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INSTRUCTION BOOK

FOR

MODEL MT-2

RADIO TELEPHONE TRANSMITTING
AND RECEIVING EQUIPMENT

NXsr-41058-LL

Manufactured by

the hallicrafters *co.*

CHICAGO, ILL., U. S. A.

NOTICE

The Model MT-2 Radio Telephone Transmitting and Receiving Equipment consists of the following units:

- 1 TYPE CHL-43056 Radio Transmitter Receiver
- 1 TYPE CHL-20181-A Vibrator-Dynamotor Power Unit

The Model MT-2 Radio Telephone Transmitting and Receiving Equipment is referred to in the text as the Model HT-11-B Marine Radio-
phone Equipment.

INSTRUCTION BOOK
for
MODEL HT-11-B
MARINE RADIOPHONE EQUIPMENT

INSTRUCTION BOOK

FOR

MODEL MT-2

ERRATA

Refer to the alignment chart on page 13

On Band No. 1 adjust the oscillator with padder capacitor C6 instead of C5 as shown on the chart.

On Band No. 2 adjust the oscillator with padder capacitor C5 instead of C6 as shown on the chart.

Refer to LIST OF REPLACEABLE PARTS on pages 21 and 22

Change part number for capacitor C31 to CM45A202J.

Change part number for capacitor C39 to CM20A510J.

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the hallicrafters *co.*

CHICAGO, ILL., U.S.A.

G U A R A N T E E

This Radiophone is guaranteed to be free from any defect in workmanship and material that may develop within a period of ninety (90) days from date of purchase, under the terms of standard guarantee, as designated by the Radio Manufacturers Association. Any part or parts that prove defective within this period will be replaced without charge when subjected to examination at our factory, providing such defect, in our opinion, is due to faulty material or workmanship, and not caused by tampering, abuse or normal wear. All such adjustments to be made F.O.B. the factory. Should it be necessary to return any part or parts to the factory, a "Return Material Permit" must be obtained in advance by first writing the Adjustment Department, who will issue due authorization under the terms of the guarantee. The Hallicrafters Co., reserves the right to make changes in design or add improvements to instruments manufactured by them without incurring any obligation to install the same in any instrument purchased.

ALL HALLICRAFTERS Radiophones are built under Patents of the Radio Corporation of America and the American Telephone and Telegraph Company.

TABLE OF CONTENTS

<u>Section</u>	<u>Subject</u>	<u>Page</u>
A.	Description of Equipment.	2
A-1	General	2
A-2	Radiophone Unit	2
A-3	Power Unit.	2
B.	Circuit Functions	2
B-1	Receiver Section.	2
B-2	Transmitter Section	6
B-3	Filament Circuit.	6
B-4	Power Supply Section.	7
C.	Installation.	7
C-1	Caution	7
C-2	Unpacking	7
C-3	Wiring Considerations	7
C-4	Antenna Recommendations	9
D.	Adjustment And Operation.	9
D-1	Receiver Adjustment	9
D-2	Transmitter Adjustment.	9
D-3	Receiver Operation.	12
D-4	Transmitter Operation	12
E.	Alignment And Service	12
E-1	Receiver Alignment.	12
E-2	Service	13
F.	Supplementary Data.	13
F-1	Weights	13
F-2	Dimensions.	13
F-3	Battery Drain	13
F-4	Power Unit.	13
F-5	HT-11-B Voltage Chart (6-volt installation)	14
F-6	HT-11-B Voltage Chart (12-volt installation).	15
F-7	Power Unit Voltage Chart.	16
F-8	List Of Replaceable Parts	17
F-9	Index To Parts Manufacturers.	29

DIAGRAMS AND ILLUSTRATIONS

<u>Figure</u>	<u>Subject</u>	<u>Page</u>
1	Model HT-11-B Marine Radiophone, power supply, and interconnecting cable	1
2	Model HT-11-B Marine Radiophone, schematic diagram.	3
3	Model HT-11-B Marine Radiophone, top view with cover removed.	4
4	Model HT-11-B Marine Radiophone, bottom view with cover removed	4
5	Model HT-11-B power unit, dust cover removed.	5
6	Model HT-11-B power unit, bottom view, dust cover and bottom plate removed	5
7	Suggested Marine Antenna Installations.	8
8	Model HT-11-B Marine Radiophone, showing location of important adjustment points	11



Figure 1 - Model HT-11-B Marine Radiophone, power supply, and interconnecting cable.

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INSTRUCTION BOOK FOR MODEL HT-11-B
MARINE RADIOPHONE EQUIPMENT
A. DESCRIPTION OF EQUIPMENT

A-1. GENERAL - The Model HT-11-B Marine Radiophone consists of a radio-telephone transmitter and receiver housed in a sturdy table mounting cabinet. A separate cabinet housing the power supply is electrically connected to the radiophone unit by an eight-foot shielded cable. The equipment provides telephone communication over a frequency range from 1500 KC. to 3000 KC. The installation requires either a 6-volt D-C or 12-volt D-C source of power, depending on the type of power supply purchased. See figure 1.

A-2. RADIOPHONE UNIT - This component consists of a transmitter and receiver mounted on a plated steel chassis which is in turn housed in a steel cabinet. All metal parts are plated and painted to insure resistance to corrosion. The transmitter is capable of delivering 11 watts of crystal controlled carrier power to a single wire antenna of varying length, depending on space requirements, demanded by the installation. The transmitter is pre-tuned to any three frequencies between 1500 KC. and 3000 KC. which are then selected by the TRANSMITTER FREQUENCY switch located on the front panel. Push-to-talk facilities are provided for quick, convenient operation, relays being used throughout the equipment to handle the switching requirements. The receiver is a five tube superheterodyne providing continuous coverage from 1500 KC. to 3000 KC. The range is divided into two bands, the desired band being selected by the RECEIVER BAND SWITCH located on the front panel of the unit. To the right of this control is the conventional volume control which controls the audio level reaching either the

handset ear-piece or the speaker. The use of either speaker or handset for reception is controlled by the SPKR-PHONES switch located to the left of the speaker escutcheon.

The tube complement for the radiophone unit is as follows:

In the Receiver:

- V₁ - Type 6SK7 - radio frequency amplifier
- V₂ - Type 6K8 - high frequency oscillator and mixer
- V₃ - Type 6SK7 - intermediate frequency amplifier
- V₄ - Type 6SQ7 - second detector, AVC and 1st audio
- V₅ - Type 6K6G - audio amplifier

In the Transmitter:

- V₆ - Type 807 - radio frequency power amplifier
- V₇ - Type 6V6 - radio frequency oscillator
- V₈ - Type 6V6 - modulator
- V₉ - Type 6V6 - modulator

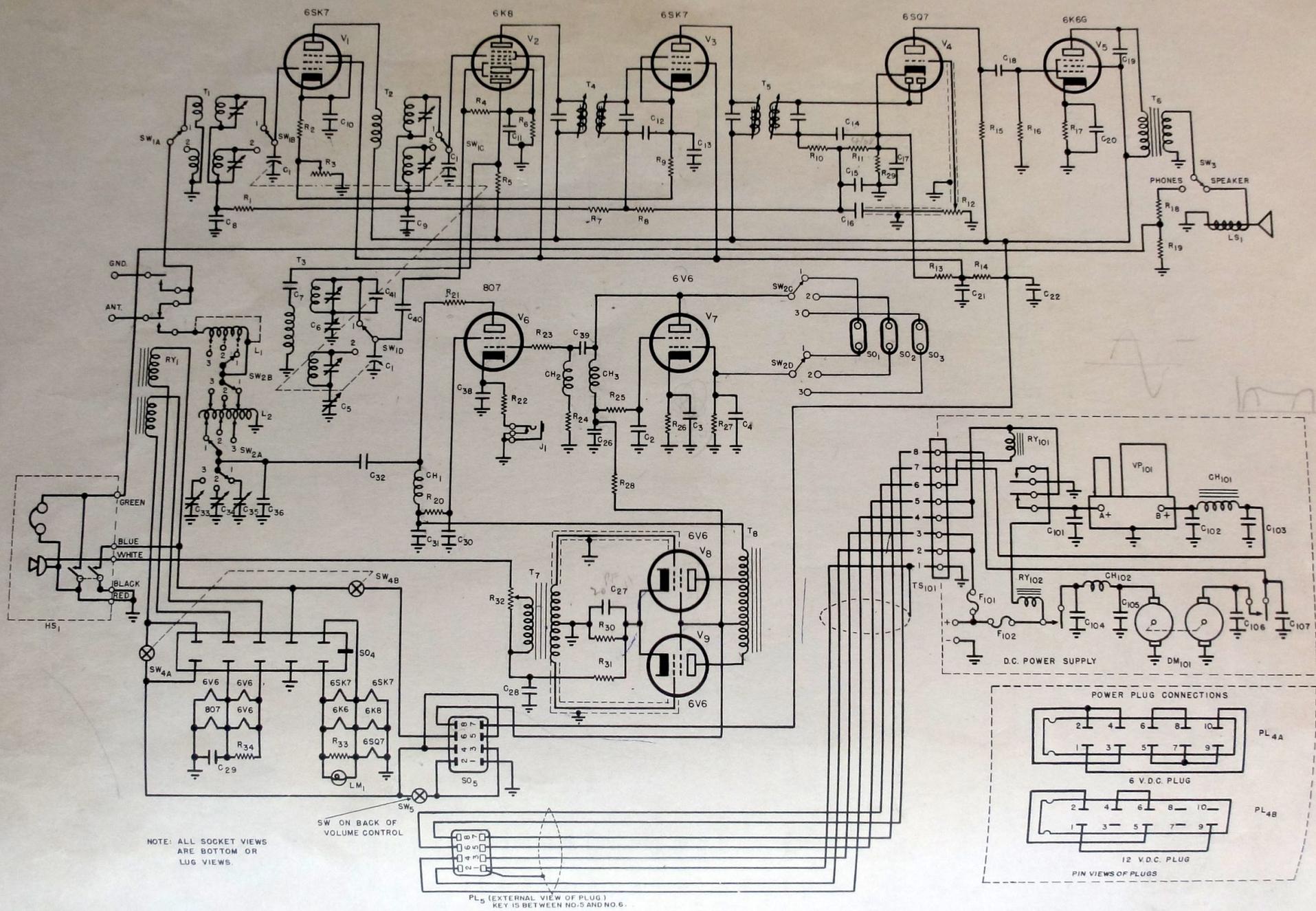
A-3. POWER UNIT - The power unit for the Model HT-11-B supplies both filament and plate power to the radiophone unit through the interconnecting cable. Plate voltage for the transmitter section is supplied from the built-in motor generator, DM₁₀₁. Plate voltage for the receiver section is supplied from the vibrator supply, VP₁₀₁. Both circuits are adequately filtered to insure hum free operation of the transmitter and receiver. Noise filtering circuits are used liberally to avoid vibrator and commutator "hash".

