (5985-A.P.164644) Switch Unit, Coaxial (1 in No.)
5895-99-418-1381 (5985-A.P.164623) Relay Unit (2 in No.)

ELECTRICAL CHARACTERISTICS

The r.f. connections within the exchange are by UR.67 cable (Z_o = 50 ohms).

PHYSICAL DATA

	Height	Width	Depth	Weight
5895-99-418-1395 Aerial Exchange, Transmitter	5 ft 6 in	2 ft 0 in	2 ft 3 in	

POWER REQUIREMENTS

Two supplys of 24 V d.c. at 5 amps (used as alternatives).

INSTALLATION SPECIFICATION

B919

HANDBOOKS

BR 2420(1)(2) Transmitter Aerial Systems for I.C.S.

ESTABLISHMENT LIST

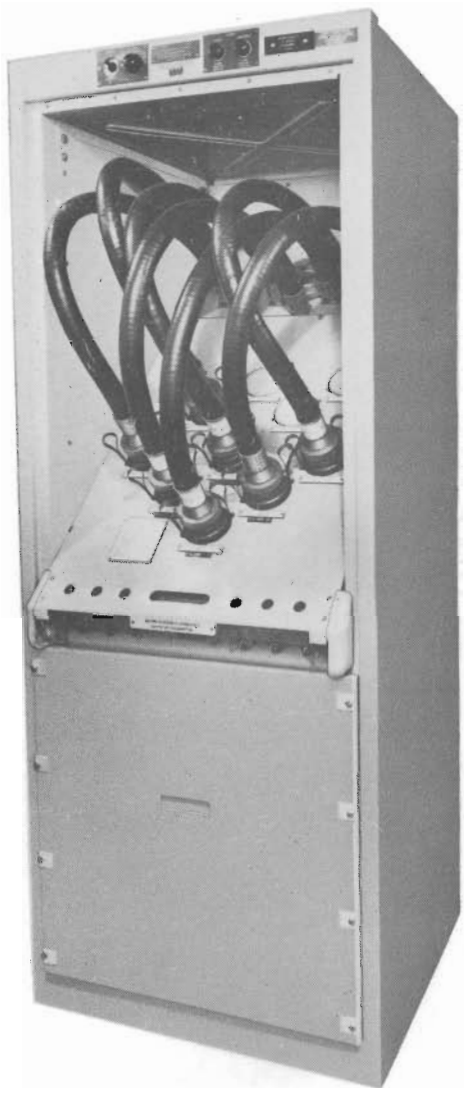
E1304

AERIAL EXCHANGE OUTFITS EY SERIES (ICS(2)) EY (2), (4) and (5)

SUMMARY OF DATA

PURPOSE

The exchanges provide limited system flexibility whilst acting as a manual and relay controlled interface between transmitter and aerial groups.



BRIEF DESCRIPTION

Similar in shape, construction and function, the three exchanges differ in the number and types of relay units, coaxial switches and application to the various aerial systems utilized. Exchanges EY (2) (4) and (5) comprise a cabinet containing 7 flexible conduits terminated with multiple transmitter plugs hanging conveniently for manual connection to fixed aerial sockets mounted on the cabinet desk assembly, 11 sockets on Exchanges EY (2) and (4), 10 sockets on EY (5). In addition to the manual connections a number of 'Direct' or 'Tied' connections are made via the exchange wiring:-

EXCHANGE EY (2).

This has no 'Tied' transmitter to aerial connections.

EXCHANGE EY (4)

This can accommodate 6 extra transmitter inputs 'Tied' to Common Aerial Outfit EAW and 1 transmitter input 'Tied' to an HF Basetuner. The exchange can be connected to 3 Broadband aerials (Outfit EAW), 2 HF Basetuners (including the 'Tied' connection) and 1 MF Basetuner.

EXCHANGE EY (5)

This can accommodate 5 extra transmitter inputs 'Tied' to Common Aerial Outfit EAW and 1 transmitter input 'Tied' to an HF Basetuner. The exchange can be connected to 2 Broadband aerials (Outfit EAW), 3 HF Basetuners (including the 'Tied' connection) and 1 MF Basetuner.

Six safe-to-transmit switches mounted on the front of each exchange cabinet ensure that RF power to the aerial systems utilized can be inhibited for maintenance purposes.

INSTALLATION SPECIFICATIONS

B1076, B1078, B1079

ESTABLISHMENT LIST

E1304

HANDBOOK

BR 4170

AERIAL EXCHANGE OUTFIT EZ(4) EZ(4)

SUMMARY OF DATA

PURPOSE

The (Receiver) Aerial Exchange Outfit EZ(4) provides from a minimum of aerials, a selection of aerial facilities to all LT-MF-HF receivers. The outfit is for use in frigates and above where ICS2 and Modified ICS1 (ie DLG's fitted with C & M Desk 5820-99-520-0956) are fitted.

BRIEF DESCRIPTION

The ICS2 Receiver Aerial Exchange Outfit EZ(4) includes a Receiver Antenna Exchange which provides eight Aerial Lines (Nos. 1 to 8) each having two aerial input connections, a primary output line to receivers and a return input of that line for termination or through connection as a secondary line to receivers. Provision is made in the exchange for a total of 18 plug-in, tunable, Band Suppression Filters, a set number of which may be inserted into each of Aerial Lines 1 to 5 and relay controlled by the keying of a pre-selected transmitter(s). The transmitted signal is rejected by the tuned Band Suppression Filters, to prevent overloading, by the local transmitter, of the input to any receivers connected to the Aerial Line. Facilities are provided for tuning the Band Suppression Filters and for individual monitoring of audio outputs of up to 30 operational receivers. The inclusion of an aerial selector switch at HF receivers enables each receiver to be connected to any one of up to four (normally only three connected) Aerial Lines. Any aerial may be connected to any aerial input on the Exchange; where only a small number of aerials can be accommodated, additional aerial inputs may be provided by the fitting of High Pass-Low Pass filters between the aerials and the Exchange.

