



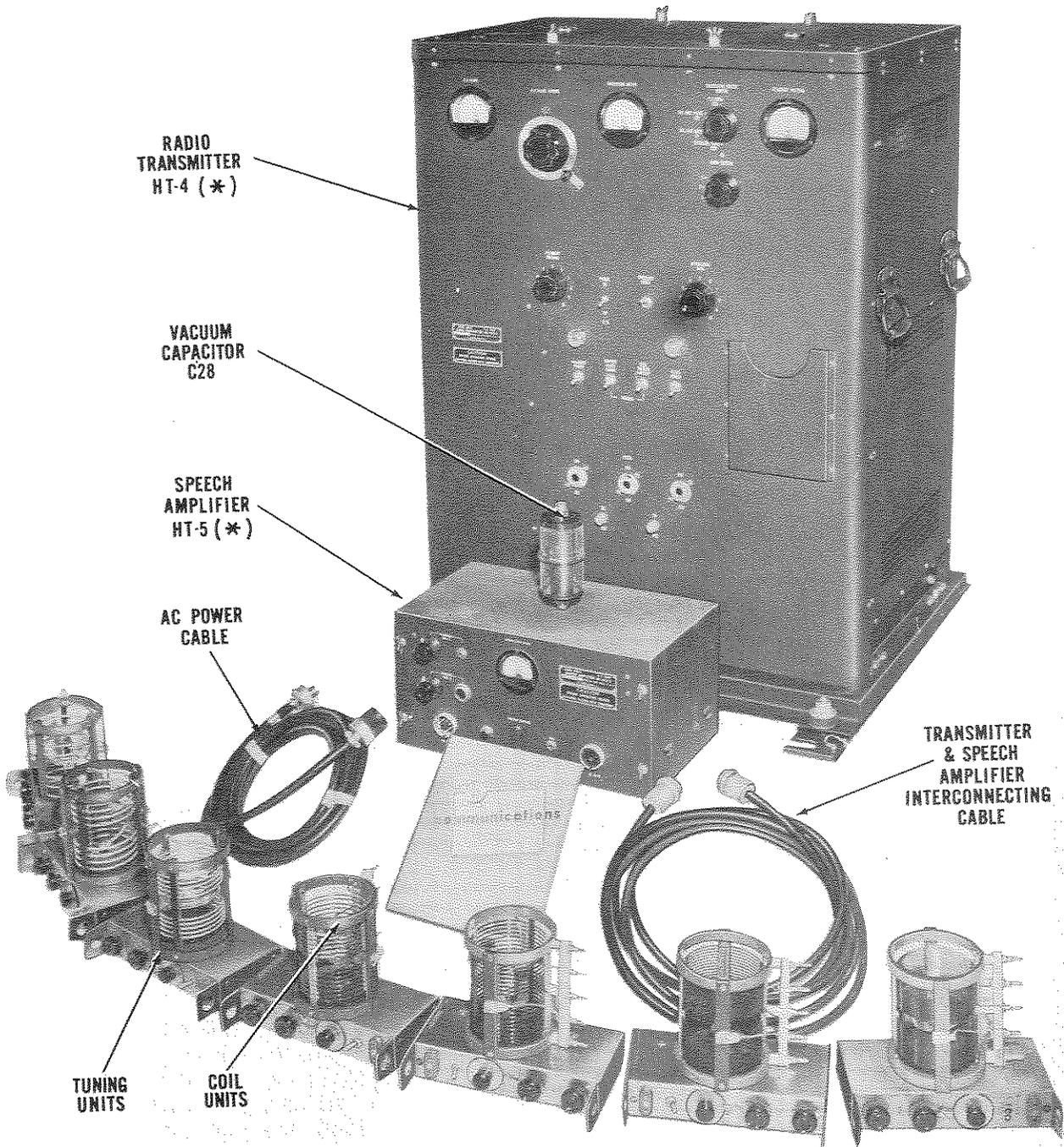
# communications

**OPERATING and SERVICE  
INSTRUCTIONS**

**HT-4-I  
and  
HT-5-I**

**the hallicrafters co.**

MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.



RADIO  
TRANSMITTER  
HT-4 (\*)

VACUUM  
CAPACITOR  
C28

SPEECH  
AMPLIFIER  
HT-5 (\*)

AC POWER  
CABLE

TRANSMITTER  
& SPEECH  
AMPLIFIER  
INTERCONNECTING  
CABLE

TUNING  
UNITS

COIL  
UNITS

92x1926

## GENERAL DESCRIPTION

The HT-4 (\*) Radio Transmitter is a medium power transmitter designed to transmit both voice and CW signals over the frequency range of 2 to 18 megacycles. Built by Hallicrafters, world's leader in precision radio equipment, the HT-4 (\*) is noted the world-over for its ruggedness, dependability and precision construction. All components in the transmitter either meet or exceed rigid JAN (Joint Army and Navy) requirements for electronic equipment.

The frequency range of the transmitter is covered by means of 8 plug-in tuning units, 7 plug-in coil units, and a plug-in vacuum capacitor. Each tuning unit and associated coil unit, or coil unit with capacitor, covers a portion of the range. The transmitter frequency may be controlled either by the variable-frequency master oscillator or the crystal oscillator depending upon the setting of the switch on the tuning unit. At frequencies below 8 megacycles, the power output of the transmitter exceeds 400 watts on CW and 300 watts on voice. At frequencies above 8 megacycles, the power output is only slightly less. The transmitter may be used to transmit radioteletype signals by means of frequency shift. For radioteletype operation, an RF exciter unit is required to shift the transmitter output frequency in accordance with the radioteletypewriter signal. The output of the exciter unit plugs into the crystal socket of any one of the transmitter tuning units, thus replacing the oscillator stage of the transmitter. The transmitter is designed to operate from 115 volt, 50/60 cycle AC power. The power consumption of the transmitter when delivering power to the antenna is 1700 to 2000 watts.

The transmitter consists of three separate chassis. The top or RF chassis contains all RF components, the center or modulator chassis includes the low voltage power supplies and the high level audio and modulator equipment, while the bottom or power supply chassis contains the high voltage power supply and the overload relay. All external controls and metering instruments are located on the front panel of the transmitter. Two doors on the top of the transmitter provide access to the tuning and coil units to permit easy removal and replacement. Tuning charts which show the approximate settings for the tuning and coil units are located in a pocket on the front panel. All tubes are easily accessible by removing the rear panel of the transmitter.

RF output terminals are provided on the side panel of the transmitter for connection to a doublet antenna. When using a whip or long wire antenna, Antenna Tuning Unit BC-939 (\*) must be provided for proper antenna matching. A coaxial connector, SO-10, located below the RF output terminals, is provided for connection to the antenna tuning unit or the doublet antenna.

AC power input is connected to the transmitter through socket SO-6 at the rear of the modulator chassis. Socket SO-5, also located on the modulator chassis, has provisions for keying the transmitter for CW operation, remotely controlling the plate power and antenna shorting relays, connecting the audio output signal from the speech amplifier to the transmitter, and supplying AC power to operate the speech amplifier or other associated equipment.

Speech Amplifier HT-5 (\*) is normally used with Radio Transmitter HT-4 (\*). This amplifier has inputs for both carbon and dynamic microphones as well as a key jack which permits keying of the transmitter for CW operation. The HT-5 (\*) also provides sidetone for monitoring the outgoing CW signal by means of a headset.

### HIGH VOLTAGE WARNING

HIGH VOLTAGE IS USED IN THE OPERATION OF THIS EQUIPMENT. DEATH ON CONTACT MAY RESULT IF PERSONNEL FAIL TO OBSERVE SAFETY PRECAUTIONS WHEN OPERATING OR SERVICING THIS EQUIPMENT. NO ATTEMPT SHOULD BE MADE TO SERVICE THIS EQUIPMENT UNTIL THE POWER HAS BEEN TURNED OFF AND THE HIGH-VOLTAGE FILTER CAPACITORS HAVE BEEN DISCHARGED MANUALLY. RADIO-FREQUENCY VOLTAGES AS HIGH AS 25,000 VOLTS MAY BE DEVELOPED ON THE ANTENNA OF THE TRANSMITTER. DO NOT COME IN CONTACT WITH THE ANTENNA WHEN THE TRANSMITTER IS IN OPERATION.

## TECHNICAL SPECIFICATIONS

### RADIO TRANSMITTER HT-4 (\*)

|  |  |
|--|--|
| FREQUENCY RANGE . . . . .              | 2 to 18.0 MC   |
| TYPES OF SIGNALS TRANSMITTED . . . . . | Voice and CW   |
| MODULATION . . . . .                   | AM   |
| NUMBER OF TUBES . . . . .              | 16   |
| ANTENNA . . . . .                      | Doublet, whip, or single wire<br>(Antenna Tuning Unit BC-939 (*)<br>required with whip or single wire) |
| POWER OUTPUT                           |  |
| CW . . . . .                           | 400 watts (approx.)  |
| Voice . . . . .                        | 300 watts (approx.)  |
| POWER CONSUMPTION . . . . .            | 2000 watts   |
| WEIGHT . . . . .                       | 401 lbs.   |
| DIMENSIONS (Overall) . . . . .         | 32-1/4" wide, 19-1/2"<br>deep, 39-3/4" high  |

### SPEECH AMPLIFIER HT-5 (\*)

|                                 |  |
|---------------------------------|--|
| AMPLIFIER TYPE . . . . .        | Audio frequency  |
| TYPE OF INPUT SIGNALS . . . . . | Voice  |
| NUMBER OF TUBES . . . . .       | 8  |
| INPUTS . . . . .                | Carbon and dynamic microphones<br>and external telephone   |
| OUTPUT . . . . .                | 500-ohm, single-ended  |
| POWER OUTPUT . . . . .          | 2 watts (approx.)  |
| POWER SUPPLY . . . . .          | 115 volts, 50/60 cycles AC from<br>Radio Transmitter HT-4 (*)                                      |
| SPECIAL FEATURES . . . . .      | Modulation meter, sidetone<br>output, key jack, provision<br>for remote control of<br>transmitter. |
| WEIGHT . . . . .                | 31 lbs.  |

## INSTALLATION INSTRUCTIONS

### 1. UNCRATING, UNPACKING, AND CHECKING

- (1) Place the packing case as near the operating position as convenient.
- (2) Cut and fold back the steel straps.
- (3) Remove the nails with a nail puller. Remove the top and sides of the packing case. Do not attempt to pry off the sides and top or the equipment may be damaged.
- (4) Remove the waterproof or moistureproof barrier, pads of corrugated fiberboard, and all cellulose wadding.
- (5) Remove the nuts and bolts which hold the transmitter to the skid.
- (6) Remove the skid.
- (7) Inspect the equipment for possible damage incurred during equipment.
- (8) Check the contents of the packing case against the master packing slip.

### 2. INSTALLATION

- (1) If possible, bolt the transmitter to the floor.
- (2) Insert the tubes and see that they are firmly seated in their proper sockets.
- (3) Insert the fuses and lamps in their proper sockets.
- (4) Connect all plate and grid caps firmly to their respective tubes.

### 3. CONNECTIONS

a. A speech amplifier capable of supplying an audio signal of 17 volts across a 500-ohm load is required to voice modulate the transmitter. The audio output of the speech amplifier should be connected to pins 6 and 7 of socket SO-5 at the rear of the transmitter. Speech Amplifier HT-5 (\*) is normally used with the HT-4 (\*) Radio Transmitter. All connections between Speech Amplifier HT-5 (\*) and Radio Transmitter HT-4 (\*) are made through the interconnecting cable between socket SO-5 on the transmitter and the socket marked TO BC-610 on the speech amplifier.

b. For CW operation, provision must be made to key between pins 2 and 8 of socket SO-5. When using Speech Amplifier HT-5 (\*), keying is accomplished from the key jack located on the front panel of the amplifier.

#### IMPORTANT

For phone operation, it is necessary to connect a jumper between pins 2 and 4 of the TO JB-70 socket on Speech Amplifier HT-5 (\*) to complete the cathode circuit of the r-f oscillator, located in the transmitter, to ground.

c. A DC milliammeter (300 ma) must be connected between pins 5 and 8 of socket SO-5 to measure modulator plate current. A modulator plate current meter is provided on the front panel of the HT-5 (\*) Speech Amplifier. On some special HT-4 (\*) Radio Transmitter models, a modulator plate current meter is provided directly below the EXCITATION METER on the transmitter front panel.

d. RF output terminals and a coaxial connector are provided on the left panel of the transmitter for connection to a doublet antenna. The doublet should be cut to match the operating frequency of the transmitter. When using a whip or long wire antenna, Antenna Tuning Unit BC-939 (\*) must be provided for proper antenna matching. Antenna Tuning Unit BC-939 (\*) mounts on the top of the transmitter.

e. AC power input is connected to the transmitter through socket SO-6 at the rear of the transmitter. Pins 1 and 3 of socket SO-5 on the transmitter provide 115 volt AC power to operate the speech amplifier or other associated equipment.

f. For remote control of the plate power and antenna shorting relays in the transmitter, connect a switch in

parallel with the PLATE POWER switch on the transmitter (between pins 3 and 4 of socket SO-5). For remote operation from the HT-5 (\*) Speech Amplifier, the switch should be connected between pins 6 and 7 of socket SO-102 on the front panel.

g. To monitor keying during CW operation, connect a jumper between pins 1 and 2 of socket SO-102 on the front panel of Speech Amplifier HT-5 (\*). This permits the sidetone oscillator to be keyed simultaneously with the transmitter and to be heard in the headphones which should be connected between pins 5 and 8 of the socket.

h. A remote telephone can be connected between pins 3 and 8 of the socket SO-102 on the front panel of the HT-5 (\*) Speech Amplifier.

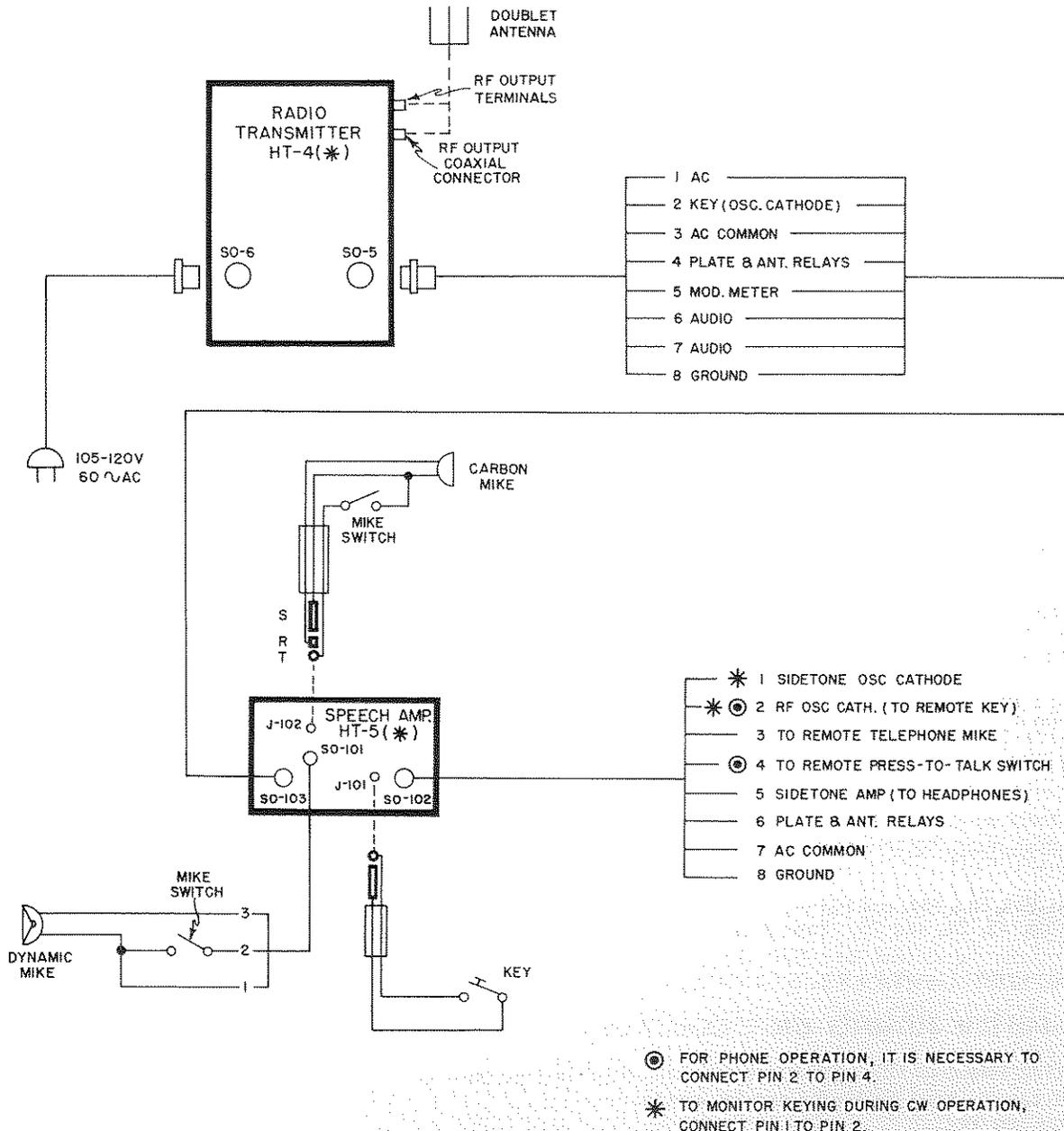


Fig. 1. Radio Transmitter HT-4 (\*) and Speech Amplifier HT-5 (\*), Installation Connections

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## OPERATING INSTRUCTIONS

### 1. RADIO TRANSMITTER HT-4 (\*) CONTROLS AND THEIR USE

**P.A. PLATE TUNING Control** — Controls the tuning of the p-a (power amplifier) plate circuit. Its approximate setting is listed on the tuning charts.