B. CIRCUIT FUNCTIONS

B-1. RECEIVER SECTION - The receiver is a conventional superheterodyne with one stage of tuned radio frequency amplification. Refer to figure 2. The signal voltage is fed from the antenna to one of the two primaries of transformer T₁ through the antenna change-over relay RY₁. The primary selected depends upon the position of the RECEIVER BAND SWITCH (SW_{1A}, SW_{1B}, SW_{1C} and SW_{1D}). Since both bands operate alike as far as the electrical circuit is concerned, functions of the circuit will be described with the band switch in position #1. The signal voltage induced in the secondary winding of T₁ is fed to the control grid of the 6SK7 radio frequency amplifier tube (V₁) where it is ampli-

fied and fed to the grid of the 6K8 converter tube (V₂) through transformer T₂. The 6K8 tube (V₂) also serves as an oscillator, the frequency of which is determined by transformer T₃, its padders, trimmers and tuning condenser section of condenser C₁. The coupling between the oscillator and converter stage occurs within the 6K8 tube (V₂) and the resulting 455 KC. voltage is fed to the grid of the 6SK7 intermediate amplifier tube (V₃) through transformer T₄. Tube V₃ amplifies the intermediate frequency signal voltage and transformer T₅ couples the output of V₃ to the diode section of the 6SQ7 second detector tube (V₄). The second detector is a conventional diode

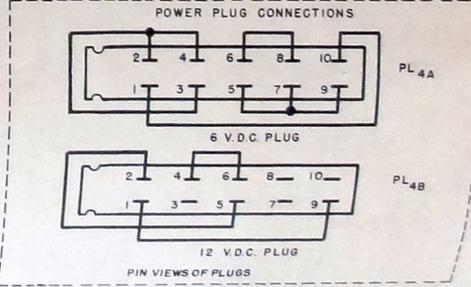
Figure 2 - Model HT-11-B Marine Radiophone, schematic diagram.



NOTE: ALL SOCKET VIEWS ARE BOTTOM OR LUG VIEWS.

SW ON BACK OF VOLUME CONTROL

PL5 (EXTERNAL VIEW OF PLUG) KEY IS BETWEEN NO.5 AND NO.6.



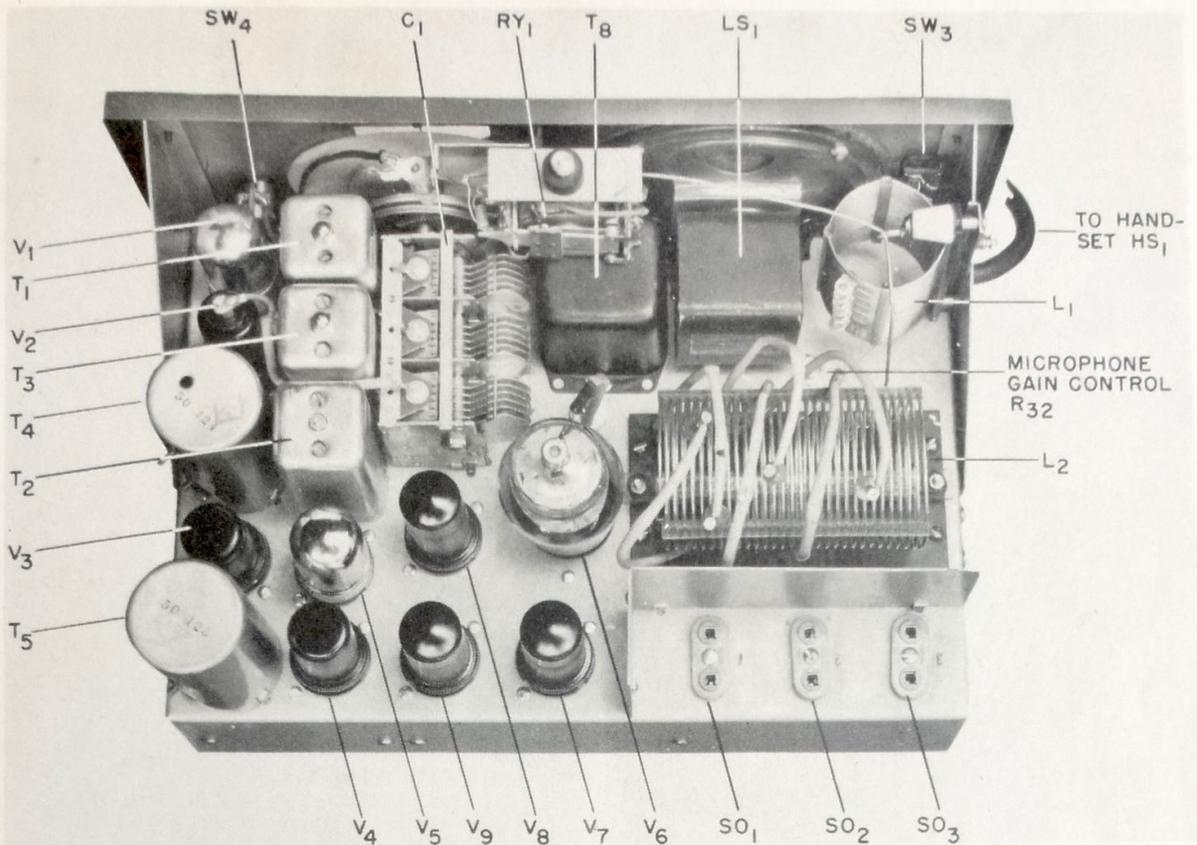
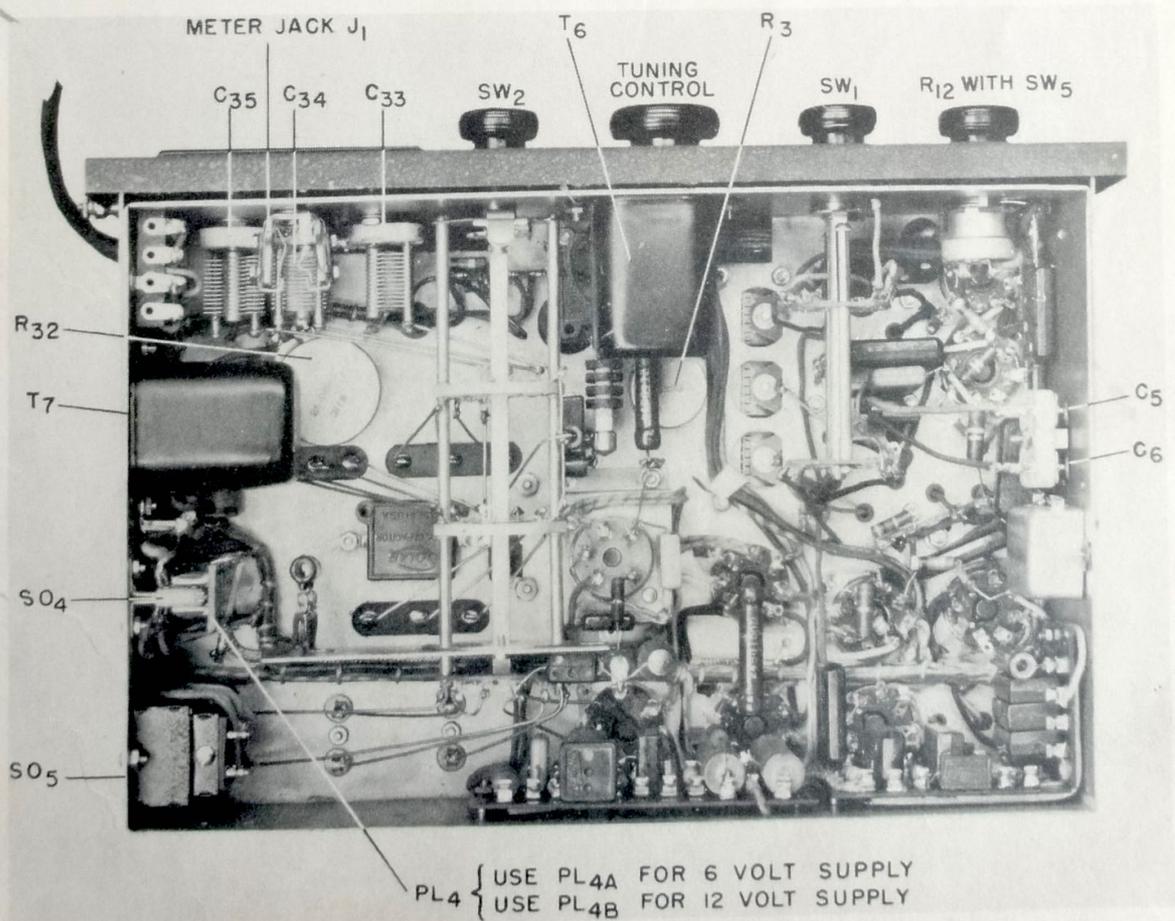


Figure 3 - Model HT-11-B Marine Radiophone, top view with cover removed.



Model HT-11-B Marine Radiophone, bottom view with cover removed.

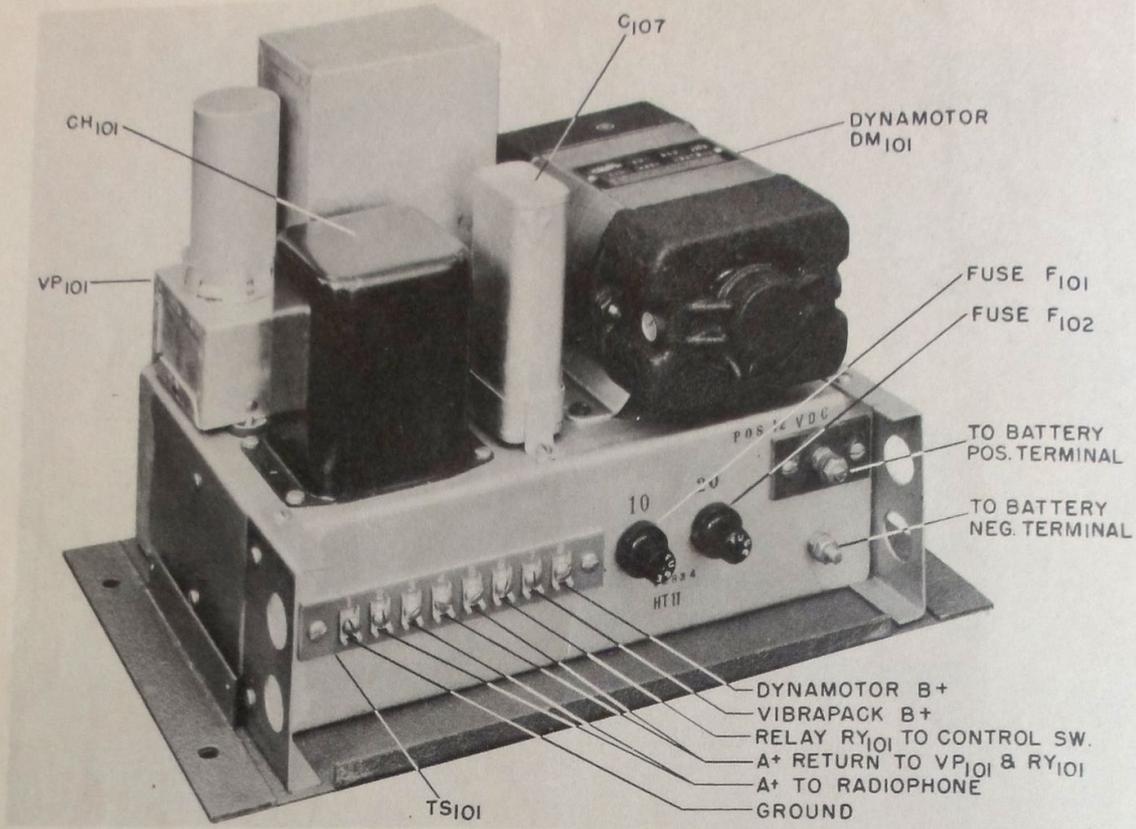


Figure 5 - Model HT-11-B power unit, dust cover removed.

