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NAVSHIPS 900,508

RESTRICTED

INSTRUCTION BOOK

for

RADIO TRANSMITTING-
RECEIVING EQUIPMENT
MODEL MBF

COLLINS RADIO COMPANY

CEDAR RAPIDS, IOWA

NAVY DEPARTMENT

BUREAU OF SHIPS

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CONTRACTUAL GUARANTEE

The equipment including all parts and spare parts, except vacuum tubes, batteries, rubber and material normally consumed in operation, is guaranteed for a period of one year from the date of delivery of the equipment to and acceptance by the Government with the understanding that all such items found to be defective as to material, workmanship or manufacture will be repaired or replaced, f.o.b. any point within the continental limits of the United States designated by the Government, without delay and at no expense to the Government; provided that such guarantee will not obligate the Contractor to make repair or replacement of any such defective items unless the defect appears within the aforementioned period and the Contractor is notified thereof in writing within a reasonable time and the defect is not the result of normal expected shelf life deterioration.

To the extent the equipment, including all parts and spare parts, as defined above, is of the Contractor's design or is of a design selected by the Contractor, it is also guaranteed, subject to the foregoing conditions, against defects in design with the understanding that if ten per cent (10%) or more of any such said items, but not less than two of any such item, of the total quantity comprising such item furnished under the contract, are found to be de-

fective as to design, such item will be conclusively presumed to be of defective design and subject to one hundred per cent (100%) correction or replacement by a suitably redesigned item.

All such defective items will be subject to ultimate return to the Contractor. In view of the fact that normal activities of the Naval Service may result in the use of equipment in such remote portions of the world or under such conditions as to preclude the return of the defective items for repair or replacement without jeopardizing the integrity of Naval communications, the exigencies of the Service, therefore, may necessitate expeditious repair of such items in order to prevent extended interruption of communications. In such cases the return of the defective items for examination by the Contractor prior to repair or replacement will not be mandatory. The report of a responsible authority, including details of the conditions surrounding the failure, will be acceptable as a basis for affecting expeditious adjustment under the provisions of this contractual guarantee.

The above one year period will not include any portion of time the equipment fails to perform satisfactorily due to any such defects, and any items repaired or replaced by the Contractor will be guaranteed anew under this provision.

INSTALLATION RECORD

Contract Number NXsr-80000

Date of Contract: 21 October 1944

Serial Number of Equipment _____
Date of Acceptance by the Navy _____
Date of Delivery to Contract Destination _____
Date of Completion of Installation _____
Date Placed in Service _____

Blank spaces in this book shall be filled in at time of installation.

REPORT OF FAILURE

Report of failure of any part of this equipment, during its service life, shall be made to the Bureau of Ships in accordance with current instructions. The report shall cover all details of the failure and

give the date of installation of the equipment. For procedure in reporting failures see Chapter 67 of the "Bureau of Ships Manual," or superseding instructions.

ORDERING PARTS

All requests or requisitions for replacement material should include complete descriptive data covering the part desired, in the following form:

1. Name of part desired.
2. Navy Type number (if assigned) (including prefix and suffix as applicable).
3. Commercial designation.
4. Model designation (including suffix) of equipment in which used.
5. Navy Type designation (including prefix and

suffix where applicable of major unit in which part is used).

6. Contract, purchase order, requisition, etc., under which the equipment was procured.
7. Circuit symbol designation of part.
8. (a) Navy drawing and/or specification number. (Include part or group number.)
(b) Manufacturer's drawing or specification's number. (Include part or group number.)
9. Rating or other descriptive data.

SAFETY NOTICE

"The attention of officers and operating personnel is directed to Chapter 67 of Bureau of Ships Manual

or Superseding instructions on the subject of Radio—Safety precautions to be observed."

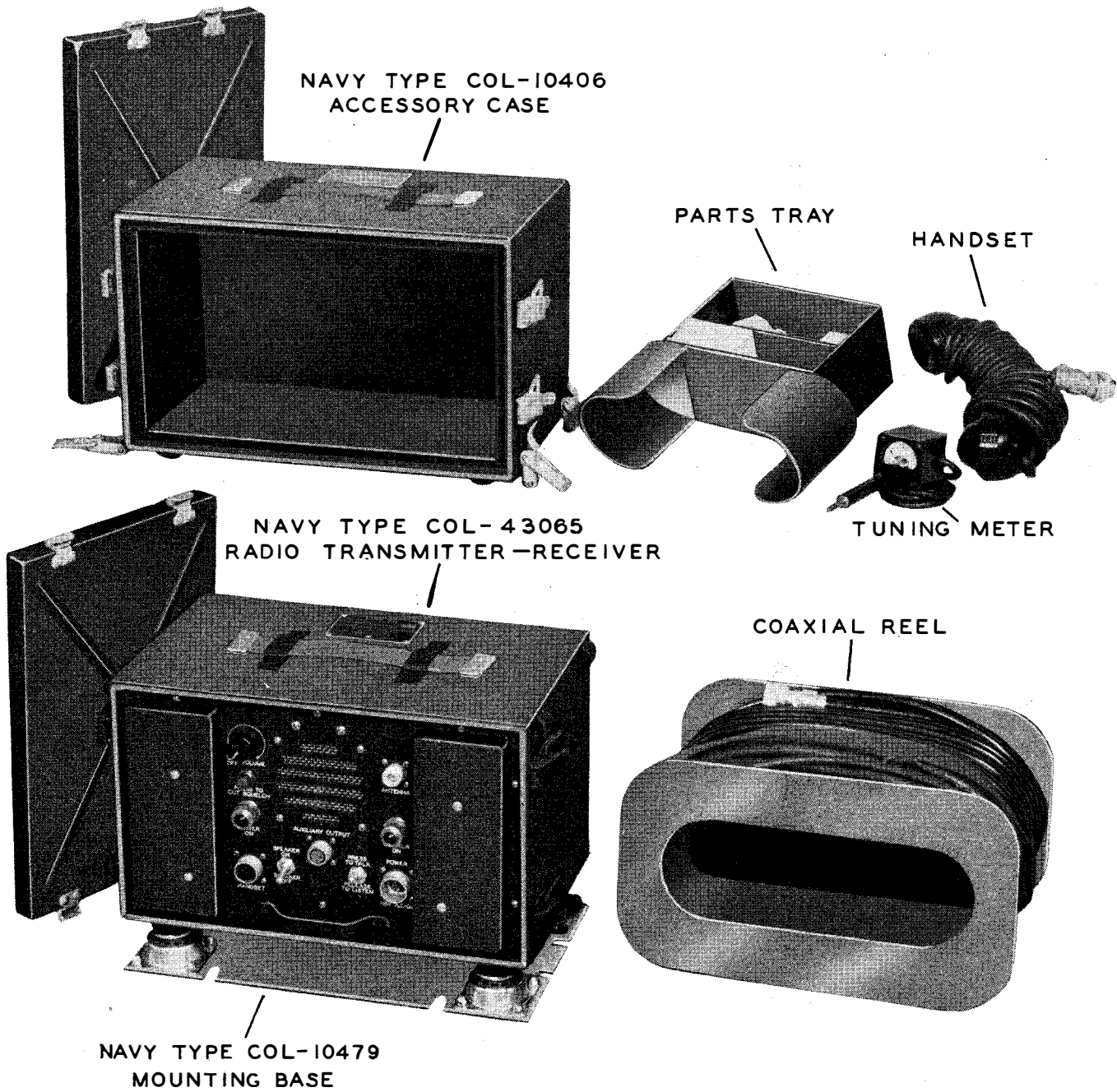


Figure 1-1—Navy Model MBF Equipment

SECTION I GENERAL DESCRIPTION

I. GENERAL.

This Instruction Book covers the installation, operation and maintenance of the Navy Model MBF Radio Transmitting-Receiving Equipment.

a. QUICK REFERENCE DATA.

- (1) Navy Model—MBF Radio Transmitting-Receiving Equipment.
- (2) Contractor—COLLINS RADIO CO., Cedar Rapids, Iowa.
- (3) Cognizant Naval Inspector—Inspector of Naval Material, Cedar Rapids, Iowa.
- (4) Frequency range—60 mc to 80 mc.
- (5) Type of frequency control—crystal.
- (6) Type of emission—Voice modulated (A3).
 - (a) Type of modulation—Amplitude.
 - (b) Modulation capability—80%.
- (7) RF power output—3.0 watts.
- (8) Power factor of equipment—.89.
- (9) Characteristics of power supply.
 - (a) 115 volts DC or 115 volts AC single phase 50/60 cps.
 - (b) Current required from source.
 1. DC power source.
 - a. Receiving—.7 amp.
 - b. Transmitting—.8 amp.
 2. AC power source.
 - a. Receiving—.85 amp.
 - b. Transmitting—.98 amp.
- (10) Number of packages involved in shipment—two.
- (11) Total cubical contents, packed for shipment.
 - (a) Transmitter-Receiver and Accessory Box—6.6 cu. ft.
 - (b) Spare Parts—5.14 cu. ft.
- (12) Total weight, packed for shipment.
 - (a) Transmitter-Receiver and Accessory Box—104 pounds.
 - (b) Spare Parts—114 pounds.
- (13) Number of crystals supplied.
 - (a) Receiver—Four crystals (four frequencies).
 - (b) Transmitter—Four crystals (four frequencies).

(14) Vacuum Tube Complement.

Tubes	Number Used in Equipment
6AK5	5
6AQ6	3
6C4	10
25Z6	2
28D7	3

b. EQUIPMENT FUNCTIONS AND CHARACTERISTICS. (See figure 1-1.)

The Navy Model MBF Radio Transmitting-Receiving Equipment is completely self contained except for power source. The transmitter-receiver is contained in the lower cabinet. The upper cabinet is the accessory case and contains the following:

1 Cable reel	1 Double female connector
1 Power cable	1 Handset
1 Concentric cable, 50 ft.	1 Screwdriver
1 Concentric cable, 25 ft.	1 Phillips screwdriver
1 Coaxial antenna	1 Spintite wrench
1 Bristo wrench, #8	2 Neon lamps
1 Tube pin straightener	4 Shockmount bolts
1 Socket wiring plug	2 Crystal hold-down
1 Meter with plug and 2 foot metering cord	1 Speaker connector
3 Fuses, 3 amp.	1 Cable clamp
	2 Carrying straps

With the covers locked in place, it is possible to submerge the equipment in water without damage. The equipment is portable and capable of transmitting and receiving voice modulated signals on any frequency within the range 60 mc to 80 mc. The audio system is capable of modulating the RF output of the transmitter 80%. Up to 3.0 watts of RF output may be obtained from the transmitter. Audio output of up to 1.0 watt when operating into the speaker and up to 10 mw when operating into the handset may be obtained from the receiver.

The equipment is designed to operate from either a 115 volt DC or 115 volt AC—single phase—50/60 cps power source. No changing of connections either internally or externally are necessary when changing from one power source to the other. A polarizing circuit within the equipment selects the proper power input circuit for the type of power source employed. The maximum drain from the power source is 120 watts.

c. EQUIPMENT REQUIRED. — The following tables list the equipment that is required for a complete installation:

Table 1-1 EQUIPMENT SUPPLIED

Quan.	Numerical Series of Reference Symbols	Name of Unit	Navy Type Designation	Overall Dimensions (Inches) Uncrated Height-Width-Depth	Volume (Cubic Feet) Uncrated	Weight (Pounds) Uncrated	Overall Dimensions (Inches) Crated Height-Width-Depth	Volume (Cubic Feet) Crated	Weight (Pounds) Crated
1	100	Radio Transmitter-Receiver	COL-43065	9½ x 15-13/16 x 10-1/16	.87	26			
1		Shockmount Plate	COL-10479	1-¼ x 14 x 8-¼	.08	2			
1	200, 300, 400, 500, 600, 700	Accessory Case and Contents	COL-10406*	9-7/16 x 15-1/16 x 9-¾	.77	27			
1	100, 200, 300, 400, 500, 600, 700	Radio Transmitting-Receiving Equipment	COL-43065 COL-10479 COL-10406*	20-3/16 x 15-13/16 x 10-1/16	1.72	55	16 x 24 x 30	6.6	104
1		Spare Parts		12-¼ x 12-¼ x 31	2.24	74	16 x 16 x 35	5.14	114
Total weight of the Model MBF Radio Transmitting-Receiving Equipment and Spare Parts						129		218	

*Navy Type Designation COL-10406 does not include contents of accessory case. Refer to Table 6-2 when ordering items included in accessory case.

Table 1-2 EQUIPMENT REQUIRED BUT NOT SUPPLIED

Quantity	Name of Unit	Navy Type Designation	Required Characteristics
1	Power Source	-----	115 volts DC or 115 volts AC —50/60 cycles

d. DESCRIPTION OF MAJOR UNITS.

(1) RADIO TRANSMITTER - RECEIVER. —

The transmitter-receiver is contained in one of the two metal cases that are supplied. This metal case is equipped with a handle for carrying when not attached to the accessory case. The cover of the transmitter-receiver case is held in place by four locking type clasps. With the cover in place, the case is waterproof. To operate the equipment, the cover must be removed. The controls for tuning the transmitter and the receiver are covered. If it is desired to make any adjustments on the transmitter or receiver, these control covers must be removed. A shockproof mounting base is attached to the bottom of the case that contains the transmitter-receiver.

(2) ACCESSORY CASE.—The accessory case can be attached to the transmitter-receiver by means of four locking type clasps. This arrangement permits the accessory case and the transmitter-receiver case to be carried together as a single unit. The accessory case cover is held in place by four locking type clasps. With the cover in place the case is waterproof. The cover must be removed to gain

access to the accessories supplied with the equipment.

e. TECHNICAL SUMMARY.

- (1) Frequency range—60 mc to 80 mc, crystal controlled.
- (2) Bands—Single band.
- (3) Number of frequencies available—Depends upon number of crystals available and frequencies of crystals (crystals for four frequencies are furnished).
- (4) Power output.
 - (a) Receiver.
 1. To speaker—up to 1 watt with not more than 15% distortion at 60% modulation.
 2. To headphones—up to 10 mw with not more than 15% distortion at 60% modulation.
 - (b) Transmitter.
 1. RF power output—3.0 watts.
- (5) Type of modulation—Amplitude (A3).
- (6) Method of modulation — High level plate modulation.
- (7) Modulation capability—80%.

(8) Receiver sensitivity. (Refer to figure 1-2.)

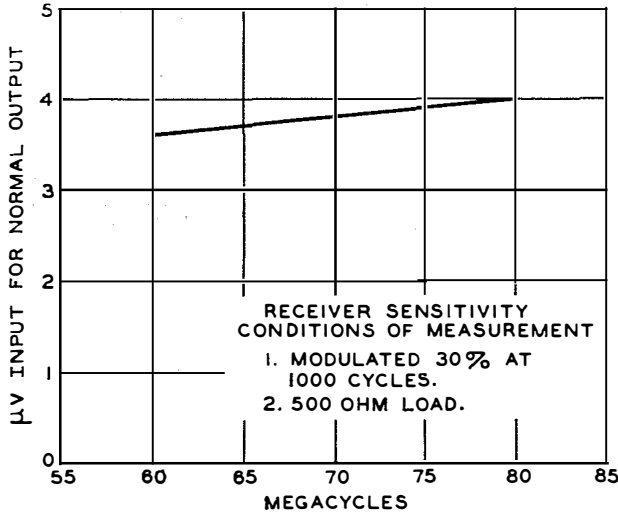


Figure 1-2—Receiver Sensitivity Curve

(9) IF selectivity. (Refer to figure 1-3.)

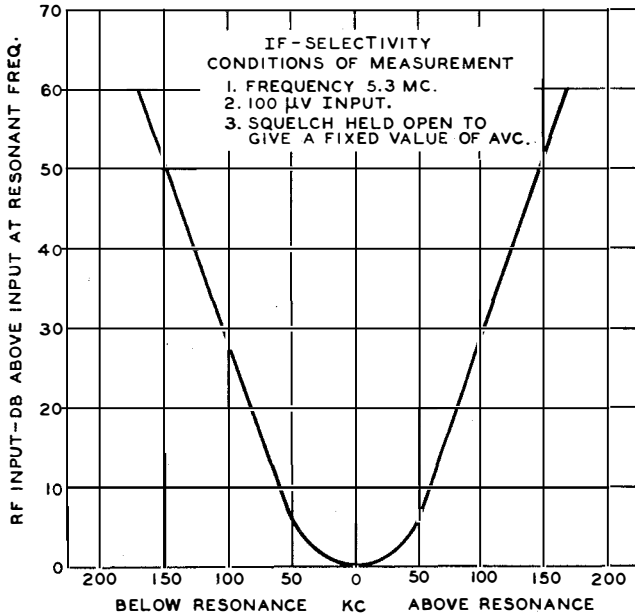


Figure 1-3—IF Selectivity Curve

(10) Audio-frequency response.

(a) Receiver response. (Refer to figure 1-4.)

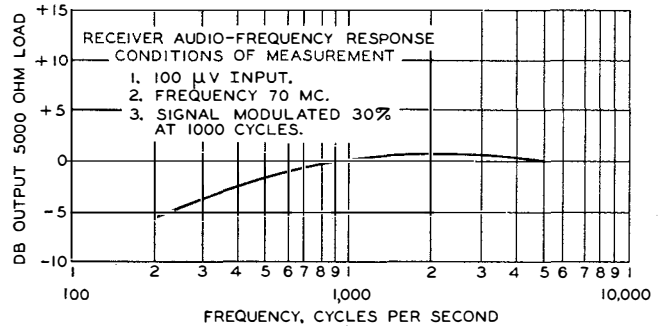


Figure 1-4—Receiver Audio Frequency Response Curve

(b) Transmitter response. (Refer to figure 1-5.)

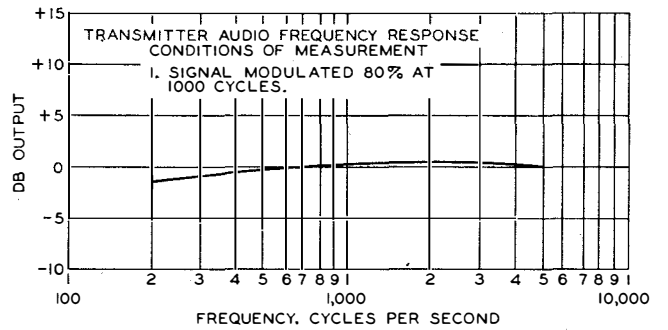


Figure 1-5—Transmitter Audio Frequency Response Curve

(11) Crystals.

(a) Receiver.

1. Oscillating frequency—13.675 mc - 18.675 mc.
2. Exciter output frequency—54.7 mc - 74.7 mc.

(b) Transmitter.

1. Oscillating frequency—15 mc to 20 mc.
2. Output frequency of equipment—60 mc to 80 mc.

(12) Frequency stability— $\pm 0.03\%$.

(13) Automatic volume control. (See figure 1-6.)

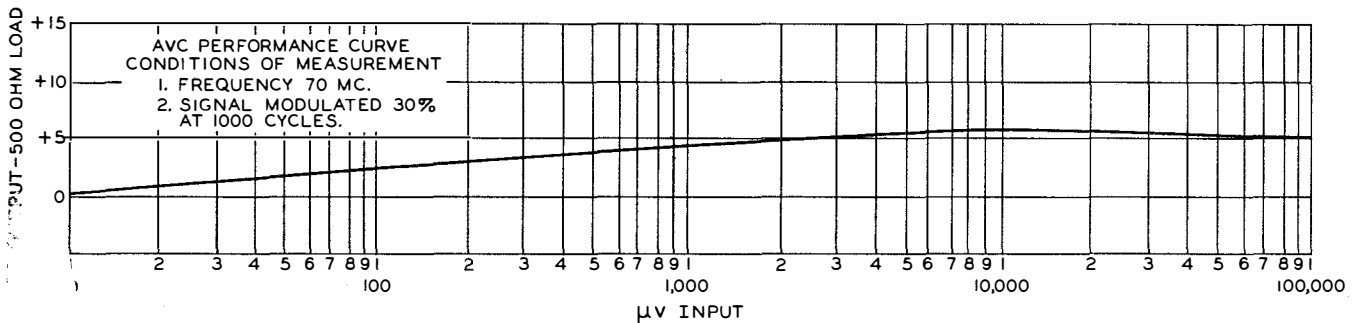


Figure 1-6—AVC Performance Curve

Section 1
Paragraph 1

RESTRICTED

(14) Squelch characteristic—Off to full output obtained with a 3 to 5 microvolt input change.

(15) Output impedance and input impedance.

- (a) Receiver.
1. Input—50 ohms.
2. Output—600 ohms.

(b) Transmitter.

1. Input (audio circuit)—Between 25 ohms and 45 ohms.

2. Output (RF coupling circuit)—30 to 120 ohms at zero degrees phase angle or 40 to 230 ohms at plus or minus 45 degrees phase angle.

(16) Antenna characteristics—Maximum standing wave ratio of 4 to 1.

(17) Receiver circuit—Superhetrodyne with 5.3 mc intermediate frequency amplifiers.

(18) Tubes employed.

<u>Symbol</u>	<u>Type Designation</u>	<u>Function</u>
V110	6AK5	Receiver 1st IF Amplifier
V111	6AK5	Receiver 2nd IF Amplifier
V112	6AK5	Receiver 3rd IF Amplifier
V113	6C4	Receiver Frequency Multiplier
V114	6C4	Receiver Oscillator
V115	6AQ6	Receiver AVC Control
V116	6C4	Receiver 2nd Detector
V117	6AQ6	Receiver Audio Squelch Control
V118	25Z6	Power Rectifier
V119	25Z6	Power Rectifier
V120	28D7	Audio Frequency Power Amplifier
V122	6C4	Polarity Rectifier
V123	6C4	Noise Limiter
V124	6C4	Polarity Rectifier

<u>Symbol</u>	<u>Type Designation</u>	<u>Function</u>
V101	6C4	Transmitter Oscillator
V102	6C4	Transmitter 1st Frequency Multiplier
V103	6C4	Transmitter 2nd Frequency Multiplier
V104	28D7	RF Power Amplifier
V105	6AQ6	1st Audio Amplifier
V106	6C4	Audio Frequency Driver
V107	28D7	Audio Frequency Power Amplifier
V108	6AK5	Receiver RF Amplifier
V109	6AK5	Receiver 1st Detector

(19) Power factor of equipment—.89.

(20) Power supply (not supplied).

(a) 115 volts DC or 115 volts AC single phase 50/60 cps.

(b) Current required from source.

1. DC power source.

a. Receiving—.7 amp.

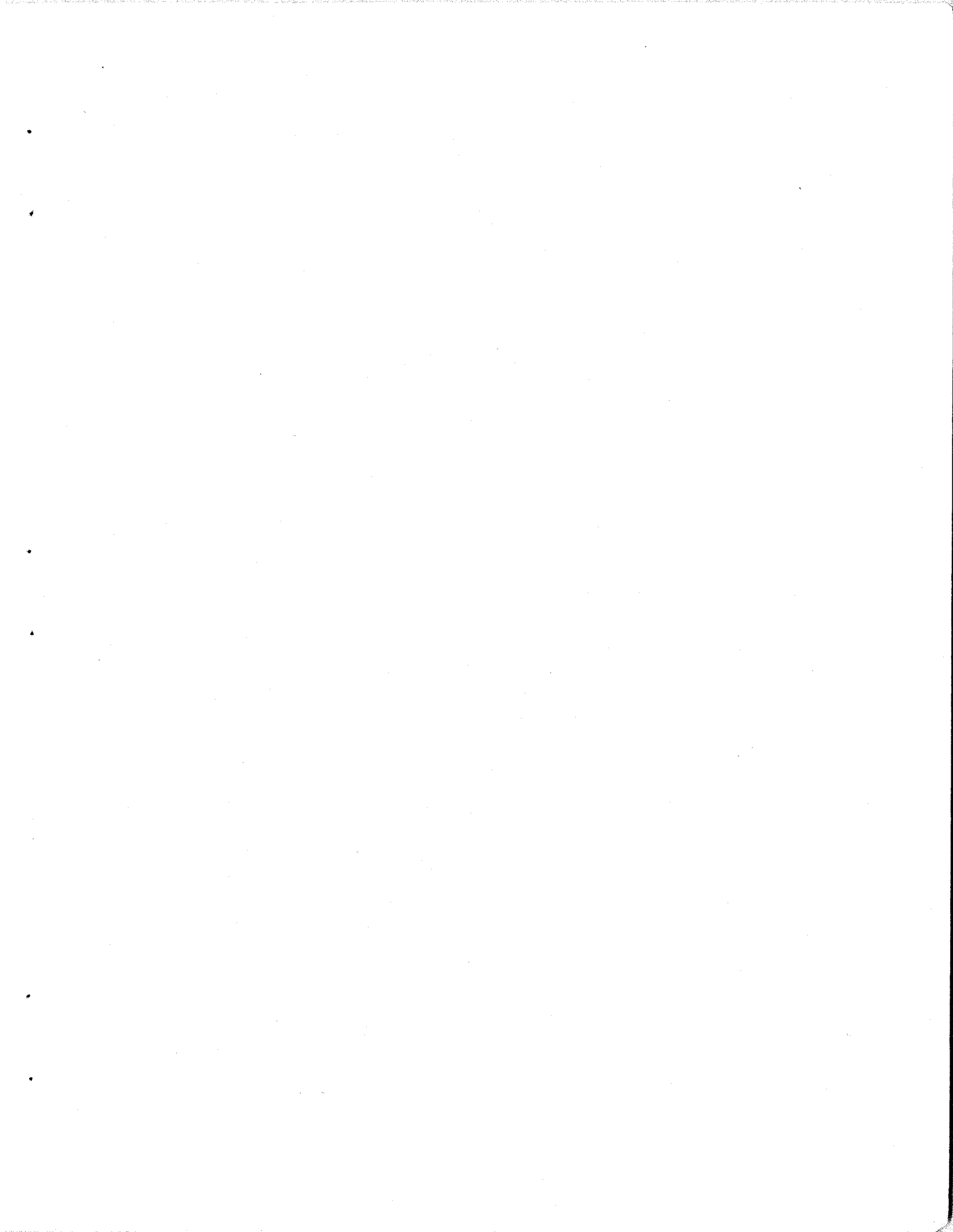
b. Transmitting—.8 amp.

2. AC power source.

a. Receiving—.85 amp.

b. Transmitting—.98 amp.

(21) Heat dissipation of unit—86.7 watts.



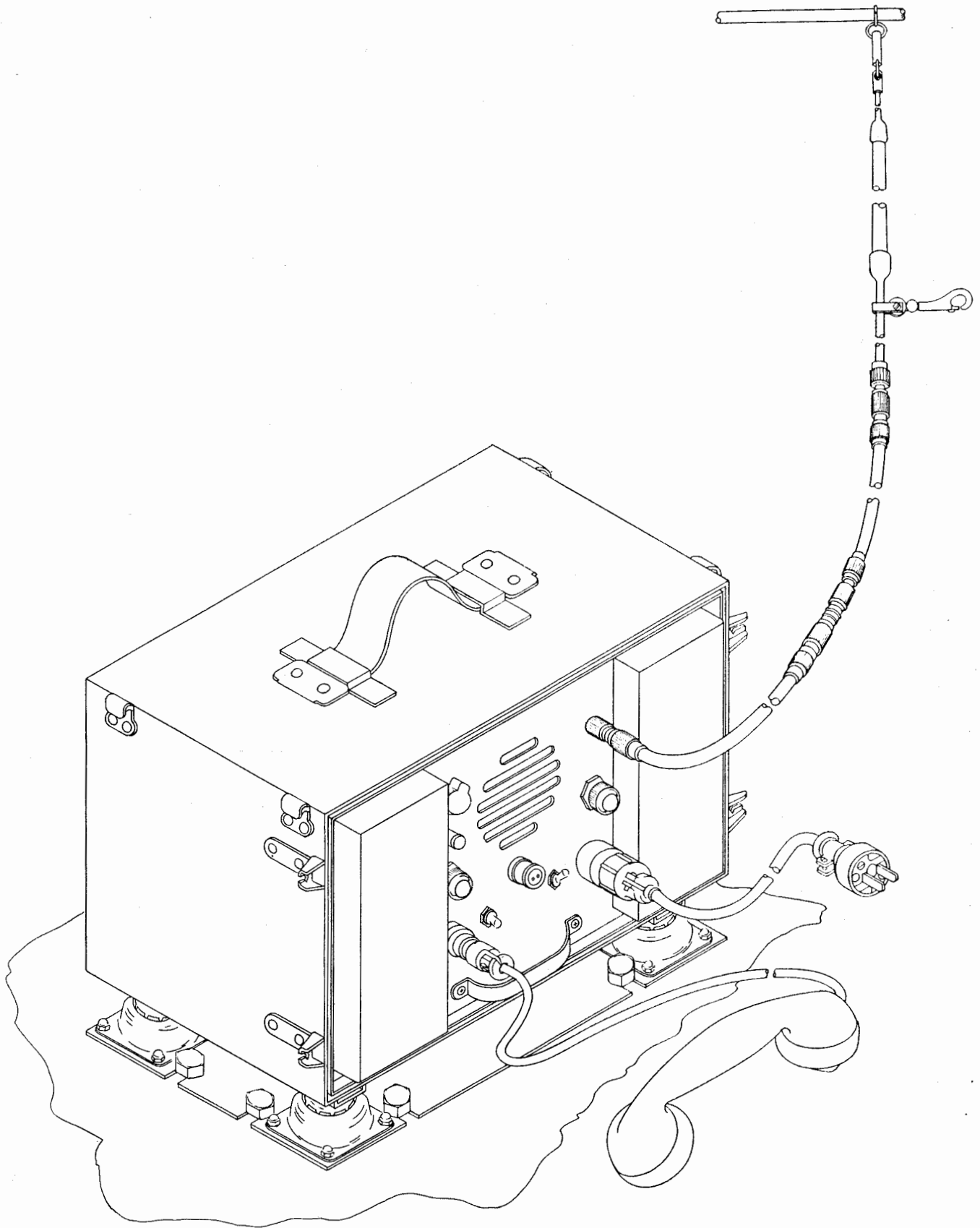


Figure 2-1—Navy Type COL-43065 Radio Transmitter-Receiver Installation

SECTION II INSTALLATION AND ADJUSTMENT

1. INSTALLATION. (See figure 2-1.)

a. UNCRATING.—Immediately upon receipt of this equipment, examination should be made to determine the extent of shipping damage and the equipment that is received should be checked against

the table of equipment supplied. The table is shown on page 1-2.

(1) Remove the Navy Type COL-43065 Transmitter-Receiver and the Navy Type COL-10406 Accessory Case from the shipping crate.

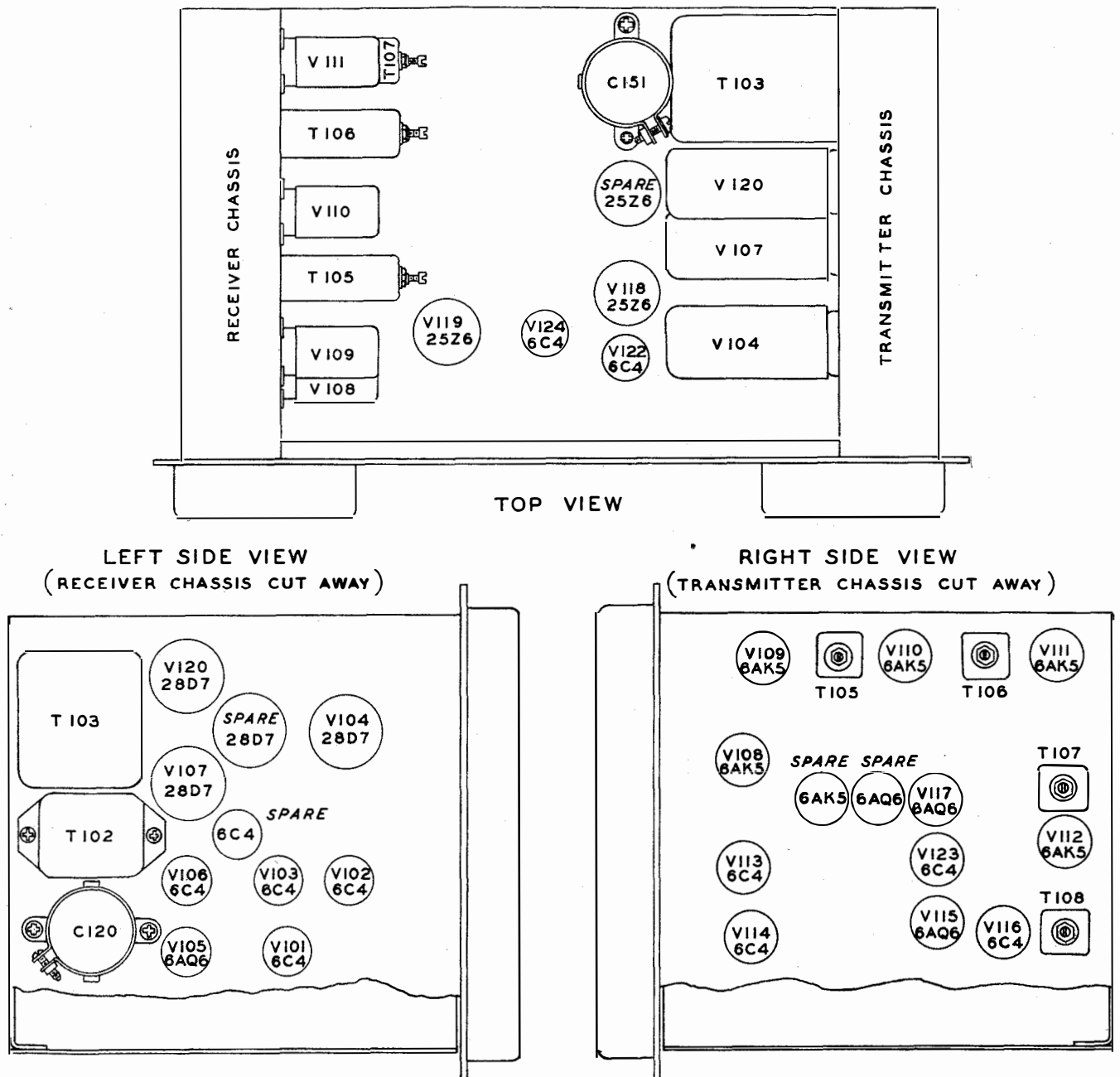


Figure 2-2—Tube Locating Diagram

(2) Examine the locking clasps for possible breakage.

(3) Unlock the four end clasps and set the accessory case beside the transmitter-receiver on a work bench.

(4) Unlock the clasps of the accessory case and remove the front sealing cover.

(5) Refer to figure 7-6 on page 7-7, 8. Pull out the handset and the parts tray that is behind it. Examine the handset for possible breakage. Check the condition of the contents of the tray.

(6) Unlock the clasps of the transmitter-receiver cabinet by loosening the wing nuts. Remove the front sealing cover. The exposed panel is fastened to the cabinet with special screw fittings, located around the edge of the panel. The two small covers that protect the transmitter and receiver controls are held in place by four Dzus fasteners.

(7) Refer to figure 7-7 on page 7-9, 10. Rotate the special screw fittings in a counterclockwise direction with a screwdriver to disengage. This operation unlocks the panel from the cabinet, permitting the entire inner assembly to be pulled out for inspection.

(8) Refer to figure 2-2. Examine the vacuum tubes, crystal holders and sockets for damage. Examine all exposed parts and wiring for obvious defects such as cracked insulators or shorted wiring.

(9) Return the panel and chassis to the transmitter-receiver cabinet and lock into place with the special screw fasteners. The accessories should be left out of the accessory case for electrical testing.

b. PRE-INSTALLATION TEST.—A preliminary electrical test should be made, as soon as possible after the examination for damage, before placing the equipment into service. No additional testing devices, other than that furnished with equipment, are needed for this test. The following test procedure is suggested:

(1) Operate the power ON-OFF switch to the open circuit or OFF position. (This switch is controlled by the panel VOLUME knob. Rotating this control to the extreme counterclockwise position opens the power switch.)

(2) Plug the female end of the power cord into the recessed receptacle designated POWER 115 v AC DC. Insert the other end of the power cord into a 115 v AC or DC outlet.

(3) Remove the coaxial transmission line and the antenna from the reel.

(4) Insert the male terminating end of the coaxial line into the panel ANTENNA receptacle and secure the connector with the locking collar. (If no signal radiation is desired, the coaxial antenna should be disconnected from the transmission line and a 50 ohm, five watt, non-inductive resistor connected from the center conductor of the transmission line to the outer shield.)

(5) Insert a receiver crystal into the lower left-

hand corner crystal receptacle and a transmitter crystal into the lower right-hand corner receptacle. Refer to paragraph 2., page 2-4 of this section for the method of selecting the correct crystal for the receiver and transmitter.

(6) Close the power switch by advancing the VOLUME control from the OFF position. The panel POWER ON light should glow, indicating that voltage is being applied to the equipment. The panel light shutter must be open. Rotate the knurled edge counterclockwise to open the shutter.

(7) Insert the tuning meter cord plug into the METER JACK.

(8) Refer to paragraph 2., page 2-4 of this section and check the tuning and output of the transmitter.

(9) Press the PRESS TO TALK—RELEASE TO LISTEN switch; the CARRIER ON panel light should glow. The panel light shutter must be open. Rotate the knurled edge counterclockwise to open the shutter.

(10) Assuming that the transmitter is properly tuned and that the output is normal, check the modulation by speaking into the transducer. Modulation is evidenced by an increase in the brilliancy of the CARRIER ON panel light. Due to the dual use as loud speaker and microphone, the panel mounted loud speaker is referred to as a transducer.

(11) Insert the handset cord connector into the receptacle labeled HANDSET.

(12) Press the Push-to-Talk button on the handset and speak into the handset transmitter. Modulation should occur, being indicated as before by the increased brilliancy of the CARRIER ON panel light.

(13) Press the PRESS TO CUT SQUELCH button. If the receiver is functioning properly and the VOLUME control is fully advanced, a marked rise in noise level will occur. With the exception of the VOLUME control, no operational adjustments are necessary when receiving. Refer to paragraph 2., page 2-4 of this section for the method of tuning the receiver.

c. METHODS OF CARRYING EQUIPMENT. (Refer to figure 2-3.)—The transmitter-receiver and the accessory case have handle straps attached for the suitcase method of carrying the equipment. Adjustable shoulder straps are furnished for back pack method of carrying. Two rings on the back of each cabinet receive the snap fasteners. The two units should be locked together before attaching the shoulder straps. The handle and shoulder straps are constructed of waterproof, fungi resistant, cotton webbing.

d. ATTACHING SHOCK MOUNT PLATE. (Refer to figure 7-13 on page 7-17, 18)—A Navy Type COL-10479 Mounting Base, equipped with a rubber cup type shockmount at each of the four corners, is supplied with the equipment. The shock mount base absorbs vibration from sources external to the trans-

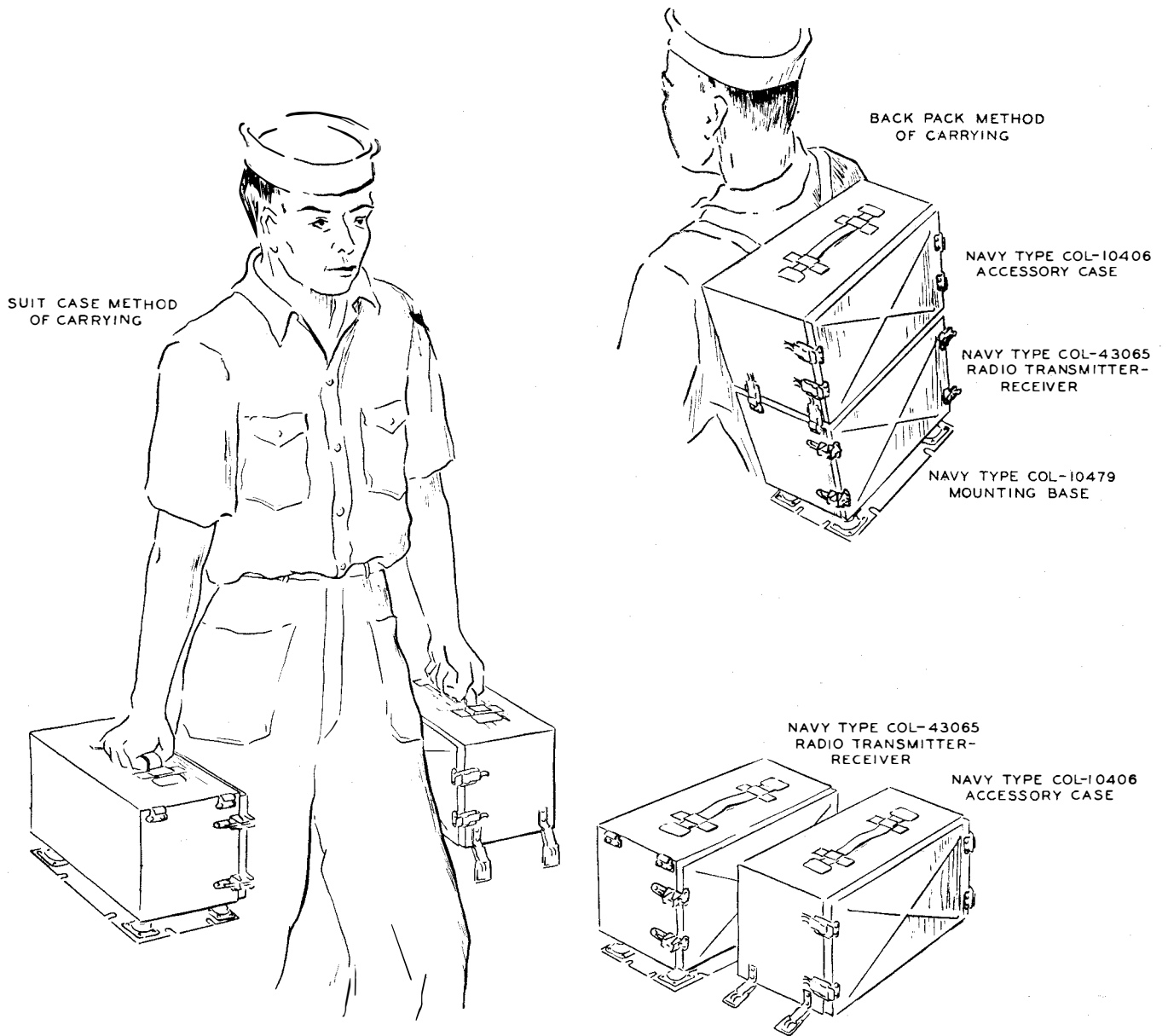


Figure 2-3—Methods of Carrying Equipment

mitter-receiver, thereby protecting the vacuum tubes and other fragile components. The base is attached to the transmitter-receiver unit by means of bolts inserted through the center of the four shock mounts and screwed into the rivet nuts that are located on the bottom of the unit.

The following procedure is suggested for fastening the shock mount base to the Navy Type COL-43065 Radio Transmitter-Receiver cabinet.

(1) Turn the cabinet so that the bottom is facing upward.

(2) Locate the four rivet nuts. The rivet nuts have been staked into the two channel strips which are welded onto the bottom of the cabinet.

(3) Set the mounting base over the bottom of the cabinet with the shock mount plate uppermost and position the base so that the center holes of the shock mounts are in line with the rivet nuts.

(4) Insert a $\frac{1}{4}$ -20 x 1- $\frac{1}{4}$ inch hex head cap screw through the center hole of each shock mount and turn the screw into the corresponding rivet nut. Tighten the cap screws sufficiently to prevent loosening with vibration.

(5) Set the cabinet and base upright.

e. **SELECTING SITE FOR SETTING UP THE EQUIPMENT.**—The important fact to keep in mind when selecting a suitable site is that there should be as few intervening objects as possible between the transmitting antenna and the receiving point. A power source and some means of supporting the antenna (elevated as high as possible) must be available.

f. **TRANSMITTER-RECEIVER DECK MOUNTING.** (Refer to figure 7-12 on page 7-15.)—The Navy Type COL-10479 Mounting Base has eight slots along the edge for fastening to the deck. The slots will admit $\frac{3}{8}$ inch diameter bolts, the size which should be used for deck mounting. Mount the base, with the transmitter-receiver attached, to the deck as follows:

(1) Set the unit on the selected deck site.

(2) Trace along the edge of each of the eight mounting slots, using a scribe or other pointed instrument.

(3) Remove the transmitter-receiver unit from the deck site.

(4) Using a center punch, mark the point which is equi-distant from the three sides of the mounting slot tracings. Repeat on each of the eight slot tracings.

(5) Drill each of the eight center punch marked points to admit the size mounting bolt that is to be used.

g. **CONNECTIONS.** (Refer to figure 2-4.)

(1) **POWER CONNECTIONS.**—A recessed receptacle on the panel of the transmitter-receiver unit provides connection for the power input. A ten

foot power cord is supplied for making the connection to the 115 v AC or 115 v DC source.

(2) INSTALLATION OF THE ANTENNA SYSTEM.

(a) **ANTENNA.**—The coaxial antenna has a supporting insulator attached to one end; the other end is to be connected to the coaxial transmission line. Installation consists of connecting the transmission line to the antenna, attaching the free end of the insulator to a halyard and hoisting the antenna as high as possible on any convenient support.

(b) **COAXIAL LINE.** — A twenty-five foot section and a fifty foot section of coaxial transmission line are furnished with the equipment. Either section may be used separately or the two sections may be used together to make a seventy-five foot transmission line. A coaxial fitting, held in place by screw type collars, couples the two sections together. Another coaxial fitting couples the antenna section to the transmission line.

(c) **CONNECTING TO EQUIPMENT.** — A receptacle mounted on the panel, designated ANTENNA, provides connection between the transmitter-receiver unit and coaxial transmission line. The center conductor of the coaxial line fits into the contact ring in the center of the panel receptacle. A collar on the coaxial line screws over the receptacle and holds the connection securely in place.

(d) **GROUND.**—The equipment does not require an external ground.

(3) **HANDSET.** (Refer to figure 7-3 on page 7-5.)—A Navy Type 51064 Handset, equipped with a non-locking butterfly type Push-to-Talk switch, is furnished. The microphone unit is of the single button carbon type. The handset receiver unit is of the magnetic type. A twenty foot, five conductor cable, ending in a five prong plug, provides connection to the transmitter-receiver unit. A panel receptacle, designated as HANDSET, receives the cable plug and a screw type sealing collar.

2. ADJUSTMENTS.

a. **GENERAL.** (See figure 2-5 and figure 4-1 on page 4-1.)—The adjustment controls on this equipment are located on the panel and are of two types, variable and semi-fixed. All of the tuning controls are of the semi-fixed type, adjustment being made with a screwdriver after the locking nuts have been loosened with the spintite wrench. Adjustment of the transmitter-receiver includes selecting the proper crystals for the frequencies used. Preliminary adjustments of the transmitter section consists of setting the tuning controls for the desired operating frequency and the coupling control for proper loading of the RF power amplifier tube. The initial adjustments will be the setting of the tuning controls of the transmitter section. The receiver SQUELCH SENSITIVITY and VOLUME controls may require resetting at various times, depending upon the strength of the received signal.

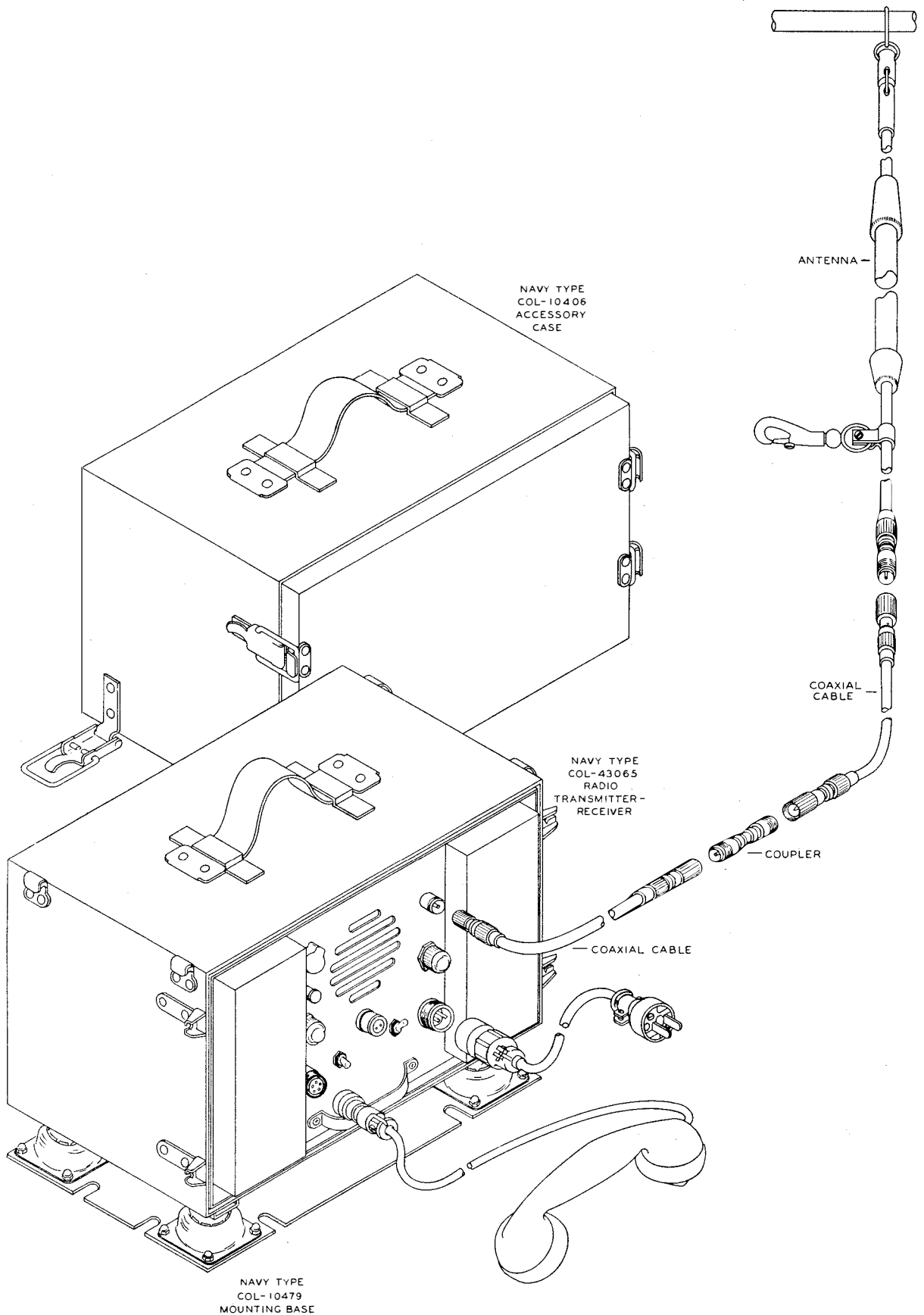


Figure 2-4—Navy Model MBF Installation Connections

b. FUNCTION OF CONTROLS.

(1) TRANSMITTER-RECEIVER CONTROLS.

—Certain controls, namely, the ON-OFF switch, METER SWITCH and the PRESS TO TALK—RELEASE TO LISTEN switch are common to both the transmitter and receiver sections.

(a) ON-OFF SWITCH.—The ON-OFF switch is located on the upper left-hand side of the panel. Operation of the switch is performed by rotating the VOLUME control knob. Closing the ON-OFF switch (advancing the VOLUME control) completes the power circuit, energizing all of the tube heaters and applying plate voltage to the receiver tubes.

(b) METER SWITCH. (See figure 2-6.)—The METER SWITCH is located on the left (receiver) side of the panel. Four positions of the switch are required for metering the transmitter and receiver sections. The panel engraving for the four positions corresponds to the encircled numbers that appear on the transmitter-receiver schematic diagram and to the controls on the panel and serves to indicate the circuit being metered. The switch connects the Tuning Meter into the circuit.

(c) PRESS TO TALK—RELEASE TO LISTEN switch.—The PRESS TO TALK—RELEASE TO LISTEN switch is a toggle type 4PDT switch and is located on the panel below the transducer grille. This switch, when in the down position, completes the energizing circuits for the antenna

relay and the receive-transmit relay and shorts out the SPEAKER ON-OFF switch. Operation of the antenna relay connects the antenna to the output of the transmitter. Operation of the receive-transmit relay connects the output of the audio power amplifier to the transmitter for the purpose of modulating the RF power amplifier. The transducer, operating as a microphone, is connected to the input of the audio amplifier. Releasing the PRESS TO TALK—RELEASE TO LISTEN switch to the normal (up) position disconnects the transducer and connects one side of the handset microphone to the audio input circuit.

(d) SPEAKER ON-OFF SWITCH. — This toggle type SPDT switch is located on the panel below the transducer grille and to the left of the PRESS TO TALK—RELEASE TO LISTEN switch. The switch is connected in series with the transducer unit. Normally the switch will be in the up or SPEAKER ON position. If it is desired to silence the transducer, the switch should be operated to the SPEAKER OFF position.

Note

In equipments with Navy Serial Numbers from one to 700 inclusive, the SPEAKER ON-SPEAKER OFF switch is connected as a microphone selector switch. When the switch is in the SPEAKER ON position, the speaker is selected for use as a microphone and when the switch is in the SPEAKER OFF position, the handset microphone is selected.

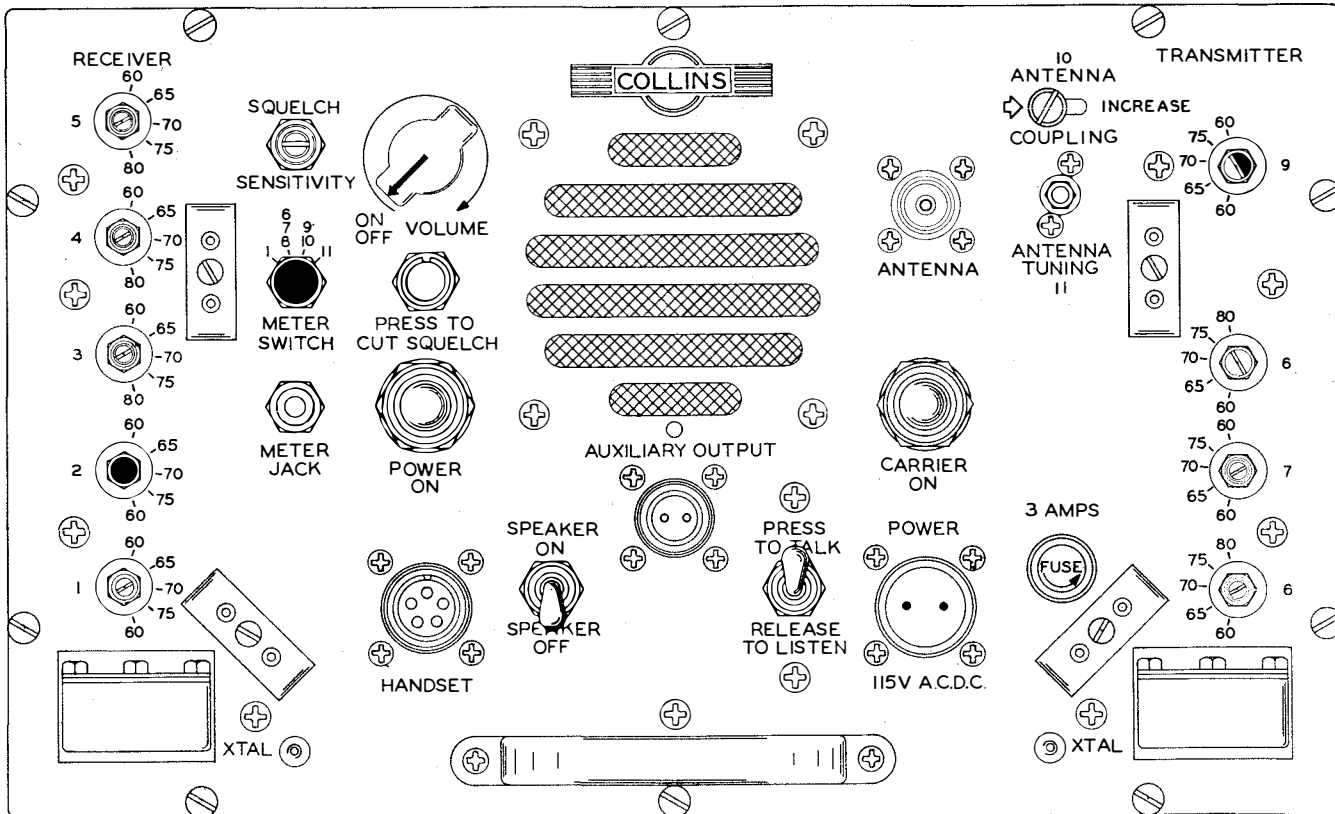


Figure 2-5—Panel Controls

(2) RECEIVER CONTROLS. — The controls that are used for the receiver section are located on the left-hand side of the panel. Tuning controls 1, 2, 3, 4 and 5 are arranged in ascending numerical order along the panel edge. The control numbers correspond to the numbers on the METER SWITCH and to the encircled numbers that appear on the transmitter-receiver schematic. These encircled numbers designate various tuned circuits. The tuning controls are semi-fixed, that is, once adjustment is made for a particular operating frequency no further changes are required. The adjustments are made by unlocking the controls with the spintite wrench provided, inserting a screwdriver into the slotted end of the controls and rotating the controls to the desired position. Approximate setting of the controls can be made by turning the control shafts until the end slots are in line with the frequency numbers that are engraved on the right-hand side of the controls. The red dot on the sides of the shafts must be adjacent to the frequency numbers.