**P.A. PLATE Meter** — Indicates p-a plate current (cathode circuit).

**EXCITATION METER** — Indicates the degree of resonance in the following circuits: p-a grid, i-p-a (intermediate power amplifier) grid or plate, and the doubler plate, depending upon the setting of the EXCITATION METER SWITCH.

**FILAMENT VOLTAGE Meter** — Indicates the p-a filament voltage, which is controlled by the setting of the FILAMENT VOLTAGE control.

**EXCITATION METER SWITCH** — Connects the EXCITATION METER in any one of four circuits, depending upon the setting of the switch, as follows: doubler plate, i-p-a grid, i-p-a plate, and p-a grid.

**BAND SWITCH** — Connects any one of the three tuning units into the transmitter circuits.

**FILAMENT VOLTAGE Control** — Adjusts the filament voltage to all tubes in the transmitter except the bias rectifier and the a-f drivers. The filament voltage reading should be between 5.0 and 5.3 volts for correct operation.

**PHONE — C.W. Switch** — In the C.W. position, full power is applied to the p-a and the modulators are switched out of the circuit. In the PHONE position, reduced power is applied to the p-a and the modulators are connected into the circuit.

**OVERLOAD RESET Switch** — Resets the overload relay when it has been tripped by an overload in the p-a or modulator stages.

**MODULATOR BIAS Control** — Adjusts the bias level on the modulator grids when the PHONE - C.W. switch is set at PHONE.

**FILAMENT POWER Switch** — In the on (up) position, applies power to the filaments of all tubes in the transmitter and Speech Amplifier HT-5 (\*), and to the plate circuit of the bias rectifier. A green pilot lamp indicates when power is being applied.

**EXCITER PLATE POWER Switch** — In the EXCITER PLATE POWER (up) position, closes the key circuit and applies power to the plate circuits of the oscillator, buffer-doubler, and the i-p-a. In the NORMAL (off) position, the plate power is removed from these circuits until the key or microphone switch is depressed.

**HIGH VOLTAGE PROTECT Switch** — In the HIGH VOLTAGE PROTECT position, the transmitter operates with reduced power for tuning purposes. Full power is applied to the transmitter only with this switch set in the NORMAL position.

**PLATE POWER Switch** — In the on (up) position, plate power is applied to the modulators and the power amplifier. The red pilot lamp indicates when plate power is applied.

**FUSES FS1, FS2, FS3, FS4, and FS5** — Fuses FS1 and FS2 are line fuses. FS3 is in the primary circuit of T6. FS4 protects T2, T3, T4, and T5. Fuse FS5 protects T1 in the transmitter and T101 in Speech Amplifier HT-5 (\*).

### 2. TRANSMITTER TUNING UNIT CONTROLS AND THEIR USE

**M.O. — XTAL Switch** — Use this control to select the desired type of operation. Set the control at M.O. for master oscillator control or at XTAL for crystal control.

**M.O. Control** — This control determines the frequency of the master oscillator. Approximate settings for this control can be found on the tuning charts.

**DOUB. Control** — Tunes the buffer-doubler tank circuit to resonance with the first, second, or fourth harmonic of the signal from the oscillator. Approximate settings for this control can be obtained from the tuning charts.

**INT. AMP. Control** — Tunes the i-p-a circuit to resonance with the signal from the buffer-doubler. Approximate settings for this control can be found on the tuning charts.

### 3. SPEECH AMPLIFIER HT-5 (\*) CONTROLS AND THEIR USE

**CARBON MIC. 1 Control** — This control adjusts the input level to the second a-f amplifier stage from the carbon microphone.

**DYNAMIC MIC. 2 Control** — This control adjusts the input level to the first a-f amplifier stage from the dynamic microphone or from a telephone used in a remote location.

**MODULATOR PLATE Meter** — Indicates the plate current of the modulators in the transmitter. The amount of plate current is controlled by the adjustment of the MODULATOR BIAS control on the transmitter front panel and by the adjustment of either the CARBON MIC. 1 or DYNAMIC MIC. 2 gain control on the speech amplifier front panel.

**PILOT LAMP** — Indicates when a-c power is being supplied to the speech amplifier by the transmitter. The lamp will light when the FILAMENT POWER switch on the transmitter is set at on (up).

**KEY Jack** — Makes it possible to key the transmitter from the speech amplifier.

**LIMITER CONTROL** — This control is concealed behind the removable plate. It adjusts the excitation to the modulation limiter in the speech amplifier.

**TO BC-610 Socket** — Connects the speech amplifier to the transmitter. See Fig. 1 and pages 4 and 5 for connections.

**TO JB-70 Socket** — Provides a sidetone signal for monitoring CW transmissions by means of a headset. Also has provisions for remote keying, remote control of transmitter, and connecting a remote telephone. See Fig. 1 and pages 4 and 5 for connections.

### 4. PRELIMINARY STARTING PROCEDURE FOR M. O. CW OPERATION

- a. Turn the FILAMENT POWER switch off (down).
- b. Turn the PLATE POWER switch off (down).
- c. Set the EXCITER PLATE POWER switch at NORMAL.
- d. Set the HIGH VOLTAGE PROTECT switch at NORMAL.
- e. Set the PHONE - C.W. switch at C.W.
- f. Open the right hand door in the top of the transmitter cabinet and insert the tuning unit covering the desired frequency in channel 1 (see Table I).
- g. Set the BAND SWITCH at position 1.
- h. Open the left hand door in the top of the transmitter cabinet and insert the coil unit covering the desired frequency (see TABLE I). Make sure that the coupling coil is set for minimum coupling (horizontal). If operation in the 2.0 to 2.5 MC range is desired, the plug-in vacuum capacitor is required in addition to the correct coil unit.
- i. Set the M.O. - XTAL switch on the tuning unit at M.O. for master oscillator control.
- j. Unlock the P.A. PLATE TUNING dial on the transmitter by unscrewing the lock knob. Set the P.A. PLATE TUNING control according to the tuning charts.
- k. Set the INT. AMP., DOUB., AND M.O. controls to their approximate settings specified on the tuning charts.

### 5. PRELIMINARY STARTING PROCEDURE FOR CRYSTAL CW OPERATION

- a. Perform steps a through h in Section 4.
- b. Set the M.O. - XTAL switch on the tuning unit at XTAL.

- c. Insert the proper crystal into the crystal jack. From 2 to 4 megacycles, the crystal frequency is identical with the operating frequency. From 4 to 12 megacycles, the crystal frequency is 1/2 of the operating frequency. From 12 to 18 megacycles, the crystal frequency is 1/4 of the operating frequency.
- d. Set the INT. AMP. and DOUB. controls on the tuning unit to the settings specified on the tuning charts.
- e. At frequencies between 2 and 4 MC, the transmitter output frequency is the same as the crystal frequency and the circuit controlled by the DOUB. control functions as a buffer stage. At frequencies between 4 and 12 MC, this stage acts as a doubler; hence the output frequency is twice that of the crystal. From 12 to 18 MC, this stage quadruples the crystal frequency.

TABLE 1. TUNING COMPONENTS

| Tuning Unit | Frequency Range (MC) |
|-------------|----------------------|
| TU-47       | 2.0 - 2.5 MC         |
| TU-48       | 2.5 - 3.2 MC         |
| TU-49       | 3.2 - 4.0 MC         |
| TU-50       | 4.0 - 5.0 MC         |
| TU-51       | 5.0 - 6.35 MC        |
| TU-52       | 6.35 - 8.0 MC        |
| TU-53       | 8.0 - 12.0 MC        |
| TU-54       | 12.0 - 18.0 MC       |

| Coil Unit                               | Frequency Range (MC) |
|---|----------------------|
| C-387-D (with plug-in vacuum capacitor) | 2.0 - 2.5 MC         |
| C-387-D                                 | 2.5 - 3.5 MC         |
| C-388-C                                 | 3.5 - 4.5 MC         |
| C-389-C                                 | 4.5 - 5.7 MC         |
| C-390-C                                 | 5.7 - 8.0 MC         |
| C-447-B                                 | 8.0 - 11.0 MC        |
| C-448-B                                 | 11.0 - 14.0 MC       |
| C-449-B                                 | 14.0 - 18.0 MC       |

## 6. STARTING PROCEDURE FOR CW OPERATION

NOTE: No matter what mode of operation is intended, always tune the transmitter for CW operation first.

- a. Supply 115 volt AC power to socket SO-6 at the rear of the transmitter modulator chassis.
- b. Set the FILAMENT POWER switch on the transmitter at on (up). The green pilot lamp should light

and an indication should be obtained on the FILAMENT VOLTAGE meter. Allow approximately one minute for the tubes to reach operating temperature.

- c. Adjust the FILAMENT VOLTAGE control on the transmitter so that the FILAMENT VOLTAGE meter indicates between 5.0 and 5.3 volts.
- d. Set the EXCITATION METER SWITCH at INT. AMP. GRID.
- e. Set the EXCITER PLATE POWER switch at on (up).
- f. Adjust the DOUB. control on the transmitter tuning unit for maximum reading as indicated on the EXCITATION METER.
- g. Set the EXCITER METER SWITCH at P.A. GRID.
- h. Adjust the INT. AMP. control on the transmitter tuning unit for maximum reading as indicated on the EXCITATION METER.
- i. Repeat steps f and h until maximum possible reading is obtained on EXCITATION METER. The meter should indicate between 60 and 100 milliamperes.
- j. Set the EXCITER PLATE POWER switch at NORMAL (off).
- k. Make certain that both doors in the top of the transmitter cabinet are firmly closed upon the interlock switches; otherwise the plate power cannot be applied.
- l. Set the HIGH VOLTAGE PROTECT switch at HIGH VOLTAGE PROTECT. Always do this before tuning the final amplifier.
- m. Set the PLATE POWER switch on (up). This will operate plate relay RY-1 and antenna shorting relay RY-4. (This may also be accomplished by a remote switch in associated equipment which shorts pins 3 and 4 of socket SO-5 in the transmitter.) The red pilot lamp on the transmitter front panel should light.
- n. Set the EXCITER PLATE POWER switch on (up). This will key the cathode circuit of the master oscillator stage. (This will normally be accomplished during operation by a key on the HT-5 (\*) Speech Amplifier or associated equipment which shorts pins 2 and 8 of socket SO-5). All subsequent tuning adjustments are made with the circuit keyed. The P.A. PLATE meter should indicate current flow in the circuit. The amount of current will

depend upon the setting of the P.A. PLATE TUNING dial and the movable coupling coil in the final tank coil.

- o. Rotate the P.A. PLATE TUNING dial until the P.A. PLATE METER dips to a minimum reading.
- p. The method of tuning the antenna to the output impedance of the p-a tank circuit will vary depending upon the type of antenna and the associated antenna equipment supplied. Adjust the antenna equipment, keeping the P.A. PLATE meter reading at 100 ma.
- q. If the minimum P.A. PLATE meter reading is much lower than 100 ma, turn off the transmitter, open the left hand top door, and remove the coil unit. Move the coupling coil to about 15° from horizontal and then replace the coil unit. Close the door and apply plate power. Tune the P.A. PLATE TUNING dial for a minimum reading on the P.A. PLATE meter. If the reading is still below 100 ma, further increase the coupling in the same manner. Do not couple above 100 ma.
- r. Set the HIGH VOLTAGE PROTECT switch at NORMAL and key the transmitter. The P.A. PLATE meter should now indicate a substantially higher reading.
- s. Adjust the antenna equipment until the maximum antenna current occurs when the P.A. PLATE meter reads 290 ma. The coupling coil in the final tank coil can be used for adjusting the coupling between the final tank coil and the antenna.

CAUTION: Never exceed a P.A. PLATE meter reading of 300 ma on CW operation. It is permissible to reduce the plate current to as low as 200 ma. if satisfactory CW communication is still maintained.

- t. Key the transmitter and check the FILAMENT VOLTAGE meter. If necessary, reset the FILAMENT VOLTAGE control so that the meter reads 5.0 to 5.3 volts; then release the key.
- u. This completes the tuning procedure; the transmitter is now ready for CW operation after setting the EXCITER PLATE POWER switch at NORMAL.

## 7. STARTING PROCEDURE FOR PHONE OPERATION

- a. Perform all steps in Sections 4 and 5 (depending upon whether master oscillator or crystal controlled) and Section 6.

When using the HT-5 (\*) Speech Amplifier for voice modulation, it will be necessary to connect a jumper between pins 2 and 4 of the TO JB-70 socket to complete the cathode circuit of the r-f oscillator, located in the transmitter, to ground.

- b. Set the MODULATOR BIAS control on the transmitter fully counterclockwise (this increases the bias).
- c. Set the PHONE - C.W. switch at PHONE.

**CAUTION:** Never throw this switch while power amplifier is turned on (red lamp lit).

- d. Operate plate relay RY-1 and antenna shorting relay RY-4 as outlined in Section 6, step m. The P.A. PLATE meter should read approximately 250 ma, the normal plate current for voice operation. If the transmitter has been tuned to 290 ma on CW operation, the plate current will automatically be reduced to 250 ma when the PHONE - C.W. switch is set at PHONE for voice operation. If the P.A. PLATE meter reading is greater than 260 ma. turn off the plate power and adjust the antenna coupling until the plate current is reduced to the proper value.
- e. Adjust the MODULATOR BIAS control on the transmitter for 40 ma of modulator current with no audio input to the transmitter. Modulator plate current is indicated on the MODULATOR PLATE meter on the front panel of SPEECH AMPLIFIER HT-5 (\*). On some special HT-4 (\*) Radio Transmitter models, a MODULATOR PLATE meter is provided on the transmitter front panel.
- f. Adjust the microphone gain control on the speech amplifier until the audio signal from the speech amplifier causes the modulator current to reach 200 ma at voice peaks.
- g. This completes the tuning procedure. The transmitter and speech amplifier are now ready for voice operation.