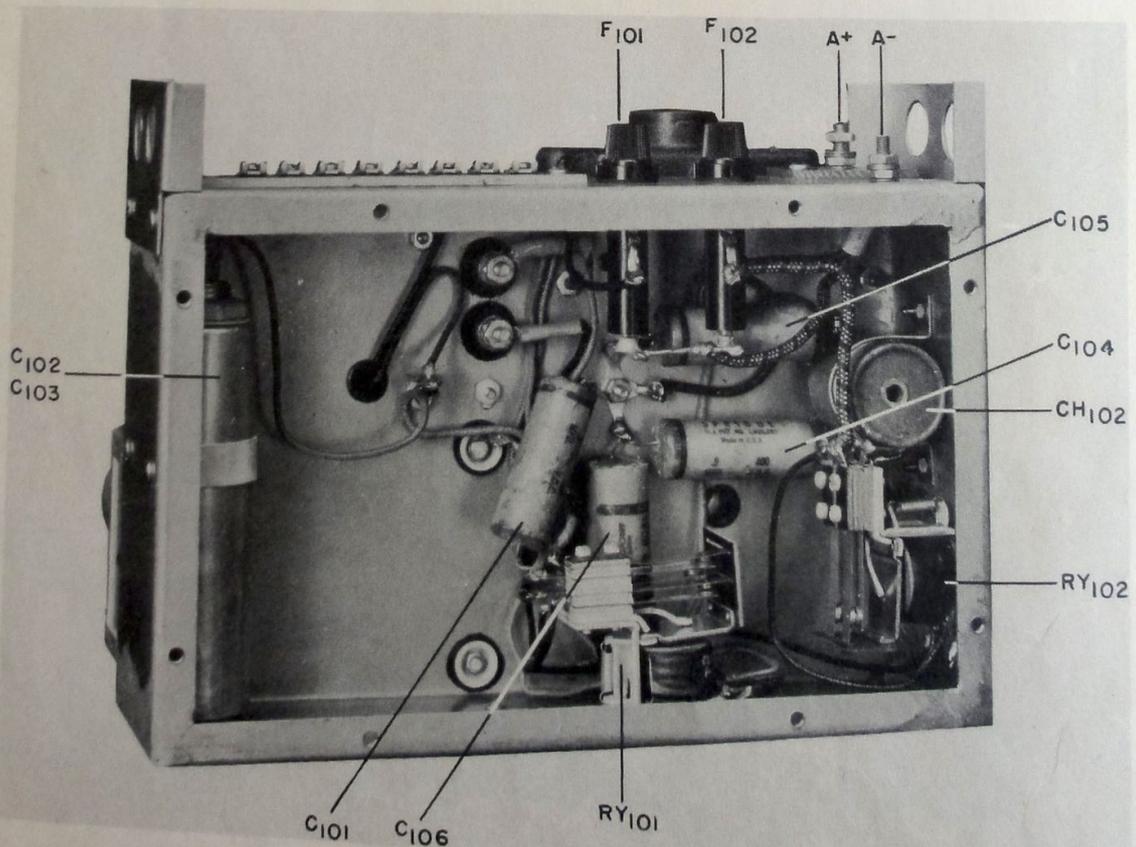


Figure 6 - Model HT-11-B power unit, bottom view, dust cover and bottom plate removed.

detector. The a-v-o voltage developed by the second detector is fed through the a-v-o filter to the control grids of the r-f amplifier, converter, and i-f amplifier stages to provide a reasonably constant audio output over a wide range of carrier levels. The r-f gain of the receiver is adjusted by the r-f gain control, R_3 , which is adjusted by a screw driver at the time the radiophone is placed in operation. Refer to SECTION E. R_3 is a variable resistor inserted in series with the cathode returns of the r-f and i-f amplifier tubes V_1 and V_3 respectively. The audio frequency voltage developed by the diode section of the second detector tube (V_4) is capacity coupled, by condenser C_{16} , to the triode section of the same tube. The audio gain is controlled by the variable resistor, R_{12} , which is located on the panel of the radiophone unit (marked VOLUME). The audio frequency voltage developed in the plate circuit of the second detector (V_4) is capacity coupled to the grid of the audio amplifier tube V_5 which is operated as a class A amplifier. The audio frequency power output of tube V_5 is coupled to the loudspeaker or handset by transformer T_6 . The use of either the headset ear-piece or the speaker is selected by switch SW_3 located on the front panel of the radiophone (marked SPKR-PHONES). Since the audio level is much too high for headset operation, the voltage divider network R_{18} and R_{19} is inserted in the handset circuit to attenuate the signal.

B-2. TRANSMITTER SECTION - The transmitter is of the two stage oscillator-amplifier type. It consists of a 6V6 crystal controlled oscillator tube (V_7) and an 807 power amplifier tube (V_6), modulated by a pair of 6V6 tubes (V_8 and V_9) operating in class AB. The crystal oscillator is of the Pierce type employing one of three crystals selected by the TRANSMITTER FREQUENCY switch (sections SW_{2C} and SW_{2D}) located on the front panel of the radiophone. The crystal selected by the switch is connected between the plate and control grid of the oscillator tube (V_7) and becomes the frequency determining element in the transmitter. The r-f voltage developed in the plate circuit of tube V_7 is then capacity coupled to the control grid of the power amplifier tube V_6 . The 807 power amplifier is a screen grid tube requiring no neutralization; hence a relatively simple amplifier to adjust. The bias voltage for the stage is developed across grid resistors R_{24} and cathode resistor R_{22} . When tuning the stage, a milliammeter is inserted into jack J_1 located in the cathode circuit, which then reads

the combined plate, screen grid and control grid current of the tube. The plate circuit of the power amplifier tube is the conventional parallel fed tank circuit. The plate of the power amplifier tube is coupled to the parallel resonant circuit by condenser C_{32} . The d-c plate current is fed through the radio frequency choke CH_1 . The tank circuit of the power amplifier consists of coil L_2 and condenser C_{36} in parallel. Across condenser C_{36} are connected variable condensers C_{33} , C_{34} and C_{35} . Condensers C_{33} , C_{34} and C_{35} are switched into the circuit by the TRANSMITTER FREQUENCY switch (SW_{2A}) and are adjusted to resonate the tank circuit to the particular frequency of transmission. In addition to switching in the variable condensers, the inductance of coil L_2 is varied simultaneously by the three "P" clips on the coil unit. The antenna is coupled to the final amplifier either directly through the "A" clips, being switched by the TRANSMITTER FREQUENCY switch (SW_{2B}), or through the loading coil L_1 which is also tapped and switched by SW_{2B} . The loading coil is necessary where antenna space is limited and the antenna must be shorter than the resonant length. By pre-setting these condensers and coil taps, the transmitter will be tuned and ready for instant use on any of the three frequencies selected. The antenna current is fed through the antenna change-over relay (RY_1) so that one antenna serves both receiver and transmitter. The power amplifier is modulated by tubes V_8 and V_9 . The control grids of the modulators obtain the audio voltage from the handset's microphone through transformer T_7 . The microphone current for the handset is obtained from the cathode circuit of the modulator tubes, and controlled by resistor R_{32} which is located on the chassis and adjusted by screwdriver when the set is installed. The single stage modulator is made possible by the fact that the 6V6 tubes have a high voltage gain as well as adequate power capabilities to modulate the r-f amplifier. The plate circuit of the modulator tubes is matched to the class C load by transformer T_8 .

B-3. FILAMENT CIRCUIT - Referring to figure 2, note that the filaments of the transmitter tubes and receiver tubes are not wired in parallel as is the usual case, but are wired in a series parallel combination. This method of wiring is necessary as the radiophone unit is designed to operate from either 6 or 12-volts D-C. When operating from a 6-volt source, the jumper plug PL_{4A} is inserted in socket SO_4 ; thus connecting the filaments and the two

windings of relay RY_1 all in parallel. When operating from a 12-volt source, the jumper plug PL_{4B} is inserted in socket SO_4 which then connects the filaments of pairs of tubes in series; the pairs are in turn connected in parallel. The two windings of relay RY_1 are then wired in series, each winding normally operating on 6-volts.

8-4. POWER SUPPLY SECTION - The power supply consists of a vibrator type of supply for the plate voltage requirements of the receiver and a dynamotor supply for the transmitter plate voltage. The equipment is protected by fuses F_{101} and F_{102} . Fuse F_{101} protects the filaments of all tubes and the vibrator supply unit (VP_{101}) for the receiver plate supply. Fuse F_{102} protects the primary winding of the dynamotor (DM_{101}). The d-c battery current, after passing through fuse F_{101} , goes through the interconnecting cable to the radiophone unit. From socket SO_5 in the radiophone, the d-c battery current goes to the main switch (SW_5) located on the back of the volume control. After passing through this switch, one branch feeds current to the receiver tube filaments, another branch feeds the current back through the interconnecting cable to the vibrapack supply providing plate voltage for the receiver, and the third branch carries current to one pole of

the TRANS. FILS. switch (SW_{4A}). Turning on switch SW_4 supplies the filaments of the transmitter tubes and applies a positive potential to the winding of the antenna change over relay. With the TRANS. FILS. switch shut off, the antenna relay will not operate when the push-to-talk switch on the hand set is pressed. The remaining pole of the TRANS. FIL. switch (SW_{4B}) (set at ON) supplies a return path to ground, or negative side of the d-c battery supply, for the vibrator supply relay RY_{101} so that when the handset switch is closed both relays (RY_1 and RY_{101}) will close connecting the antenna to the transmitter and disconnecting the vibrator supply (VP_{101}) from the battery. When relay RY_{101} closes, it also applies battery current to relay RY_{102} which turns on the dynamotor plate voltage.

Hum free operation for the receiver is insured by the low pass filter made up of condensers C_{102} and C_{103} and choke CH_{101} connected in a pi-section network. Commutator ripple in the high voltage supply for the transmitter is filtered out by condenser C_{107} . Unwanted noises, such as commutator hash, vibrator hash and etc. are filtered out by condenser C_{101} on the input of the vibrapack and by a pi-section network composed of condensers C_{104} and C_{105} and choke CH_{102} on the input side of the dynamotor.

C. INSTALLATION

C-1. CAUTION - High voltages at various points in the radiophone unit and power supply unit are dangerous. Extreme care should be exercised when either unit is being serviced. Disconnect battery leads if necessary. During transmissions, the r-f voltage on the antenna lead is capable of inflicting a severe burn if contacted. Once the transmitter has been properly adjusted, it will not be necessary to open the cover door of the radiophone; in any event do not open the cover door with the TRANS. FILS. switch set at ON.

C-2. UNPACKING - Remove the radiophone and power supply from their cartons and inspect carefully for damages that might have occurred during transit. In the event that any of the equipment has been damaged, file a claim at once with the transportation company.

C-3. WIRING CONSIDERATIONS - The radiophone unit should be located as near to the antenna and ground connections as possible, i.e. the connection between the antenna feed-thru insulator and the radiophone should be as short as the installation will

allow. The power supply unit, which is connected to the radiophone by the 8-foot cable, must be located as near to the d-c source as possible to avoid excessive voltage drop in the inter-connecting wires. Battery leads should be at least of #8 wire for the 6-volt installation and #12 wire for the 12-volt installation. The ground terminals of the radiophone, power supply, battery system and ground plate must all be well interconnected electrically. Check for a potential difference between the ground plate and other metal parts, such as screw and rudder which are below the water line. Electrolytic action resulting from any potential difference, will seriously erode those metal parts. Four conduit terminations, two on each side of the power supply, are provided for conduit or armored cable type of installations. The radiophone unit and power unit should be mounted base down and well anchored. To anchor the radiophone, remove 4 screws holding the front panel to the cabinet and pull the panel and chassis forward and out of the cabinet. Anchor the cabinet to the location, and replace the chassis and screws. The power supply is mounted, using the 4

Note that on ship an insula ing as an ante able installati the maximum for this type of time keeping of the canvas.

