TM 11-4024

WAR DEPARTMENT TECHNICAL MANUAL

RADIO RECEIVER AND TRANSMITTERS

BC-1000-A and -B

REPAIR INSTRUCTIONS

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Refer to FM 21-6 for explanation of distribution formula.

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Figure 1. Radio Receiver and Transmitter BC-1000-(*).

SECTION I

DESCRIPTION OF RADIO RECEIVER AND TRANSMITTERS BC-1000-A AND -B[1]

1. General

a. USE. Radio Receiver and Transmitter BC-1000-(*) is a low-power, portable, frequency-modulated (f-m) radio receiver and transmitter powered by dry batteries. The set is designed for two-way voice communication over short ranges. Radio Receiver and Transmitter BC-1000-(*) is part of Radio Set SCR-300-(*) and Radio Set AN/VRC-3. Official nomenclature followed by the symbol (*) indicates all models of the item of equipment included in this manual. Thus, Radio Receiver and Transmitter BC-1000-(*) represents Radio Receiver and Transmitters BC-1000-A and -B.

b. RANGE. The normal operating range, using the *long* Antenna AN-131-A, is 3 miles or more, depending upon operating conditions. The range with the *short* Antenna AN-130-A will be slightly less.

c. FREQUENCY COVERAGE. The frequency range is continuously variable from 40.0-48.0 megacycles (mc) (40,000 to 48,000 kilocycles (kc)). The dial is calibrated in 41 channels separated by 200 kilocycles each, with O channel located at 40.0 megacycles, and with channel 40 at 48.0 megacycles.

d. POWER SOURCE. Battery BA-70, consisting of three sections, 4½ volts, 90 volts, and 60 volts, furnishes power for filament and plate circuits of the receiver and transmitter.

e. POWER OUTPUT. Receiver has an output of 2 milliwattts, transmitter 0.3 watt.

2. Over-All System Function

a. GENERAL OPERATION. Radio Receiver and Transmitter BC-1000-A is an 18-tube, f-m low-power receiver and transmitter operating over a frequency range of 40 to 48 megacycles. The receiver has a very high gain double superheterodyne circuit using 4.3 and 2.515 megacycles for intermediate frequencies. The master oscillator is common to both receiver and transmitter. Transmission is accomplished by merely operating the switch in Handset TS-15-(*), which turns on the transmitter tube filaments. A squelch circuit is provided to eliminate noise in the receiver when no signal is being received.

b. RECEIVER. (1) The receiver has a double superheterodyne circuit, designed for reception of frequency-modulated signals in the band of 40 to 48 megacycles. Automatic frequency control is incorporated to compensate for slight inaccuracies due to tuning or other factors. A sensitive squelch circuit is also provided to eliminate, if desired, the noise heard in the headphones when no signal is being received.

(2) With the set in the receive position, the following 16 tubes are used, stage by stage:

(*a*) Receiver radio-frequency (r-f) amplifier stage using Tube JAN-IT4/VT-173 (V6).

(*b*) Master-oscillator stage using Tube JAN-IT4/VT-173 (V4).

(*c*) Doubler stage using Tube JAN-IT4/VT-173 (V3).

(*d*) Receiver first mixer stage using Tube JAN-1L4 (V7).

(*e*) First intermediate-frequency (i-f) amplifier stage (4.3 mc) using Tube JAN-1T4/VT-173 (V8).

(*f*) Second i-f amplifier stage (4.3 mc) using Tube JAN-1T4/VT-173 (V9).

(*g*) Receiver second mixer and 6.815-mc crystal-oscillator stage using Tube JAN-1R5/VT-171 (V10).

(*h*) Third i-f amplifier stage (2.515 mc) using Tube JAN-T4/VT-173 (V11).

(*i*) First limiter stage (2.515 mc) using Tube JAN-1L4 (V12).

(*j*) Second limiter stage (2.515 mc) using Tube JAN-1L4 (V13).

(*k*) Discriminator stage using one Tube JAN-1A3 (V14), and the diode section of Tube JAN-1S5/VT-172 (V15).

(*l*) Automatic-frequency-control stage using Tube JAN-1L4 (V5).

[1] Refer to TM 11-242 and TM 11-637 for installation, operation, and other maintenance data on this equipment.

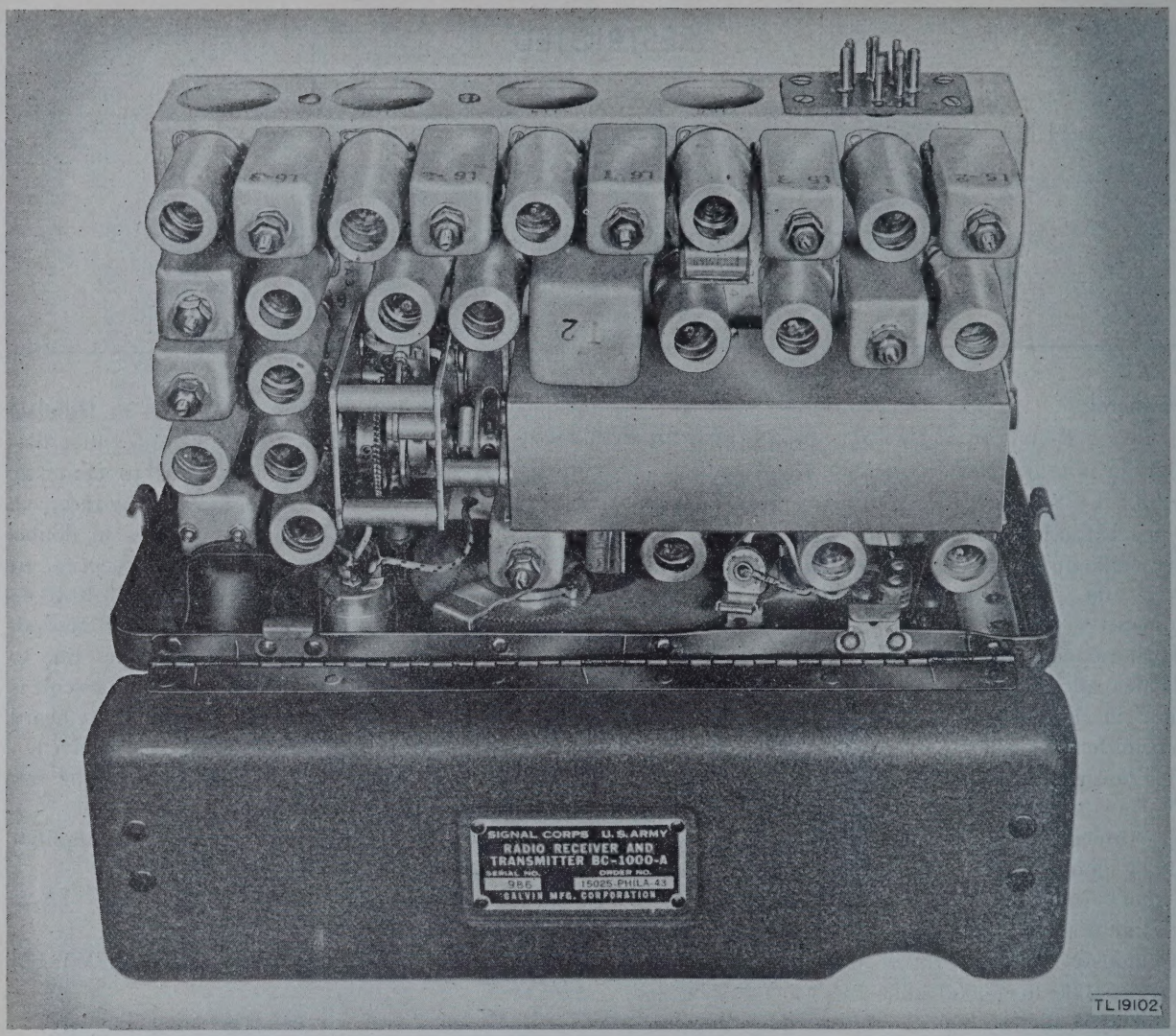


Figure 2. Top view of chassis, Radio Receiver and Transmitter BC-1000-(*).