Aerial Line No. 8 is normally used for aerial facilities to Receiver Outfits CJD/CAY-FAZ/FTA.

MAJOR UNITS

NSN or other Reference No.	Description	Qty.	Dimensions			
			Height	Width	Depth	Weight
	Aerial Outfits					
	Whip and Wire Outfits	As Reqd.				
	Outfit EZ(4)					
5895-99-924-5841	Antenna Exchange Receiver	1	4 ft 5 in	1 ft 5 in	2 ft 4 in	230 lb
5915-99-580-6578	Filter Band Suppression Tunable 2-5 MHz	10	6 in	6 in	1 ft 2⅛ in	6 lb
5915-99-580-6579	Filter Band Suppression Tunable	6	6 in	6 in	1 ft 2⅛ in	6 lb
5915-99-580-6580	Filter Band Suppression Tunable 10-16.5 MHz	2	6 in	6 in	1 ft 2⅛ in	6 lb
Part of 924-5841	4-Switch Unit	3	2½ in	11½ in	2 in	5 lb
Part of 924-5841	3-Switch Unit	2	2½ in	11½ in	2 in	5 lb
Part of 924-5841	Filter Tuning Unit	1	5¾ in	7 in	11½ in	7 lb
AP 164817	Power Supply	1	6 in	6 in	6 in	9 lb
5915-99-924-1363	Filter, Low Pass	As Reqd.	5¼ in	7 in	1 ft 4 in	9½ lb
5915-99-924-1364	Filter, High Pass-Low Pass	As Reqd.	5¼ in	7 in	1 ft 4 in	9¾ lb
5915-99-519-8188	Filter, Low Pass	As Reqd.	2 7/8 in	2½ in	1 ft 2 in	8 lb
5895-99-519-9352	Switch Unit	As Reqd.	3 7/8 in	3 7/8 in	2⅝ in	

HANDBOOK

BR 4103.

ESTABLISHMENT LIST

E 1305

INSTALLATION SPECIFICATION

B 1099.

RECEIVER AERIAL SYSTEM FOR I.C.S.

SUMMARY OF DATA

PURPOSE

The Receiver Aerial System provides from a minimum of aerials, a selection of aerial facilities to all LF-MF-HF receivers. The system is for use in frigates and above with ICS.

BRIEF DESCRIPTION

The ICS Receiver Aerial System includes a Receiver Aerial Exchange Outfit EZ(1), (2) or (3) and in some instances a Common Aerial Outfit EAO(1), (2) or (3). Outfit EZ(1), (2) or (3) provides eight Aerial Lines (Nos. 1 to 8) each having two aerial input connections, a primary output line to receivers and a return input of that line for termination or through connection as a secondary line to receivers. Provision is made in the exchange for a total of 18 plug-in, tunable, Band Suppression Filters, a set number of which may be inserted into each of Aerial Lines 1 to 5 and relay controlled by the keying of a pre-selected transmitter(s). The transmitted signal is rejected by the tuned Band Suppression Filters, to prevent overloading, by the local transmitter, of the input to any receivers connected to the Aerial Line. Facilities are provided for tuning the Band Suppression Filters and for individual monitoring of audio outputs of up to 30 operational receivers. the inclusion of an aerial selector switch at HF receivers enables each receiver to be connected to any one of up to four (normally only three connected) Aerial Lines. Any aerial may be connected to any aerial input on the Exchange; where only a small number of aerials can be accommodated, additional aerial inputs may be provided by the fitting of cross-over filters between the aerials and the Exchange.

Two lines are normally connected from the EZ(1) Exchange to the EAO(1) or (2) Outfit to provide aerial facilities to Receiver Outfits CAY, CAZ and MF-DF Outfit FM12.

MAJOR UNITS

NSN or other Reference No.	Description	Quantity			Dimensions			
					Height	Width	Depth	Weight
	Aerial Exchanges Outfit EZ(1) or (2) or (3)	(1)	(2)	(3)				
5895-AP 164607	Aerial Exchange Receiver	1	1	1	4 ft 5 in	1 ft 5 in	2 ft 4 in	230 lb
5915-99-580-6578	Filter Band Suppression Tunable 2-5 MHz	5	5	5	6 in	6 in	1 ft 2⅛ in	6 lb
5915-99-580-6579	Filter Band Suppression Tunable 5-10 MHz	8	8	8	6 in	6 in	1 ft 2⅛ in	6 lb
5915-99-580-6580	Filter Band Suppression Tunable 10-16.5 MHz	5	5	5	6 in	6 in	1 ft 2⅛ in	6 lb
–	4-Switch Unit	3	3	3	2½ in	11½ in	2 in	5 lb
–	3-Switch Unit	2	2	2	2½ in	11½ in	2 in	5 lb
–	Filter Tuning Unit	1	1	1	5¾ in	7 in	11½ in	7 lb
AP 164531/817	Power Supply	1	1	1	6 in	6 in	6 in	9 lb
5915-99-920-1188	Filter, Low Pass	1	–	1	5¼ in	7 in	1 ft 4 in	9½ lb
5915-99-920-1189	Filter, Cross-Over	1	1	–	5¼ in	7 in	1 ft 4 in	9½ lb
5915-99-920-1192	Filter, Low Pass	1	–	–	2⅜ in	2¼ in	1 ft 2 in	8 lb
5915-99-519-8188	Filter, Low Pass	–	1	1	1½ in	2½ in	6¼ in	
5895-99-519-9351	Switch Unit, Transmission Line	–	1	–				
5895-99-519-9352	Switch Unit, Transmission Line	–	4	4				
	Common Aerial Outfits Outfit EAO(1) or (2) or (3)	(1)	(2)	(3)				
AP 62124	Connector, Flexible	4	2	15				
AP 62126	Switch Unit Des. 75	4	3	3				
AP 62127	Filter, Cross-Over	2	1	1				
AP 62128	Box Junction	7	6	18				
AP 62129	Resistor Unit Terminating	8	6	6				
	Aerial Switch							
5820-99-916-4657	Switch, Aerial Selector	As required						
	Aerial Outfits							
	Whip and Wire Outfits	As required						

HANDBOOK BR 2391.