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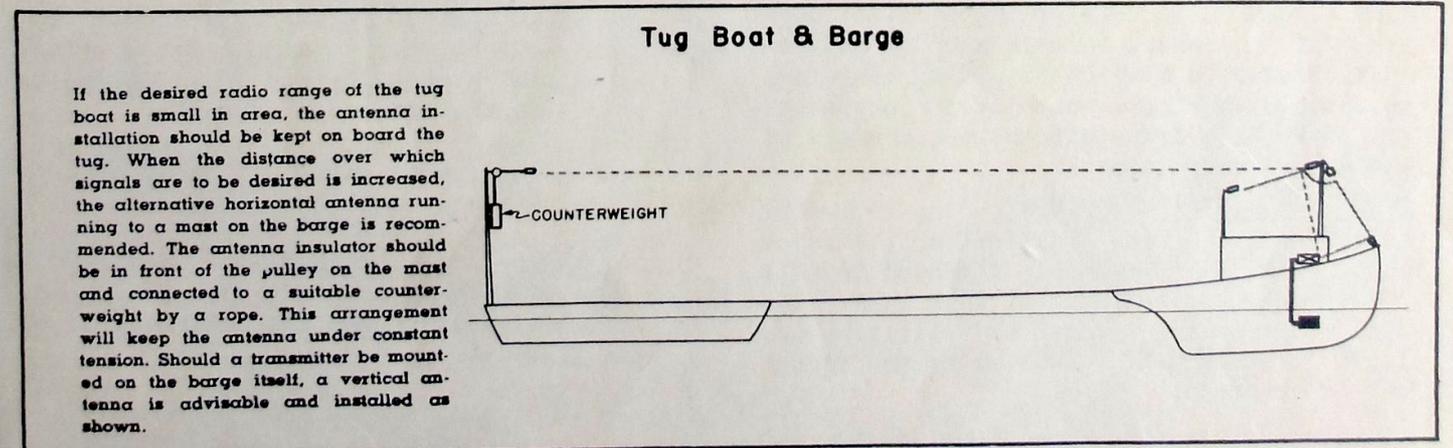
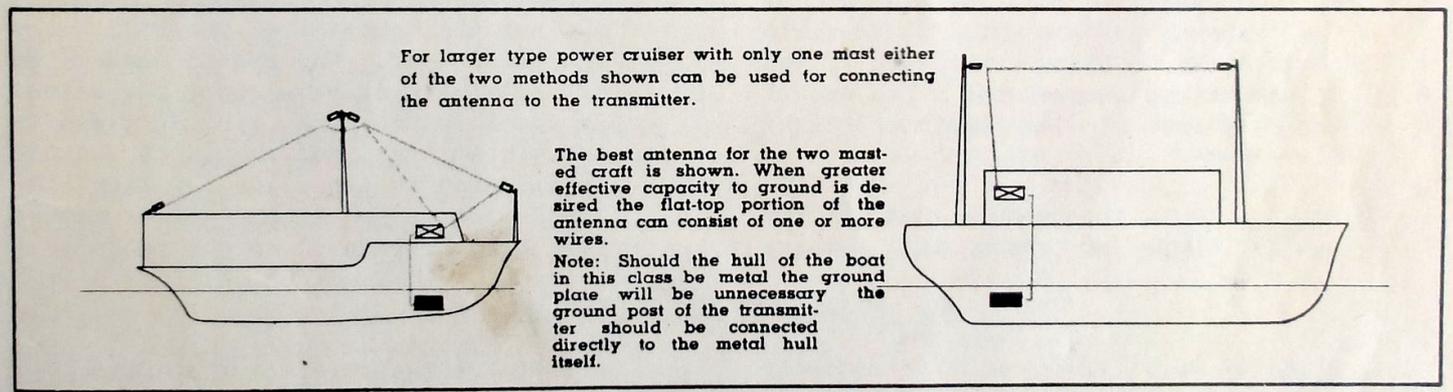
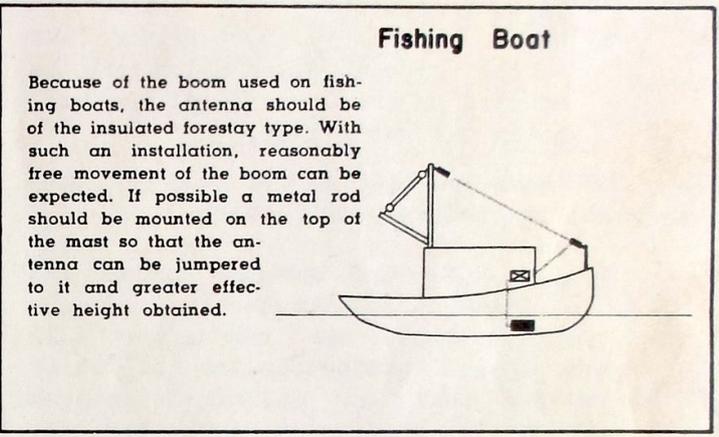
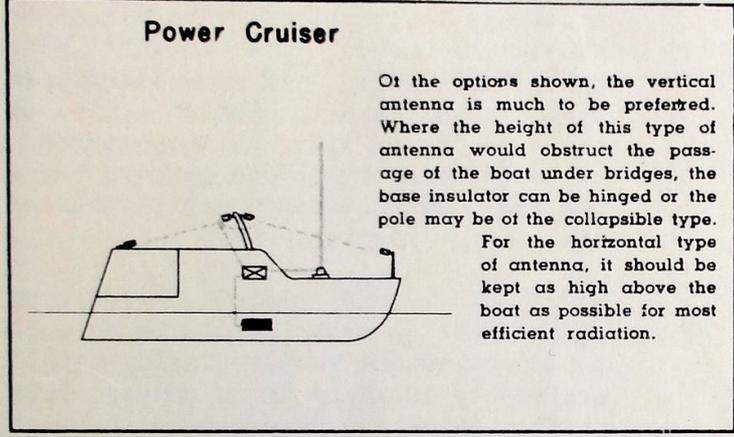
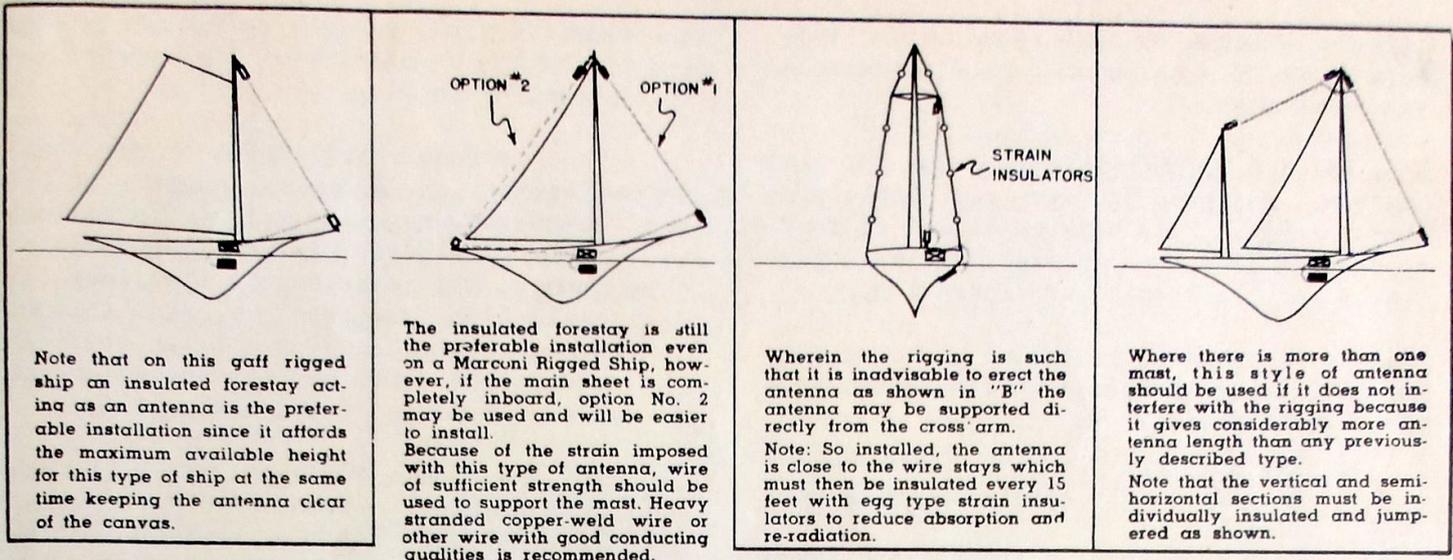


Figure 7 - Suggested Marine Antenna Installations.

holes in the flanges located on either side. Some form of shock mounting is recommended for both units.

C-4. ANTENNA RECOMMENDATIONS - The HT-11-B has been designed to match any single wire whose length runs between 28 and 85 feet. An antenna less than 28 feet long will generally require special consideration.

When an antenna is installed on board ship the following points should be given primary consideration:

1. Maximum possible height above water.
2. Maximum length consistent with uniform height.
3. Good insulation of antenna and lead-in to transmitter.
4. Use a reasonably short ground lead to the ground plate which must be mounted on the outside of the hull below the water line.

Each of these requisites for good performance are treated in detail below.

No. 1 - Both the antenna proper and the lead-in constitute the antenna system. Since the transmitter will always be located in the hull it is obvious that one end of the antenna system will be close to the waterline. It is imperative that the free end of the antenna be as high as possible above water. (Note that each of the illustrations shows the free end of the antenna at the maximum height above water).

No. 2 - It is improbable that in the smaller type of craft the antenna

length will ever be sufficiently long enough to eliminate the use of the "loading coil".

The loading coil makes up for a deficiency in antenna length - as encountered on small craft. The loading coil dissipates rather than radiates power, so consequently the ideal installation utilizes as much antenna and as little loading coil as possible consistent with maximum radiation and proper loading of the transmitter.

No. 3 - Strain or egg shaped insulators are not recommended for antenna insulation. Any good tension insulator of glass or glazed porcelain with a leakage length of at least 8 inches should be used. The antenna wire should be solid #12 enameled copper wire. The lead-in, which can be of the same type wire as the antenna, connects directly to the lead-in bushing and must not touch any portion of the boat or rigging.

No. 4 - A ground plate at least 20 square feet in area should be of copper or equivalent rust-resisting metal, preferably 20 gauge in thickness. This sheet, which may be of any convenient shape, should be fastened tightly against the outside of the hull below the water line. The ground lead of #8 copper wire must be as short and direct as possible from the ground plate to the transmitter, and should be securely soldered to the plate. After installation, the ground plate may be left bare or painted as you prefer.

D. ADJUSTMENT AND OPERATION

D-1. RECEIVER ADJUSTMENT - All adjustments necessary have been made at the factory during the alignment of the receiver section. If the receiver is in need of adjustment, refer to SECTION E. Only competent personnel, equipped with the necessary equipment, should be allowed to make any of the adjustments necessary.

D-2. TRANSMITTER ADJUSTMENT - The following adjustments on the transmitter should be made only by personnel licensed to make adjustments on equipment of this type. The following tuning procedure will give the least trouble when setting up the transmitter channels:

- (1) Remove the two screws holding the top cover down, and open the cover door.