## 8. STOPPING PROCEDURE

- a. Set the EXCITER PLATE POWER switch at NORMAL.
- b. Set the PLATE POWER switch on the transmitter off (down). If a remote switch is used, it also must be set at off.
- c. Set the FILAMENT POWER switch at off (down).

## 9. FREQUENCY CHANGING

- a. Provision is made in the transmitter for simultaneously accommodating three tuning units, each of which may be instantly selected by the BAND SWITCH. Each tuning unit may be tuned to a separate frequency and left plugged in, ready for use when needed. It is possible to install three tuning units pretuned to different frequencies and covered by one coil unit. In this case, frequency changing is accomplished by setting the BAND SWITCH to the desired channel and repeating steps 1 thru 5 in Section 6.
- b. The three tuning units installed in the transmitter may not be covered by one coil unit. In this case, frequency changing is accomplished by setting the BAND SWITCH to the desired channel, replacing the coil unit with the proper one, and repeating steps 1 thru 5 in Section 6.

## 10. PRESETTING TUNING UNITS TO EXACT FREQUENCY

- a. In presetting the transmitter tuning units for M.O. control, the settings given in the tuning charts are approximate. If greater accuracy is required, it will be necessary to add the following steps after step 1 in Section 6.
  - (1) Set a frequency meter to the desired operating frequency.
  - (2) Place the frequency meter on top of the transmitter. Use about a foot of wire for an antenna on the meter.
  - (3) Adjust the M.O. control on the tuning unit for a zero beat with the frequency meter.
  - (4) Readjust the DOUB. and INT. AMP. controls on the tuning unit for maximum P.A. GRID reading and then recheck frequency.

## ADJUSTMENTS

### 1. NEUTRALIZATION

- a. Radio Transmitter HT-4 (\*) has been neutralized at the factory and should normally not require re-adjustment, except when the setting of neutralizing capacitor C-18 has been changed or when the power amplifier tube V-16 has been replaced. To determine if adjustment is necessary, proceed as outlined below.

- (1) Install Tuning Unit TU-52 and associated Coil Unit C-390-C.
- (2) Disconnect the antenna from the transmitter output terminals.
- (3) Set the PLATE POWER switch on the transmitter at off (down). Neutralization is made with the h-v plate power disconnected.
- (4) Set the FILAMENT POWER switch at on (up).
- (5) Set the EXCITATION METER switch at P.A. GRID.
- (6) Set the EXCITER PLATE POWER switch at on (up).
- (7) Adjust the controls of the tuning unit to resonance at some frequency near the high frequency end of the range.
- (8) Adjust the PLATE TUNING wheel slowly through resonance. If neutralization is faulty, resonance will be indicated by a sharp dip in the EXCITATION METER reading.

- (9) If it is apparent from the preceding steps that neutralization is faulty, readjust C-18 in small steps, until rotating the PLATE TUNING wheel through resonance causes only a slight dip in the reading of the EXCITATION METER. When properly neutralized, this dip should not exceed 3 ma.

### 2. MODULATION LIMITER CONTROL ADJUSTMENT

The modulation limiter in Speech Amplifier HT-5 (\*) has been properly set to provide a minimum of 3 db compression at 100% modulation, and no change in setting is recommended. Readjustment should be made only if the LIMITER CONTROL has been tampered with. To adjust the LIMITER CONTROL, proceed as follows:

- a. Disconnect the dynamic microphone from the speech amplifier and connect a 400-cycle audio generator to terminals 1 and 3 of socket SO-101. Connect the ground side of the generator to terminal 1.
- b. Turn on the transmitter and adjust it for phone operation.
- c. Remove the metal plate located below the LIMITER CONTROL marking on the front panel of the speech amplifier. The LIMITER CONTROL, located behind the plate, is a screwdriver adjustment.
- d. Turn the LIMITER CONTROL full counterclockwise.
- e. Adjust the generator output and the DYNAMIC MIC. 2 control for a MODULATOR PLATE meter reading of 225 ma.
- f. Turn the LIMITER CONTROL clockwise until the MODULATOR PLATE meter reads 160 ma.
- g. Replace the metal plate.

## THEORY OF OPERATION

## 1. RADIO TRANSMITTER HT-4 (\*)

Radio Transmitter HT-4 (\*) is designed for transmitting both voice and CW signals over the frequency range of 2 to 18 MC. The frequency range is covered by means of 8 plug-in tuning units, seven plug-in coil units, and a vacuum capacitor. Each tuning unit and associated coil unit, or coil unit and vacuum capacitor, covers a portion of this range. The transmitter contains an RF section, a modulator section, and a high voltage power supply.

- a. The RF oscillator stage consists of a 6V6GT tube, V-8, operating in a Hartley circuit. The oscillator operates either as a variable master oscillator or crystal oscillator, depending upon the setting of the M.O. -XTAL switch. When the switch is set at M.O., the frequency may be varied over the range of the tuning unit being used. CW keying is accomplished in the cathode circuit of V-8. The output of the RF oscillator is fed into the buffer-doubler, V-9.
- b. The plate tuned circuit of the buffer-doubler, V-9, is located in the tuning unit. When the variable-frequency master oscillator is used, the buffer-doubler operates as a frequency doubler up to 12 MC and as a frequency quadrupler from 12 to 18 MC. During crystal operation, the buffer-doubler, V-9, operates as a buffer from 2 to 4 MC, as a doubler from 4 to 12 MC, and as a quadrupler from 12 to 18 MC. The output of the buffer-doubler is coupled to the grids of the intermediate power amplifiers, V-10 and V-11.
- c. The i-p-a stage consists of two 807's connected in parallel. The plate tuned circuit is located in the tuning unit. Screen and plate voltages are supplied by the exciter rectifier, V-12. Bias voltage is supplied by the bias rectifier, V-5. The output of the i-p-a stage is connected to the grid of the RF power amplifier, V-16.
- d. The RF power amplifier consists of a type 250TH tube operating as a neutralized class C amplifier. Bias voltage is provided by the bias rectifier, V-5. The plate tank circuit consists of variable capacitor C-12 and coil unit L-7. RF power is inductively coupled from the plate tank circuit to the RF output terminals by means of a link. When the transmitter is not in operation, contacts on relay RY-4 short-circuit the coupling link.
- e. The modulator stage consists of V-3 and V-4 operated in Class B push-pull. The plates of V-3 and V-4 connect to the primary of modulation transformer, T-9. The secondary of T-9, during phone operation, is connected in series with the

plate circuit of power amplifier, V-16. Thus, the audio frequency voltage developed across the secondary of T-9 adds to and subtracts from the DC plate voltage applied to the RF power amplifier V-16, resulting in an amplitude modulated RF carrier. During CW operation, the secondary of T-9 is shorted by contacts on relay RY-3.

- f. The audio signal from the speech amplifier is applied to the grids of the AF drivers, V-1 and V-2. These tubes are connected in push-pull and operate as Class AB1 audio amplifiers. The output of the driver stage is coupled to the modulators, V-3 and V-4, by transformer T-8.
- g. The exciter rectifier, V-12, supplies plate and screen voltage to the buffer-doubler, V-9, the intermediate power amplifiers, V-10 and V-11, and the RF oscillator, V-8. The plate voltage of V-8 is regulated by voltage regulators, V-14 and V-15. The screen voltage of V-8 is regulated by voltage regulator, V-13.
- h. The bias rectifier, V-5, furnishes filament and plate voltage for the AF drivers, V-1 and V-2, and bias voltage for tubes V-3, V-4, V-10, V-11, and V-16.
- i. The HV rectifiers, V-6 and V-7, furnish DC plate voltage for the modulators, V-3 and V-4, and the RF power amplifier, V-16. V-6 and V-7 are connected in a full-wave rectifier circuit.

## 2. SPEECH AMPLIFIER HT-5 (\*)

Speech Amplifier HT-5 (\*) is an audio frequency amplifier designed for use with Radio Transmitter HT-4 (\*). The basic purpose of the speech amplifier is to raise the output of a carbon or dynamic microphone to a level suitable to drive the input of the modulator section in the transmitter. The speech amplifier also has provisions for keying the transmitter for CW operation and monitoring outgoing CW transmissions by means of a headset.

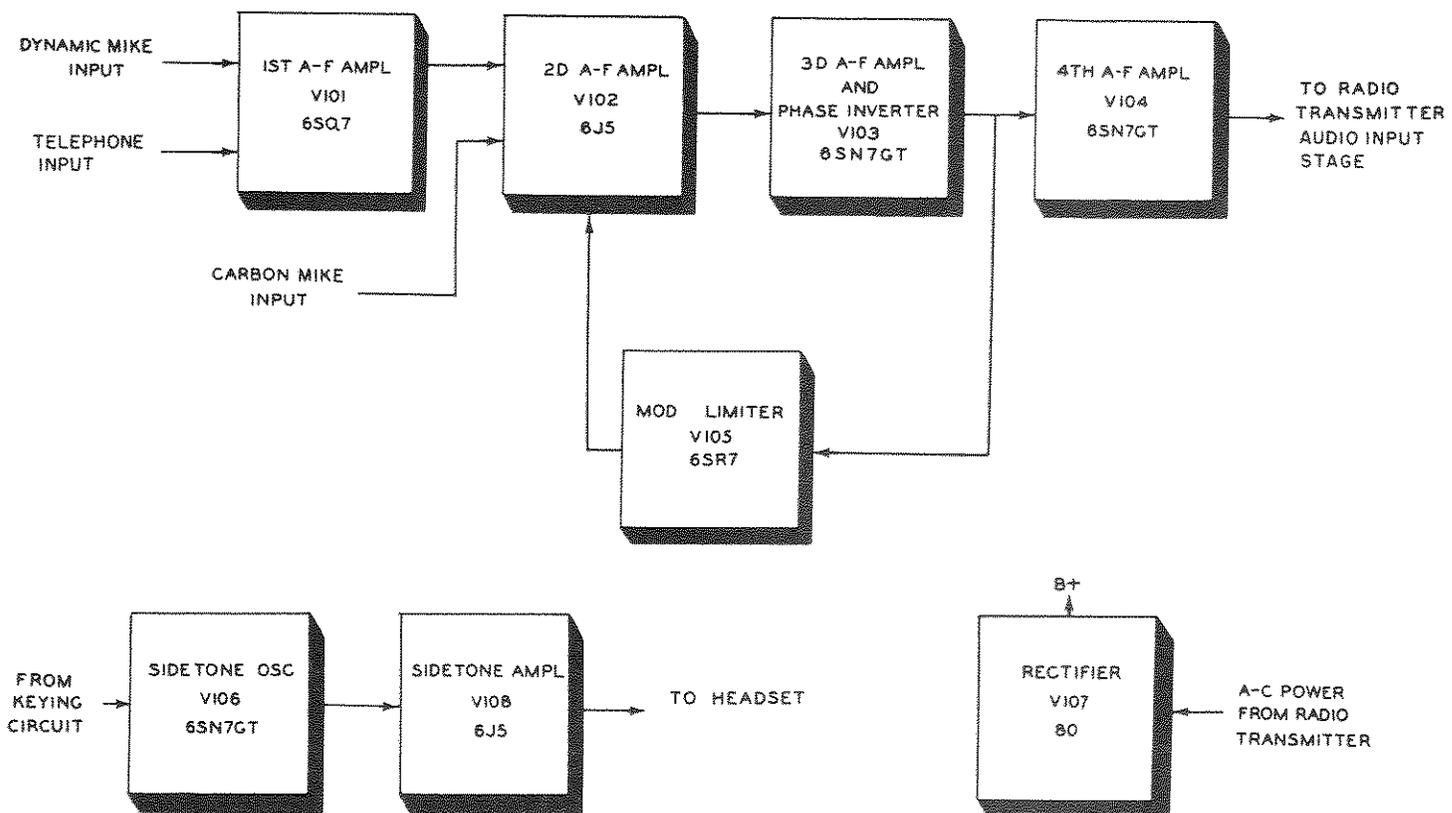
- a. The outputs of the dynamic microphone and remote telephone are amplified by the 1st AF amplifier, V-101. The microphone is connected to the input of V-101 through socket SO-101 while the telephone output is connected through socket SO-102. A resistive network in the grid circuit of V-101 is designed to properly match both the high impedance dynamic microphone and the low impedance telephone. This network also provides the correct attenuation necessary to compensate for

the difference in output levels of the dynamic microphone and the telephone.

- b. The carbon microphone output is fed through jack J-102 to the input of the 2nd AF amplifier, V-102. V-102 amplifies the outputs of both the carbon microphone and the 1st AF amplifier, V-101. The output of V-102 is applied to the grid of the 3rd AF amplifier and phase inverter, V-103.
- c. The 3rd AF amplifier and phase inverter V-103 employs both sections of a 6SN7GT dual triode. One section functions as a conventional RC coupled amplifier; the other section provides a push-pull output to the grids of the 4th AF amplifier, V-104.
- d. The 4th AF amplifier, V-104, operates as a class A push-pull amplifier. The output transformer, T-102, is designed to match the plate impedance of V-104 to a 500-ohm line. The audio output signal from V-104 is fed to the AF driver stage in the transmitter.
- e. A portion of the audio voltage on one of the grids (pin 4) of V-104 is fed back to the grid of the

modulation limiter V-105. This signal is amplified, and rectified to produce a DC control voltage proportional to the peak amplitude of the audio signal. This DC voltage is used to bias the 2nd AF amplifier, V-102; its effect is to vary the gain of V-102 in inverse proportion to the amplitude of the audio output signal.

- f. The sidetone oscillator, V-106, is a dual-triode connected in a multi-vibrator circuit. Its purpose is to generate a sidetone signal for monitoring outgoing CW transmissions. To monitor keying during CW operation, it is necessary to connect a jumper between pins 1 and 2 of socket SO-102.
- g. The sidetone amplifier, V-108, amplifies the output of the sidetone oscillator, V-106, and provides a cathode follower output for connection to headphones.
- h. AC power is supplied to the speech amplifier by Radio Transmitter HT-4 (\*) through, socket SO-103. The rectifier, V-107, is connected in a conventional full-wave circuit. The output is filtered by a pi type LC network.