ESTABLISHMENT LIST E 1305

INSTALLATION SPECIFICATION B 919, B 1098.

AERIAL TUNING OUTFITS ETA(1) AND ETA(2)

ETA(1)
ETA(2)

SUMMARY OF DATA

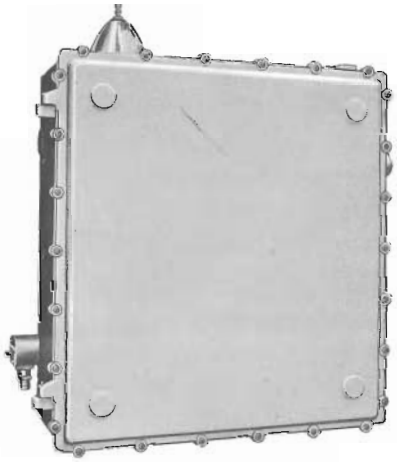
PURPOSE

Outfit ETA(1) enables Aerial Outfit AWF(M), or other aerial outfits having similar impedance characteristics, to be matched to a feeder cable of 50 ohms impedance, using a remote control system.

Outfit ETA(2) enables Aerial Outfit ALN and Emergency Outfit AWJ to be matched to a feeder cable of 50 ohms impedance, using a remote control system.

BRIEF DESCRIPTION

The Outfit comprises a Base Tuner and a Power Supply. The Base Tuner, mounted at the base of the aerial, houses the variable components of the r.f. matching circuit, the tuning motors and drives which are controlled by a remote unit. (The remote unit is not part of Outfit ETA). Provision is made for local manual control. The Power Supply contains the transformer and rectifiers to supply the control circuits and the control circuit relay assemblies.



ETA(1) BASE TUNER

ELECTRICAL CHARACTERISTICS

The Base Tuner is capable of dissipating 800 watts. It will perform matching over the frequency range 1.5 MHz to 24 MHz, accepting an input of 1 kW p.e.p. (eg approximately 700 watts fst or 450 watts, 70% voice modulated carrier) between 2 MHz and 24 MHz. Below 2 MHz the input must be limited to 500 watts p.e.p. (eg approximately 250 watts, voice modulated carrier).

PHYSICAL DATA

		Height	Width	Depth	Weight
ETA(1) –	5985-AP 186747 Base Tuner (Flexwell)	35½ in	35 in	15 in	300 lb
	5985-AP 186275 Base Tuner (Pyro)				
	5985-AP 186277 Power Supply	9 in	12 in	15 in	45 lb
ETA(2) –	5985-AP 186540 Base Tuner	48 in	35 in	15 in	305 lb
	5985-AP 186555 Power Supply	9 in	12 in	15 in	45 lb

POWER REQUIREMENTS

Control Supply, Single phase a.c. 115/230 V, 48–62 Hz.
Load 120 VA continuous
360 VA short periods during tuning.
Heater Supply (anti-condensation) 115/230 V a.c. separate from control supply
Load 100 watts

HEAT DISSIPATION

Power Supply – less than 25 watts

HANDBOOKS

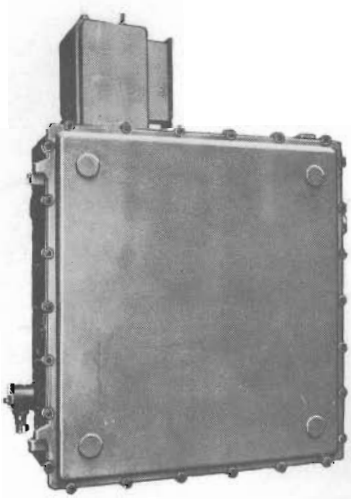
BR 2363
BR 2216 Cabinet H.F. Type 603/605 matching
ICS Handbooks
BR 2388

ESTABLISHMENT LIST

E 1325

INSTALLATION SPECIFICATION

B 948
ETA(2) B 954.

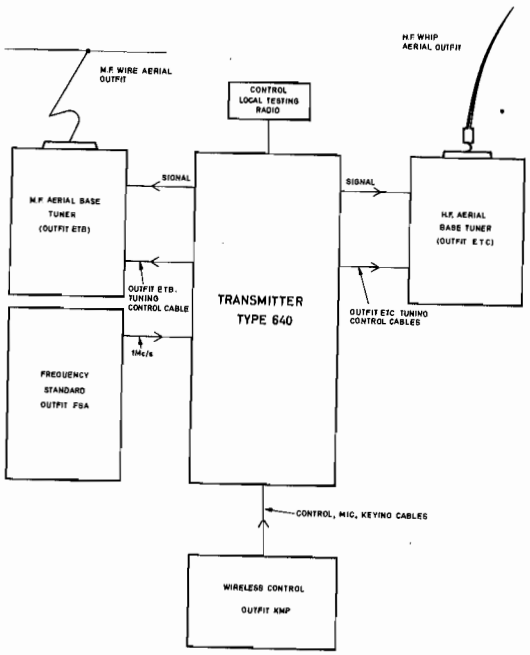


ETA(2) BASE TUNER

AERIAL TUNING OUTFIT ETB

ETB

SUMMARY OF DATA



PURPOSE

Outfit ETB enables a wire aerial, which has a capacity greater than 240 pF and is quarter wave resonant above 3 MHz, to be matched to a feeder cable of 50 ohms impedance, using a remote control system.