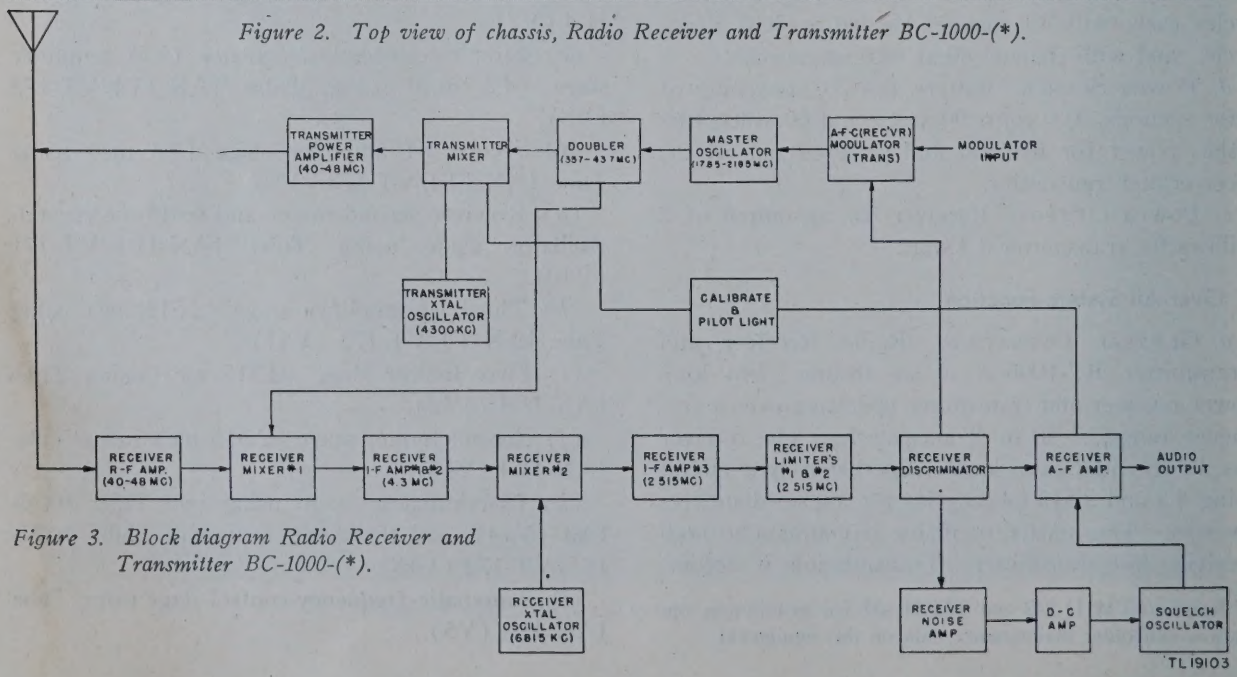


Figure 3. Block diagram Radio Receiver and Transmitter BC-1000-(*).

(*m*) Audio - frequency (a - f) power - amplifier stage using Tube JAN-1S5/VT-172 (V15).

(3) Squelch circuit consists of:

(*a*) Noise amplifier-rectifier stage using Tube JAN-1S5/VT-172 (V16).

(*b*) Direct-current (d-c) amplifier stage using Tube JAN-1L4 (V17).

(*c*) Squelch oscillator-rectifier stage using Tube JAN-1S5/VT-172 (V18).

(4) The signal is picked up by the antenna and impressed on the control grid of receiver r-f amplifier tube V6. In the r-f stage the signal is amplified, and coupled to the control grid of first mixer tube V7. The output of r-f amplifier tube V6 is tuned by receiver r-f plate coil L4 and variable capacitor C6J.

(5) Master-oscillator Tube JAN-1T4 (V4) is a tuned plate oscillator operating over a range of 17.85 to 21.85 megacycles. The master-oscillator output is coupled to the control grid of the doubler stage through capacitor C21. In doubler Tube JAN-1T4 (V3), the second harmonic of the master oscillator is selected by the plate circuit. The output of the doubler stage (35.7 to 43.7 megacycles) is loosely coupled into the cathode of receiver first mixer Tube JAN-1L4 (V7). The frequency of this voltage applied to the mixer tube is always 4.3 megacycles below the frequency of the received signal and is the second harmonic of the master oscillator.

(6) Receiver first mixer tube V7 combines the received signal with the second harmonic of the master oscillator and selects and amplifies the frequency difference between them (4.3 megacycles). The output of receiver first mixer tube V7 is tuned and coupled to first i-f amplifier tube V8 by first mixer plate coil L5-1.

(7) The amplifier output of first i-f amplifier tube V8 is tuned and coupled to second i-f amplifier tube V9 by first i-f amplifier plate coil L5-2.

(8) The amplified output of second i-f amplifier tube V9 is tuned and coupled to the receiver second mixer and crystal-oscillator tube V10 by second i-f amplifier plate coil L5-3.

(9) Receiver second mixer and crystal-oscillator tube V10 has a 6.815-megacycle Pierce oscillator circuit. The 6.815-megacycle crystal (XTAL2) is connected between oscillator grid and screen of tube V10. It also combines this frequency (6.815 mc) with the 4.3-megacycle output from second i-f amplifier V9. The difference between these two frequencies (2.515 megacycles) is the second intermediate frequency of the receiver. The output of receiver second mixer and crystal-oscillator tube V10 2.515 mc is tuned and coupled to third i-f amplifier tube VII by second mixer plate coil L6-1.

(10) The amplifier output of third i-f amplifier tube VII is tuned and coupled to first limiter tube V12 by third i-f amplifier plate coil L6-2.

(11) The output of first limiter V12 is tuned and coupled to second limiter tube V13 by first limiter plate coil L6-3.

(12) The output of second limiter tube is tuned and coupled to the discriminator network by second limiter plate coil L7.

(13) The discriminator network consists of discriminator coil L8, the discriminator tube V14, the diode section of discriminator and a-f power-amplifier tube V15, and their associated resistor and capacitor network.

(14) The output voltage is passed through low-pass filter and is used for automatic frequency control. The audio-frequency signal is produced between the cathode of tube V14 and ground. The output of the discriminator is also coupled through a high-pass filter and is used for control of the squelch circuit.

(15) The d-c voltage developed by the discriminator *because of inaccuracies in tuning* is passed through filter R50, R55, C30, and R18 to remove audio components. It is then used to control the bias on automatic-frequency-control tube (V5). The automatic frequency control will minimize the effect of a tuning error up to about one-quarter channel on the dial.

(16) The audio voltage developed by the discriminator is coupled to the amplifier portion of the discriminator and a-f power-amplifier tube V15.

c. TRANSMITTER. (1) The transmitter is frequency modulated and transmits over the frequency range of 40.0 to 48.0 megacycles. The transmitter automatically transmits on the same frequency that the receiver receives. When transmitting, receiver automatic-frequency-control tube V5, receiver master oscillator V4, and receiver doubler V3 are used as transmitter-modulator, oscillator, and doubler. In addition, a 4.3-megacycle crystal oscillator is mixed with the double output to obtain the desired frequency. The power amplifier is driven directly by the mixer and delivers approximately 0.3 watt to the antenna. Harmonics of the 4.3-megacycle crystal oscillator are used as reference frequencies for calibration purposes.

(2) With the set in the transmit position the following five tubes are used, stage by stage:

(*a*) Reactance-modulator stage using Tube JAN-1L4 (V5).

(*b*) Master-oscillator stage using Tube JAN-1T4/VT-173 (V4).

(*c*) Doubler stage using Tube JAN-1T4/VT-173 (V3).

(*d*) Transmitter crystal-oscillator and mixer stage using Tube JAN-3A4 (V2).

(*e*) Transmitter r-f power-amplifier stage using Tube JAN-3A4 (V1).

(3) Pressing the switch in Handset TS-15-A turns on the filaments of transmitter r-f power-amplifier tube V1 and transmitter crystal-oscillator and mixer tube V2, and energizes the microphone circuit.

(4) The audio-frequency voltage is coupled to the grid of reactance-modulator tube V5 by microphone transformer T3A. The grid circuit of reactance-modulator tube V5 is completed through R18, R55, R50, R49, coil L8, and R53 to ground. Reactance-modulator tube V5 is coupled directly to master-oscillator tube V4.

(5) The frequency of master-oscillator tube V4 will vary in accordance with the audio voltage impressed on the grid of reactance-modulator tube V5.