The SQUELCH SENSITIVITY control is located near the upper edge of the panel, adjacent to tuning control number 5. The VOLUME control is located next to the SQUELCH SENSITIVITY control. The VOLUME control may need adjustment, depending upon the strength of the incoming signal. The PRESS TO CUT SQUELCH switch is used when first tuning the receiver and when it is desired to receive a weak signal.

(a) TUNING CONTROL NUMBER 1.—This control operates the variable capacitor, C149, in the plate circuit of the oscillator portion of the exciter. The exciter consists of the oscillator and the multiplier stage.

(b) TUNING CONTROL NUMBER 2.—This control operates the tuning capacitor, C166, in the plate circuit of the multiplier stage.

(c) TUNING CONTROL NUMBER 3.—This control operates a variable capacitor, C123, to tune the first RF amplifier to the incoming signal.

(d) TUNING CONTROL NUMBER 4.—This control operates the variable capacitor, C126, to tune the plate circuit of the first RF amplifier.

(e) TUNING CONTROL NUMBER 5.—This control operates the variable capacitor, C128, to tune the input to the mixer (1st detector).

(f) SQUELCH SENSITIVITY. — The SQUELCH SENSITIVITY control operates a variable resistor (rheostat) which is in series with the cathodes of the first and second IF amplifying tubes. The setting of this control affects the point at which the squelch circuit is disabled. Increasing the resistance will decrease the sensitivity, requiring a stronger signal voltage to disable the squelch and produce an audible output. The sensitivity is decreased by rotating the control counterclockwise.

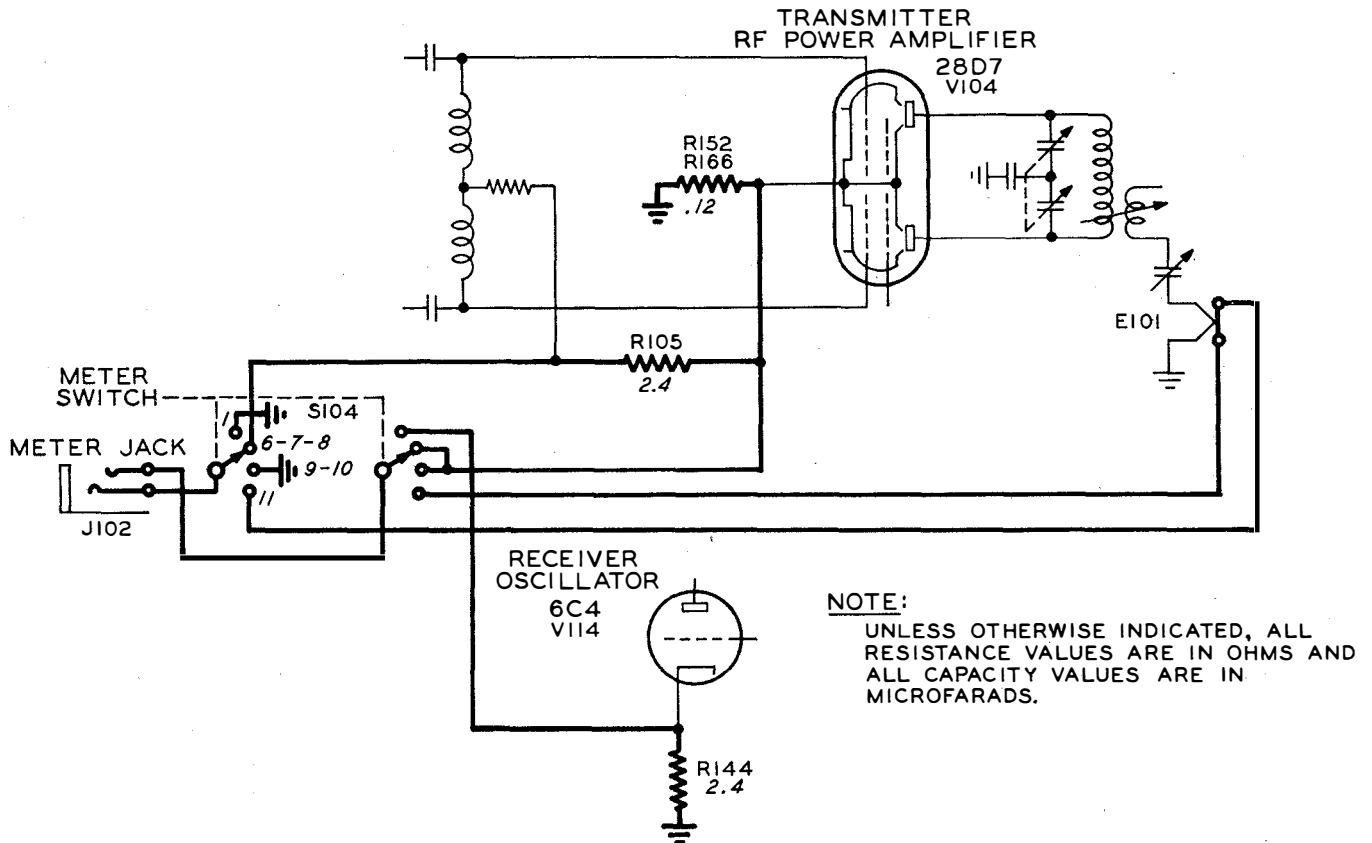


Figure 2-6—Transmitter-Receiver Metering Circuits

(g) **VOLUME.**—The **VOLUME** control adjusts a variable resistor (potentiometer) in the grid circuit of the first audio amplifying stage. The audio signal voltage which is developed across the noise limiter cathode is applied to the movable arm of the potentiometer. The position of the movable arm determines the voltage that is impressed upon the grid of the audio tube.

(h) **PRESS TO CUT SQUELCH.**—This control, when operated, shorts out the **SQUELCH SENSITIVITY** control and opens the plate circuit of the squelch tube, V117.

(3) **TRANSMITTER CONTROLS.**—The controls which are used to adjust the transmitter circuits are located on the right-hand side of the panel. Tuning controls 6, 7, 8 and 9 are spaced in ascending numerical order along the panel edge. The **ANTENNA COUPLING** control, number 10, and the **ANTENNA TUNING** control, number 11, are arranged near the upper edge of the panel. Controls 6, 7, 8, 9, 10 and 11 are adjustable with a screwdriver. All of the controls except number 10 may be rotated for adjustment after unlocking with the Spintite wrench. The adjustment of control number 10 is made by turning the protruding screw counterclockwise to unlock the control and sliding the inner assembly to the left or right. Numerals spaced around the left-hand side of all the controls except 10 and 11 are provided for initial approximate tuning settings.

(a) **TUNING CONTROL NUMBER 6.**—This control operates the variable capacitor, C103, which tunes the transmitter oscillator plate circuit.

(b) **TUNING CONTROL NUMBER 7.**—This control operates the tuning capacitor, C106, in the plate circuit of the first multiplier stage.

(c) **TUNING CONTROL NUMBER 8.**—This control operates the second multiplier stage variable plate tank capacitor, C110A-B.

(d) **TUNING CONTROL NUMBER 9.**—This control operates the variable capacitor, C114A-B, to tune the plate circuit of the power amplifier stage.

(e) **ANTENNA COUPLING CONTROL NUMBER 10.**—This control operates the antenna coupling coil, L109, changing the loading on the RF power amplifier by moving the coil in relation to the plate tank coil, L108.

(f) **ANTENNA TUNING CONTROL NUMBER 11.**—This control operates the antenna tuning capacitor, C176, which tunes out the input reactance of the transmission line and the reactance of the coupling loop.

c. **TUNING.**—This equipment has been designed for communication on frequencies between 60 and 80 megacycles. Eleven tuning controls must be correctly set before the transmitter and receiver sections can operate properly on any one frequency in this range. Each tuning control must be individu-

ally adjusted; the exact setting will depend upon the frequency selected. A screwdriver must be used to adjust the tuning controls. After adjustment the controls are locked to prevent accidental changes. The controls are locked by tightening the locking nuts with the Spintite wrench that is provided with the equipment. An indication of proper tuning is given by the Tuning Meter. The meter is furnished with cable and plug attached. By positioning the **METER SWITCH**, the Tuning Meter is connected into the circuit that is being tuned or into a following circuit. In the latter case the tuning is indirectly indicated.

(1) **TRANSMITTER TUNING THEORY.**—The transmitter is tuned by adjusting variable capacitors in each successive stage, beginning with the oscillator and progressing to the antenna circuit. The variable capacitors in the plate tank circuits of the oscillator, the first and second multiplier stages and the power amplifier are rotated until resonance is obtained at the desired frequency. At the resonant point, maximum RF voltage will be developed across the capacitors and inductors and will be applied to the grids of the tubes in the following stages, or to the antenna coil in the case of the power amplifier stage. Adjusting the **ANTENNA COUPLING** control varies the amount of coupling between the power amplifier plate circuit and the antenna circuit and consequently varies the power that is fed to the antenna. A variable capacitor, connected in series with the antenna coil, balances out the inductive reactance of this coil and the reactance present at the transmission line input.

Refer to the following table for the functions of the panel controls that are used to adjust the circuits:

Panel Control Numbers	Circuits Affected
6	Oscillator Plate Tank
7	1st Multiplier Plate Tank
8	2nd Multiplier Plate Tank
9	RF Power Amplifier Plate Tank
10	Antenna Coupling
11	Antenna Tuning

(2) **TRANSMITTER TUNING PROCEDURE.**—Adjust the transmitter to any desired frequency within the 60 to 80 megacycle range by the following procedure:

(a) Select a transmitter crystal which is one-fourth of the operating frequency desired. Crystal frequency = $\frac{\text{Output frequency}}{4}$. This crystal fre-

quency (actually the third harmonic of the quartz crystal) is engraved upon the crystal holder.

(b) Remove the covers from the transmitter and the receiver controls.

(c) Insert this crystal into the lower right-hand crystal receptacle.

(d) Turn on the transmitter power by advancing the VOLUME control from the OFF position.

(e) Insert the Tuning Meter cord plug into the METER JACK.

(f) Set the METER SWITCH to the position designated 6-7-8.

(g) Unlock and adjust the right-hand tuning controls 6, 7, 8 and 9 to settings approximating the frequency desired. The red dots must be adjacent to the frequency numbers. Clockwise rotation of the tuning controls decreases the capacity of the tuned elements, thereby increasing the resonant frequency.

Example: Output frequency desired — 75.2 megacycles. Set the controls to positions where the end slots are in line with the engraved numerals 75. (Red dots adjacent to the numbers.)

(h) Depress the PRESS TO TALK - RELEASE TO LISTEN switch. The Tuning Meter should now show a reading, indicating drive to the power amplifier.

(i) While observing the Tuning Meter, re-adjust control number 6 clockwise from 60 until a maximum reading is obtained.

(j) While observing the Tuning Meter, re-adjust control number 7 until a maximum reading is obtained.

(k) Repeat step (j) with control number 8.

(l) Repeat step (j) with control number 8.

(m) Unlock the ANTENNA COUPLING control and move the shaft to the middle position. Advance the METER SWITCH to the position engraved 9-10. This operation places the Tuning Meter between the cathode of the RF power amplifier tube and ground to provide an indication of proper tuning and loading of this stage. The Tuning Meter should show a reading, indicating plate and screen grid current flow. The grid returns to the cathode. Therefore the grid current flow is not included in the meter reading.

(n) Adjust control number 9 until the Tuning Meter reading shows a pronounced dip, indicating that the RF power amplifier tube plate circuit is in resonance. Leave the control set at the point where the Tuning Meter dip is at a minimum.

(o) Move the METER SWITCH to the number 11 position to place the Tuning Meter in series with the output of the thermocouple in the antenna circuit. A deflection should be observed on the meter, indicating the passage of RF current to the antenna.

(p) Rotate the ANTENNA TUNING control number 11 to the position which causes the Tuning Meter to show the greatest deflection.

(q) Rotate the METER SWITCH back to the 9-10 position and observe the Tuning Meter reading.

(r) Readjust control number 9 until the meter pointer dips. Leave the control set at the minimum point of the meter dip. If the Tuning Meter is now reading appreciably above or below the red area on the meter scale, the ANTENNA COUPLING control, number 10, must be re-set.

(s) Change the setting of the ANTENNA COUPLING control, number 10, until the Tuning Meter deflection is within the red area.

(t) Readjust control number 9. Set the control for the minimum point of the Tuning Meter dip.

(u) Repeat steps (s) and (t) until the minimum point of the meter dip occurs within the red area.

(v) Tighten locking nuts on the controls with the Spintite wrench. Be careful not to change the settings of the controls.

Note

Do not leave the transmitter on when the controls have not been correctly set or when the XTAL is not in place. The RF power amplifier tubes will be damaged.

An alternate method of tuning the transmitter is outlined below:

(a) Refer to the above procedure and perform steps (a) thru (h).

(b) Tune control number 6 until the meter indicates maximum drive. If the meter reads backward return control number 6 to the approximate setting and tune control number 7 and control number 8 for maximum meter reading.

(c) Repeat steps (i) thru (l) from the procedure outlined above.

(d) Operate the METER SWITCH to position number 11 and tune control number 9 and control number 11 for maximum meter reading. The meter needle should indicate current slightly below the red portion of the meter scale. If it is desired to check for maximum absorption, connect a pen lamp in series with a pickup coil and place the coil inside of the final tank coil.

(3) RECEIVER TUNING THEORY.—The oscillator circuit is the first circuit to be adjusted when tuning the receiver. The tuning of this stage consists of adjusting a variable capacitor until the plate tank circuit is resonant to the third harmonic of the quartz crystal frequency. The plate circuit of the multiplier stage is tuned by a variable capacitor to the fourth harmonic of the oscillator output frequency. The grid and plate circuits of the RF amplifier are tuned by variable capacitors to the incoming signal frequency delivered by the antenna. The grid circuit of the first detector (mixer) stage is tuned by a variable capacitor to the same frequency as the RF amplifier. The plate circuit is tuned to the IF frequency, 5.3 megacycles, by a movable powdered iron slug in the IF transformer primary winding. The grid and plate circuits of the first, second and third

IF amplifier tubes and the grid circuit of the second detector tube are also tuned to the IF frequency by movable slugs in the IF transformer windings.

Refer to the following table for the panel controls that are used to adjust the circuits:

<u>Panel Control Numbers</u>	<u>Circuits Affected</u>
1	Oscillator Plate Tank
2	Multiplier Plate
3	RF Amplifier Grid
4	RF Amplifier Plate
5	1st Detector Grid

The adjustment of the IF transformer tuning slugs is not a part of the normal tuning operation and will be covered in the aligning procedure in the Maintenance Section of this Instruction Book.

(4) RECEIVER TUNING PROCEDURE.—The receiver should be tuned in the order of the following steps:

(a) Select the correct crystal for the channel or input frequency of the antenna circuit. The frequency of the crystal to be used is calculated as follows:

$$\text{Crystal frequency} = \frac{\text{input frequency in mc} - 5.3 \text{ mc.}}{4}$$

This crystal frequency (actually the third harmonic of the quartz crystal) is engraved upon the crystal holder.

(b) Insert the crystal into the lower left-hand panel XTAL receptacle.

(c) Unlock and set controls 1, 2, 3, 4 and 5 with the red dots adjacent to the numbers corresponding to the channel frequency. The end slots should be in line with the numbers. For example: If the channel frequency were 75.2 megacycles, the slots should be set in line with the number 75 to the right of the controls. The final setting of the controls may be slightly above or below this position.

(d) Connect one end of the power cord into a 115 volt AC or DC source and the other end into the POWER -115v AC or DC panel receptacle.

(e) Advance the VOLUME control to the full on position.

(f) Insert the Tuning Meter cord plug into the panel METER JACK.

(g) Rotate the METER SWITCH to the number 1 position. The Tuning Meter should indicate a current flow in the oscillator plate circuit.

(h) Rotate control number 1 clockwise, starting from 60, until the Tuning Meter shows a pronounced dip. Leave the control set at this point.

(i) Rotate the SQUELCH SENSITIVITY control fully clockwise and press the PRESS TO CUT SQUELCH switch. Noise should be heard in the transducer.

(j) Adjust control number 2 above and below the original setting until the transducer noise output is at a maximum level. Leave the control set at the position where maximum noise occurs.

(k) Operate control number 3 above and below the original position until the noise is at maximum in the transducer.

(l) Adjust control number 4 for the maximum noise.

(m) Adjust control number 5 for the maximum noise.

(n) Repeat steps (j), (k), (l) and (m) until the noise output no longer increases.

(o) Release the PRESS TO CUT SQUELCH switch and rotate the SQUELCH SENSITIVITY control counterclockwise just past the point where the noise is no longer heard in the transducer. In quiet locations, this control should be advanced clockwise to the control limit stop.

(p) Press the PRESS TO CUT SQUELCH switch button. The noise should reappear in the transducer.

This completes the tuning of the receiver section. Lock the controls with the Spintite wrench, care being taken to avoid changing the settings.

It has been assumed for the above explanation that no RF signal was present in the antenna circuit. If such a signal is present, from another transmitter or a modulated signal generator, the controls would be adjusted to the frequency of this RF source and for the maximum audio response at the transducer rather than the maximum noise.

d. PERFORMANCE CHECKS. — The performance of the equipment should be thoroughly checked before placing the protective covers over the tuning controls.

(1) TRANSMITTER CHECKS.—Advance the VOLUME control. The POWER ON light should glow if the shutter is open.

(a) Press the PRESS TO TALK - RELEASE TO LISTEN switch button. The CARRIER ON light should appear if the shutter is open.

(b) Insert the tuning meter cord plug into the METER JACK.

(c) Rotate the METER SWITCH to the position designated 6-7-8. The Tuning Meter should read between 3 and 6.

(d) Change the METER SWITCH to the position designated as 9 and 10. The Tuning Meter should read between 4.5 and 5.5.

(e) Place the METER SWITCH in the position designated as 11. The Tuning Meter should now read between 1 and 1.5 approximately.

(f) Whistle into the transducer while observing the Tuning Meter. The Tuning Meter reading should increase and the CARRIER ON panel light should brighten.

(g) Release the PRESS TO TALK-RELEASE TO LISTEN switch button. The CARRIER ON light should cease to glow and the Tuning Meter needle should drop back to zero.

(h) Insert the Handset cord plug into the panel HANDSET receptacle.

(i) Press the Push-to-Talk switch on the Handset. The CARRIER ON light should reappear and the Tuning Meter should indicate antenna current as before.

(j) Whistle into the handset microphone. The Tuning Meter reading should increase. Leave the Handset plugged into the panel receptacle for the check of the receiver section.

(2) RECEIVER CHECKS.

(a) Release the Push-to-Talk switch on the Handset. The antenna is now connected to the receiver input and the audio section is connected to

the receiver output. If a sufficiently strong modulated signal is present at the antenna circuit the audio will appear at the Handset and transducer as soon as the Push-to-Talk switch is released.

(b) Rotate the METER SWITCH to the position designated as number 1. The Tuning Meter should read between 3 and 4.

(c) Press the PRESS TO CUT SQUELCH switch button on the panel. A marked rise in noise level should be apparent in both the Handset and transducer.

(d) Operate the SPEAKER ON-OFF switch to the SPEAKER OFF position. The transducer noise output should cease.

SECTION III OPERATION

1. OPERATING PROCEDURE. (Refer to figure 3-1)

This section outlines the steps to be followed when operating the equipment. Assuming that the equipment has been installed and that all of the tuning controls have been set for a desired frequency, the procedure is as follows:

a. RECEIVING.—Turn the set on by advancing the VOLUME control in a clockwise direction from the OFF position. If the shutter is open, the POWER ON panel lamp should glow. If the panel lamp does not glow, grasp the knurled edge of the lens holder and rotate counterclockwise.

(1) Move the SPEAKER ON - SPEAKER OFF switch to the SPEAKER ON (up) position. If the equipment is within the receiving range of an active sending station operating on the same frequency, the sending station's signal should be heard in the transducer.

(2) Adjust the VOLUME control for the desired audio output level.

(3) If a signal cannot be heard in the trans-

ducer, press the PRESS TO CUT SQUELCH switch. Noise should be heard in the transducer if the receiver is functioning properly. Weak signals from distant sending points may be heard.

If the handset cord plug is inserted into the HANDSET panel receptacle, the signal or noise will be heard in the handset as well as in the transducer.

The transducer can be disabled by placing the SPEAKER ON - SPEAKER OFF switch in the SPEAKER OFF position.

b. TRANSMITTING.

(1) Press the PRESS TO TALK - RELEASE TO LISTEN switch. The CARRIER ON panel light should glow if the shutter is open, indicating that voltage is being applied to the tubes in the transmitter section. The panel light shutter may be opened by grasping the knurled edge of the lens holder and rotating counterclockwise.

(2) Speak into the transducer or handset to modulate the transmitter. If reception is acknowledged by another station when the PRESS TO

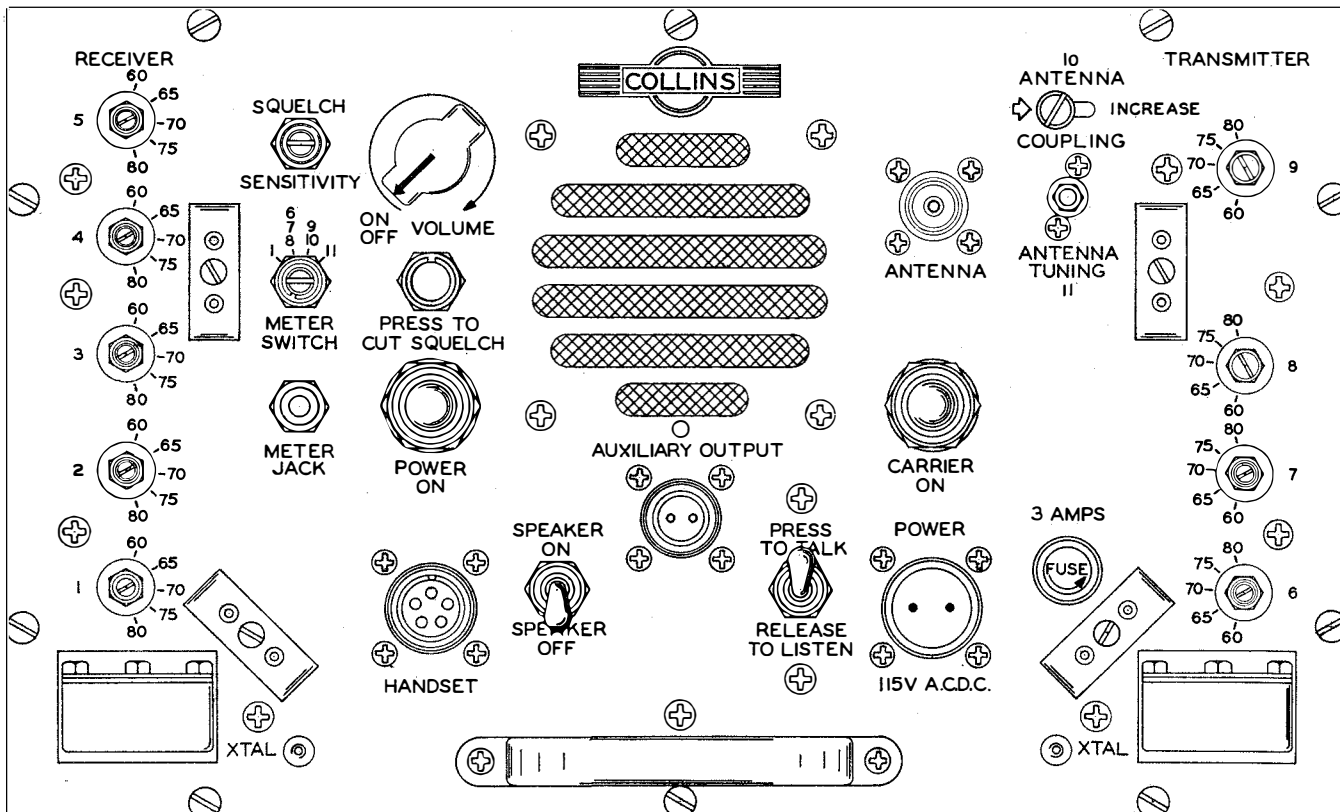


Figure 3-1—Panel Controls

TALK - RELEASE TO LISTEN switch is released, no further steps are necessary.

(3) Failure to receive the acknowledgment may be due to the fact that the transmitter was not performing properly and the other station was unable to receive the transmission. The audio modulation voltage should cause the CARRIER ON panel light to brighten when speaking into the transducer. The actual modulation taking place may be checked by inserting the Tuning Meter into the antenna circuit and observing the meter reading. The above check is performed as follows:

(a) Remove the small cover, which protects the receiver controls, from the left end of the panel by loosening the Dzus fasteners.

(b) Insert the Tuning Meter cord plug into the METER JACK.

(c) Rotate the METER SWITCH to the number 11 position.

(d) Press the PRESS TO TALK - RELEASE TO LISTEN switch. The Tuning Meter should indicate a steady current flowing into the antenna.

(e) Whistle into the transducer while holding the PRESS TO TALK - RELEASE TO LISTEN switch down, or into the handset while operating the Push-to-Talk handset switch. The current in the antenna circuit should increase. The increase will be indicated by an increase in the meter reading. If the meter reading does not increase, the modulation circuit should be checked. Refer to paragraph V, 2., f., 6. in this Instruction Book.

c. Turn the equipment off by rotating the VOLUME control counterclockwise to the limit stop.

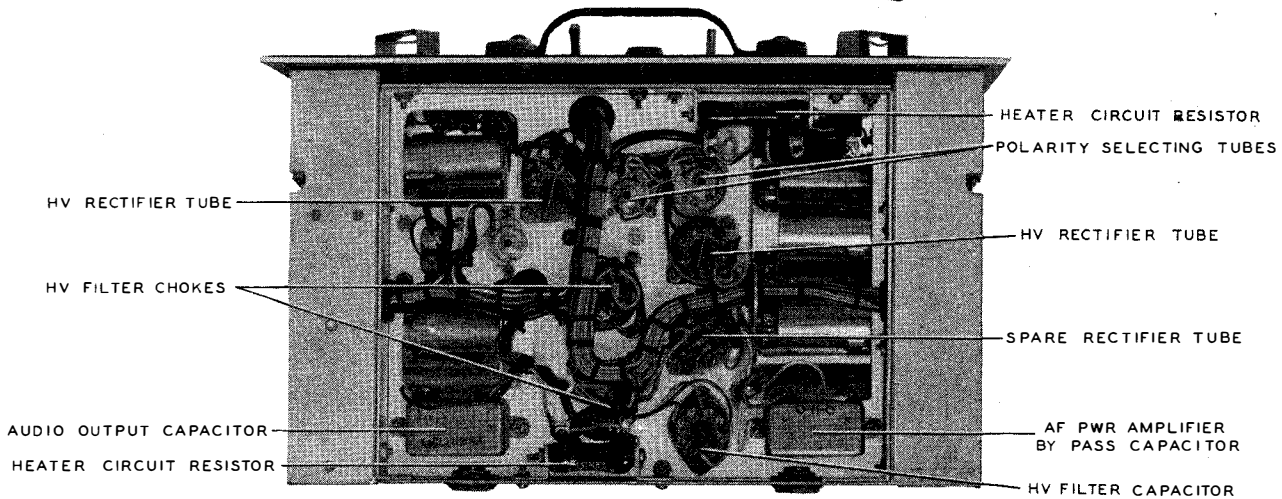
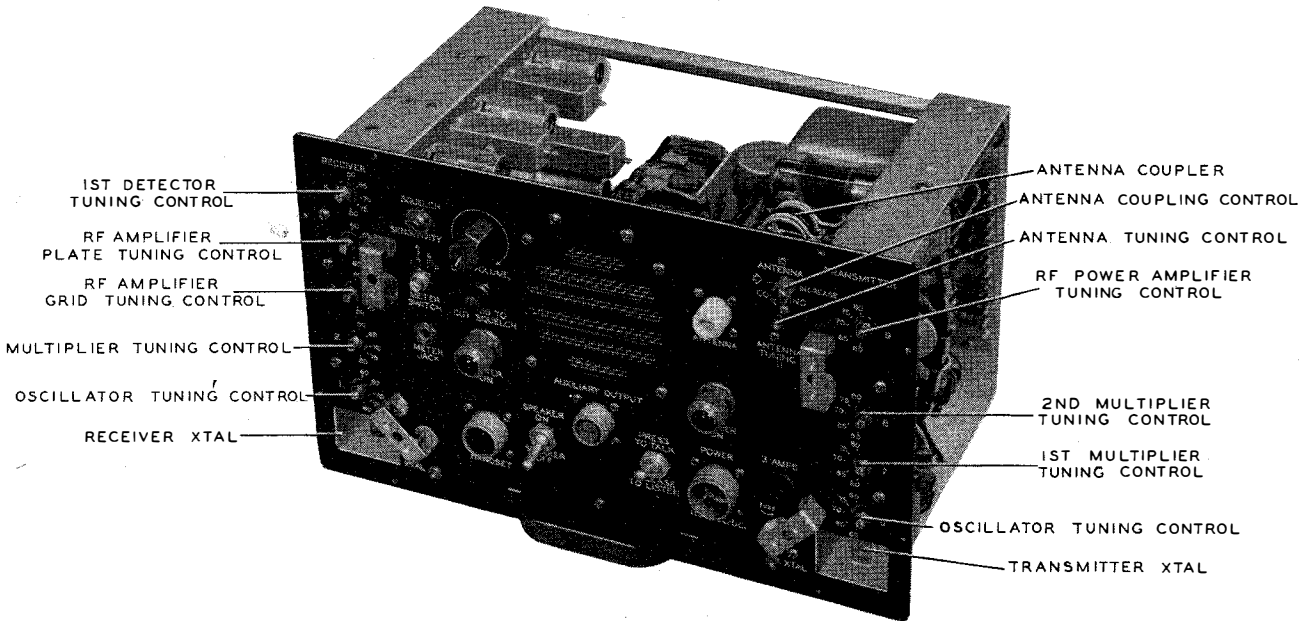
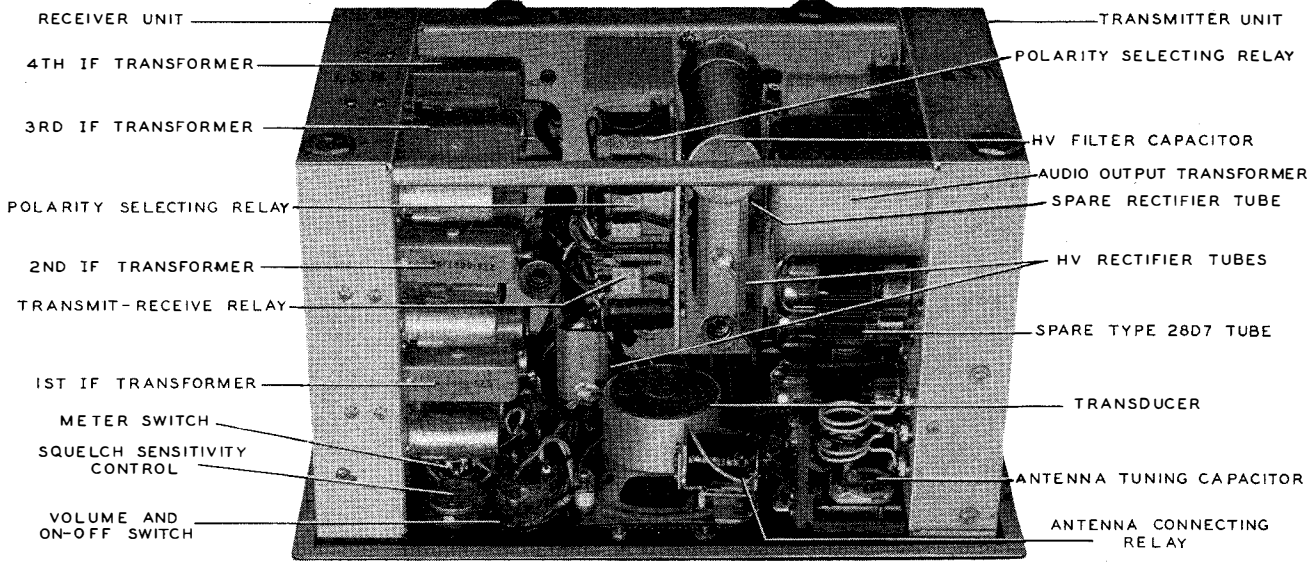


Figure 4-1—Navy Type COL-43065 Radio Transmitter-Receiver, Top, Front and Bottom Views

SECTION IV THEORY OF OPERATION

1. GENERAL.

(See figures 4-1 and 4-2.)

The transmitting-receiving unit is comprised of four distinct sections, namely; transmitter, receiver, audio amplifier and power rectifier. The audio amplifier section is used for modulating the transmitter carrier or amplifying the output of the receiver. In the normal or unoperated position of the transmit-receive relay the audio section is connected to the receiver; in the operated position the audio section is connected to the transmitter. The receiver section design provides for the automatic control of volume (AVC), limitation of noise (NOISE LIMITER) and audio disabling (SQUELCH). A moving coil unit (transducer) functions either as a loudspeaker or as a microphone.

2. ELECTRICAL CIRCUITS.

a. COMMON CIRCUITS.

(1) PRIMARY POWER CIRCUITS. (See figure 4-3.) — This equipment has been designed to operate from either a 115 volt DC or a 115 volt single phase 50/60 cps power source. The vacuum tubes used are of the 6.3, 25 and 28 volt heater types. The 28 volt heaters of V104, V107 and V120 are connected in series with the 25 volt heaters of V118 and V119 across the 115 volt power input. A resistor, R140, is connected in parallel with the heaters of V118 and V119. This parallel path for the current flow is necessary because the heaters of V118 and V119 have a higher resistance and require less current

for operation than the heaters of V104, V107 and V120. The 6.3 volt heaters of V108, V109, V110, V111 and V112 are connected in series with R141 across the input. The resistor, R141, is connected in parallel with the 6.3 volt heaters of V101, V102, V103, V105, V106, V113, V114, V115, V116, V117, V122, V123, and V124, which are connected in series.

A receptacle, J104, mounted on the panel and designated POWER 115 v AC DC, provides connection for the external power source. The ON-OFF switch, S101, operated by the VOLUME control, connects the power input circuit to the vacuum tube heaters and the rectifiers. A 3 ampere fuse, F101, is connected in the power input circuit for protection against overloads. A panel lamp, I102, designated POWER ON, is connected across the output side of the ON-OFF switch.

(2) RECTIFIER CIRCUITS. (See figure 4-4.) —The rectifier circuits include a polarity selecting rectifier circuit, using two Type 6C4 tubes, for maintaining the correct polarity to the high voltage filter sections when a DC power source is used. The high voltage rectifier circuit is of the half wave rectifying type and uses two Type 25Z6 tubes connected in parallel.

Two polarity selecting relays, K102 and K103, three filter chokes, L130, L115 and L116 and filtering capacitors C151A, C151B and C151C complete the rectifier circuits. The operation of the rectifier circuits is as follows: With an external 115 DC power

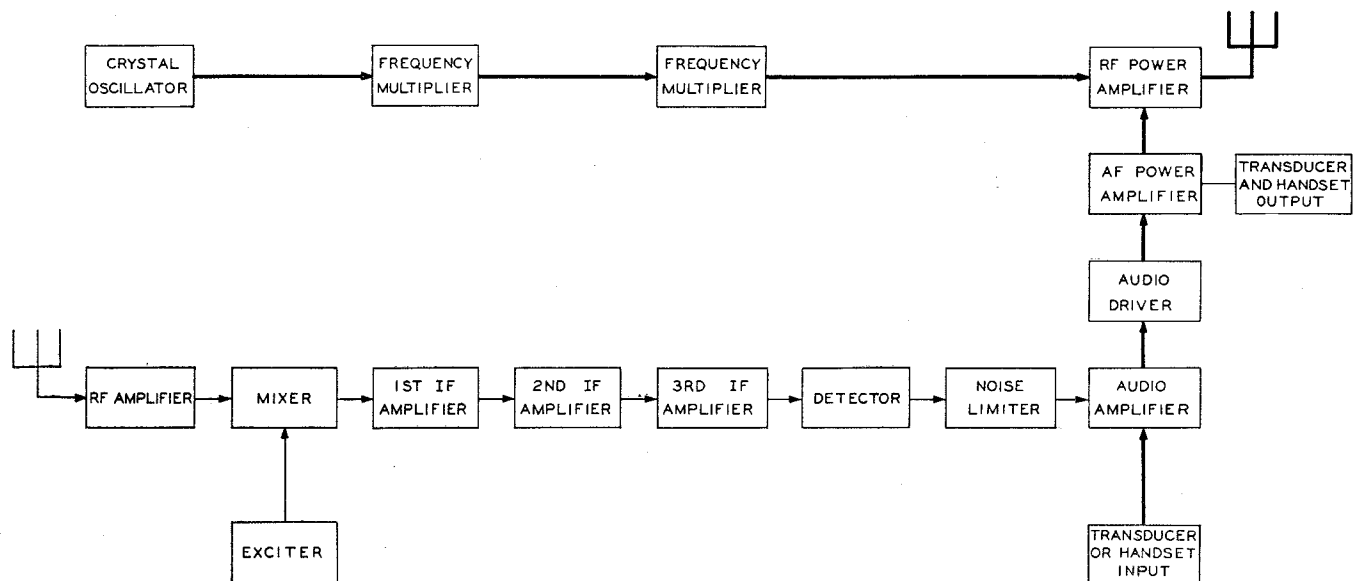


Figure 4-2—Transmitter-Receiver Block Diagram

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Paragraph 2

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source connected to the power input receptacle and the ON-OFF switch, S101, in the ON position, the POWER ON light will glow. A DC voltage will be applied through L130 to the cathode of the polarity selecting rectifier tube, V124, and to the plate of the polarity selecting rectifier tube, V122. A voltage of opposite polarity will be impressed through the coil windings of K102 and K103 to the cathode of V122 and to the plate of V124. Assuming that the voltage that is applied to the plate of V122 is of positive sign, current will flow from the negative side of the line through the coil of polarity relay K102 to the cathode of V122. This current flow will close the relay, completing an electrical circuit through the relay contacts from the positive side of the DC input directly to the positive side of the high voltage filter circuit. The negative side of the filter section returns to the

NOTE:

UNLESS OTHERWISE INDICATED ALL RESISTANCE VALUES ARE IN OHMS AND ALL CAPACITY VALUES ARE IN MF'S.

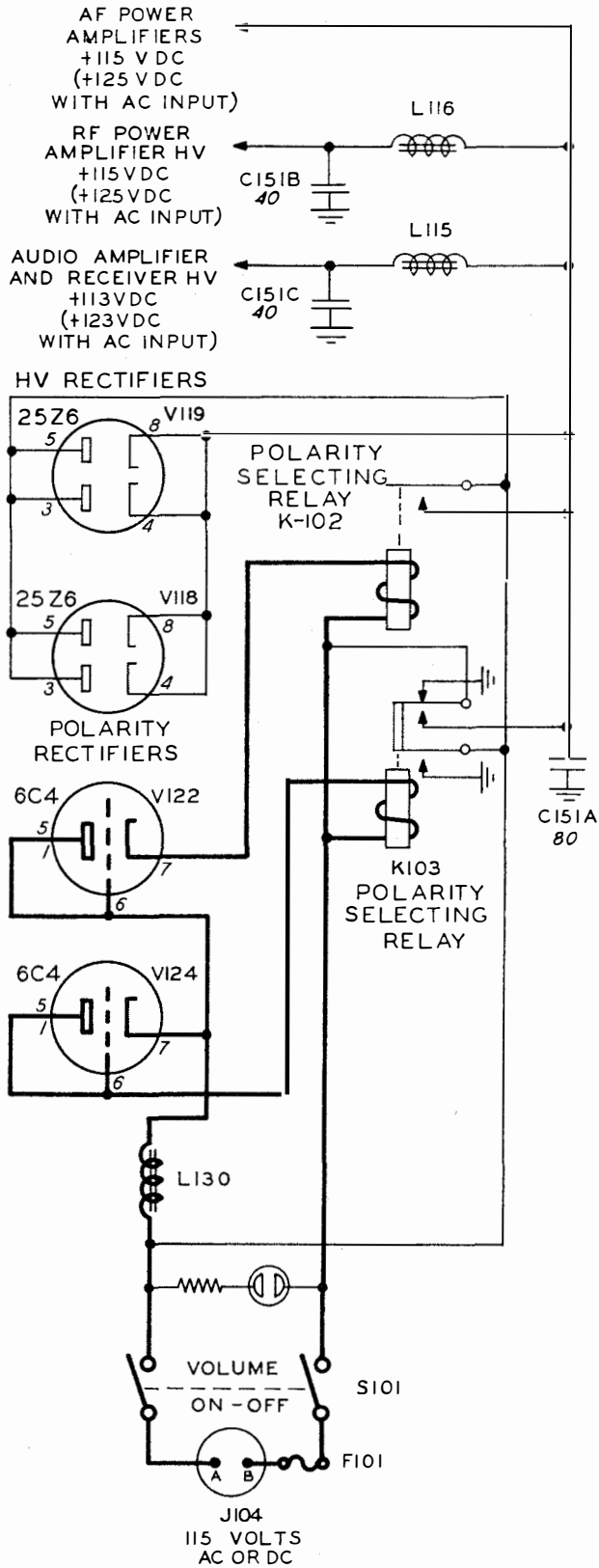


Figure 4-4—Rectifier Circuits

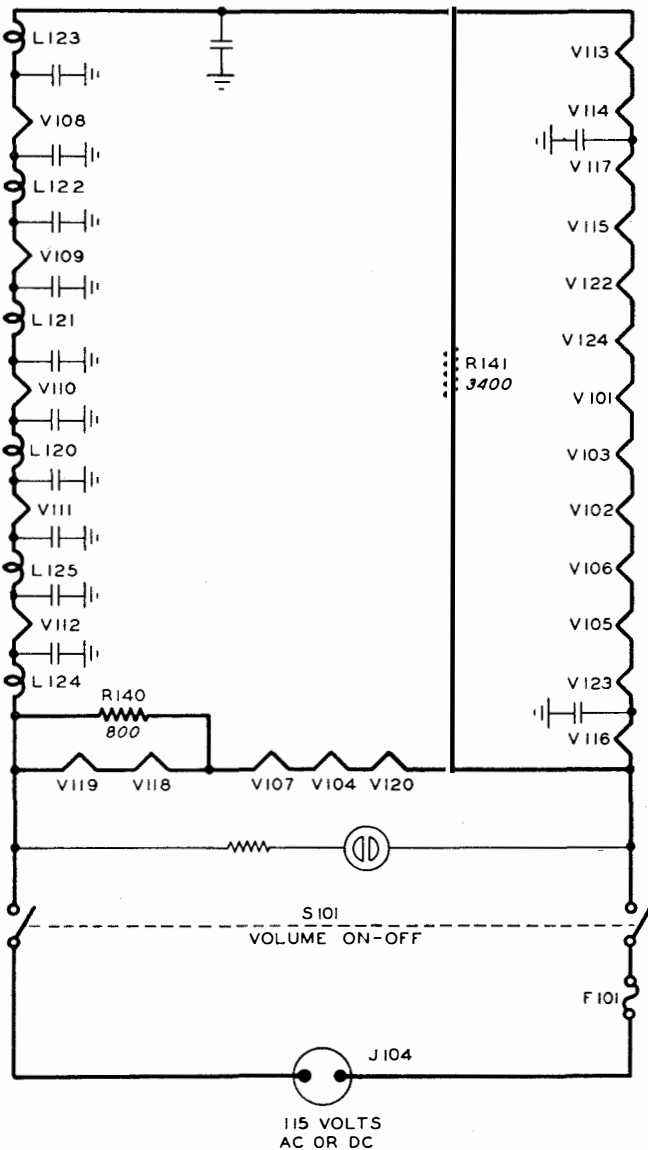


Figure 4-3—Heater Circuits

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negative side of the input through the normally closed contacts of the polarity relay, K103. The polarity relay, K103, will not operate because of the negative voltage on the plate of V124.

If the DC input polarity is reversed a negative voltage will be applied to the plate of V122, no current will flow through this tube and K102 will not close. A positive voltage will be applied to the plate of V124 through the coil of K103 and cause this relay to close. When K103 closes, the positive side of the DC input circuit is completed through a pair of closed contacts to the positive side of the filter section. The negative side of the DC input is connected to the negative side of the filter section through another pair of closed contacts of K103.

When the equipment is being operated from a 115 volt AC power source the polarity selecting relays do not follow the AC variation due to the AC impedance opposition of L130. The Type 25Z6 rectifier tubes, V118 and V119, function normally with the AC voltage applied. The negative side of the high voltage filter sections returns through the normally closed contacts of K103 to the AC input.

WARNING

Due to the fact that no transformers are used, the chassis should never be connected to an earth ground. As one side of the external power source is normally grounded, an earth ground connected to the chassis may short circuit the power line through the equipment with resulting damage.

The power output of the HV rectifiers is filtered by two pi section filters. The high voltage for the audio amplifier and the receiver section is filtered by C151A, L115 and C151C. The high voltage that is applied to the RF power amplifier is filtered by C151A, L116 and C151B. The plate and screen volt-

ages for the audio power amplifier tubes are taken directly from the rectifier cathodes.

(3) AUDIO AMPLIFIER CIRCUIT. (Refer to figure 4-5.)—The audio amplifier uses one Type 6AQ6, one Type 6C4 and two Type 28D7 tubes. The triode section of the Type 6AQ6 is used for low level amplifying, the diode plates being grounded. The Type 6C4 tube functions as a driver for the two Type 28D7 tubes that are used as audio power amplifiers. The audio amplifier circuit is used interchangeably to amplify the output of the second detector and to modulate the output of the RF power amplifier to the transmitter section. The PRESS TO TALK—RELEASE TO LISTEN toggle type switch, S102, when pressed downward, connects terminal number 1 of the audio input transformer, T101, to ground. The ungrounded side of the transducer is connected through a set of contacts on S102, in parallel with the SPEAKER ON-OFF switch, S103, to a movable contact on the receive-transmit relay, K101. Depressing the PRESS TO TALK - RELEASE TO LISTEN switch also causes the receive-transmit relay, K101, to close. The operation of relay K101 completes the transducer circuit to terminal number 2 of the input transformer, T101, and connects the secondary winding of the output transformer, T103, between the high voltage source and the transmitter RF power amplifier tube plate for the modulating of the RF power amplifier output. The closing of K101 also inserts R179 in series with the handset phone for monitoring the modulation and puts a blocking voltage on the cathode of the receiver squelch tube. The antenna relay, K104, also closes when the PRESS TO TALK - RELEASE TO LISTEN switch is depressed. The operation of this relay connects the antenna to the transmitter.

Speaking into the transducer generates an audio voltage which is applied through T101 to the grid

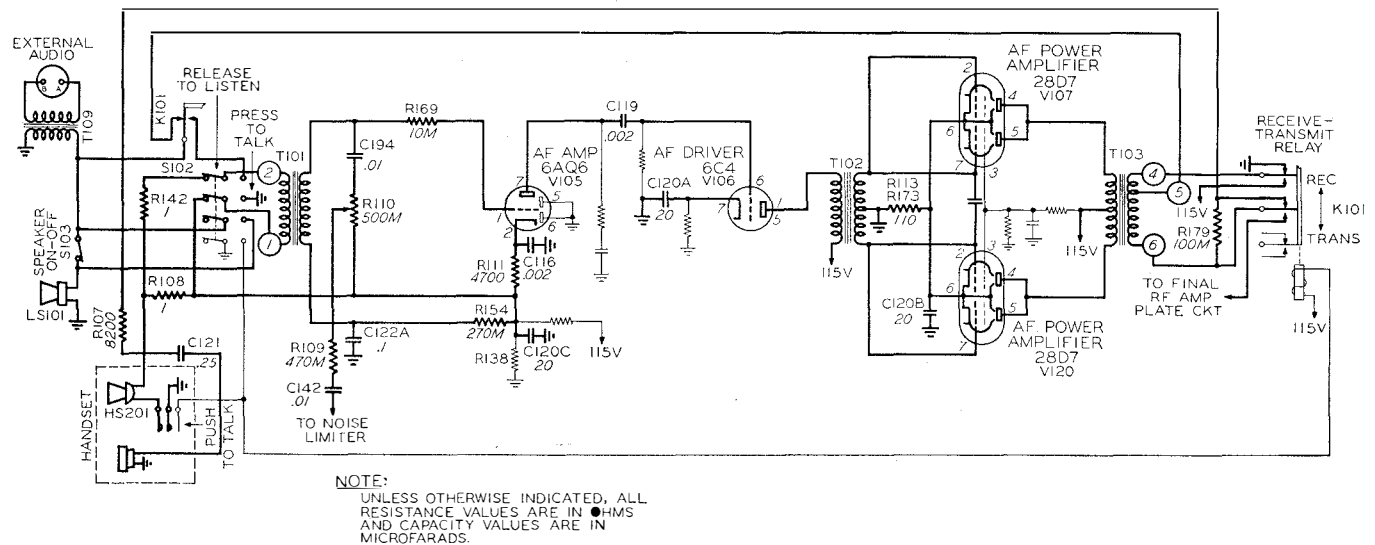


Figure 4-5—Audio Amplifier Circuits

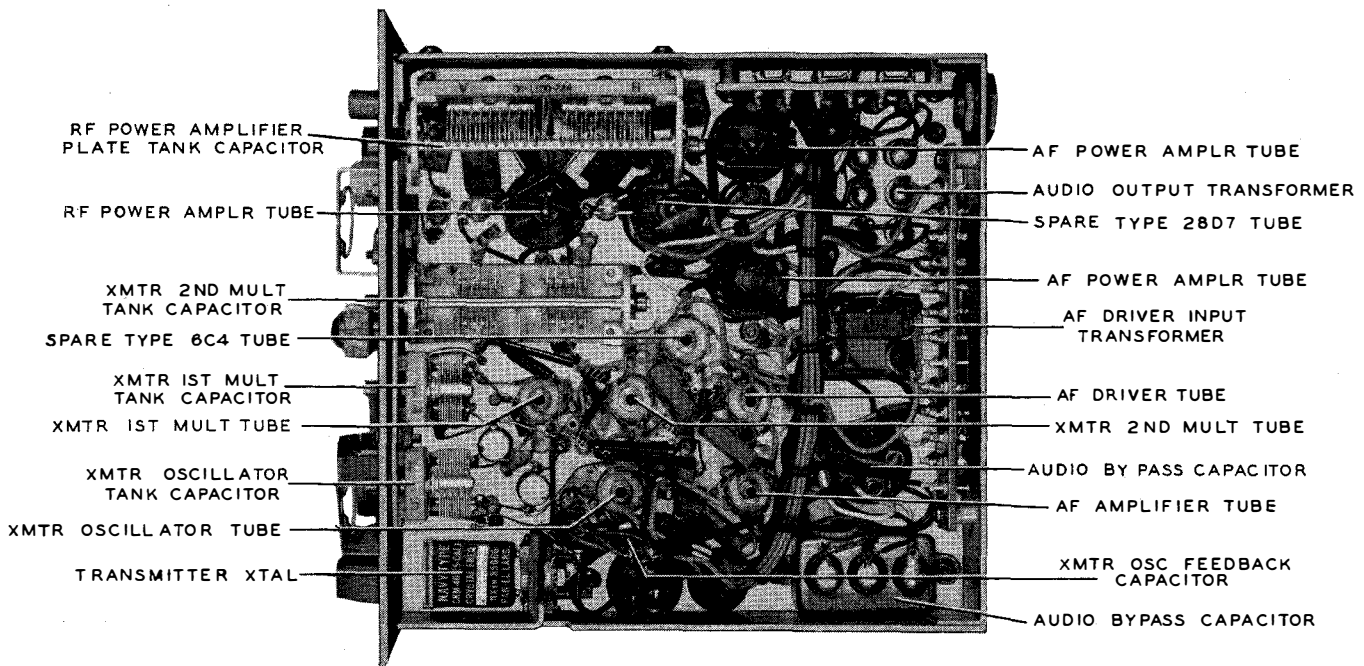


Figure 4-6—Navy Type COL-43065 Radio Transmitter-Receiver, Transmitter Section

of the Type 6AQ6 audio amplifying tube, V105. The amplified output voltage of V105 is applied to the grid of the Type 6C4 triode tube, V106. The output of V106 furnishes audio voltage to the grid circuit of the Type 28D7 tubes, V107 and V120. The output of the AF power amplifier tubes, V107 and V120, is fed through T103 and the contacts of K101 to the plate tank circuit of the RF power amplifier of the transmitter and modulates the radio frequency output.

If the PUSH TO TALK - RELEASE TO LISTEN switch is released and the handset cable plug has been inserted into the handset jack, the audio input and relay control circuit is transferred to the handset. The DC voltage necessary to operate the carbon microphone is developed across R138. Resistor R138 is part of a resistance type voltage divid-

ing circuit across the high voltage supply circuit. The Push-to-Talk switch on the handset, when depressed, energizes the receive-transmit relay, K101, and the antenna connecting relay, K104.

With the Push-to-Talk handset switch released, the receive-transmit relay, K101, is in the receiving or unoperated (normal) position, terminal number 5 of T103 is connected through the SPEAKER ON-OFF switch, S103, to one side of the transducer (now functioning as a loudspeaker), terminal number 4 of T103 is grounded, the input circuit to T101 is open and the blocking cathode voltage is removed from the squelch tube. The audio amplifier is now properly connected to amplify the output of the receiver section. The receiver output is fed from the noise limiter cathode through the potentiometer, R110, to the grid of V105, the audio amplifier tube.