TM 5054-7

Fig. 2. Block Diagram of Speech Amplifier HT-5 (\*)

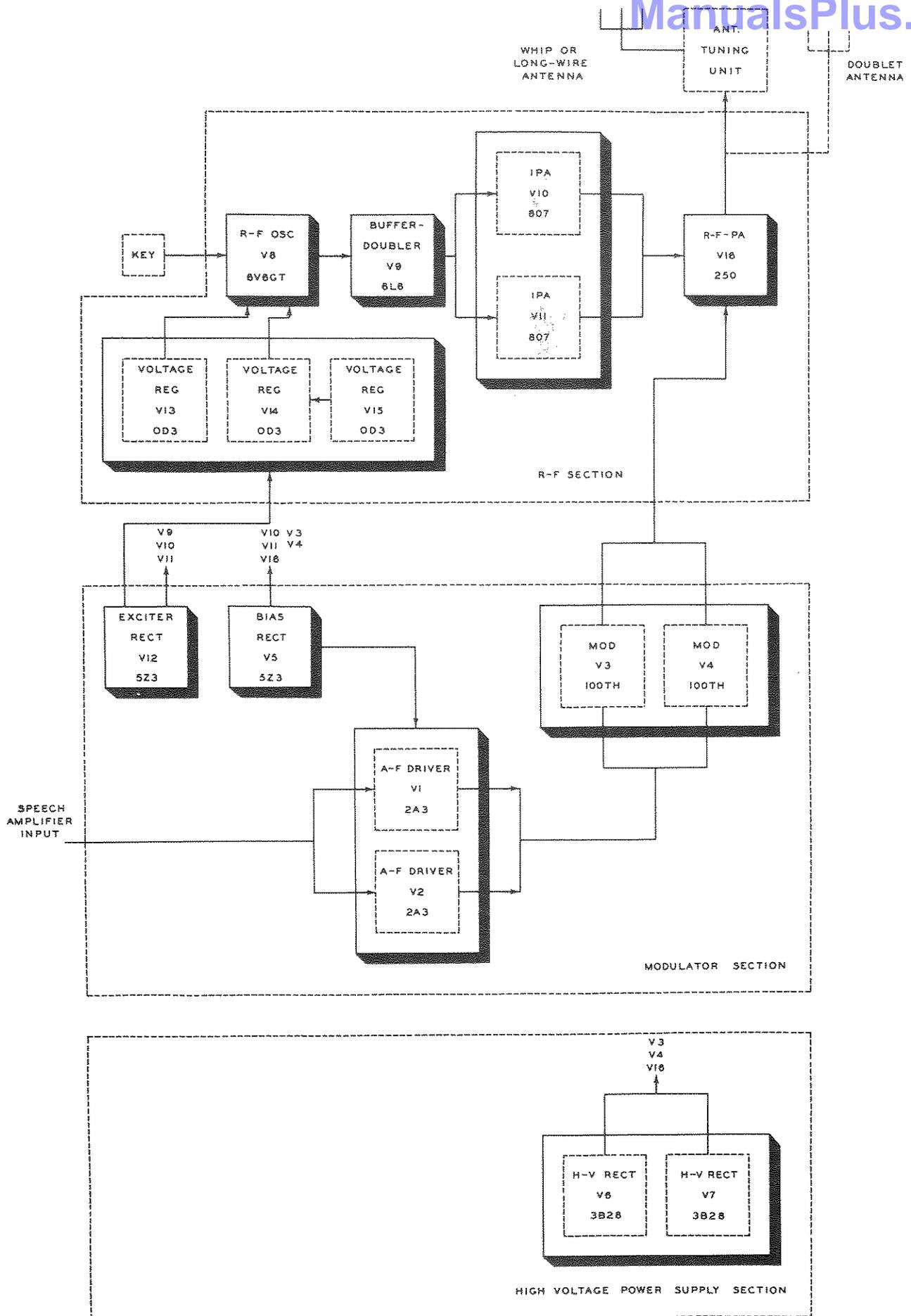
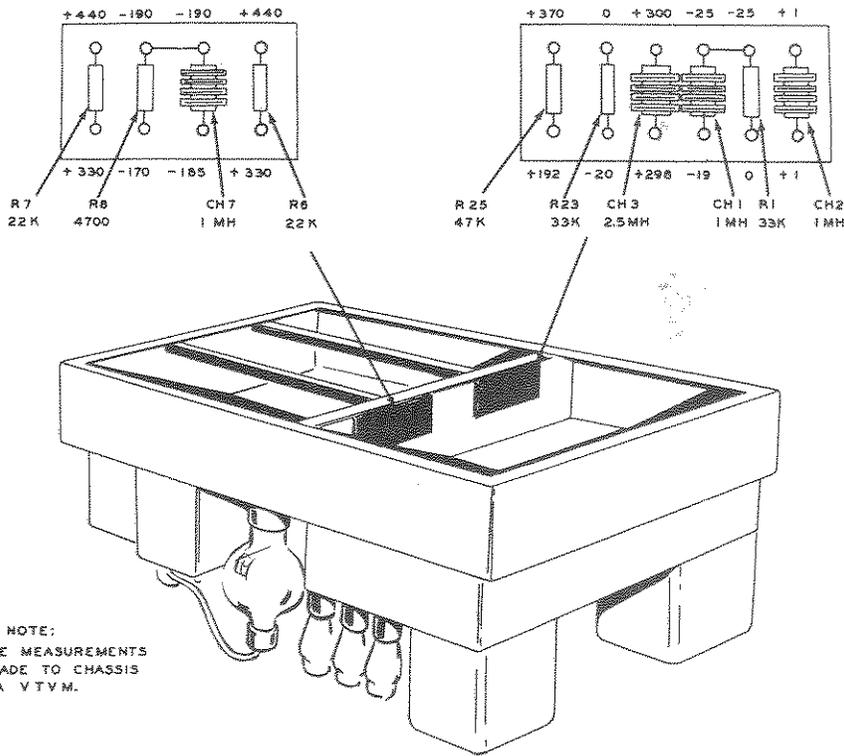


Fig. 3. Block Diagram of Radio Transmitter HT-4 (\*)

TM 826-10

# SERVICE DATA

## RADIO TRANSMITTER HT-4 (\*)



NOTE:  
VOLTAGE MEASUREMENTS  
ARE MADE TO CHASSIS  
WITH A VTVM.

Fig. 4. Radio Transmitter HT-4 (\*), Bottom View of RF Chassis Showing Resistor and Capacitor Board Voltages and Resistances

TM 826-41

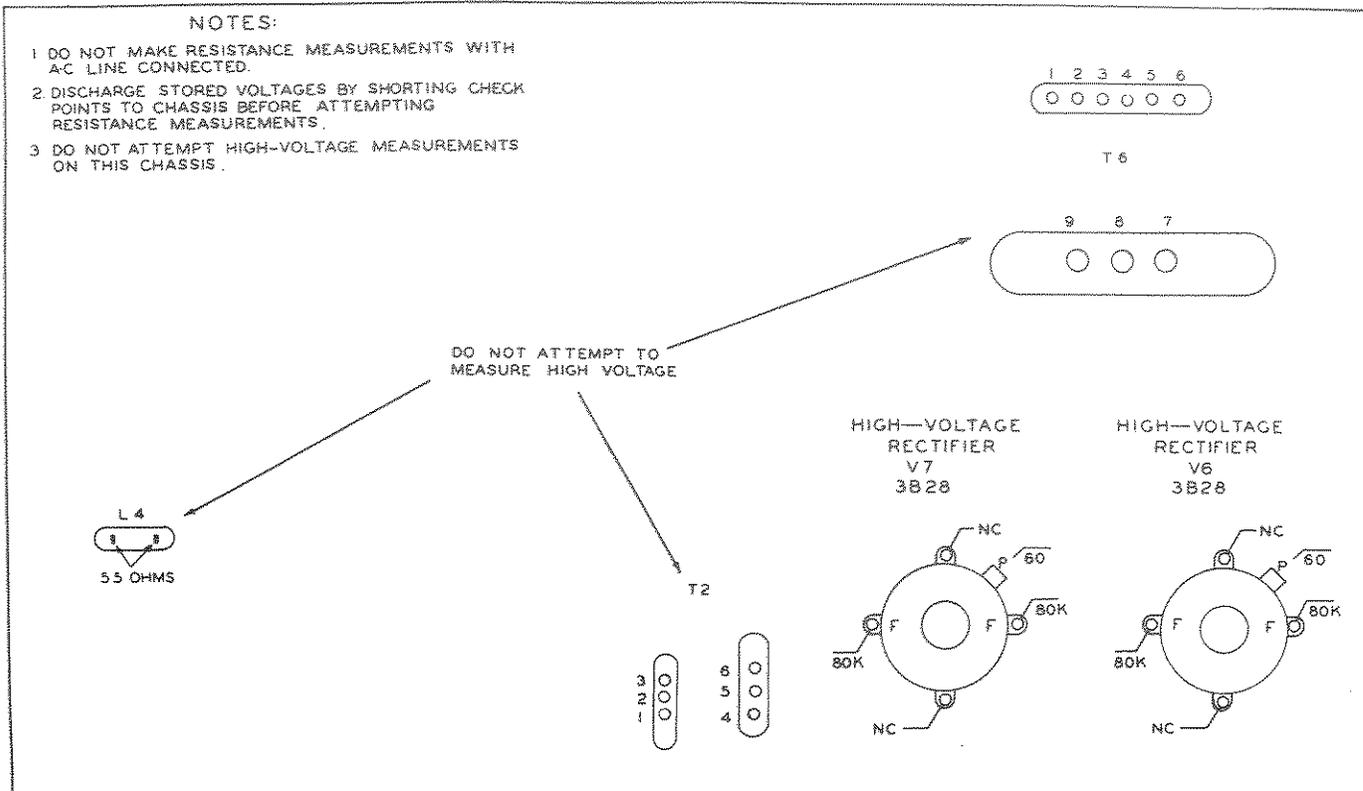


Fig. 5. Radio Transmitter HT-4 (\*), Power Supply Chassis Resistance Chart

TM 826-43

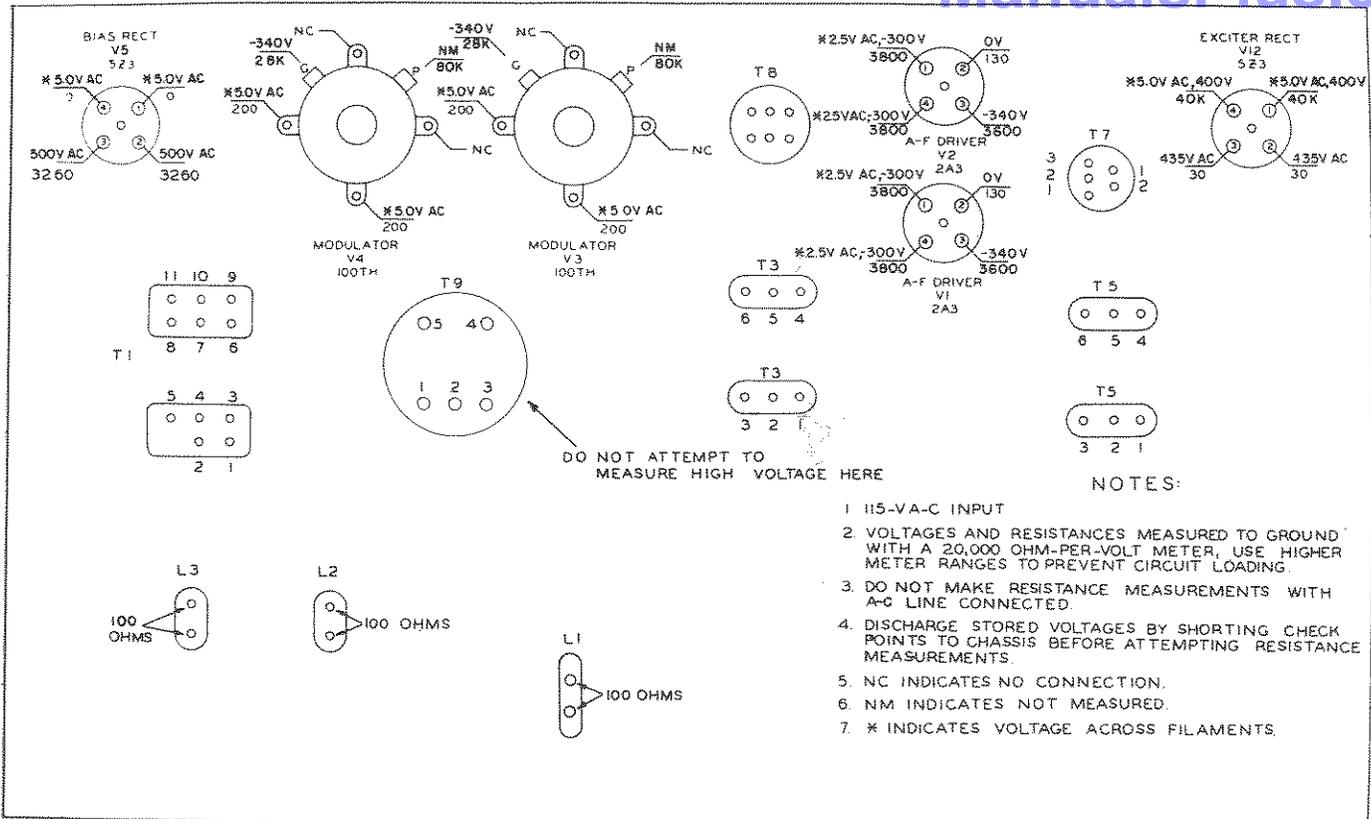


Fig. 6. Radio Transmitter HT-4 (\*), Modulator Chassis Voltage and Resistance Chart

TM 826-42

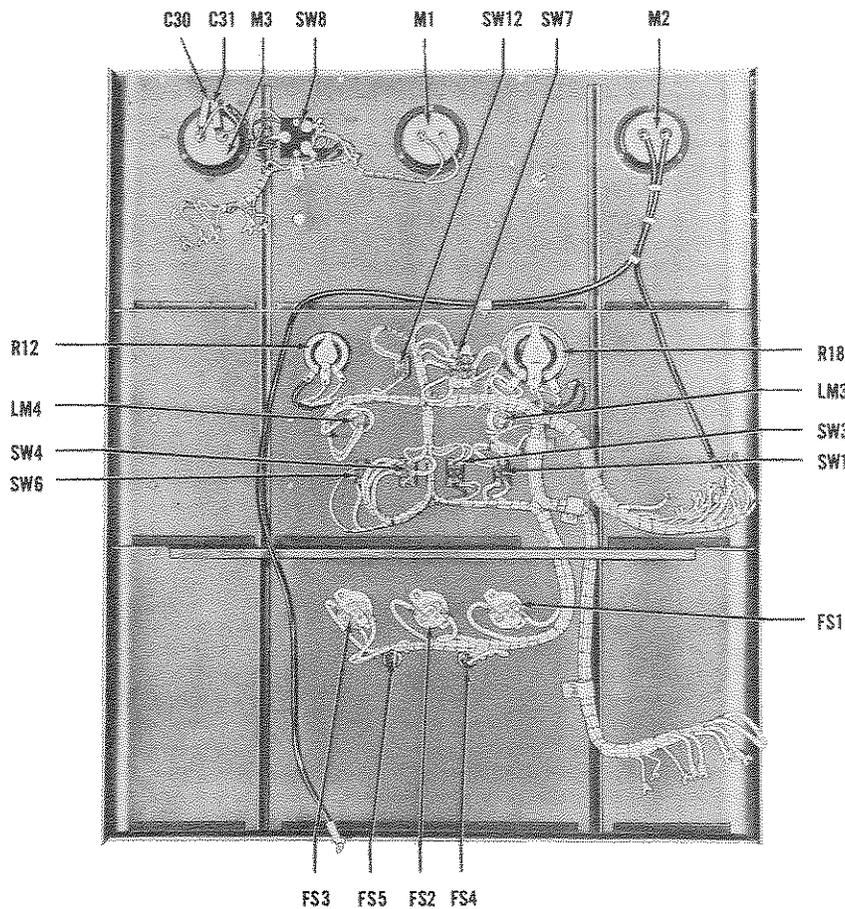


Fig. 7. Radio Transmitter HT-4 (\*), Rear View of Front Panel Showing Component Location

92X1916



## TROUBLE-SHOOTING CHART

### RADIO TRANSMITTER HT-4 (\*)

| Symptom  | Probable Trouble   | Correction   |
|--|--|--|
| 1. FILAMENT POWER switch in on position. FILAMENT VOLTAGE meter indicates voltage. Green pilot lamp does not light.  | Lamp LM3 burned out or loose in socket.                    | Replace LM3 or tighten in socket.  |
|  | Leads broken or defective.                                 | Repair.  |
|  | Socket defective.  | Replace socket.  |
| 2. FILAMENT POWER switch in on position. FILAMENT VOLTAGE meter indicates no voltage. Green pilot lamp does not light.   | Fuse FS1, FS2, or FS4 burned out.                          | Replace.   |
|  | Switch SW1 defective.                                      | Replace.   |
|  | Damaged or poor contacts at socket S06.                    | Repair power cord or socket S06.   |
| 3. FILAMENT POWER switch in on position. Green pilot lamp lights. FILAMENT VOLTAGE meter indicates no voltage.   | Tube V13, V14, or V15 not in socket.                       | Place tube properly in its socket.   |
|  | FILAMENT VOLTAGE resistor R18 defective.                   | Check sliding arm for contact. Repair or replace resistor.                                   |
|  | Open connection at terminals 3 or 7 of terminal strip TS1  | Check connections at terminal strips TS1, TS9, and TS11. Clean or tighten as required.       |
| 4. FILAMENT POWER switch in on position. Green pilot lamp lights. FILAMENT VOLTAGE meter indicates voltage. Filaments of tubes V1, V2, and V5 are not heated.  | Fuse FS5 open.   | Replace.   |
| 5. FILAMENT POWER switch in on position. Green pilot lamp lights. FILAMENT VOLTAGE meter indicates voltage. Filaments of tubes V6 and V7 are heated. Filaments of tubes V1, V2, and V5 are not heated. | Open connection at terminal 2 or 8 on terminal strip TS11. | Check connections at terminals 2 and 8 on terminal strip TS11. Clean or tighten as required. |
| 6. FILAMENT POWER switch in on position. Green pilot lamp lights. FILAMENT VOLTAGE meter indicates voltage. Filaments of tubes V1, V2, and V5 are heated. Filaments of tubes V6 and V7 are not heated. | Open connection at terminal 7 or 8 on terminal strip TS14. | Check connections at terminals 7 and 8 on terminal strip TS14. Clean or tighten as required. |
| 7. EXCITER PLATE POWER switch in up position. Current excessive on EXCITATION METER when EXCITATION METER SWITCH is in INT. AMP. GRID, INT. AMP. PLATE, and P.A. GRID positions.                       | Open filter choke L2 or L3.                                | Replace.   |
|  | Defective rectifier tube V5.                               | Replace defective tube.  |
|  | Open ground connection at terminal 7 of transformer T1.    | Repair open ground circuit.  |
|  | Open resistor R11.   | Replace.   |