BRIEF DESCRIPTION

The outfit comprises a Tuner Radio Frequency and a Power Supply. The Tuner houses the variable components of the r.f. matching circuit and the associated d.c. driving motors, which also drive potentiometers used to give position indication remotely. The control of the driving motors may be adapted to be either by means of relays from, or directly from, a remote unit. (The remote unit, containing position indicators and tuning controls, is not part of Outfit ETB). The Power Supply contains transformers and rectifiers to supply the motors, the position indication circuits, and, when the Tuner is adapted for relay control the control circuits. Some of the relays of the control circuits are also in the Power Supply.

ELECTRICAL CHARACTERISTICS

The Tuner will perform matching over the frequency range 240 kHz to 3 MHz. It will accept an input of 1 kW p.e.p. between 1.5 MHz and 3 MHz. Below 1.5 MHz the power input must be limited to 500 W p.e.p.

PHYSICAL DATA

		Height	Width	Depth	Weight
5840-99-580-2114	Tuner, Radio Frequency	5 ft 11 in	2 ft 0 in	2 ft 1½ in	360 lb
5820-99-916-4931	Power Supply	9 in	12 in	1 ft 5¾ in	41 lb

POWER REQUIREMENTS

Control Supply — Single Phase a.c. 115/230 V 50–60 Hz
Load — 0.8 A at 230 V, 1.5 A at 115 V (185 watts)

Heater Supply

1. Obtained via Power Supply. Single Phase a.c. 115/230 V 50–60 Hz common with control supply 1.65 A at 230 V, 3.3 A at 115 V (380 watts – heaters on, 80 watts – fans only).
2. 115/230 V a.c. or d.c. (separate from above) anti-condensation heater supply 0.65 A at 230 V, 1.3 A at 115 V (75 watts).

HEAT DISSIPATION

Tuner — Up to 500 watts r.f. power may be dissipated inside the tuner.
Power Supply — 110 watts

HANDBOOKS

BR 2328(1) and (2) Handbook for Marconi Transmitter Type NT204 (Naval Type 640).
ICS Handbooks.

ESTABLISHMENT LIST

E 1358.

INSTALLATION SPECIFICATION

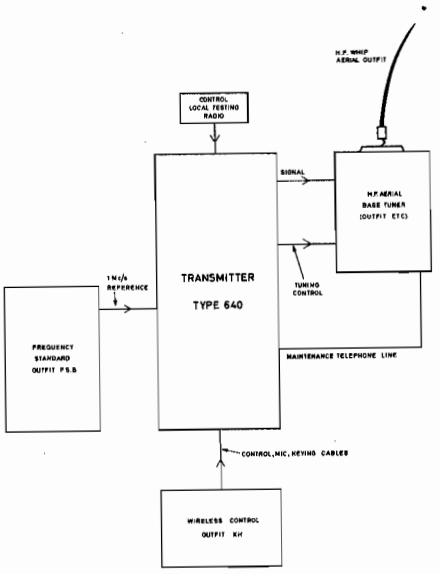
AERIAL TUNING OUTFIT ETC

ETC

SUMMARY OF DATA

PURPOSE

This outfit provides a means of matching various aerial impedances to a 50 ohm transmitter output (eg Transmitter Type 640) over a frequency range of 1.5 to 24 MHz.



BRIEF DESCRIPTION

The Tuner R.F. consists of a wideband transformer in series with a tunable L or pi network (the configuration is changed automatically for different ranges). The network has three motor-driven tuning elements which are all remotely controlled from either a transmitter or special control box. The tunable elements are inductance, fine input capacitance and range (which is changed by coarse capacitance tuning and altering the network configuration).

The Tuner R.F. cabinet is airtight.

MAJOR UNIT

5820-99-1594 Tuner, Radio Frequency

PRINCIPAL POWER REQUIREMENTS

Separate main or anti-condensation heater supplies are not required, but 230 volts, 50-60 Hz, 360 watts is needed, from its associated transmitter (usually Type 640); for the anti-condensation heater.

PERFORMANCE

Frequency Coverage: 1.5 to 24 MHz in eleven ranges:-

1. 1.5 to 1.8 MHz
2. 1.7 to 2.1 MHz
3. 2.0 to 3.0 MHz
4. 3.0 to 4.0 MHz
5. 4.0 to 6.0 MHz
6. 6.0 to 8.0 MHz
7. 8.0 to 10.0 MHz
8. 10.0 to 13.0 MHz
9. 13.0 to 16.0 MHz

7, 8 and 9 are strapped in some installations.

10. 16.0 to 20.0 MHz
11. 20.0 to 24.0 MHz

10 and 11 are strapped in some installations.

R.F. Input Power: 1.5 to 2 MHz, 360 W mean f.s.t.
500 W mean c.w.
700 W peak two-tone

2.0 to 3.0 MHz, 400 W mean f.s.t.
600 W mean c.w.
800 W peak two-tone

3.0 to 4.0 MHz, 750 W mean f.s.t.
1 kW mean c.w.
1 kW peak two-tone

Above 4.0 MHz, 1 kW all services.

Input Impedance: 50 ohms

Output impedance: 2 to 80 ohms resisting
-700 to +300 ohms reactive

Matching: Better than 0.85 v.s.w.r.

HANDBOOK	ESTABLISHMENT LIST	INSTALLATION SPECIFICATION
BR 2346	E 1359	B 933

AERIAL TUNING OUTFIT ETD

ETD

SUMMARY OF DATA

PURPOSE

Provides matched coupling between transmitters types 618 and 619 and Whip Antenna Outfits AWH(M) or AWQ.

MAJOR UNITS

NSN 5985-99-523-6142 Base Tuner, Antenna.
5985-99-523-6143 Control, Antenna Base Tuner.

PERFORMANCE

Frequency range	: 1.6 MHz to 24 MHz
Input r.f. power	: 100 watts p.e.p.
Antenna	: Whip pattern, types AWH(M) or AWQ
Transmitter	: H.F. type 618 or 619.
Coaxial feeder impedance	: 50 or 75 ohms
Mains power requirements	: 115 V or 230 V a.c. single phase 45 to 60 Hz.