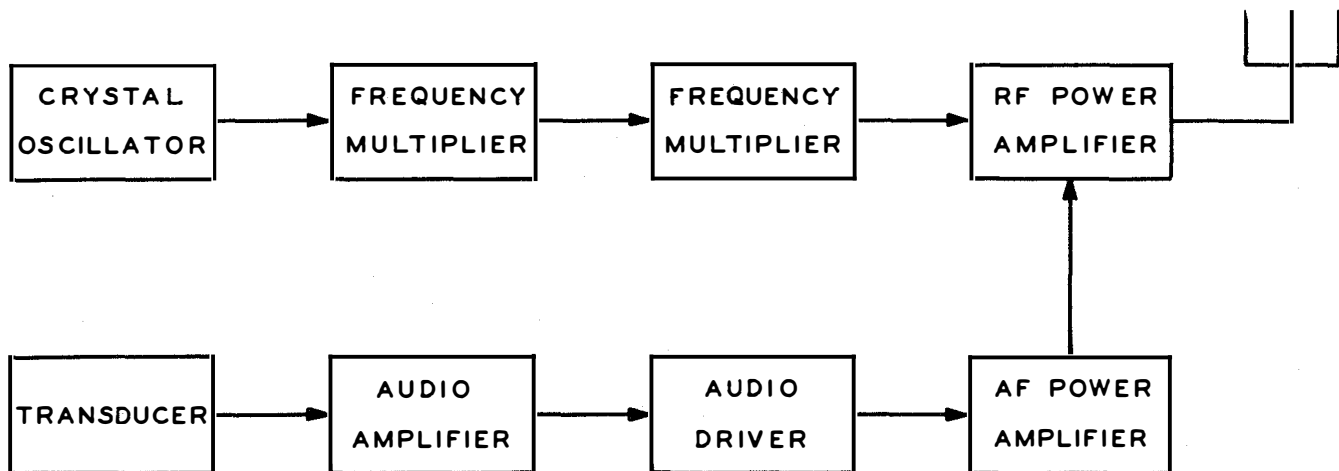


Figure 4-7—Transmitter Block Diagram

The output of V105 feeds the driver tube, V106, which in turn drives the audio amplifier output tubes, V107 and V120. The output tubes operate the transducer through the output transformer, T103, and an auxiliary speaker through transformer T109.

b. TRANSMITTER RF CIRCUITS. (See figures 4-6 and 4-7.)—The transmitter RF section of this equipment employs an oscillator, two frequency multiplying stages and a power amplifier. The transmitter has a power output of 3.5 watts with a frequency range of 60 to 80 megacycles. The frequency is controlled by a crystal oscillator.

(1) OSCILLATOR CIRCUIT. (See figure 4-8.)—The crystal oscillator circuit output is in the frequency range 15 to 20 megacycles. The crystals used are of the third harmonic type. That is, the crystals have been so ground that a strong output may be obtained at the third harmonic of the frequency corresponding to the crystal thickness. The oscillator circuit used is of the regenerative type and provides maximum output at the third harmonic of the crystal frequency. The oscillator tube used is a Type 6C4 triode. The frequency of the oscillator output is determined by the crystal, the plate circuit being tuned to the third harmonic by capacitor C103. The frequency that is stamped on the crystal holder corresponds to this third harmonic and not to the frequency of the quartz crystal itself. The oscillator output is capacitively coupled to the grid of the first frequency multiplier tube, V102.

(2) FREQUENCY MULTIPLIER STAGES.—The first and second multiplier stages employ Type 6C4 triode tubes. The output frequency of each stage is twice the input frequency. Tuning is accomplished by varying capacitors C106 and C110A-B. Capacitor C106 is connected in the plate circuit of the first multiplier tube. Capacitor C110A-B is connected in the plate circuit of the second multiplier tube. Capacity coupling is employed in both mul-

tiplier stages to connect the excitation to the following stage. A center tapped inductor, L103, and capacitor C110A-B are used in the second multiplier plate circuit to provide a balanced drive to the power amplifier.

(3) RF POWER AMPLIFIER STAGE. — A push pull circuit, employing a Type 28D7 double-beam tube, is used in the RF power amplifier stage. Two RF chokes are connected in series across the input circuit to provide a grid return. Resistor R104, in series with the common connection of the chokes, furnishes bias when the tube is being driven. Resistor R105 is a metering resistor placed in the grid return to determine the relative power input to the amplifier. The Tuning Meter indicates the voltage that is developed across this resistor by the grid current flow. Resistors R152 and R166 are connected in the cathode circuit for metering the power amplifier plate and screen current. Cross neutralization is employed. The variable neutralizing capacitors, C178 and C179, are connected between opposite grids and plates of the power amplifier tubes. The plate tank circuit is balanced, using a variable capacitor C114A-B and a center tapped inductor L108. The plate inductor, L108, actually is composed of two sections of two turns each with a space between the sections to allow insertion of the antenna coil. The single turn antenna coil can be moved horizontally within the plate inductor field, to vary the loading effect of the antenna upon the power amplifier stage, by a panel control. A thermocouple element is connected between the antenna coil and ground. The leads that carry the DC current, that is developed by the thermocouple, are connected to the METER SWITCH for checking the antenna current with the Tuning Meter.

c. RECEIVER CIRCUITS. (See figures 4-9 and 4-10.)—The receiver section of this equipment employs the superhetrodyne type of circuit with one

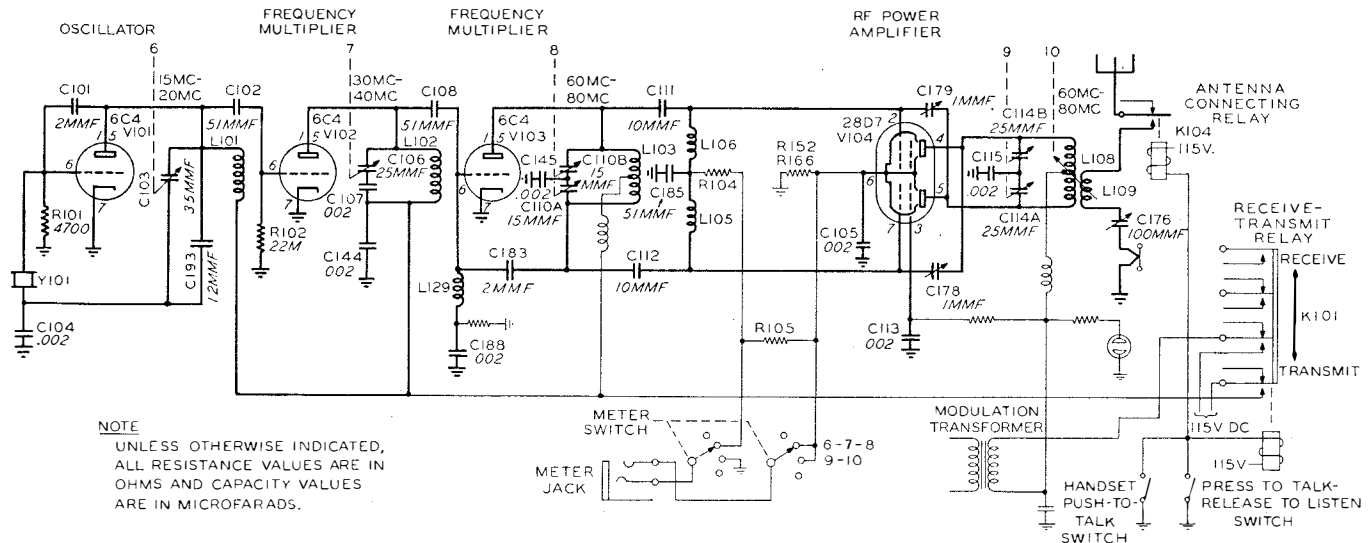


Figure 4-8—Transmitter RF Circuits

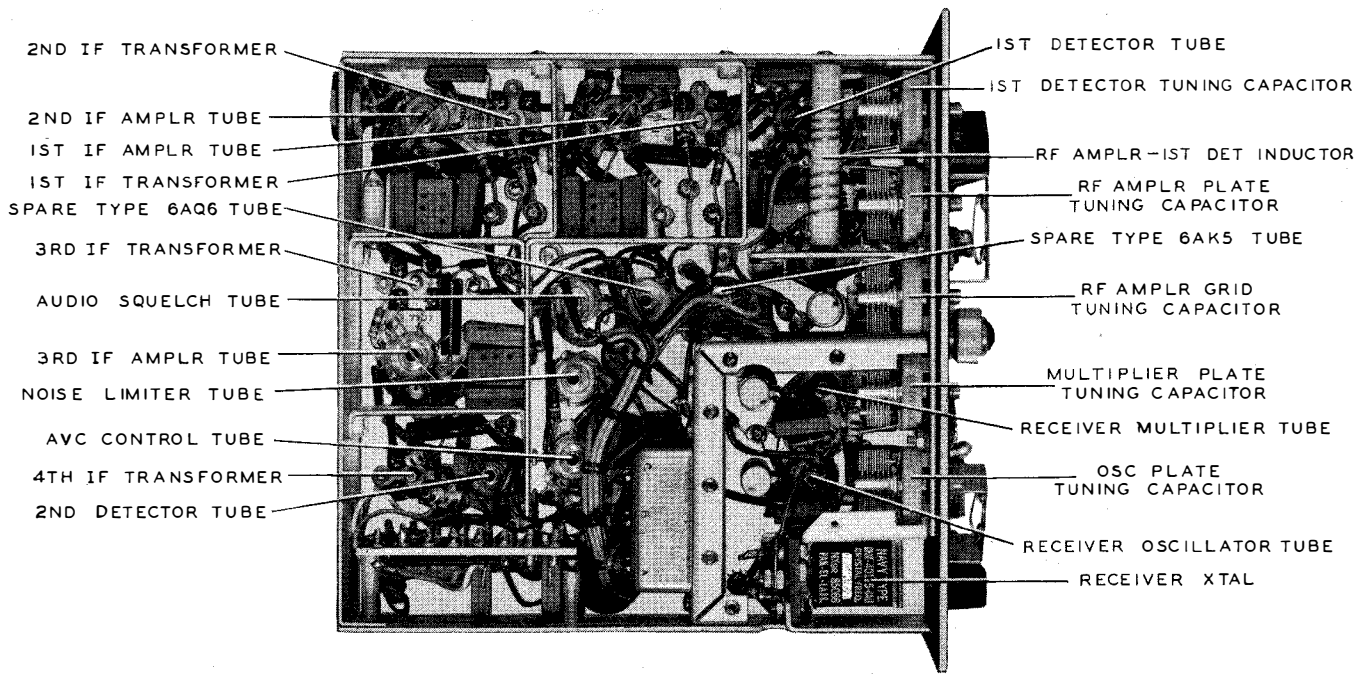


Figure 4-9—Navy Type COL-43065 Radio Transmitter-Receiver, Receiver Section

stage of RF amplification and three stages of IF amplification. An oscillator, crystal controlled, followed by a frequency multiplier supplies the beat frequency to the first detector for converting the radio frequency voltage to the intermediate frequency. Automatic volume control, noise limiter and audio squelch circuits are provided to assist in maintaining optimum reception under varying receiving conditions. Type 6AK5 tubes are employed in the RF and IF amplifiers and the first detector. Type 6C4 tubes function in the oscillator, multiplier, second detector and the noise limiter circuits. The automatic volume control and squelch circuits employ Type 6AQ6 tubes.

(1) RF CIRCUITS. (See figure 4-11.)—The antenna is connected through the normally closed contacts of relay K104 and coupling capacitor C168 to one end of the tapped RF input inductor, L111.

The RF circuit is completed to ground through capacitors C124, C125A and C125B. The input inductor may be tuned to the proper frequency by variable tuning capacitor C123. Capacitor C189 is a trimmer capacitor. The signal output of the secondary winding is impressed upon the control grid of the Type 6AK5 RF amplifier tube, V108. This tube is of the pentode type, especially designed for high frequency amplification. The plate circuit employs a tunable circuit, using a variable capacitor for tuning. This circuit, consisting of a trimmer capacitor, C190, a HV isolating capacitor, C127, the variable capacitor, C126, and the inductor, L118, is inductively coupled to the following grid circuit. Resistor R119 and capacitor C139 comprise the plate decoupling circuit. Resistor R137 is a screen grid voltage dropping resistor. The RF voltage is bypassed around R137 by capacitor C181. Resistor R117 and capacitor

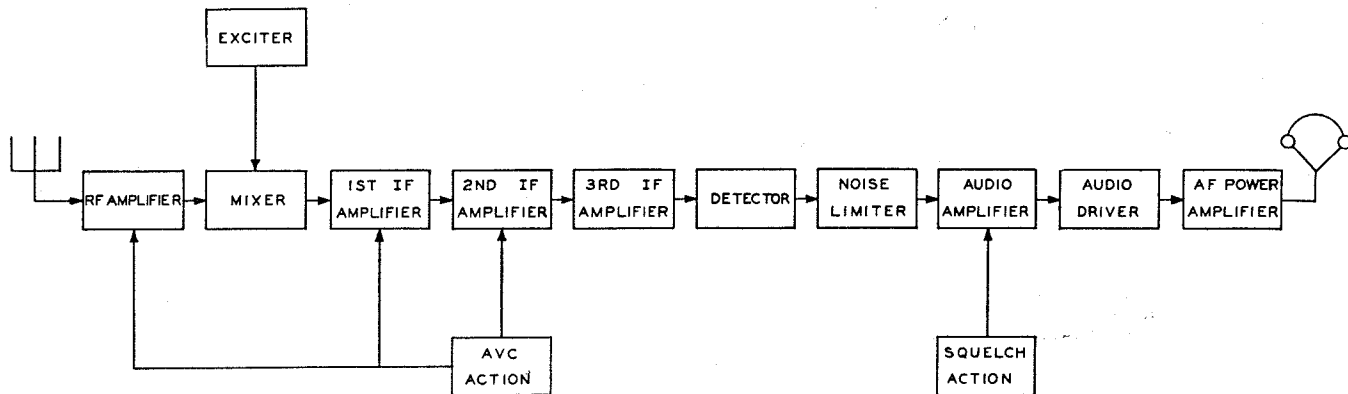


Figure 4-10—Receiver Block Diagram

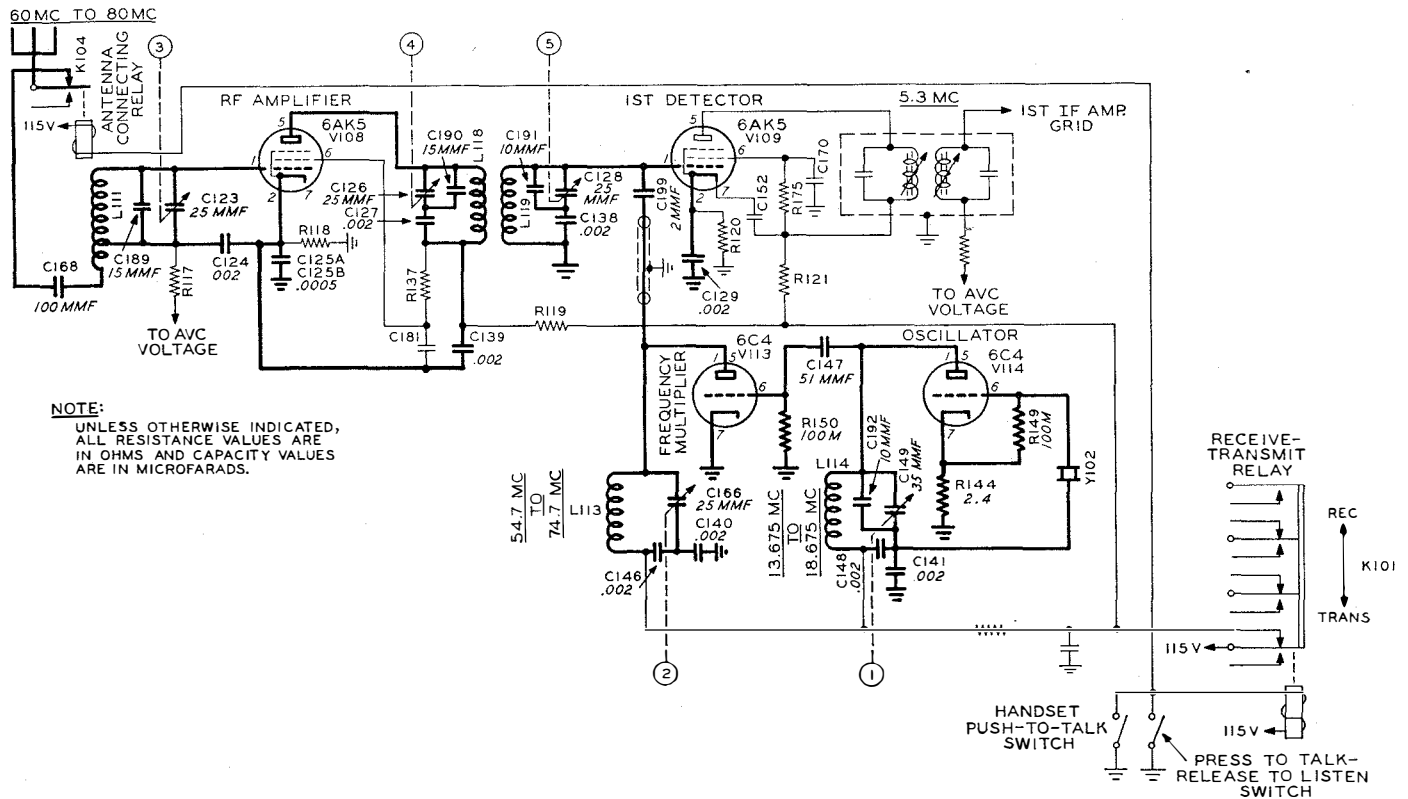


Figure 4-11—Receiver RF Circuits

C124 provide decoupling in the AVC circuit. Resistor R118, located in the cathode circuit of the RF amplifier tube, furnishes biasing voltage. Capacitor C125A bypasses the RF current around R118.

The first detector (mixer) stage receives the signal voltage (60 to 80 mc) from the RF amplifier and voltage from the exciter (oscillator and multiplier stage) section (54.7 to 74.7 mc). The detector grid circuit is inductively coupled to the RF amplifier and capacitively coupled to the exciter. Grid tuning is accomplished by rotating variable capacitor C128. Trimmer capacitor C191 provides means of tracking the grid circuit with the frequency numbers that are adjacent to panel control number 5. Capacitor C138 is a HV isolating capacitor. The signal voltage and the exciter voltage are both applied to the control grid for mixing. The tuned primary of an IF transformer, located in the detector plate circuit, couples the IF frequency voltage (5.3 megacycles) to the first IF amplifier stage. Resistor R121 and capacitor C152 compose a decoupling filter section. Resistor R175 lowers the screen grid voltage. Capacitor C170 bypasses the RF voltage from the screen grid to ground. Cathode bias for the detector is furnished by resistor R120. Capacitor C129 bypasses voltages of RF and IF frequencies around R120.

The exciter section, which supplies the IF conversion voltage to the first detector, consists of a crystal controlled oscillator and a frequency mul-

tiplier stage. Type 6C4 triode tubes are used in both stages. The oscillator develops an RF output voltage in the frequency range 13.675 mc to 18.675 mc, the exact frequency depending upon the frequency of the crystal used. The oscillator RF output is impressed upon the grid of the multiplier tube, V113. The output of the multiplier tube is tuned to a frequency corresponding to the fourth harmonic of the oscillator frequency. The exciter output frequency will, therefore, be in the frequency range 54.7 mc to 74.7 mc, the exact frequency depending upon the oscillator frequency. The multiplier RF output voltage is capacitively coupled to the grid of the first detector. Crystal Y102 is the oscillator crystal. Resistors R149 and R150 are grid biasing resistors. Resistor R144 is the oscillator cathode metering resistor. Inductor L114, variable tuning capacitor C149, trimmer capacitor C192 and a HV isolating capacitor, C148, comprise the oscillator tank circuit. The frequency multiplier circuit consists of inductor L113, variable tuning capacitor C166, trimmer capacitor C140 and a HV isolating capacitor, C146. Capacitor C147 is a coupling capacitor between the oscillator and the frequency multiplier stage. Capacitor C199 is the coupling capacitor between the frequency multiplier stage and the first detector.

(2) IF CIRCUIT. (See figure 4-12.) — Three stages of intermediate frequency amplification are provided. The primary and secondary windings of

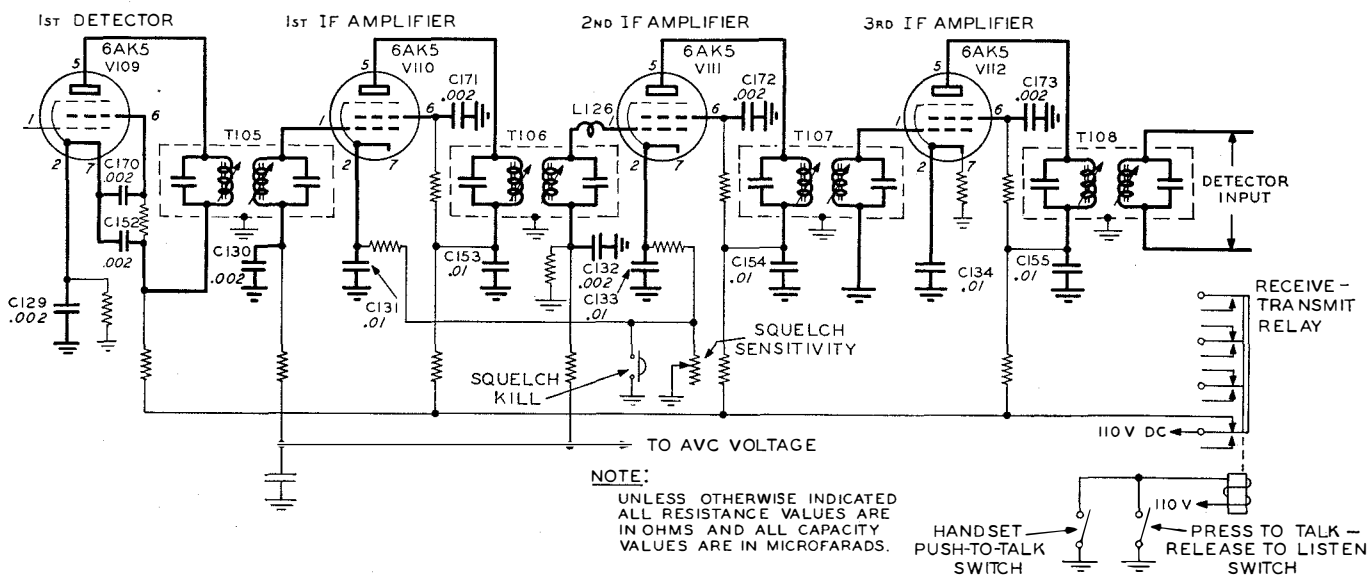


Figure 4-12—IF Amplifier Circuits

the four IF coupling transformers are slug tuned to 5.3 megacycles. AVC voltage is applied to the first and second IF stages through decoupling resistors R122 and R125. The cathode biasing resistors, R123 and R126, in the first and second stages are connected to ground through a variable resistor, R145. Resistors R124, R127 and R129 are plate decoupling resistors. The capacitors, C152, C153, C154 and C155, bypass the plate decoupling resistors. Resistors R175, R176, R177 and R178 are screen voltage dropping resistors. Capacitors C171, C172 and C173 bypass the IF voltages from the screen grids to ground. The primary of the fourth IF transformer, T108, furnishes voltage to operate the AVC and the squelch circuits. The secondary winding supplies the IF voltage to the 2nd detector.

(3) DETECTOR CIRCUIT. (See figure 4-13.)
—The detector circuit employs a Type 6C4 triode tube, V116. The voltage output of the third IF amplifier stage is coupled by transformer T108 to the detector grid. The rectified current flow through the diode load resistors, R133 and R134, develops the voltage necessary to operate the noise limiter tube and the audio amplifier. This diode load voltage, when of sufficient magnitude, also causes the AVC circuit to function and disables the squelch circuit by opposing the delaying bias voltage in the cathode circuit of the AVC tube, V115. (See figure 4-15 in this section.)

(4) NOISE LIMITER CIRCUIT. (Refer to figure 4-14A, 4-14B, and 4-14C.)—A Wasmandorf type noise limiter is incorporated in the receiver section of this equipment. The purpose of the limiter circuit is to limit pulsing noises, such as caused by ignition, static and radar. The limiter circuit is of the conductive type. The limiter circuit is effectively between the second detector and the AF amplifier circuits. The Type 6C4 limiter tube, V123, ceases to pass the audio signal when large noise pulses are received.

For the purpose of explanation, the received modulated signal will be considered as being composed of two parts, an unmodulated RF carrier voltage and RF side band voltages produced by the audio modulation process. Rectification of the unmodulated RF carrier by the second detector will produce a DC voltage across the load resistors, R133 and R134. The DC voltage will be of a positive polarity at the detector cathode end of R134 and of a negative polarity at the detector plate end of R133. The positive DC potential is applied to the plate of the noise limiter tube through the coupling resistor, R130. The negative DC potential is applied to the cathode of the noise limiter through a filter section, composed

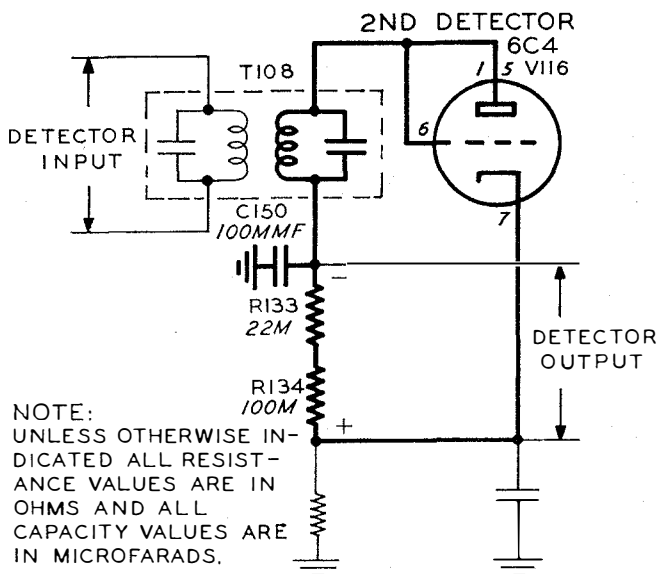


Figure 4-13—2nd Detector Circuit

of R132, C143A and C186, and through the cathode coupling resistor, R131. The filter section prevents any AC voltage, coming directly from the detector load circuit, from reaching the noise limiter cathode coupling resistor, R131, where it would be fed to the audio amplifier. The positive DC potential on the noise limiter tube causes conduction to take place. The current flowing in the tube circuit causes a DC voltage drop across the cathode coupling resistor, R131. See figure 4-14A.

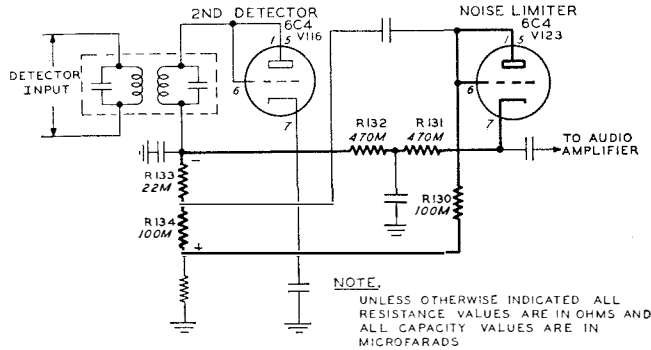


Figure 4-14A—Noise Limiter Circuit (DC Path)

The rectification of the RF side band voltage will produce an audio (AC) voltage across the second detector load resistors, R133 and R134. Part of this voltage will appear across C137 and R130, which are in series and connected in parallel with R134. The reactive impedance of the circuits, which are connected across the load resistors, causes the negative peaks of the audio (AC) voltage to be clipped at an amplitude corresponding to approximately 70 per cent of modulation. The positive audio (AC) peaks are not affected by the reactive impedance and therefore must be limited in amplitude by some other means to prevent the noise impulses from developing high positive peaks. The noise limiter tube functions for this purpose, limiting the peaks to 70 per cent of the original modulation. The cathode of the noise limiter tube is connected, for the AC voltage, through the cathode coupling resistor, R131, and capacitors C143A and C186 to the second detector cathode. The potential existing at the second detector cathode will be the algebraic sum of the DC positive potential developed by rectifying the unmodulated carrier voltage and the positive or negative AC superimposed potential developed by rectifying the side band voltages. As the negative AC peaks are clipped the resultant potential at this point can never become zero, although it may fall to a low positive value. Therefore, a positive potential will be impressed upon the cathode of the noise limiter tube which will increase in amplitude with an increase in the amplitude of the modulated side bands or with a noise pulse. The plate of the noise limiter tube receives a varying negative voltage due to the plate being connected through C137 to the junction of R133 and R134. See figure 4-14B.

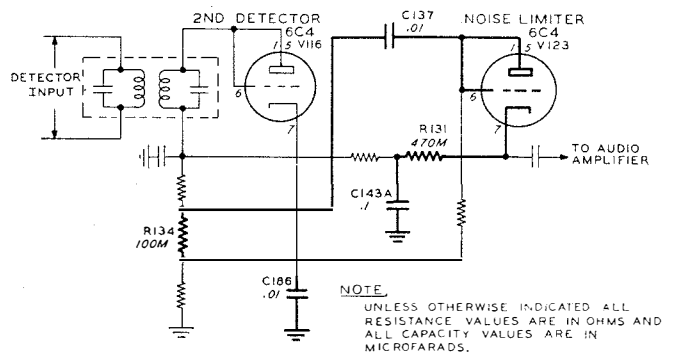


Figure 4-14B—Noise Limiter Circuit (AC Path)

The result is that the tube current flow is modulated by a variable positive cathode voltage (or variable negative plate voltage) supplied by the rectified RF side band voltage which varies the limiter tube current in accordance with the originally received modulation voltage. The varying tube current flowing through the cathode resistor, R131, causes an audio voltage drop across this resistor which is applied to the first AF amplifier through a coupling capacitor. See figure 4-14C. A noise pulse

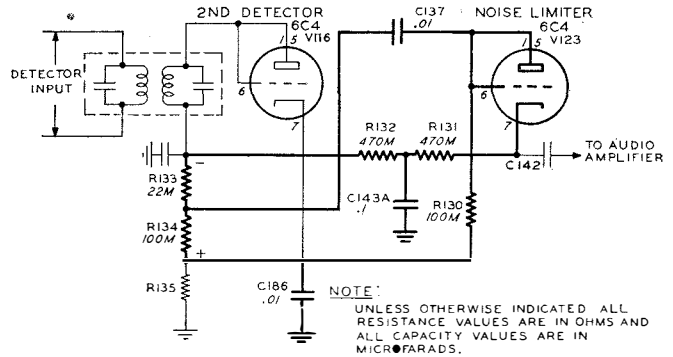


Figure 4-14C—Noise Limiter Circuit (Combined Paths)

having a voltage amplitude greater than the incoming signal will cause a large positive voltage to be applied to the noise limiter cathode (or a large negative voltage to the plate) which will stop the current conduction of this tube. During the noise pulse interval no voltage will be developed across the cathode coupling resistor, R131, and therefore the first audio amplifier receives neither the noise nor the signal. As the noise peaks are usually of short duration and the recovery time of the circuit is practically instantaneous, the interruption of the signal will not be noticeable.

(5) SQUELCH CIRCUIT. (Refer to figure 4-15.)—The squelch circuit employs the triode section of a Type 6AQ6 diode-triode tube, V117. Plate voltage for the squelch tube is supplied by a voltage dividing circuit consisting of resistors R138 and R139. The voltage is fed through resistor R154. Resistor R154 is common to the squelch plate circuit and the AF amplifier grid circuit, therefore, voltage devel-

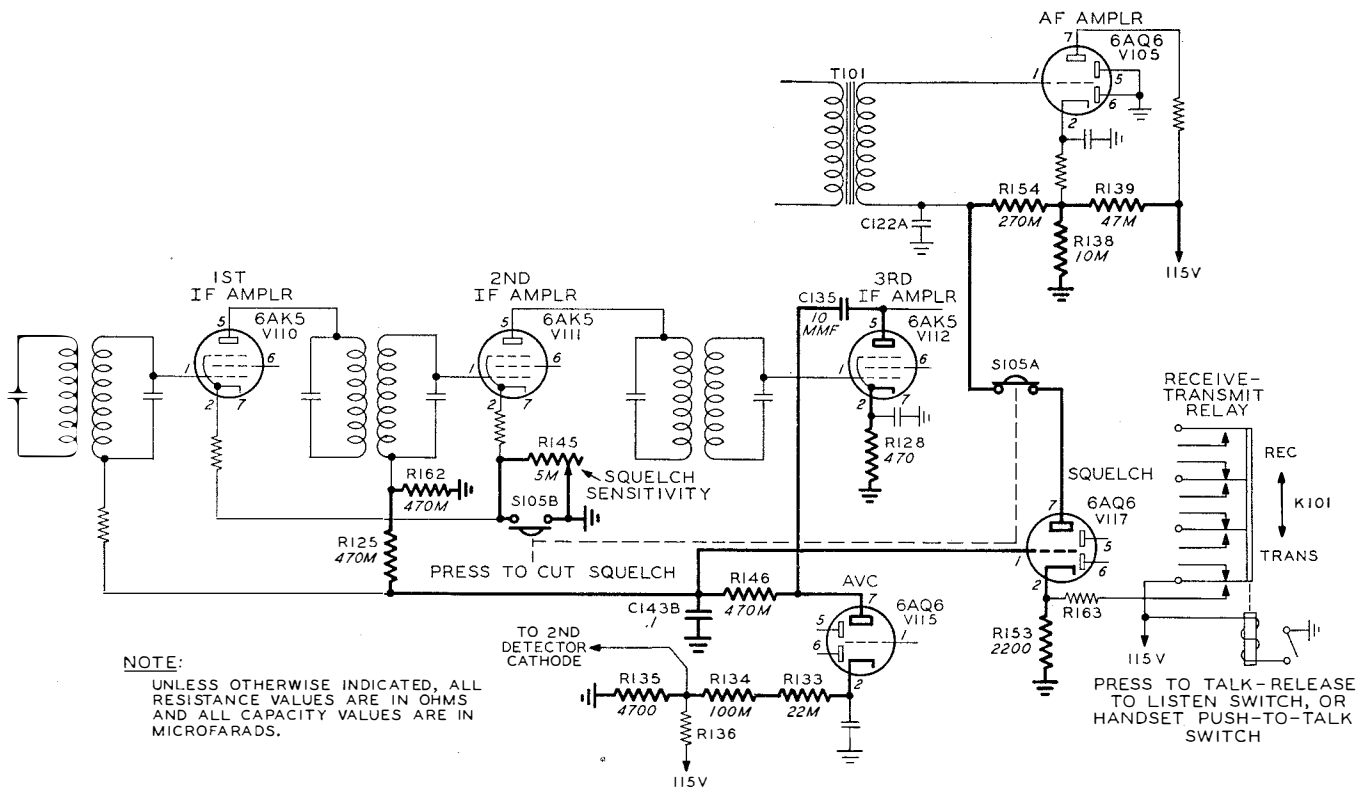


Figure 4-15—Audio Squelch Circuit

oped across this resistor by the plate current flow of the squelch tube is applied to the AF amplifier tube grid. The AVC plate circuit is utilized to supply a negative squelch disabling voltage to the grid of the squelch tube. The grid voltage is the voltage developed across resistors, R125 and R162. The voltage developed, by detection of the signal voltage, across resistors R133 and R134, which are common to both the AVC cathode and the second detector plate circuits, opposes the AVC cathode delay bias voltage across R135. The variable resistor, R145, designated on the panel as the SQUELCH SENSITIVITY control furnishes a means of varying the noise or signal level at which the squelch circuit is rendered inoperative. The PRESS TO CUT SQUELCH switch, operated by a panel push button, is of the DPDT type. When pressed, this switch shorts the variable SQUELCH SENSITIVITY cathode resistor, R145, and opens the squelch plate circuit. The squelch tube cathode resistor, R153, is a part of a voltage divider circuit consisting of R153 and R163. The voltage divider circuit is completed when the receive-transmit relay, K101, is in the transmit position. With the relay, K101, in this position, a positive voltage is applied to the squelch tube cathode to disable the squelch circuit when the transmitter is being used.

Assuming that the SQUELCH SENSITIVITY control is correctly adjusted and that a reasonably

strong RF signal is being received the operation of the squelch circuit is as follows: The voltage across the second detector load resistors, R133 and R134, produced by the detector rectifying action, counteracts the existing positive delaying voltage at the AVC tube cathode. The positive delaying voltage is supplied by the voltage divider circuit, R135 and R136. An IF voltage is supplied to the plate of the AVC tube through the coupling capacitor, C135. The AVC tube then conducts on the positive half of the IF cycle. A negative DC voltage, existing at the plate of the AVC tube due to rectification of the IF voltage, is impressed across the load resistor, R146, R125 and R162. A portion of this voltage is fed to the grid of the squelch tube, biasing the tube sufficiently to prevent current flow through the tube. Therefore, the squelch tube is disabled and no squelching action takes place. If, however, the received RF signal is removed from the receiver input or the receiver is detuned from the signal frequency, the negative bias voltage on the squelch grid will disappear and the tube will conduct. Current flow through the squelch tube will develop a voltage across R154 in the AF amplifier grid circuit which is of the correct polarity to block the AF tube and thereby stop (squelch) the audio output. If the cathode circuit resistance of the first and second IF amplifier stages is increased by operating the SQUELCH SENSITIVITY control counterclockwise, a stronger RF signal will be required to furnish sufficient voltage to block off the squelch tube.

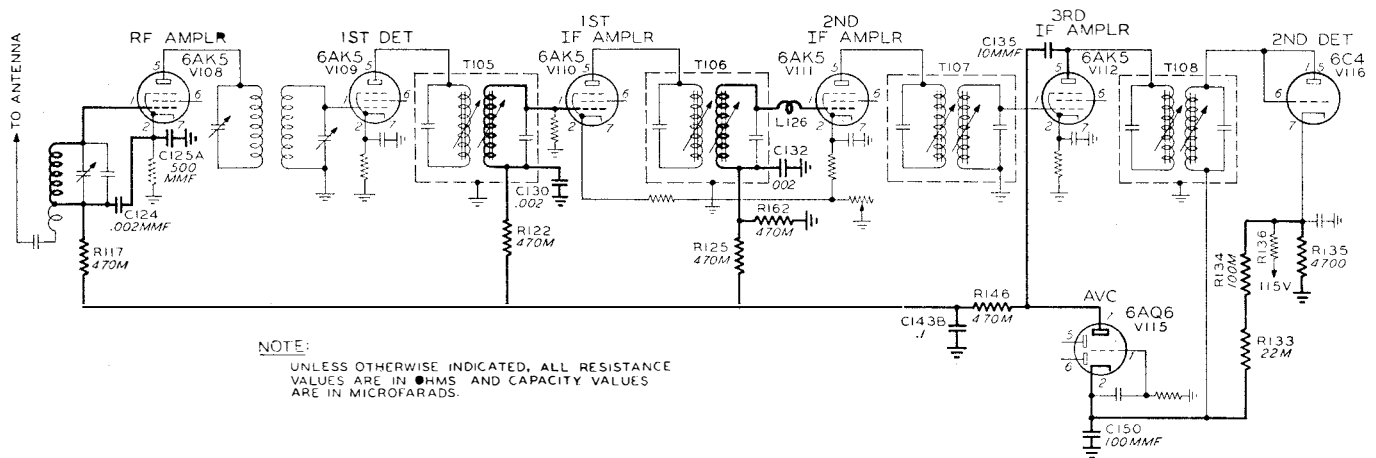


Figure 4-16—AVC Circuit

Therefore, the original assumed RF signal may no longer cause an audio response in the output. If no squelching action is desired, such as when it is desired to merely determine whether or not an RF carrier exists, the PRESS TO CUT SQUELCH switch is operated. The operation of this switch shorts the SQUELCH SENSITIVITY adjusting resistor, R145, and opens the squelch tube plate circuit. The shorting of resistor R145 increases the amplification (voltage gain) of the first and second IF stages.

(6) AVC CIRCUIT. (Refer to figure 4-16.)—The automatic volume control circuit employs the triode section of a Type 6AQ6 diode-triode tube, V115. A cathode delaying bias prevents the operation of the tube, thus permitting the maximum sensitivity of the RF and IF stages when weak signals are being received. Voltage for the operation of the AVC control circuit is obtained from the primary coil of the output IF transformer. The advantages of coupling to the primary instead of the secondary are higher audio voltage and less shunting effect on the diode detector load. A positive voltage is supplied to the AVC tube cathode by a resistor divider circuit consisting of R135 and R136. This voltage is supplied through the diode detector load resistors, R133 and R134. The AVC tube grid is held at ground potential by a resistor connected from the grid to the chassis ground. The positive voltage on the AVC tube cathode prevents the tube from functioning until a signal sufficiently strong to overcome this

delay voltage is received. The rectified diode detector current flow through the detector load resistors, R133 and R134, supplies the voltage that is required to overcome the positive delay voltage on the AVC tube cathode. When the positive voltage is counteracted by the diode detector negative voltage, the AVC tube will conduct due to the voltage received from the IF transformer primary.

A capacitor, C135, transfers the IF voltage from the IF transformer primary to the AVC tube plate. The current flow through the AVC tube, establishes a voltage across resistors R146, R125 and R162. A filter section composed of resistor R146 and capacitor C143B is connected to the plate of the AVC tube. This filter removes the IF and AF voltage components and feeds the DC component to the grid of the RF and the first and second IF amplifying tubes. Resistors R117, R122 and R125 prevent intercoupling between stages. Resistor R125 also is a part of a voltage dividing circuit, consisting of R125 and R162, which lowers the AVC voltage that is supplied to the grid of the second IF amplifier tube to approximately half of that to the other stages. The AVC time constant depends mainly upon the values of resistor R146 and capacitor C143B. The decoupling resistors and the bypass capacitors, C124, C125A, C130 and C132 do not affect the time constant materially. The bypass capacitors isolate the grid circuits and provide a low impedance RF path to ground.

SECTION V MAINTENANCE

This radio equipment has been constructed of materials considered to be the best obtainable for the purpose and has been carefully inspected and adjusted at the factory to reduce maintenance to a minimum. However, a certain amount of servicing will be necessary to maintain efficient and dependable operation. The following paragraphs have been compiled to aid in checking and servicing the equipment.

WARNING

Electrical or mechanical servicing should be attempted only by personnel authorized for such work. Operation of this equipment involves the use of high voltages which may be dangerous to life. Operating and maintenance personnel must continually observe all safety regulations.

1. MAINTENANCE TEST SCHEDULE.

Note

THE ATTENTION OF MAINTENANCE PERSONNEL IS INVITED TO THE REQUIREMENTS OF CHAPTER 67 OF THE "BUREAU OF SHIPS MANUAL" OF THE LATEST ISSUE.

To insure the proper operation of this equipment at all times, periodic inspection should be made as follows:

a. HOURLY.—Check to ascertain if the transmitter and receiver are operative.

(1) RECEIVER CHECK.

(a) Operate the VOLUME control to the ON position.

(b) Place the SPEAKER ON - SPEAKER OFF switch to the SPEAKER ON position.

(c) Listen for a transmitted signal.

(d) If a signal cannot be heard, press the PRESS TO CUT SQUELCH switch and listen for noise (background, ignition, or static). If no signal or noise is audible it may be assumed that the receiver is inoperative. Refer to paragraph 2. in this section for servicing instructions.

(e) If the receiver appears to be operating satisfactorily, place the SPEAKER ON - SPEAKER OFF switch in the SPEAKER OFF position and listen to the handset for a transmitted signal or noise, as indicated in steps (c) and (d) above.

If a signal or noise can be heard under the above stated conditions it may be assumed that the receiver is operating properly.

(2) TRANSMITTER CHECK.

(a) Press the PRESS TO TALK - RELEASE TO LISTEN switch. If the CARRIER ON indicator lights it may be assumed the transmitter is operative.

(b) Communicate with another station (if permissible) to complete the check.

b. DAILY.—Remove the dust from the outside of the transmitter-receiver cabinet and the panel. Make certain that the plug-in connections are tight.

c. WEEKLY.—Check and record the meter readings in each position of the METER SWITCH. Compare the weekly readings. Variations in readings may indicate failure or deterioration of circuit components.

d. MONTHLY.—Inspect the handset cord, antenna lead-in and the power cord for signs of wear and poor connections.

e. QUARTERLY.—Check the VOLUME control, switches, fuse and the cord connectors to make certain that proper contact is being made.

f. SEMI-ANNUALLY.—Remove and inspect the chassis for loose parts and wiring. Carefully dust the chassis with a small, soft paint brush or blow the dust out with an air hose.

g. ANNUALLY.—If the transmitter-receiver has been in use continually for a year replace all of the tubes. A complete check of the chassis and equipment should be made and all parts replaced which show signs of wear.

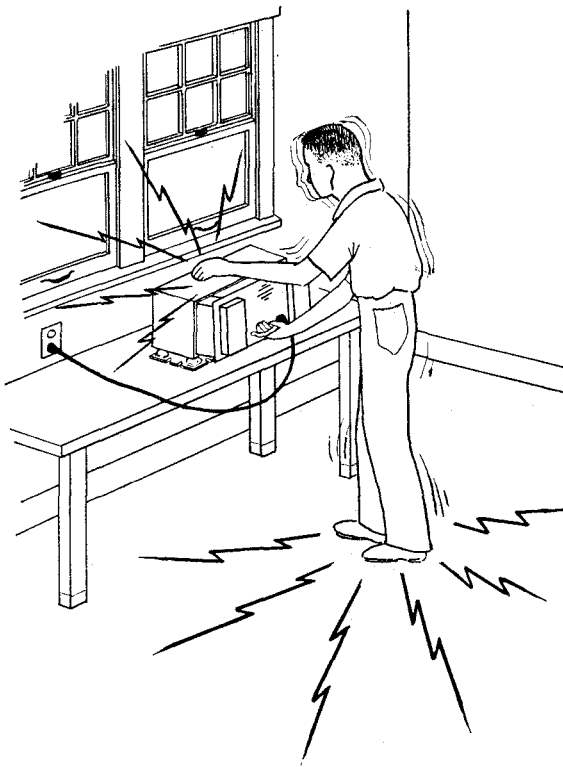
Note

ALL TUBES OF A GIVEN TYPE SUPPLIED WITH THIS EQUIPMENT SHALL BE CONSUMED PRIOR TO EMPLOYMENT OF TUBES FROM GENERAL STOCK.

2. MAINTENANCE METHODS.

a. GENERAL.—In case of trouble look for simple causes first. Analyze and isolate the difficulty before attempting to remove or dismantle any part of the equipment. A few moments of thought and study of the transmitter-receiver complete schematic diagram, figure 7-1, together with a tabulation of the various possible causes of failure, may save hours of haphazard labor. Radio equipment is often damaged by needless disassembly and removal of parts when the real trouble is merely a broken lead or faulty connection. When both the receiver and transmitter are inoperative, repair the receiver first.

b. GAINING ACCESS TO COMPONENTS.—



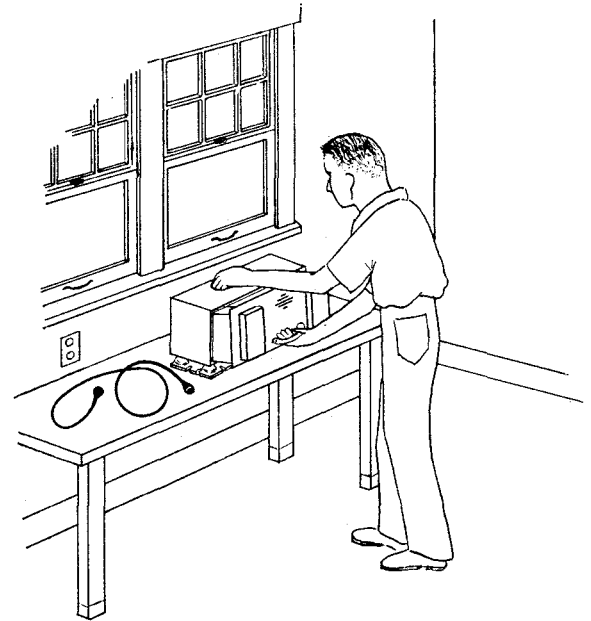
For all service operations, remove the chassis from the metal cabinet. To do this proceed as follows:

CAUTION

Before removing the chassis from the metal cabinet, disconnect the power plug. One side of the 115 volt power line is always connected to the chassis through relay K103 regardless of the polarity of the power plug. Therefore, do not let the chassis contact an earth ground as the fuse may be burned out or the tubes may be damaged. Do not handle or service the chassis while standing on a grounded surface when the power is turned on. Electric shock may result.

(1) Remove the control covers on each end of the panel by rotating the Dzus fasteners a half revolution counterclockwise.

(2) Loosen the special screws which are located along the edge of the panel.



(3) Carefully pull the chassis from the metal cabinet.

(4) Place the chassis on a bench or other flat surface made of insulating material.

c. **PRELIMINARY TROUBLE LOCATING TABLE.** (Refer to table 5-1.)—The following table will assist in locating trouble in both the receiver and the transmitter. The preliminary check consists primarily of a visual inspection of control positions, meter readings and equipment performance.

CAUTION

Notice the spacing of the plates of capacitor C110. Do not attempt to equalize the spacing of these plates. The spacing is intentionally set with .030 inch on one side and .060 inch on the other side rather than centered with .045 inch on each side of the plate.

TABLE 5-1 PRELIMINARY TROUBLE LOCATING

Symptoms	Possible Source of Trouble	Suggested Action (See CAUTION below)
POWER ON indicator and tubes do not light.	<ol style="list-style-type: none"> 1. Power line voltage off. 2. Fuse burned out. 3. Broken power cord or plug. 4. ON-OFF switch defective. 5. Indicator lamp defective. 	<ol style="list-style-type: none"> 1. Measure line voltage across power source. 2. Refer to paragraph 2. <i>i.</i> in this section. 3. Measure voltage across output terminals of power cord. 4. Measure voltage across input and output terminals of ON - OFF switch with VOLUME control advanced. 5. Unscrew panel light lens and replace bayonet base lamp.
All tubes do not light.	<ol style="list-style-type: none"> 1. Open tube filaments. 2. Shorted filament capacitor. 3. Open filament choke. 4. Defective connections. 	<ol style="list-style-type: none"> 1. Refer to paragraph 2. <i>d.</i> in this section. 2. Refer to paragraph 2. <i>d.</i> (1) (b) 2. in this section. 3. Measure across filament choke coils with ohmmeter. 4. Inspect wiring connections and socket pins. See paragraph 2. <i>h.</i> (3) in this section.
No plate voltage. CARRIER ON indicator does not light.	<ol style="list-style-type: none"> 1. Shorted filter or bypass capacitor. 2. Open filter choke. 3. Defective Push-to-Talk switch on handset. 4. Defective PRESS TO TALK—RELEASE TO LISTEN switch. 5. Defective rectifier tube. 6. No line voltage to rectifier tube plates. 	<ol style="list-style-type: none"> 1. Measure across filter capacitors with ohmmeter set on lowest range. 2. Measure across filter choke coils with ohmmeter. 3. Refer to figure 7-3 in Section VII and check continuity of switch. 4. Refer to figure 4-5 in Section IV and check continuity of switch. 5. Refer to paragraph 2. <i>h.</i> in this section. 6. Measure line voltage at rectifier tube plates and at terminals of ON-OFF switch.
Relays do not operate.	<ol style="list-style-type: none"> 1. No input voltage. 2. Defective Push-to-Talk switch on handset. 3. Defective PRESS TO TALK—RELEASE TO LISTEN switch. 4. Open circuit in relay coils or wiring. 	<ol style="list-style-type: none"> 1. Measure line voltage at output terminals of ON-OFF switch. 2. Refer to figure 7-3 in Section VII and check continuity of switch. 3. Refer to figure 4-5 in Section IV and check continuity of switch. 4. Check continuity of relay coils, also see 2. <i>j.</i> in this section.
PRESS TO CUT SQUELCH switch has no effect upon receiver operation.	<ol style="list-style-type: none"> 1. SQUELCH SENSITIVITY control is not properly adjusted. 2. Defective PRESS TO CUT SQUELCH switch. 3. Defective squelch stage. 	<ol style="list-style-type: none"> 1. Refer to paragraph 2. <i>c.</i> (4) (o) in Section II. 2. Check continuity of PRESS TO CUT SQUELCH switch. 3. Refer to paragraph 2. <i>g.</i> in this section.

CAUTION: Do not use ohmmeter when equipment is energized.

Symptoms (Cont.)	Possible Source of Trouble (Cont.)	Suggested Action (Cont.) (See CAUTION below)
Hum in receiver.	<ol style="list-style-type: none"> 1. Open filter or bypass capacitors. 2. Defective tubes. 3. Loose wiring connection. 	<ol style="list-style-type: none"> 1. Connect similar capacitor in parallel to check. 2. Refer to paragraph 2. <i>h.</i> in this section. 3. Inspect wiring connections for poor solder joints.
Oscillation in receiver.	<ol style="list-style-type: none"> 1. Defective tubes. 2. Tube shields loose. 3. Open capacitor. 4. Receiver is not properly tuned. 5. Poor connection in wiring. 	<ol style="list-style-type: none"> 1. Refer to paragraph 2. <i>h.</i> in this section. 2. Try interchanging tube shields. 3. Connect similar capacitor in parallel to check. 4. Refer to paragraph 2. <i>c.</i> (4) in Section II. 5. Inspect wiring connections for poor solder joints.
Signal distorted.	<ol style="list-style-type: none"> 1. Tubes in audio section defective. 2. Voltage or bias on tubes incorrect. 3. Audio transformers defective. 4. High resistance short in capacitor C119. 	<ol style="list-style-type: none"> 1. Refer to paragraph 2. <i>h.</i> in this section. 2. Refer to figure 5-8 for typical voltages. 3. Refer to table 5-2 for resistance of transformer windings. 4. Check AF amplifier grid voltage. See figure 5-8 for typical voltage.
Receiver output weak.	<ol style="list-style-type: none"> 1. Weak tubes in receiver. 2. Receiver is not properly tuned. 3. Voltages too low. 4. A receiver stage is inoperative. 5. IF transformers are not properly aligned. 	<ol style="list-style-type: none"> 1. Substitute new tubes. Refer to paragraph 2. <i>h.</i> in this section. 2. Refer to paragraph 2. <i>c.</i> (4) in Section II. 3. Refer to figure 5-8 for typical voltages. 4. Refer to paragraph 2. <i>g.</i> in this section. 5. Refer to paragraph 4. in this section.
Receiver noisy and/or unstable in operation.	<ol style="list-style-type: none"> 1. Loose connection within a tube. 2. Loose connection in the receiver. 3. IF or AF transformers have developed a high resistance open in windings. 4. Defective switch or relay contacts. 5. Broken or shorted antenna connection. 6. Electrical interference in neighborhood of installation. 	<ol style="list-style-type: none"> 1. Substitute new tube. Refer to paragraph 2. <i>h.</i> in this section. 2. Check connections visually. Refer also to paragraph 2. <i>e.</i> in this section. 3. Check resistance of windings. Refer to table 5-2 in this section. 4. Check contact continuity while operating switch or relay by hand. 5. Inspect antenna and coaxial transmission line connectors. 6. Inspect neighboring electrical equipment for abnormal sparking.

CAUTION: Do not use ohmmeter when equipment is energized.