## TROUBLE-SHOOTING CHART (Continued)

| Symptom   | Probable Trouble  | Correction  |
|---|---|---|
| 8. EXCITER PLATE POWER switch in up position. No indications on EXCITATION METER when EXCITATION METER SWITCH is in DOUBLER PLATE, INT. AMP. GRID, and INT. AMP. PLATE positions.   | Defective switch SW3 or SW8.  | Replace.  |
|   | Open choke CH1 or CH2.  | Replace.  |
|   | Open connection at terminal 2 or 5 of terminal strip TS1 or TS9.  | Check connections; clean or tighten as required.                            |
|   | Defective rectifier tube V12.   | Replace.  |
|   | Open ground lead at terminal 5 of transformer T5.   | Repair connection.  |
| 9. EXCITER PLATE POWER switch in up position. Normal indications on EXCITATION METER when EXCITATION METER SWITCH is in DOUBLER PLATE position. No reading on EXCITATION METER when EXCITATION METER SWITCH is in INT. AMP. GRID, INT. AMP. PLATE, and P.A. Grid positions. | Open resistor R8 or choke CH7.  | Replace.  |
|   | Open connection at terminal 4 or 5 of terminal strip TS2, terminal 9 of terminal strip TS1 or TS9, or terminal 13 of terminal strip TS11. | Check terminal strip connections. Clean or tighten as required.             |
|   | Open resistor R11 or R12.   | Replace.  |
|   | Open tap contact on resistor R11.   | Clean or tighten tap contact as required.                                   |
| 10. EXCITER PLATE POWER switch in up position. No current when EXCITATION METER SWITCH is in P.A. GRID position. Normal current on EXCITATION METER when EXCITATION METER SWITCH is in DOUBLER PLATE, INT. AMP. GRID, and INT. AMP. PLATE positions.                        | Open choke coil CH8.  | Replace.  |
|   | Defective tube V16.   | Replace.  |
|   | Open ground circuit at terminal 8 on transformer T4.  | Repair open ground circuit.   |
|   | Open grid cap clip connection on side of tube V16.  | Clean or tighten clip connection as required.                               |
| 11. PLATE POWER switch in on position. No current on P.A. PLATE meter. All other indications normal.  | Defective switch SW6.   | Replace.  |
|   | Open coil in relay RY1.   | Replace.  |
|   | Defective contacts on relay RY1 or RY2.   | Clean or replace defective contacts as required.                            |
|   | Open fuse FS3.  | Replace.  |
|   | Open interlock switch SW2, SW5, or SW13.  | Check position of top access doors and tightness of transmitter back cover. |
|   | Overload relay RY2 energized.   | Press OVERLOAD RESET switch.  |
|   | Open filter choke L4.   | Replace.  |
|   | Defective switch SW4.   | Replace.  |
|   | Open plate cap clip connection on top of tube V16.  | Clean or tighten clip connection as required.                               |
|   | Open primary coil in plug-in unit L7.   | Replace plug-in unit L7.  |
| Open connections between plug-in coil L7 and jack.  | Clean or tighten connections as required.   |   |

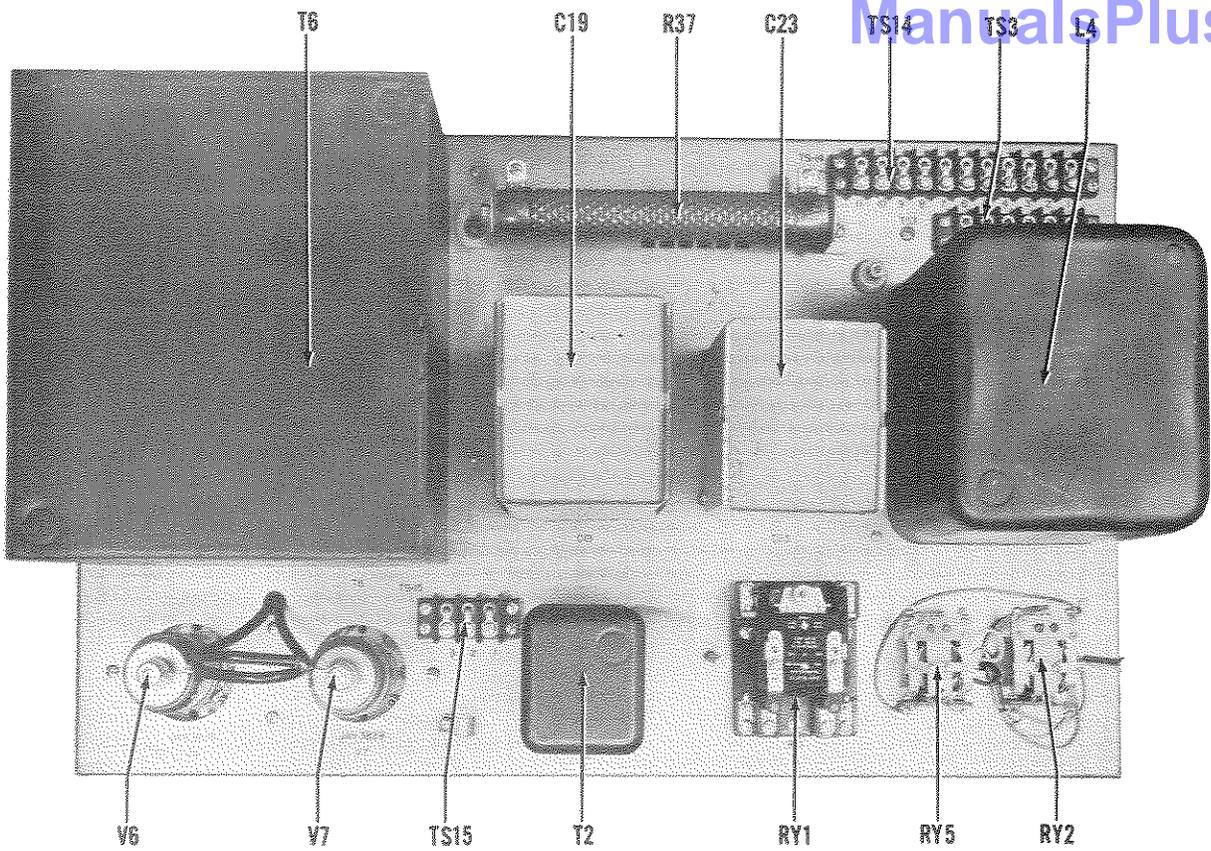


Fig. 9. Radio Transmitter HT-4 (\*), Top View of Power Supply Chassis Showing Component Location

92X1917

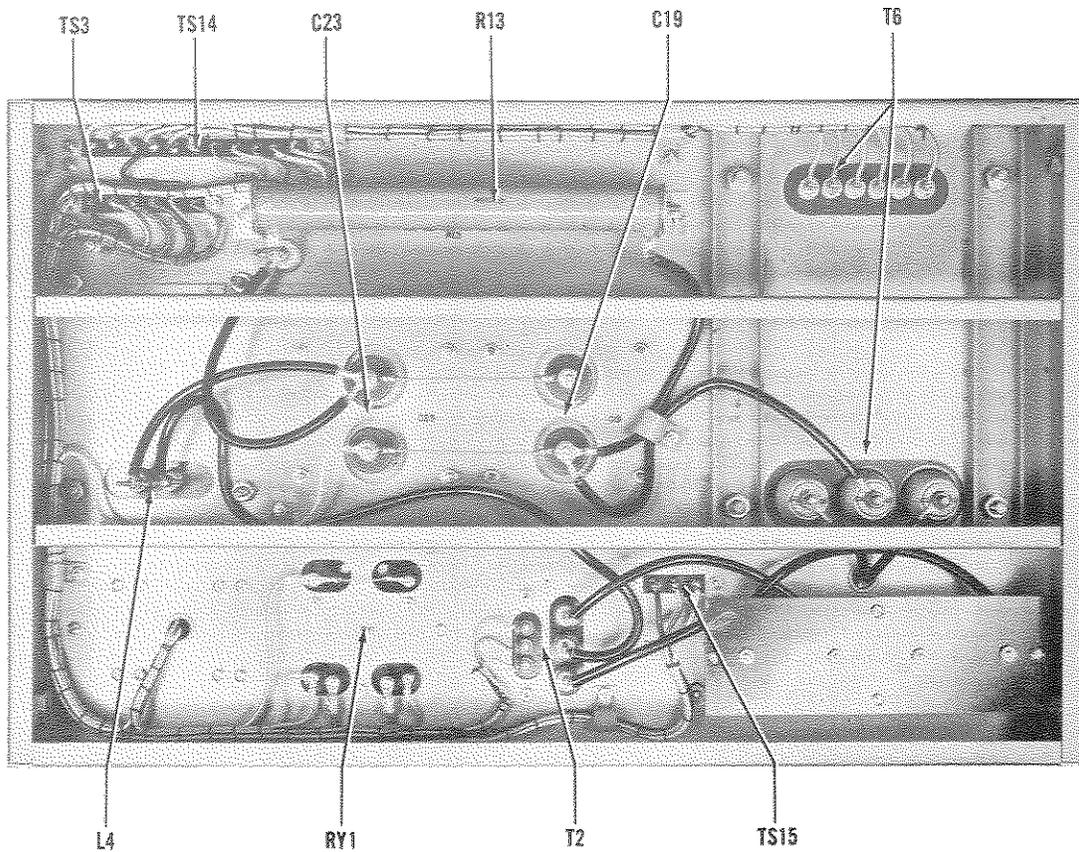


Fig. 10. Radio Transmitter HT-4 (\*), Bottom View of Power Supply Chassis Showing Component Location

92X1918

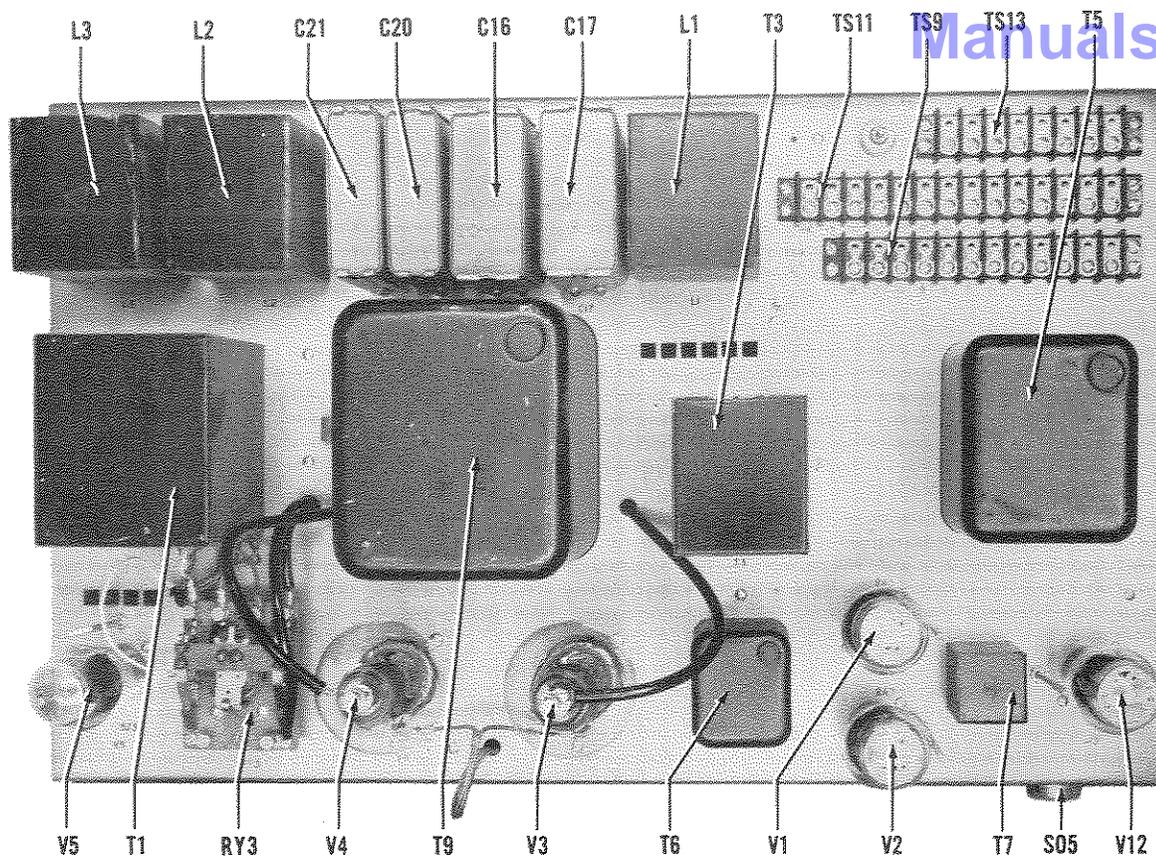


Fig. 11. Radio Transmitter HT-4 (\*), Top View of Modulator Chassis Showing Component Location