PHYSICAL DATA

	Height	Width	Depth	Weight
Control, Antenna Base Tuner	150 mm	150 mm	150 mm	3.75 kg
Base Tuner, Antenna	300 mm	230 mm	230 mm	15 kg

HANDBOOK

BR 4202

ESTABLISHMENT LIST

S1689

INSTALLATION SPECIFICATION

B 1195

AIRCRAFT CONTROL OUTFIT KFJ

KFJ

SUMMARY OF DATA

PURPOSE

A remote control system for the wireless communication equipment associated with Carrier Controlled Approach (C.C.A.) for aircraft operating from Aircraft Carriers.

BRIEF DESCRIPTION

The Outfit provides remote voice-modulation control facilities, including carrier ON-OFF control of four wireless transmitter-receivers associated with the C.C.A. system in Aircraft Carriers. Each of four Controllers can converse directly with the pilot of an aircraft during the approach to land on the Carrier deck. Separate channel frequencies are allocated to each Controller and a stand-by transmitter-receiver is immediately available for use in the event of failure on any Controller's channel.

The control system also enables the Supervisor in the C.C.A. Room to listen or talk on any Controller's channel. When required, voice-modulation control of any of the transmitter-receivers connected to the system may be extended to the Flying Control Position or Mirror Sight Position. Interlinking with the ship's main communication control system is provided by the Control Circuit Exchange.

MAJOR UNITS

Patt. No.	Description	Qty.	Physical Data			
			Height in.	Width in.	Depth in.	Weight lb
70786	Control Unit, Des. 138 voice	4	21½	3¾	3¾	9
64454	Base Des. 3 for C.U. Des. 138 voice	4	21¼	3¾	3¾	5
64808	Control Unit, Des. 115 voice	3	5	6½	9½	7
70787	Control Unit, Des. 139 voice	2	4	4	4	4
61505	Extension Unit, voice, Des. 3	4	4½	4½	6	9
–	Composite Comm. Unit Type 6	1	7	8	6	7
65273/A	Control Circuit Exch. (Upper)	5	6½	16½	5	23
65274/A	Control Circuit Exch. (Lower)	1	2 ft 11 in	9½	16	115

NOTE: Quantities fitted may vary slightly with individual installations.

BRIEF DESCRIPTION OF UNITS

(1) AP 70786 Control Unit, Des. 138 voice
AP 64454 Base, Des. 3 for Control Unit, Des. 138 voice

This Unit is fitted adjacent to the display console at each Controller's position in the C.C.A. Room. The Unit embodies four channel selecting switches for the transmitter-receiver normally used by the Controller, an ON-OFF switch for the stand-by transmitter-receiver, a PRESS TO TRANSMIT switch for the transmitter and a VOLUME switch for the transmitter and a VOLUME control for adjusting the level in the headphones. Two MIC. sockets, a recorder jack and indicating lamps are also included.

(2) AP 64808 Control Unit, Des. 115 voice

This Unit is weathertight and is fitted at the Port and Starboard Mirror Sight Positions. The Unit Unit embodies a MIC. socket, two phones jacks in parallel, a VOLUME control for adjusting level in the headphones, and a changeover switch for selecting either the PORT or STBD. lines from the C.C.A. Room.

(3) AP 70787 Control Unit, Des. 139 voice

This Unit is fitted at the Supervisor's position in the C.C.A. Room. An additional Unit is also fitted for convenience, usually above the Controller's positions. The Unit embodies a MIC. socket, two phones jacks and a VOLUME control for adjusting the level in the headphones.

(4) AP 61505 Extension Unit, Voice, Des. 3

This Unit is weathertight and is fitted at the Flying Control Position. The Unit embodies a MIC. socket, two phones jacks and a VOLUME control for adjusting the level in the headphones.

(5) Composite Communication Unit Type 6 and Base Type 3

This Unit is fitted at the Supervisor's position in the C.C.A. Room. The Unit embodies five selecting switches which enable the Supervisor to listen or talk on any of the Controllers Channels, or on the stand-by transmitter-receiver.

(6) AP 65273 Control Circuit Exchange (Upper)
AP 65274 Control Circuit Exchange (Lower)

These Units are standard type (KHB) plug and socket exchanges, the lower Unit carrying the plugs with leads from the Remote Control Units, and the upper Unit carrying the sockets connected to the transmitter-receivers.

HANDBOOK

BR 1358

ESTABLISHMENT LIST

E 1137

INSTALLATION SPECIFICATION

B.

CONTROL OUTFITS KH SERIES

KH

SUMMARY OF DATA

PURPOSE

To give control of the wireless communication equipment in a ship. The outfits in the series are fitted as follows:

KHA – Capital Ships and Cruisers
KHB – Aircraft Carriers
KHC – Leaders and Destroyers
KHE – Other light craft
KHF – Light craft with separated Transmitter and Receiver Offices
KHG – A.D. Frigates

Fighter Direction Control Outfits are embodied in Wireless Control Outfits of the KH Series.