(6) The output of master-oscillator tube V4 is coupled to the grid of the doubler stage. The second harmonic of the master oscillator is selected in the output of doubler tube V3 by variable capacitor C6F.

(7) The output of the doubler is coupled to the grid of transmitter crystal oscillator and mixer tube V2 by capacitor C16 and crystal XTAL1.

(8) The control grid and screen grid of transmitter crystal-oscillator and mixer tube V2 comprises a triode crystal oscillator. The screen grid is tuned by L3 to the frequency of crystal XTAL1 in the grid circuit. The oscillator generates a crystal-controlled frequency of 4.3 megacycles (4,300 kilocycles). Transmitter crystal-oscillator and mixer tube V2 combines the output of doubler tube V3 (35.7 to 43.7 megacycles) with the crystal-controlled 4.3-megacycle signal. The output is tuned to the sum of these two frequencies (40.0 to 48.0 megacycles) by transmitter mixer plate coil L2 and variable capacitor C6D. By adding the 4.3-megacycle crystal-controlled frequency to the doubler output frequency, the receiver and the transmitter frequencies are automatically made the same for any channel setting on the dial.

(9) The output of transmitter crystal-oscillator and mixer tube V2 is coupled to the grid of the transmitter r-f power-amplifier tube. The output of transmitter r-f power-amplifier tube V1 is tuned by the tank circuit consisting of coil L1 and variable capacitor C6B and is coupled to the antenna by capacitor C1 from a tap on coil L1. During transmissions the receiver is operative and the presence of the 4.3-megacycle crystal-controlled signal holds the discriminator at *zero voltage*.

SECTION II

DIFFERENCES BETWEEN MODELS

3. Operational Difference

There are no operational differences in the various models of the Radio Receiver and Transmitter BC-1000-(*).

4. Design Differences

a. The following changes are incorporated in Radio Set SCR-300-A, beginning with serial number 6500 on Order No. 8558-Phila-44-01.

> Resistor R41 (22,000 ohms) is replaced by resistor R77 (15,000 ohms ⅓ watt, 10%; Galvin Part No. 6B6422, or 15,000 ohms ⅓ watt, 20%; Galvin Part No. 6B6209).

The bare wire ground from coil L6-1 is covered with spaghetti insulation and is moved from the chassis ground to lug No. 8 of terminal strip assembly (42 lugs) 1X41389 which also connects to lug No. 7 of second mixer and crystal-oscillator Tube JAN-1R5/VT-171 (V10).

b. MWO SIG 11-242-1 describes a modification to be performed on the antenna insulator assembly.

MWO SIG 11-242-2 authorizes the replacement of clip-catches.

d. MWO SIG 11-242-3 describes a modification to be performed on the squelch circuit of Radio Receiver and Transmitter BC-1000-A. This modification was incorporated in production on Order No. 29316-Phila-44-01 effective with Serial No. 9945 and Order No. 26925-Phila-44-01 effective with Serial No. 5353 of Radio Set SCR-300-A. Resistor R67 was removed from between the low side and the ground lug of potentiometer R66 and was replaced with a short length of spaghetti-insulated bare wire. The 68,000-ohm resistor, R69, between contact terminal 4 on socket V15 and contact terminal 3 on socket V17 was replaced by a 39,000-ohm, ⅓-watt, ±20% resistor, Signal Corps stock No. 2Z6639-8. The 0.5-megohm potentiometer, R66, was changed to R79, 1 megohm, carbon, ±20%, Signal Corps stock No. 3Z7499-1.16. This modification will change the voltage and resistance values shown in figures 10 and 11. The voltage at pin 4 of V17 will be 0 volts and the resistance at pin 4 of V17 will be 0 ohms.

e. On Order No. 29316-Phila-44-01, effective with Serial No. 14084, the following production changes were made:

(1) Resistor R11 was removed from between lug 11 on the long terminal panel and lug 2 of the oscillator coil T2, and was replaced with a 2200-ohm, ⅓-watt, ±20% carbon resistor (Philco Part No. 66-2222540) and retained its original reference symbol.

(2) Capacitor C24 was removed from between lug 3 of oscillator T2 and ground, and was replaced with a 200-mmf capacitor. The original reference symbol was retained. The new Philco Part No. is 305-1405.

SECTION III

INITIAL REPAIR PROCEDURES

Note. Before making any repairs or adjustments, all authorized modification work orders must be applied. See FM 21-6 for list of applicable MWO's.

5. General

Maintenance personnel should follow the procedure outlined in this manual when repairing and overhauling Radio Receiver and Transmitter BC-1000-(*). The repair information in this and the following sections is presented in the order in which the repairman should actually perform the various operations on the equipment in the repair shop. This procedure permits repair of the equipment in the shortest time possible, resulting in sensitivity and selectivity comparable to that of new equipment.

6. Tools, Test, and Cleaning Equipment

The following items should be available for repair of this set:

Table I

Item	Description
Assorted screw driver and pliers.	
Insulated alignment tool (provided with equipment).	
Soldering iron and solder.	
Maintenance Equipment ME-40-(*) and Maintenance Kit ME-53-(*).	
Volt-ohm-milliammeter.	Minimum sensitivity 1,000 Ω/volt.
Signal generator audio frequency.	Providing either 400 cps or 1,000 cps with an ouput of at least 5 volts across high-impedance load.
Solvent, Dry-cleaning.	
Assorted brushes.	
Pipe cleaners.	
Clean cloth.	Lint-free.
Sandpaper.	#0000.
Crocus cloth.	

7. Disassembly for Inspecting and Cleaning

a. Chassis. The chassis and front operating panel are permanently attached and can be removed from the chassis housing by opening the tension clamps on either side of the operating panel. The radio receiver and transmitter can then be slid out from the housing for repair.

b. Crystal Removal. Remove both crystals from chassis by lifting crystal retaining spring. Insert a small screw driver between one of the crystals and the crystal socket and pry gently. After removal has been started, the crystals may be withdrawn by hand.

c. Removal of Tubes. To remove, grasp tube firmly, rock it back and forth in the direction of the tube socket mounting screws and pull upward. This technique will prevent possible crushing of tube and injury to the hands.

d. Dial Lamp Removal. The dial lamp may be removed by pulling it upward and releasing the clip and bracket which hold it in place.

e. Removal of Tube Shields. The tube shields may be removed by pressing down gently and turning the shield counterclockwise. The spring will tend to push the shield upward, freeing it from its clamp base.

8. Cleaning and Inspecting

a. Cleaning Main Chassis. Chassis must be clean and free from rust and corrosion. Blow out all dust and dirt using clean, dry compressed air. Use dry-cleaning solvent (SD) applied with lint-free cloth, brushes, or pipe cleaners.

Caution: Do not attempt to remove tarnish from silver-plated switch contacts.

Remove rust and corrosion with a stiff brush and

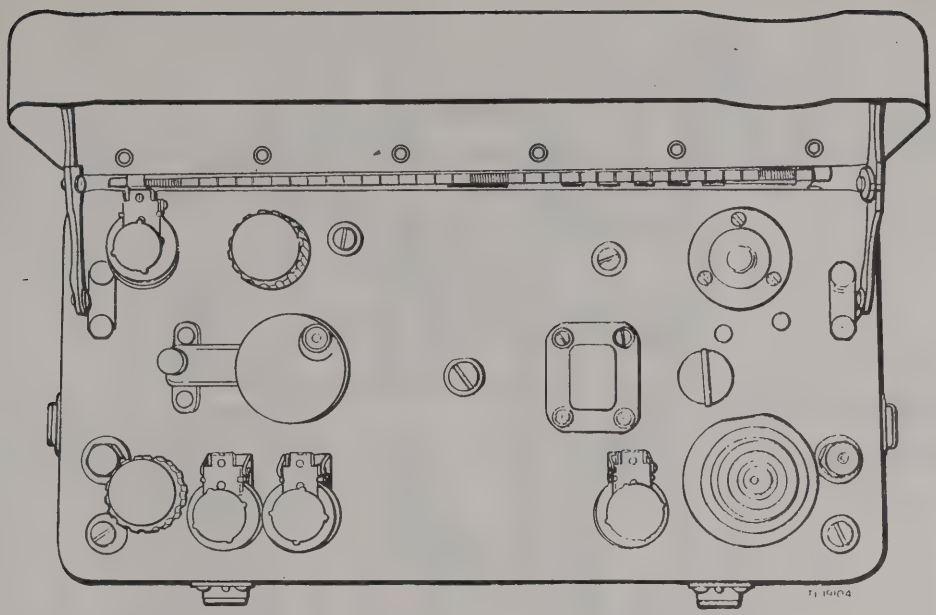


Figure 4. Front panel, Radio Receiver and Transmitter BC-1000-(*).