92X1919

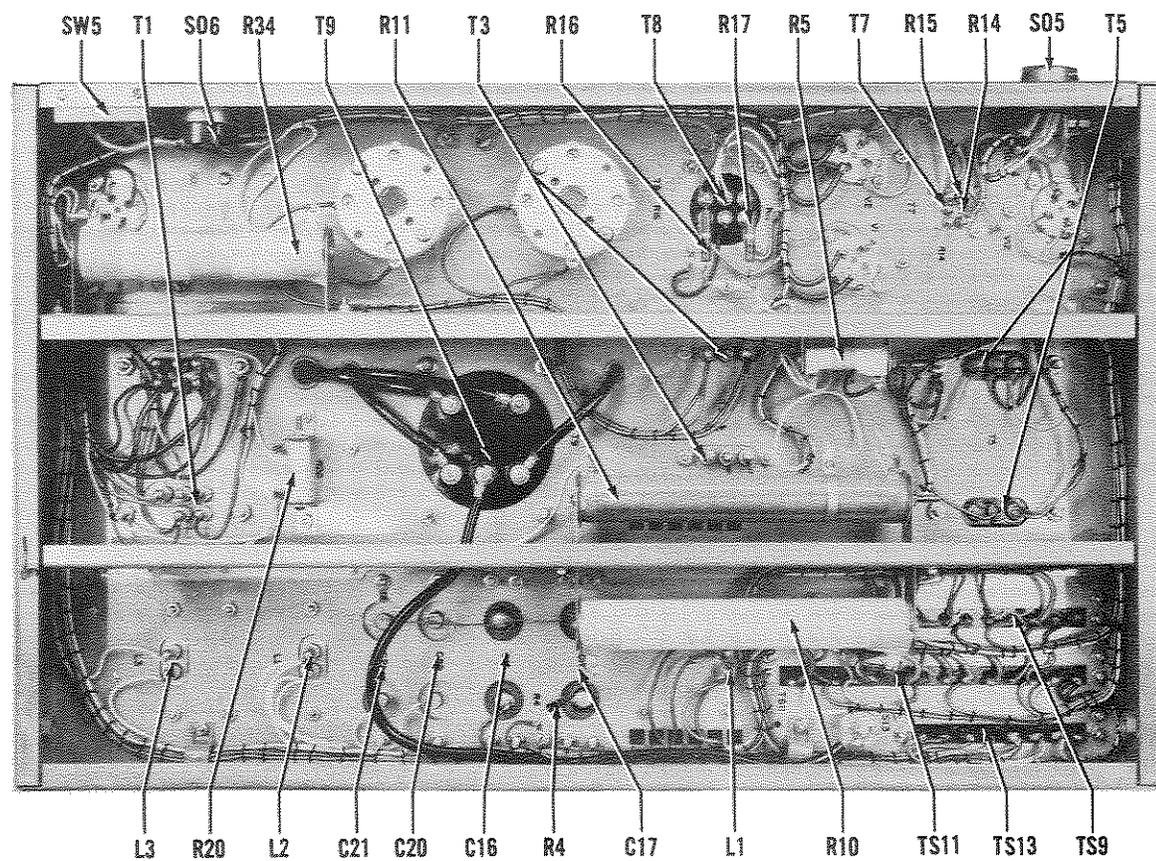
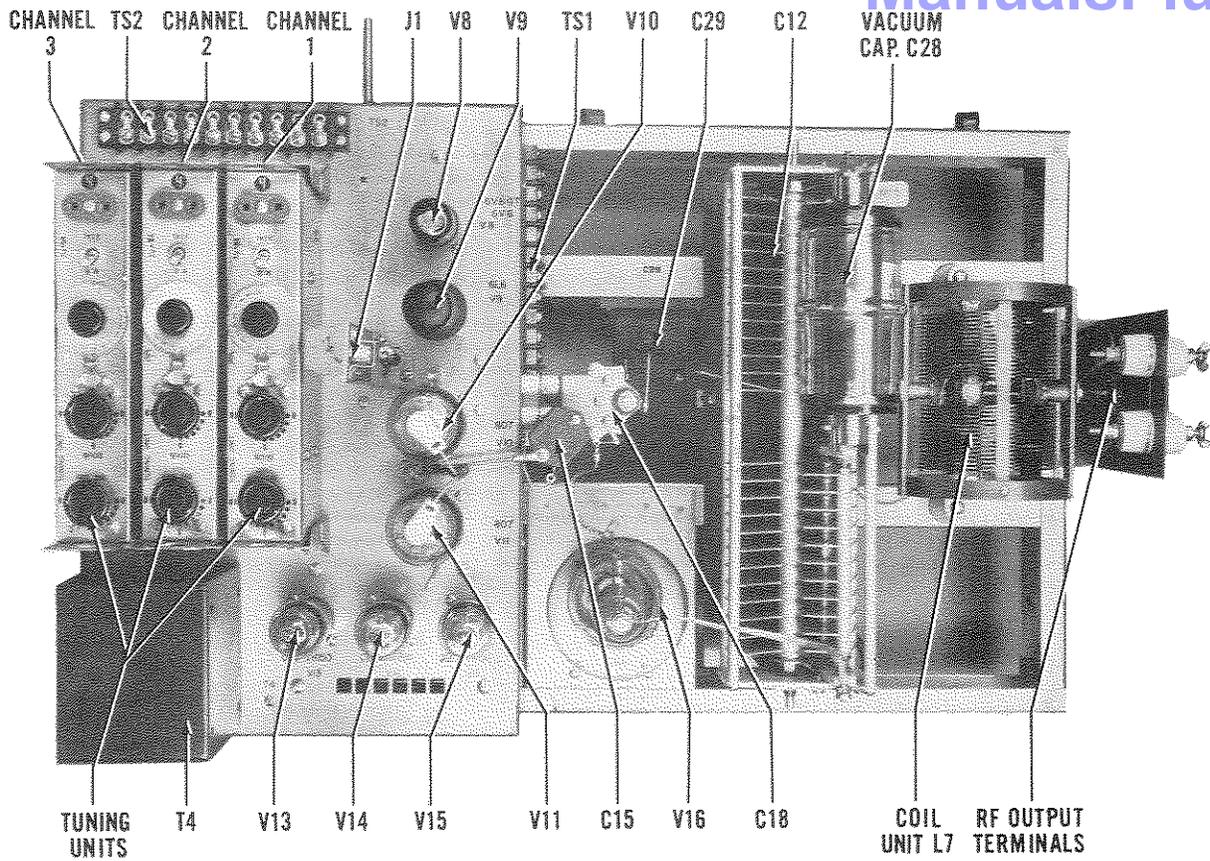


Fig. 12. Radio Transmitter HT-4 (\*), Bottom View of Modulator Chassis Showing Component Location

92X1920



92x1921

Fig. 13. Radio Transmitter HT-4 (\*), Top View of RF Chassis Showing Component Location

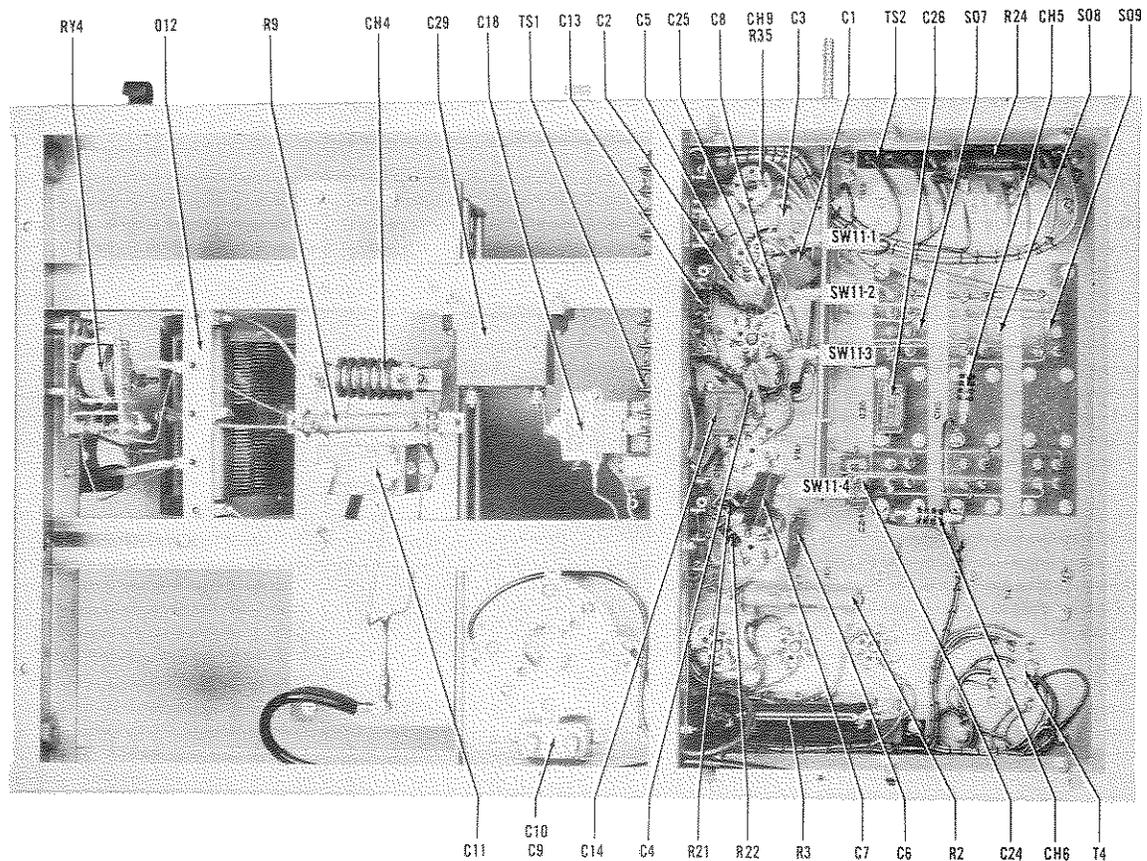


Fig. 14. Radio Transmitter HT-4 (\*), Bottom View of RF Chassis Showing Component Location

92x1922

# SERVICE DATA

## SPEECH AMPLIFIER HT-5 (\*)

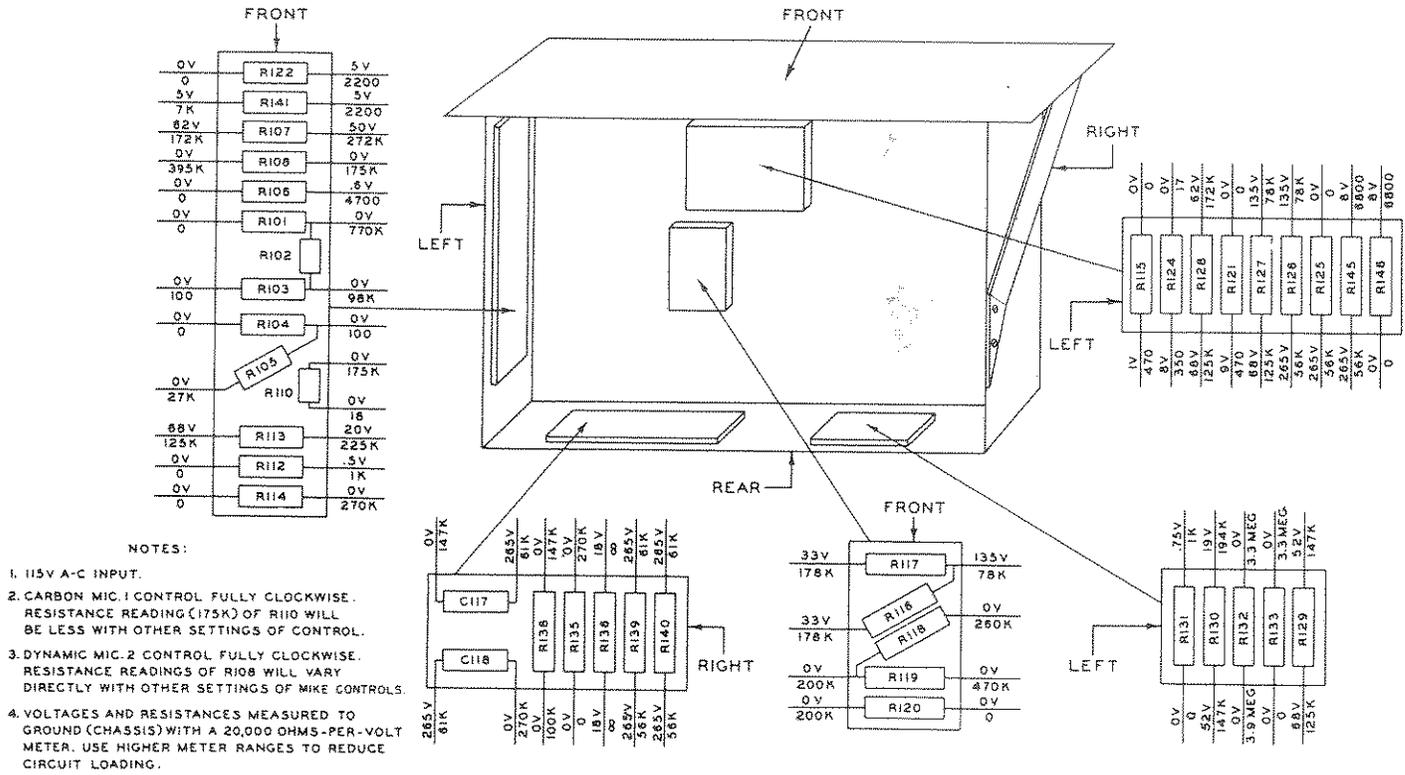


Fig. 15. Bottom View of Speech Amplifier HT-5 (\*), Showing Resistor and Capacitor Board Voltages and Resistances

TM 5054-18

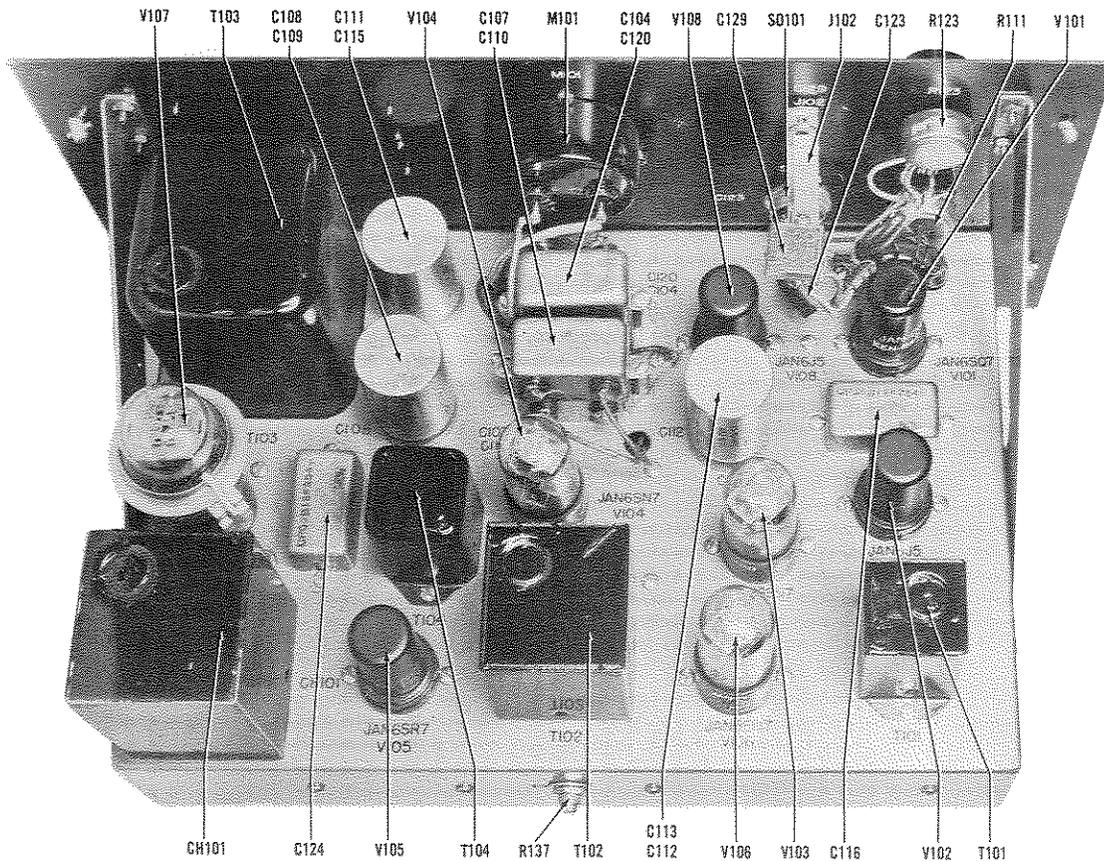


Fig. 16. Top View of Speech Amplifier HT-5 (\*), Showing Component Location

92X1923





## TROUBLE-SHOOTING CHART

### SPEECH AMPLIFIER HT-5 (\*)

| Symptoms   | Probable Trouble  | Correction                   |
|--|---|------------------------------|
| 1. Filament voltage present at tubes, plate voltage lacking.   | Rectifier tube V107 defective.  | Replace tube V107.           |
|  | Secondary 250-volt winding of transformer T103 burned out.                  | Replace transformer T103.    |
|  | Shorted filter capacitor C108 or C109.                                      | Replace capacitor.           |
|  | Open filter choke CH101.  | Replace choke.               |
| 2. Transmitter can be modulated by a carbon microphone but not by a dynamic microphone or telephone.                                 | Tube V101 defective.  | Replace tube.                |
|  | Resistor R101, R102, R103, R104, R106, R107, R108, R111, or R128 defective. | Replace defective resistor.  |
|  | Capacitor C102 or C113 defective.   | Replace defective capacitor. |
| 3. Transmitter can be modulated by a dynamic microphone or telephone, but not by a carbon microphone.                                | Resistor R110 or R123 defective.  | Replace defective resistor.  |
|  | Transformer T101 defective.   | Replace transformer.         |
|  | Shorted capacitor C120, C110 or C129.                                       | Replace shorted capacitor.   |
| 4. Transmitter can be modulated by carbon or dynamic microphone, but not by telephone.   | Resistor R105 defective.  | Replace defective resistor.  |
|  | Capacitor C130 shorted.   | Replace capacitor.           |
| 5. Filament voltage and plate power supplied. Transmitter can be modulated. Sidetone lacking during c-w operation.                   | Tube V106 or V108 defective.  | Replace defective tube.      |
|  | Resistor R135, R136, R137, R138, R139, R140, R122, or R141 defective.       | Replace defective resistor.  |
|  | Capacitor C117, C118 or C128 defective                                      | Replace defective capacitor. |
| 6. Filament voltage and plate power supplied to all tubes. Transmitter can be modulated. Speech limiter fails to limit speech peaks. | LIMITER CONTROL R134 defective.   | Replace resistor.            |
|  | Transformer T104 defective.   | Replace transformer.         |
|  | Capacitor C114, C115 or C116 defective.                                     | Replace defective capacitor. |
|  | Resistor R109, R129, R130, R131, R132, or R133 defective.                   | Replace defective resistor.  |
|  | Tube V105 defective   | Replace tube.                |