- (2) Insert the crystals in sockets SO₁, SO₂ and SO₃, placing the crystal of highest frequency in socket SO₃. Insert the remaining two crystals in socket SO₁ and SO₂, depending on the frequency sequence.

- (3) Disconnect all "A" clip connections to coil L₂.

- (4) Set the TRANSMITTER FREQUENCY switch at position #1, #2, or #3, depending on the channel to be tuned.

- (5) In the 1500 - 2100 KC range, the "P" clips will be located on the left-hand portion of coil L₂ while in the 2100 - 3000 KC range, the

"P" clips will fall along the right half of the coil length. Estimate the location for "P" clip #1, #2, or #3.

- (6) Remove the tuning chart card from its holder below the speaker escutcheon. The holes there, reading from left to right, are for access to the plate tuning condensers; one for each channel.
- (7) Connect a milliammeter (0-150 ma.) to a phone plug (+ terminal of meter to tip of plug) and insert into jack located below the three condenser adjustment holes. The meter will read the cathode current of the amplifier tube (V_6) when the transmitter is in operation.
- (8) Turn on the radiophone by turning the VOLUME control until the switch clicks.
- (9) Set the TRANS. FILS. switch at ON. Allow about 5 minutes for filaments to warm up.
- (10) Turn on the transmitter plate supply by pressing the push-to-talk switch on the handset, and rotate the plate tuning condenser for the channel being adjusted until the milliammeter reading decreases indicating resonance. If there is no resonant point throughout 360 degrees of rotation, relocate the "P" clip and repeat the process until resonance occurs. At resonance, the milliammeter will read approximately 40 milliamperes which represents power amplifier plate, screen, and grid current since the meter is connected in the cathode of the power amplifier tube.
- (11) To complete the tuning of the channel, the "A" clip bearing the channel number is clipped to the tank coil L_2 . The final position of this clip will depend upon the electrical characteristics of the antenna. In general, start at the left end of the coil and work toward the right, moving the clip two or three turns at a time for rough adjustment. With each new setting of the clip, re-establish resonance by adjusting the tank

condenser for the dip in the milliammeter reading. Continue adjusting the "A" clip until the milliammeter reads 75 MA. at resonance.

Note: If the plate current of 75 MA. cannot be obtained, the following step will be required to complete the tuning of the channel:

- (12) Any antenna which is electrically too short to resonate at the transmitter frequency must be "loaded" by inserting an additional coil in series with it. To do this, unsolder the jumper on the "L" terminal bearing the channel number and insert a piece of flexible wire between the "L" terminal and the highest lug on the loading coil L_1 . (After the proper tap has been located, replace the flexible lead with a solid wire of the same gage used in the loading coil). Repeat the tuning procedure outlined in step (11). If the antenna is still too short electrically, move the tap on the loading coil down to the next lug and try again. Note that the inductance of the loading coil increases as the tap is moved down toward the bottom of the coil. If the whole loading coil is needed, leave the "L" lug on the tank coil strip unconnected. Bear in mind that the loading coil does not contribute to the radiation field, but dissipates energy due to its resistance; hence a small loading coil is preferred.
- (13) After the channels have been adjusted as described, check the percentage of modulation. The microphone gain control has been adjusted to provide about 95% modulation, however, the operator may require more or less gain depending on the characteristics of his voice. In any case the adjustment should be made with the aid of an oscilloscope to avoid overmodulation, which results in an interfering signal. See figure 3 for the location of this control. After completing the adjustment, close the cabinet cover and replace the two screws, as no further access to the inside of the cabinet will be required during normal operation.

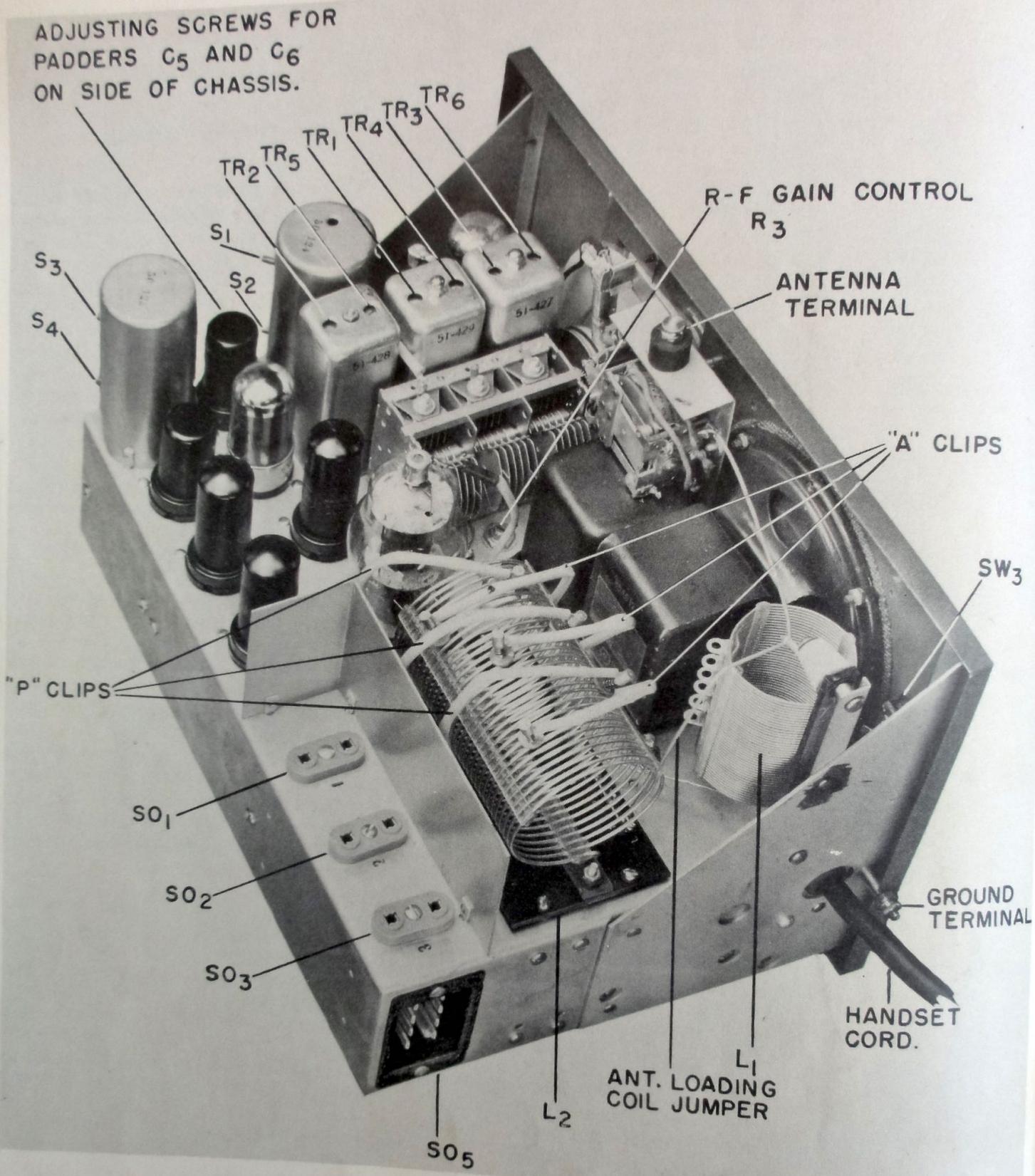


Figure 8 - Model HT-11-B Marine Radiophone, showing location of important adjustment points.

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D-3. RECEIVER OPERATION - When not in operation, the VOLUME control and TRANS. FILS. switch should be set at OFF. To operate the receiver, the following steps are essential:

- (1) Rotate the VOLUME control to the right until the switch on it clicks.
- (2) Set the RECEIVER BAND SWITCH at either position #1 or position #2. Position #1 covers 1500 to 2100 KC. and position #2 covers 2100 to 3000 KC.
- (3) After allowing sufficient time for the filaments to warm up, advance the VOLUME control to the right until the background noise is heard either in the ear-piece of the handset or in the speaker, depending upon the position of the SPKR-PHONES switch located to the left of the speaker escutcheon.
- (4) Rotate the TUNING control to select the frequency of reception which is read directly on the illuminated dial scale above and to the right of the TUNING control.
- (5) To shut off the receiver, merely rotate the VOLUME control to the left until the switch clicks and the white dot on the control is opposite the word OFF.

D-4. TRANSMITTER OPERATION - As described in receiver operation above, the set is completely turned off when the VOLUME control switch and the TRANS. FILS. switch are set at OFF. To turn off the transmitter portion of the radiophone only, set the TRANS. FILS. switch at OFF. The following steps are essential in the operation of the transmitter.

E. ALIGNMENT AND SERVICE

E-1. RECEIVER ALIGNMENT - The equipment necessary to align the receiver section of the radiophone consists of a signal generator, audio level meter, nonmetallic screwdriver, and a dummy antenna. The signal generator must be capable of generating a tone modulated 455 KC. signal and also cover the receiver's frequency range, namely, 1500 KC. to 3000 KC. The dummy antenna consists of a 200 mmfd condenser.

To get at the receiver, disconnect the antenna, ground and power plug. Remove the

(1) If the receiver is not already in operation, turn the VOLUME control to the right until its switch clicks. The transmitter cannot operate unless the receiver is turned on, although the receiver does not operate during transmission periods.

(2) Set the TRANS. FILS. switch at ON and allow about 5 minutes for the filaments to warm up.

Caution: The push-to-talk switch on the handset is now active. Do not press this switch and turn on the TRANS. FILS. switch at the same time.

(3) Set the TRANSMITTER FREQUENCY switch at one of its three positions, depending upon the frequency of transmission desired.

(4) Pick up the hand set and press the push-to-talk switch. Note that this puts the carrier on the air and turns off the receiver.

(5) Treat the handset as you would a telephone, remembering that you must release the press-to-talk switch each time it is your turn to listen.

(6) To shut down the station, put the handset in its clip, set the TRANS. FILS. switch at OFF, and rotate the VOLUME control to the left until its switch clicks. To shut off the transmitter only, set the TRANS. FILS. switch at OFF. This turns off the transmitter filaments and disconnects the press-to-talk switch on the handset, but permits the operator to use the receiver without the additional battery drain caused by the transmitter tube filaments.

four screws holding the chassis in the cabinet and pull out the chassis assembly. Connect the power cable to the chassis, and reconnect the ground wire.

First adjust the intermediate amplifier. Connect the signal generator's hot lead to the grid of the 6K8 tube (V_2), (Remove the grid connection in the receiver) and the ground lead to the chassis. Connect the output meter between the center soldering lug of the SPKR-PHONES switch (SW_3) and the chassis. Turn on the receiver and set

the VOLUME control for maximum volume. Set the signal generator at 455 KC. and adjust the slugs S₁, S₂, S₃, and S₄ on the sides of transformers T₄ and T₅ for maximum audio output. Refer to figure 8 for the location of the slugs.

Now adjust the radio frequency stages. Disconnect the generator's hot lead from the grid cap of the 6K8 and reconnect the grid lead. Connect the hot lead of the signal generator to the antenna post of the radiophone through the 200 mmfd dummy antenna condenser.

Set the signal generator and receiver at the settings shown in the alignment chart and adjust for maximum audio output. Make the adjustments with the volume control set at maximum. Refer to figure 8 for location of adjustment screws.