Symptoms (Cont.)	Possible Source of Trouble (Cont.)	Suggested Action (Cont.) (See CAUTION below)
No meter reading with the METER SWITCH in position number 1.	<ol style="list-style-type: none"> 1. Receiver oscillator stage inoperative. 2. Defective meter. 	<ol style="list-style-type: none"> 1. Refer to paragraph 2. g. in this section. 2. Substitute new meter, check continuity of meter cord.
No meter reading with the METER SWITCH in position number 6-7-8.	<ol style="list-style-type: none"> 1. Defective transmitter crystal. 2. Transmitter oscillator and multiplier stages are not properly tuned. 3. Transmitter oscillator or multiplier stage inoperative. 	<ol style="list-style-type: none"> 1. Check crystal holder connector, replace crystal. 2. Refer to paragraph 2. c. (2) in Section II. 3. Refer to paragraph 2. g. in this section.
No meter reading with the METER SWITCH in position number 9-10.	<ol style="list-style-type: none"> 1. Relay K101 defective. 2. RF power amplifier stage inoperative. 	<ol style="list-style-type: none"> 1. Check contact continuity. If relay does not close check coil continuity. 2. Refer to paragraph 2. g. in this section.
No meter reading with the METER SWITCH in position number 11.	<ol style="list-style-type: none"> 1. Antenna circuit open or shorted. 2. Antenna relay defective. 3. Transmitter antenna circuit is not properly tuned. 4. RF stages of transmitter inoperative. 	<ol style="list-style-type: none"> 1. Inspect antenna and coaxial transmission line connectors. 2. Check contact continuity. If relay does not close check coil continuity. 3. Refer to paragraph 2. c. (2) in Section II. 4. Refer to paragraph 2. g. in this section.
No modulation indicated with the METER SWITCH in position number 11.	<ol style="list-style-type: none"> 1. Handset inoperative (try transducer). 2. Relay K101 defective. 3. PRESS TO TALK — RELEASE TO LISTEN switch defective. 4. Defective modulation transformer T103. 	<ol style="list-style-type: none"> 1. Refer to figure 7-3 and check handset wiring continuity. 2. Check contact continuity. If relay does not close check continuity of the relay energizing circuit. 3. Refer to figure 4-5 and check continuity of circuits through switch. 4. Refer to table 5-2 and check continuity of transformer windings.

CAUTION: Do not use ohmmeter when equipment is energized.

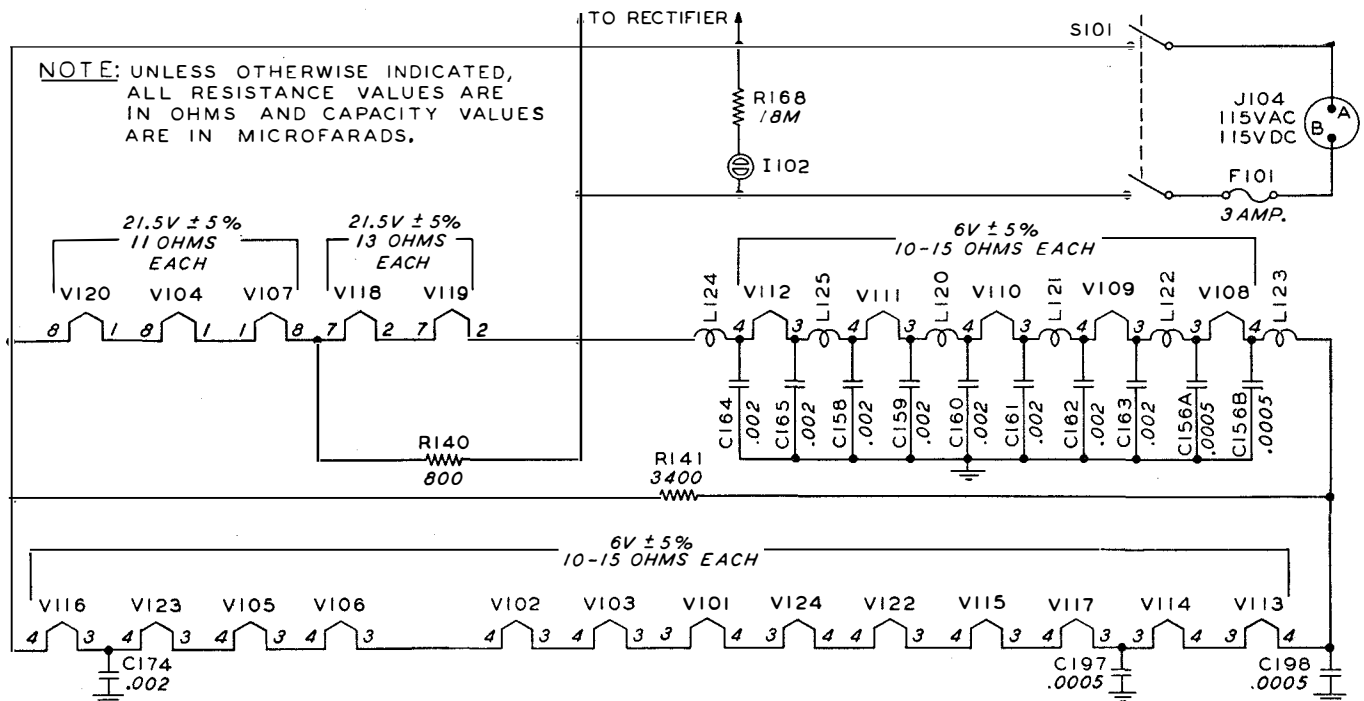


Figure 5-1—Filament Circuit Voltage and Resistance Measurements

d. TROUBLE LOCATING IN COMMON CIRCUITS.

(1) **FILAMENT CIRCUITS.**—The filament circuits are common to all transmitter and receiver stages and should be operative before the other circuits are checked. Before checking the filament circuits, see precautions to be observed and the information under paragraph 2. *h.* in this section.

(a) **ALL TUBES DO NOT LIGHT.**—Using an ohmmeter check the continuity of the following:

1. The fuse. See paragraph 2. *i.* in this section.
2. The OFF-ON switch.
3. Power cord and plug.
4. The filament wiring.

(b) **LOCATING OPEN TUBE FILAMENTS.**

1. Operate the ON-OFF switch to the OFF position.

2. Measure the resistance of each tube filament at the socket numbers shown on figure 5-1. If the measured filament resistance is found to be appreciably different the tube is probably defective. To determine whether a shorted capacitor caused the tube to open, remove V116 and V120 and measure the resistance to ground of the associated filter capacitors. The ohmmeter should indicate a resistance of 3400 ohms if the capacitors are not shorted.

3. Replace the defective tube with a new tube and reinsert V116 and V120.

4. When all tubes light, measure the voltage across each tube filament. Use an AC or DC meter depending on the type of power being used. Each tube filament must have the proper voltage to insure normal tube life and proper operation of the equipment.

(2) **RECTIFIER CIRCUITS.**—The rectifier circuits furnish power to all stages in both the transmitter and receiver and must be operative before proceeding with the checking of the transmitter and receiver circuits.

(a) **CHECKING THE RECTIFIER CIRCUITS.** (Refer to figure 5-2.)

1. Operate the transmitter-receiver ON-OFF switch to the ON position.

2. Operate the PRESS TO TALK—RELEASE TO LISTEN switch to the PRESS TO TALK position.

3. Check to see if the CARRIER ON indicator lights and if relays K101 and K104 operate.

4. If the relays operate but the CARRIER ON indicator does not light, replace the indicator lamp.

5. If the CARRIER ON indicator does not light after the lamp has been replaced, measure the voltage from chassis ground to terminals 8 and 4 on sockets X118 and X119 of rectifier tubes V118 and V119. If no voltage is indicated the rectifier circuits are inoperative. Refer to paragraph 2. *g.*, in this section for servicing instructions.

(3) **AUDIO STAGES.** — To determine if the

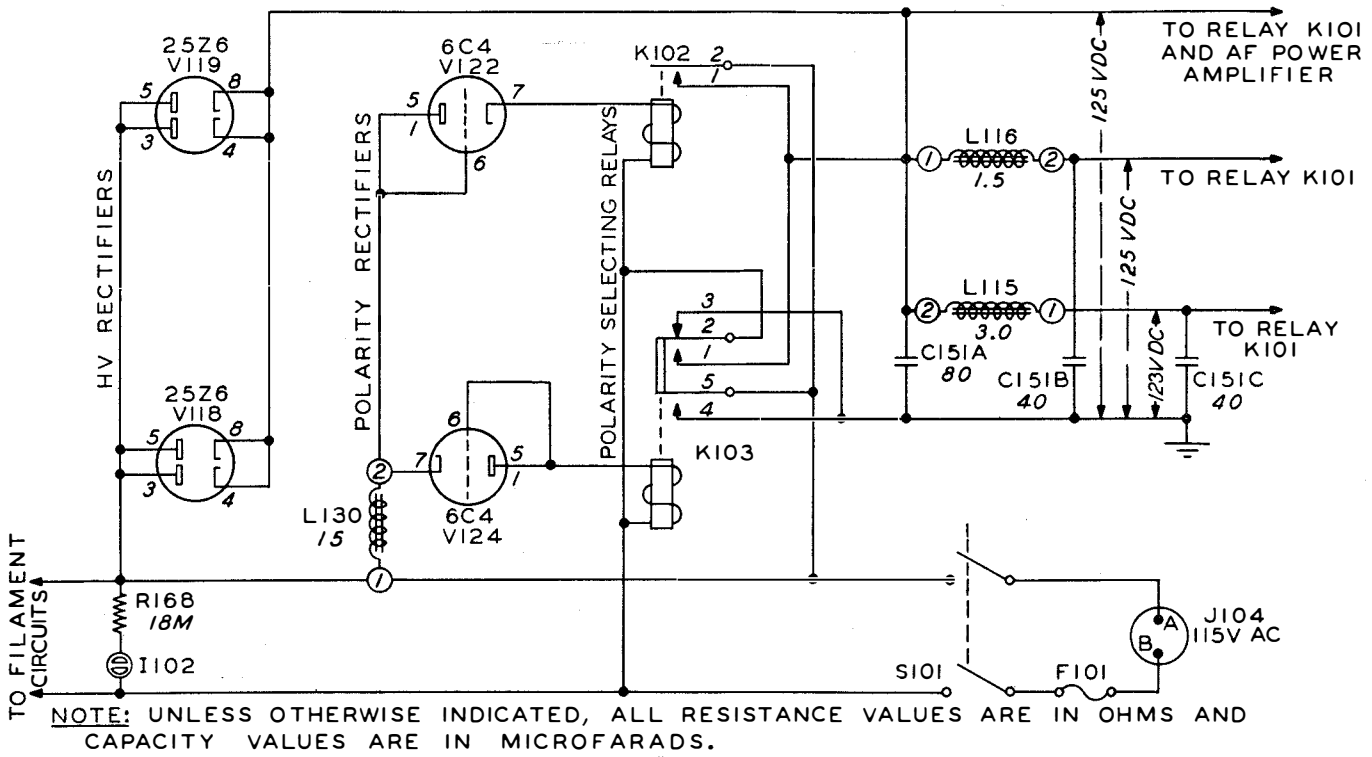


Figure 5-2—Rectifier Circuit Voltages

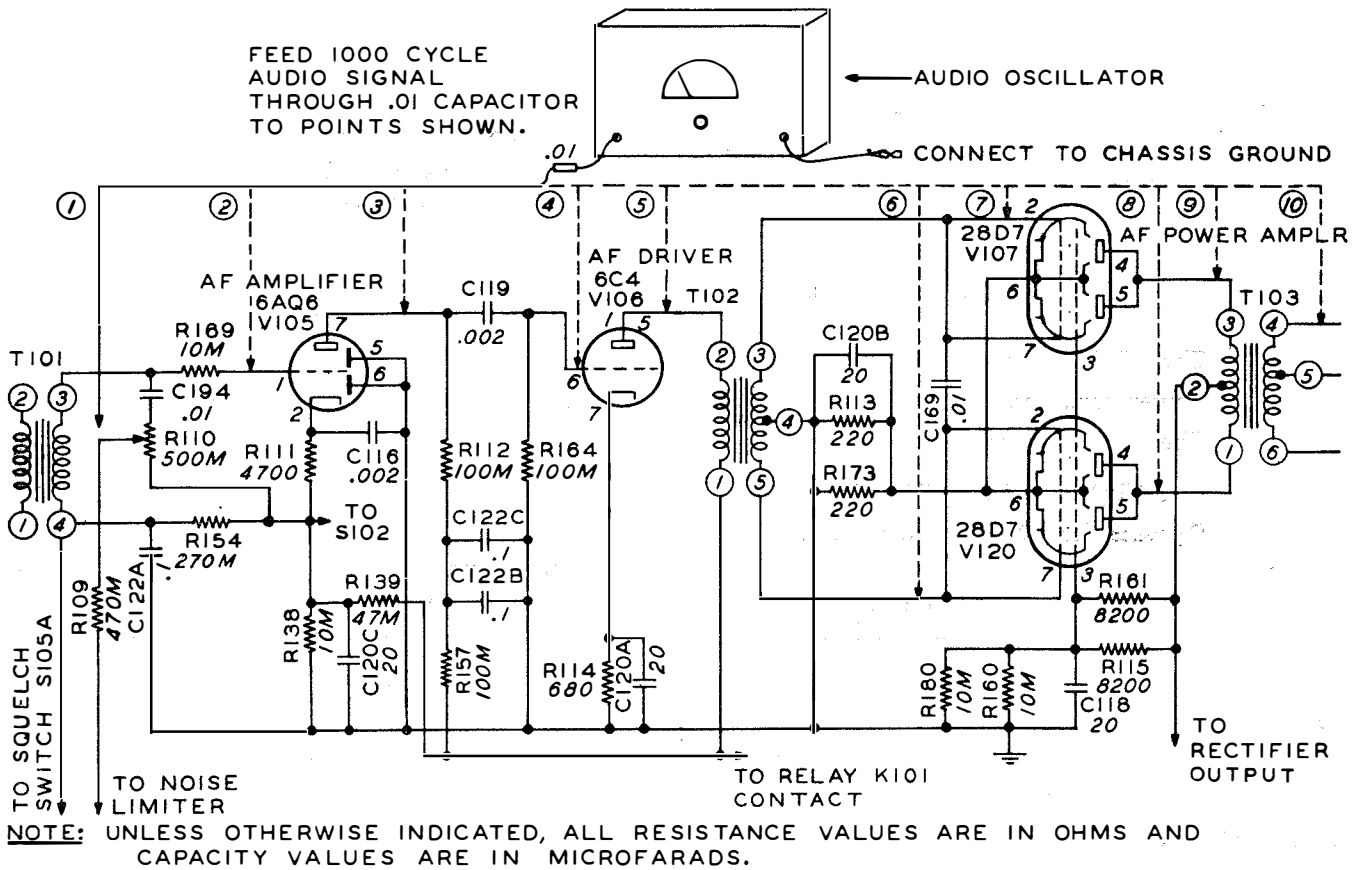


Figure 5-3—Trouble Locating in Audio Stages

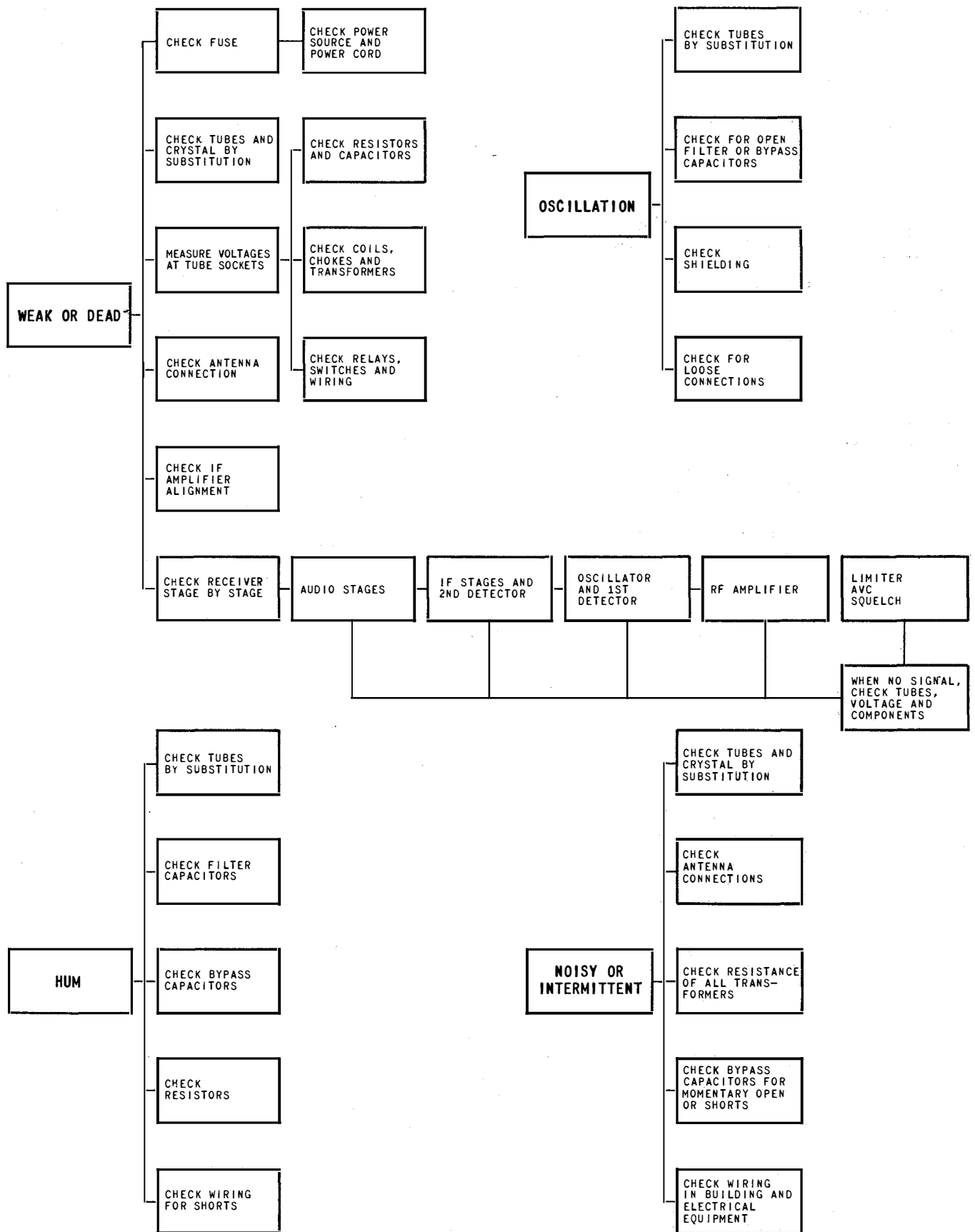


Figure 5-4—Receiver Trouble Locating Block Diagram

trouble is in the audio stages and if so, in which stage, proceed as follows:

- (a) Adjust the audio oscillator to 1000 cps.
- (b) Connect a .01 mf capacitor in series with the output lead.
- (c) Connect the audio oscillator ground lead to the chassis ground of the transmitter-receiver.
- (d) Advance the VOLUME control to the maximum position.
- (e) Connect the audio oscillator output lead through the .01 mf capacitor to the terminal of the VOLUME control that is connected to resistor R109. If the audio stages are operative the audio oscillator signal will be heard in the handset or in the transducer.
- (f) When the trouble is in the audio stages, advance the audio oscillator lead point by point as shown in figure 5-3. When a point is reached where the signal is heard, it may be assumed that the trouble lies in the stage immediately preceding this point.
- (g) If the trouble is located in the first audio amplifier stage, also check the squelch and limiter circuits which operate on the first audio amplifier. Refer to paragraph 2. g. in this section.

e. RECEIVER TROUBLE LOCATING.

(1) BLOCK DIAGRAM. — Figure 5-4 shows the procedure to be followed for the checking for trouble in the receiver. With the receiver trouble symptoms in mind, study the block diagram and

considerable time may be saved in locating the trouble.

(2) ISOLATING THE TROUBLE.—The stage in which the trouble exists should be located first. The stage by stage test procedure in the following paragraphs will locate the inoperative stage. Before checking stage by stage, refer to paragraph 2. c. in this section.

(a) TEST EQUIPMENT REQUIRED.

1. Volt-ohmmeter.
Range—0 to 150 volts.
0 to 1 megohms.
2. Audio oscillator.
Range—1000 cps.
3. Signal Generator.
Range—5.3 mc.
60 to 80 mc.

(b) STAGE BY STAGE TEST PROCEDURE.—The numbers on the trouble locating diagrams show where the audio oscillator or the signal generator should be connected to test each stage and the connecting sequence to be followed.

1. IF AMPLIFIER, FIRST AND SECOND DETECTOR AND NOISE LIMITER.—If the signal is heard in the transducer or handset when the audio oscillator signal is fed through the VOLUME control, it is evident that the audio stages are operative and that the trouble must be in a stage preceding this point. These stages may be checked in much the same manner as the AF stages were checked. Use

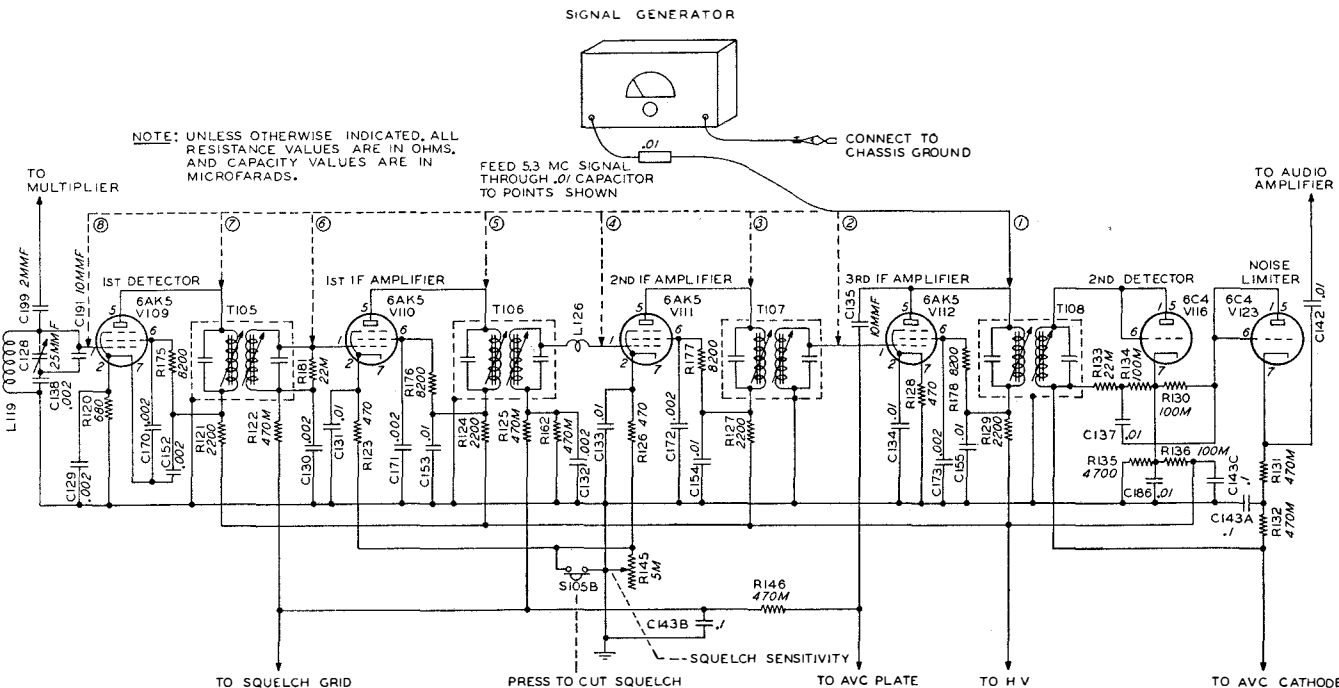


Figure 5-5—Trouble Locating in IF Amplifier, 1st and 2nd Detector, and Noise Limiter Stages

a signal generator in place of the audio oscillator and proceed as follows:

- a. Adjust the signal generator to 5.3 mc.
- b. Connect the signal generator output through a .01 mf capacitor to the plate of the third IF amplifier tube. (Terminal number 5 on socket X112)
- c. Connect the signal generator ground lead to the chassis ground of the transmitter-receiver.
- d. Refer to figure 5-5 for the connecting points of the signal generator and the sequence of the connections. The inoperative stage will be between the point of no signal and the last point from which a signal was heard.
- e. Adjust the signal generator above and below 5.3 mc as each stage is checked to determine if the IF transformers are properly aligned.

CAUTION

Do not adjust the IF transformer trimmer adjustments unless it is certain that the receiver is mis-aligned and then only after all possible causes of faulty operation have been fully investigated. If the IF stages must be aligned, follow the procedure outlined under alignment procedure in paragraph 4. in this section.

f. If each IF stage is operating properly, reduce the output of the signal generator as the output lead is advanced stage by stage.

g. If the AVC or noise limiter circuits operate in conjunction with the stage found inoper-

ative, the AVC and limiter circuits should also be checked. Refer to paragraph 2. g. in this section.

2. OSCILLATOR.

- a. Operate the METER SWITCH to position number 1.
- b. Insert the meter cord plug into the METER JACK, J102. A reading should be indicated on the meter.
- c. Tune the oscillator coil, L114, to the crystal frequency with receiver tuning control number 1. A sharp downward deflection of the meter needle will occur when the crystal starts oscillating.
- d. If no reading is indicated on the meter in the above steps b. and c., the oscillator stage is inoperative. Refer to paragraph 2. g. in this section.

3. MULTIPLIER. (Refer to figure 5-6.)

- a. Connect the output of the signal generator to the grid of the first detector (terminal 5 on socket X109).
- b. Adjust the signal generator to four times the crystal frequency plus 5.3 mc.
- c. Tune the multiplier coil, L113, to four times the crystal frequency with receiver tuning control number 2. The multiplier frequency and the signal generator frequency will beat with a resulting difference of 5.3 mc when mixed in the first detector. This beat frequency will be amplified in the IF stages, which are tuned to 5.3 mc, then detected and heard in the transducer or handset if the multiplier stage is operative.
- d. If no signal is heard, refer to paragraph 2. g. in this section.

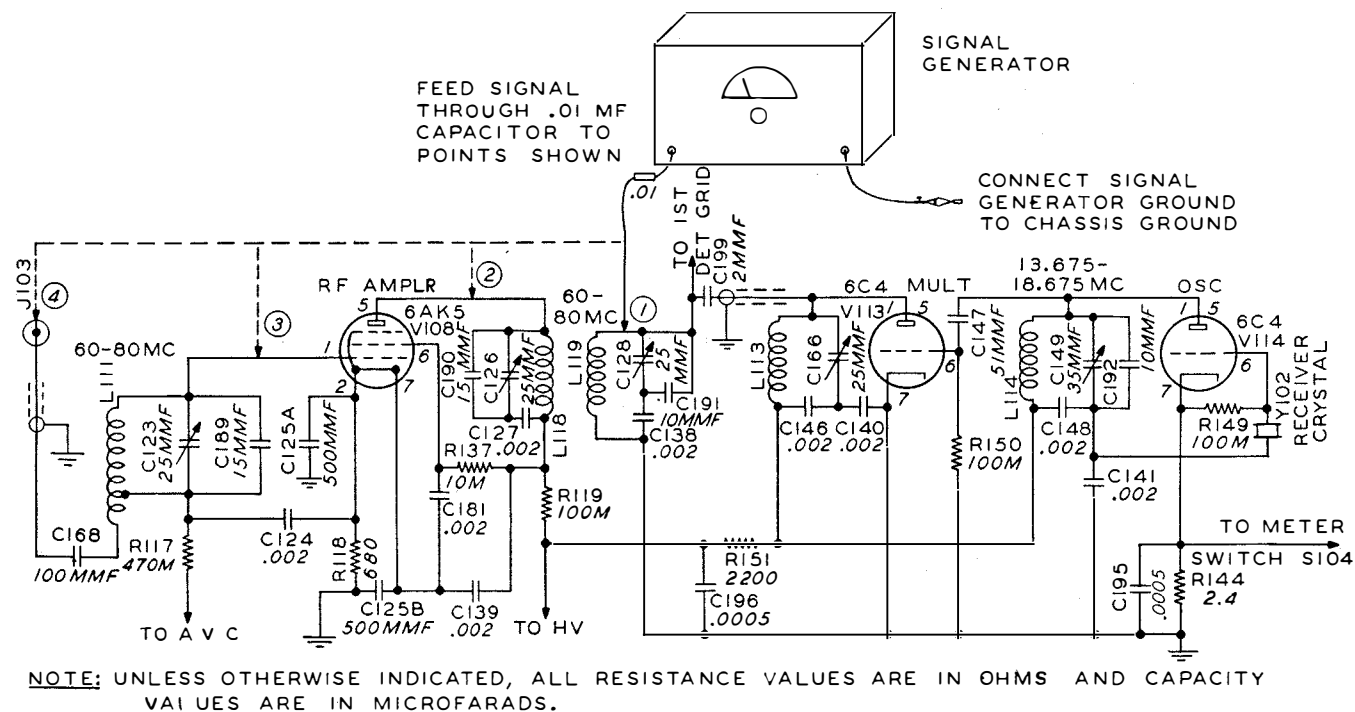


Figure 5-6—Trouble Locating in Receiver Multiplier and RF Stages

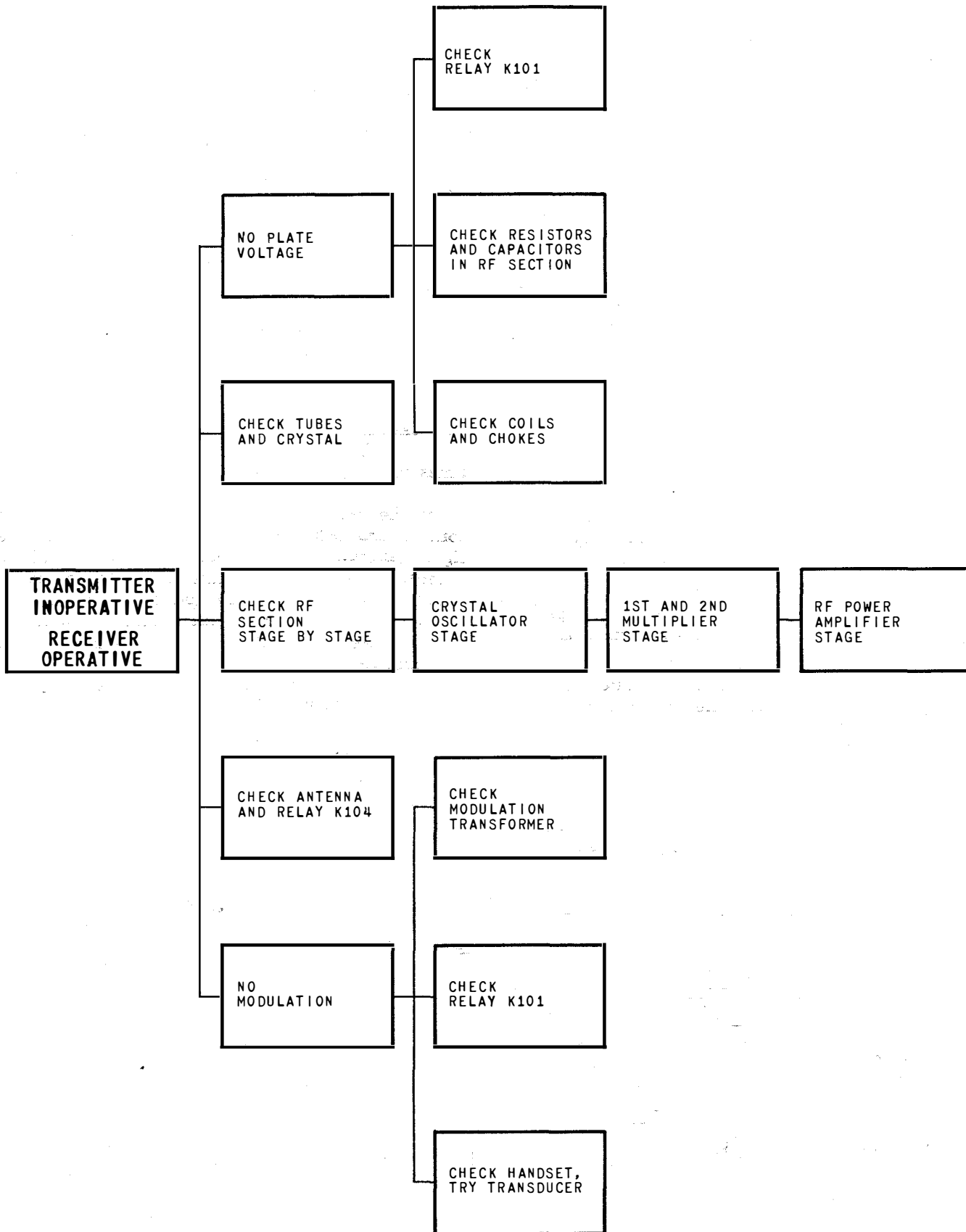


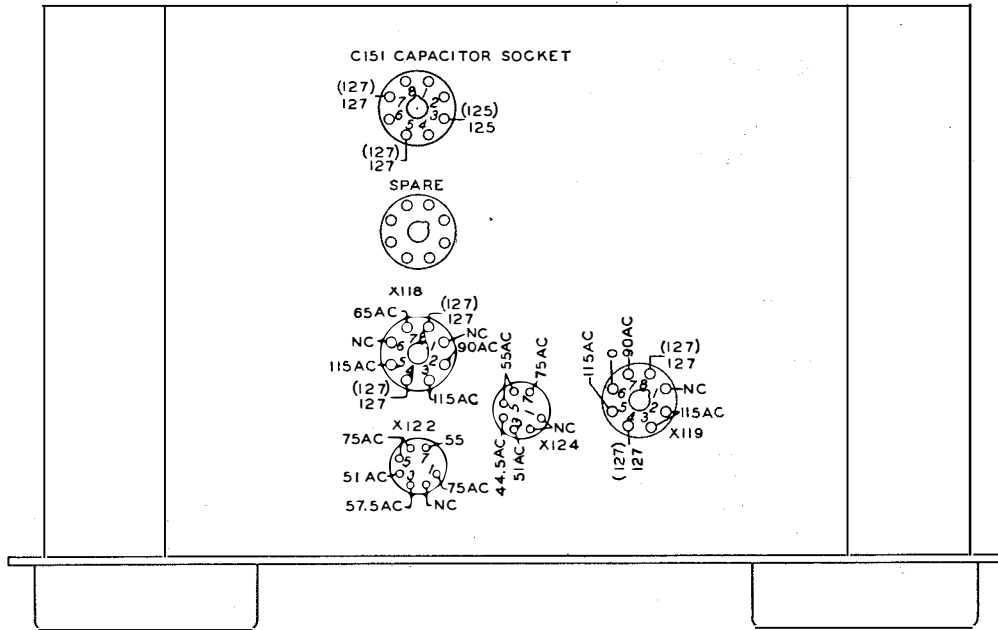
Figure 5-7—Transmitter Trouble Locating Block Diagram

4. RF AMPLIFIER.

a. Using the same signal generator frequency that was used to check the multiplier stage, connect the output of the signal generator to the plate of the RF amplifier tube (terminal number 5 of socket X108).

b. Tune the first detector grid coil, L119, to the signal generator frequency with receiver tuning control number 5.

c. Tune the RF amplifier plate coil, L118, to the signal generator frequency with receiver tuning control number 4.



(22)20	R139	(125)125
(22)20	R138	0
(125)90	R157	(125)125
(4) 4	R114	0
0	R164	0
(125)90	R112	(125) 75
(22)20	R111	(22) 20
(22)20	R154	(18) 8

NOTE: ALL MEASUREMENTS TAKEN UNDER THE FOLLOWING CONDITIONS:

1. POWER SUPPLY 115 VOLTS AC.
2. READINGS IN BRACKETS WERE TAKEN WITH A MODEL 772 WESTON METER ON THE 0-10,0-50 AND 0-250 VOLT SCALES. (20,000 OHMS PER VOLT).
3. READINGS NOT IN BRACKETS WERE TAKEN WITH THE ABOVE METER. (1000 OHMS PER VOLT)
4. RESISTOR BOARD, RECTIFIER AND RECEIVER VOLTAGES MEASURED IN RECEIVE POSITION, VOLUME CONTROL MAXIMUM AND ALL CIRCUITS TUNED.
5. TRANSMITTER VOLTAGES MEASURED WITH ANTENNA LOADED.
6. WHEN A 115 VOLT DC POWER SUPPLY IS USED THE HIGH VOLTAGES WILL MEASURE APPROXIMATELY 10 PERCENT LOWER.
7. ALL VOLTAGES MEASURED FROM GROUND.

0	R131	0	(4) 0.5
(2) 0	R132	0	(3) 0.5
(5) 4	R136	0	(127) 127
(5) 4	R135	0	0
(5) 4	R130	0	(4) 0.25
(5) 4	R134	0	(3) 0.25
(3) 0.5	R133	0	(3) 0.25
(115) 115	R129	0	(127) 127

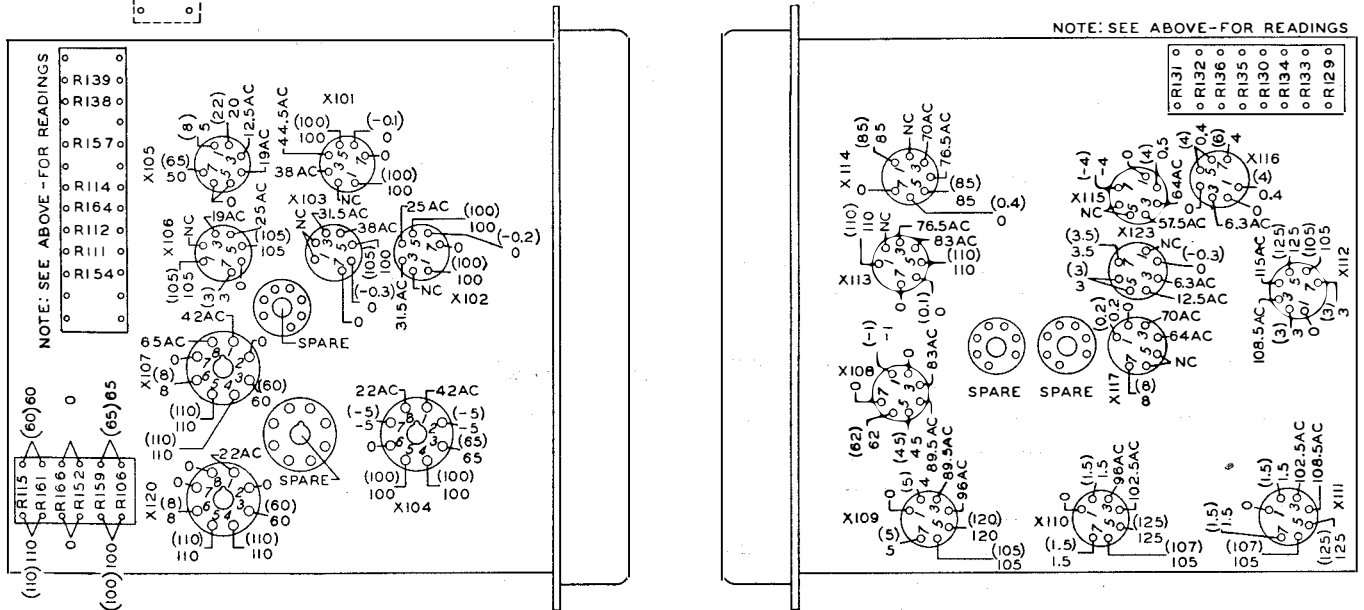


Figure 5-8—Tube Socket to Ground Voltage Measurements

d. If the signal is heard, connect the output of the signal generator to the grid of the RF amplifier tube (terminal number 1 of socket X108).

e. If the signal is heard, connect the output of the signal generator to the ANTENNA connector.

f. Tune the RF amplifier grid coil, L111, to the signal generator frequency with receiver tuning control number 3. The signal should now be heard.

g. If no signal was heard at any of the preceding check points, refer to paragraph 2. g. in this section.

f. TRANSMITTER TROUBLE LOCATING.

(1) BLOCK DIAGRAM.—Figure 5-7 shows the procedure that should be followed for the checking for trouble in the transmitter. With the transmitter trouble symptoms in mind, study the block diagram and time may be saved in locating the trouble.

(2) ISOLATING THE TROUBLE.—The receiver should be operating properly before attempting to service the transmitter. For receiver trouble locating see paragraph 2. e. in this section. With the receiver in an operative condition, the audio stages and rectifier circuits will not have to be checked, as the same audio stages and rectifier circuits are used in both the transmitter and receiver.

(a) TEST EQUIPMENT REQUIRED.

1. Volt-ohmmeter.

Range: 0-1, 0-100 ohms, 0-2 megohms.
0-10, 0-50, 0-150 volts.

Sensitivity: 20,000 ohms per volt.

2. RF choke coil (use L107 supplied with spare parts or similar choke).

3. Tuning Meter (M301, furnished with the equipment).

(b) STAGE BY STAGE TEST PROCEDURE. (Refer to figure 5-8.)

1. OSCILLATOR STAGE.

a. Select the 10 volt scale of the twenty thousand ohm per volt voltmeter.

b. Connect the negative voltmeter lead through the test equipment choke coil to the grid of the second multiplier tube (terminal number 6 on socket X102).

c. Connect the other lead of the voltmeter to the chassis ground of the equipment.

d. Tune the oscillator coil, L101, to the crystal frequency with transmitter tuning control number 6. A reading should be indicated on the voltmeter if the oscillator stage is operative.

e. If there is no reading indicated on the meter, refer to paragraphs 2. g. in this section.

2. FIRST MULTIPLIER.

a. Connect the negative lead of the volt-

meter to the grid of the second multiplier tube (terminal number 6 on socket X103).

b. Connect the other lead of the voltmeter to the chassis of the transmitter-receiver.

c. Tune the first multiplier coil, L102, to the output of the oscillator stage with transmitter tuning control number 7. A reading should be indicated on the voltmeter if the oscillator and first multiplier stages are operative.

d. If there is no reading indicated on the voltmeter, the stage is inoperative. Refer to paragraph 2. g. in this section.

3. SECOND MULTIPLIER.—To check the second multiplier stage, use the Tuning Meter that is furnished with the equipment in place of the 20,000 ohms per volt voltmeter that was used to check the oscillator and first multiplier stages. Use the following procedure:

a. Insert the meter cord plug into the METER JACK.

b. Operate the METER SWITCH to the 6-7-8 position.

c. Tune the second multiplier coil, L103, to the output of the first multiplier stage with transmitter tuning adjustment number 8. A reading will be indicated if the oscillator and the first and second multiplier stages are operative.

d. If there is no reading indicated on the meter, the second multiplier stage is inoperative. Refer to paragraph 2. g. in this section.

4. RF POWER AMPLIFIER.

a. Insert the meter cord plug into the METER JACK.

b. Place the METER SWITCH in the number 9-10 position.

c. Tune the RF power amplifier coil, L108, to the output of the second multiplier stage with transmitter tuning control number 9. A reading will be indicated on the meter if the RF stages are operative.

d. If the RF power amplifier stage cannot be adjusted properly with transmitter tuning control number 9, the RF power amplifier may not be properly neutralized. Refer to paragraph 5. in this section for the procedure to be followed for checking neutralization.

e. If no reading is indicated on the meter, the RF power amplifier stage is inoperative. Refer to paragraph 2. g. in this section.

5. ANTENNA CIRCUITS.

a. Insert the meter cord plug into the METER JACK.

b. Place the METER SWITCH in the number 11 position.

c. Tune the antenna to the frequency of the RF power amplifier stage with transmitter tun-

ing controls number 10 and 11. The meter should indicate current in the antenna if the antenna tuning and coupling circuits are operative.

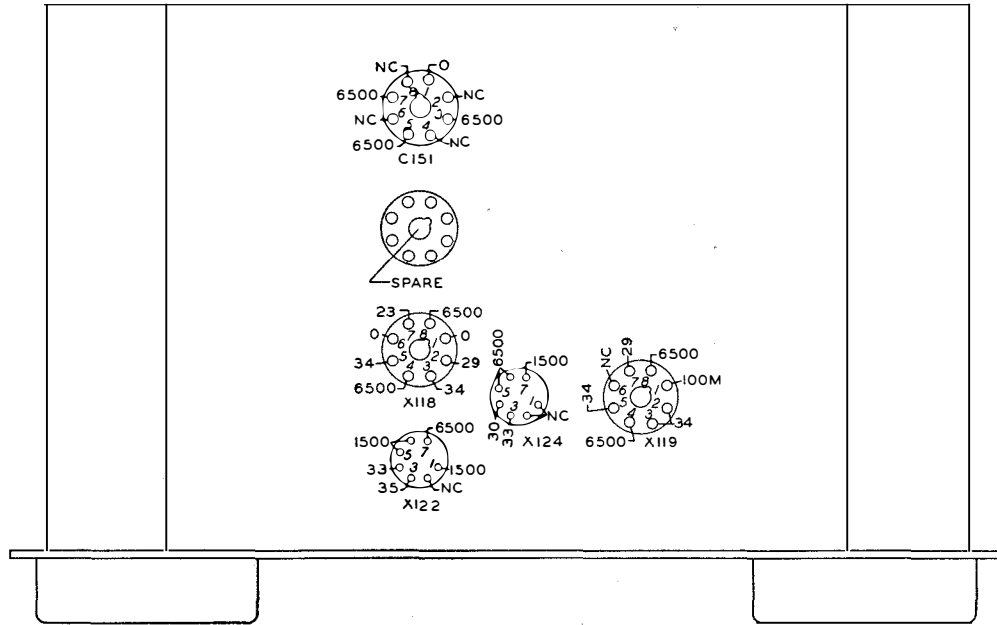
6. MODULATION CHECK.

a. Insert the meter cord plug into the METER JACK, J102.

b. Place the METER SWITCH in the number 11 position.

c. Operate the PRESS TO TALK—RELEASE TO LISTEN switch, S102.

d. Whistle into the transducer and watch the meter needle. A deflection should be indicated on the meter.



NOTE: UNLESS OTHERWISE SPECIFIED ALL RESISTANCE VALUES ARE IN OHMS.
ALL RESISTANCE MEASURED FROM TERMINALS TO GROUND WITH A WESTON MODEL 772 OHM METER.

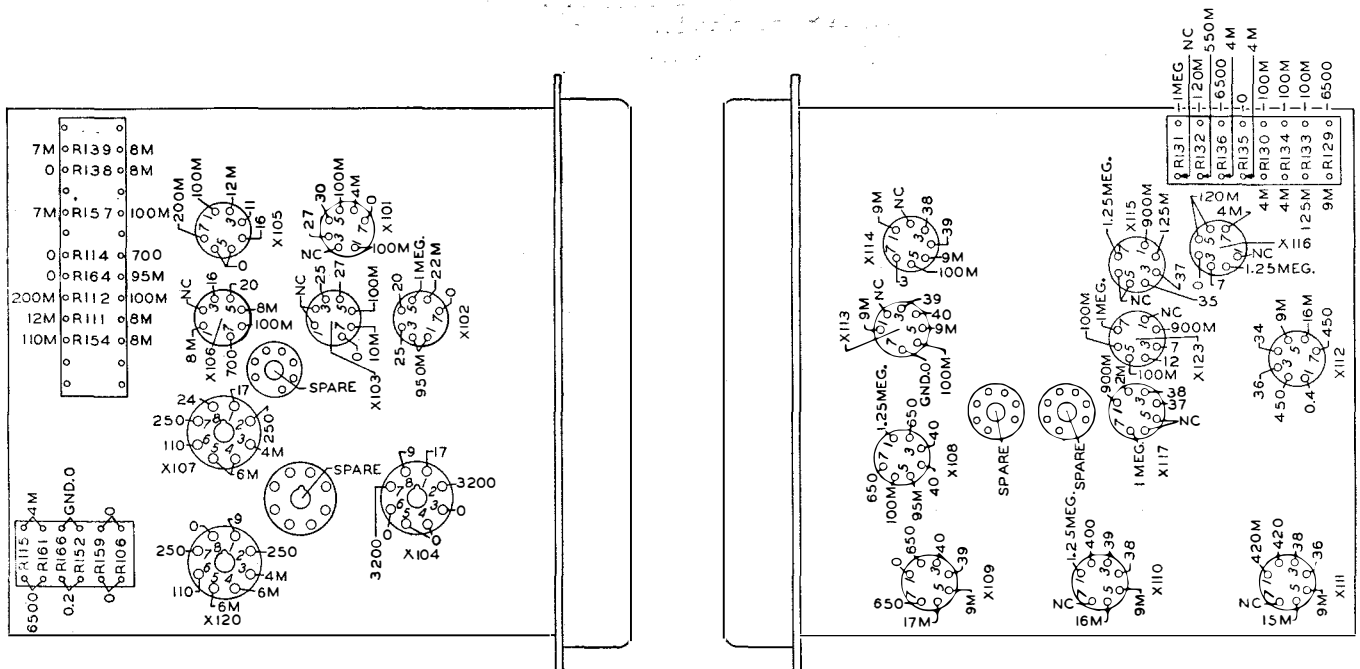


Figure 5-9—Tube Socket to Ground Resistance Measurements

e. If there is no deflection, operate the Push-to-Talk switch on the handset.

f. Whistle into the handset and watch the meter needle. A deflection should occur on the meter.

g. If there was no deflection indicated on the meter when using the transducer or handset in steps d and f, measure the resistance of the windings of the modulation transformer, T101.

h. Check the continuity of the wiring and of the PRESS TO TALK—RELEASE TO LISTEN switch. This switch connects the transducer or handset to the modulation transformer, T101.

g. TROUBLE LOCATING IN A STAGE FOUND INOPERATIVE.—After the stage in which trouble exists has been located, proceed to check the components of the inoperative stage. In the following steps replace or repair any component found defective and after each replacement check the operation of the equipment to determine if the trouble is corrected. See paragraph 3., in this section, for the procedure for replacing components.

(1) Replace the tube with one of the same type that is known to be in good condition. See precautions under paragraph 2. h. in this section.

(2) If the stage employs a crystal, replace the crystal with one of the correct frequency that is known to be in good condition.

(3) Measure the voltages at the tube sockets. Refer to figure 5-8 for typical voltages.

(4) Using an ohmmeter, refer to figure 5-9 and to a schematic diagram of the stage found to be inoperative and carefully check the circuit wiring and each component. Proceed as follows:

(a) Check the capacitors for an open or shorted condition.

(b) Check the continuity of the coils and wiring.

(c) Measure the resistance of all fixed and variable resistors.

(d) Measure the resistance of the transformer windings.

(e) Check the continuity of the switch and relay contacts and the relay coils. Refer to paragraph 2. j. in this section.

Note

Before soldering to any miniature tube socket terminal, remove the tube and insert the socket wiring tool supplied with the equipment to hold the socket terminals in place.

h. VACUUM TUBES.

(1) LOCATION OF SPARE TUBES. — One spare tube of each type used is supplied with the equipment. The spare tubes are inserted in sockets marked SPARE. The spare tubes are located on the transmitter-receiver chassis among the active

tubes. See figures 7-8, 7-9, and 7-10 in section VII for exact location. When inserting a spare tube into a spare tube socket make certain that the tube is the same type as the type number that is marked near the socket.

Some of the spare socket terminals are used for wiring connections and, therefore, insertion of the wrong type tube may short circuit the equipment.

(2) REPLACEMENT OF TUBES.—Before a tube is discarded, make certain that the tube is at fault and that the trouble is not a loose or broken connection in the equipment. When a tube is known to be defective it should be disposed of immediately so that the tube will not become mixed with good tubes from general stock. Discard all tubes with open filaments, shorted or noisy elements, low emission or any other defect which would cause faulty operation of the equipment. If the tubes in the transmitter and receiver have been continually in use for a year, replace all of the tubes. A marked improvement in the performance of the equipment is usually noticeable after the weak tubes have been replaced.

Note

ALL TUBES OF A GIVEN TYPE SUPPLIED WITH THE EQUIPMENT SHALL BE CONSUMED PRIOR TO EMPLOYMENT OF TUBES FROM GENERAL STOCK.

(3) TUBE REPLACEMENT PRECAUTIONS.—Before any tube is removed from the transmitter or receiver, make certain that the ON-OFF switch is in the OFF position.

The tubes are connected in a series-parallel circuit. Tube filaments that have a higher resistance than other filaments in the same series circuit are shunted with resistors to compensate for the difference in resistance. Therefore, other tubes may be damaged if a tube should be removed while the power is on. Before a tube is replaced, make certain that the type of tube is correct for the socket into which it is being placed. Check the filter capacitors of the rectifier before replacing a rectifier tube. A shorted rectifier filter capacitor will instantly damage a good rectifier tube when the power is turned on.

CAUTION

Before a tube is removed from a socket make certain that the ON-OFF switch is in the OFF position. The tubes operate at high temperatures and should be allowed to cool before attempting to handle with bare hands.

All of the tubes are removed by pulling straight out of the sockets. In some cases a tube may be more easily pushed out from the bottom of the socket. Use the tube pin straightener supplied with

the equipment to straighten the pins on the miniature type tubes before inserting the tube into a socket. When replacing a tube, properly orient the tube with respect to the socket and push into place.

(4) **PRECAUTIONS FOR SATISFACTORY TUBE LIFE.** — Before the transmitter-receiver is connected to a power line of unknown voltage, check the voltage. The power line voltage shall not exceed 120 volts. If a line voltage in excess of 120 volts is used, the tube life will be shortened. Measure the voltage across the filament at each tube socket, using an AC or DC voltmeter, depending upon the type of voltage that is used. A tube with a filament resistance that is higher than normal will receive too much voltage and will cut the voltage down on the other tube filaments in the circuit. To obtain satisfactory operation and tube life it is important that the tubes are operated at the tube manufacturers ratings. Refer to paragraph 6. in this section.

i. **REPLACEMENT OF FUSE.**

(1) **SIZE.** — The 115 volt primary power line fuse, F101, is a 3 ampere, 250 volt cartridge type.

(2) **REPLACEMENT PRECAUTIONS.** — Before replacing the fuse, make certain that the ON-OFF switch is turned to the OFF position or that the power line plug is disconnected. The short circuit which caused the fuse to burn out should be located and corrected. The fuse may have corroded, causing an open circuit. When the fuse is corroded, carefully clean the fuse holder. If the fuse holder

does not make a good contact with the fuse, the fuse may become hot enough to melt the solder on the fuse and cause it to open. A fuse that does not make a good contact in the fuse holder will cause unstable operation of the equipment.

j. **SERVICING RELAYS.** — The relays used in this equipment should not require adjustment unless the relays have been damaged by rough handling of the equipment or the improper treatment of the contacts. The relays are delicate pieces of equipment and have been properly adjusted at the factory. If a relay should require attention, handle it as you would an expensive watch or fine meter. A short circuit through the relay contacts may cause burned or pitted contacts. To clean the contacts use only a crocus cloth or a burnishing tool. Extreme care must be exercised so as not to bend or damage the contact arms. If new adjustments must be made, make the adjustments carefully and correctly. Check and re-check until the spacings are correct. Do not bend contact arms to make adjustments. After the relay has been in operation again for a short time, check the spacings once more and readjust if necessary. When the relay is badly damaged replace the relay.