## SERVICE PARTS LIST

### RADIO TRANSMITTER HT-4-1

| Schematic Symbol   | Description                                      | Hallicrafters Part Number | Schematic Symbol              | Description  | Hallicrafters Part Number |
|--------------------|--|---------------------------|-------------------------------|--|---------------------------|
| <b>RESISTORS</b>   |  |                           | <b>COILS AND TRANSFORMERS</b> |  |                           |
| R 1,23             | 33,000 ohms 10%, 2 watt, carbon                  | 23J40BF333K               | L-1,2,3                       | Choke, filter; 6 henries, 250 ma, 105 ohms DC, 2000V. RMS    | 56C121                    |
| R-2                | 5000 ohms 5%, 24 watt, wirewound                 | 24J33G502                 | L-4                           | Choke, filter; 11 henries, 500 ma. 67 ohms DC, 10,000V. RMS  | 56C122                    |
| R-3                | 16,000 ohms 5%, 38 watt, wirewound               | 24J35G163                 | CH-1,2,5,6,7,8                | Choke, RF; 1 millihenry                                      | 53A026                    |
| R-4                | 680 ohms 10%, 1 watt, carbon                     | 23J30BF681K               | CH-3                          | Choke, RF; 2.5 millihenries                                  | 53A033                    |
| R-5                | 200 ohms 5%, 12 watt, wirewound                  | 24J32G201                 | CH-4                          | Choke, RF; 2.5 millihenries                                  | 51A431                    |
| R-6,7,16,17        | 22,000 ohms 10%, 2 watt, carbon                  | 23J40BF223K               | CH-9                          | Choke, RF; 10 millihenries                                   | 53A181                    |
| R-8                | 4700 ohms 10%, 2 watt, carbon                    | 23J40BF472K               | T-1                           | Transformer, power; bias power supply                        | 52C214                    |
| R-9                | 630 ohms 5%, 24 watt, wirewound                  | 24J33G631                 | T-2                           | Transformer, filament; for V-6 and V-7                       | 52C215                    |
| R-10               | 40,000 ohms 5%, 100 watt, wirewound              | 24J38G403                 | T-3                           | Transformer, filament; for V-3 and V-4                       | 52C216                    |
| R-11               | 2500 ohms 5%, 110 watt, variable; RF BIAS        | 24A916                    | T-4                           | Transformer, filament; for V-8 thru V-12 and V-16            | 52C217                    |
| R-12               | 500 ohms, 50 watt, variable; MODULATOR BIAS      | 25J151FE501KK             | T-5                           | Transformer, power; exciter power supply                     | 52C218                    |
| R-13               | 80,000 ohms 10%, 200 watt, wirewound             | 24A915                    | T-6                           | Transformer, power; HV power supply                          | 52C219                    |
| R-14,15,35         | 100,000 ohms 10%, 1/2 watt, carbon               | 23J20BF104K               | T-7                           | Transformer, audio input                                     | 55C162                    |
| R-18               | 15 ohms, 100 watt, variable; FILAMENT VOLTAGE    | 25J251FE150KK             | T-8                           | Transformer, audio interstage                                | 55C163                    |
| R-20               | 800 ohms 5%, 8 watt, wirewound                   | 24J31G801                 | T-9                           | Transformer, modulation                                      | 55C202                    |
| R-21,22            | 47 ohms 10%, 2 watt, carbon                      | 23J40BF470K               | <b>RELAYS AND SWITCHES</b>    |  |                           |
| R-24               | 500 ohms 5%, 8 watt, wirewound                   | 24J31G501                 | RY-1                          | Relay, dpst; plate power on-off                              | 21B098                    |
| R-25               | 47,000 ohms 10%, 2 watt, carbon                  | 23J40BF473K               | RY-2                          | Relay, dpdt; HV overload                                     | 21B097                    |
| R-26,33            | .37 ohms .5%, 1/3 watt wirewound                 | 24J11BR3700D              | RY-3                          | Relay, dpdt; Phone-CW switching                              | 21B096                    |
| R-27               | .1752 ohms .5%, 1/3 watt, wirewound              | 24J11BR1752D              | RY-4                          | Relay, spst; antenna shorting                                | 21B099                    |
| R-28               | 470 ohms 10%, 1 watt, carbon                     | 23J30BF471K               | RY-5                          | Relay, dpst; HV overload                                     | 21B095                    |
| R-34               | 25,000 ohms 5%, 78 watt, wirewound               | 24J37G253                 | SW-1,3                        | Switch, toggle; dpst; FILAMENT POWER and EXCITER PLATE POWER | 60JST52K<br>60B450        |
| R-36               | 2000 ohms 5%, 12 watt, wirewound                 | 24J32G202                 | SW-2,5,13                     | Switch, interlock  |                           |
| R-37               | 11 ohms 10%, 300 watt, wirewound                 | 24B933                    | SW-4                          | Switch, toggle; dpdt, HIGH VOLTAGE PROTECT                   | 60JST52N                  |
| <b>CAPACITORS</b>  |  |                           | SW-6                          | Switch, toggle; spst, PLATE POWER                            | 60JST42A                  |
| C-1,2,3,5,25,30,31 | .006 mfd. 20%, 600V., paper                      | 46J35A602M                | SW-7                          | Switch, toggle; dpdt; PHONE - CW                             | 60A087                    |
| C-4,24,26          | .006 mfd. 20%, 1000V., paper                     | 46J42A602M                | SW-8                          | Switch, rotary; 2 pole, 4 position; EXCITATION METER SWITCH  | 60A368                    |
| C-6,7              | .002 mfd. 20%, 1000V., paper                     | 46J42A202M                | SW-11                         | Switch, rotary; 4 pole, 3 position BAND SWITCH               | 60C367                    |
| C-8                | 330 mmf. 10%, 500V., mica                        | 47J20B331K                | SW-12                         | Switch, toggle; spst, OVERLOAD RESET                         | 60JST42B                  |
| C-9,10             | Dual .05 mfd. +40% -15%, 600 V., oilfilled paper | 46J54B6FF503X             | <b>METERS</b>                 |  |                           |
| C-11               | .002 mfd. 5%, 6000V., mica                       | 47A003                    | M-1                           | Milliammeter, DC; 0-15 ma, EXCITATION METER                  | 82A186                    |
| C-12               | Dual 31-150 mmf. 7000V., variable air            | 48C075                    | M-2                           | Milliammeter, DC; 0-500 ma, P.A. PLATE                       | 82A187                    |
| C-13               | 150 mmf. 20%, 500V., mica                        | 47J20B151M                | M-3                           | Voltmeter, AC; 0-10 volts                                    | 82A185                    |
| C-14               | 56 mmf. 10%, 2500V., mica                        | 47J45B560K                | <b>CONNECTORS AND SOCKETS</b> |  |                           |
| C-15               | 2200 mmf. 20%, 2500V., mica                      | 47J56B222M                | J-1                           | Socket, pilot lamp; tuning unit compartment                  | 86-082                    |
| C-16,17            | 8 mfd. +20% -10%, 1000V., paper                  | 46J70B1FG805V             | SO-5                          | Connector, female; 8 pin; speech amplifier input             | 10B040                    |
| C-18               | 3.5 - 5.7 mmf. 7000V., variable air              | 48A076                    | SO-6                          | Connector, male; 2 pin; AC power input                       | 10A349                    |
| C-19               | 4 mfd. +40% -15%, 4000V., paper                  | 46J70E1EM405X             | SO-7,8,9                      | Socket, tuning unit; 12 pin                                  | 10B350                    |
| C-20,21            | 8 mfd. +40% -15%, 600V., paper                   | 46J70B1FF805X             |                               |  |                           |
| C-23               | 2 mfd. +40% -15%, 4000V., paper                  | 46J70E1EM205X             |                               |  |                           |
| C-28               | 55 mmf -5 +2 mmf., 32,000V., vacuum              | 48B224                    |                               |  |                           |
| C-29               | 220 mmf. 2%, 5000 V., mica                       | 47J70B221G                |                               |  |                           |



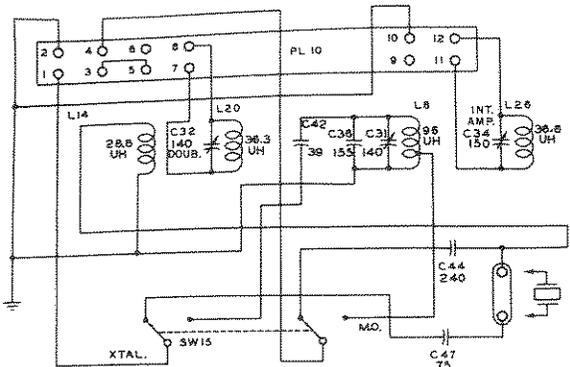
## SERVICE PARTS LIST SPEECH AMPLIFIER HT-5-1

| Schematic Symbol                          | Description  | Hallicrafters Part Number | Schematic Symbol              | Description  | Hallicrafters Part Number |
|---|--|---------------------------|-------------------------------|--|---------------------------|
| <b>RESISTORS</b>                          |  |                           | <b>COILS AND TRANSFORMERS</b> |  |                           |
| R-101                                     | 1 megohm 20%, $\frac{1}{2}$ watt, carbon                           | 23J20BF105M               | CH-101                        | Choke, filter; 29 henries, 25 ma, 525 ohms DC                                      | 56C119                    |
| R-102,133                                 | 3.3 megohms 20%, $\frac{1}{2}$ watt, carbon                        | 23J20BF335M               | T-101                         | Transformer, audio; carbon mike input  | 55C160                    |
| R-103,107,113,116,117                     | 100,000 ohms 10%, $\frac{1}{2}$ watt, carbon                       | 23J20BF104K               | T-102                         | Transformer, audio output  | 55C159                    |
| R-104                                     | 100 ohms 10%, $\frac{1}{2}$ watt, carbon                           | 23J20BF101K               | T-103                         | Transformer, power   | 52C213                    |
| R-105                                     | 27,000 ohms 10%, $\frac{1}{2}$ watt, carbon                        | 23J20BF273K               | T-104                         | Transformer, modulation limiter  | 55C161                    |
| R-106,139,140,141                         | 4700 ohms 10%, $\frac{1}{2}$ watt, carbon                          | 23J20BF472K               | <b>SOCKETS AND CONNECTORS</b> |  |                           |
| R-108,145                                 | 220,000 ohms 10%, $\frac{1}{2}$ watt, carbon                       | 23J20BF224K               | J-101                         | Jack, KEY  | 36A050                    |
| R-109,132                                 | 560,000 ohms 10%, $\frac{1}{2}$ watt, carbon                       | 23J20BF564K               | J-102                         | Jack, CARBON MIC. 1  | 36A051                    |
| R-110,114,118,119,120,135                 | 270,000 ohms 10%, $\frac{1}{2}$ watt, carbon                       | 23J20BF274K               | SO-101                        | Connector, female; 3 pin; DYNAMIC MIC. 2   | 10A046                    |
| R-111,123                                 | 1 megohm, variable; CARBON MIC. 1 and DYNAMIC MIC. 2 gain controls | 25B920                    | SO-102                        | Connector, female; 8 pin; TO JB-70   | 10B040                    |
| R-112,131                                 | 1000 ohms 10%, $\frac{1}{2}$ watt, carbon                          | 23J20BF102K               | SO-103                        | Connector, male; 8 pin; TO BC-610  | 10A033                    |
| R-115,121                                 | 470 ohms 10%, 1 watt, carbon                                       | 23J30BF471K               |                               | Socket assembly, pilot lamp  | 86A016                    |
| R-122                                     | 2200 ohms 10%, $\frac{1}{2}$ watt, carbon                          | 23J20BF222K               |                               | Socket, tube; 4 pin  | 6A367                     |
| R-124                                     | 330 ohms 10%, 1 watt, carbon                                       | 23J30BF331K               |                               | Socket, tube; octal  | 6A379                     |
| R-125                                     | 75,000 ohms 5%, 2 watt, carbon                                     | 23J40BF753J               | <b>TERMINAL BOARDS</b>        |  |                           |
| R-126                                     | 22,000 ohms 10%, 2 watt, carbon                                    | 23J40BF223K               |                               | Board, terminal; 8 terminals   | 88B692                    |
| R-127,128                                 | 47,000 ohms 10%, 1 watt, carbon                                    | 23J30BF473K               |                               | Board, terminal; 10 terminals  | 88B690                    |
| R-129                                     | 22,000 ohms 10%, $\frac{1}{2}$ watt, carbon                        | 23J20BF223K               |                               | Board, terminal; 14 terminals  | 88B691                    |
| R-130,138                                 | 47,000 ohms 10%, $\frac{1}{2}$ watt, carbon                        | 23J20BF473K               |                               | Board, terminal; 18 terminals  | 88B693                    |
| R-134                                     | 500,000 ohms, variable; LIMITER CONTROL                            | 25B921                    |                               | Board, terminal; 28 terminals  | 88B689                    |
| R-136                                     | 510 ohms 5%, $\frac{1}{2}$ watt, carbon                            | 23J20BF511J               | <b>TUBE COMPLEMENT</b>        |  |                           |
| R-137                                     | 100,000 ohms, variable; SIDE-TONE VOLUME control                   | 25B922                    | V-101                         | 6SQ7: 1st AF amplifier   | 90J6SQ7                   |
| R-142                                     | 200 ohms 5%, 1 watt, carbon  | 23J30BF201J               | V-102,108                     | 6J5: 2nd AF amplifier, sidetone amplifier  | 90J6J5                    |
| R-146                                     | 6800 ohms 10%, $\frac{1}{2}$ watt, carbon                          | 23J20BF682K               | V-103,104,106                 | 6SN7GT: 3rd AF amplifier and phase inverter, 4th AF amplifier, sidetone oscillator | 90J6SN7GT                 |
| <b>CAPACITORS</b>                         |  |                           | V-105                         | 6SR7: modulation limiter   | 90J6SR7                   |
| C-101,102,103,105,106,114,119,121,125,126 | .01 mfd. 20%, 600V., molded paper                                  | 46J35A103M                | V-107                         | 80: rectifier  | 90J80                     |
| C-104,107                                 | 10 mfd. 100 V., electrolytic                                       | 45J63C100H                | <b>MISCELLANEOUS PARTS</b>    |  |                           |
| C-108-109,111-115,112-113                 | Dual 10 mfd. 450V., electrolytic                                   | 45J42F100R                |                               | Cable, control and power; for connection to transmitter                            | 87A159                    |
| C-110,120                                 | 50 mfd. 25V., electrolytic   | 45J63C500F                |                               | Clamp, tube  | 76-680                    |
| C-116,124                                 | .25 mfd. 10%, 600V., paper   | 46J55B1EF254              |                               | Knob, control; less calibrated skirt   | 15B007                    |
| C-117,118,122,123,128                     | .002 mfd. 20%, 800V., molded paper                                 | 46J30A202M                | LM-101                        | Lamp, pilot; type 44   | 39A027                    |
| C-127,129,130                             | .0051 mfd. 10%, 500V., mica  | 47J35B512J                | M-101                         | Milliammeter, DC; 0-300 ma; MODULATOR PLATE  | 82A188                    |
|   |  |                           |                               | Skirt, control knob  | 83B062                    |
|   |  |                           |                               | Stud, cowl fastener  | 73A184                    |