After the set is properly aligned check the sensitivity. It should run about 6 microvolts at 3000 KC. and 10 microvolts at 1500 KC. for 50 milliwatts of audio output.

The sensitivity of the set is controlled by the r-f gain control located on the chassis deck to the left of the receiver's main tuning gang. See figure 8. This adjustment is set at maximum gain when the set leaves the factory. Its setting will be determined by the installation. If local contacts only are to be made, the r-f gain control can be backed off to reduce the noise level.

E-2. SERVICE - For dependable service, keep the units clean and dry. At least once a year or oftener, depending upon service demands, clean the relay contacts with fine crocus cloth, emery paper, or an ignition file. There are three relays in the entire installation, one located in the radiophone unit and two in the power supply. The two in the power supply are reached by removing the dust cover and bottom plate from the chassis. See figure 6 for location of the power supply components. Tube life will vary from installation to installation, probably depending greatly upon the amount of vibration to which they are subjected. It is recommended that the tubes be given a check up every six months to a year.

RF & OSC. ALIGNMENT PROCEDURE						
Band	Rec. Dial Setting	Sig. Gen. Freq.	Dummy Antenna	HIGH FREQ. SETTING		LOW FREQ. SETTING
				Adjust Osc. With	Adjust Trimmers For Max. Gain	Adjust Osc. With
1	2100 KC	2100 KC	200 mmf	TR ₁	TR ₂ TR ₃	No Adjust.
1	1500 KC	1500 KC	200 mmf	No Adjust.	No Adjust.	C ₅
2	3000 KC	3000 KC	200 mmf	TR ₄	TR ₅ TR ₆	No Adjust.
2	2200 KC	2200 KC	200 mmf	No Adjust.	No Adjust.	C ₆

F. SUPPLEMENTARY DATA

F-1. WEIGHTS - The radiophone unit weighs 27 pounds and the power supply unit weighs 33 pounds.

F-2. DIMENSIONS - The radiophone unit measures 16 3/4 inches wide, 9 3/4 inches high, and 10 inches deep. These dimensions are clearance dimensions and include the handset and the antenna insulator.

The power supply unit measures 13 inches wide, 9 3/8 inches high, and 8 3/8 inches deep overall.

F-3. BATTERY DRAIN - The radio equipment requires the following amount of battery current:

	6-volt installation	12-volt installation
Receiving	7.5 amperes	3.8 amperes
Transmitting	19.0 amperes	10.8 amperes

F-4. POWER UNIT - The model HT-11-B Radiophone has been designed to operate from a 6 or 12-volt source. This does not mean that the power supply you have will operate on either 6-volts or 12-volts. Operate the supply at the voltage specified for your unit, it will be either the 6-volt model or the 12-volt model. The radiophone unit will operate with either supply.

When installing the equipment, check to see that the jumper plug for socket SO₄ (Refer to figures 2 and 4) is wired for the supply voltage you are using. Plug PL_{4A} is to be used for 6-volt operation and PL_{4B} is to be used for 12-volt operation.

If the vibrator supply (VP₁₀₁) in your power unit is equipped with a 4-position switch be sure that it is set at position #2. This setting provides the proper voltage for the receiver. Refer to the voltage charts in this section.

Note: P

TUBE TY

V₁ 6S

V₂ 6

V₃ 6S

V₄ 6S

V₅ 6L

V₆

V₇

V₈

V₉

TUBE T

V₁ 6

V₂

V₃ 6

V₄ 6

V₅ 6

V₆

V₇

V₈

V₉

"NR"

* Res

† Res

Res

• Res

F-5. HT-11-B VOLTAGE CHART (6-volt installation)

Note: Readings taken from socket terminals to ground unless otherwise indicated.
 Use a 1000 ohms per volt meter
 6-volt source measured at power unit input terminals

RECEIVER ON

TUBE TYPE	1	2	3	4	5	6	7	8	CAP
V ₁ 6SK7	0	0	3.3*	0	3.3*	100	6	215	X
V ₂ 6K8	0	0	215	100	NR	145	6	NR	NR
V ₃ 6SK7	0	6	3.4*	0	3.4*	100	0	215	X
V ₄ 6SQ7	0	0	NR	0	0	125	6	0	X
V ₅ 6K6G	0	6	215	220	0	X	0	13	X
V ₆ 807	6	NR	NR	0	0	X	X	X	NR
V ₇ 6V6	0	0	NR	0	0	X	6	0	X
V ₈ 6V6	0	6	NR	NR	0	X	0	0	X
V ₉ 6V6	0	6	NR	NR	0	X	0	0	X

TRANSMITTER ON (Loaded to 75 ma.)

TUBE TYPE	1	2	3	4	5	6	7	8	CAP
V ₁ 6SK7	0	0	0	NR	0	0	6	0	X
V ₂ 6K8	0	0	0	0	0	0	6	0	0
V ₃ 6SK7	0	6	0	0	0	0	0	0	X
V ₄ 6SQ7	0	0	0	NR	NR	0	6	0	X
V ₅ 6K6G	0	6	NR	NR	NR	X	0	0	X
V ₆ 807	6	240	-17†	21	0	X	X	X	310•
V ₇ 6V6	0	0	70#	43	NR	X	6	NR	X
V ₈ 6V6	0	6	320	320	0	X	0	27	X
V ₉ 6V6	0	6	320	320	0	X	0	27	X

"NR" = No reading "X" = No pin.

- * Readings taken with R₃ turned all the way to the right.
- † Reading taken from the junction of CH₂ and R₂₄ to ground.
- # Reading taken from the junction of CH₃ and C₂₆ to ground.
- Reading taken from the junction of CH₁ and C₃₁ to ground.

F-6. HT-11-B VOLTAGE CHART (12-volt installation)

Note: Readings taken from socket terminals to ground unless otherwise indicated.
 Use a 1000 ohm per volt meter.
 12-volt source measured at power unit input terminals.

Note:

RECEIVER ON

TUBE TYPE	1	2	3	4	5	6	7	8	CAP
V ₁ 6SK7	0	0	3.8*	0	3.8*	110	6	240	X
V ₂ 6K8	0	0	240	110	NR	165	6	NR	0
V ₃ 6SK7	0	6	3.4*	0	3.4*	110	12	240	X
V ₄ 6SQ7	0	0	NR	0	0	130	6	0	X
V ₅ 6K6G	0	6	235	240	0	X	12	14	X
V ₆ 807	6	NR	NR	0	0	X	X	X	0
V ₇ 6V6	0	0	NR	NR	NR	X	6	0	X
V ₈ 6V6	0	6	NR	NR	0	X	12	0	X
V ₉ 6V6	0	6	NR	NR	0	X	12	0	X

TRANSMITTER ON (Loaded to 75 ma.)

TUBE TYPE	1	2	3	4	5	6	7	8	CAP
V ₁ 6SK7	0	0	0	NR	0	0	6	NR	X
V ₂ 6K8	0	0	NR	NR	NR	NR	6	0	0
V ₃ 6SK7	0	6	0	NR	0	NR	12	NR	X
V ₄ 6SQ7	0	NR	0	NR	NR	0	6	0	X
V ₅ 6K6G	0	6	NR	NR	NR	X	12	0	X
V ₆ 807	6	240	-29 †	21.5	0	X	X	0	X
V ₇ 6V6	0	0	125 #	50	NR	X	6	X	340 •
V ₈ 6V6	0	6	350	350	0	X	12	28	X
V ₉ 6V6	0	6	350	350	0	X	12	28	X

"NR" = No reading "X" = No Pin.

* Readings taken with R₃ turned all the way to the right.

† Readings taken from the junction of CH₂ and R₂₄ to ground.

Reading taken from the junction of CH₃ and C₂₆ to ground.

• Reading taken from the junction of CH₁ and C₃₁ to ground.

F-7. POWER UNIT VOLTAGE CHART

Note: Readings are taken from terminals of TS₁₀₁ to ground (chassis).
 Use a 1000 ohm per volt meter.
 Supply voltage measured at input terminals.

RECEIVER ON

SUPPLY	1	2	3	4	5	6	7	8
6-volts D-C	0	6	6	6	6	6	220	0
12-volts D-C	0	12	12	12	12	12	230	0

TRANSMITTER ON (Loaded to 75 ma.)

SUPPLY	1	2	3	4	5	6	7	8
6-volts D-C	0	6	6	6	6	0	0	325
12-volts D-C	0	12	12	12	12	0	0	350

F-8. LIST OF REPLACEABLE PARTS

REF. SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	CONTR'S. PART NO.
(1) Radiophone Assembly.-				
R ₁	Resistor, 100,000 ohm ± 20%, ½ watt, carbon	A-V-C decoupling for tube V ₁	ASA	RC21AE104M
R ₂	Resistor, 400 ohm ± 10%, ½ watt, wire wound, type BW-½	Cathode bias for tube V ₁	IRC	24BX401E
R ₃	Resistor, variable, 15,000 ohm ± 20%, carbon, type 35	R-F gain control	CT	25C033
R ₄	Resistor, 47,000 ohm ± 5%, ½ watt, carbon	Oscillator grid bias for tube V ₂	ASA	RC21AE473J
R ₅	Resistor, 15,000 ohm ± 10%, 1 watt, carbon	Plate decoupling for oscillator section of tube V ₂	ASA	RC31AE153K
R ₆	Resistor, 300 ohm ± 10%, ½ watt, wire wound	Cathode bias for tube V ₂	IRC	24BX301E
R ₇	Same as R ₁	A-V-C decoupling for tubes V ₁ and V ₂		
R ₈	Resistor, 1 megohm ± 20% ½ watt, carbon	A-V-C decoupling for tubes V ₁ , V ₂ and V ₃	ASA	RC21AE105M
R ₉	Same as R ₂	Cathode bias for tube V ₃		
R ₁₀	Same as R ₄	Diode load for second detector tube V ₄		
R ₁₁	Resistor, 470,000 ohm ± 5%, ½ watt, carbon	Diode load for second detector tube V ₄	ASA	RC21AE474J
R ₁₂	Resistor, variable, 1 megohm ± 20%, carbon, includes SPST switch in the assembly	A-F gain control	CT	25C072
R ₁₃	Resistor, 30,000 ohm ± 5%, 1 watt, carbon	Voltage divider	ASA	RC31AE303J
R ₁₄	Resistor, 11,000 ohm ± 5%, 10 watt, wire wound, type CC	Voltage divider	U	24BG113D
R ₁₅	Same as R ₁	Plate load for audio amplifier section of tube V ₄		

LIST OF REPLACEABLE PARTS - (Cont'd.)

REF. SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	CONTR'S. PART NO.
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LIST OF REPLACEABLE PARTS - (Cont'd.)