The relays that are used in this equipment are of the midget type and if a relay fails to operate properly it will usually be found that it is more practical to replace the component with a new one than to try to adjust the defective relay. However, some minor adjustments of the relay contacts may be made if new relays are not available. Adjust

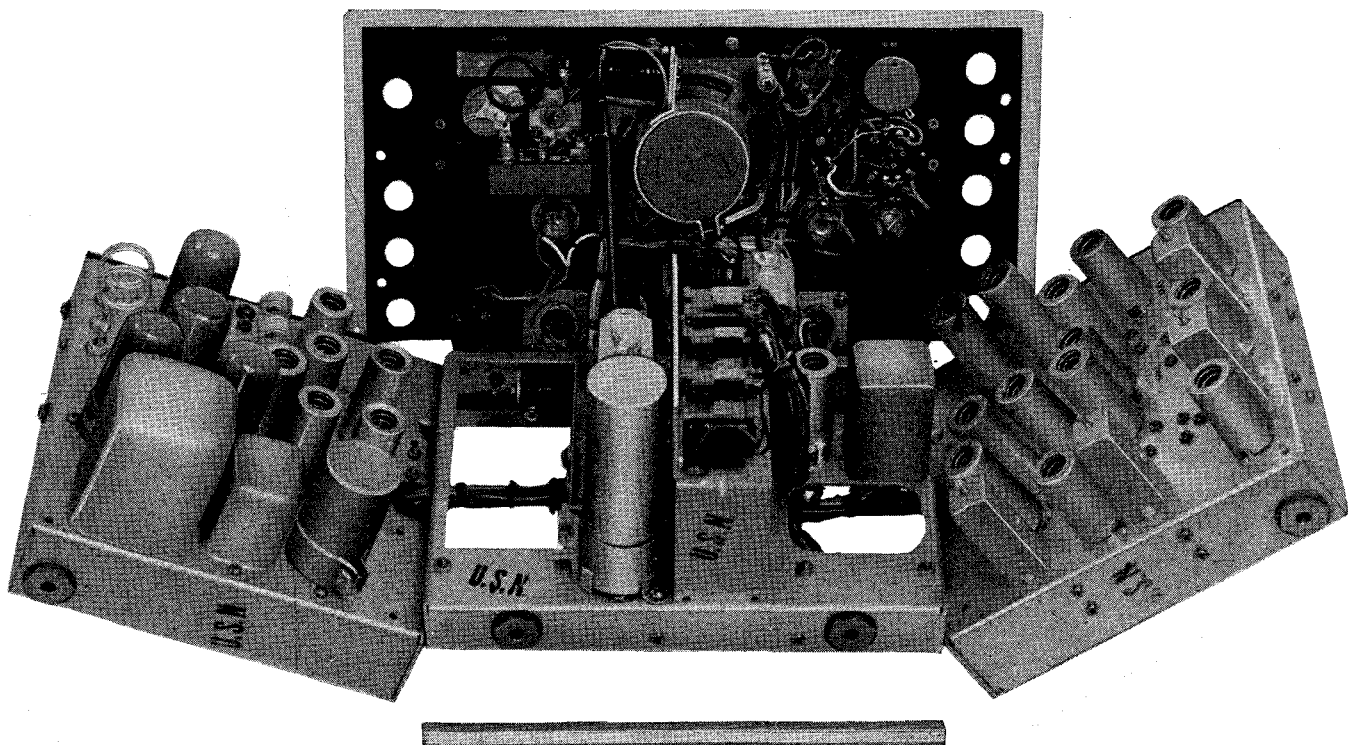


Figure 5-10—Navy Type COL-43065 Radio Transmitter-Receiver, Dismantled View

the contact leaf springs so that positive contact is made between normally open contacts when the armature is in position against the pole piece and so that positive contact is made between normally closed contacts when the relay is not operated. Use a relay spring adjusting tool for all adjustments.

3. REPLACEMENT OF COMPONENTS.

(Refer to figure 5-10.)

a. PANEL COMPONENTS.—To replace inaccessible components which are mounted on the front panel, remove the panel in the following manner:

(1) Remove the ANTENNA COUPLING adjustment screw.

(2) Remove the eight Phillips head bolts located around the edge of the front panel. Save all of the insulating spacer washers.

(3) Tilt the top of the panel forward. This will provide sufficient space for replacing the panel components.

(4) When assembling the panel to the chassis make certain that the insulating washers are in place so that the panel is not shorted to the chassis.

b. CHASSIS COMPONENTS.—To replace inaccessible components which are mounted on the receiver, transmitter or rectifier section, the chassis may be disassembled as shown in figure 5-10 and outlined in the following steps:

(1) Place the chassis on a bench with the panel facing upward.

(2) To loosen panel repeat steps (1), (2), (3) in the above paragraph.

(3) Press out the two rubber grommets around the wire cables which connect the transmitter and

receiver sections to the rectifier section. Press the rubber grommets into the rectifier section.

(4) Remove the bolts which fasten the transmitter and receiver sections to the rectifier section.

(5) To avoid strain and damage to the connecting cables, support the panel and chassis sections with both hands while turning the chassis to the normal position.

(6) Remove the spacer bar between the transmitter and receiver section.

(7) To avoid strain and damage to the connecting cables, use wood blocks to support the transmitter and receiver sections which will tilt outward as shown in figure 5-10.

(8) After repairs have been made and the chassis is reassembled, make certain that the wire cable grommets are in place and that the panel is not shorted to the chassis.

4. ALIGNMENT OF IF AMPLIFIER STAGES.

All possible causes of faulty operation should be investigated before attempting alignment. Proper alignment of the IF amplifier stages is extremely important for the proper operation of the receiver; however, alignment should not be attempted unless it is certain that the receiver is misaligned. The proper step by step procedure is given in the following paragraphs and should be followed whenever the receiver must be aligned. The location of each trimmer adjustment is shown in figure 5-11.

a. TEST EQUIPMENT REQUIRED.

- (1) Signal generator.—5.3 mc output.
- (2) Capacitor value .01 mf (approx).
- (3) Output Meter—0-10 v AC.

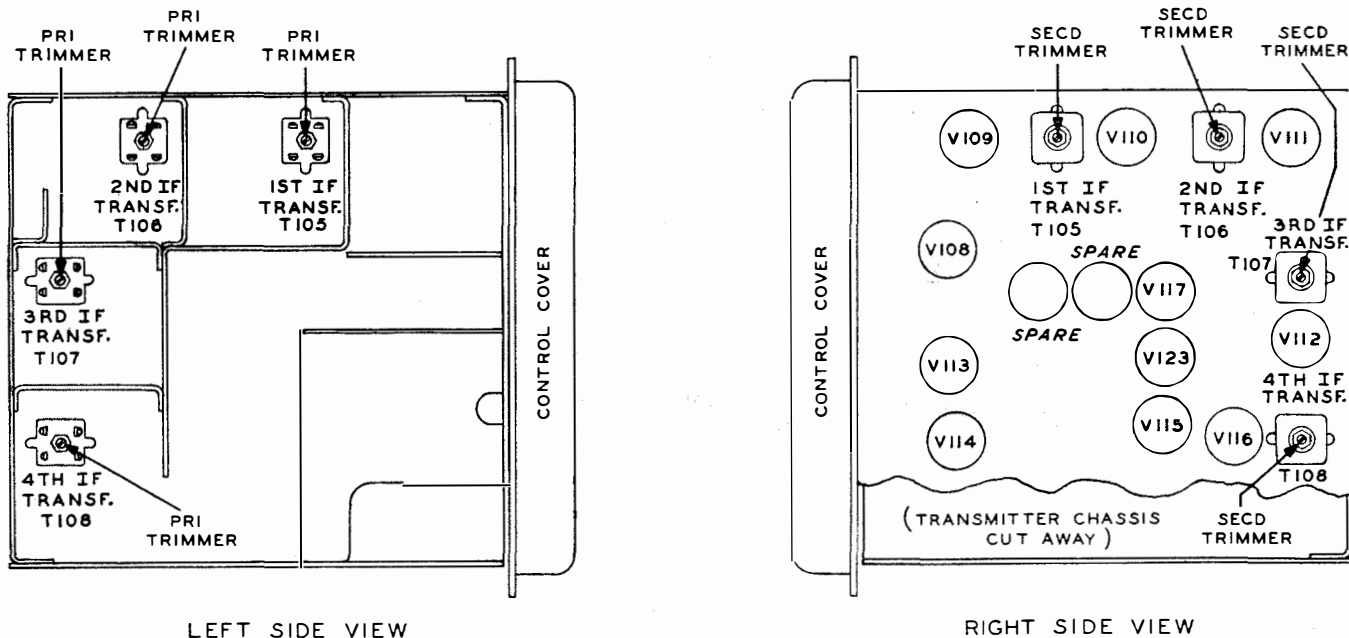


Figure 5-11—IF Transformer and Trimmer Locations

b. ALIGNMENT PROCEDURE.

(1) Connect the output meter across the terminals of the transducer, LS101, or to the pins of the external audio receptacle, J105.

(2) Adjust the signal generator to 5.3 mc.

(3) Feed the signal through a .01 mf capacitor to the grid of the first detector tube (terminal number 1 on socket X109), using a short connector, preferably shielded.

(4) Connect the signal generator ground lead to the receiver chassis.

(5) Unsolder the plate lead of the AVC tube, V115, (terminal number 7 on socket X115) to disable the AVC action.

(6) Operate the signal generator switch to the on position.

(7) Adjust the VOLUME control of the receiver to the maximum position.

(8) With the PRESS TO CUT SQUELCH switch depressed, adjust the signal generator output for a reading within the range of the output meter.

(9) Allow both the receiver and the signal generator to warm up several minutes before making any adjustments.

(10) Start with the fourth IF transformer and progress toward the first detector tube, referring to figure 5-11 for trimmer locations.

(11) While making adjustments, press the PRESS TO CUT SQUELCH switch to cut the squelch action of the squelch stage.

(12) Adjust each trimmer for a maximum indication on the output meter.

(13) Readjust the output of the signal generator, if it is necessary, for a reading within the range of the output meter.

(14) Reconnect the plate wire that was disconnected on the AVC tube socket.

The IF amplifier stages should now be properly aligned.

5. NEUTRALIZING THE RF POWER AMPLIFIER STAGE.

Exact neutralizing is important for the proper operation of the RF power amplifier stage. Make certain that neutralizing is necessary before disturbing the adjustment of the neutralizing capacitors. The transmitter has been properly neutralized at the factory but may require neutralizing if any components in the RF amplifier are replaced.

a. NEUTRALIZING CHECK. — To determine if the neutralizing is exact proceed as follows:

(1) Operate the PRESS TO TALK—RELEASE TO LISTEN switch to the PRESS TO TALK position.

(2) Insert the meter cord plug into the METER JACK.

(3) Operate the METER SWITCH to the number 9-10 position.

(4) Tune the RF power amplifier plate coil, L108, to resonance with the second multiplier output frequency, using transmitter tuning control number 9. (Tune for minimum meter reading). If the meter reading tends to be unstable when approaching the minimum point, the RF power amplifier should be neutralized.

b. NEUTRALIZING PROCEDURE.

(1) Unsolder the wire which furnishes power to the plates of the RF power amplifier tube at terminal number 6 on transformer T103.

(2) Operate the METER SWITCH to the number 6-7-8 position.

(3) Turn the transmitter-receiver on.

(4) Press the PRESS TO TALK—RELEASE TO LISTEN switch.

(5) Tune the plate tank coil, L108, through resonance with transmitter control number 9. If no variation of the meter reading is indicated, the neutralizing is exact.

Note

Care must be taken to avoid electric shock while neutralizing adjustments are being made with the transmitter-receiver turned on. To adjust the neutralizing capacitors, use a screwdriver made of an insulating material to minimize hand capacity effects and to avoid contact with high voltage.

(6) If a variation of the meter reading was indicated in step (5), adjust the two neutralizing capacitors, C178 and C179, together, step by step, keeping the spacing of the capacitors as nearly equal as possible.

(7) Tune the plate tank coil, L108, through resonance with transmitter tuning control number 9 while adjusting the neutralizing capacitors in small steps. The variation of the meter reading will become less and less as exact neutralization is approached. If the exact neutralization is passed the meter reading variation will become greater and greater.

(8) When the neutralizing is exact, resolder the wire which was disconnected in step (1).

(9) The adjustment of the neutralizing capacitors may have affected the tuning of the second multiplier stage. Retune second multiplier plate tank coil L103 with transmitter tuning control number 8.

TABLE 5-2 DC RESISTANCE OF INDUCTORS, REACTORS AND TRANSFORMERS

Symbol Designation	Name of Part	Winding	Measured Across Terminals	DC Resistance* in Ohms
T101	Transformer, Audio input coupling	Primary Secondary	1-2 3-4	0.1 1300
T102	Transformer, Audio driver output coupling	Primary Secondary	1-2 3-5	700 450
T103	Transformer, Audio output coupling	Primary Secondary	1-3 4-6	140 40
T105	Transformer, 1st IF	Primary Secondary	3-4 or blue-orange or plate—HV 1-2 or yellow-blank or grid-ground	0.4 0.4
T106	Transformer, 2nd IF	Primary Secondary	3-4 or blue-orange or plate—HV 1-2 or yellow-blank or grid ground	0.4 0.4
T107	Transformer, 3rd IF	Primary Secondary	3-4 or blue-orange or plate—HV 1-2 or yellow-blank or grid-ground	0.4 0.4
T108	Transformer, 4th IF	Primary Secondary	3-4 or blue-orange or plate—HV 1-2 or yellow-blank or grid-ground	0.4 0.4
T109	Transformer, External audio	Primary Secondary	1-2 3-4	0.2 18
K101	Relay, Transmit-receive			2000
K102	Relay, Polarity selecting			6500
K103	Relay, Polarity selecting			6500
K104	Relay, Antenna connecting			3250
L101	Inductor, Transmitter oscillator plate tank			0
L102	Inductor, Transmitter 1st multiplier plate tank			0
L103	Inductor, Transmitter 2nd multiplier plate tank			0
L104	Transmitter 2nd multiplier RF Choke			0.3
L105	RF power amplifier grid RF Choke			0.3
L106	RF power amplifier grid RF Choke			0.3
L107	RF power amplifier plate RF Choke			0.3
L108	Inductor, RF power amplifier plate tank			0
L109	Inductor, Transmitter antenna coupling			0
L111	Inductor, Receiver RF amplifier grid			0
L113	Inductor, Receiver, multiplier plate tank			0
L114	Inductor, Receiver oscillator plate tank			0
L115	Reactor, HV filter		1-2	80
L116	Reactor, HV filter		1-2	47
L118	Inductor, Receiver RF amplifier plate tank			0
L119	Inductor, 1st detector grid tank			0
L120-L125	Filament filter choke			0.7
L126	2nd IF amplifier grid choke			0
L129	Transmitter 2nd multiplier grid choke			0.7
L130	Reactor, Primary power		1-2	1400
LS101	Transducer	Voice Coil		0.2

*Measured with componets connected in transmit er-receiver circuit.

TABLE 5-3 TRANSFORMER AND REACTOR WINDING DATA

Symbol Designation	Collins Part No.	Winding	Terminal Numbers	Wire Size	No. Of Turns	Turns Per Layer	DC Resistance at 25 °C (hms)	Volts Test
T101	677 0021 00	Primary Secondary	# 1 and 2 # 3 and 4	# 23E # 42F	30 5000	———— ————	0.1 1200.0	500
T102	677 0017 00	Primary Secondary	# 1 and 2 # 3, 4 and 5	# 40E # 39E	3021 2006*	160 144	745.5 475.5	1500 1500
T103	677 0023 00	Primary Secd # 1a *** Secd # 1b	# 1, 2 and 3 # 4 and 5 # 5 and 6	# 36E # 20E # 32E	930** 34 591	116-½ 17 74	143.0 0.114 40.7	2000 2000 2000
T109	677 0038 00	Primary Secondary	# 1 and 2 # 3 and 4	# 31E # 32E	250 570		3.67 18.4	500 500
L115	678 0019 00		# 1 and 2	# 32E	1436	76	76.5	1500
L116	678 0018 00		# 1 and 2	# 31E	1073	67-½	45.27	1500
L113	678 0020 00		# 1 and 2	# 39E	6520	142	1582.0	1500

* Tap at turn #1003 (Terminal #4).

** Tap at turn #465 (Terminal #2).

*** Secondaries # 1a and # 1b are in series.

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TABLE 6-1 LIST OF MAJOR UNITS

Navy Type Designation	Name of Major Unit	Symbol Group Or Unit Number	Assembly Drawing
COL-43065	Radio Transmitter-Receiver	100	
COL-10406	Accessory Case	—	
COL-10479	Mounting Base	—	502 3686 004
	Handset and Cord	200	977 0005 00
	Tuning Meter	300	458 0016 00
	Coaxial Cable (25')	400	
	Coaxial Cable (50')	500	502 1447 003
	Antenna	600	
	Power Cord	700	502 1446 002

**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
CAPACITORS								
C101	Capacitor, Xmtr osc feedback	Ceramic, 2mmf $\pm 1/2$ mmf 1000 TV	CC20U-K020D	JAN-C-20	700			916 0002 00 or 916 4200 00
C102	Capacitor, Xmtr osc output coupling	Ceramic, 51 mmf $\pm 10\%$ 1000 TV	CC20U-K-510K	JAN-C-20	700			916 0011 00 or 916 4295 00
C103	Capacitor, Xmtr osc plate tank tuning	Variable, single sect 35 mmf		AN-QQ-S-91	2140			922 0012 00
C104	Capacitor, Xmtr osc grid	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C105	Capacitor, RF power amplr cathode by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B-20	JAN-C-5	4030			909 0005 00
C106	Capacitor, Xmtr 1st mult plate tank tuning	Variable, single sect, 25 mmf		AN-QQ-S-91	2140			922 0009 00
C107	Capacitor, Xmtr 1st mult plate tank	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C108	Capacitor, Xmtr 1st mult output coupling	Ceramic, 51 mmf $\pm 10\%$ 1000 TV	CC20U-K510K	JAN-C-20	700			916 0011 00 or 916 4295 00
C110	Capacitor, Xmtr 2nd mult plate tuning	Variable, dual sect 15.0 mmf per sect	-483379	AN-QQ-P-421	44210	AP-11L-6		922 0010 00
C111	Capacitor, Xmtr 2nd mult output coupling	Ceramic, 10 mmf ± 1 mmf 1000 TV	CC20U-K100F	JAN-C-20	700			916 0006 00 or 916 4232 00
C112	Capacitor, Xmtr 2nd mult output coupling	Ceramic, 10 mmf ± 1 mmf 1000 TV	CC20U-K100F	JAN-C-20	700			916 0006 00 or 916 4232 00
C113	Capacitor, RF power amplr screen by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-20	4030			909 0005 00
C114	Capacitor, RF power amplr plate tank tuning	Variable, dual sect Max 28.5 mmf Min 5.0 mmf	-483380	AN-QQ-P-421	44210	AP-12L-6		922 0011 00
C115	Capacitor, RF power amplr plate tank by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C116	Capacitor, AF amplr cathode by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
*C117	Capacitor, AF driver plate	Mica, 10,000 mmf $\pm 20\%$ 600 TV	CM35B-103M	JAN-C-5	911			935 2118 00
C118	Capacitor, AF power amplr screen by-pass	Dry Electrolytic, 20 mf -90% $+250\%$ 150 WV	CE63B-200J	JAN-C-62	911			184 6509 00
C119	Capacitor, AF amplr output coupling	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C120	C120A, C120B, C120C	Dry Electrolytic, triple sect 20 mf/sect -90% $+250\%$ 25 WV	-483356	JAN-C-62	30			183 1001 00
C120A	Capacitor, AF driver cathode by-pass	20 mf, Section of C120						
C120B	Capacitor, AF power amplr cathode by-pass	20 mf, Section of C120						
C120C	Capacitor, Microphone voltage filtering	20 mf, Section of C120						

* Applies only to equipments with Navy Serial No. 1 to 479.

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**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
CAPACITORS (Cont.)								
C121	Capacitor, Rec audio output coupling	Paper, .25 mf +40% -15% 400 WV	CP50B1F F254X	JAN-C-25	911			961 4014 00 or 961 4023 00
C122	C122A, C122B, C122C	Paper, triple sect, .1 mf/sect +40% -15% 400 WV	CP51B5F E104X	JAN-C-25	911	DYRT		961 5050 00
C122A	Capacitor, AF amplr grid by-pass	.1 mf, Section of C122						
C122B	Capacitor, Audio amplr plate decoupler	.1 mf, Section of C122						
C122C	Capacitor, Audio amplr plate decoupler	.1 mf, Section of C122						
C123	Capacitor, Rec RF amplr grid tuning	Variable, single sect 25 mmf		AN-QQ-S-91	2140			922 0009 00 or 922 0013 00
C124	Capacitor, Rec RF amplr cathode coupling	Mica, .002 mf ±20% 600 TV	-483703- B20	JAN-C-5	4030			909 0005 00
C125	C125A, C125B	Silver Mica, dual sect, 500 mmf/sect ±20% 1300 TV	-483382	71-2202a	700	837		912 0004 00
C125A	Capacitor, Rec RF amplr cathode by-pass	500 mmf, Section of C125						
C125B	Capacitor, Rec RF amplr cathode by-pass	500 mmf, Section of C125						
C126	Capacitor, Rec RF amplr plate tank tuning	Variable, single sect, 25 mmf		AN-QQ-S-91	2140			922 0009 00 or 922 0013 00
C127	Capacitor, Rec RF amplr plate tank	Mica, .002 mf ±20% 600 TV	-483703- B20	JAN-C-5	4030			909 0005 00
C128	Capacitor, 1st detector grid tuning	Variable, single sect, 25 mmf		AN-QQ-S-91	2140			922 0009 00
C129	Capacitor, 1st detector cathode by-pass	Mica, .002 mf ±20% 600 TV	-483703- B20	JAN-C-5	4030			909 0005 00
C130	Capacitor, 1st IF amplr grid decoupling	Mica, .002 mf ±20% 600 TV	-483703- B20	JAN-C-5	4030			909 0005 00
C131	Capacitor, 1st IF amplr cathode by-pass	Mica, .01 mf ±20% 1000 TV	-48848	JAN-C-5				935 5009 00
C132	Capacitor, 2nd IF amplr grid decoupling	Mica, .002 mf ±20% 600 TV	-483703- B20	JAN-C-5	4030			909 0005 00
C133	Capacitor, 2nd IF amplr cathode by-pass	Mica, .01 mf ±20% 1000 TV	-48848	JAN-C-5				935 5009 00
C134	Capacitor, 3rd IF amplr cathode by-pass	Mica, .01 mf ±20% 1000 TV	-48848	JAN-C-5				935 5009 00
C135	Capacitor, AVC voltage coupling	Ceramic, 10 mmf ±1 mmf 1000 TV	CC20U- K100F	JAN-C-20	700			916 0006 00 or 916 4232 00
C136	Capacitor, AVC control tube cathode coupling	Mica, .01 mf ±20% 1000 TV	-48848	JAN-C-5				935 5009 00
C137	Capacitor, Audio voltage coupling	Mica, .01 mf ±20% 1000 TV	-48848	JAN-C-5				935 5009 00
C138	Capacitor, 1st detector grid tank	Mica, .002 mf ±20% 600 TV	-483703- B20	JAN-C-5	4030			909 0005 00

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**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
CAPACITORS (Cont.)								
C139	Capacitor, Rec RF amplr HV filter	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C140	Capacitor, Rec mult plate tank by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C141	Capacitor, Rec osc plate tank by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C142	Capacitor, 2nd detector output coupling	Mica, .01 mf $\pm 20\%$ 1000 TV	-48848	JAN-C-5				935 5009 00
C143	C143A, C143B, C143C	Paper, triple section .1 mf/sect +40 -15% 400 WV .1 mf, Section of C143	CP51B5F E104X	JAN-C-25	911	DYRT		961 5050 00
C143A	Capacitor, Noise limiter cathode resistor by-pass	.1 mf, Section of C143						
C143B	Capacitor, AVC voltage filter	.1 mf, Section of C143						
C143C	Capacitor, Rec HV by-pass	.1 mf, Section of C143						
C144	Capacitor, Xmtr 1st mult plate tank by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C145	Capacitor, Xmtr 2nd mult plate tank by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C146	Capacitor, Rec mult plate tank	Mica, .002 mf $\pm 2\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C147	Capacitor, Rec mult grid coupling	Ceramic, 51 mmf $\pm 10\%$ 1000 TV	CC200K 510K	JAN-C-20	700			916 0011 00 or 916 4295 00
C148	Capacitor, Rec osc plate tank	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C149	Capacitor, Rec osc plate tank tuning	Variable, single sect 35 mmf		AN-QQ-S-91	2140			922 0012 00 or 922 0014 00
C150	Capacitor, AVC control tube cathode by-pass	Ceramic, 100 mmf $\pm 20\%$ 1000 TV	CC30UJ- 101M	JAN-C-20	30			916 4061 00
C151	C151A, C151B, C151C	Dry Electrolytic, triple sect, 80, 40 & 40 mf -90% +250%, 250WV	-483355	JAN-C-62	30			184 9000 00
C151A	Capacitor, Rect output filter	80 mf, Section of C151						
C151B	Capacitor, Rect output filter	40 mf, Section of C151						
C151C	Capacitor, Rect output filter	40 mf, Section of C151						
C152	Capacitor, 1st detector screen voltage filter	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C153	Capacitor, 1st IF amplr screen voltage filter	Mica, .01 mf $\pm 20\%$ 1000 TV	-48848	JAN-C-5				935 5009 00
C154	Capacitor, 2nd IF amplr screen voltage filter	Mica, .01 mf $\pm 20\%$ 1000 TV	-48848	JAN-C-5				935 5009 00
C155	Capacitor, 3rd IF amplr screen voltage filter	Mica, .01 mf $\pm 20\%$ 1000 TV	-48848	JAN-C-5				935 5009 00

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**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
CAPACITORS (Cont.)								
C156	C156A, C156B	Silver mica, dual sect, 500 mmf/sect $\pm 20\%$ 1300 TV	-483382	71-2202a	700	837		912 0004 00
C156A	Capacitor, Filament by-pass	500 mmf, Section of C156						
C156B	Capacitor, Filament by-pass	500 mmf, Section of C156						
*C157	Capacitor, Power input lead by-pass	Mica, .001 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C158	Capacitor, Filament by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C159	Capacitor, Filament by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C160	Capacitor, Filament by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C161	Capacitor, Filament by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C162	Capacitor, Filament by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C163	Capacitor, Filament by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C164	Capacitor, Filament by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C165	Capacitor, Filament by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C166	Capacitor, Rec mult plate tank tuning	Variable, single sect, 25 mmf		AN-QQ-S-91	2140			922 0009 00
C167	Capacitor, Ant Conn by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C168	Capacitor, Rec ant coupling	Tubular Ceramic, 100 mmf, $\pm 20\%$ 1000 TV	CC30U-J101M	JAN-C-20	30			916 4061 00
C169	Capacitor, AF power amplr grid	Mica, .01 mf $\pm 20\%$ 1000 TV	-48848	JAN-C-5	911			935 5009 00
C170	Capacitor, 1st detector screen decoupling	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C171	Capacitor, 1st IF amplr screen decoupling	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C172	Capacitor, 2nd IF amplr screen decoupling	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C173	Capacitor, 3rd IF amplr screen decoupling	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C174	Capacitor, Filament by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
*C175	Capacitor, Power input lead by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00

* Applies only to equipments with Navy Serial No. 1537 to 2126.

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**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
CAPACITORS (Cont.)								
C176	Capacitor, RF power amplr loading	Ceramic, variable, Min cap: less than 10 mmf ,Max cap: greater than 100 mmf 1000 TV	-483377	AN-QQ-S-91	700	823BN		917 1003 00
*C177	Capacitor, Meter by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C178	Capacitor, RF Power amplr neutralization	Ceramic, variable, .25 mmf Min; 1.5 mmf Max; 1000 TV	-483376	JAN-I-10	700	830		917 1002 00
C179	Capacitor, RF power amplr neutralization	Ceramic, variable, .25 mmf Min; 1.5 mmf Max; 1000 TV	-483376	JAN-I-10	700	830		917 1002 00
*C180	Capacitor, Meter by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C181	Capacitor, Rec RF amplr screen decoupling	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C183	Capacitor, Xmtr 2nd mult grid coupling	Ceramic, 2 mmf $\pm \frac{1}{2}$ mmf 1000 TV	CC20U-K020D	JAN-C-20	700			916 0002 00
C185	Capacitor, RF power amplr grid by-pass	Ceramic, 51 mmf $\pm 10\%$ 1000 TV	CC20U-K510K	JAN-C-20	700			916 0011 00 or 916 4295 00
C186	Capacitor, 2nd detector cathode by-pass	Capacitor, Mica .01 $\pm 20\%$ 1000 TV	-48848	JAN-C-5	911			935 5009 00
C187	Capacitor, RF power amplr HV filter	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C188	Capacitor, Xmtr 2nd mult grid by-pass	Mica, .002 mf $\pm 20\%$ 600 TV	-483703-B20	JAN-C-5	4030			909 0005 00
C189	Capacitor, Rec RF amplr grid tank	Tubular ceramic, 15 mmf, $\pm 10\%$ 1000 TV	CC30LH-150K	JAN-C-20				916 4048 00
C190	Capacitor, Rec RF amplr plate tank	Tubular ceramic, 15 mmf, $\pm 10\%$ 1000 TV	CC30LH-150K	JAN-C-20				916 4048 00
C191	Capacitor, 1st detector grid tank	Tubular ceramic, 10 mmf, ± 1 mmf 1000 TV	CC30LH-100F	JAN-C-20				916 4041 00
C192	Capacitor, Rec osc plate tank	Tubular ceramic, 10 mmf, ± 1 mmf 1000 TV	CC30LH-100F	JAN-C-20				916 4041 00
C193	Capacitor, Xmtr osc plate tank	Tubular ceramic, 12 mmf $\pm 10\%$ 1000 TV	CC30LH-120K	JAN-C-20				916 4044 00
C194	Capacitor, AF amplr grid	Mica, .01 mf $\pm 20\%$ 1000 TV	-48848	JAN-C-5	911			935 5009 00
C195	Capacitor, Rec osc cathode by-pass	Mica, 500 mmf $\pm 20\%$ 500 TV	-483357		700	B-831		912 0009 00
C196	Capacitor, Rec exciter HV voltage filter	Mica, 500 mmf $\pm 20\%$ 500 TV	-483357		700	B-831		912 0009 00
C197	Capacitor, Filament by-pass	Mica, 500 mmf $\pm 20\%$ 500 TV	-483357		700	B-831		912 0009 00
C198	Capacitor, Filament by-pass	Mica, 500 mmf $\pm 20\%$ 500 TV	-483357		700	B-831		912 0009 00
C199	Capacitor, Rec exciter output coupling	Ceramic, 2 mmf, $\pm \frac{1}{2}$ mmf 1000 TV	CC20U-K020D	JAN-C-20	700			916 0002 00 or 916 4200 00

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* Applies only to equipments with Navy Serial No. 1537 to 2126.

Section 6

**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
MISCELLANEOUS ELECTRICAL PARTS								
E101	Thermocouple for tuning meter	Thermocouple, RF 0-0.5 amp for use with 0-2 ma meter	-40215	C39.4-1943	4197			457 0003 00
E102	Coil Support	Terminal, ceramic, bushing with soldering lug		AN-QQ-P-421	39562	502		190 1103 00
E103	Coil Support	Terminal, ceramic, bushing with special soldering lug		AN-QQ-P-421	39562			190 1104 00
E104	Insulator, Standoff	Standoff, ceramic, cylindrical 1/4" x 5/8"		JAN-I-10	700			190 1105 00
E105	Coil Winding Form for L101, L102, L114	Coil Form, ceramic, 3/8" diam x 1-1/4" long		JAN-I-10	700			190 1106 00
E106	Coil Winding Form for L111, L112, L113	Coil Form, ceramic, 3/8" diam x 1-3/8" long		JAN-I-10	700			190 1107 00
E107	Coil Winding Form for L118 and L119	Coil Form, ceramic, 3/8" diam x 2-1/4" long		JAN-I-10				190 1108 00
E108	Insulator, Bushing	Bushing, ceramic, with reverse eyelet		JAN-I-10	39562	502		190 1102 00
E109	Insulator, Antenna coupling coil support	Mycalex Strip			830			502 1417 002
E110	Insulator, R109 support	Standoff, Isolantite, cylindrical 3/8" x 1/2"			2410	395-L1 1/2		190 2329 00
E601	Radiator, (or Receptor) for transmitter-receiver	Antenna, coaxial, portable, freq range 60-80 MC	-66156					013 0002 00
FUSE								
F101	Fuse, Primary power	Cartridge, 3 amp 250 v			2920	1043		264 4080 00
PILOT LAMPS								
I101	Pilot lamp, Carrier on indicator	Pilot lamp, Neon 1/25 w 105-125 v external resistance			1880	NE-51		262 0021 00
I102	Pilot lamp, Primary power indicator	Pilot lamp, Neon 1/25 w 105-125 v external resistance			1880	NE-51		262 0021 00
JACKS AND RECEPTACLES								
J101	Handset connector plug receptacle	Mic, 5 term box mtg socket, type RB size 14		AN-9534	630			357 2000 00
J102	Tuning meter connector plug receptacle	Metering jack, 3 conductor for 3/16" barrel plug		AN-QQ-S-91	3240			358 1100 00

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**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
JACKS AND RECEPTACLES (Cont.)								
J103	Antenna transmission line connector	Antenna w/ll mtg socket for coax cable		RE 49F 188				357 9003 00
J104	Primary power connector plug receptacle	Box mtg, pin insert, 2 conductor, 200 v 10 amp		AN-W-C-591	630			357 3001 00
J105	Auxiliary speaker connector	Box mtg, socket insert, 2 conductor, 200 v 5 amp		AN-W-C-591	630			357 2001 00
J106	Fuse receptacle	Holder, bakelite, for cartridge fuse 1-1/4" x 1/4"			530	HKM		265 1003 00
RELAYS								
K101	Relay, Transmit-Receive	Circuit control 4 common 4 PDT coil 115 v DC	-29755	AN-QQ-S-91	284	Desig. on Part		972 1003 00
K102	Relay, Polarity selecting	Circuit control 2 common DPDT coil 115 v DC	-29754	AN-QQ-S-91	284	Desig. on Part		972 1002 00
K103	Relay, Polarity selecting	Circuit Control 2 common DPDT coil 115 v DC	-29754	AN-QQ-S-91	284	Desig. on Part		972 1002 00
K104	Relay, Antenna connecting	Circuit control SPDT coil 115 v DC	-29756	AN-QQ-S-91	284	Desig. on Part		972 1004 00
INDUCTORS AND REACTORS								
L101	Inductor, Xmtr osc plate tank	Xmtr osc plate 25 turns of #24 E wire on a ceramic form 3/8" x 1-1/4"			830			502 1352 002
L102	Inductor, Xmtr 1st mult plate tank	Double 12 turns of #21 E wire ceramic form 3/8" x 1-1/4"			830			502 1351 002
L103	Inductor, Xmtr 2nd mult plate tank	Driver, 10 turns of #12 wire, Silver plated, spaced wound, center tapped 1/2" diam			830			502 1350 002
L104	Xmtr 2nd mult HV RF choke	Inductor, 2.7 μh 300 ma 45 turns of #30 S.C.C. E		AN-QQ-S-91	4230			240 0012 00
*L104	Xmtr 2nd mult HV RF Choke	Inductor, 3.8 μh 300 ma 30 turns of H30E		AN-QQ-S-91	4230			240 0032 00
L105	RF power amplr grid RF choke	Inductor, 2.7 μh 300 ma 45 turns of #30 S.C.C. E		AN-QQ-S-91	4230			240 0012 00
*L105	RF Power amplr grid RF Choke	Inductor, 3.8 μh 300 ma 30 turns of #30E		AN-QQ-S-91	4230			240 0032 00
L106	RF power amplr grid RF choke	Inductor, 2.7 μh 300 ma 45 turns of #30 S.C.C. E		AN-QQ-S-91	4230			240 0012 00
*L106	RF Power amplr grid RF Choke	Inductor, 3.8 μh 300 ma 30 turns of #30E		AN-QQ-S-91	4230			240 0032 00
L107	RF power amplr plate RF choke	Inductor, 2.7 μh 300 ma 45 turns of #30 S.C.C. E		AN-QQ-S-91	4230			240 0012 00
*L107	RF Power amplr plate RF Choke	Inductor, 3.8 μh 300 ma 30 turns #30E		AN-QQ-S-91	4230			240 0032 00

* Applies only to equipments with Navy Serial No. 480 to 2126.

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**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
INDUCTORS AND REACTORS (Cont.)								
L108	Inductor, RF power amplr plate tank	Final tank, 4 turns spaced wound #12 wire silver plated			830			502 1346 002
L109	Inductor, Xmtr antenna coupling	Antenna coupler 1 turn #12 wire silver plated			830			502 1443 002
L111	Inductor, Rec RF amplr grid	7 turns #18E wire on form 3/8" x 1-3/8"			830			502 1347 002
L113	Inductor, Rec mult Plate tank	6 turns #18 E wire on form 3/8" x 1-3/8"			830			502 1348 002
L114	Inductor, Rec osc plate tank	Rec osc plate 25 turns of #24 E wire on a ceramic form 3/8" x 1-1/4"			830			502 1345 002
L115	Reactor, HV filter	0-60 cps 3 hy 60 ma 1500 TV	-302714	RE 13A 553B	4632	9B		678 0019 00
L116	Reactor, HV filter	0-60 cps 1.5 hy 100 ma 1500 TV	-302713	RE 13A 553B	4632	9B		678 0018 00
L118	Inductor, Rec RF amplr plate tank	7 turns #18 E wire (L118, L119 on one form)			830			502 1349 002
L119	Inductor, 1st detector grid tank	Wound on same form as L118. Part No. 502 1349 002 applies to inductors L118 & L119 on one form						
L120	Filament supply filter choke	9.8 μh 300 ma 80 turns #30 wire		AN-QQ-S-91	4230			240 0011 00
*L120	Filament supply filter choke	3.8 μh 300 ma 30 turns of #30E		AN-QQ-S-91	4230			240 0032 00
L121	Filament supply filter choke	9.8 μh 300 ma 80 turns #30 wire		AN-QQ-S-91	4230			240 0011 00
*L121	Filament supply filter choke	3.8 μh 300 ma 30 turns of #30E		AN-QQ-S-91	4230			240 0032 00
L122	Filament supply filter choke	9.8 μh 300 ma 80 turns #30 wire		AN-QQ-S-91	4230			240 0011 00
*L122	Filament supply filter choke	13.0 μh 300 ma 55 turns of #30E		AN-QQ-S-91	4230			240 0031 00
L123	Filament supply filter choke	9.8 μh 300 ma 80 turns #30 wire		AN-QQ-S-91	4230			240 0011 00
*L123	Filament supply filter choke	13.0 μh 300 ma 55 turns of #30E		AN-QQ-S-91	4230			240 0031 00
L124	Filament supply filter choke	2.7 μh 300 ma 45 turns of #30 S.C.C. E		AN-QQ-S-91	4230			240 0012 00
*L124	Filament supply filter choke	13.0 μh 300 ma 55 turns of #30E		AN-QQ-S-91	4230			240 0031 00
L125	Filament supply filter choke	2.7 μh 300 ma 45 turns of #30 S.C.C. E		AN-QQ-S-91	4230			240 0012 00
*L125	Filament supply filter choke	13.0 μh 300 ma 55 turns of #30E		AN-QQ-S-91	4230			240 0031 00
L126	2nd IF amplr grid	5 turns #20 wire			830			502 3751 002
**L127	Meter lead choke	3.8 μh 300 ma 30 turns #30E		AN-QQ-S-91	4230			240 0032 00

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* Applies only to equipments with Navy Serial No. 480 to 2126.

** Applies only to equipments with Navy Serial No. 1 to 479.

**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spel. Tol. or Mod.	Contractor's Drawing and Part Number
INDUCTORS AND REACTORS (Cont.)								
*L127	Meter lead choke	2.7 μ h 300 ma 45 turns of #30 S. C. C. E.		JAN-P-14	4230			240 0012 00
L129	Xmtr 2nd mult grid choke	34 μ h 100 ma 140 turns #35 wire		AN-QQ-S-91	4230			240 0010 00
*L129	Xmtr 2nd mult grid choke	40 μ h 100 ma 85 turns of #35		AN-QQ-S-91	4230			240 0030 00
L130	Reactor, Primary power	0-60 cps 15 hy 60 ma 1500 TV	-302715	RE 13A 553B	4632	9B		678 0020 00
LOUDSPEAKER								
LS101	Transducer	3'' permanent magnet speaker. Voice coil 3.4 ohm \pm 10%			3498	30YM4		271 0001 00
RESISTORS								
R101	Resistor, Xmtr osc grid	4700 ohm \pm 10% $\frac{1}{2}$ w	RC20BF-472K	JAN-R-11	2360			745 1114 00
R102	Resistor, Xmtr 1st mult grid	22,000 ohm \pm 10% $\frac{1}{2}$ w	RC20BF-223K	JAN-R-11	2360			745 1142 00
R103	Resistor, Xmtr 2nd mult grid	10,000 ohm \pm 10% $\frac{1}{2}$ w	RC20BF-103K	JAN-R-11	2360			745 1128 00
R104	Resistor, RF power amplr grid	3300 ohm \pm 10% $\frac{1}{2}$ w	RC20BF-332K	JAN-R-11	2360			745 1107 00
R105	Resistor, RF power amplr grid metering	2.4 ohm \pm 5% $\frac{1}{2}$ w	-632502-2R4	JAN-R-11	2360	BW $\frac{1}{2}$		707 0074 00
R106	Resistor, RF power amplr screen	10,000 ohm \pm 10% 1 w	RC30BF-103K	JAN-R-11	2360			745 3128 00
R107	Resistor, Rec audio output limiting	8200 ohm \pm 10% 1 w	RC30BF-822K	JAN-R-11	2360			745 3125 00
**R108	Resistor, Microphone current limiting	1.0 ohm \pm 5% $\frac{1}{2}$ w	-632502-1R0	JAN-R-11	2360			707 0047 00
R108	Resistor, Microphone current limiting	2.4 ohm \pm 5% $\frac{1}{2}$ w	-632502-2R4	JAN-R-11	2360			707 0074 00
**R109	Resistor, Rec detector output coupling	470,000 ohm \pm 10% 1 w	RC20BF-474K	JAN-R-11	2360			745 1198 00
R109	Resistor, Rec detector output coupling	270,000 ohm \pm 10% 1 w	RC20BF-274K	JAN-R-11	2360			745 1188 00
R110	Resistor, AF amplr grid (VOLUME)	500,000 ohm Potentiometer with DPST switch	-633847	AN-QQ-S-91	700	Midget Series 3		380 0001 00
**R111	Resistor, AF amplr cathode	2200 \pm 10% $\frac{1}{2}$ w	RC20BF-222K	JAN-R-11	2360			745 1100 00
R111	Resistor, AF amplr cathode	4700 ohm \pm 10% $\frac{1}{2}$ w	RC20BF-472K	JAN-R-11	2360			745 1114 00

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* Applies only to equipments with Navy Serial No. 480 to 2126.

** Applies only to equipments with Navy Serial No. 1 to 479.

**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
RESISTORS (Cont.)								
R112	Resistor, AF amplr plate	100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-104K	JAN-R-11	2360			745 1170 00
R113	Resistor, AF power amplr cathode	220 ohm $\pm 10\%$ 1 w	RC30BF-221K	JAN-R-11	90			745 3058 00
R114	Resistor, AF driver cathode	680 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-681K	JAN-R-11	2360			745 1079 00
R115	Resistor, AF power amplr screen	8200 ohm $\pm 10\%$ 1 w	RC30BF-822K	JAN-R-11	2360			745 3125 00
*R116	Resistor, Audio limiting	18,000 ohms $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-183K	JAN-R-11	2360			745 1139 00
R117	Resistor, Rec RF amplr grid	470,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-474K	JAN-R-11	2360			745 1198 00
R118	Resistor, Rec RF amplr cathode	680 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-681K	JAN-R-11	2360			745 1079 00
R119	Resistor, Rec RF amplr HV dropping	100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-104K	JAN-R-11	2360			745 1170 00
R120	Resistor, 1st detector cathode	680 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-681K	JAN-R-11	2360			745 1079 00
R121	Resistor, 1st detector HV dropping	2200 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-222K	JAN-R-11	2360			745 1100 00
R122	Resistor, 1st IF amplr grid	470,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-474K	JAN-R-11	2360			745 1198 00
R123	Resistor, 1st IF amplr cathode	470 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-471K	JAN-R-11	2360			745 1072 00
R124	Resistor, 1st IF amplr HV dropping	2200 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-222K	JAN-R-11	2360			745 1100 00
R125	Resistor, 2nd IF amplr grid	470,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-474K	JAN-R-11	2360			745 1198 00
R126	Resistor, 2nd IF amplr cathode	470 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-471K	JAN-R-11	2360			745 1072 00
R127	Resistor, 2nd IF amplr plate	2200 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-222K	JAN-R-11	2360			745 1100 00
R128	Resistor, 3rd IF amplr cathode	470 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-471K	JAN-R-11	2360			745 1072 00
R129	Resistor, 3rd IF amplr plate	2200 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-222K	JAN-R-11	2360			745 1100 00
R130	Resistor, Noise limiter plate coupling	100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-104K	JAN-R-11	2360			745 1170 00
R131	Resistor, Noise limiter cathode coupling	470,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-474K	JAN-R-11	2360			745 1198 00
R132	Resistor, 2nd detector load	470,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-474K	JAN-R-11	2360			745 1198 00
R133	Resistor, Noise limiter voltage dividing	22,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-223K	JAN-R-11	2360			745 1142 00
R134	Resistor, Noise limiter voltage dividing	100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-104K	JAN-R-11	2360			745 1170 00

* Applies only to equipments with Navy Serial No. 480 to 2126.

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**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
RESISTORS (Cont.)								
R135	Resistor, 2nd detector cathode	4700 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-472K	JAN-R-11	2360			745 1114 00
R136	Resistor, HV dropping	100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-104K	JAN-R-11	2360			745 1170 00
R137	Resistor, RF amplr screen	10,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-103K	JAN-R-11	2360			745 1128 00
R138	Resistor, AF amplr cathode	10,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-103K	JAN-R-11	2360			745 1128 00
R139	Resistor, Microphone voltage dividing	47,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-473K	JAN-R-11	2360			745 1156 00
R140	Resistor, Filament voltage dropping	800 ohm $\pm 5\%$ 16 w	RW32D-801	JAN-R-26				747 1086 00 or 747 1133 00
R141	Resistor, Filament voltage dropping	3400 ohm $\pm 5\%$ 8 w	-633831	JAN-R-26				747 9005 00
*R142	Resistor, Microphone current limiting	1.0 ohm $\pm 5\%$ $\frac{1}{2}$ w	-632502-1R0	JAN-R-11	2360			707 0047 00
R142	Resistor, Microphone Current Limiting	2.4 ohm $\pm 5\%$ $\frac{1}{2}$ w	-632502-2R4	JAN-R-11	2360			707 0074 00
R144	Resistor, Rec osc cathode	2.4 ohm $\pm 5\%$ $\frac{1}{2}$ w	-632502-2R4	JAN-R-11	2360	BW $\frac{1}{2}$		707 0074 00
R145	Resistor, Squelch sensitivity adjustment	5000 ohm Potentiometer	-633848	AN-QQ-S-91	700			380 0002 00
R146	Resistor, AVC voltage filtering	470,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-474K	JAN-R-11	2360			745 1198 00
R148	Resistor, AVC control tube grid	1 megohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-105K	JAN-R-11	2360			745 1212 00
R149	Resistor, Rec osc grid	100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-104K	JAN-R-11	2360			745 1170 00
R150	Resistor, Rec mult grid	100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-104K	JAN-R-11	2360			745 1170 00
R151	Resistor, Rec plate HV voltage dropping	2200 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-222K	JAN-R-11	2360			745 1100 00
R152	Resistor, RF power amplr cathode voltage metering	.24 ohm $\pm 5\%$ 1000 TV $\frac{1}{2}$ w	-632502-0R24	JAN-R-11	2360	BW $\frac{1}{2}$		707 0002 00
R153	Resistor, Squelch control tube cathode	2200 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-222K	JAN-R-11	2360			745 1100 00
*R154	Resistor, AF amplr grid	100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-104K	JAN-R-11	2360			745 1170 00
R154	Resistor, AF amplr grid	270,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-274K	JAN-R-11	2360			745 1188 00
*R155	Resistor, voltage divider	100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-104K	JAN-R-11	2360			745 1170 00
*R156	Resistor, voltage divider	100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-104K	JAN-R-11	2360			745 1170 00

* Applies only to equipments with Navy Serial No. 1 to 479.

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**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
RESISTORS (Cont.)								
*R157	Resistor, limiter cathode	22,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-223K	JAN-R-11	2360			745 1142 00
R157	Resistor, AF amplr plate decoupling	100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-104K	JAN-R-11	2360			745 1170 00
*R158	Resistor, limiter cathode	22,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-223K	JAN-R-11	2360			745 1142 00
R159	Resistor, RF power amplr screen	10,000 ohm $\pm 10\%$ 1 w	RC30BF-103K	JAN-R-11	2360			745 3128 00
R160	Resistor, AF power amplr screen voltage dividing	10,000 ohm $\pm 10\%$ 1 w	RC30BF-103K	JAN-R-11	2360			745 3128 00
R161	Resistor, AF power amplr screen	8200 ohm $\pm 10\%$ 1 w	RC30BF-822K	JAN-R-11	2360			745 3125 00
R162	Resistor, 2nd IF amplr grid	470,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-474K	JAN-R-11	2360			745 1198 00
R163	Resistor, Audio squelch voltage dropping	100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-104K	JAN-R-11	2360			745 1170 00
R164	Resistor, AF driver grid	100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-104K	JAN-R-11	2360			745 1170 00
R166	Resistor, RF power amplr cathode	.24 ohm $\pm 5\%$ 1000 TV $\frac{1}{2}$ w	-632502-0R24	JAN-R-11	2360	BW $\frac{1}{2}$		707 0002 00
R167	Resistor, Pilot lamp voltage dropping	18,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-183K	JAN-R-11	2360			745 1139 00
R168	Resistor, Pilot lamp voltage dropping	18,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-183K	JAN-R-11	2360			745 1139 00
R169	Resistor, AF amplr grid	10,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-103K	JAN-R-11	2360			745 1128 00
R173	Resistor, AF power amplr cathode	220 ohm $\pm 10\%$ 1 w	RC30BF-221K	JAN-R-11	90			745 3058 00
R175	Resistor, 1st detector screen	8200 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-822K	JAN-R-11	2360			745 1125 00
R176	Resistor, 1st IF amplr screen	8200 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-822K	JAN-R-11	2360			745 1125 00
R177	Resistor, 2nd IF amplr screen	8200 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-822K	JAN-R-11	2360			745 1125 00
R178	Resistor, 3rd IF amplr screen	8200 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-822K	JAN-R-11	2360			745 1125 00
R179	Resistor, Audio voltage dropping	100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-104K	JAN-R-11	2360			745 1170 00
R180	Resistor, AF power amplr screen voltage dividing	10,000 ohm $\pm 10\%$ 1 w	RC30BF-103K	JAN-R-11	2360			745 3128 00
R181	Resistor, 1st IF amplr grid	22,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	RC20BF-223K	JAN-R-11	2360			745 1142 00

* Applies only to equipments with Navy Serial No. 1 to 479.

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**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
SWITCHES								
S101	Switch, POWER ON-OFF	See R110. Part of assem covered by Part No. 380 0001 00						
*S102	Switch, PRESS-TO TALK-RELEASE TO LISTEN	Lever toggle DPDT 125 v 3 amp	ST28N	JAN-S-23		Desig. on Part		266 3003 00
S102	Switch, PRESS TO TALK-RELEASE TO LISTEN	Lever toggle 4 PDT 125 v 3 amp	-24762					266 0006 00
*S103	Switch, SPEAKER ON-OFF	Lever toggle 4 PDT 125 v 3 amp	-24762	AN-QQ-S-91	CH			266 0006 00
S103	Switch, SPEAKER ON-OFF	Lever toggle DPDT 125 v 3 amp	ST28N	JAN-S-23		Desig. on Part		266 3003 00
S104	Switch, METER SWITCH	2 pole 4 position, 1 sect enclosed		AN-QQ-S-91	3030	B		259 0009 00
S105	S105A, S105B	Push button, DPDT		AN-QQ-S-91	3030	MCM1904C2		266 0005 00
S105A	Switch, Squelch disabling	Section of S105	-24907					
S105B	Switch, 1st & 2nd IF amplr bias reducing	Section of S105						
TRANSFORMERS								
T101	Transformer, Audio input coupling	Microphone and speaker voice coil, Pri: 3.4 ohm, Secd: 100,000 ohm	-302711	RE 13A 553B	4632	86275		677 0021 00
T102	Transformer, Audio driver output coupling	Driver type, Pri: 30 ma DC unbalanced PP parallel 1500 TV	-302710	RE 13A 553B	780	8601		677 0017 00
T103	Transformer, AF power amplr output coupling	Pri: 3000 ohm Secd: 12,500 ohm 1500 TV	-303464	RE 13A 553B	780	8953		677 0023 00
T105	Transformer, 1st IF	IF interstage 5.3 mc iron core tuning	-471271	JAN-P-13	70	T		278 0007 00
T106	Transformer, 2nd IF	IF interstage 5.3 mc iron core tuning	-471271	JAN-P-13	70	T		278 0007 00
T107	Transformer, 3rd IF	IF interstage 5.3 mc iron core tuning	-471271	JAN-P-13	70	T		278 0007 00
T108	Transformer, IF output coupling	IF diode 5.3 mc iron core tuning	-471271*	JAN-P-13	70	T		278 0008 00
T109	Transformer, Auxiliary speaker coupling	Pri: 20 ohms; Sec: 600 ohms 0.500 watt max.	-302712	RE 13A 553B	4632	88662		677 0038 00
VACUUM TUBES								
V101	Tube, Xmtr osc	Miniature HF power triode				6C4		254 0126 00
V102	Tube, Xmtr 1st mult	Miniature HF power triode				6C4		254 0126 00
V103	Tube, Xmtr 2nd mult	Miniature HF power triode				6C4		254 0126 00
V104	Tube, RF power amplr	Double Beam power amplifier			4340	28D7		254 0279 00

* Applies only to equipments with Navy Serial No. 1 to 1536.