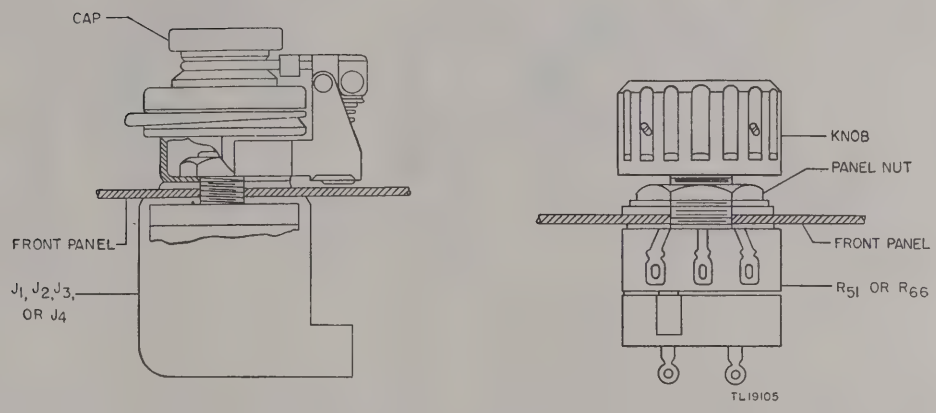


Figure 5. Jack water-seal assembly, volume control, Radio Receiver and Transmitter BC-1000-(*).

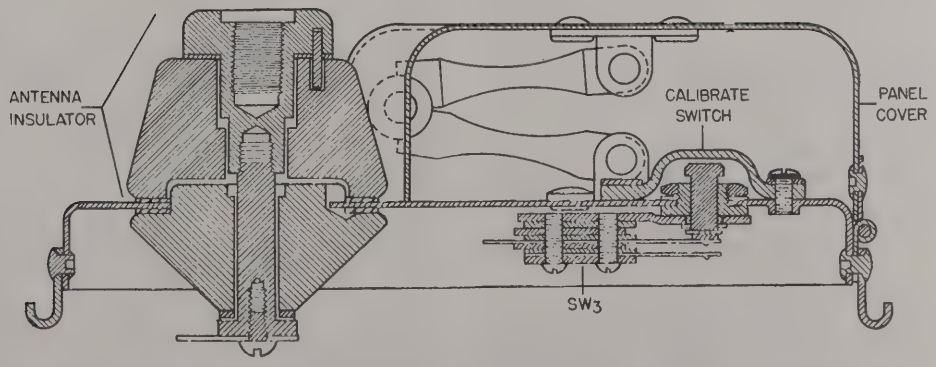


Figure 6. Antenna insulator, Radio Receiver and Transmitter BC-1000-(*).

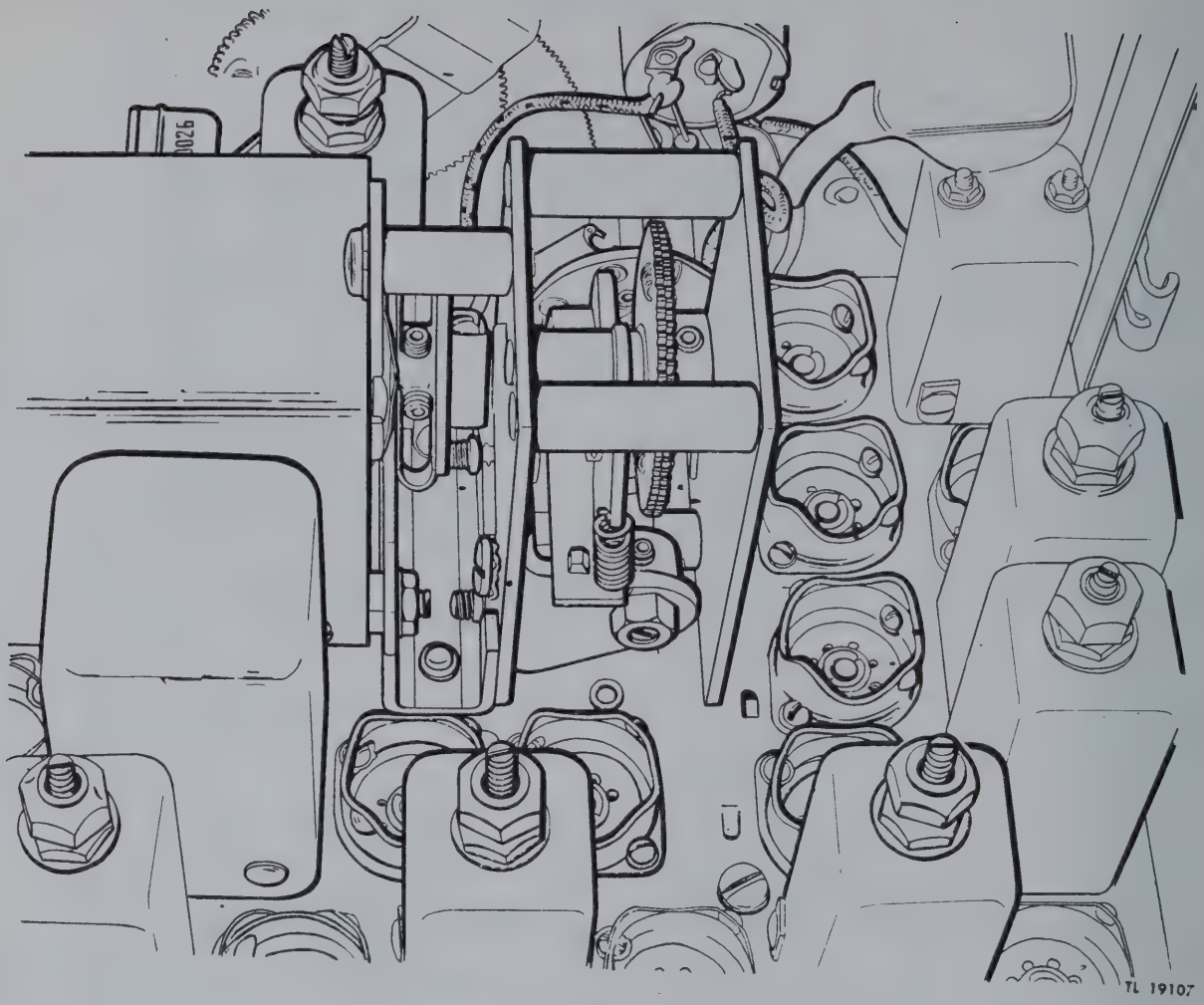


Figure 7. Dial mechanism, Radio Receiver and Transmitter BC-1000-(*).

dry-cleaning solvent (SD). Heavier rust and corrosion may be removed by careful use of crocus cloth, solvent, and compressed air.

b. Inspecting Main Chassis. After cleaning the set, inspect the chassis to determine the exact model. Check to see that model has been modified as required. During inspection make a careful check for any evidence of temporary field repairs. All electrical components must be free from obvious mechanical and electrical defects when inspected visually. *Any part, the failure of which was obviously caused by an electrical fault, must not be replaced until circuit is checked and cause of failure is determined.*

(1) *Wiring.* All soldered joints must present a good mechanical and electrical connection. Wiring insulation must not be worn or chafed. Insulated tubing must not be worn or missing, and bare wires must not be shorted to chassis or other parts. Chassis must be clean and free from corrosion.

(2) *Housing.* The housing must not have cracks or breaks in the metal. It must be free from corrosion. It must not be scratched, and must have no outside unpainted areas.

(3) *Painting.* The housing must be touched up using olive-drab wrinkle-finish paint if the housing presents a poor appearance. If scratches are deep or unpainted areas are large, the entire assembly should be repainted with olive-drab paint.

(4) *I-f transformer alignment screws.* The alignment screws on the top and bottom of i-f transformers should be checked for tightness. If screws are loose, the units will change tuning under normal operation.