REF. SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	CONTR.'S. PART NO.
R ₁₆	Same as R ₁₁	Grid return for tube V ₅		
R ₁₇	Resistor, 470 ohm ± 5%, 1 watt, carbon	Cathode bias for tube V ₅	ASA	RC31AE471J
R ₁₈	Same as R ₂	Attenuation for handset		
R ₁₉	Same as R ₂	Attenuation for handset		
R ₂₀	Same as R ₁₄	Screen supply filter for tube V ₆		
R ₂₁	Resistor, 25 ohm ± 20%, ½ watt, wire wound, type BW-½	Parasitic suppressor in plate circuit of tube V ₆	IRC	24BX250F
R ₂₂	Resistor, 250 ohm ± 5%, 10 watt, wire wound, type CC	Cathode bias for tube V ₆	U	24BG251D
R ₂₃	Resistor, 50 ohm ± 10%, ½ watt, wire wound, type BW-½	Parasitic suppressor in grid circuit of tube V ₆	IRC	24BX500E
R ₂₄	Resistor, 10,000 ohm ± 10%, 1 watt, carbon	Grid bias for tube V ₆	ASA	RC31AE103K
R ₂₅	Resistor, 100,000 ohm ± 20%, 1 watt, carbon	Screen supply filter for tube V ₇	ASA	RC31AE104M
R ₂₆	Resistor, 240 ohm ± 10%, ½ watt, wire wound, type BW-½	Cathode bias for tube V ₇	IRC	24BX241E
R ₂₇	Same as R ₄	Grid return for tube V ₇		
R ₂₈	Resistor, 47,000 ohm ± 5%, 2 watt, carbon	Plate and screen supply filter for crystal oscillator tube V ₇	ASA	RC41AE473J
R ₂₉	Resistor, 100 ohm ± 10%, ½ watt, wire wound, type BW-½	Cathode bias for tube V ₄	IRC	24BX101E
R ₃₀	Resistor, 330 ohm ± 5%, 10 watt, wire wound, type CC	Cathode bias for modulator tubes V ₈ and V ₉	U	24BG331D
R ₃₁	Same as R ₁₇	Microphone current supply filter		
R ₃₂	Resistor, variable, 500 ohm ± 20%, wire wound	Audio gain control on modulator	CT	25C069

LIST OF REPLACEABLE PARTS - (Cont'd.)

REF. SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	CONTR.'S. PART NO.
R ₃₃	Resistor, 120 ohm \pm 10%, 1 watt, wire wound, type BW-1	Receiver filament network load equalizer	IRC	24BW121E
R ₃₄	Resistor, 15 ohm \pm 5%, 10 watt, wire wound, type CC	Transmitter filament network load equalizer	U	24BG150D
C ₁	Capacitor, variable, 3 section, min. cap. 9.5 mmfd., max. cap. 70 mmfd., air, shaft $\frac{1}{4}$ " dia. x $\frac{31}{32}$ " long, special	Receiver tuning capacitor	OM	48C074
C ₂	Capacitor, 0.002 mfd. \pm 5%, 500 V. D-C working, mica	Screen by-pass tube V ₇	ASA	CM30A202J
C ₃	Capacitor, 0.006 mfd. \pm 5%, 300 V. D-C working, mica	Cathode by-pass for tube V ₇	ASA	CM35A622J
C ₄	Capacitor, 100 mmfd. \pm 5%, 500 V. D-C working, mica	To control oscillator excitation	ASA	CM20A101J
C ₅	Capacitor, variable, min. cap. 110 mmfd. max. cap. 600 mmfd., 500 V. D-C, mica, ceramic insulation, compression type adjustment	Oscillator pad for BAND 2	UE	44A056
C ₆	Same as C ₅	Oscillator pad for BAND 1		
C ₇	Capacitor, 0.001 mfd. \pm 20%, 500 V. D-C working, mica	Oscillator feed-back coupling	ASA	CM30A102M
C ₈	Capacitor, 0.05 mmfd. -10 + 20%, 400 V. D-C working, molded paper	A-V-C by-pass for tube V ₁	SO	46AL503H
C ₉	Same as C ₈	A-V-C by-pass for tube V ₂		
C ₁₀	Capacitor, 0.02 mfd. -10 + 20%, 400 V. D-C working, molded paper, type 342	Cathode by-pass for tube V ₁	MIC	46AF203H

LIST OF REPLACEABLE PARTS - (Cont'd.)

REF. SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	CONTR'S. PART NO.
C ₁₁	Same as C ₈	Cathode by-pass for tube V ₂		
C ₁₂	Same as C ₁₀	A-V-C by-pass for tube V ₃		
C ₁₃	Capacitor, 0.01 mfd. -10 + 20%, 400 V. D-C working, molded paper, type 342	Cathode by-pass for tube V ₃	MIC	46AF103H
C ₁₄	Same as C ₄	By-pass across diode load		
C ₁₅	Same as C ₄	A-V-C by-pass		
C ₁₆	Same as C ₁₃	Audio coupling between second detector diode and first audio amplifier		
C ₁₇	Capacitor, 0.1 mfd. -10 + 20%, 400 V. D-C working, molded paper	Cathode by-pass for tube V ₄	SO	46AL104H
C ₁₈	Same as C ₁₀	Audio coupling between tubes V ₄ and V ₅		
C ₁₉	Capacitor, 0.05 mfd. -10 + 20%, 600 V. D-C working, molded paper, type 345	Shunt across primary of transformer T ₆	MIC	46AM503H
C ₂₀	Capacitor, 20 mmfd. -15 + 20%, 50 V. D-C working, tubular electrolytic, cardboard case, special	Cathode by-pass	SP	45A040
C ₂₁	Same as C ₁₇	Screen by-pass for tubes V ₁ , V ₂ and V ₃		
C ₂₂	Capacitor, 0.25 mfd. 600 V. D-C working, oil-filled, paper, type DA6025	By-pass on receiver's d-c supply	CD	46A027
C ₂₃	Not used.			
C ₂₄	Not used			

LIST OF REPLACEABLE PARTS - (Cont'd.)

REF. SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	CONTR'S. PART NO.
C ₂₅	Not used			
C ₂₆	Same as C ₂	Plate return for oscillator tube V ₇		
C ₂₇	Same as C ₂₀	Cathode by-pass for tubes V ₈ and V ₉		
C ₂₈	Same as C ₂₀	Microphone current supply filter		
C ₂₉	Same as C ₃	Filament by-pass for transmitter tubes		
C ₃₀	Same as C ₂	Screen by-pass for tube V ₆		
C ₃₁	Capacitor, 0.002 mfd. ± 5%, 1200 V. D-C working, mica	Plate return for tube V ₆	ASA	CM454202J
C ₃₂	Same as C ₃₁	Parallel feed coupling to tank circuit of tube V ₆		
C ₃₃	Capacitor, variable, max. cap. 100 mmfd., air, 27 aluminum plates, ceramic insulation, shaft $\frac{1}{4}$ " dia. x $\frac{9}{32}$ " long, special	Adjustable capacitor for tank circuit of tube V ₆	RC	48A096
C ₃₄	Same as C ₃₃	Adjustable capacitor for tank circuit of tube V ₆		
C ₃₅	Same as C ₃₃	Adjustable capacitor for tank circuit of tube V ₆		
C ₃₆	Capacitor, 390 mmfd. ± 5%, 2500 V. D-C working, mica	Fixed capacitor for tank circuit of tube V ₆	ASA	CM45A391J
C ₃₇	Not used.			
C ₃₈	Same as C ₃	Cathode by-pass for tube V ₆		

LIST OF REPLACEABLE PARTS - (Cont'd.)

REF. SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	CONTR'S. PART NO.

LIST OF REPLACEABLE PARTS - (Cont'd.)

REF. SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	CONTR'S. PART NO.
C ₃₉	Capacitor, 50 mmfd. \pm 5%, 500 V. D-C working, mica	Coupling between tubes V ₆ and V ₇	ASA	CM20A501J
C ₄₀	Same as C ₄	Coupling between transformer T ₃ and grid of oscillator section of tube V ₂		
C ₄₁	Capacitor, 15 mmfd. \pm 20%, 500 V. D-C working, -0.075% T.C., ceramicon, wire leads 1 $\frac{1}{2}$ " long, type 809-047	Fixed trimmer in oscillator transformer T ₃ for BAND 1	CRL	47A027
T ₁	Transformer, R-F, 2 bands, wound in 4 sections, 2 primaries and 2 secondaries, secondary for band #1 tunes 1500-2100 KC., secondary for band #2 tunes 2100-3000 KC. with capacitor C ₁ , trimmers adjustable 2 $\frac{1}{2}$ to 35 mmfd., coils air core, special	Couples antenna to grid of r-f amplifier tube V ₁	SWI	51C427
T ₂	Transformer, R-F, 2 bands, wound in 3 sections, 1 primary and 2 secondaries, secondary for band #1 tunes 1500-2100 KC., secondary for band #2 tunes 2100-3000 KC. with capacitor C ₁ , trimmers adjustable 2 $\frac{1}{2}$ to 35 mmfd., coils air core, special	Couples r-f amplifier to converter section of tube V ₂	SWI	51C428
T ₃	Transformer, R-F, 2 bands, wound in 3 sections, 1 primary and 2 secondaries, secondary for band #1 tunes 1955 to 2555 KC., secondary for band #2 tunes 2555 to 3455 KC. with capacitor C ₁ , trimmers adjustable 2 $\frac{1}{2}$ to 35 mmfd., coils air core, special	Tuned circuit of oscillator stage	SWI	51C429
T ₄	Transformer, I-F, 455 KC., primary and secondary tuned by adjustable iron core, fixed trimmers 125 mmfd. \pm 5%, type 8387	Couples converter to intermediate frequency amplifier tube V ₃	SI	50B124
T ₅	Transformer, I-F, 455 KC., primary and secondary tuned by adjustable iron core, fixed trimmers, primary trimmer 125 mmfd. \pm 3%, secondary trimmer 130 mmfd. \pm 3%, type 8388.	Couples inter-mediate frequency amplifier to second detector tube V ₄	SI	50B125

LIST OF REPLACEABLE PARTS - (Cont'd.)

REF. SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	CONTR'S. PART NO.
T ₆	Transformer, A-F, primary to match 7600 ohm plate impedance of 6K6G, secondary to match 3.8 ohm voice coil impedance, Type 6408	Couples audio amplifier tube V ₅ to speaker and handset.	CHI	55B043
T ₇	Transformer, A-F, primary to match 200 ohm carbon microphone, C.T. secondary to match P.P. 6V6 grids class A, type 6405	Couples microphone to grids of modulator tubes V ₈ and V ₉	CHI	55B041
T ₈	Transformer, A-F, C.T. primary to match 8000 ohm 6V6GT P.P. plates @ 45 milliamperes per plate, secondary to match 5000 ohm class C amplifier load @ 80 milliamperes, type 6406	Couples modulator tubes V ₈ and V ₉ to class C amplifier tube V ₆	CHI	55B042
CH ₁	Choke, R-F, 2.5 millihenries ± 5%, distributed capacity 2 mmfd., ± 20%, 4 pi universal winding on $\frac{1}{4}$ " dia. ceramic dowel, wire leads $1\frac{1}{2}$ " long	Plate circuit r-f choke of tube V ₆ for parallel feed	SWI	53A033
CH ₂	Same as CH ₁	Grid circuit r-f choke for tube V ₆		
CH ₃	Same as CH ₁	Plate circuit r-f choke for tube V ₇		
L ₁	Inductor, R-F, 44 turns of #18 tinned copper wire, pitch of winding 16 turns per inch, diameter of winding 1-3/4" O.D., tapped at $5\frac{1}{4}$, $11\frac{1}{4}$, $16\frac{1}{4}$, $21\frac{1}{4}$, $27\frac{1}{4}$ and $34\frac{1}{4}$ turns from start of winding, air core, polystyrene insulation, special	Transmitter antenna loading coil	BW	51A312
L ₂	Inductor, R-F, inductance 26.8 microhenries ± 2%, 30 turns of #14 bare tinned copper wire, pitch of winding 7 turns per inch, diameter of winding 2-9/16" O.D., polystyrene insulation, air core, special	Transmitter tank coil	BW	51B430

LIST OF REPLACEABLE PARTS - (Cont'd.)

MFR. CONTR'S.