MAJOR UNITS

Patt. No.	Description	Physical Data			
		Height	Width	Depth	Weight (lb)
57115A	Switch, Loudspeaker, selecting	8 in	9¼ in	5¼ in	9½
57723	Loudspeaker Unit, Design 2	7⅛ in	9½ in	6½ in	6½
65237	Control Unit, Transmitter, Design 8	12 in	10½ in	14 in	43
65243	Control Unit, Wireless and Voice, Design 4	7⅝ in	8¼ in	7⅞ in	29
65244	Control Unit, Wireless and Voice, Design 5	6 in	4⅜ in	9 in	11½
65246	Control Unit, Voice, 6 channel, Design 6	6½ in	9¼ in	8⅛ in	10½
65247	Control Unit, Voice, 12 channel, Design 7	6½ in	15¼ in	8⅛ in	18
65249	Extension Unit, Voice, Design 2	5½ in	6½ in	4⅝ in	7
65250	Switch, Selector, 3 circuit, 6 channel	14⅜ in	9¼ in	9⅜ in	30
65273	Control circuit exchange unit (upper)	6½ in	17½ in	5½ in	17½
65274	Control circuit exchange unit (lower)	3 ft 3 in	9⅛ in	16⅛ in	120
65339	Exchange Unit A/F, Design 1	6¼ in	10 in	6½ in	15½
65871A	Amplifier N24	7 in	19 in	12 in	39½
66141	Switch Unit isolating, Design 51	15⅝ in	9½ in	10 in	40
68668	Control Unit Voice, Design 70	4 in	4 in	4 in	3

The quantity of individual items varies for each outfit. Two outfits of the same lettering may also vary as the equipment has been designed for flexibility.

BRIEF DESCRIPTION OF MAIN UNITS

Wireless Control Units

Pattern 65243 (Design 4) is watertight and is fitted in exposed positions. Pattern 65244 (Design 5) is non-watertight and plugs into a base permanently wired into the system. They include a microphone socket, phone jacks with volume control, keying jack, on-off switch and transmitter "ready" lamp. Pattern 65414 (Design 6) is portable and is used at emergency conning positions. It is connected to the Control Outfit by means of Pattern 64515 connector and Pattern 65588 junction box.

Multi-channel Voice Control Units

Patterns 65246, 65247 are used in Air Direction Rooms and Operations Rooms and consist of six and twelve channel units respectively. Each has a row of switches (one per channel) and two rows of lamps, one indicating transmitter "Ready" and the other transmitter "In use."

Voice Control Unit (Single Channel)

Pattern 68668 is used principally in Air Direction Rooms and Operations Rooms wherever voice only control is required. It provides a microphone jack and phone jack with volume control. Until Pattern 68668 is available Pattern W7546 Box Junction is used incorporating a microphone socket and Pattern 2411 Jack Box and Pattern 65248 Attenuator Unit, Design 27 for phones.

Control Circuit Exchange (CCX's)

These are plug and socket exchanges which consist of an assembly of upper units (Pattern 65273) containing three circuits each and lower units (Pattern 65274) containing nine circuits each. Each circuit in the upper units has four sockets wired in parallel connected directly or via similar exchanges to a transmitter and receiver. The control units are connected to the lower units and can be plugged into any transmitter and receiver. Control units will work in parallel with one another. In certain small offices eg Second Wireless Office in Destroyers with KHC, a switch exchange (Pattern 66141 Switch Unit, Design 51) is used instead of plug and socket exchanges.

Other Exchanges

Pattern 65250 Switch Selector 3 circuit 6 channel is used for extending microphone and reception circuits only from the main control circuit exchanges to single channel control units. Pattern 65339 Exchange Unit A/F Design 1 is a simple exchange of the plug and jack type. For switching only a few circuits, loudspeaker line selecting switches are used.

Loudspeaker Amplifier

Pattern 65871A A.F. Amplifier N24 operates from reception line and gives an output of 3 watts for one or two loudspeakers. This amplifier is being superseded by Pattern 32047 Amplifier 2 watt.

Transmitter Control Units

Pattern 65237 Control Unit Transmitter Design 8 is associated with some transmitters (Types 57, 59, TBS, 87, 89 etc.) to adapt them to work into the control circuits. Pattern 65238 Control Unit Transmitter Design 9 is associated with Type 86M.

FACILITIES PROVIDED

Local or remote control of any transmitter wired into the system and local or remote reception from any receiver wired into the system. These facilities are provided by various units as follows:

1. Wireless Control Units

   (a) Headphone reception with volume control.

   (b) On-off switch (bringing transmitter to the "Ready" condition when required).

   (c) Plug-in microphone with on-off control of the transmitter carrier wave.

   (d) Plug-in morse key, and terminals for permanently wired key if required.

   (e) Lamp indication of Transmitter "Ready" condition.

2. Multi-channel Voice Control Unit

   As for 1(a), (b) and (e) and also

   (g) Lamp indication of Transmitters in use.

   (h) Selection of the required channel ie Transmitter and Receiver.

3. Voice Extension Positions

   As for 1(a) and (c).

OPERATION OF SYSTEM

The system may be divided into five basic circuits, all terminating in control units:

Reception Lines
Microphone Lines
Control Lines (Switch-on and keying)
Lamp Indication Lines
Loudspeaker Lines

The various bays, remote control positions, receivers and transmitters are connected together by means of control circuit exchange (CCX's) which are mostly of the plug and socket type. The basic circuits, other than the loudspeaker circuits, pass together through the main CCX units which consist of upper units giving access to the transmitters and the lower units giving connection to bays and remote control positions. Each circuit in the upper units has several sockets wired in parallel so that the control units can be connected in parallel to the transmitters.

Bay receivers have their outputs wired to the lower CCX in parallel with the phone line of the bay. Receivers associated with a particular transmitter have their outputs wired to the transmitter line appearing on the upper unit of the CCX.

Loudspeakers are supplied by amplification from the reception lines. In some cases Audio Frequency amplifier inputs are connected by small two-wire plug and jack exchanges to the phone lines. The amplifier outputs are in turn connected to the loudspeakers via similar exchanges.

HANDBOOKS

BR 1814(1)(2) (for KHC/D/E) BR 1818(1)(2) (for KHA/B)

ESTABLISHMENT LIST

E 927

INSTALLATION SPECIFICATION

B 694

CONTROL OUTFIT KHH

KHH

SUMMARY OF DATA

PURPOSE

A standard control system for the wireless communication equipment in small craft and submarines. Control Outfit KHH will supersede various miscellaneous control systems.