(5) *Alignment screw position.* Check the position of all alignment screws on i-f transformers. The position should not be such that the screw driver slot is flush or almost flush to the containing bushing.

Note that there are two positions of the aligning screw at which it is possible to align the transformer. The correct position is the one in which the aligning screw is extended the farthest.

(6) *Tuning dial.* The tuning mechanism consisting of the internal gears and channel dial should be operated with low friction. It should be checked to ascertain binding or uneven operation. The gears should be free from corrosion and the flexible couplings connecting the variable capacitor with the dial mechanism should be free from cracks or evidences of strain. The dial lock should hold the tuning knob rigid when turned in a clockwise direction.

(7) *Jack covers.* The water-tight jack covers used on the front operating panel of Radio Receiver and Transmitter BC-1000-(*) should mesh with the rubber grommet to prevent the entrance of water. The springs should apply sufficient tension to maintain the covers in a closed position.

(8) *Trimmer capacitors.* The trimmer capacitors, as viewed from beneath the chassis, should not indicate a short circuit between the rotor and stator plates when checked visually. Cracks in the porcelain insulation of the capacitors will necessitate capacitor replacement.

c. Cleaning and Inspecting Removed Parts. (1) *Crystals.* The crystal holder must be free from cracks or chips and must be properly sealed. Inspect and clean pins of crystal units with dry-cleaning solvent (SD) applied with a brush. If pins are bent or broken, replace crystal unit with a new unit. Remove any heavy corrosion by careful use of crocus cloth. Wipe off the unit with a lint-free cloth moistened with dry-cleaning solvent (SD).

(2) *Tubes.* Inspect the removed tubes. Clean pins of each tube with dry-cleaning solvent (SD) applied with a brush. For heavier corrosion use crocus cloth applied with care. Inspect tube for bent pins and internal and external breaks. Shake tubes to detect loose pins and loose elements. Check tubes on the tube tester, allowing sufficient time for tube to warm up. Tap tube gently during test to detect loose or defective elements. Check for shorts between elements.

(3) *Dial lamp.* Clean contacts by careful use of crocus cloth. Test by connecting across a 1.5-volt battery. If found satisfactory reinstall in chassis.

SECTION IV

PRELIMINARY TROUBLE-SHOOTING PROCEDURES

9. General

a. Crystals and Tubes. The 6,815-kilocycle and the 4,300-kilocycle crystal should be inserted in the proper holder. Install one set of tested tubes as listed in table II below. Install tube shields taking care that they are properly latched in place.

Table II

Tube	Quantity
JAN-1L4	5
JAN-1T4, VT-173	6
JAN-3A4	2
JAN-1R5, VT-171	1
JAN-1A3	1
JAN-1S5, VT-172	3

b. Replacing Crystal Units in Chassis. Take care to insure the proper placement of the two crystal units. When crystals are in place, close the retaining spring.

10. Returning Chassis to Housing

The chassis can be returned to the housing by sliding it into the open end. Fasten the two clamps holding the chassis in place.

11. Operation Set-up

Connect the set to the power supply and turn on by rotating the volume control clockwise. Inspect set for any signs of abnormal operation such as smoking, arcing, crackling, or burning. If abnormal behavior is noted, turn off the set immediately. See section VIII, and correct the fault before proceeding.

12. Operational Test

If all indications appear normal check the performance of the set by communicating with another unit operating on the same frequency.

SECTION V

ALIGNMENT PROCEDURE

13. Alignment

a. Radio Receiver and Transmitter BC-1000-A is provided with a metering socket to facilitate alignment and aid in circuit tests. The following material gives the step-by-step procedure in alignment.

b. EQUIPMENT REQUIRED. (1) Maintenance Equipment ME-40-(*) and Maintenance Kit ME-53-(*) (less replacement batteries for the radio set) contained in Chest CH-165 or:

(2) Direct current *vacuum-tube* voltmeter (VTVM) for measuring voltages at the metering socket in Radio Receiver and Transmitter BC-1000-A:

(*a*) Battery-operated electronic voltohmmeter: Voltohmmeter I-107-A or -B (powered by plugging into one Battery BA-40) or:

(*b*) A-c operated electronic voltohmmeter: When only this type of instrument is available a source of 110- to 120-volt, 60-cycle alternating current can be provided by connecting a 6-volt d-c to 110-volt alternating-current (a-c) inverter as follows:

Connect the inverter clip leads to a 6-volt storage battery.

Plug the a-c inverter into the receptacle on the inverter.

The common lead of the meter is connected to the chassis of Radio Receiver and Transmitter BC-1000-A; the voltage lead is connected to the desired pin of the metering socket.

(3) Any signal generator capable of being accurately adjusted to 4.3 megacycles at an output of 5 microvolts or less, and of holding its calibration over a reasonable period of time. Frequency Meter SCR-211-(*), tuned to 4.3 megacycles, may be used.

(4) A *small nonmetallic screw driver* for making coil and trimmer adjustments.

(5) A *⅜-inch wrench* for locking and unlocking coil adjustments.

(6) *Antenna* A-28-(*) (*Phantom*) for adjusting the transmitter.

14. Metering Socket

A metering socket is provided on the chassis of the radio set for metering the various circuits for alignment and test purposes. The pin jacks on this socket are numbered from 1 to 8 and are connected to the various parts of the circuit, so that when the common lead on the vacuum-tube voltmeter is connected to the chassis of the set or to pin jack No. 8 of the metering socket and the voltage probe of the vacuum-tube voltmeter is inserted into the pin jack indicated in the following table, the corresponding voltage is indicated on the vacuum-tube voltmeter.

Table III.—Pin jack connections on metering socket

Pin jack No. 1—Master-oscillator grid voltage.
Pin jack No. 2—1st limiter grid voltage.
Pin jack No. 3—2d limiter grid voltage.
Pin jack No. 4—Transmitter mixer grid voltage.
Pin jack No. 5—Transmitter r-f power-amplifier grid voltage.
Pin jack No. 6—Receiver r-f amplifier grid.
Pin jack No. 7—Discriminator output voltage.
Pin jack No. 8—Ground.

15. Preliminary

a. Connect a fresh Battery BA-70 to the radio chassis. The chassis may be plugged directly into Battery BA-70, as shown in figure 8.

b. Connect Handset TS-15-A to the MIC and PHONE No. 1 jacks on the front panel.

c. Turn on the 4.3-megacycle signal generator and allow it to warm up for at least 15 minutes.

d. Turn the set *on* by means of the VOLUME control knob. Allow the set to warm up for at least 10 minutes.

e. Loosen the adjustment locknuts on coils L3, L5-1, L5-2, L5-3, L6-1, L6-2, L6-3, L7, and L8. Loosen just enough to allow adjustment of screw.

16. Alignment Operation (fig. 9)

To align Radio Receiver and Transmitter BC-1000-A, perform the following operations in order listed.