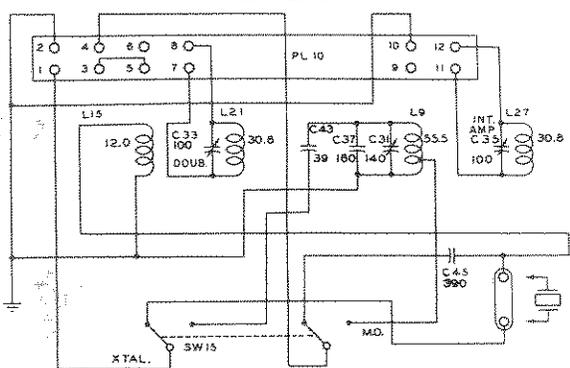
# TRANSMITTER TUNING UNITS

## TU-47 THRU TU-54

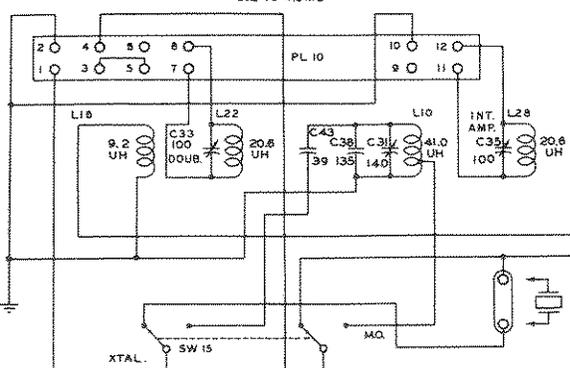
TRANSMITTER TUNING UNIT TU-47  
2.0 TO 2.3MC



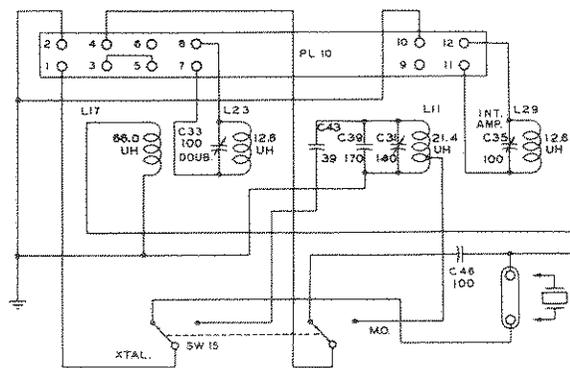
TRANSMITTER TUNING UNIT TU-48  
2.5 TO 3.2MC



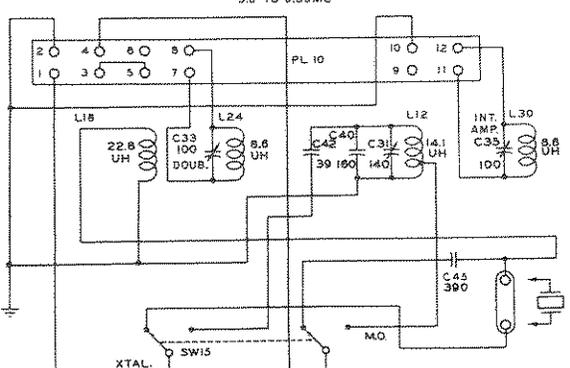
TRANSMITTER TUNING UNIT TU-49  
3.2 TO 4.0MC



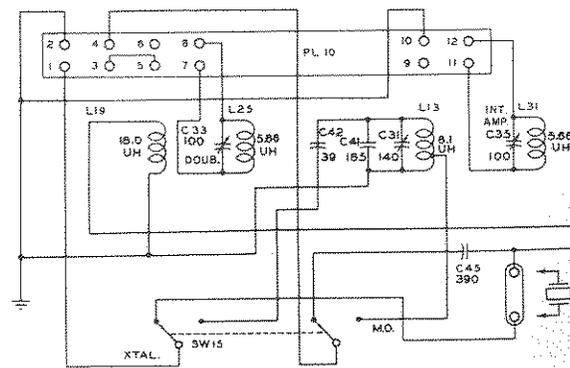
TRANSMITTER TUNING UNIT TU-50  
4.0 TO 5.0MC



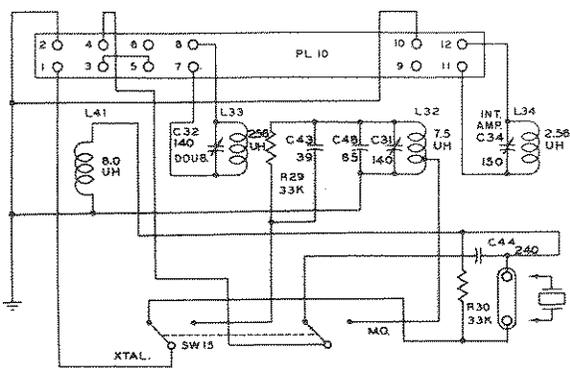
TRANSMITTER TUNING UNIT TU-51  
5.0 TO 6.35MC



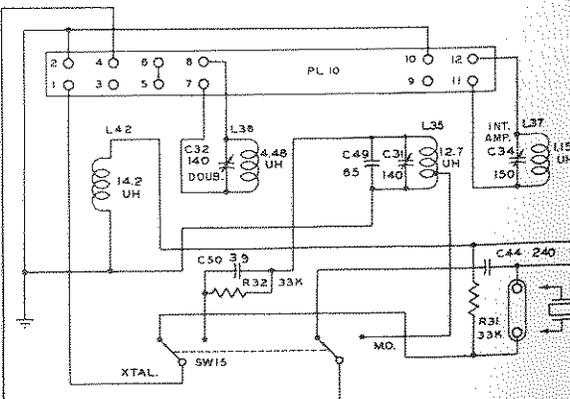
TRANSMITTER TUNING UNIT TU-52  
6.35 TO 8.0MC



TRANSMITTER TUNING UNIT TU-53  
8.0 TO 12.0MC



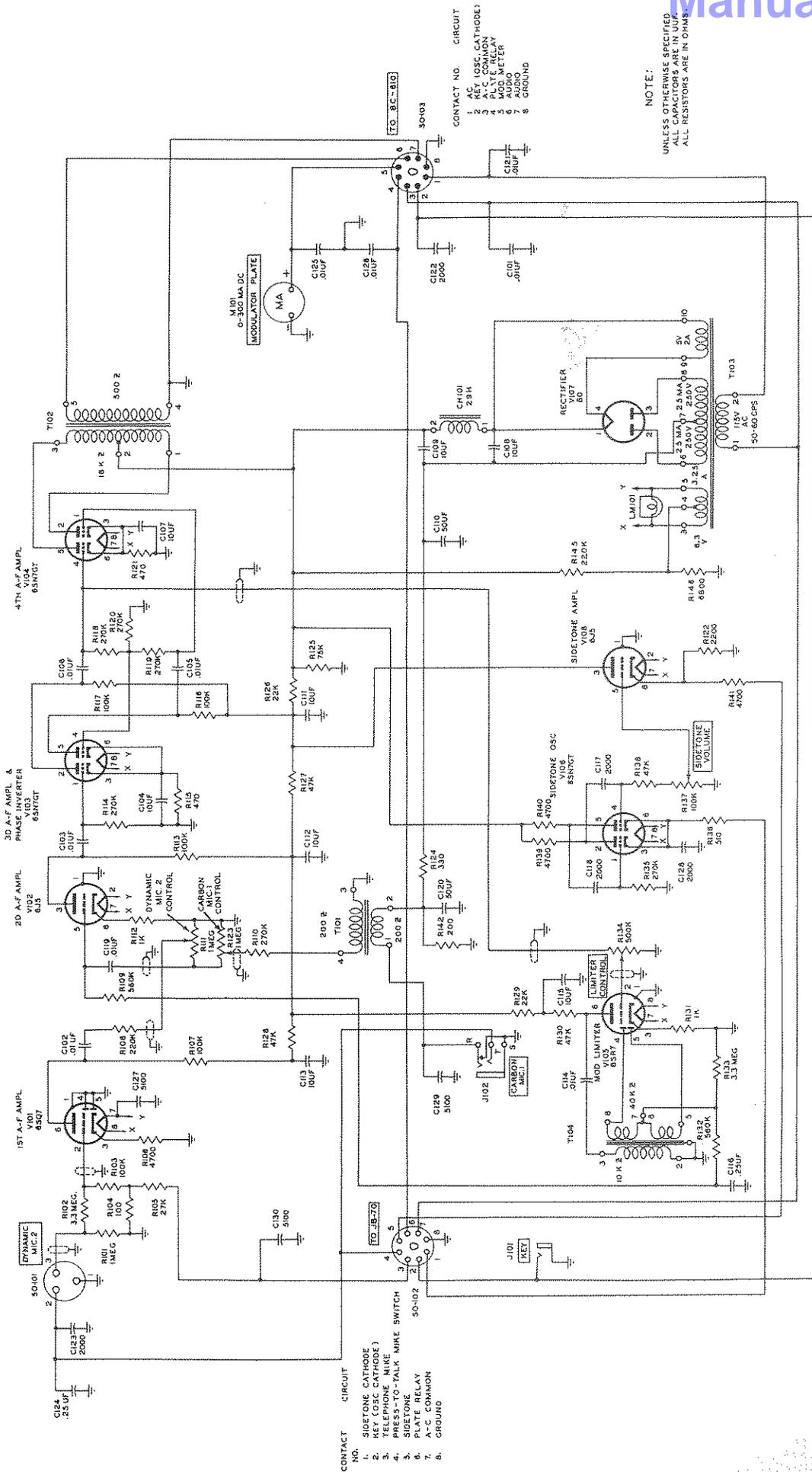
TRANSMITTER TUNING UNIT TU-54  
12.0 TO 18.0MC



NOTE:

1. UNLESS OTHERWISE NOTED ALL CAPACITORS ARE IN UFUF. ALL RESISTORS ARE IN OHMS.
2. PLUG STRIP PL 10 SHOWN ON PRONG SIDE.

# SPEECH AMPLIFIER HT-5-1



- CONTACT NO. CIRCUIT
1. SIDETONE CATHODE
  2. CATHODE
  3. TELEPHONE BUZZ
  4. PRESS-TO-TALK MIKE SWITCH
  5. SIDETONE
  6. PLATE RELAY
  7. A-C COMMON
  8. GROUND

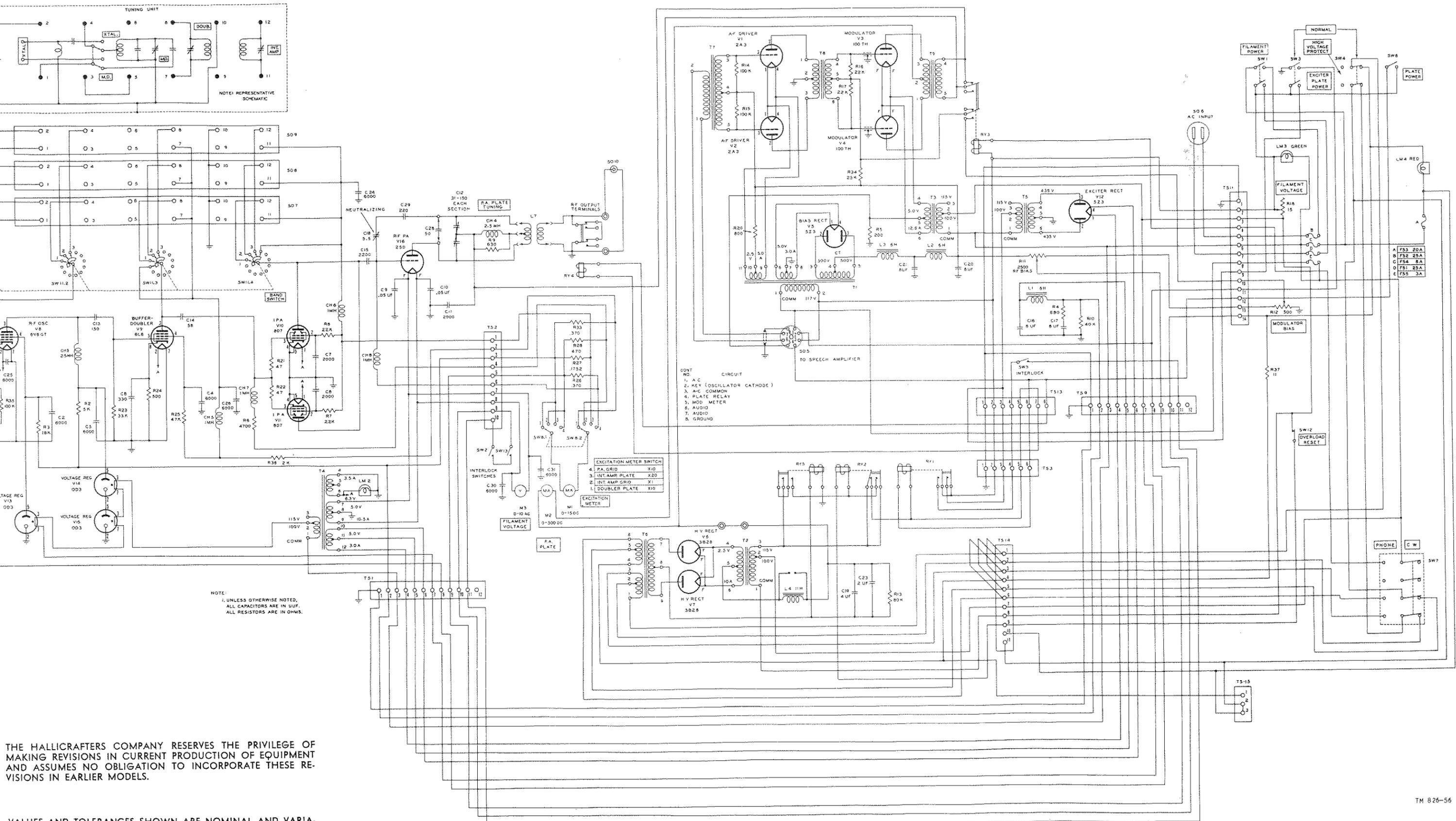
- CONTACT NO. CIRCUIT
1. AC
  2. KEY OSC. CATHODE
  3. PLATE RELAY
  4. PLATE RELAY
  5. MOD. METER
  6. MOD. METER
  7. AUDIO
  8. GROUND

NOTE:  
UNLESS OTHERWISE SPECIFIED  
ALL CAPACITORS ARE IN  $\mu\text{UF}$   
ALL RESISTORS ARE IN OHMS

TM 5054-21

THE HALICRAFTERS COMPANY RESERVES THE PRIVILEGE OF MAKING REVISIONS IN CURRENT PRODUCTION OF EQUIPMENT AND ASSUMES NO OBLIGATION TO INCORPORATE THESE REVISIONS IN EARLIER MODELS.

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.



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## Warranty

*"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.*

*This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.*

*Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.*

*This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."*

Form No. 94X622

*the Hallicrafters co.*