FACILITIES PROVIDED

The KHH control system provides local or remote voice control of any transmitter connected to the system, and local or remote reception from any receiver connected to the system. A maximum of four transmitters and four receivers may be used in this way.

Loudspeakers and Voice Control Units installed in the same compartment are referred to as "groups". In each group the control circuit is arranged so that a loudspeaker is muted during transmissions from any Voice Control Unit switched to the same channel as the loudspeaker.

MAJOR UNITS

Pattern No.	Description	Physical Data			
		Height	Width	Depth	Weight (lb)
63685	Switch Unit Design 84	16½ in	12 in	8-15/16 in	30 (approx.)
63686	Switch Unit Design 85, Loudspeaker Selecting	5 in	6-5/16 in	6-17/32 in	6½ (approx.)
71225	Switch Unit Design 116, Loudspeaker Selecting Weathertight	5 in	6-5/16 in	9⅛ in	7 (approx.)
63687	Control Unit Design 103, Voice	5 in	6-5/16 in	6-17/32 in	6½ (approx.)
63688	Control Unit Design 104, Voice Weatherproof	5 in	6-5/16 in	9⅛ in	7 (approx.)

The number of units fitted and their dispositions will vary from ship to ship according to the number of positions from which control is required, and with the class of ship.

BRIEF DESCRIPTION OF MAJOR UNITS

(1) AP 63687 Control Unit Voice, Design 103

This unit is not weathertight and is fitted only at closed control positions. It includes a mic-tel. socket, a send-receive key switch AP 63912 which also controls loudspeaker muting, two phone jacks connected in parallel and a volume control for adjusting level in the earpiece.

(2) AP 63688, Control Unit Voice, Design 104

This unit is identical to AP 63687 but is weatherproof and fitted in open control positions.

(3) AP 63686, Switch Unit, Design 85, Loudspeaker Selecting

This unit includes four AP 63910 four-pole change-over key switches which enable No. 1 or No. 2 loudspeaker to be switched to any one of four receivers as required. A mechanical interlock is provided so that it is not possible to switch the same loudspeaker to the output of more than one receiver at the same time.

(4) AP 71225, Switch Unit Design 116, Loudspeaker Selecting, Weathertight

This unit is identical to AP 63686 but is weathertight and fitted in open control positions.

(5) AP 63685, Switch Unit, Design 84

This unit includes sixteen two-position AP 63911 key switches mounted in four rows of four switches, and functions as a control circuits exchange (CCX). By setting the key switches appropriately any transmitter and the phone output of its associated receiver may be switched to any of the Voice Control Units. Loudspeaker lines passing through the switch unit to the loudspeaker selecting switches are diverted by the key switches through the Voice Control Units so that the loudspeakers may be muted during transmissions.

HANDBOOK

BR 1363

ESTABLISHMENT LIST

E 1102

INSTALLATION SPECIFICATION

B 694

CONTROL OUTFIT KHJ

KHJ

SUMMARY OF DATA

PURPOSE

A standard control system for the wireless communication equipment in small ships where the requirement is for control facilities of one wireless set at one or two remote positions in addition to local control. In the event of two wireless sets being fitted, the control outfit would be duplicated.

FACILITIES PROVIDED

Control Outfit KHJ is designed to provide remote control facilities for any one of the following transmitters: Type 618 with receiver outfit CAS; Type 619 with receiver outfit CAT; Type 691 with receiver outfit CUH; Type 86M. It is suitable for other Naval Transmitters and Receivers, if necessary by the provision of adaptors.

MAJOR UNITS

Pattern No.	Description	Physical Data			
		Height (in)	Width (in)	Depth (in)	Weight (lb)
65244 65276	Control Unit Des. 5) Base for AP 65244)	6	4⅜	9	11½ approx.
61656	Control Unit Des. 94	7⅝	8¼	7⅞	14 approx.
65328	Control Unit Des. 9 *	14	11⅜	7½	39 approx.

* Only if Type 86M is fitted.

BRIEF DESCRIPTION OF MAJOR UNITS

(1) AP 65244 Control Unit Des. 5

This unit is not weathertight and is fitted only at closed control positions. It includes a microphone-tel socket, 2 jacks for headphone reception, a jack formorse key, a volume control for adjusting headphone level, and ON-OFF-INTERCOM switch. (INTERCOM is not used.)

(2) AP 61656 Control Unit Des. 94

This unit is similar to C.U. Des. 5 but is weatherproof and fitted in open control positions.

(3) AP 65238 Control Unit Des. 9

This unit is designed for the local control of Type 86M transreceivers operating on pre-set channel frequencies. The selected channel is indicated by a lamp on the control unit panel. The control unit provides for transmission and reception on any one of four pre-set channels in addition to controlling the power supply for the transreceiver. Provision is made for remote control.

HANDBOOK

BR 1363

ESTABLISHMENT LIST

E 1184

INSTALLATION SPECIFICATION

B 846

MISSILE GUIDANCE AND CONTROL OUTFIT MAA

MAA

SUMMARY OF DATA

PURPOSE

To provide the radio control link over which the demands from the aimer's joystick are passed to the SEACAT missile.

TYPE OF TRANSMISSION

Amplitude modulated sequentially by supersonic tone generators.