a. Align the 4.3-megacycle crystal oscillator by in-

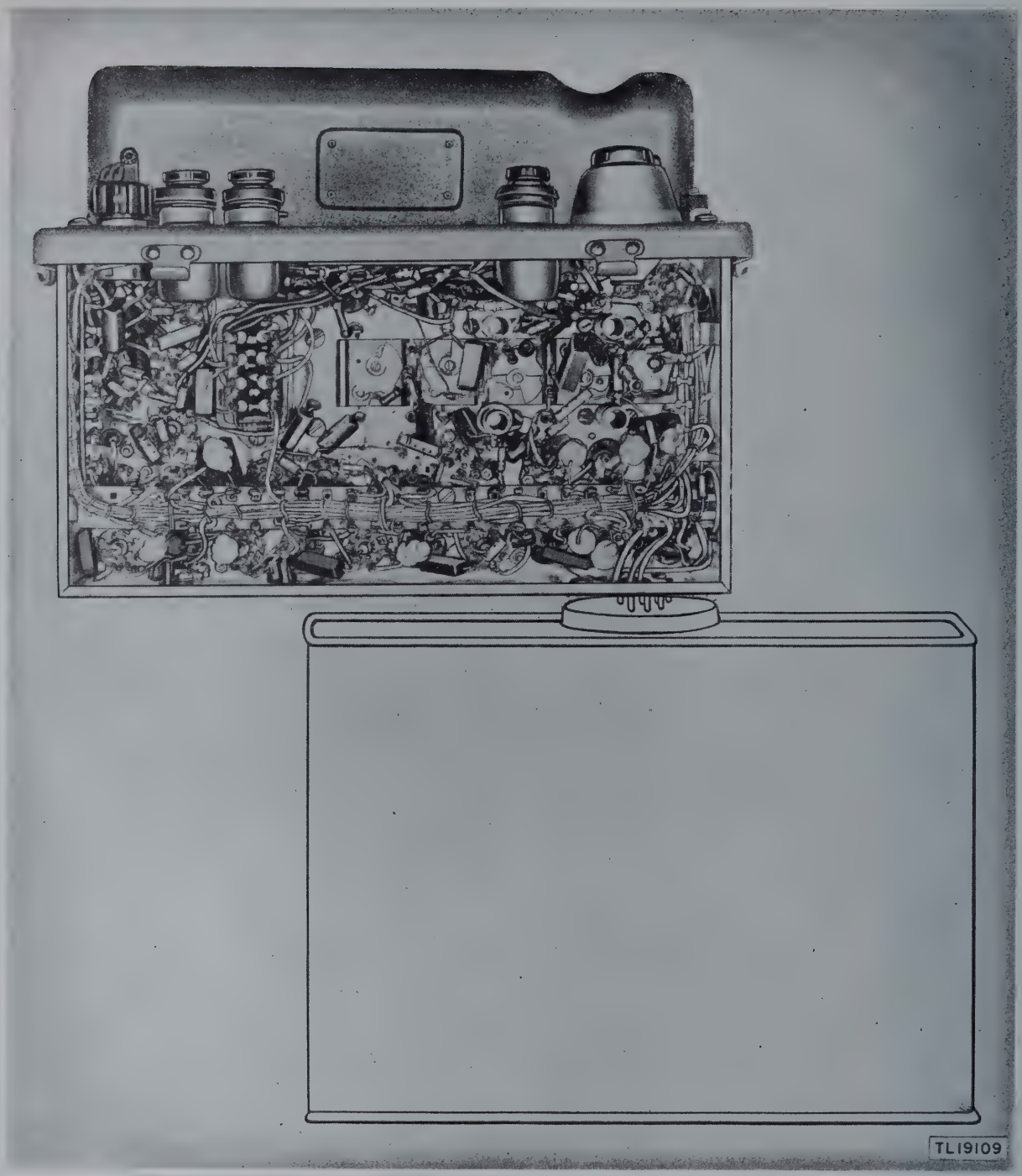


Figure 8. Radio Receiver and Transmitter BC-1000-(*), connected directly to Battery BA-70 for test purposes.

serting the VTVM probe into pin jack No. 4 of the metering socket. Press the PRESS FOR DIAL LIGHT & CALIB. button on the front panel and adjust L3 for maximum deflection on the VTVM. This voltage should be at least —20 volts.

b. Align the discriminator and second limiter by inserting the VTVM probe into jack No. 7 of the metering socket. Press the PRESS FOR DIAL LIGHT & CALIB. button and adjust L8 so that the VTVM reads approximately + 0.5 volt. Next adjust L7 for maximum reading. Finally readjust L8 until VTVM reads O.

c. Align the i-f amplifiers and receiver mixers as follows:

(1) loosely couple the 4.3-megacycle signal generator to first mixer tube V7. This can be done by

placing a wire from the generator near first mixer tube V7. If greater coupling is necessary, connect directly to the grid (pin No. 6) through a small capacitor. Insert the VTVM probe into pin jack No. 7 of the metering socket and adjust the signal generator frequency until the VTVM reads 0. The signal generator is now at the exact frequency of the 4.3-megacycle crystal contained in the radio set. (If Oscillator VO-6 is used, this procedure is not necessary.)

(2) Insert VTVM probe into pin jack No. 2 of the metering socket, and adjust the signal generator output until the VTVM reads 0.5 volt. Adjust L5-1, L5-2, L5-3, L6-1, and L6-2 for maximum reading on VTVM. Reduce the generator output as resonance is approached.

d. Align the first limiter by inserting the VTVM probe into pin jack No. 3 on the metering socket and adjust L6-3 for maximum reading on VTVM. Disconnect signal generator from V7.

e. Check the discriminator by connecting the VTVM into pin jack No. 7. Be sure there is no signal being received by the receiver, and measure the voltage at pin jack No. 7. If this voltage is greater than ± 0.5 volt, very slight readjustment of L5-1 and L5-2 may be necessary to bring the voltage to zero.

f. Lock the adjustments and check the discriminator by tightening the adjustment locknuts on coils L3, L5-1, L5-2, L5-3, L6-1, L6-2, L6-3, L7, and L8. *During this operation be careful not to disturb the settings of the adjustment screws.* After tightening locknuts check voltage at pin jack No. 7. This voltage should be no greater than ± 0.5 volts. Press the PRESS FOR DIAL LIGHT & CALIB. button. The voltage should be zero.

g. Align the master oscillator by adjusting the dial indicator by turning knob marked INDICATOR ADJUSTMENT until the dial indicator is in center of window. Turn dial until either one of the two calibrate marks (calibrate marks are indicated on dial by C at channel 15 and midway between channel 36 and 37) is directly under the dial indicator. Press the PRESS FOR DIAL LIGHT & CALIB. button and adjust trimmer C6G to zero beat.

Caution: In performing the following two steps do not leave set in transmit position too long or damage to tube VI may result.

h. Align the doubler by connecting the phantom Antenna A-28, Antenna AN-130-A, or AN-131-A to the antenna terminal of the set. Set dial to channel 39 for steps in h, i, and j. Insert VTVM probe into pin jack No. 5 of the metering socket. Press the transmit switch on the handset and very quickly adjust trimmer C6E for maximum indication on VTVM.

i. Align the transmitter mixer with the VTVM connected as in *h* above. Press the transmit switch on the handset and *very quickly* adjust trimmer C6C for maximum indication on VTVM. This voltage should be at least —10 volts.

j. Align the transmitter r-f power amplifier by pressing the transmit button on the handset and adjusting trimmer C6A for maximum voltage at pin jack No. 6 of the metering socket. This voltage should be at least —25 volts.

k. Align the receiver r-f amplifier by inserting the VTVM probe into pin jack No. 2 on the metering socket. Attach Antenna AN-130-A to set and connect the antenna ground lead to the GROUND FOR SHORT ANTENNA on the front panel. Adjust trimmer CSK for maximum reading on VTVM. *This adjustment must be made while no signal is being received.*

17. Alignment Procedure Using Maintenance Equipment ME-40-(*)

a. EQUIPMENT. The following equipment is needed for alignment:

1 Radio Receiver and Transmitter BC-1000-(*).
1 Antenna A-28-(*) (Phantom).
1 nonmetallic aligning tool.
1 wrench, Spintite, 3/8-inch.
1 power cord.
1 Oscillator VO-6-(*), or Frequency Meter Set SCR-211-(*), or an accurate signal generator having a 4.3-megacycle output.
1 Alignment Indicator I-210-(*), or a vacuum-tube voltmeter with 5- and 50-volt ranges.

b. PRELIMINARY PROCEDURE. (1) Remove the chassis of Radio Receiver and Transmitter BC-1000-(*) from the chassis case.

(2) Before attempting to align the BC-1000-(*), check all tubes.

(3) Connect the BC-1000-(*) to Battery BA-70 or BA-80 by using the battery cord furnished with Maintenance Equipment ME-40-(*), or plug the set into the battery.

(4) Plug in Handset TS-15-(*).

(5) Turn the set on and allow it to warm up for at least 10 minutes.