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**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
VACUUM TUBES (Cont.)								
V105	Tube, AF amplr	Miniature, duplex diode and high-mu triode				6AQ6		254 0595 00
V106	Tube, AF driver	Miniature HF power triode				6C4		254 0126 00
V107	Tube, AF power amplr	Double Beam power amplifier			4340	28D7		254 0279 00
V108	Tube, Rec RF amplr	Miniature RF pentode				6AK5		254 0121 00
V109	Tube, 1st detector	Miniature RF pentode				6AK5		254 0121 00
V110	Tube, 1st IF amplr	Miniature RF pentode				6AK5		254 0121 00
V111	Tube, 2nd IF amplr	Miniature RF pentode				6AK5		254 0121 00
V112	Tube, 3rd IF amplr	Miniature RF pentode				6AK5		254 0121 00
V113	Tube, Rec mult	Miniature HF power triode				6C4		254 0126 00
V114	Tube, Rec osc	Miniature HF power triode				6C4		254 0126 00
V115	Tube, AVC control	Miniature, duplex-diode and high-mu triode				6AQ6		254 0595 00
V116	Tube, 2nd detector	Miniature HF power triode				6C4		254 0126 00
V117	Tube, Audio squelch control	Miniature, duplex diode and high-mu triode				6AQ6		254 0595 00
V118	Tube, HV rectifier	Full wave, high vacuum rectifier				25Z6GT/G		254 0493 00
V119	Tube, HV rectifier	Full wave, high vacuum rectifier				25Z6GT/G		254 0493 00
V120	Tube, AF power amplr	Double Beam power amplifier			4340	28D7		254 0279 00
*V121	Tube, AF Limiter	Miniature HF power triode				6C4		254 0126 00
V122	Tube, Polarity rectifier	Miniature HF power triode				6C4		254 0126 00
V123	Tube, Noise limiter	Miniature HF power triode				6C4		254 0126 00
V124	Tube, Polarity rectifier	Miniature HF power triode				6C4		254 0126 00
SOCKETS								
X101	Socket, Xmtr osc tube	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X102	Socket, Xmtr 1st mult tube	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X103	Socket, Xmtr 2nd mult tube	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X104	Socket, RF power amplr tube	Bakelite, locktal 7 pin	-49423-A	AN-QQ-P-421	200	88-8XM		220 1002 00
X105	Socket, AF amplr tube	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X106	Socket, AF driver tube	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X107	Socket, AF power amplr tube	Bakelite, locktal 7 pin	-49423-A	AN-QQ-P-421	200	88-8XM		220 1002 00
X108	Socket, Rec RF amplr	Ceramic, miniature 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X109	Socket, 1st detector tube	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00

* Applies only to equipments with Navy Serial No. 1 to 479.

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**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
SOCKETS (Cont.)								
X110	Socket, 1st IF amplr tube	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X111	Socket, 2nd IF amplr tube	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X112	Socket, 3rd IF amplr tube	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X113	Socket, Rec mult tube	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X114	Socket, Rec osc tube	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X115	Socket, AVC control tube	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X116	Socket, 2nd detector noise limiter	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X117	Socket, Audio squelch control tube	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X118	Socket, HV rect tube	Bakelite, octal 8 pin	-491479-A *	AN-QQ-P-421	200	88-8TM		220 1005 00
X119	Socket, HV rect tube	Bakelite, octal 8 pin	-491479-A *	AN-QQ-P-421	200	88-8TM		220 1005 00
X120	Socket, AF pr amplr tube	Bakelite, locktal 7 pin	-49423-A	AN-QQ-P-421	200	88-8XM		220 1002 00
***X121	Socket, AF limiter tube	Ceramic miniature, 7 pin with shield base	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X122	Socket, Polarity rect tube	Ceramic miniature, 7 pin with shield	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X123	Socket, Noise limiter tube	Ceramic miniature, 7 pin with shield	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X124	Socket, Polarity rect tube	Ceramic miniature, 7 pin with shield	-49956	AN-QQ-P-421	2570	277B		220 1003 00
X125	Socket, Carrier indicator pilot lamp	Miniature bayonet with camera type shutter		AN-QQ-S-91	2012	1140		262 0022 00
X126	Socket, POWER-ON indicator pilot lamp	Miniature bayonet with camera type shutter		AN-QQ-S-91	2012	1140		262 0022 00
X127	Socket, Receiver crystal	Socket, 2 large and 2 small jacks			830			502 1364 002
X128	Socket, Xmtr crystal	Socket, 2 large and 2 small jacks			830			502 1364 002
X151	Socket, C151 mounting	Bakelite, octal 8 pin	-491479-A *	AN-QQ-P-421	200	88-8TM		220 1005 00
CRYSTALS*								
Y101	Crystal, Xmtr osc			RE 40A 136A RE 40A 145A **				520 2546 88
Y102	Crystal, Rec osc			RE 40A 136A RE 40A 145A **				520 2546 88

* When ordering crystals specify whether for transmitter or receiver as well as signal frequency.
 ** Small type crystals are furnished as GFE. Large size crystals (TBS type) may be used in equipment.
 *** Applies only to equipments with Navy Serial No. 1 to 479.

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**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
HANDSET ASSEMBLY								
HANDSET								
HS201	Handset	Single button carbon mic DC res 25 ohms min 45 ohms max; Magnetic type receiver, impedance approx 600 ohms; 20 ft. of 5 conductor cord	51064	RE 9357A	284			977 0005 00
PLUG								
P201	Plug, Handset connector	See HS201. This plug included in assembly covered by Part No. 977 0005 00 Cable clamp	AN-3106-14S-5P AN-3057-6					
CORD								
W201	Cord, Handset connector	See HS201. This cord included in assembly covered by Part No. 977 0005 00						
TUNING METER ASSEMBLY								
METER								
M301	Meter, Tuning	2 ma DC 20 mv $\pm 3\%$ at 25°C (Submersion proof) with cord and plug	-22548	71-2202a				458 0016 00
PLUG								
P301	Plug, Tuning meter connecting	See M301. This plug included in assembly covered by Part No. 458 0016 00	49007					
CORD								
W301	Cord Tuning meter connecting	See M301. This plug included in assembly covered by Part No. 458 0016 00						

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**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing and Part Number
COAXIAL CABLE ASSEMBLY (25 ft.)—Collins Part Number 502 3723 003								
CONNECTORS								
P401	Connector, Transmission line connecting	Weather proof plug connector for use with RF coaxial cable	-49268					357 9001 00
P402	Connector, Transmission line connecting	Weather proof plug connector for use with RF coaxial cable	-49268					357 9001 00
CABLE								
W401	Cable, Transmission line section	Coaxial type, 26 feet long (one foot allowed for stripping) cap 29 mmfd per foot, Nominal impedance 52 ohms	AN type- RG- 8/U					425 0006 00
COAXIAL CABLE ASSEMBLY (50 ft.)—Collins Part Number 502 1447 003								
CONNECTORS								
P501	Connector, Transmission line connecting	Weather proof plug connector for use with RF Coaxial Cable	-49268					357 9001 00
P502	Connector, Transmission line connecting	Weather proof plug connector for use with RF Coaxial Cable	-49268					357 9001 00
CABLE								
W501	Cable, Transmission line section	Coaxial type, 51 ft long (one foot allowed for stripping) Cap 29 mmfd per foot, Nominal impedance 52 ohms	AN type- RG- 8/U					425 0006 00
POWER CORD ASSEMBLY (10 ft.)—Collins Part Number 502 1446 002								
CONNECTOR								
J701	Power cord connector	Socket insert, 2 contacts Cable clamp to fit AN 3106 connector	AN-3106- 16S-4S AN-3057- 8					357 4001 00 357 8003 00
PLUG								
P701	Plug, power outlet connecting	Rubber male plug for 2 conductor cable Ratings: 10 amp, 250 volts 15 amp, 125 volts						368 0011 00

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**TABLE 6-2 PARTS LIST BY SYMBOL DESIGNATION FOR NAVY
MODEL MBF RADIO TRANSMITTING-RECEIVING EQUIPMENT**

Symbol Designation	Function	Description	Navy Type Number	Navy Spec. or Dr. Number	Mfr. Code	Mfr's. Designation	Spel. Tol. or Mod.	Contractor's Drawing and Part Number
POWER CORD ASSEMBLY (10 ft.)—Collins Part Number 502 1446 002 (Cont.)								
CABLE								
W701	Cable, Power source connecting	Rubber covered, 2 conductors max WV 500 v, max current 5 amp, 0.0127 ohms per foot						424 0009 00
MISCELLANEOUS PARTS								
CONNECTORS								
	Coupler, Coaxial Cable and antenna connecting Connector, Speaker	Weatherproof Splice Connector, double ended socket Connector, cable plug, pin insert, 2 conductor 200 v 5 amp Connector clamp	AN-UG-29/U	RE-49F-188				357 9000 00
			AN 3106-12S-3P	AN-W-C-591	630			357 5000 00
			AN 3057-4	AN 3057	630			357 8001 00
TOOLS								
	Wrench, Set screw Wrench, 5/16" nut Screw driver Screw driver	# 8 Bristo Spintite, hex 5/16" x 6" Screw driver, Phillips #1, length 6" Screw driver, straight lipped, 1/8" x 5-1/4"			500 4803 410			024 0019 00 024 0027 00 024 0021 00 024 0023 00
	Tube Pin Straightener	Tube pin straightener, miniature. Zinc base alloy, stainless steel insert				JE13		024 0025 00
	Plug, Socket wiring	Plug, zinc base alloy, steel pins, 1-19/32" long				JE10		024 0024 00
	Carrying Strap	Strap, length, adjustable from 28-1/2" to 49-1/4", 1" wide, snaps on each end			39699	4613		011 0002 00

TABLE 6-3 PARTS LIST BY NAVY TYPE NUMBER

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Quan.	Navy or JAN Type Number	All Symbol Designations Involved
CAPACITORS			JACKS AND RECEPTACLES (Cont.)		
3	CC200UK020D	C101, C183, C199	1	AN3106-16S-4S}	J701
3	CC20UK100F	C111, C112, C135		AN3057-8 }	
4	CC20UK510K	C102, C108, C147, C185	1	-49451	J103
2	CC30LH100F	C191, C192	1		J102
1	CC30LH120K	C193	1		J104
2	CC30LH150K	C189, C190	1		J106
2	CC30UJ101M	C150, C168			
1	CE63B200J	C118			
1	CP50B1FE254	C121			
2	CP51B5FE104	C122, C143			
2		C103, C149	2	-29754	K102, K103
1	-483355	C151	1	-29755	K101
1	-483356	C120	1	-29756	K104
4	-483357	C195, C196, C917, C198			
2	-483376	C178, C179			
1	-483377	C176			
1	-483379	C110			
1	-483380	C114			
2	-483382	C125, C156			
38	-483703-B20	C104, C105, C107, C113, C115, C116, C124, C127, C129, C130, C132, C138, C139, C140, C141, C144, C145, C146, C148, C152, C158, C159, C160, C161, C162, C163, C164, C165, C167, C170, C171, C172, C173, C174, C181, C187, C188	1 1 1 6 1 1 1 1 1 1 1 1 2 4 2 1 1 1		L101 L102 L103 L104, L105, L106, L107, L124, L125 L108 L109 L111 L113 L114 L116 L115 L118, L119 L120, L121, L122, L123 L124, L125 L126 L129 L130
5		C106, C123, C126, C128, C166	1	-302713	L116
13	-483703-B20	C119, C131, C133, C134, C136, C137, C142, C153, C154, C155, C169, C186, C194	1 1 2 4 2 1 1 1	-302714	L115 L118, L119 L120, L121, L122, L123 L124, L125 L126 L129 L130
MISCELLANEOUS ELECTRICAL PARTS			INDUCTORS AND REACTORS		
1	-40215	E101	1		L101
1	-66156	E601	1		L102
5		E102	1		L103
2		E103	1		L104, L105, L106, L107, L124, L125
4		E104	1		L108
18		E105	1		L109
3		E106	1		L111
2		E107	1		L113
1		E108	1		L114
1		E109	1	-302713	L116
1		E110	1	-302714	L115
			2		L118, L119
			4		L120, L121, L122, L123
			2		L124, L125
			1		L126
			1		L129
			1	-302715	L130
FUSES			LOUDSPEAKERS		
1		F101	1		LS101
HANDSETS			METERS		
1	51064	HS201	1		M301
PILOT LAMPS			PLUGS		
2		I101, I102	1	AN3106-14S-SP}	P201
			4	AN3057-6 }	
			1	-UG-21/U	P401, P402, P501, P502
			1	-UG-29/U	Coaxial Cable Connector
			1	49007	P301
			1		P701
JACKS AND RECEPTACLES			RESISTORS		
1	AN3102-145-53	J101	4	RC20BF103K	R103, R137, R138, R169
1	AN3102-12S-3S	J105	10	RC20BF104K	R112, R119, R130, R134, R136, R149, R150, R157, R163, R164, R179, R154, R155, R156
1	AN3106-12S-3P}	Speaker Connector	1	RC20BF105K	R148
	AN3057-4 }		2	RC20BF183K	R167, R168
			6	RC20BF222K	R121, R124, R127, R129, R151, R153, R111
			3	RC20BF223K	R102, R133, R181, R157
			1	RC20BF274K	R154

TABLE 6-3 PARTS LIST BY NAVY TYPE NUMBER

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Quan.	Navy or JAN Type Number	All Symbol Designations Involved
RESISTORS (Cont.)			VACUUM TUBES		
1	RC20BF332K	R104	5	6AK5	V108, V109, V110, V111, V112
3	RC20BF471K	R123, R126, R128	10	6C4	V101, V102, V103, V106, V113, V114, V116, V122, V123, V124
3	RC20BF472K	R101, R111, R135	2	25Z6GT/G	V118, V119
1	RC20BF473K	R139	3	28D7	V104, V107, V120
8	RC20BF474K	R109, R117, R122, R125, R131, R132, R146, R162	3	6AQ6	V105, V115, V117
3	RC20BF681K	R114, R118, R120	CABLES		
5	RC20BF822K	R107, R175, R176, R177, R178	26'	-RG-8/U	W401
4	RC30BF103K	R106, R159, R160, R180	51'	-RG-8/U	W501
2	RC30BF221K	R113, R173	1		W201
2	RC30BF822K	R115, R161	1		W301
1	RW32D801	R140	1		W701
2	-632502-0R24	R152, R166	SOCKETS		
2	-632502-2R4	R105, R144	3	49423-A	X104, X107, X120
2	-632502-1R0	R108, R142	18	-49956	X101, X102, X103, X105, X106, X108, X109, X110, X111, X112, X113, X114, X115, X116, X117, X122, X123, X124
1	-633831	R141	3	-491479-A*	X118, X119, X151
2	-633847	R110, S101	2		X125, X126
1	-633848	R145	2		X127, X128
SWITCHES			CRYSTALS		
1	ST18C	S102	1		Y101
1	ST28N	S103	1		Y102
1		S104			
1	-24907	(S105A, S105B)			
TRANSFORMERS					
1	-302710	T102			
1	-302711	T101			
1	-302712	T109			
1	-303464	T103			
3	-471271	T105, T106, T107			
1	-471271*	T108			

**TABLE 6-4a EQUIPMENT SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
CAPACITORS								
3	-48848	C131, C133, C134, C136, C137, C142, C153, C154, C155, C169, C186, C194	Capacitor, Mica, .01 mf ±20% 1000 TV	JAN-C-5	911			935 5009 00
1	-483355	C151	Capacitor, Dry Electrolytic, triple sect 80, 40 & 40 mf -90 +250% 250 WV	JAN-C-62	911			184 9000 00
1	-483356	C120	Capacitor, Dry Electrolytic, triple sect, 20 mf per sect -90% +250% 25 WV	JAN-C-62	30			183 1001 00
1	-483357	C195, C196, C197, C198	Capacitor, Silver mica, 500 mmf ±20% 500 TV		700	B-831 Special		912 0009 00
1	-483376	C178, C179	Capacitor, Ceramic, variable, .25 mmf min 1.5 mmf max 1000 TV	JAN-I-10	700	830		917 1002 00
1	-483377	C176	Capacitor, Ceramic, variable, min cap, less than 10 mmf, max cap, greater than 100 mmf 1000 TV	AN-QQ-S-91	700	823BN		917 1003 00
1	-483379	C110	Capacitor, Variable, dual sect 15 mmf per sect	AN-QQ-P-421	44210	AP-11L-6		922 0010 00
1	-483380	C114	Capacitor, Variable, dual sect max 28.5 mmf min 5.0 mmf	AN-QQ-P-421	44210	AP-12L-6		922 0011 00
1	-483382	C125, C156	Capacitor, Silver mica, dual sect, 500 mmf/sect ±20% 1300 TV	71-2202a	700	837		912 0004 00
8	-483703-B20	C104, C105, C107, C109, C113, C115, C116, C119, C124, C127, C129, C130, C132, C138, C139, C140, C141, C144, C145, C146, C148, C152, C158, C159, C160, C161, C162, C163, C164, C165, C167, C170, C171, C172, C173, C174, C181, C187, C188	Capacitor, Mica, .002 mf ±20% 600 TV	JAN-C-5	4030			909 0005 00
1		C103, C149	Capacitor, Variable, single sect 35 mmf	AN-QQ-S-91	2140			922 0012 00
3		C106, C123, C126, C128, C166	Capacitor, Variable, single sect 25 mmf	AN-QQ-S-91	2140			922 0009 00
1	CC20UK020D	C101, C183, C199	Capacitor, Ceramic, 2 mmf ±½ mmf 1000 TV	JAN-C-20	700			916 0002 00

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**TABLE 6-4a EQUIPMENT SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spel. Tol. or Mod.	Contractor's Drawing or Part Number
CAPACITORS (Cont.)								
1	CC20UK100F	C111, C112, C135	Capacitor, Ceramic, 10 mmf ±1 mmf 1000 v	JAN-C-20	700			916 0006 00
1	CC20UK510K	C102, C108, C147, C185	Capacitor, Ceramic, 51 mmf ±10% 1000 TV	JAN-C-20	700			916 0011 00
1	CC30LH100F	C191, C192	Capacitor, Tubular ceramic, 10 mmf ±1 mmf 1000 TV		700			916 4041 00
1	CC30LH120K	C193	Capacitor, Tubular ceramic, 12 mmf ±10% 1000 TV		700			916 4044 00
1	CC30LH150K	C189, C190	Capacitor, Tubular ceramic, 15 mmf ±10% 1000 TV		700			916 4048 00
1	CC30UJ101M	C150, C168	Capacitor, Tubular ceramic, 100 mmf, ±20% 1000 TV		700			916 4061 00
1	CE63B200J	C118	Capacitor, Dry Electrolytic, 20 mf -90% +250% 150 WV	JAN-C-62	911			184 6509 00
1	CP50B1FE254	C121	Capacitor, Paper .25 mf +40 -15% 400 WV		911			961 4014 00
1	CP51B5FE104	C122, C143	Capacitor, Paper, triple C-950 sect .1 mf/sect +40 -15% 400 WV	C-950	911	DYRT		961 5050 00
METER								
1	-40215	E101	Thermocouple, RF 0-0.5 amp for use with 0-2 ma meter	C39.4-1943	4197			457 0003 00
JACKS AND RECEPTACLES								
1	AN3057-4		Connector Clamp, use with connector 357 5000 00	AN 3057	630			357 8001 00
1	AN3057-8		Connector Clamp, use with connector 357 4001 00	AN 3057	630			357 8003 00
1	AN3102-12S-3S	J105	Connector, box mtg, socket insert, 2 conductor 200 volt 5 amp	AN-W-C-591	630			357 2001 00
1	AN3102-14S-53	J101	Connector, Microphone 5 term box mtg socket type RB Size 14	AN-9534	630			357 2000 00
1	AN3106-12S-3P		Connector, cable plug, pin insert, 2 conductor 200 v 5 amp	AN-W-C-591	630			357 5000 00
1	AN-3106-16S-4S	J701	Connector, cable plug, socket insert, 2 conductor 200 v 10 amp	AN-W-C-591	630			357 4001 00

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**TABLE 6-4a EQUIPMENT SPARE PARTS LIST BY NAVY TYPE NUMBERS,
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
JACKS AND RECEPTACLES (Cont.)								
1	-49451		Connector, Weather-proof, splice connection for coaxial cable	RE-49F-188	2570			357 9000 00
1	-49470	J103	Connector, Antenna, wall mtg socket for coaxial cable	RE-49F-188	2570			357 9003 00
1		J102	Connector, Metering jack 3 conductor for 3/16 barrel plug	AN-QQ-S-91	3240			358 1100 00
1		J104	Connector box mtg, pin insert, 2 conductor, 200 v 10 amp	AN-W-C-591	630			357 3001 00
2			Connector, Jack for small crystal	AN-QQ-S-91	204			360 0001 00
2			Connector, Jack for large crystal		2570	74		360 2020 00
RELAYS								
1	-29754	K102, K103	Relay, Circuit Control 2 common, DPDT coil 115 v DC	AN-QQ-S-91	284	Desig. on Part		972 1002 00
1	-29755	K101	Relay, Circuit Control 4 common, 4 PDT coil 115 v DC	AN-QQ-S-91	284	Desig. on Part		972 1003 00
1	-29756	K104	Relay, Circuit Control, SPDT, coil 115 v DC	AN-QQ-S-91	284	Desig. on Part		972 1004 00
INDUCTORS								
1		L101	Inductor, xmtr osc plate, 25 turns of #24 E wire on a ceramic form $\frac{3}{8}$ x $1\frac{1}{4}$		830			502 1352 002
1		L102	Inductor, Doubler, 12 turns of #21 E wire on a ceramic form $\frac{3}{8}$ x $1\frac{1}{4}$		830			502 1351 002
6		L104, L105, L106, L107, L124, L125, L109	Inductor, 2.7 μ h 300 ma 45 turns of #30 C En	AN-QQ-S-91	4230			240 0012 00
1		L109	Inductor, Antenna coupler 1 turn #12 wire Silver plated		830			502 1443 002
1		L111	Inductor, RF assem, 7 turns #18 E wire on form $\frac{3}{8}$ x $1\frac{3}{8}$		830			502 1347 002
1		L113	Inductor, Quadrupler assem L113, 6 turns #18 E wire on form $\frac{3}{8}$ x $1\frac{3}{8}$		830			502 1348 002
1		L114	Inductor, rec osc plate, 25 turns of #24 E wire on a ceramic form $\frac{3}{8}$ x $1\frac{1}{4}$		830			502 1345 002

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**TABLE 6-4a EQUIPMENT SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
INDUCTORS (Cont.)								
1	-302713	L116	Inductor, 0-60 cps, 1.5 hy 100 ma, 1500 TV	RE 13A 553B	780			678 0018 00
1	-302714	L115	Inductor, 0-60 cps 3 hy 60 ma, 1500 TV	RE 13A 553B	780			678 0019 00
1	-302715	L130	Inductor, 0-60 cps 15 hy 60 ma, 1500 TV	RE 13A 553B	780			678 0020 00
1		L118, L119	Inductor, converter assem L118, 7 turns #18 E wire L119, 7 turns #18 E wire (L118, L119 on one form)		830			502 1349 002
4		L120, L121, L122, L123	Inductor, 9.8 μ h 300 ma 80 turns #30 wire	AN-QQ-S-91	4230			240 0011 00
1		L126	Inductor, suppressor coil		630			502 3751 002
1		L129	Inductor, 34 μ h 100 ma 140 turns #35 wire	AN-QQ-S-91	4230			240 0010 00
CONNECTORS								
2	-49268	P401, P402, P501, P502	Connector, Weatherproof plug for coaxial cable	RE-49F-188	2570			357 9001 00
1		P701	Connector, Rubber plug 2 con- ductor 10 amp 250 v 15 amp 125 v	AN-QQ-S-91	2232	9940 Special		368 0011 00
RESISTORS								
2	RC20BF103K	R103, R137, R138, R169	Resistor, 10,000 ohm \pm 10% $\frac{1}{2}$ w	JAN-R-11	2360			745 1128 00
7	RC20BF104K	Alternate R112, R119, R130, R134, R136, R149, R150, R154, R157, R163, R164, R179	Resistor, 10,000 ohm \pm 5% $\frac{1}{2}$ w Resistor, 100,000 ohm \pm 10% $\frac{1}{2}$ w	JAN-R-11 JAN-R-11	2360 2360			745 1127 00 745 1170 00
1	RC20BF105K	R148	Resistor, 1 meg \pm 10% $\frac{1}{2}$ w	JAN-R-11	2360			745 1212 00
1	RC20BF183K	R167, R168	Resistor, 18,000 ohm \pm 10% $\frac{1}{2}$ w	JAN-R-11	2360			745 1139 00
4	RC20BF222K	R111, R121, R124, R127, R129, R151, R153	Resistor, 2,200 ohm \pm 10% $\frac{1}{2}$ w	JAN-R-11	2360			745 1100 00
3	RC20BF223K	R102, R133, R158, R181	Resistor, 22,000 ohm \pm 10% $\frac{1}{2}$ w	JAN-R-11	2360			745 1142 00
1	RC20BF332K	Alternate R104	Resistor, 22,000 ohm \pm 5% $\frac{1}{2}$ w Resistor, 3,300 ohm \pm 10% $\frac{1}{2}$ w	JAN-R-11 JAN-R-11	2360 2360			745 1141 00 745 1107 00
2	RC20BF471K	Alternate R123, R126, R128	Resistor, 3,300 ohm \pm 5% $\frac{1}{2}$ w Resistor, 470 ohm \pm 10% $\frac{1}{2}$ w	JAN-R-11 JAN-R-11	2360 2360			745 1106 00 745 1072 00

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**TABLE 6-4a EQUIPMENT SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spel. Tol. or Mod.	Contractor's Drawing or Part Number
RESISTORS (Cont.)								
1	-632502-0R24	R152, R166	Resistor, .24 ohm $\pm 5\%$ 1000 TV $\frac{1}{2}$ w	JAN-R-11	2360	BW $\frac{1}{2}$		707 0002 00
1	-632502-1R0	R108**, R142	Resistor, 1 ohm $\pm 5\%$ $\frac{1}{2}$ w	JAN-R-11	2360	BW $\frac{1}{2}$		707 0047 00
1	-632502-2R4	R105, R144	Resistor, 2.4 ohm $\pm 5\%$ $\frac{1}{2}$ w	JAN-R-11	2360	BW $\frac{1}{2}$		707 0074 00
1	-633831	R141	Resistor, 3400 ohm $\pm 5\%$ 8 w		20430			747 9005 00
1	-633847	R110, S101	Resistor, 500,000 ohm Potentiometer with DPST switch	AN-QQ-S-91	700	Midget Series 3		380 0001 00
1	-633848	R145	Resistor, 5000 ohm Potentiometer		700			380 0002 00
1	RC20BF472K	R101, R135	Resistor, 4,700 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1114 00
1	RC20BF473K	R139	Resistor, 47,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1156 00
4	RC20BF474K	R109, R117, R122, R125, R131, R132, R146, R162	Resistor, 470,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1198 00
2	RC20BF681K	R114, R118, R120	Resistor, 680 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1079 00
	RC20BF681K	Alternate	Resistor, 680 ohm $\pm 5\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1078 00
3	RC20BF822K	R107, R175, R176, R177, R178	Resistor, 8200 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1125 00
2	RC30BF103K	R106, R159, R160, R180	Resistor, 100,000 ohm $\pm 10\%$ 1 w	JAN-R-11	2360			745 3128 00
1	RC30BF221K	R113, R173	Resistor, 220 ohm $\pm 10\%$ 1 w	JAN-R-11	90			745 3058 00
1	RC30BF822K	R115, R161	Resistor, 8200 ohm $\pm 10\%$ 1 w	JAN-R-11	2360			745 3125 00
1	RW32D801	R140	Resistor, 800 ohm $\pm 5\%$ 16 w		20430			747 1086 00
** Applies only to equipments with Navy Serial No. 480 to 2126.								
SWITCHES								
1	-24907	(S105A, S105B) Alternate (S105A, S105B)	Switch, push button, DPDT Switch, push button, DPDT	AN-QQ-S-91 AN-QQ-S-91	3030 3030	MCM 1904C2 MCM 1925C3		266 0005 00 266 0007 00
1		S104	Switch, 2 pole 4 position, 1 sect, enclosed	AN-QQ-S-91	3030	B		259 0009 00
1	ST28N	S102	Switch, Lever toggle DPDT 125 v 3 amp	JAN-S-23	18800	Desig. on part		266 3001 00
1	ST28N	S102* S103	Switch, Lever toggle 4PDT Switch, Lever toggle DPDT 125 v 3 amp	JAN-S-23	10100 18800	Desig. on part		266 0006 00 266 3003 00
* Used on equipments bearing serial numbers above 1536.								

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**TABLE 6-4a EQUIPMENT SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
TRANSFORMERS								
1	-302710	T102	Transformer, Driver type Pri: 30 ma DC unbalanced PP parallel 1500 TV	RE 13A 553B	780	8601		677 0017 00
1	-302711	T101	Transformer, Microphone and speaker voice coil Pri: 3.4 ohms, Secd: 100,000 ohms	RE 13A 553B	4632			677 0021 00
1	-302712	T109	Transformer, Pri: 20 ohms; Secd: 600 ohms	RE 13A 553B	88662			677 0038 00
1	-303464	T103	Transformer, RF Power amplr, Pri: 3000 ohms Secd: 12,500 ohms 1500 TV	RE 13A 553B	780			677 0023 00
3	-471271	T105, T106, T107	Transformer, IF interstage 5.3 mc iron core tuning	JAN-P-13	70	T		278 0007 00
1	-471271*	Alternate T108	Transformer, IF Diode 5.3 mc iron core tuning	JAN-P-13	70	T		278 0011 00 278 0008 00
		Alternate						278 0011 00
TUBES								
15	6AK5	V108, V109, V110, V111, V112	Tube, Miniature RF pentode		33100	6AK5		254 0121 00
30	6C4	V101, V102, V103, V106, V113, V114, V116, V122, V123, V124	Tube, Miniature HF power triode		38110 18800	6C4		254 0126 00
4	25Z6GT/G	V118, V119	Tube, full wave, high vacuum, rectifier		33100	25Z6GT/G		254 0493 00
6	28D7	V104, V107, V120	Tube, Double Beam power amplifier		4340	28D7		254 0279 00
9	6AQ6	V105, V115, V117	Tube, Miniature, duplex diode and high-mu triode		38110	6AQ6		254 0595 00
SOCKETS								
2	-49423-A	X104, X107, X120	Socket, Bakelite, locktal 7 pin	AN-QQ-P-421	200	88-8XM		220 1002 00
10	-49956	X101, X102, X103, X105, X106, X108, X109, X110, X111, X112, X113, X114, X115, X116, X117, X122, X123, X124	Socket, Ceramic, miniature 7 pin with shield base	AN-QQ-P-421	2570	277B		220 1003 00
2	-491479-A*	X118, X119, X151	Socket, Bakelite, octal 8 pin	AN-QQ-P-421	200	88-8TM		220 1005 00
1		X125, X126	Socket, Miniature Bayonet with camera type shutter	AN-QQ-S-91	2012	1140		262 0022 00

* When ordering crystals specify whether for transmitter or receiver as well as signal frequency.

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**TABLE 6-4a EQUIPMENT SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spel. Tol. or Mod.	Contractor's Drawing or Part Number
MISCELLANEOUS								
1			Concentric cable assem, Antenna lead in (long)		830			502 1447 003
1			Concentric cable assem, Antenna lead in (short)		830			502 3723 003
1			Cable, Rubber covered AC power		830			502 1446 002
1			Insulator, micalex, antenna coupler coil		830			502 5035 002
10		F101	Fuses, non-renewable 3 amp 250 v		2920	1043		264 4080 00
1		J106	Holder, Bakelite, for cartridge fuse 1- $\frac{1}{4}$ x $\frac{1}{4}$		530	HKM		265 1003 00
1			Terminal, Ceramic bushing with soldering lug	AN-QQ-P-421	39562	502		190 1103 00
1			Insulator, Ceramic standoff, cylindrical $\frac{3}{8}$ x $\frac{1}{2}$		2410	395-L $\frac{1}{2}$		190 2329 00
2			Terminal, Ceramic bushing with soldering lug	AN-QQ-P-421	39562			190 1104 00
10			Standoff, Ceramic cylindrical $\frac{1}{4}$ x $\frac{5}{8}$	JAN-I-10	700			190 1105 00
1.9'			Cord, Rubber weather proofing gasket $\frac{1}{8}$ OD	71-2202a	4640	M-40387-D2		200 0004 00
4'			Strip, Rubber weather proofing gasket 3/16 OD	71-2202a	4640	M-40387-D2		200 0005 00
1			Shockmount, 4 to 12 lb load rating, 1- $\frac{1}{8}$ x 2- $\frac{3}{8}$ square		4640	5750 CB		200 0006 00
4		I101, I102	Bulb, pilot lamp, Neon 1/25 w 105-125 v, External Resistance		1880	NE51		262 0021 00
1			Wrench, #8 Bristo		500			024 0019 00
1			Screwdriver, Phillips #1 Length 6		410			024 0021 00
1			Wrench, Spintite hex size 5/16 Length 6		4308			024 0022 00
1			Plug, socket wiring, zinc base alloy, steel pins 1-19/32 long		42949	JE10		024 0024 00
1			Straightener, Tube pins, zinc base alloy, stainless steel insert		42949	JE13		024 0025 00
5			Mounting strap for miniature tube sockets	AN-QQ-P-421	810	1031		139 0017 00
2			Tube Shield for short miniature tubes, steel cadmium plated	AN-QQ-P-421	2570	278A		141 0001 00
4			Tube Shield for tall miniature tubes, steel cadmium plated	AN-QQ-P-421	2570	278B		141 0002 00
1			Spare Parts Box					500 3535 004
1			Tray, for Spare Parts Box					500 3534 004
1			Seal, for Spare Parts Box					004 7490 00

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**TABLE 6-4b TENDER SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
CAPACITORS								
8	-48848	C117, C119, C131, C133, C134, C136, C137, C142, C153, C154, C155, C169, C186, C194	Capacitor, Mica, .01 mf ±20% 1000 TV	JAN-C-5	911			935 5009 00
3	-483355	C151	Capacitor, Dry Electrolytic, triple sect 80, 40 & 40 mf —90 +250% 250 WV	JAN-C-62	911			184 9000 00
3	-483356	C120	Capacitor, Dry Electrolytic, triple sect, 20 mf per sect —90% +250% 25 WV	JAN-C-62	30			183 1001 00
3	-483357	C195, C196, C197, C198	Capacitor, Silver mica, 500 mmf ±20% 500 TV		700	B-831 Special		912 0009 00
2	-483376	C178, C179	Capacitor, Ceramic, Variable .25 mmf Min 1.5 mmf Max 1000 TV	JAN-I-10	700	830		917 1002 00
1	-483377	C176	Capacitor, Ceramic, Variable, Min cap, less than 10 mmf, Max cap, greater than 100 mmf 1000 TV	AN-QQ-S-91	700	823BN		917 1003 00
1	-483379	C110	Capacitor, Variable, dual sect 16 mmf per sect	AN-QQ-P-421	44210	AP-11L-6		922 0010 00
1	-483380	C114	Capacitor, Variable, Dual sect Max 28.5 mmf Min 5.0 mmf	AN-QQ-P-421	44210	AP-12L-6		922 0011 00
2	-483382	C125, C156	Capacitor, Silver mica, dual sect, 500 mmf/sect ±20% 1300 TV	71-2202a	700	837		912 0004 00
23	-483703-B20	C104, C105, C107, C109, C113, C115, C116, C124, C127, C129, C130, C132, C138, C139, C140, C141, C144, C145, C146, C148, C152, C158, C159, C160, C161, C162, C163, C164, C165, C167, C170, C171, C172, C173, C174, C181, C187, C188	Capacitor, Mica, .002 mf ±20% 600 TV	JAN-C-5	4030			909 0005 00
3		C103, C149	Capacitor, Variable, Single sect 35 mmf	AN-QQ-S-91	2140			922 0012 00
5		C106, C123, C126, C128, C166	Capacitor, Variable, Single sect 2 mmf	AN-QQ-S-91	2140			922 0009 00
2	CC20UK020D	C101, C183, C199	Capacitor, Ceramic, 2 mmf ±½ mmf 1000 TV	JAN-C-20	700			916 0002 00

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**TABLE 6-4b TENDER SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
CAPACITORS (Cont.)								
2	CC20UK100F	C111, C112, C135	Capacitor, Ceramic, 10 mmf ±1 mmf 1000 TV	JAN-C-20	700			916 0006 00
3	CC20UK510K	C102, C108, C147, C185	Capacitor, Ceramic, 51 mmf ±10% 1000 TV	JAN-C-20	700			916 0011 00
2	CC30LH100F	C191, C192	Capacitor, Tubular ceramic, 10 mmf ±1 mmf 1000 TV					916 4041 00
1	CC30LH120K	C193	Capacitor, Tubular ceramic, 12 mmf ±10% 1000 TV					916 4044 00
2	CC30LH150K	C189, C190	Capacitor, Tubular ceramic, 15 mmf ±10% 1000 TV					916 4048 00
2	CC30UJ101M	C150, C168	Capacitor, Tubular ceramic, 100 mmf, ±20% 1000 TV					916 4061 00
3	CE63B200J	C118	Capacitor, Dry Electrolytic, 20 mf -90% +250% 150 WV	JAN-C-62	911			184 6509 00
2	CP50BIFE254	C121	Capacitor, Paper .25 mf +40 -15% 400 WV		911			961 4014 00
3	CP51B5FE104	C122, C143	Capacitor, Paper, triple sect .1 mf/sect +40 -15% 400 WV	C-950	911	DYRT		961 5050 00
METER								
1	-40215	E101	Thermocouple, RF 0-0.5 amp for use with 0-2 ma meter	C39.4-1943	4197			457 0003 00
JACKS AND RECEPTACLES								
1	AN3057-4		Connector Clamp, use with connector 357 5000 00	AN 3057	630			357 8001 00
1	AN3057-8	J701	Connector Clamp, use with connector 357 4001 00	AN 3057	630			357 8003 00
1	AN3102-12S-3S	J105	Connector, Box mtg, socket insert, 2 conductor 200 volt 5 amp	AN-W-C-591	630			357 2001 00
1	AN3102-14S-5S	J101	Connector, Microphone 5 term box mtg socket type RB size 14	AN-9534	630			357 2000 00
1	AN3106-12S-3P		Connector, Cable plug, pin insert, 2 conductor 200 v 5 amp	AN-W-C-591	630			357 5000 00
1	AN3106-16S-4S	J701	Connector, Cable plug, socket insert, 2 conductor, 200 v 10 amp	AN-W-C-591	630			357 4001 00
1	-49451		Connector, Weather-proof, splice connection for coaxial cable	RE-49F-188				357 9000 00

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**TABLE 6-4b TENDER SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
JACKS AND RECEPTACLES (Cont.)								
1	-49470	J103	Connector, Antenna, wall mtg socket for coaxial cable	RE-49F-188				357 9003 00
1		J102	Connector, Metering jack 3 conductor for 3/16" barrel plug	AN-QQ-S-91	3240			358 1100 00
1		J104	Connector, Box mtg, pin insert, 2 conductor, 200 v 10 amp	AN-W-C-591	630			357 3001 00
4			Connector, Jack for small crystal	AN-QQ-S-91	204			360 0001 00
4			Connector, Jack for large crystal		2570	74		360 2020 00
RELAYS								
3	-29754	K102, K103	Relay, Circuit Control, 2 common, DPDT coil 115 v DC	AN-QQ-S-91	284	Desig. on part		972 1002 00
2	-29755	K101	Relay, Circuit Control, 4 common, 4 PDT coil 115 v DC	AN-QQ-S-91	284	Desig. on part		972 1003 00
2	-29756	K104	Relay, Circuit Control, SPDT coil 115 v DC	AN-QQ-S-91	284	Desig. on Part		972 1004 00
INDUCTORS								
2	-302713	L116	Inductor, 0-60 cps, 1.5 hy 100 ma, 1500 TV	RE 13A 553B	780			678 0018 00
2	-302714	L115	Inductor, 0-60 cps 3 hy 60 ma, 1500 TV	RE 13A 553B	780			678 0019 00
2	-302715	L130	Inductor, 0-60 cps 15 hy 60 ma, 1500 TV	RE 13A 553B	780			678 0020 00
2		L101	Inductor, Xmtr osc plate, 25 turns of #24 En wire on a ceramic form $\frac{3}{8}$ x $1-\frac{1}{4}$		830			502 1352 002
2		L102	Inductor, Doubler, 12 turns of #21 wire on a ceramic form $\frac{3}{8}$ x $1-\frac{1}{4}$		830			502 1351 002
1		L103	Inductor, Driver, 10 turns of #12 wire, silver plated, spaced wound, center tapped, $\frac{1}{8}$ inch diam		830			502 1350 002
12		L104, L105, L106, L107, L124, L125	Inductor, 2.7 μ h 300 ma 45 turns of #30 S.C.C. En.	AN-QQ-S-91	4230			240 0012 00
1		L108	Inductor, Final tank, 6 turns spaced wound, #12 wire silver plated		830			502 1346 002

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**TABLE 6-4b TENDER SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
INDUCTORS (Cont.)								
1		L109	Inductor, Antenna coupler 1 turn #12 wire silver plated		830			502 1443 002
2		L111	Inductor, RF assem, 7 turns #18 En wire on form $\frac{3}{8}$ x $1-\frac{3}{8}$		830			502 1347 002
2		L113	Inductor, Quadrupler assem L113, 6 turns #18 En wire on form $\frac{3}{8}$ x $1-\frac{3}{8}$		830			502 1348 002
2		L114	Inductor, Rec osc plate, 25 turns of #24 En wire on a ceramic form $\frac{3}{8}$ x $1-\frac{1}{4}$					502 1345 002
2		L118, L119	Inductor, Converter assem L118, 7 turns #18 En wire L119, 7 turns #18 En wire (L118, L119 on one form)		830			502 1349 002
8		L120, L121, L122, L123	Inductor, 9.8 μ h 300 ma 30 turns #30 wire	AN-QQ-S-91	4230			240 0011 00
2		L126	Inductor, Suppressor coil #20 wire		630			502 3751 002
2		L129	Inductor, 34 μ h 100 ma 140 turns #35 wire	AN-QQ-S-91	4230			240 0010 00
CONNECTORS								
4	-49268	P401, P402, P501, P502	Connector, Weatherproof plug for coaxial cable	RE-49F-188				357 9001 00
1		P701	Connector, Rubber plug 2 conductor 10 amp 250 v 15 amp 125 v	AN-QQ-S-91	2232	9940 Special		368 0011 00
RESISTORS								
6	-632502-0R24	R152, R166	Resistor, .24 ohm $\pm 5\%$ 1000 TV $\frac{1}{2}$ w	JAN-R-11	2360	BW $\frac{1}{2}$		707 0002 00
6	-632502-1R0	R108, R142	Resistor, 1 ohm $\pm 5\%$ $\frac{1}{2}$ w	JAN-R-11	2360	BW $\frac{1}{2}$		707 0047 00
6	-632502-2R4	R105, R144	Resistor, 2.4 ohm $\pm 5\%$ $\frac{1}{2}$ w	JAN-R-11	2360	BW $\frac{1}{2}$		707 0074 00
3	-633831	R141	Resistor, 3400 ohm $\pm 5\%$ 8 w					747 9005 00
3	-633847	R110, S101	Resistor, 500,000 ohm Potentiometer with DPST switch	AN-QQ-S-91	700	Midget Series 3		380 0001 00
3	-633848	R145	Resistor, 5000 ohm Potentiometer		700			380 0002 00
12	RC20BF103K	R103, R137, R138, R169 Alternate	Resistor, 10,000 ohm $\pm 10\%$ $\frac{1}{2}$ w Resistor, 10,000 ohm $\pm 5\%$ $\frac{1}{2}$ w	JAN-R-11 JAN-R-11	2360 2360			745 1128 00 745 1127 00

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**TABLE 6-4b TENDER SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
RESISTORS (Cont.)								
39	RC20BF104K	R112, R119, R130, R134, R136, R149, R150, R154, R155, R156, R163, R164, R179	Resistor, 100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1170 00
3	RC20BF105K	R148	Resistor, 1 meg $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1212 00
3	RC20BF183K	R167, R168	Resistor, 18,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1139 00
21	RC20BF222K	R111, R121, R124, R127, R129, R151, R153	Resistor, 2200 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1100 00
15	RC20BF223K	R102, R133, R157, R158, R181	Resistor, 22,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1142 00
3	RC20BF332K	Alternate R104	Resistor, 22,000 ohm $\pm 5\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1141 00
9	RC20BF471K	R123, R126, R128	Resistor, 3300 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1107 00
6	RC20BF472K	R101, R135	Resistor, 3300 ohm $\pm 5\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1106 00
3	RC20BF473K	R139	Resistor, 470 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1072 00
24	RC20BF474K	R109, R117, R122, R125, R131, R132, R146, R162	Resistor, 4700 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1114 00
9	RC20BF681K	R114, R118, R120	Resistor, 47,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1156 00
15	RC20BF822K	Alternate R107, R175, R176, R177, R178	Resistor, 470,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1198 00
12	RC30BF103K	R106, R159, R160, R180	Resistor, 680 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1079 00
6	RC30BF221K	R113, R173	Resistor, 680 ohm $\pm 5\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1078 00
6	RC30BF822K	R115, R161	Resistor, 8200 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1125 00
3	RW32D801	R140	Resistor, 10,000 ohm $\pm 10\%$ 1 w	JAN-R-11	2360			745 3128 00
6			Resistor, 220 ohm $\pm 10\%$ 1 w	JAN-R-11	90			745 3058 00
6			Resistor, 8200 ohm $\pm 10\%$ 1 w	JAN-R-11	2360			745 3125 00
3			Resistor, 800 ohm $\pm 5\%$ 16 w					747 1086 00
SWITCHES								
1	-24907	(S105A, S105B)	Switch, push button, DPDT	AN-QQ-S-91	3030	MCM 1904-C2		266 0005 00
1		S104	Switch, 2 pole 4 position, 1 sect, enclosed	AN-QQ-S-91	3030	B		259 0009 00
1	ST18C	S102	Switch, Lever toggle SPNO 125 v 3 amp	JAN-S-23		Desig. on Part		266 3001 00
1	ST28N	Alternate S103	Switch, Lever toggle 4PDT Switch, Lever toggle DPDT 125 v 3 amp	JAN-S-23		Desig. on Part		266 0006 00 266 3003 00

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**TABLE 6-4b TENDER SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
TRANSFORMERS								
2	-302710	T102	Transformer, Driver type Pri: 30 ma DC unbalanced PP parallel 1500 TV	RE 13A 553B	780	8601		677 0017 00
2	-302711	T101	Transformer, Mic and speaker voice coil Pri: 3.4 ohms Secd: 100,000 ohms	RE 13A 553B	4632			677 0021 00
2	-302712	T109	Transformer, Pri: 20 ohms; Sec: 600 ohms; 0.050 w max					677 0038 00
2	-303464	T103	Transformer, Mod Pri: 3000 ohms Secd: 1250 ohms 1500 TV	RE 13A 553B	780			677 0023 00
6	-471271	T105, T106, T107	Transformer, IF interstage 5.3 mc iron core tuning	JAN-P-13	70	T		278 0007 00
2	-471271*	T108	Transformer, IF Diode 5.3 mc iron core tuning	JAN-P-13	70	T		278 0008 00
TUBES								
30	6AK5	V108, V109, V110, V111, V112	Tube, Miniature RF pentode			6AK5		254 0121 00
66	6C4	V101, V102, V103, V106, V113, V114, V116, V121, V122, V123, V124	Tube, Miniature HF power triode			6C4		254 0126 00
6	25Z6GT/G	V118, V119	Tube, Full wave, high vacuum, rectifier			25Z6GT/G		254 0493 00
6	28D7	V104, V107, V120	Tube, Double Beam power amplifier		4340	28D7		254 0279 00
9	6AQ6	V105, V115, V117	Tube, Miniature, duplex diode and high-mu triode			6AQ6		254 0595 00
SOCKETS								
2 10	-49423-A -49956	X104, X107, X120 X101, X102, X103, X105, X106, X108, X109, X110, X111, X112, X113, X114, X115, X116, X117, X121, X122, X123, X124	Socket, Bakelite, octal 7 pin Socket, Ceramic, miniature 7 pin with shield base	AN-QQ-P-421 AN-QQ-P-421	200 2570	88-8XM 277B		220 1002 00 220 1003 00
2 1	-491479-A*	X118, X119, X151 X125, X126	Socket, Bakelite, octal 8 pin Socket, Miniature Bayonet with camera type shutter	AN-QQ-P-421 AN-QQ-S-91	200 2012	88-8TM 1140		220 1005 00 262 0022 00

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Section 6

TABLE 6-4b TENDER SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
MISCELLANEOUS								
1			Concentric Cable assem, Antenna lead in (long)		830			502 1447 003
1			Concentric Cable assem, Antenna lead in (short)		830			502 3723 003
1			Cable, Rubber covered ACpower					502 1446 002
1			Insulator, Micalax, antenna coupler coil		830			502 5035 002 or 520 2453 00
20		F101	Fuses, Cartridge 3 amp 250 v		2920	1043		264 4080 00
1		J106	Holder, Bakelite, for cartridge fuse 1- $\frac{1}{4}$ " x $\frac{1}{4}$ "		530	HKM		265 1003 00
2			Terminal, Ceramic bushing with soldering lug	AN-QQ-P-421	39562	502		190 1103 00
1			Insulator, Ceramic standoff, cylindrical $\frac{3}{8}$ " x $\frac{1}{2}$ "		2410	395-L $\frac{1}{2}$		190 2329 00
4			Terminal, Ceramic bushing with soldering lug	AN-QQ-P-421	39562			190 1104 00
20			Standoff, Ceramic cylindrical $\frac{1}{4}$ " x $\frac{5}{8}$ "	JAN-I-10	700			190 1105 00
3.8'			Cord, Rubber weather proofing gasket $\frac{1}{8}$ " OD	71-2202a	4640	M-40387-D2		200 0004 00
8'			Strip, Rubber weather proofing gasket $\frac{3}{16}$ " OD	71-2202a	4640	M-40387-D2		200 0005 00
4			Shockmount, 4 to 12 lb load rating, 1- $\frac{1}{8}$ x 2- $\frac{3}{8}$ square		4640	5750 CB		200 0006 00
8		I101, I102	Bulb, Pilot lamp, Neon 1/25 w 105-125 v, External Resistance		1880	NE51		262 0021 00
1			Wrench, #8 Bristo		500			024 0019 00
1			Screwdriver, Phillips #1 Length 6"		410			024 0021 00
1			Wrench, Spintite hex size 5/16" Length 6"		4308			024 0022 00
1			Plug, Socket wiring, zinc base alloy, steel pins 1-19/32" long		42949	JE10		024 0024 00
1			Straightener, Tube pins, zinc base alloy, stainless steel insert		42949	JE13		024 0025 00
5			Mounting strap for miniature tube sockets	AN-QQ-P-421	810	1031		139 0017 00
2			Tube shield for short miniature tubes, steel cadmium plated	AN-QQ-P-421	2570	278A		141 0001 00
4			Tube Shield for tall miniature tubes, steel cadmium plated	AN-QQ-P-421	2570	278B		141 0002 00
2			Spare Parts Box		830			500 3535 004
2			Tray, for Spare Parts Box		830			500 3534 004
2			Seals, for Spare Parts Box					004 7490 00

**TABLE 6-4c STOCK SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
CAPACITORS								
14	-48848	C117, C119, C131, C133, C134, C136, C137, C142, C153, C154, C155, C169, C186, C194	Capacitor, Mica, .01 mf ±20% 1000 TV	JAN-C-5	911			935 5009 00
3	-483355	C151	Capacitor, Dry Electrolytic, triple sect 80, 40 & 40 mf -90 +250% 250 WV	JAN-C-62	911			184 9000 00
3	-483356	C120	Capacitor, Dry Electrolytic, triple sect, 20 mf per sect -90% +250% 25 WV	JAN-C-62	30			183 1001 00
4	-483357	C195, C196, C197, C198	Capacitor, Silver mica, 500 mmf ±20% 500 TV		700	B-831 Special		912 0009 00
2	-483376	C178, C179	Capacitor, Ceramic, variable, .25 mmf Min 1.5 mmf Max 1000 TV	JAN-I-10	700	830		917 1002 00
1	-483377	C176	Capacitor, Ceramic, variable, Min cap, less than 10 mmf, Max cap, greater than 100 mmf 1000 TV	AN-QQ-S-91	700	823BN		917 1003 00
1	-483379	C110	Capacitor, Variable, dual sect 15 mmf per sect	AN-QQ-P-421	44210	AP-11L-6		922 0010 00
1	-483380	C114	Capacitor, Variable, dual sect Max 28.5 mmf Min 5.0 mmf	AN-QQ-P-421	44210	AP-12L-6		922 0011 00
2	-483382	C125, C156	Capacitor, Silver mica, dual sect, 500 mmf/sect ±20% 1300 TV	71-2202a	700	837		912 0004 00
38	-483703-B20	C104, C105, C107, C109, C113, C115, C116, C124, C127, C129, C130, C132, C138, C139, C140, C141, C144, C145, C146, C148, C152, C158, C159, C160, C161, C162, C163, C164, C165, C167, C170, C171, C172, C173, C174, C181, C187, C188	Capacitor, Mica, .002 mf ±20% 600 TV	JAN-C-5	4030			909 0005 00
2		C103, C149	Capacitor, Variable, Single sect 35 mmf	AN-QQ-S-91	2140			922 0012 00

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**TABLE 6-4c STOCK SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
CAPACITORS (Cont.)								
5		C106, C123, C126, C128, C166	Capacitor, Variable, single sect 2 mmf	AN-QQ-S-91	2140			922 0009 00
3	CC20UK020D	C101, C183, C199	Capacitor, Ceramic, 2 mmf $\pm 1/2$ mmf 1000 TV	JAN-C-20	700			916 0002 00
3	CC20UK100F	C111, C112, C135	Capacitor, Ceramic, 10 mmf ± 1 mmf 1000 TV	JAN-C-20	700			916 0006 00
4	CC20UK510K	C102, C108, C147, C185	Capacitor, Ceramic, 51 mmf $\pm 10\%$ 1000 TV	JAN-C-20	700			916 0011 00
2	CC30LH100F	C191, C192	Capacitor, Tubular ceramic, 10 mmf ± 1 mmf 1000 TV					916 4041 00
1	CC30LH120K	C193	Capacitor, Tubular ceramic, 12 mmf $\pm 10\%$ 1000 TV					916 4044 00
2	CC30LH150K	C189, C190	Capacitor, Tubular ceramic, 15 mmf $\pm 10\%$ 1000 TV					916 4048 00
2	CC30UJ101M	C150, C168	Capacitor, Tubular ceramic, 100 mmf, $\pm 20\%$ 1000 TV					916 4061 00
3	CE63B200J	C118	Capacitor, Dry Electrolytic, 20 mf -90% $+250\%$ 150 WV	JAN-C-62	911			184 6509 00
3	CP50B1FE254	C121	Capacitor, Paper .25 mf $+40$ -15% 400 WV		911			961 4014 00
5	CP51B5FE104	C122, C143	Capacitor, Paper, triple sect .1 mf/sect $+40$ -15% 400 WV	C-950	911	DYRT		961 5050 00
METERS								
1		M101	Meter, 2 ma DC 20 mv $\pm 3\%$ at 25 °C (Submersion proof) with cord and plug	71-2202a				458 0016 00
1	-40215	E101	Thermocouple, RF 0-0.5 amp for use with 0-2 ma meter	C39.4-1943	4197			457 0003 00
JACKS AND RECEPTACLES								
2	AN3057-4		Connector Clamp, use with connector 357 5000 00	AN 3057	630			357 8001 00
2	AN3057-8	J701	Connector Clamp, use with connector 357 4001 00	AN 3057	630			357 8003 00
2	AN3102-12S-3S	J105	Connector, Box mtg, socket insert, 2 conductor 200 volt 5 amp	AN-W-C-591	630			357 2001 00
2	AN3102-145-53	J101	Connector, Microphone 5 term box mtg socket type RB size 14	AN-9534	630			357 2000 00