FREQUENCY RANGE

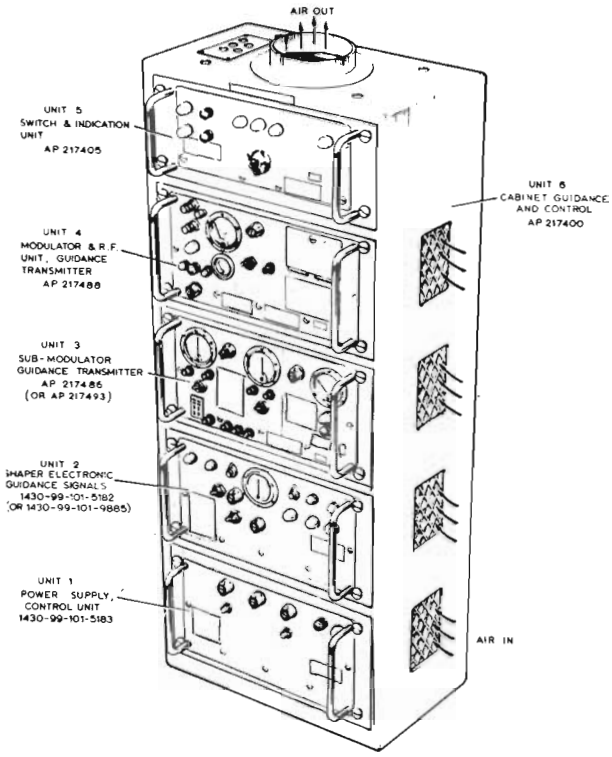
Any two of 31 crystal-controlled channels in the band 400–420 MHz provided they are separated by not more than 3.4 MHz.

BRIEF TECHNICAL DESCRIPTION

The equipment comprises a UHF transmitter in the band 400 – 420 MHz, amplitude modulated by a time sequence of two pairs of frequencies 21 – 28 kHz and 36 – 48 kHz. The joystick demand voltages are modified by the shaping circuits and control the relative duration of these frequencies.

MAJOR UNITS

The Cabinet, Guidance and Control with its contents and the Aerial Unit comprise the operational units, the Cabinet, Spares Stowage with its contents and the Cradle, Test are for maintenance purposes. Maintenance units are normally supplied on the basis of one set for two operational equipments.



GUIDANCE AND CONTROL CABINET

PHYSICAL DATA

Unit	Pattern No.	Title	Height	Width	Depth	Weight
1	1430-99-101-5183	Power Supply Control Unit	9 in	19 in	11 in	44 lb
2	1430-99-101-5182 1430-99-101-9885	Shaper, Electronic, Guidance Signals	9 in	19 in	11 in	28 lb
3	217486 217493	Sub-Modulator, Guidance Transmitter	9 in 9 in	19 in 19 in	11 in 11 in	32 lb 45 lb
4	217488	Modulator and R.F. Unit Guidance Transmitter	9 in	19 in	11 in	44 lb
5	217405	Switch and Indication Unit	7¾ in	19 in	11 in	23 lb
6	217400	Cabinet, Guidance and Control	52 in	21 in	12 in	130 lb
7	186165	Aerial Unit	36 in dia.		21 in	51 lb
8	217406	Cabinet, Spares Stowage	52 in	21 in	12 in	130 lb
9	217407	Cradle, Test	25½ in	31 in	25 in	174 lb

ELECTRICAL CHARACTERISTICS

R.F. Power Output	15 W Nominal
R.F. Load Impedance	75 ohms
Output Frequency	Crystal Frequency x 12
Frequency Stability	± 8 kHz
Minimum Channel Spacing	0.6 MHz
Maximum Channel Spacing	3.4 MHz
Inputs (each plane)	± 10 V d.c.

POWER REQUIREMENTS

Mains Input	115 V ± 5% 60 Hz ± 2½% 1 ph	8.0 A
Conditioning Heaters	115 V a.c. or d.c.	1.4 A
	230 V a.c. or d.c.	0.7 A
	24 V −3 V +2 V d.c.	2.0 A

CONTROL CIRCUITS

Normal operation: remote control, but local test facilities provided.

HEAT DISSIPATION

Cabinet, Guidance and Control (fitted with all units)	600 watts
Cabinet, Spares Stowage	80 watts
Cradle, Test (without chassis)	80 watts
Cradle, Test (with chassis)	400 watts

AERIAL SYSTEM

A four turn helix which is part of the outfit.

HANDBOOK

BR 2541.

ESTABLISHMENT LIST

E 1250.

INSTALLATION SPECIFICATIONS

B 897.

AERIAL CONTROL AND TERMINATION OUTFITS EUA SERIES

EUA

SUMMARY OF DATA

BRIEF DESCRIPTION

EUA(1)/(2) are antenna exchange outfits for use in Submarines: they only differ in the scale on the Depth Meter on the panel.

EUA(1) indicates antenna depth from 0 to 50 ft and is normally used with Aerial Outfit ALM(1).

EUA(2) indicates antenna depth from 0 to 800 ft and is used with Aerial Outfits ALM(2) and ALY.

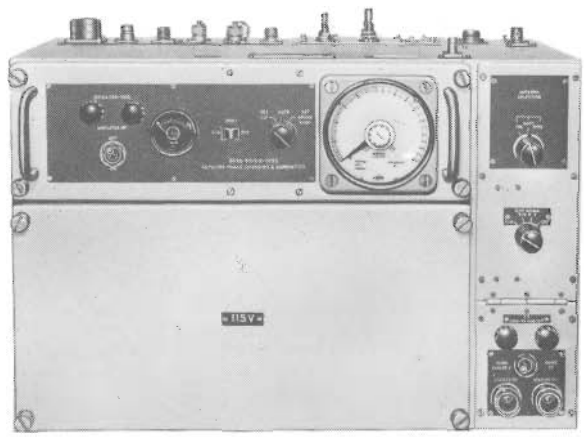
EUA(3) is an antenna exchange for submarines, and also has signal processing and Compensating facilities not available in EUA(1)/(2).

The antenna exchange is used to select the required aerial outfit and to supply power to the head amplifier.

The Mode Switch on the Control Unit (SET BROADBAND – AUTO – SET VLF) makes it possible to override the normal AUTO mode selection, if desired.

MAJOR UNIT

EUA(3) Consists solely of 5895-99-519-9292 Antenna Exchange and Indicator Unit



HANDBOOK

BR 2476

E LIST

R1504

INSTALLATION SPECIFICATION

B987