(6) Loosen locknuts L, L5-1, L5-2, L5-3, L6-1, L6-2, L6-3, L7, and L8. *These locknuts should be loosened just enough to leave some tension on the*

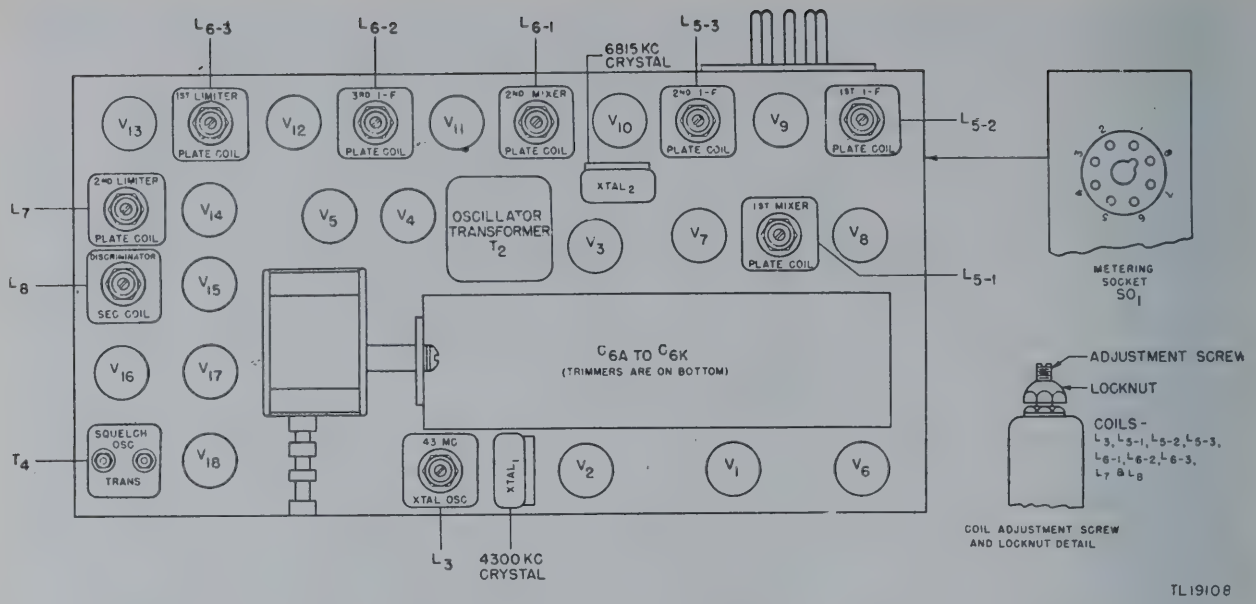


Figure 9. Top chassis layout for alignment, Radio Receiver and Transmitter BC-1000-(*).

screw adjustment. Use the Spintite wrench found in Maintenance Kit ME-40-(*).

(7) Remove the antenna from the BC-1000-(*), if one is installed.

(8) Plug Alignment Indicator I-210-(*) (vacuum-tube voltage indicator) into Battery BA-39.

(9) Throw the vacuum-tube voltage indicator switch to the 30-volt position and turn the vacuum-tube voltage indicator calibrate knob to open the shadow angle on the indicator eye to 90°.

c. Aligning 4.3-Megacycle Crystal Oscillator. (1) Insert the test probe in metering socket pin jack No. 4 of the BC-1000-(*), and connect the alligator clip to the chassis.

(2) Screw adjustment L3 to the extreme counterclockwise position.

(3) Hold down the PRESS FOR DIAL LIGHT & CALIB. button and screw the adjustment L3 in (clockwise) until the shadow becomes just a hairline, or to minimum shadow if hairline indication cannot be obtained. Screw the adjustment out one-half to three-quarter turn and leave it there. Tighten locknut. (See fig. 9.)

d. Aligning Discriminator and Second Limiter. (1) With vacuum-tube voltage indicator switch in the 4.5 position, short the test probe to the alligator clip of the vacuum-tube voltage indicator and adjust the knob for a hairline shadow.

(2) Insert the test probe in pin jack No. 7 of the metering socket.

(3) Hold down the PRESS FOR DIAL LIGHT & CALIB. button and adjust L8 so that a 5° or 10° (0.5-volt) shadow angle appears.

Note. In adjusting coil L8, it will be noted that there is a point where the shadow on the indicator eye is extremely active. At this point have the adjustment such that a shadow of approximately 5° or 10° appears. *Remember that an increase in positive voltage tends to cause the eye to open, and an increase in negative voltage causes the eye to close or overlap.*

(4) After adjusting L8 to plus 0.5 volt hold down the PRESS FOR DIAL LIGHT & CALIB. button, and adjust L7 for maximum shadow angle. If the angle opens too wide (85° to 90°) during this adjustment, turn the L8 screw to the left very slowly, so that the angle reduces to 5° or 10°. Readjust L7 for maximum angle and tighten the locknut on L7.

(5) Still depressing the PRESS FOR DIAL LIGHT & CALIB. button, turn L8 slightly to the left until the shadow angle is reduced to a hairline. Tighten the locknut on coil L8, making sure it does not disturb the final setting of the screw. Check this by making certain that the shadow angle remains a hairline after the locknut is tightened.

e. Aligning I-f Amplifier. (1) With the vacuum-tube voltage indicator switch set to the 4.5-volt position, open the shadow angle by adjusting the calibrate knob.

(2) Insert the test probe in jack No. 2 of the metering socket.

(3) Connect Oscillator VO-6-(*) by attaching the alligator clip on the flexible lead of the terminal

box to the chassis or ground, and attaching the other alligator clip to the grid (pin No. 6) of first mixer tube V7.

(4) Throw the switch of the oscillator terminal box (dummy load) to the LO position.

(5) Increase the output by turning the attenuation control (marked INCREASE) of the oscillator to the right just enough to change the shadow angle. If there is no indication, leave the INCREASE control fully on and throw the terminal box switch to the HI position. If there is still no indication, disconnect Oscillator VO-6-(*), and set L5-1, L5-2, L5-3, L6-1, and L6-2 so that the adjusting screws are extended about ¼ inch, and adjust them for maximum noise in Handset TS-15-(*). Reconnect Oscillator VO-6-(*) as before.

(6) Adjust the input signal until a small indication is obtained on the indicator eye, and adjust L5-1, L5-2, L5-3, L6-1, and L6-2 to minimum shadow angle (negative volts). Tighten each locknut after each adjustment, watching the indicator eye to insure that there is no misalignment.

f. Aligning First Limiter. (1) Set the vacuum-tube indicator switch to the 30-volt position.

(2) Insert the test probe in pin jack No. 3 of the metering socket, and adjust L6-3 for minimum shadow angle. Turn off Oscillator VO-6-(*) by turning the INCREASE control to the extreme left until a click is heard, and remove the output leads of Oscillator VO-6-(*) from the radio set. Make certain that the locknuts of L3, L5-1, L5-2, L5-3, L6-1, L6-2, L6-3, L7, and L8 are snug. Be careful not to change the settings.

g. Checking the Discriminator. (1) Set the vacuum-tube voltage indicator switch to the 4.5-volt position, ground the test probe, and adjust the calibrate knob for a hairline shadow.

(2) Insert the test probe in pin jack No. 7 of the metering socket. There should be no change in the shadow angle from the original hairline setting. If there is, a very slight readjustment of L5-1 or L5-2 should bring the indicator eye back to the hairline with a slight flutter (due to r-f noise).

h. Aligning Master Oscillator. (1) Screw Antenna A-28-(*) (phantom) into the antenna post of the set and attach its ground lead to the ground post on the set.

(2) Use the INDICATOR ADJUSTMENT to center the dial indicator line in the channel window.

(3) Turn the TUNING knob until the calibrate line between channels No. 36 and No. 37 is under the indicator line. Press the DIAL LIGHT & CALIB. button and with the handset to your ear, adjust trimmer CSG (fig. 9) for zero beat. The proper rotor-plate position for this capacitance is about three-fourths meshed. Check the calibration at channel No. 15.

(4) Rotate the dial to channel No. 20. Remove the test lead of the vacuum-tube voltage indicator.

i. Aligning Doubler. (1) With the test probe free, set the vacuum-tube voltage indicator switch to the 30-volt position, and, by adjusting the calibrate knob, open the indicator eye to approximately 90°.

(2) Insert the test probe in pin jack No. 5 of the metering socket.

Caution: The following adjustments should be made quickly to prevent damage to r-f power amplifier tube V1.