LIST OF REPLACEABLE PARTS - (Cont'd.)

REF. SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	CONTR'S. PART NO.
RY ₁	Relay, DPDT, normally open, $\frac{1}{4}$ " pure silver contacts rated 30 amperes @ 6 V. D-C, to 10 amperes @ 115 V. D-C, relay activating coils rated 115 V. D-C, type 204B	Changes over antenna connection from receiver to transmitter	AE	21B028
SW ₁	Switch, 2 section, 2 position, shorting type contacts, bakelite wafers, bushing $\frac{1}{4}$ " long, shaft $\frac{7}{8}$ " long x $\frac{1}{4}$ " dia., type H	Receiver band switch	OM	60B058
SW ₂	Switch, 3 section, 3 position, shorting type contacts, sections 1 and 2 ceramic wafers, section 3 low-loss bakelite wafer, bushing $\frac{3}{8}$ " long, shaft $\frac{11}{16}$ " long, flat for $\frac{5}{16}$ " x $\frac{7}{32}$ " of shaft dia., type H	Transmitter band switch	OM	60B163
SW ₃	Switch, snap, SPDT, bakelite base, steel mtg. plate with 1- $\frac{1}{8}$ " mtg. centers, brass solder lugs, rated 3 amperes @ 115 V., type 77	Phone speaker switching	OM	60A130
SW _{4A}	Switch, DPDT, toggle, fibre separators, brass mechanism, rated 1 amperes @ 250 V., 3 amperes @ 125 V., type 81012-Q	Filament switch for transmitting tube V ₆ , V ₇ , V ₈ , V ₉	HH	60A117
SW _{4B}				
SW ₅	Switch, SPST, toggle action, part of R ₁₂	Connects radio-phone to d-c source		
SO ₁	Socket, 2 prongs, female, mica-filled bakelite body, non-ferrous spring metal clips, one mtg. hole, type 33-3	Crystal socket	AP	6A004
SO ₂	Same as SO ₁	Crystal socket		
SO ₃	Same as SO ₁	Crystal socket		

LIST OF REPLACEABLE PARTS - (Cont'd.)

REF. SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	CONTR.'S. PART NO.
SO ₄	Socket, 10 contacts, female, bakelite insulation, metal prongs, 2 metal mtg. feet with 23/32" x 3-1/8" x 3-1/8" mtg. hole centers, type 1410S	Receiver jumper socket for operation on 6 or 12 volts D-C	HJ	10A070
SO ₅	Socket, 8 contacts, male, steel body, bakelite insulation, brass contacts, type P408-DB	Socket connection for power supply cable plug	AP	10A126
PL _{4A}	Plug assembly, 10 contacts, male, bakelite insulation, brass prongs, terminals 1 and 10; 5, 7 and 9; 2, 3 and 4; 6 and 8 are connected together, type 1410P	Jumper plug for 6 V. D-C operation	H	41A1918
PL _{4B}	Plug assembly, same as PL _{4A} except terminals 1 and 9; 2 and 5; 4 and 6 are connected together, type 1410P	Jumper plug for 12 V. D-C operation	H	41A1906
J ₁	Jack, shorting type, circuit normally closed, bakelite insulation, metal parts brass, type 951	Meter jack for transmitter tuning	CHI	36A012
LS ₁	Speaker, P.M. field 5" O.D., 3.8 ohm voice coil, type PM5DS-S1351	Receiver loudspeaker	J	85A017
HS ₁	Handset, French phone type, DPDT press-to-talk switch includes 5 conductor cable 4½ feet long, type ES-3238	Transmitter's microphone and control switch, and receiver's headset for telephone operation	KE	85B019
LM ₁	Lamp, pilot light, bayonet base, 6-8 V. @ 150 milliamperes, type 47	Tuning dial illumination	GE	39A004
V ₁	Tube, triple-grid super control amplifier, type 6SK7	Radio frequency amplifier, receiver section	RCA	90X6SK7
V ₂	Tube, triode-hexode converter, type 6K8	Converter and high frequency oscillator, receiver section	RCA	90X6K8

LIST OF REPLACEABLE PARTS - (Cont'd.)

REF. SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	CONTR.'S PART N
V ₃	Same as V ₁	Intermediate amplifier, receiver section		
V ₄	Tube, duplex-diode, high-mu triode, type 6SQ7	Second detector and audio amplifier, receiver section	RCA	90X6SQ
V ₅	Tube, power amplifier pentode, type 6K6-G	Audio amplifier, receiver section	RCA	90X6K6
V ₆	Tube, beam power amplifier, type 807	Class C amplifier, transmitter section	RCA	90X807
V ₇	Tube, beam power amplifier, type 6V6	Crystal controlled oscillator, transmitter section	RCA	90X6V6
V ₈	Same as V ₇	Audio amplifier, transmitter section		
V ₉	Same as V ₇	Audio amplifier, transmitter section		
(2) D-C Power Supply Assembly.-				
C ₁₀₁	Capacitor, 0.5 mfd. -10 + 40%, 400 V. D-C working, tubular paper, special	Hash filter capacitor at input to vibrator supply unit (VP ₁₀₁)	CD	46AV504J
C ₁₀₂	Capacitor, dual, 8 mfd. - 10 + 40%, 475 V. D-C working, electrolytic, type EB10016, section one of dual unit	Input capacitor of receiver supply filter	CD	45A036
C ₁₀₃	Same as C ₁₀₂ , section two of dual unit	Output capacitor of receiver supply filter		
C ₁₀₄	Same as C ₁₀₁	Hash filter capacitor of transmitter plate supply		
C ₁₀₅	Same as C ₁₀₁	Hash filter capacitor of transmitter plate supply		

REF. SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	CONTR'S. PART NO.
C ₁₀₆	Capacitor, 0.03 mfd., 1600 V. D-C working, tubular paper, type MD1653	Commutator hash filter capacitor of transmitter plate supply	CD	46A025
C ₁₀₇	Capacitor, 2 mfd. ± 10%, 600 V. D-C working, oil-filled paper, type TJU6020	High-voltage filter capacitor of transmitter plate supply	CD	46B026
CH ₁₀₁	Choke, inductance 5.5 henries @ 160 milliamperes, d-c resistance 97 ohms, iron core, type 5613-F	Filter choke of receiver supply filter	CT	56C030
CH ₁₀₂	Choke, heavy duty filter, 56 turns of #12 enameled wire on $\frac{1}{4}$ " air core, coil O.D. $1\frac{1}{4}$ ", kraft tube casing, wax impregnated, type A5933	Hash filter choke of transmitter plate supply	FA	56A024
RY ₁₀₁	Relay, 3 circuit, normally 2 circuits open one closed, inner and outer windings have 28 ohms d-c resistance. connect windings in series for 12 V. D-C operation and in parallel for 6 V. D-C operation, type 27577	Controls primary current of vibrator pack VP ₁₀₁ and relay winding current of relay RY ₁₀₂	GD	21B030
RY ₁₀₂	Relay, DPST, normally open, inner and outer windings have 28 ohms d-c resistance, connect windings in series for 12 V. D-C operation and in parallel for 6 V. D-C operation, type 24242.	Controls primary current of dynamotor DM ₁₀₁ and secondary high-voltage to transmitter	GD	21B029
TS ₁₀₁	Terminal strip, 8 terminals, high grade laminated bakelite insulation, 2 mtg. holes with $4\frac{1}{2}$ " mtg. centers, type 1033.	Power supply connection for power cable to radio-phone	HJ	81A054
*F ₁₀₁	Fuse, 20 amperes @ 25 V., glass enclosed, 4 AG, type 1097	Radio-phone filament and receiver supply protection for 6-volt operation	LF	39A310
*F ₁₀₂	Fuse, 30 amperes @ 25 V., glass enclosed, 4 AG, type 1099	Dynamotor DM ₁₀₁ protection for 6-volt operation	LF	39A305

LIST OF REPLACEABLE PARTS - (Cont'd.)

REF. SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	CONTR'S. PART NO.
#F ₁₀₁	Fuse 10 amperes @ 25 V., glass enclosed, 4 AG, type 1095	Radio-phone filament and receiver supply protection for 12-volt operation	LF	39A311
#F ₁₀₂	Fuse 20 amperes @ 25 V., glass enclosed, 4 AG, type 1097	Dynamotor DM ₁₀₁ protection for 12-volt operation	LF	39A310
*DM ₁₀₁	Dynamotor, input 6 V. D-C, output 350 V. D-C ± 3% @ 165 milliamperes, continuous duty, supplied with mtg. bracket, type 3420	Transmitter plate supply	EI	20C001
#DM ₁₀₁	Dynamotor, input 12 V. D-C, output 350 V. D-C ± 3% @ 165 milliamperes, continuous duty, supplied with mtg. bracket, type 3518B	Transmitter plate supply	CAM	20C009
*VP ₁₀₁	Vibrapack, Mallory type VP-552, uses vibrator type 725	Receiver high voltage supply	MA	27A012
#VP ₁₀₁	Vibrator power supply, Oak type 6291, uses vibrator type V-6456	Receiver high voltage supply	OM	27A116
(3) Cordage.-				
	Cord 87B317, 8 conductor, rubber covered, 87 inches long, includes four #22 ga., three #16 ga., and one #18 ga. conductors, radio-phone end has an 8 contact female type S408-CCT Amphenol plug (PL ₅), power supply end has individual spade lugs, special	Connects d-c power supply to Radiophone HT-11-B	E	87B317

* Used on 6 V. D-C power units only.

Used on 12 V. D-C power units only.

F-9 INDEX TO PARTS MANUFACTURERS

SYMBOL	MANUFACTURER	SYMBOL	MANUFACTURER
AE	Advance Electric Los Angeles, Calif.	IRC	International Resistance Co. Philadelphia, Penn.
AP	American Phenolic Corp. Cicero, Illinois	J	Jensen Radio Mfg. Co. Chicago, Illinois
ASA	Any manufacturer meeting American Standards Association specifications.	KE	Kellogg Switchboard Supply Co. Chicago, Illinois
BW	Barker & Williamson Upper Darby, Penn.	LF	Littlefuse Inc. Chicago, Illinois
CAM	Carter Motor Co. Chicago, Illinois	MA	P.R. Mallory & Co. Indianapolis, Indiana
CD	Cornell-Dubilier Corp. South Plainfield, N.J.	MIC	Micamald Radio Corp. Brooklyn, N. Y.
CHI	Chicago Transformer Corp. Chicago, Illinois	OM	Oak Mfg. Co. Chicago, Illinois
CRL	Centralab Milwaukee, Wis.	RC	Radio Condenser Corp. Camden, N. J.
CT	Chicago Telephone & Supply Co. Elkhart, Indiana	RCA	R.C.A. Mfg. Co. Inc. Harrison, N. J.
EI	Eicor Mfg. Co. Chicago, Illinois	SI	F.W. Sickles Co. Springfield, Mass.
FA	John E. Fast & Co. Chicago, Illinois	SO	Solar Mfg. Co. Bayonne, N. J.
GD	Guardian Electric Co. Chicago, Illinois	SP	Sprague Specialties Co. North Adams, Mass.
GE	General Electric Co. Schenectady, N. Y.	SWI	S.W. Inductor Chicago, Illinois
H	The Hallicrafters Co. Chicago, Illinois	U	Utah Radio Products Co. Chicago, Illinois
HH	Hart & Hegeman Elec. & Co. Hartford, Conn.	UE	Underwood Electric Chicago, Illinois
HJ	Howard B. Jones Chicago, Illinois		