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**TABLE 6-4c STOCK SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spel. Tol. or Mod.	Contractor's Drawing or Part Number
JACKS AND RECEPTACLES (Cont.)								
2	AN3106-12S-3P		Connector, Cable plug, pin insert, 2 conductor 200 v 5 amp	AN-W-C-591	630			357 5000 00
2	AN3106-16S-4S	J701	Connector, Cable plug, socket insert, 2 conductor, 200 v 10 amp	AN-W-C-591	630			357 4001 00
2	-49451		Connector, Weather-proof, splice connection for coaxial cable	RE-49F-188				357 9000 00
2	-49470	J103	Connector, Antenna, wall mtg socket for coaxial cable	RE-49F-188				357 9003 00
2		J102	Connector, Metering jack 3 conductor for 3/16" barrel plug	AN-QQ-S-91	3240			358 1100 00
2		J104	Connector, Box mtg, pin insert, 2 conductor, 200 v 10 amp	AN-W-C-591	630			357 3001 00
8			Connector, Jack for small crystal	AN-QQ-S-91	204			360 0001 00
8			Connector, Jack for large crystal		2570	74		360 2020 00
RELAYS								
5	-29754	K102, K103	Relay, Circuit Control, 2 common, DPDT coil 115 v DC	AN-QQ-S-91	284	Desig. on Part		972 1002 00
3	-29755	K101	Relay, Circuit Control 4 common, 4 PDT coil 115 v DC	AN-QQ-S-91	284	Desig. on Part		972 1003 00
3	-29756	K104	Relay, Circuit Control SPDT, coil 115 v DC	AN-QQ-S-91	284	Desig. on Part		972 1004 00
INDUCTORS								
3	-302713	L116	Inductor, 0-60 cps, 1.5 hy 100 ma, 1500 TV	RE 13A 553B	780			678 0018 00
3	-302714	L115	Inductor, 0-60 cps 3 hy 60 ma, 1500 TV	RE 13A 553B	780			678 0019 00
3	-302715	L130	Inductor, 0-60 cps 15 hy 60 ma, 1500 TV	RE 13A 553B	780			678 0020 00
3		L101	Inductor, Xmtr osc plate, 25 turns of #24 En wire on a ceramic form 3/8 x 1-1/4		830			502 1352 002
3		L102	Inductor, Doubler, 12 turns of #21 wire on a ceramic form 3/8 x 1-1/4		830			502 1351 002

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TABLE 6-4c STOCK SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
INDUCTORS (Cont.)								
1		L103	Inductor, Driver, 10 turns of #12 wire, silver plated, spaced wound, center tapped, 1/2 inch diam		830			502 1350 002
18		L104, L105, L106, L107, L124, L125	Inductor, 2.7 μh 300 ma 45 turns of #30 S.C.C. En	AN-QQ-S-91	4230			240 0012 00
1		L108	Inductor, Final tank, 6 turns spaced wound, #12 wire silver plated		830			502 1346 002
1		L109	Inductor, Antenna coupler 1 turn #12 wire silver plated		830			502 1443 002
3		L111	Inductor, RF assem, 7 turns #18 En wire on form 3/8 x 1-3/8		830			502 1347 002
3		L113	Inductor, Quadrupler assem L113, 6 turns #18 En wire on form 3/8 x 1-3/8		830			502 1348 002
3		L114	Inductor, Rec osc plate, 25 turns of #24 En wire on a ceramic form 3/8 x 1-1/4					502 1345 002
3		L118, L119	Inductor, Converter assem L118, 7 turns #18 En wire L119, 7 turns #18 En wire (L118, L119 on one form)		830			502 1349 002
12		L120, L121, L122, L123	Inductor, 9.8 μh 300 ma 80 turns #30 wire	AN-QQ-S-91	4230			240 0011 00
3		L126	Inductor, Suppressor coil #20 wire		630			502 3751 002
3		L129	Inductor, 34 μh 100 ma 140 turns #35 wire	AN-QQ-S-91	4230			240 0010 00
CONNECTORS								
8	-49268	P401, P402, P501, P502	Connector, Weatherproof plug for coaxial cable	RE-49F-188				357 9001 00
2		P701	Connector, Rubber plug 2 conductor 10 amp 250 v 15 amp 125 v	AN-QQ-S-91	2232	9940 Special		368 0011 00
RESISTORS								
10	-632502-0R24	R152, R166	Resistor, .24 ohm ±5% 1000 TV 1/2 w	JAN-R-11	2360	BW 1/2		707 0002 00
10	-632502-1R0	R108, R142	Resistor, 1 ohm ±5% 1/2 w	JAN-R-11	2360	BW 1/2		707 0047 00
10	-632502-2R4	R105, R144	Resistor, 2.4 ohm ±5% 1/2 w	JAN-R-11	2360	BW 1/2		707 0074 00

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**TABLE 6-4c STOCK SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
RESISTORS (Cont.)								
5	-633831	R141	Resistor, 3400 ohm $\pm 5\%$ 8 w					747 9005 00
5	-633847	R110, S101	Resistor, 500,000 ohm Potentiometer with DPST switch	AN-QQ-S-91	700	Midget Series 3		380 0001 00
5	-633848	R145	Resistor, 5000 ohm Potentiometer		700			380 0002 00
20	RC20BF103K	R103, R137, R138, R169 Alternate	Resistor, 10,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1128 00
			Resistor, 10,000 ohm $\pm 5\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1127 00
65	RC20BF104K	R112, R119, R130, R134, R136, R149, R150, R154, R155, R156, R163, R164, R179	Resistor, 100,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1170 00
5	RC20BF105K	R148	Resistor, 1 meg $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1212 00
10	RC20BF183K	R167, R168	Resistor, 18,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1139 00
35	RC20BF222K	R111, R121, R124, R127, R129, R151, R153	Resistor, 2200 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1100 00
25	RC20BF223K	R102, R133, R157, R158, R181 Alternate	Resistor, 22,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1142 00
5	RC20BF332K	R104 Alternate	Resistor, 22,000 ohm $\pm 5\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1141 00
15	RC20BF471K	R123, R126, R128	Resistor, 3300 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1107 00
10	RC20BF472K	R101, R135	Resistor, 3300 ohm $\pm 5\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1106 00
5	RC20BF473K	R139	Resistor, 470 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1072 00
			Resistor, 4700 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1114 00
40	RC20BF474K	R109, R117, R122, R125, R131, R132, R146, R162	Resistor, 47,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1156 00
15	RC20BF681K	R114, R118, R120 Alternate	Resistor, 470,000 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1198 00
25	RC20BF822K	R107, R175, R176, R177, R178	Resistor, 680 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1079 00
20	RC30BF103K	R106, R159, R160, R180	Resistor, 680 ohm $\pm 5\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1078 00
10	RC30BF221K	R113, R173	Resistor, 8200 ohm $\pm 10\%$ $\frac{1}{2}$ w	JAN-R-11	2360			745 1125 00
10	RC30BF822K	R115, R161	Resistor, 10,000 ohm $\pm 10\%$ 1 w	JAN-R-11	2360			745 3128 00
5	RW32D801	R140	Resistor, 220 ohm $\pm 10\%$ 1 w	JAN-R-11	90			745 3058 00
			Resistor, 8200 ohm $\pm 10\%$ 1 w	JAN-R-11	2360			745 3125 00
			Resistor, 800 ohm $\pm 5\%$ 16 w					747 1086 00

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**TABLE 6-4c STOCK SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
SWITCHES								
1	ST28N	S102	Switch, Lever toggle DPDT 125 v 3 amp	JAN-S-23	18800	Desig. on Part		266 3003 00
1	ST28N	Alternate S102* S103	Switch, Lever toggle 4PDT Switch, Lever toggle DPDT 125 v 3 amp	JAN-S-23		Desig. on Part		266 0006 00 266 3003 00
1		S104	Switch, 2 pole 4 position, 1 sect, enclosed	AN-QQ-S-91	3030	B		259 0009 00
1	-24907	(S105A, S105B)	Switch, Push button, DPDT	AN-QQ-S-91	3030	MCM 1904-C2		266 0005 00
* Used in equipments with Serial Nos. above 1536.								
TRANSFORMERS								
3	-302710	T102	Transformer, Driver type Pri: 30 ma DC unbalanced PP parallel 1500 TV	RE 13A 553B	780	8601		677 0017 00
3	-302711	T101	Transformer, Mic and speaker voice coil Pri: 3.4 ohms Secd: 100,000 ohms	RE 13A 553B	4632			677 0021 00
3	-302712	T109	Transformer, Pri: 20 ohms Sec: 600 ohms; 0.050 w max					677 0038 00
3	-303464	T103	Transformer, Mod Pri: 3000 ohms Secd: 1250 ohms 1500 TV	RE 13A 553B	780			677 0023 00
9	-471271	T105, T106, T107	Transformer, IF interstage 5.3 mc iron core tuning	JAN-P-13	70	T		278 0007 00
3	-471271*	T108	Transformer, IF Diode 5.3 mc iron core tuning	JAN-P-13	70	T		278 0008 00
SOCKETS								
3	-49423-A	X104, X107, X120	Socket, Bakelite, loktal 7 pin	AN-QQ-P-421	200	88-8XM		220 1002 00
19	-49956	X101, X102, X103, X105, X106, X108, X109, X110, X111, X112, X113, X114, X115, X116, X117, X121, X122, X123, X124	Socket, Ceramic, miniature 7 pin with shield base	AN-QQ-P-421	2570	277B		220 1003 00
3	-491479-A*	X118, X119, X151	Socket, Bakelite, octal 8 pin	AN-QQ-P-421	200	88-8TM		220 1005 00
2		X125, X126	Socket, Miniature Bayonet with camera type shutter	AN-QQ-S-91	2012	1140		262 0022 00
MISCELLANEOUS								
2		E601	Antenna, Coaxial, portable, freq range 60-80 mc	71-2202a	2570			013 0001 00
		Alternate	Antenna, Coaxial, portable, freq range 60-80 mc	71-2202a				013 0002 00

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**TABLE 6-4c STOCK SPARE PARTS LIST BY NAVY TYPE NUMBERS
FOR NAVY MODEL MBF RADIO TRANSMITTING AND RECEIVING EQUIPMENT**

Quan.	Navy or JAN Type Number	All Symbol Designations Involved	Description	Navy Spec. or Dwg. No.	Mfr. Code	Mfr's. Designation	Spcl. Tol. or Mod.	Contractor's Drawing or Part Number
MISCELLANEOUS (Cont.)								
2			Concentric Cable assem, Antenna lead in (long)		830			502 1447 003
2			Concentric Cable assem, Antenna lead in (short)		830			502 3723 003
2			Cable, Rubber covered AC power					502 1446 002
1			Insulator, Micalox, antenna coupler coil		830			502 5035 002 or 520 2453 00
50		F101	Fuses, Cartridge 3 amp 250 v		2920	1043		264 4080 00
1		J106	Holder, Bakelite, for cartridge fuse 1-1/4" x 1/4"		530	HKM		265 1003 00
4			Terminal, Ceramic bushing with soldering lug	AN-QQ-P-421	39562	502		190 1103 00
2			Insulator, Ceramic standoff, cylindrical 3/8" x 1/2"		2410	395-L1 1/2		190 2329 00
8			Terminal, Ceramic bushing with soldering lug	AN-QQ-P-421	39562			190 1104 00
38			Standoff, Ceramic cylindrical 1/4" x 5/8"	JAN-I-10	700			190 1105 00
7.6			Cord, Rubber weather proofing gasket 1/8" OD	71-2202a	4640	M-20387-D2		200 0004 00
16			Strip, Rubber weather proofing gasket 3/16" OD	71-2202a	4640	M-40387-D2		200 0005 00
4			Shockmount, 4 to 12 lb load rating, 1-1/8 x 2-3/8 square		4640	5750 CB		200 0006 00
12		I101, I102	Bulb, Pilot lamp, Neon 1/25 w 105-125 v, External Resistance		1880	NE51		262 0021 00
2			Wrench, #8 Bristo		500			024 0019 00
2			Screwdriver, Phillips #1 Length 6"		410			024 0021 00
2			Wrench, Spintite hex size 5/16" Length 6"		4308			024 0022 00
2			Plug, Socket wiring, zinc base alloy, steel pins 1-19/32" long		42949	JE10		024 0024 00
2			Straightener, Tube pins, zinc base alloy, stainless steel insert		42949	JE13		024 0025 00
7			Mounting strap for miniature tube sockets	AN-QQ-P-421	810	1031		139 0017 00
3			Tube Shield for short miniature tubes, steel cadmium plated	AN-QQ-P-421	2570	278A		141 0001 00
7			Tube, Shield for tall miniature tubes, steel cadmium plated	AN-QQ-P-421	2570	278B		141 0002 00

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6-41

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Section 6

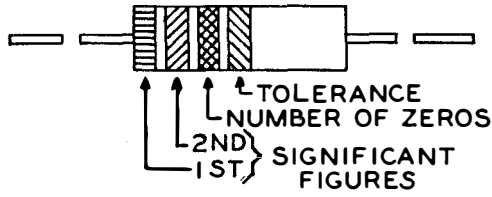
TABLE 6-5 APPLICABLE COLOR CODES AND MISCELLANEOUS DATA

TABLE 6-5a MBF HOOKUP WIRE CODE

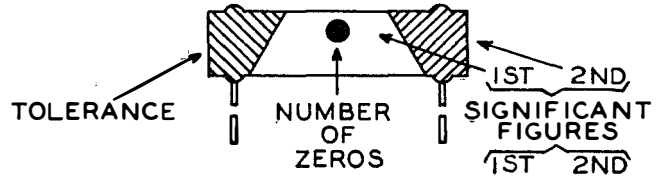
Numerals Refer to Color Code
Letters Refer to Wire Size

COLOR CODE	COLOR	WIRE SPECIFICATIONS
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 A11 A12	Black Brown Red Orange Yellow Green Blue Violet Gray White Tan Pink	Hookup wire, Navy Type SRIR Cable in accordance with JAN-C-76. No. 22 AWG Stranded (7 strands) Plastic insulation covering 1000 volt rating.
K0	Black	Shielded Hookup wire, Navy Type SRIR Cable in accordance with JAN-C-76. No. 22 AWG Stranded (7 strands) with shield braid over the cable.

TABLE 6-5b COLOR CODE FOR FIXED RESISTORS—Values in Ohms



Resistor with axial wire leads.



Resistor with radial wire leads.

BODY		END		DOT OR BAND		END	
1st Band		2nd Band		3rd Band		End Band	
Color	Value	Color	Value	Color	Value	Color	Tolerance
Black	0	Black	0	Gold	0.1	Gold	(J) ± 5%
Brown	1	Brown	1	Silver	0.01	Silver	(K) ± 10%
Red	2	Red	2	Black	None	None	(M) ± 20%
Orange	3	Orange	3	Brown	0		
Yellow	4	Yellow	4	Red	00		
Green	5	Green	5	Orange	000		
Blue	6	Blue	6	Yellow	0000		
Violet	7	Violet	7	Green	00000		
Grey	8	Grey	8	Blue	000000		
White	9	White	9	Violet	0000000		
				Grey	00000000		
				White	000000000		

EXAMPLE OF AXIAL-LEAD RESISTOR

Band	Color	Significant Figures		Number of Zeros	Tolerance
		1st	2nd		
1	red	2	..	..	....
2	orange	..	3	..	....
3	yellow	..	..	0000	....
4	gold	..	..	..	±5%

The resistance of this resistor is 230,000 ohms ±5%

EXAMPLE OF RADIAL-LEAD RESISTOR

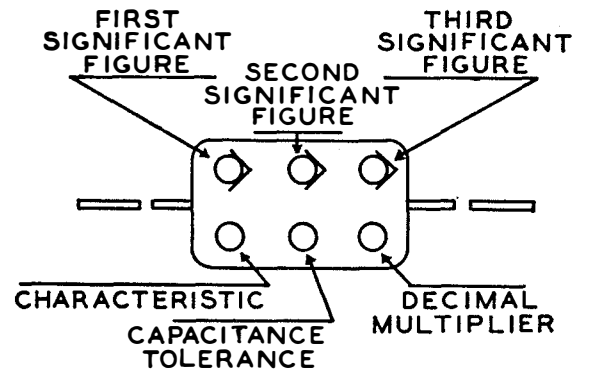
Position	Color	Significant Figures		Number of Zeros	Tolerance
		1st	2nd		
body	orange	3	..	..	....
end	blue	..	6	..	....
dot	green	..	..	00000	....
end	silver	..	..	..	±10%

The resistance of this resistor is 3,600,000 ohms ±10%

TABLE 6-5c COLOR CODE FOR FIXED MICA CAPACITORS

Color	CAPACITANCE*		Tolerance	Characteristic
	Significant Figure	Decimal Multiplier		
Black	0	1	20% (M)	A
Brown	1	10	1%	B
Red	2	100	2% (G)	C
Orange	3	1000	3%	D
Yellow	4	....	4%	E
Green	5	....	5%	F
Blue	6	....	6%	G
Violet	7	....	7%	..
Gray	8	....	8%	..
White	9	....	9%	..
Gold	..	0.1	5%	..
Silver	..	0.01	10% (K)	..

* Capacitance in micromicrofarads.



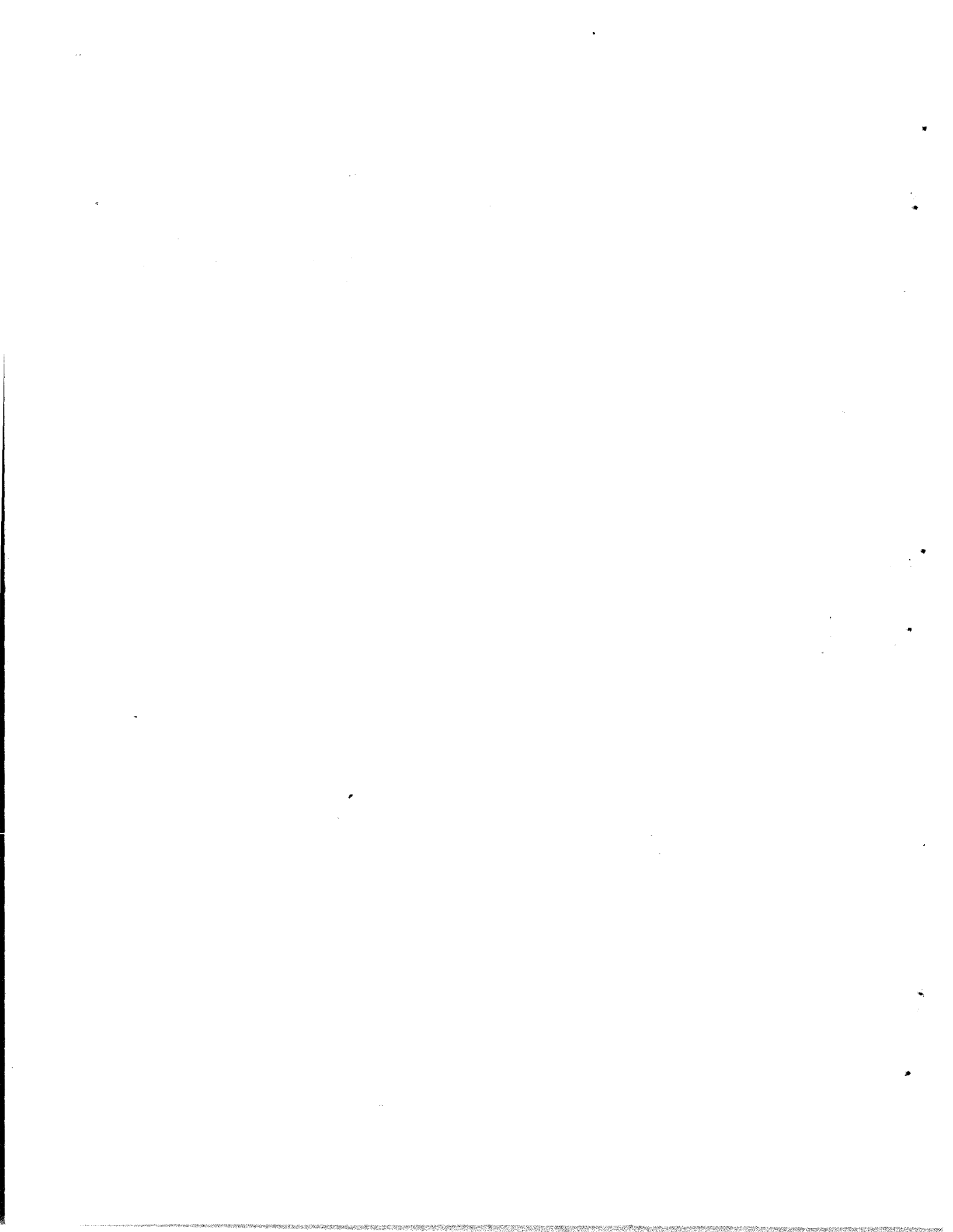
Color code scheme for JAN standard fixed mica capacitors. The significance of the letters denoting "characteristic" will be found in the Joint Army-Navy Specification JAN-C-5.

TABLE 6-6 LIST OF MANUFACTURERS

Num. Code	Alpha. Code	Name Address	Num. Code	Alpha. Code	Name Address
30	06A	Aerovox Corporation 740 Belleville Avenue New Bedford, Mass.	2140	05H	Hammarlund Mfg. Co., Inc. 460 West 34th Street New York 1, New York
70	16A	Aladdin Radio Ind., Inc. 223 West Jackson Blvd. Chicago, Illinois	2232	80H	Harvey Hubbell, Inc. 1930 Thomas Street Bridgeport, Conn.
90	22A	Allen-Bradley Company 136 West Greenfield Avenue Milwaukee 4, Wisconsin	2360	28J	International Resist. Co. 401 North Broad Street Philadelphia 8, Penna.
200	60A	American Phenolic Corp. 1830 South 54th Ave. Chicago 50, Cicero P.O. Illinois	2410		Isolantite, Inc. Belleville, New Jersey
204	62A	American Radio Hardware Co. 476 Broadway New York, New York	2570	77J	E. F. Johnson Company Waseca, Minnesota
284		Automatic Elect. Sales Corp. 1033 W. Van Buren Street Chicago 7, Illinois	2850	30L	Lavelle Rubber Company 424 North Wood Street Chicago, Illinois
410	48B	Bonney Forge & Tool Works Allentown, Penna.	2920	78L	Littelfuse, Incorporated 4757 Ravenswood Avenue Chicago 40, Illinois
500	72B	Bristol Company 66 Bride Street Waterbury 91, Conn.	3030	10M	P. R. Mallory & Co., Inc. 3029 East Washington St. Indianapolis, Indiana
530	97B	Bussmann Mfg. Co. Div. of the McGraw Elec. Co. University at Jefferson St. Louis, Missouri	3050		Marshall Huschart Mach. Co. 571 Washington Blvd. at JE Chicago 6, Illinois
630	10C	Cannon Elect. Development 3209 Humboldt Street Los Angeles 31, Calif.	3240	21N	National Fabricated Prod. 2650 West Belden Ave. Chicago 47, Illinois
700	25C	Centralab 900 E. Keefe Avenue Milwaukee, Wisconsin	4030	02S	Sangamo Electric Co. 1935 Funk Street Springfield, Illinois
780	55C	Chicago Transformer Corp. 3501 Addison Street Chicago 18, Illinois	4197	58S	Simpson Electric Co. 5200-18 W. Kinzie Street Chicago 44, Illinois
810	60C	Cinch Manufacturing Corp. 2335-2347 W. Buren Street Chicago 12, Illinois	4230	65S	Speer Resistor Corp. St. Marys, Penna.
830	64C	Collins Radio Company 855 35th Street NE Cedar Rapids, Iowa	4308		Stevens Walden, Inc. 475 Shrewsbury St. Worcester, Mass.
911	75C	Cornell-Dubilier Corp. 333 Hamilton Blvd. South Plainfield 6, N. J.	4632		United Transformer Corp. 150 Varick Street New York 13, New York
1880		General Electric Co. 1 Plastics Avenue Pittsfield, Mass.	4640	53U	United States Rubber Co. 440 W. Washington St. Chicago 6, Illinois
2012		Gothard Manufacturing Co. Springfield, Illinois	10100		Cutler Hammer, Inc. 315 N. 12th St. Milwaukee, Wisconsin
			18800		General Electric Co. 1 Plastics Ave. Pittsfield, Mass.

TABLE 6-6 LIST OF MANUFACTURERS

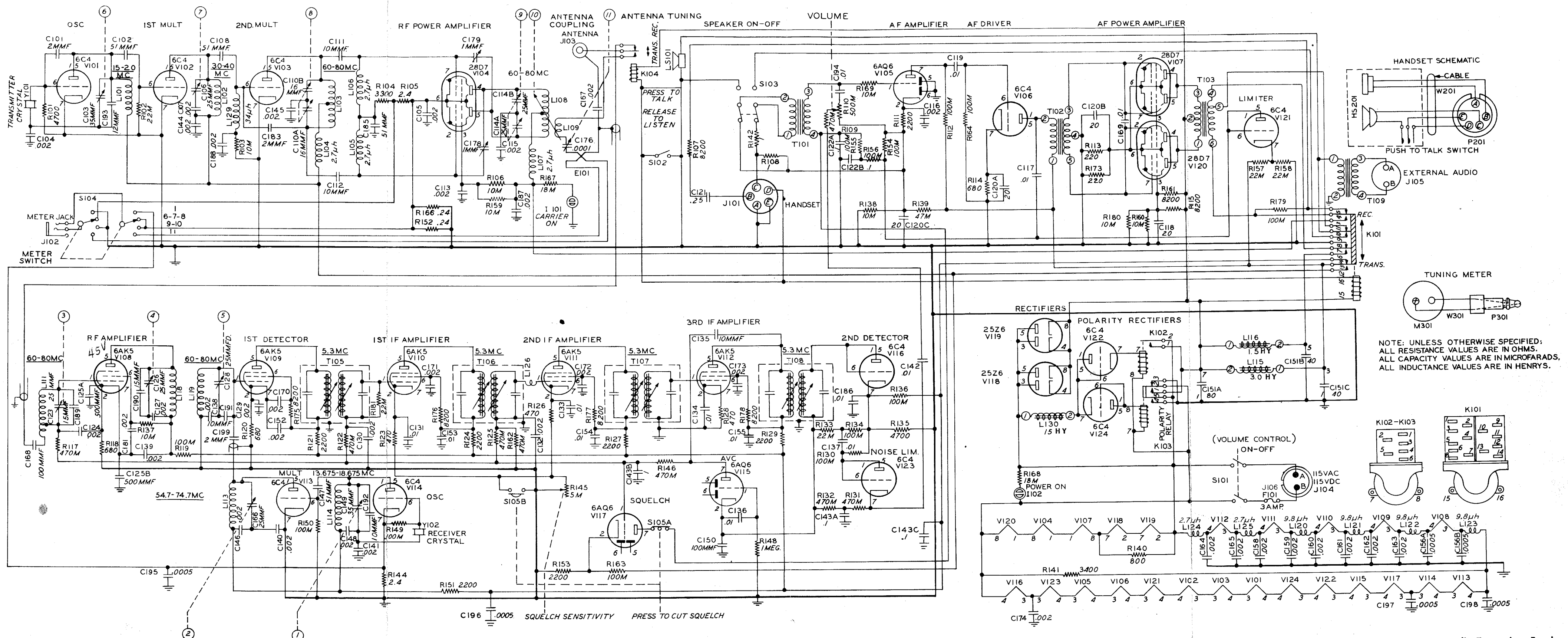
<u>Num. Code</u>	<u>Alpha. Code</u>	<u>Name Address</u>	<u>Num. Code</u>	<u>Alpha. Code</u>	<u>Name Address</u>
20430		The First National Bank Assignee of Groves Corp. Cape Girardeau, Missouri	39562		Rohden Mfg. Co. 1753 N. Honore Street Chicago, Illinois
33100		National Union Radio Corp. 1181 McCarter Highway Newark, New Jersey	42949		Star Expansion Bolt Co. 147-149 Cedar Street New York, New York
38110		Radio Corp. of America Camden, New Jersey	44210		Telradio Engineering Corp. 99 Wall Street New York 5, N. Y.
			88662		United Transformer Corp. 148 Varick Street New York, N. Y.



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NOTE: UNLESS OTHERWISE SPECIFIED:
 ALL RESISTANCE VALUES ARE IN OHMS.
 ALL CAPACITY VALUES ARE IN MICROFARADS.
 ALL INDUCTANCE VALUES ARE IN HENRYS.

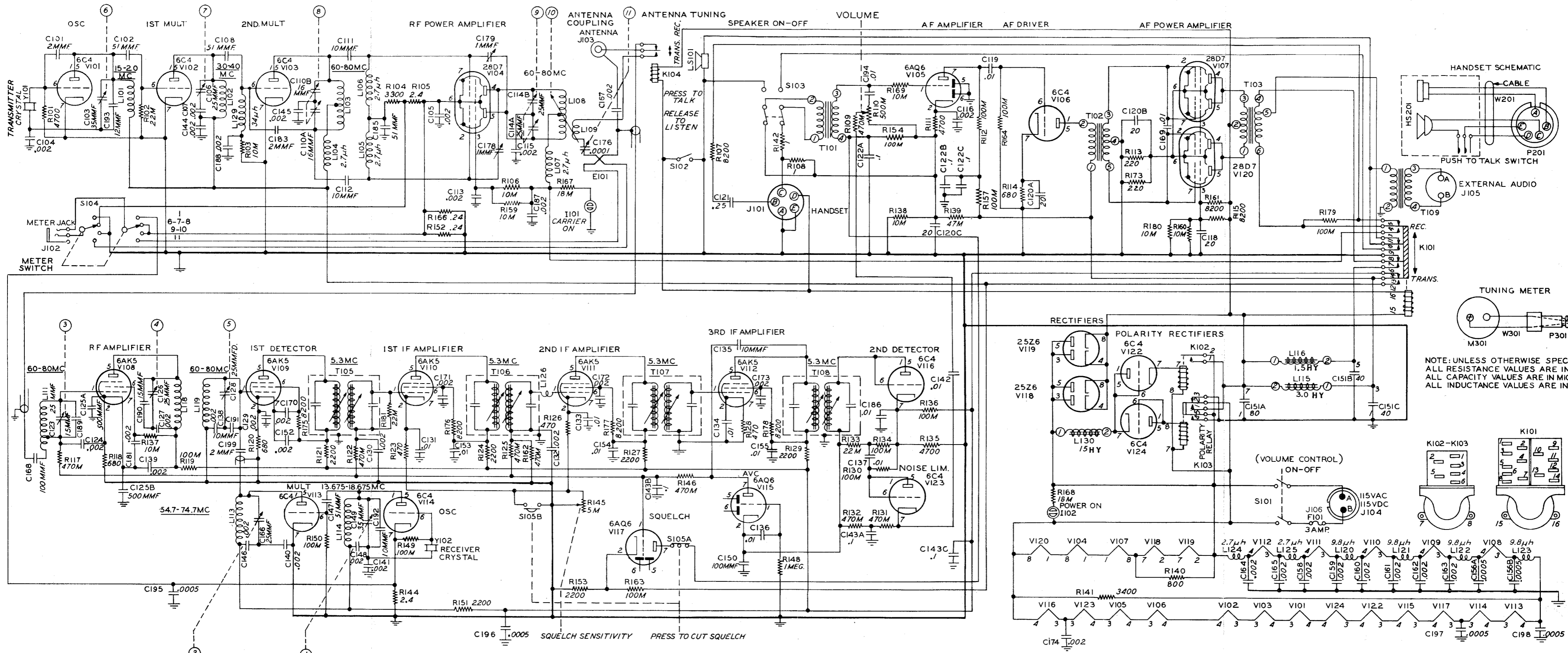
NOTE: This schematic applies only to equipments with
 Navy Serial No. 1 to 479.

Figure 7-1A—Navy Type COL-43065 Radio Transmitter-Receiver
 Complete Schematic

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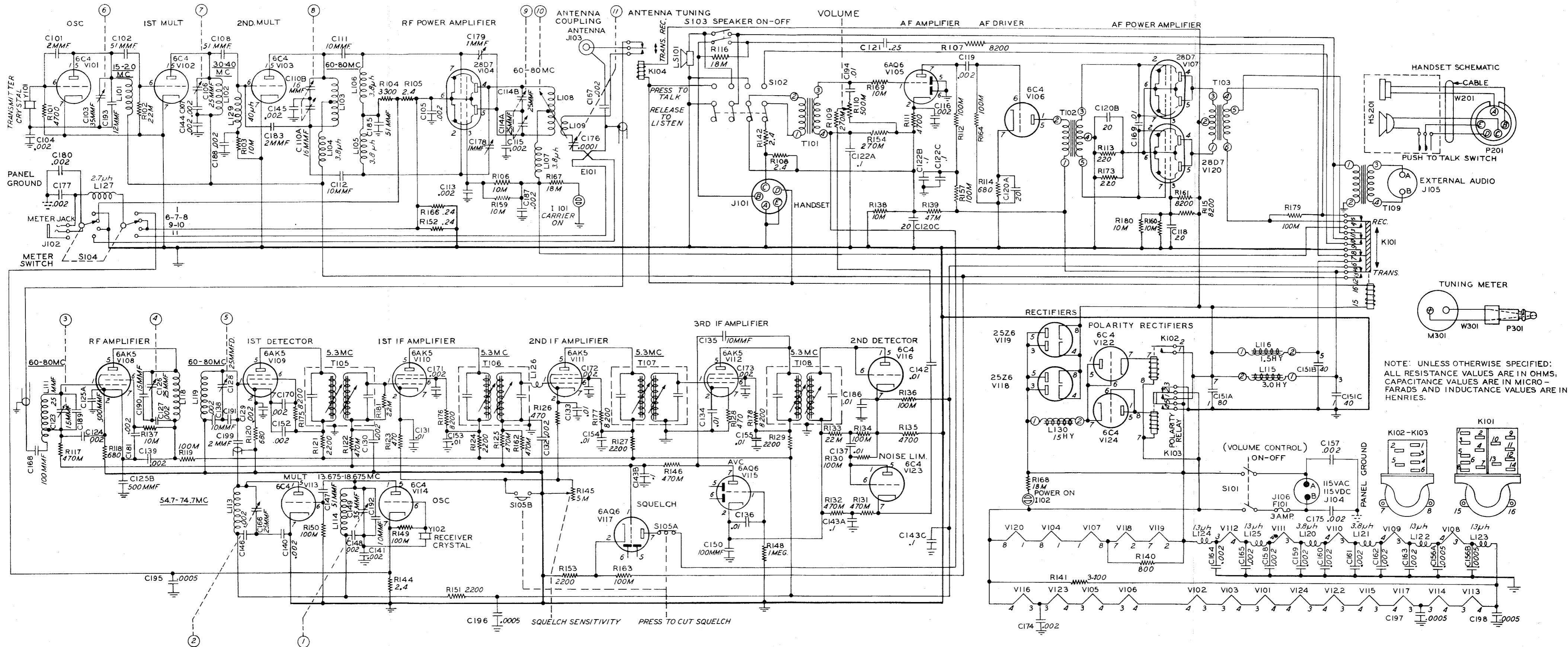
NOTE: This schematic applies only to equipments with Navy Serial No. 480 to 1536.

Figure 7-1B—Navy Type COL-43065 Radio Transmitter-Receiver Complete Schematic

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NOTE: This schematic applies only to equipments with Navy Serial No. 1537 to 2126.

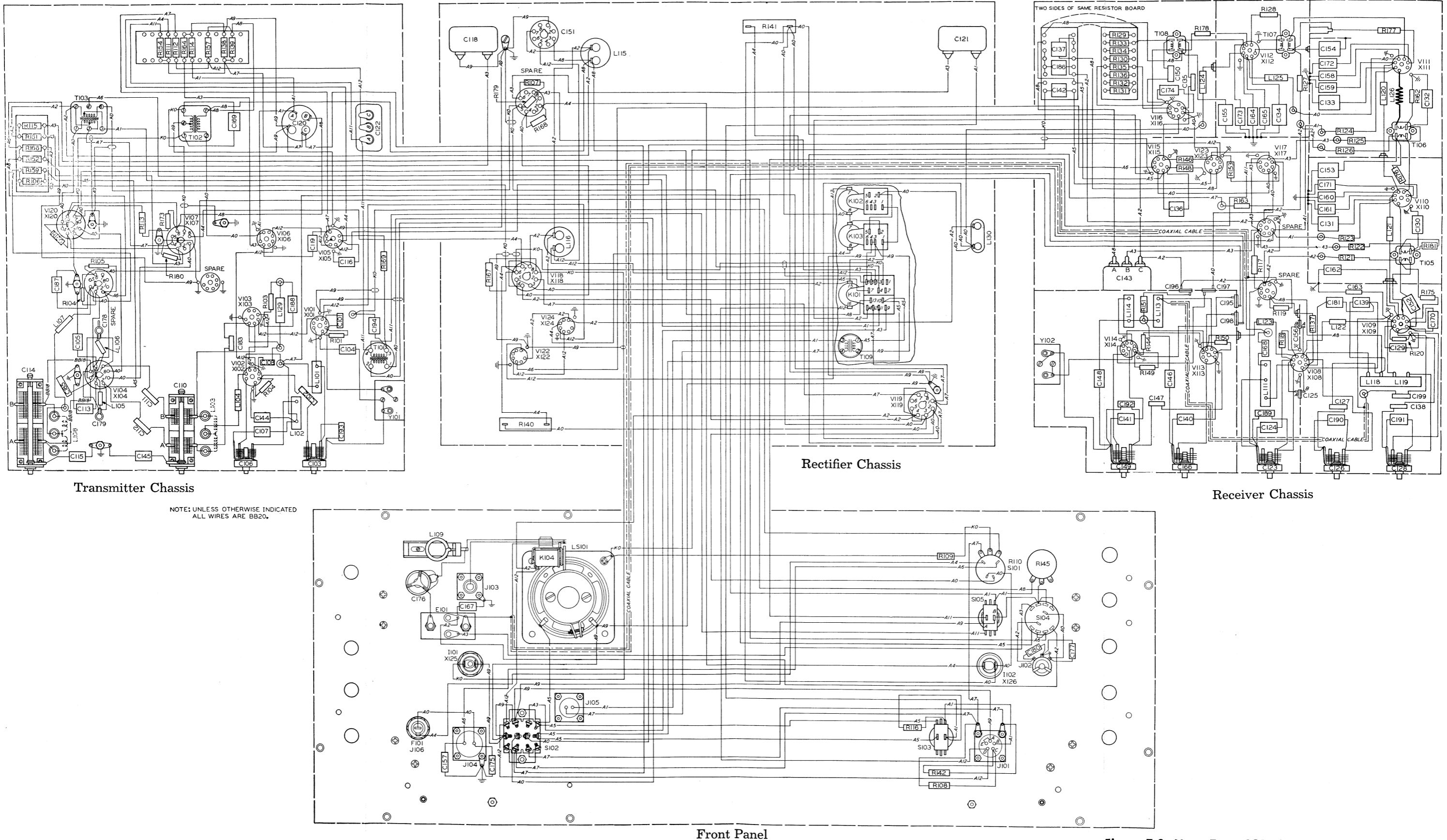
Figure 7-1C—Navy Type COL-43065 Radio Transmitter-Receiver Complete Schematic

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7-1C, 2C



Transmitter Chassis

Rectifier Chassis

Receiver Chassis

Front Panel

Figure 7-2—Navy Type COL-43065 Transmitter-Receiver, Practical Wiring Diagram

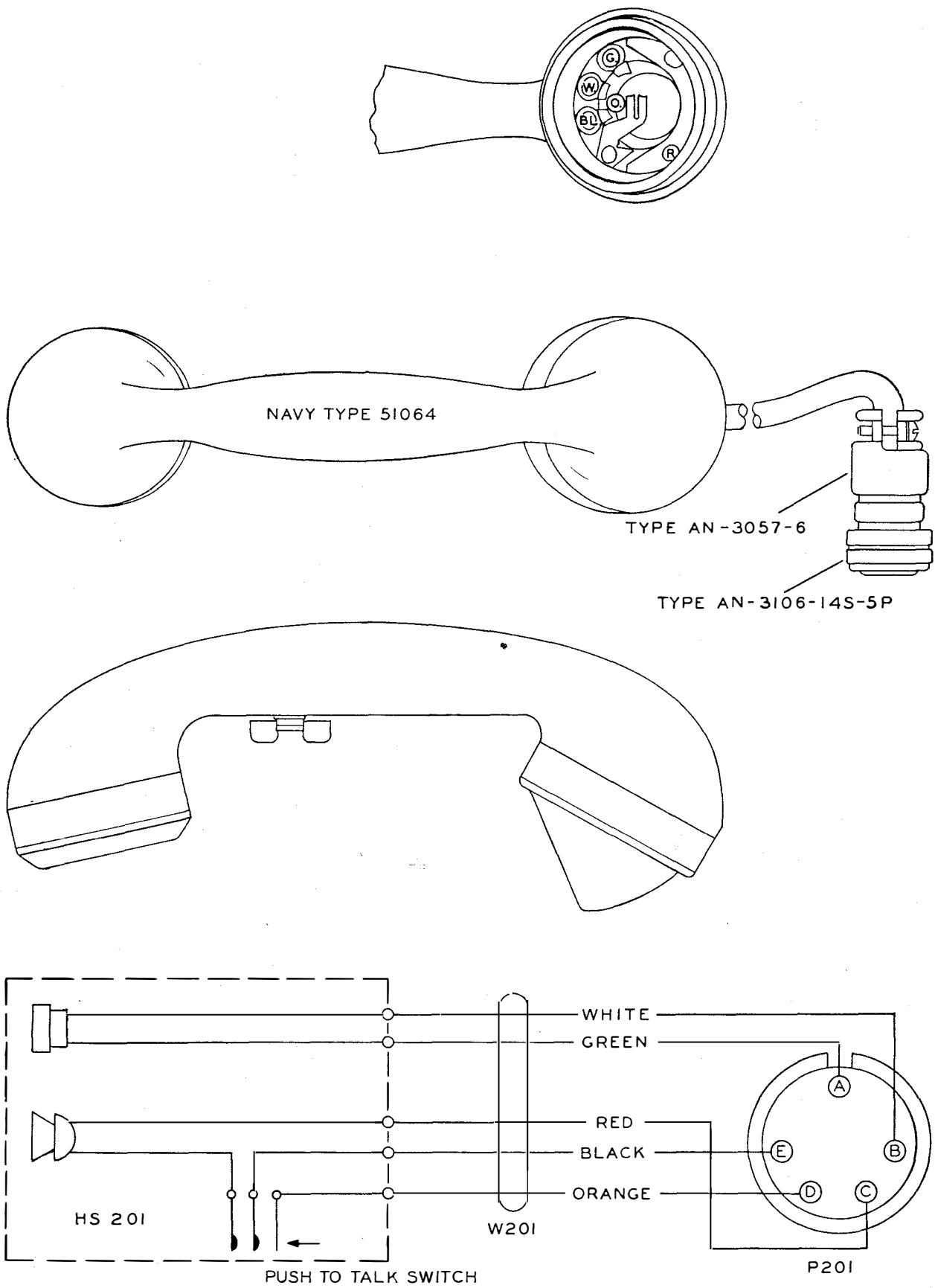


Figure 7-3—Details of Handset and Cord

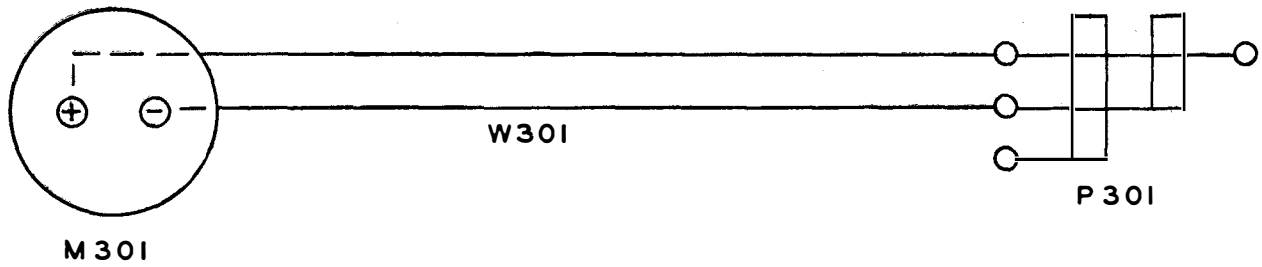
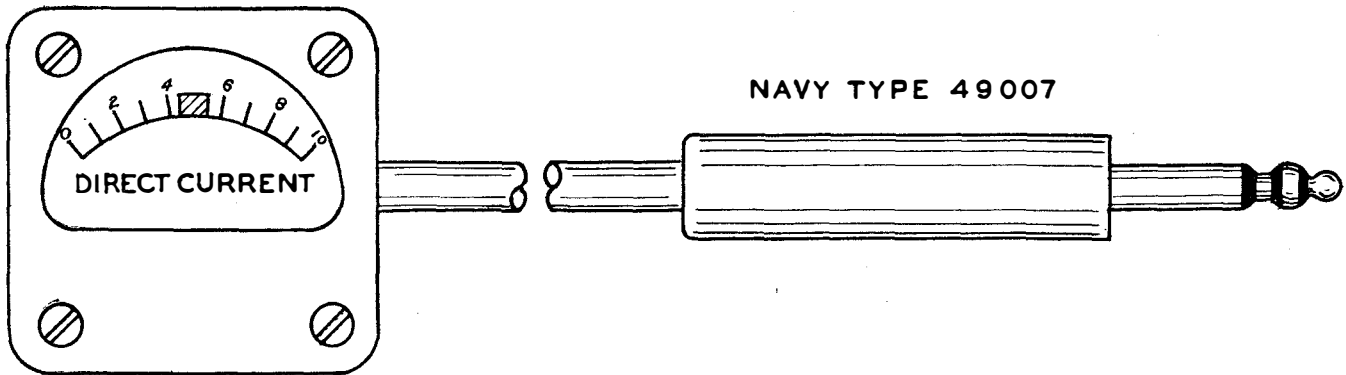


Figure 7-4—Details of Tuning Meter

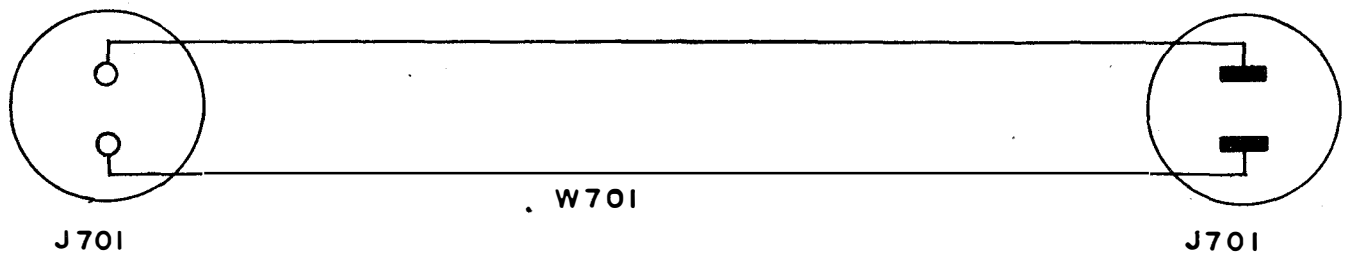
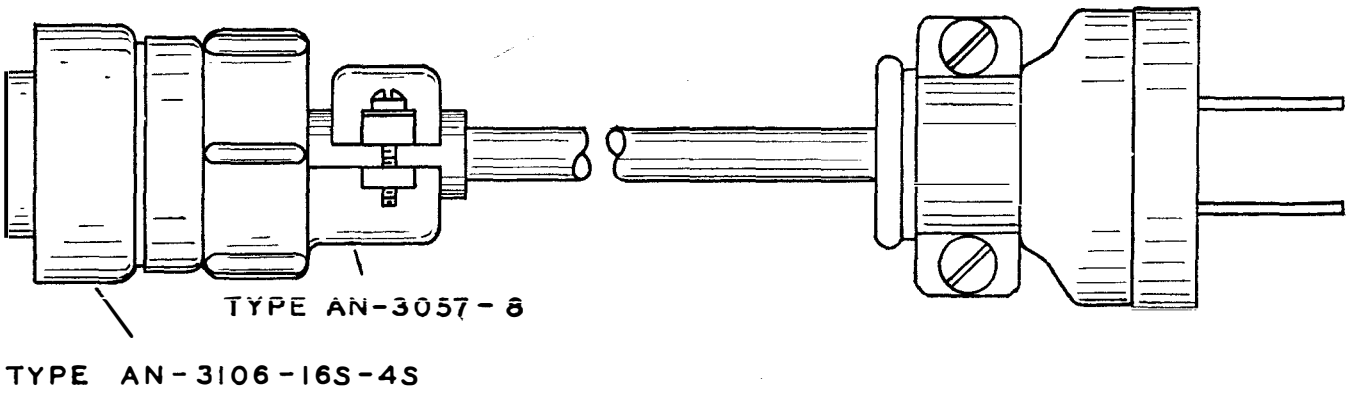


Figure 7-5—Details of Power Cord

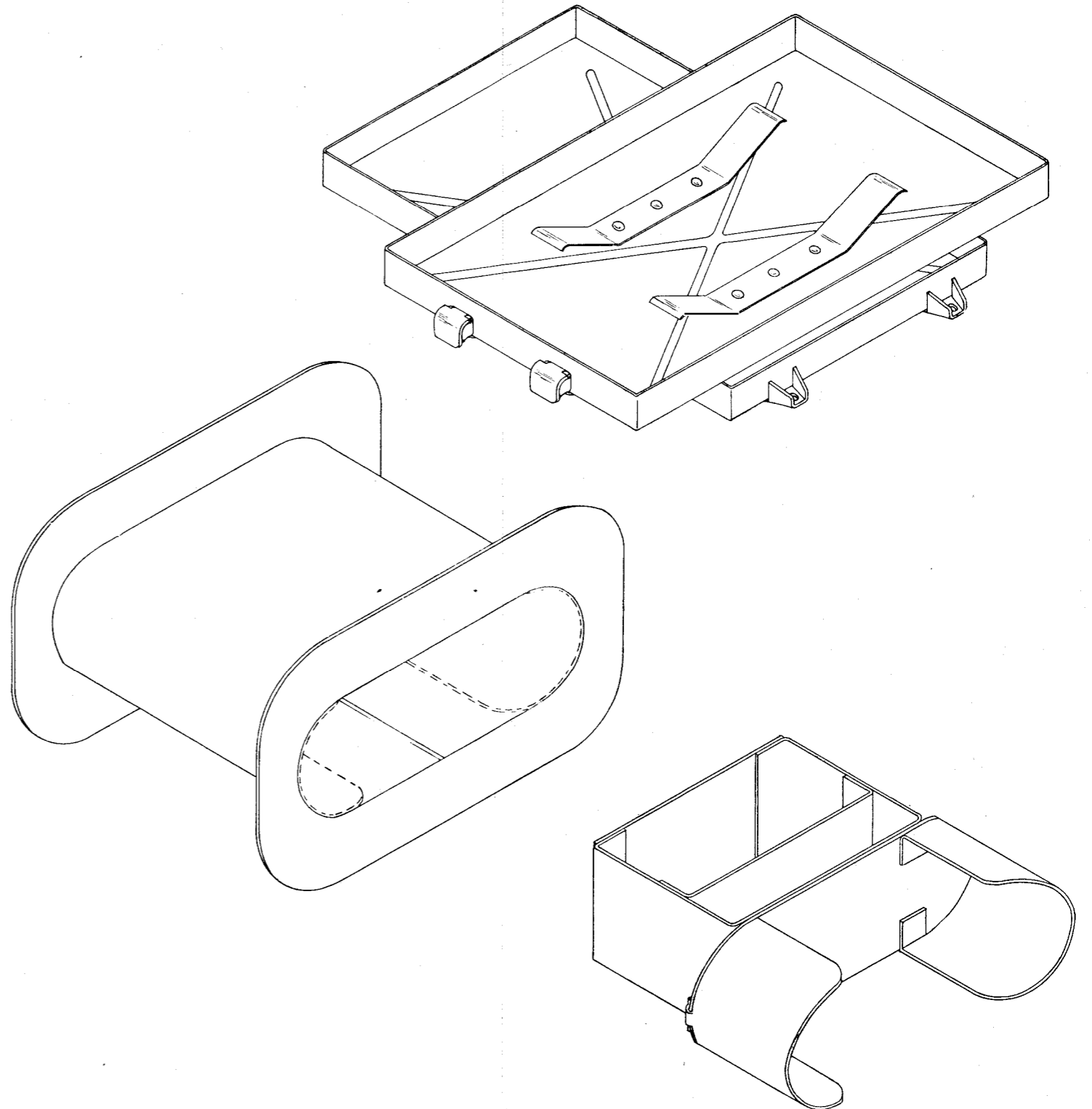
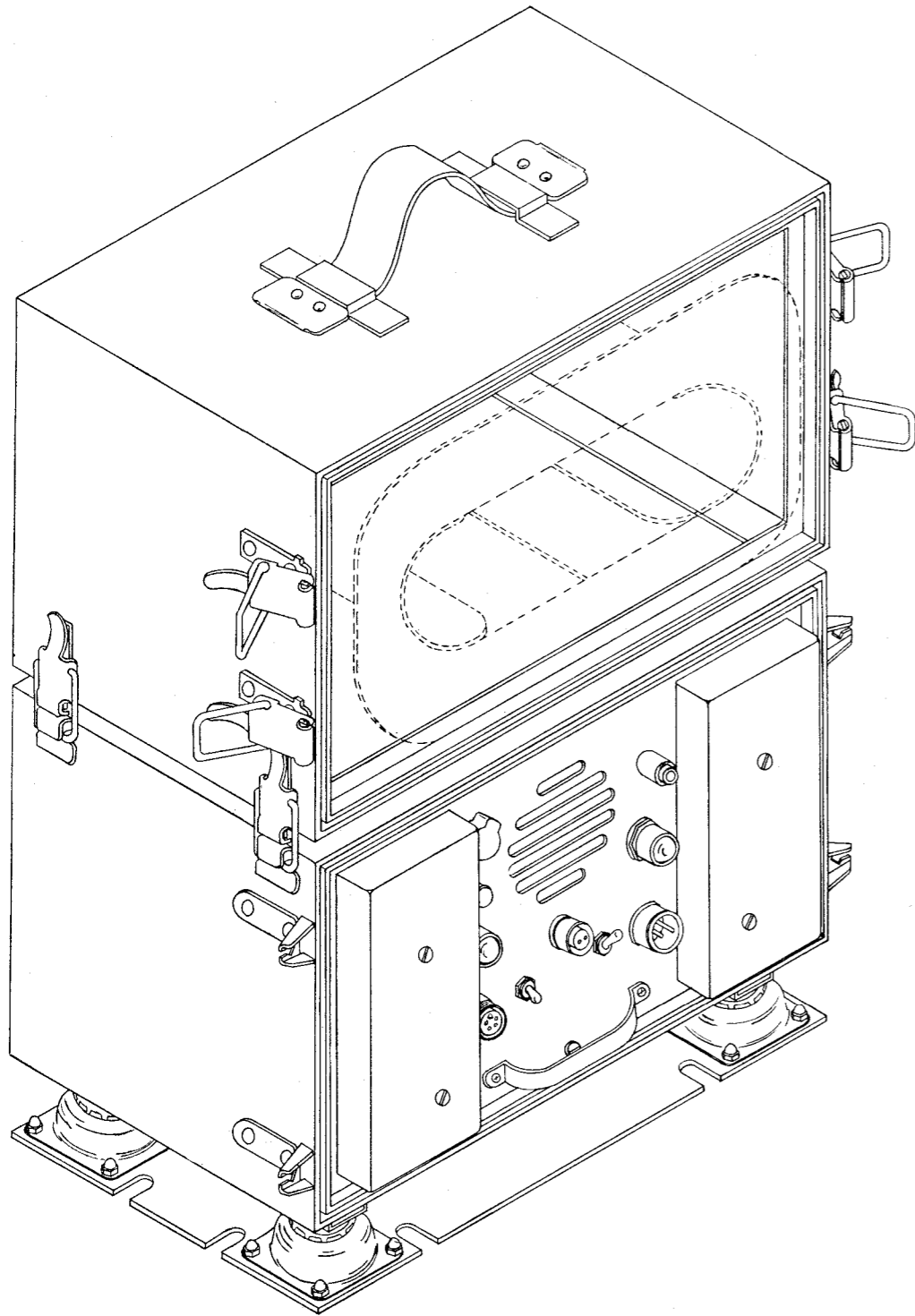


Figure 7-6—Method of Accessory Tray Removal

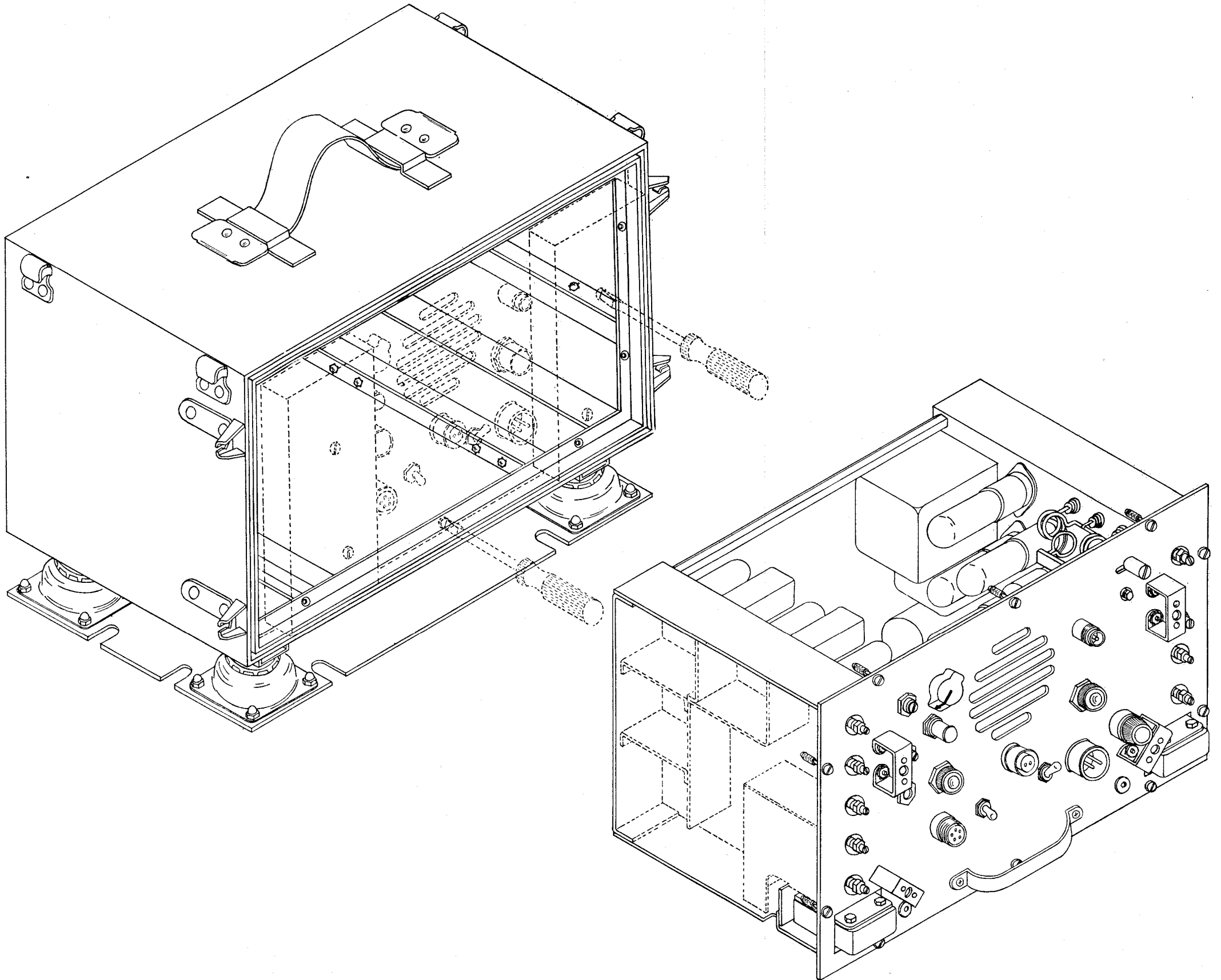


Figure 7-7—Method of Transmitter-Receiver Removal

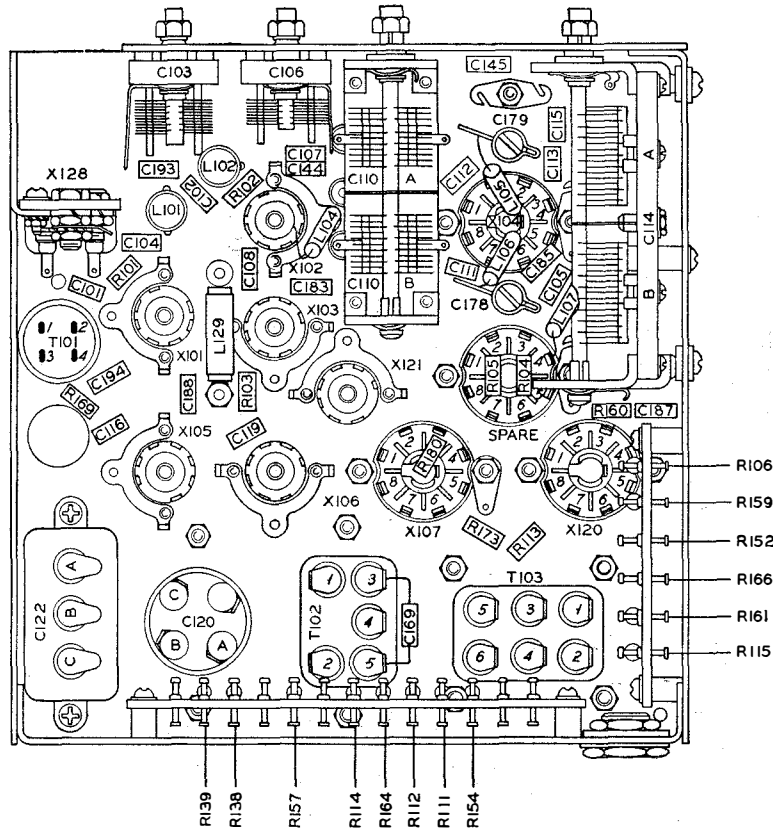
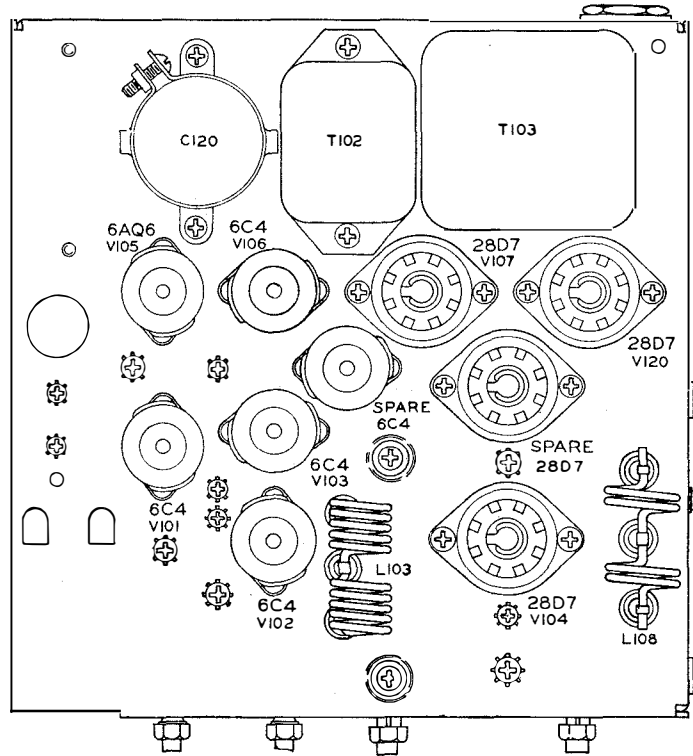


Figure 7-8—Transmitter Parts Arrangement

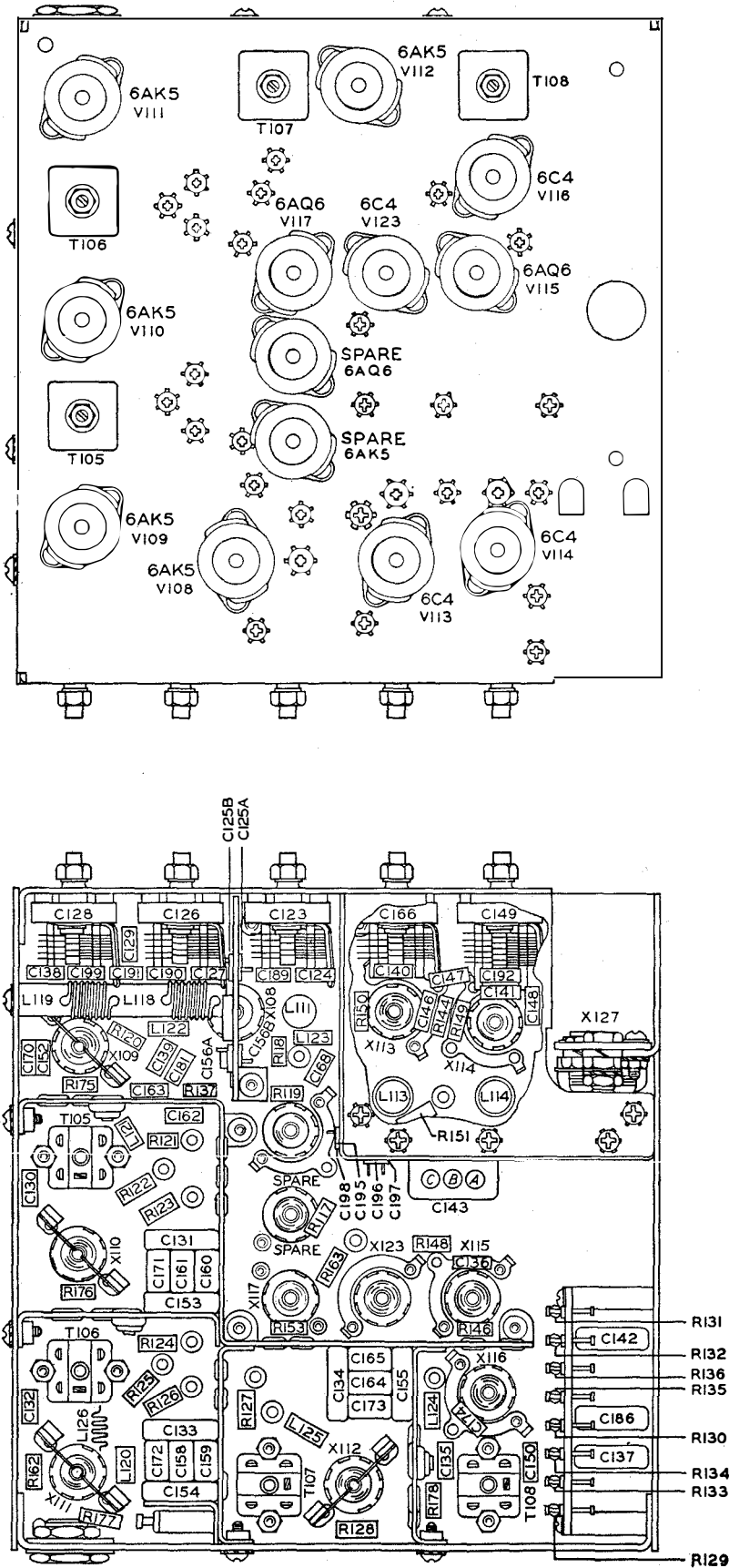


Figure 7-9—Receiver Parts Arrangement

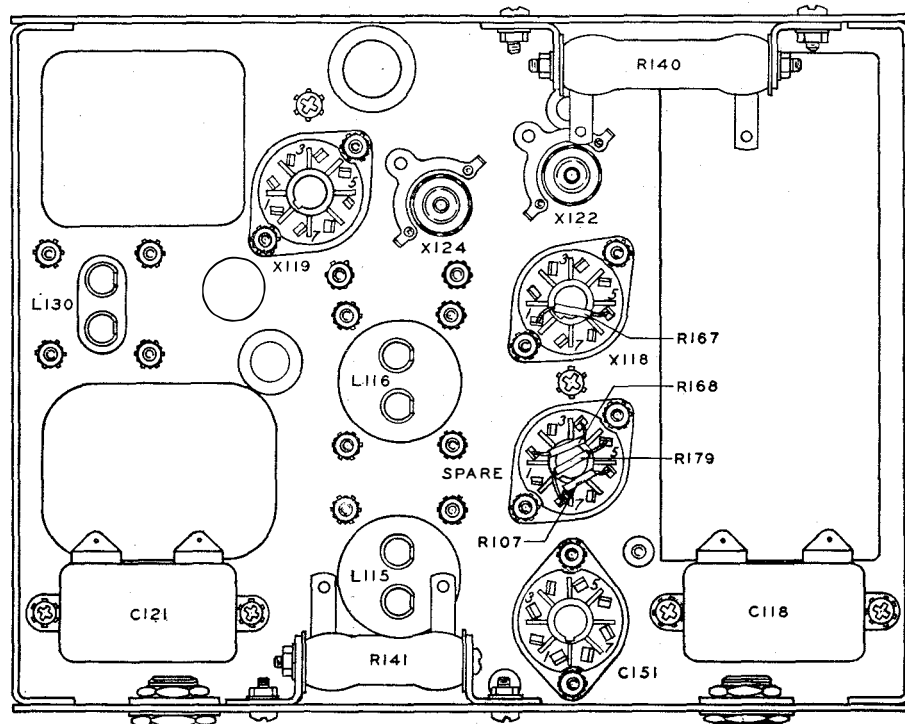
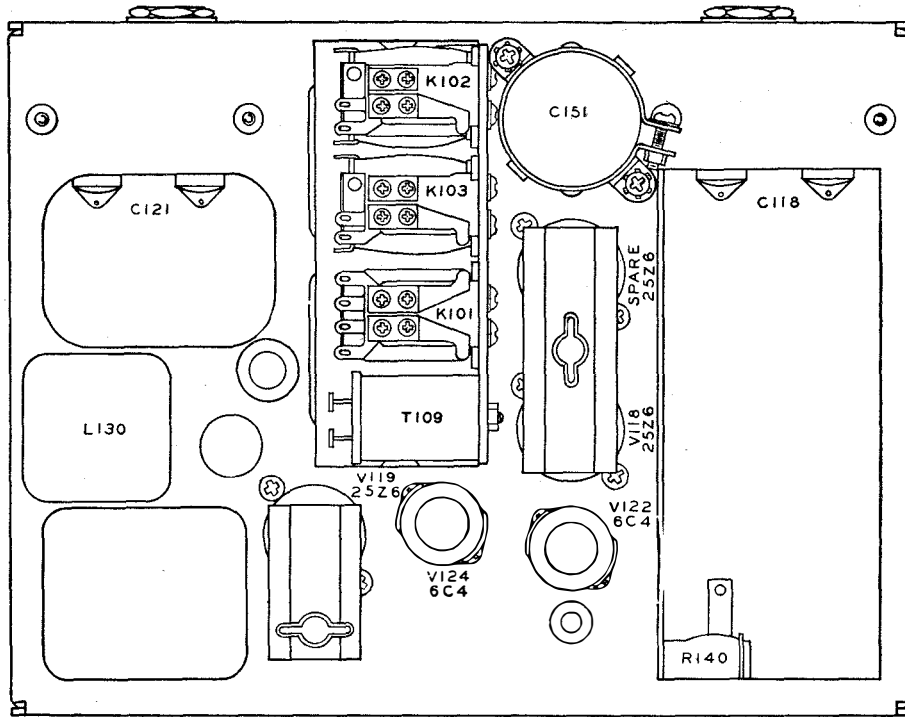


Figure 7-10—Rectifier Parts Arrangement

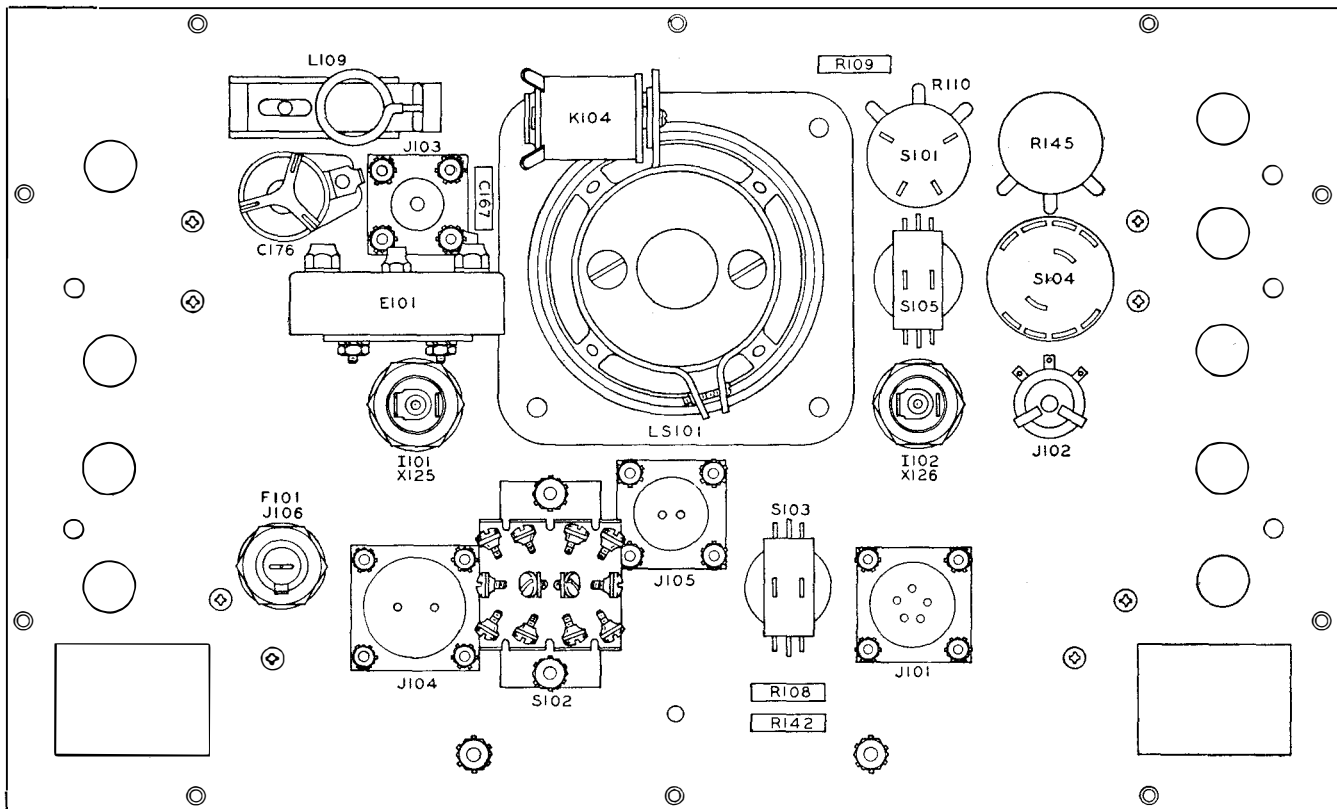


Figure 7-11—Panel Parts Arrangement

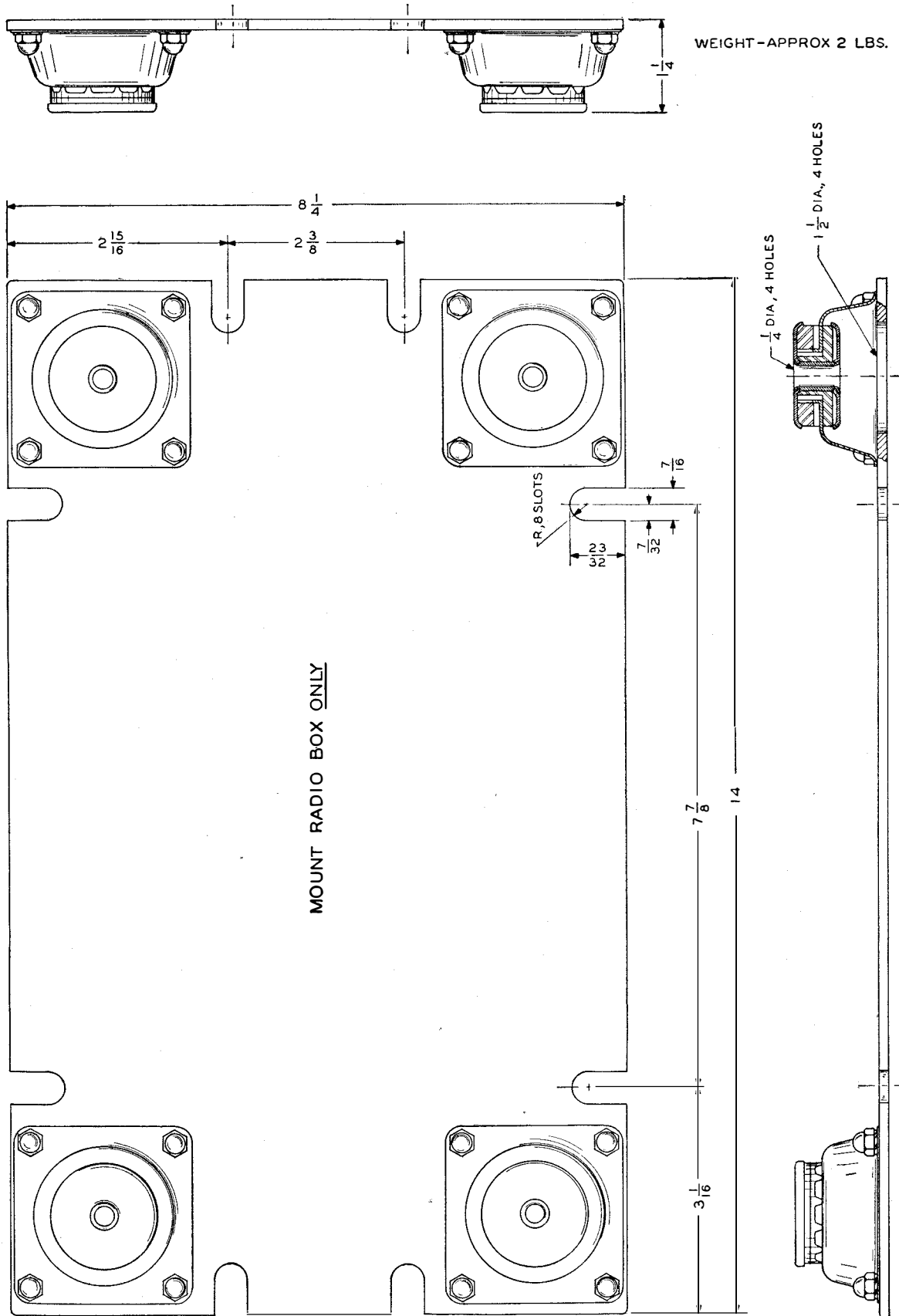
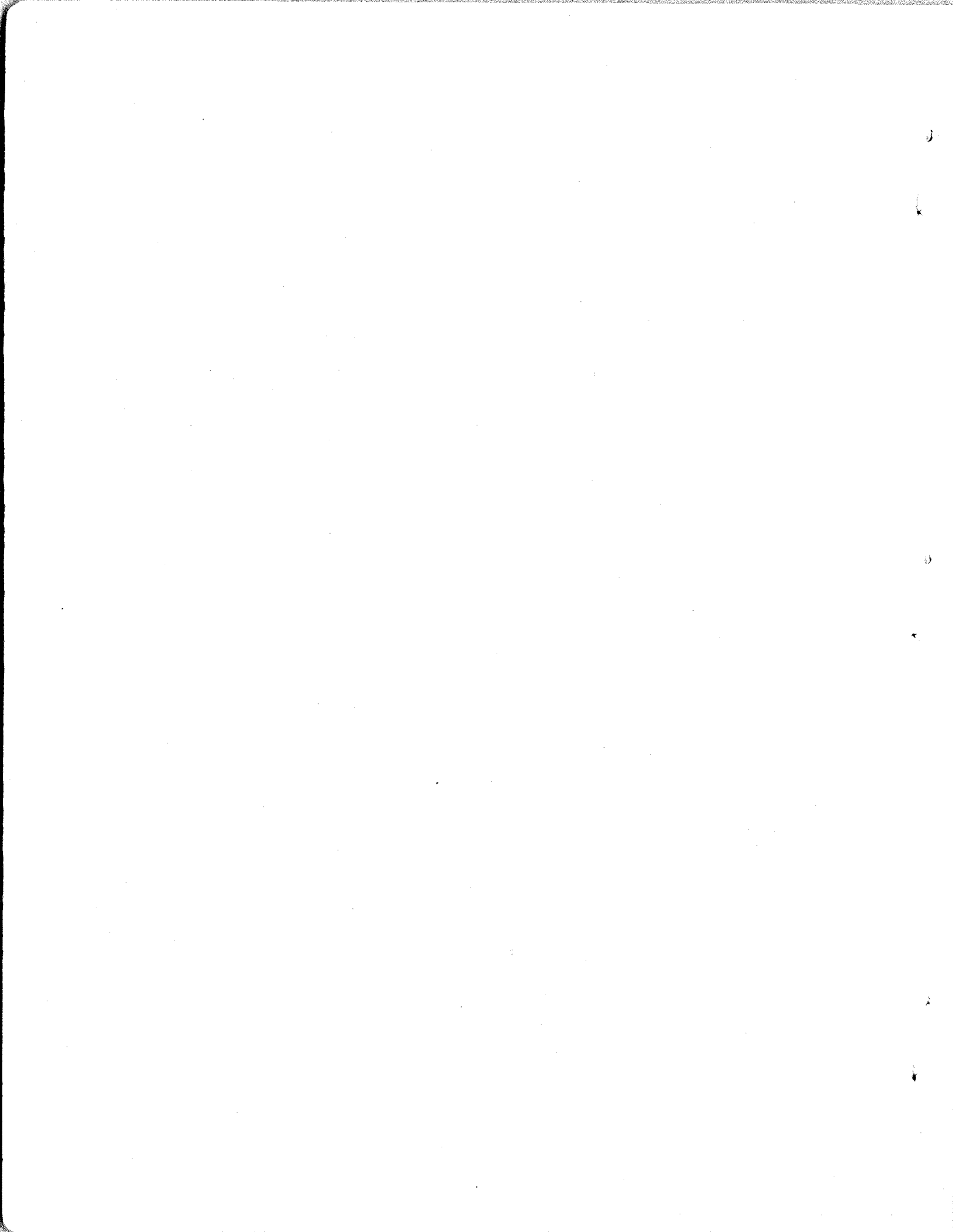
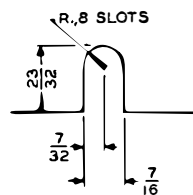
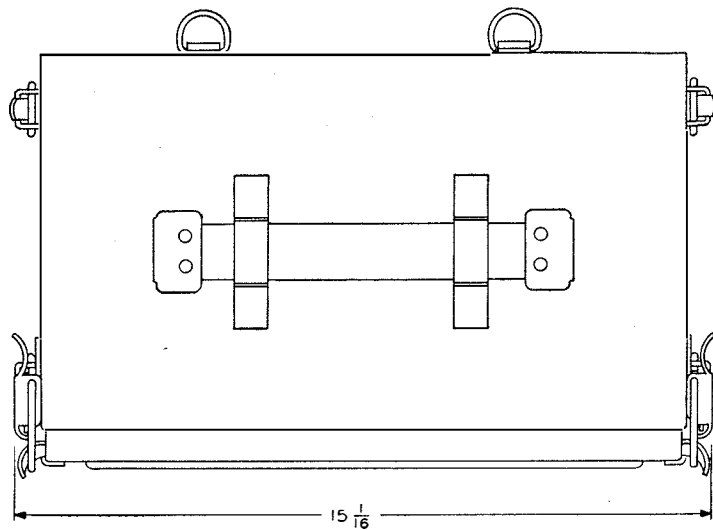


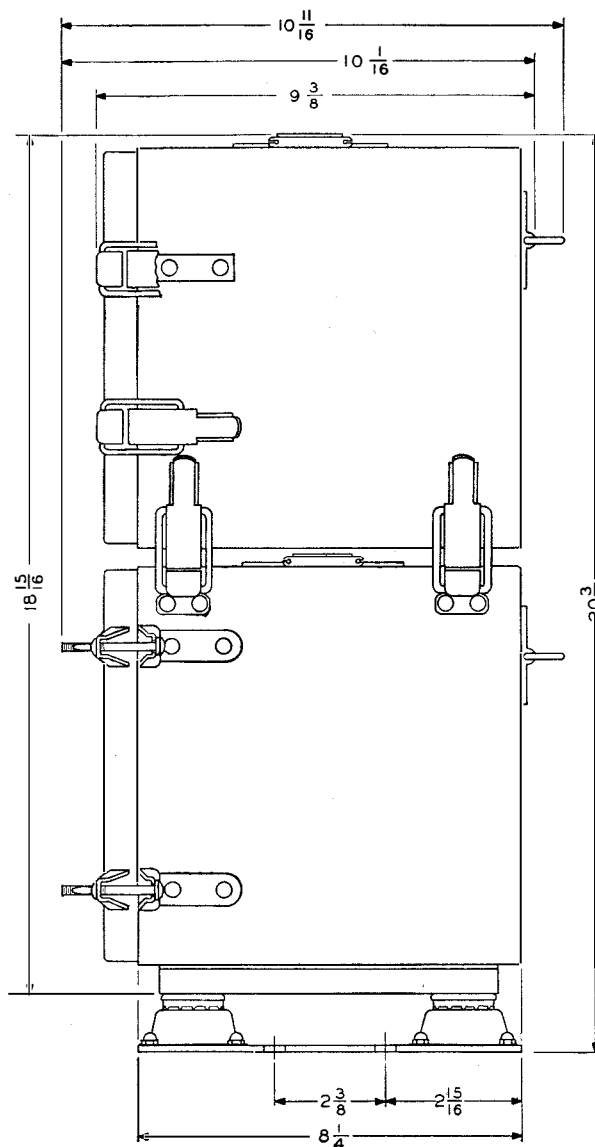
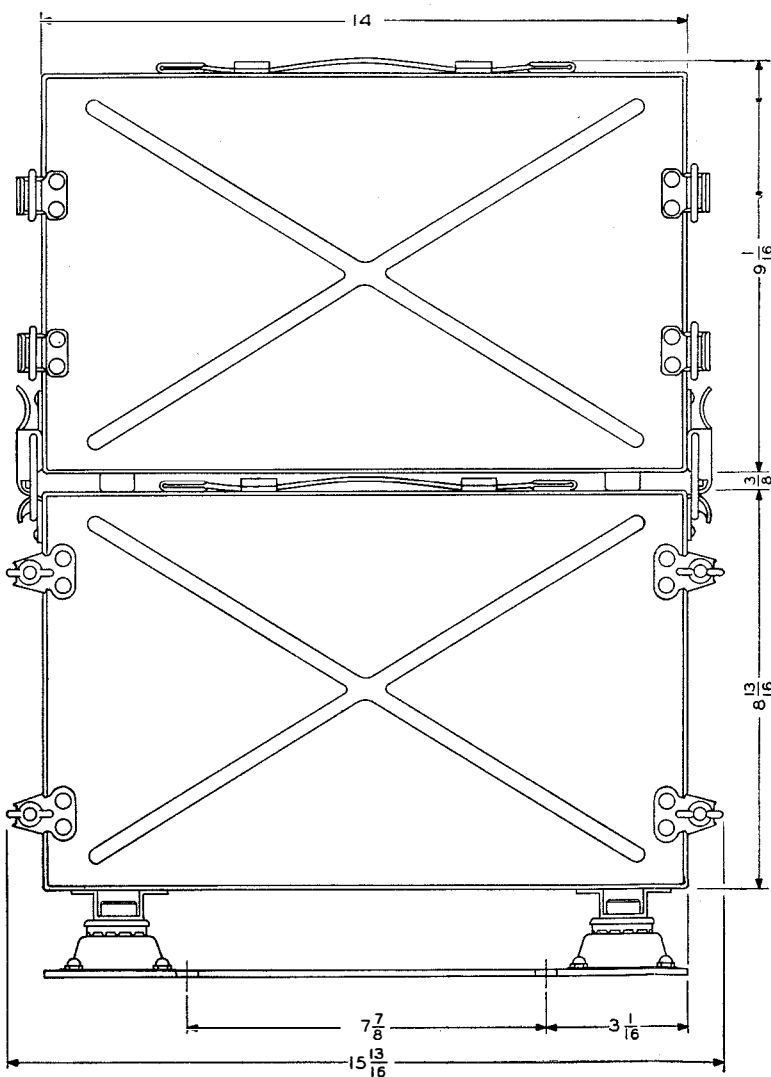
Figure 7-12—Navy Type COL-10479 Mounting Base Outline and Dimensions



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TOTAL WEIGHT - APPROX 55.0 LBS.
MOUNTING - USE $\frac{3}{8}$ INCH BOLTS



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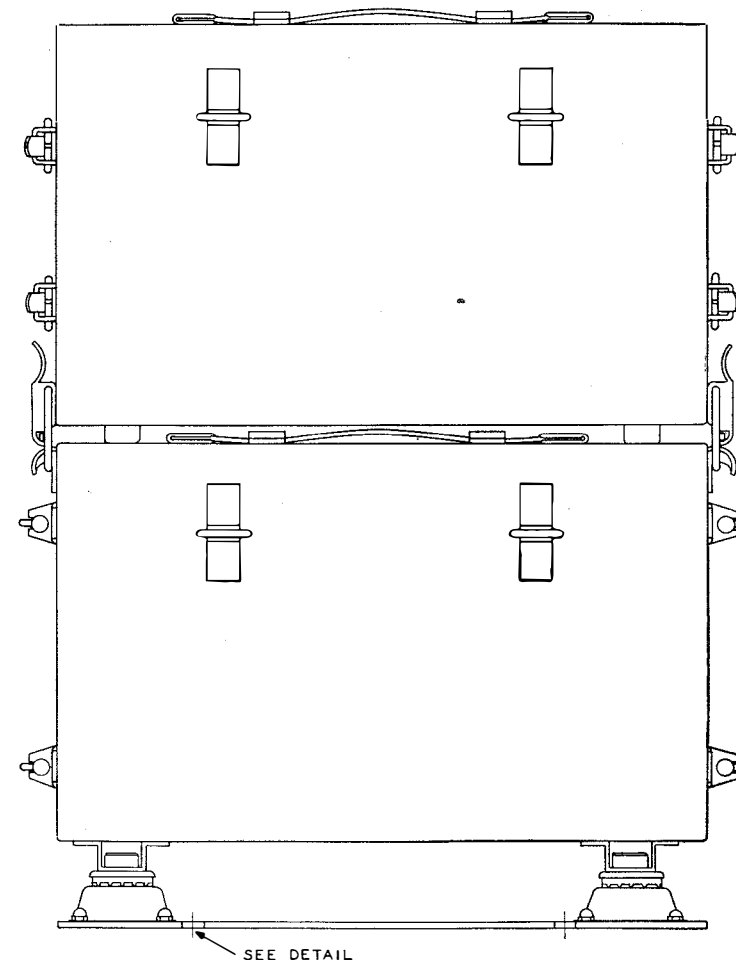


Figure 7-13—Navy Model MBF Outline and Mounting Dimensions

RESTRICTED

RESTRICTED

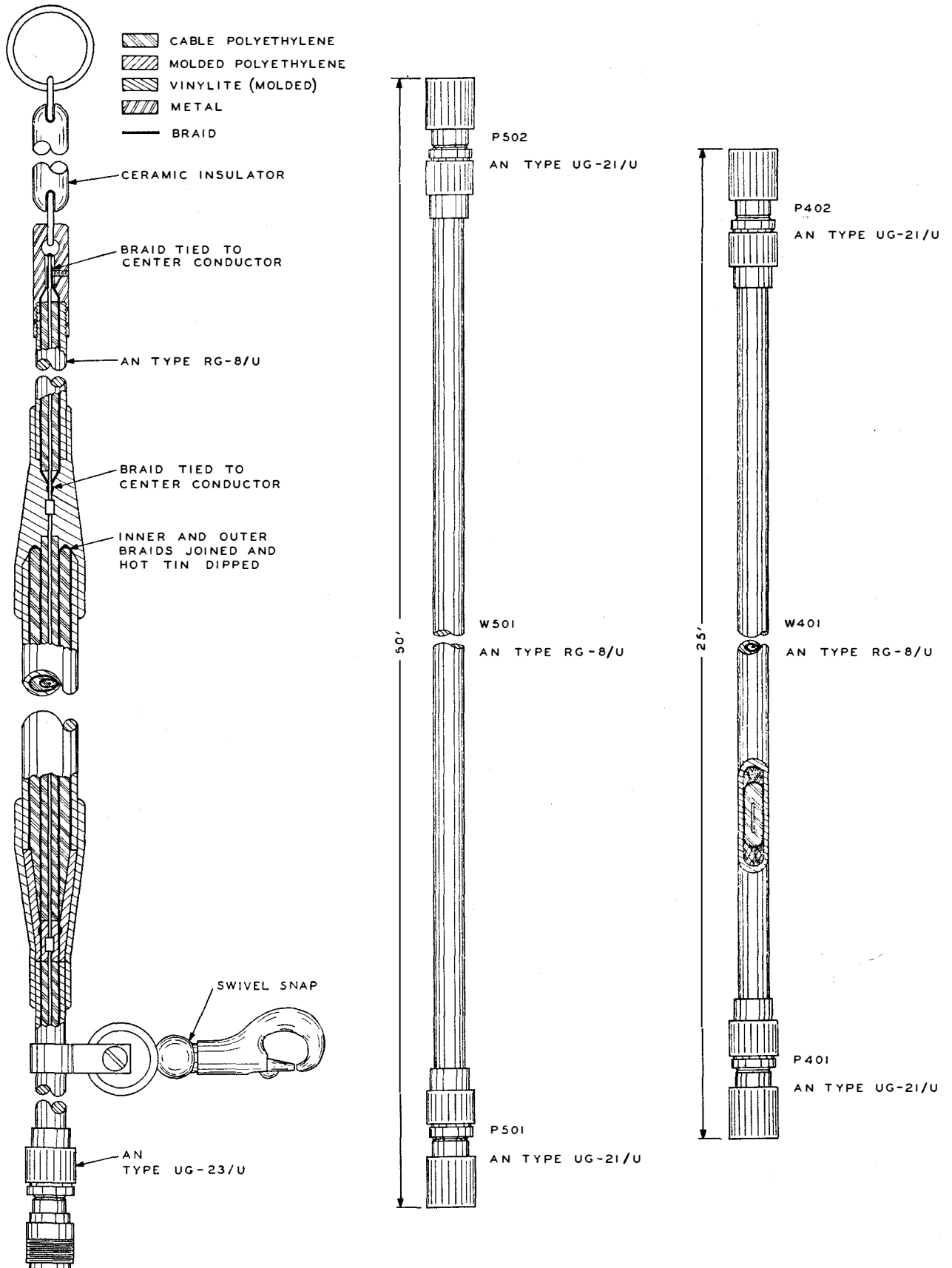
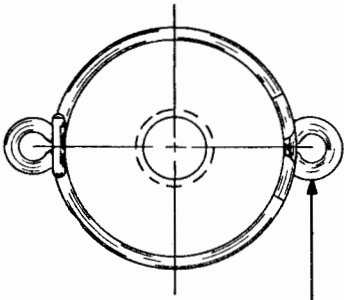


Figure 7-14—Details of Coaxial Antenna and Cables

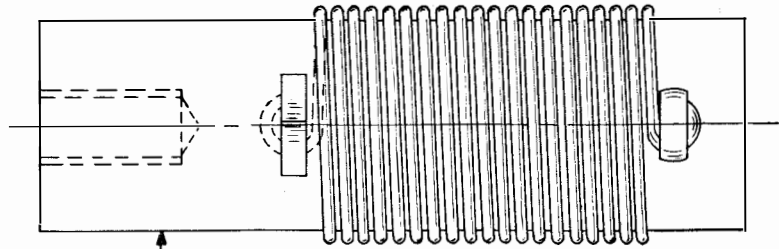


COTTER PIN
PART NO. 338 0001 00

APPLIES TO

L-101
PART NO. 502 1352 002

L-114
PART NO. 502 1345 002



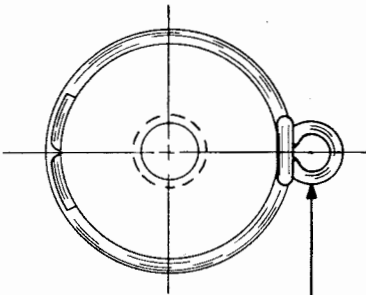
COIL FORM
PART NO. 196 1106 00

WINDING DATA

19 ¹/₂ TURNS NO. 24 ENAMELED
COPPER WIRE, SPACE WOUND.
PART NO. 421 2440 00

22 TURNS NO. 26 ENAMELED
COPPER WIRE, SPACE WOUND.
PART NO. 421 2640 00

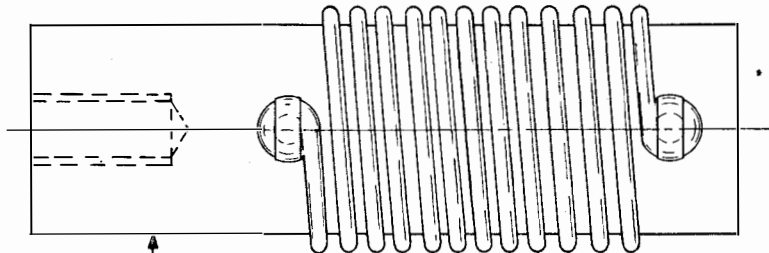
NOTE: REFER TO DRAWINGS OF INSULATOR DETAILS FOR DIMENSIONS OF COIL FORM.



COTTER PIN
PART NO. 338 0001 00

APPLIES TO

L-102
PART NO. 502 1351 002



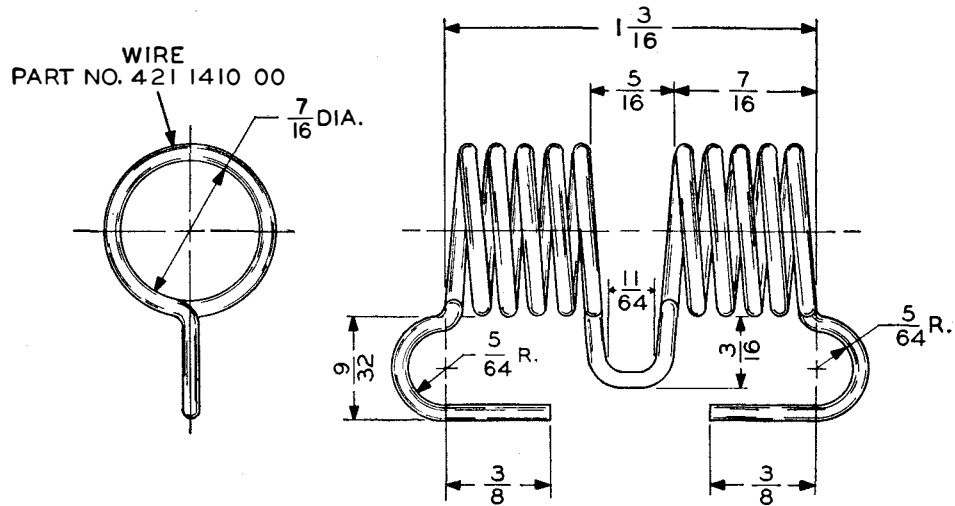
COIL FORM
PART NO. 190 1106 00

WINDING DATA

12 TURNS NO. 21 ENAMELED
COPPER WIRE, SPACE WOUND.
PART NO. 421 2140 00

NOTE: REFER TO DRAWINGS OF INSULATOR DETAILS FOR DIMENSIONS OF COIL FORM.

Figure 7-15—Inductor Winding Data L101, L102, L114



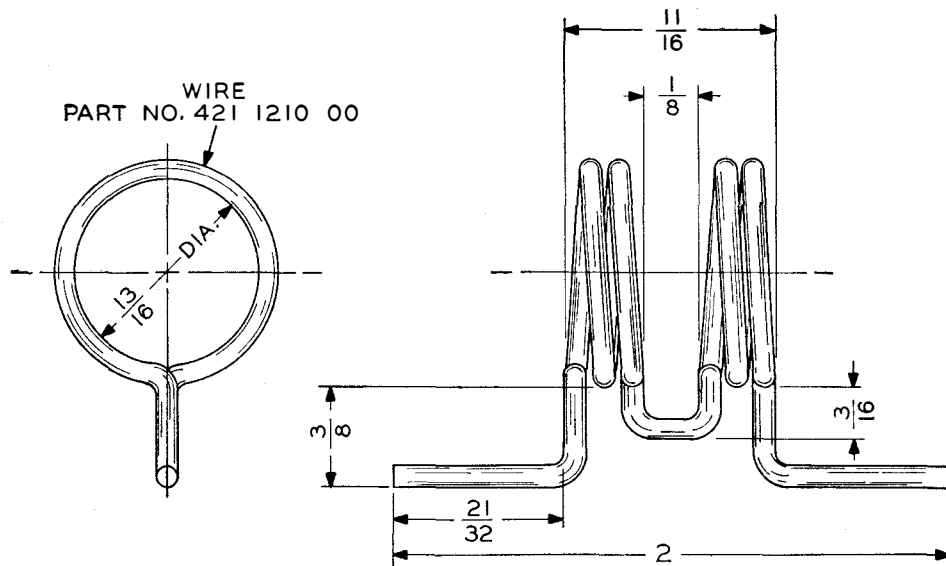
APPLIES TO

L-103
PART NO. 502 1350 002

WINDING DATA

10 TURNS NO. 14 SOFT
COPPER WIRE

NOTE: 1. WIRE SHALL BE DRAWN AND THEN FORMED.
2. SILVER PLATE, .0005/.0007 THICKNESS;
FINISH AFTER FORMING.



APPLIES TO

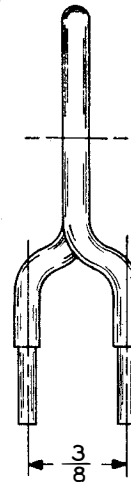
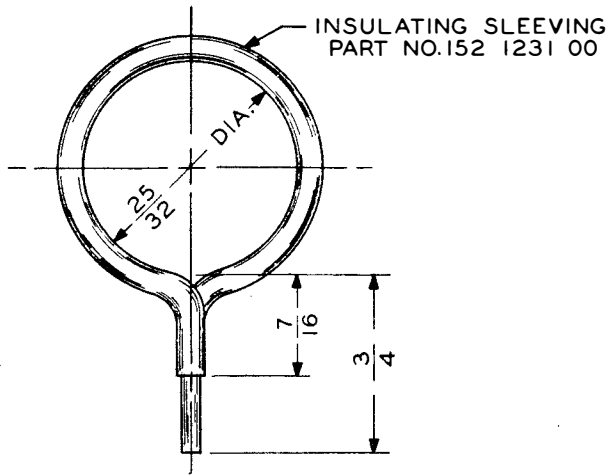
L-108
PART NO. 502 1346 002

WINDING DATA

4 TURNS NO. 12 SOFT
COPPER WIRE

NOTE: 1. WIRE SHALL BE DRAWN AND THEN FORMED.
2. SILVER PLATE, .0005/.0007 THICKNESS; FINISH
AFTER FORMING.

Figure 7-16—Inductor Winding Data, L103, L108

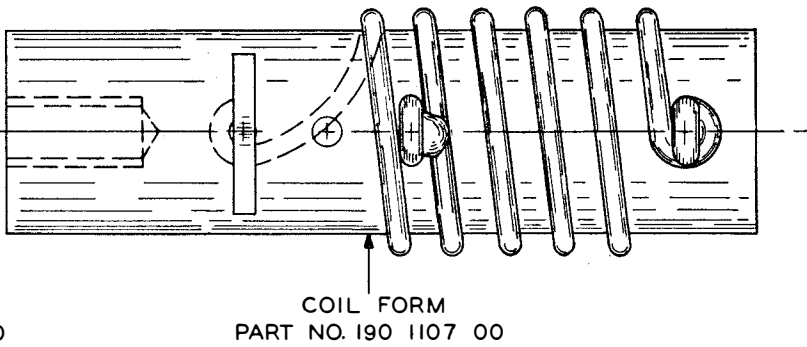
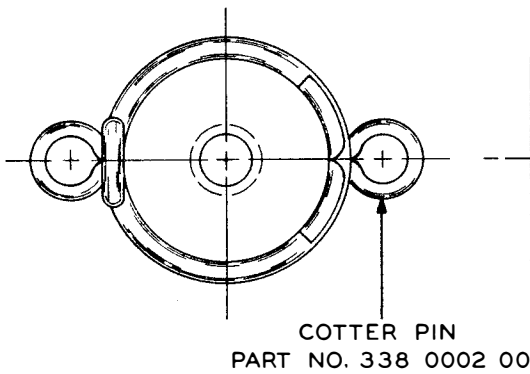


APPLIES TO

L-109
PART NO. 502 1443 002

WINDING DATA

1 TURN NO. 14 BUS WIRE
PART NO. 421 0003 00



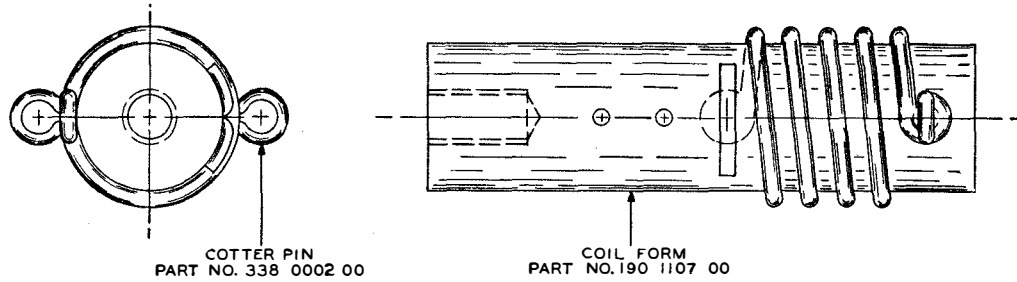
APPLIES TO

L-111
PART NO. 502 1347 002

WINDING DATA

4 TURNS, SPACE WOUND - DROP OF SOLDER
ON WIRE AT COTTER PIN - CONTINUE
FOR 1 1/2 TURNS SAME SPACING.
NO. 18 BUS WIRE PART NO. 421 1820 00

Figure 7-17—Inductor Winding Data, L109, L-111



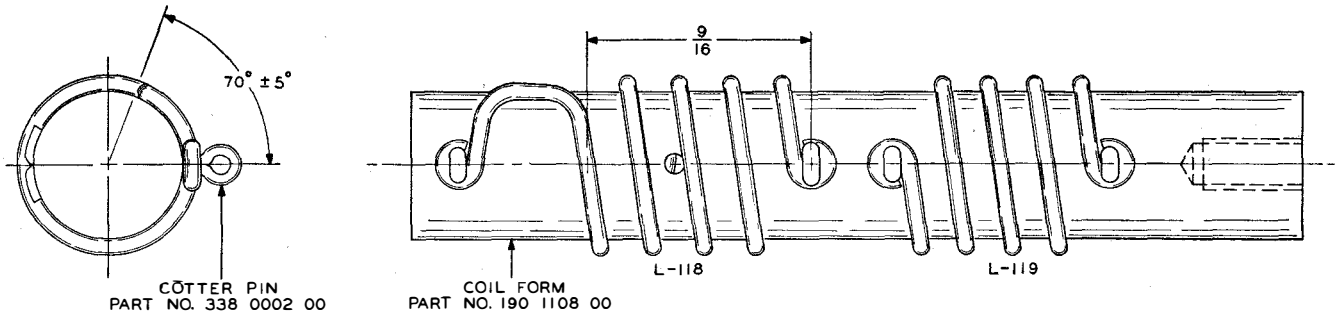
APPLIES TO

L-113
PART NO. 502 1348 002

WINDING DATA

4 1/2 TURNS NO. 18 BUS
WIRE, SPACE WOUND.
PART NO. 421 1820 00

NOTE: REFER TO DRAWINGS OF INSULATOR DETAILS FOR DIMENSIONS OF COIL FORM.



APPLIES TO

L-118
L-119
PART NO. 502 1349 002

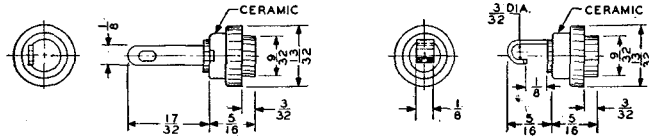
WINDING DATA

4 TURNS PLUS LOOP NO. 18
BUS WIRE SPACE WOUND
4 TURNS NO. 18 BUS WIRE
SPACE WOUND
PART NO. 421 1820 00

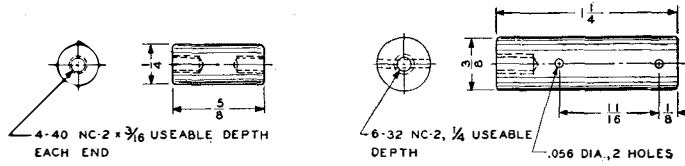
NOTE: REFER TO DRAWINGS OF INSULATOR DETAILS FOR DIMENSIONS OF COIL FORM.

Figure 7-18—Inductor Winding Data L113, L118, L119

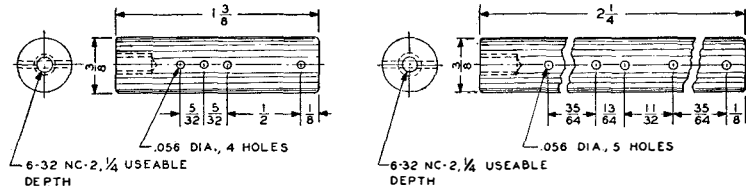
<u>COLLINS PART NO.</u> 190 1103 00	<u>SYMBOL DESIGNATION</u> E-102	<u>COLLINS PART NO.</u> 190 1104 00	<u>SYMBOL DESIGNATION</u> E-103
--	------------------------------------	--	------------------------------------



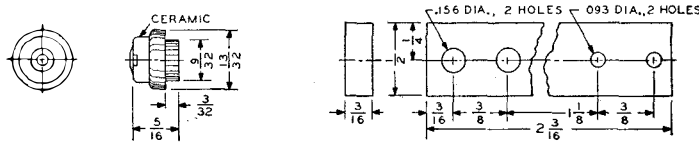
<u>COLLINS PART NO.</u> 190 1105 00	<u>SYMBOL DESIGNATION</u> E-104	<u>COLLINS PART NO.</u> 190 1106 00	<u>SYMBOL DESIGNATION</u> L-101, L-102, L-114 (E-105)
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<u>COLLINS PART NO.</u> 190 1107 00	<u>SYMBOL DESIGNATION</u> L-111 L-113 (E-106)	<u>COLLINS PART NO.</u> 190 1108 00	<u>SYMBOL DESIGNATION</u> L-118 L-119 (E-107)
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<u>COLLINS PART NO.</u> 190 1102 00	<u>SYMBOL DESIGNATION</u> E-108	<u>COLLINS PART NO.</u> 502 1417 002	<u>SYMBOL DESIGNATION</u> E-109
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<u>COLLINS PART NO.</u> 190 2329 00	<u>SYMBOL DESIGNATION</u> E-110
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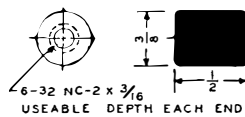


Figure 7-19—Insulator Details