(3) Press the switch on Handset TS-15-(*) and *quickly* adjust C6E for minimum shadow.

j. Aligning Transmitter Mixer. Press the switch on Handset TS-15-(*) and adjust C6C for minimum shadow.

k. Aligning Transmitter R-*f* Power Amplifier. Insert the test probe in pin jack No. 6 of the metering socket, press the switch of Headset TS-15-(*), and *quickly* adjust C6A for minimum shadow.

l. Aligning Receiver R-f Amplifier. Insert the test probe in pin jack No. 3 of the metering socket and adjust C6K for minimum shadow. (Handset TS-15-(*) switch is not pressed for this step, and no signal should be received.)

m. Final Check of Discriminator. (1) Set the vacuum-tube voltage indicator switch in the 4.5-volt position, short the test probe to the alligator clip, and adjust the calibrate knob for a hairline shadow.

(2) Insert the test probe into pin jack No. 7 of the metering socket. There should be no change in the shadow angle from the original hairline setting. If there is, a very slight readjustment of L5-1 or L5-2 should bring the indicator eye back to the hairline with slight flutter.

18. I-F Alignment Using Crystal Calibration Circuit and Vacuum-Tube Voltmeter

a. In this method of alignment the 4.3-megacycle output of the crystal calibration circuit is used as the source of signal instead of Oscillator VO-6-(*) or other signal generator for aligning the i-f stages. To reduce the signal input to the i-f stages to a usable level, a dummy tube is used in the first mixer stage. A satisfactory dummy tube can be made by cutting off all pins but filament pins 1, 5, and 7 on Tube JAN-1L4, JAN-1T4, or JAN-1R5 whose filament circuit is good.

b. The alignment procedure is as follows:

(71) Turn off the set, remove first mixer tube V7, and insert the dummy tube in its place. Insert the probe of the VTVM in pin jack No. 3 of the metering socket. Turn set on.

(2) Hold down the PRESS FOR DIAL LIGHT & CALIB. button.

(3) Adjust L6-3 for maximum indication on the VTVM.

Note. If the set is considerably out of line, it may be necessary to adjust L6-2, L6-1, L5-3, and L5-2 to ¼ inch above the locknuts to obtain an initial reading at pin jack No. 3 of the metering socket. If the set is practically aligned and needs only trimming, then this reading may be over —15 volts; in this case slightly detune L5-2 so that when L6-3 is adjusted, the meter reading does not exceed —15 volts.

(4) Insert the probe of the VTVM in pin jack No. 2 of the metering socket. Adjust L6-2, L6-1, L5-3, and L5-2 respectively for maximum indication on the VTVM.

(5) Release the PRESS FOR DIAL LIGHT & CALIB. button and turn off the set.

(6) Replace the dummy tube with a good tube and replace the shield.

(7) Insert the probe of the VTVM in pin jack No. 3 of the metering socket.

(8) Adjust L5-1 for maximum indication on the VTVM.

(9) Insert the probe of the VTVM in pin jack No. 7 of the metering socket. If the voltage is greater than ±0.5 volt, a final adjustment of L5-2 and L5-1 will bring the voltage to zero. Be sure the receiver is not picking up a signal.

(10) Carefully tighten all locknuts. Recheck the voltage at pin jack No. 7 for zero indication.

19. I-F and Mixer Alignment

Two methods of aligning the i-f stages follow. The first uses Oscillator VO-6-(*) as a source of i-f signal. The second uses the 4.3-megacycle crystal calibrate circuit in the set as a source of i-f signal.

20. I-F Alignment with Oscillator VO-6-(*)

a. Connect high side of Oscillator VO-6-(*) to control grid of first mixer tube 1L4, No. 6 socket terminal of V7.

b. Connect low side to chassis.

c. Insert probe of VTVM in pin jack No. 2 of metering socket.

d. Turn on Oscillator VO-6-(*) by rotating potentiometer knob clockwise. In following alignment adjust potentiometer and HI-LO switch on Oscillator VO-6-(*) so that VTVM reads about 5 volts.

Note. If set is very much out of alignment there may be no voltage indication. In this case adjust screws on L5-1, L5-2, L5-3, L6-1, and L6-2 until they are extended ¼ inch. Disconnect Oscillator VO-6-(*) and then adjust screws for maximum noise in Handset TS-15-(*). Reconnect Oscillator VO-6-(*).

e. Adjust L6-1, L6-2, L5-3, L5-2, and L5-1 for maximum voltage.

f. Insert probe of VTVM in pin jack No. 3 of metering socket.

g. Adjust L6-3 for maximum voltage. Adjust Oscillator VO-6-(*) to keep voltage below —20 volts.

h. Disconnect Oscillator VO-6-(*).

i. Insert probe of VTVM in pin jack No. 7 of metering socket. If voltage is greater than ± 0.5 volt, a final adjustment of L5-2 and L5-1 will bring the voltage to zero. Be sure the receiver does not pick up a signal.

j. Carefully tighten all locknuts. Recheck voltage pin jack No. 7 of metering socket for zero.

21. I-F Alignment with Crystal Calibration Circuit

Note. In this method of alignment the voltage output of the crystal calibration circuit to the i-f stages is reduced by the use of a dummy tube in the first mixer stage. A satisfactory dummy tube can be made by cutting off all pins but filament pins 1, 5, and 7 on either a 1L4, 1T4, or 1R5 tube whose filament circuit is good.

a. Turn off set, remove first mixer tube V7 and insert dummy tube in its place. Insert probe of VTVM in pin jack No. 3 of metering socket.

b. Push the PRESS FOR DIAL LIGHT & CALIB. button.

c. Adjust L6-3 for maximum voltage.

Note. If the set is considerably out of line it may be necessary to adjust L6-2, L6-1, and L5-3 to obtain an initial reading at pin jack No. 3 of metering socket. If the set is nearly aligned and only needs trimming up, then this reading may be over —15 volts; in this case slightly detune L5-2 so that when L6-3 is adjusted the meter does not exceed —15 volts.

d. Insert probe of VTVM in pin jack No. 2 of metering socket. Adjust L6-2, L6-1, L5-3, and L5-2, respectively, for maximum voltage.

e. Release button and turn off set.

f. Replace dummy tube with good tube and shield. Turn set on.

g. Insert probe of VTVM in pin jack No. 3 of metering socket.

h. Adjust L5-1 to maximum voltage. (This is random noise voltage. Be sure receiver does not pick up a signal.)

i. Insert probe of VTVM in pin jack No. 7 of metering socket. If voltage is greater than ±0.5 volt, a final adjustment of L5-2 and L5-1 will bring

the voltage to zero. Be sure receiver does not pick up a signal.

j. Carefully tighten all locknuts. Recheck voltage at pin jack No. 7 for zero.

22. Calibrating Receiver

Provision is made for calibrating the radio receiver and transmitter in the following manner: With the set operating as a receiver, pressing the PRESS FOR DIAL LIGHT & CALIB. button turns on the pilot light and the filament of the transmitter crystal oscillator and mixer tube V2. The tenth and eleventh harmonic of the 4.3-megacycle crystal-oscillator are used as reference points. Beat notes between these harmonics and the sum of the doubled master-oscillator frequency plus 4.3 megacycles are heard at 43.0 and 47.3 megacycles (channel 15 and midway between channels 36 and 37) on the dial. These frequencies are present in the screen grid of transmitter crystal-oscillator and mixer tube V2 (which is the plate of the 4.3-megacycle crystal-oscillator circuit). The audible beat note derived from these frequencies is capacitively coupled to the grid of the discriminator and r-f power-amplifier tube so that it can be heard in the headphones.

Caution: Do not press the PRESS FOR DIAL LIGHT & CALIB. button when the transmitter is turned on.

A block diagram is shown in figure 3.

Table IV. Burned-out tube location chart.

Test No.	Following tube filaments OK if indication is obtained	Metering socket pin jack	Press the following	OK indication obtained
1	V4, V3, V8	No. 1		Voltage indication (on 6-volt scale).
2	V2 (also dial light)	No. 4	PRESS FOR DIAL LIGHT & CALIB. button.	Dial lamp lights dimly. Voltage indication (on 30-volt scale).
3	V1	No. 1	Handset transmit switch.	Voltage indication (on 30-volt scale).
4	V11, V12, V13	No. 5	Handset transmit switch.	Voltage indication (on 30-volt scale).
5	V9, V10, V14	No. 2	PRESS FOR DIAL LIGHT & CALIB. button.	Voltage indication (on 30-volt scale).
6	V7, V13	No. 3	PRESS FOR DIAL LIGHT & CALIB. button.	Voltage indication (on 30-volt scale).
7	V6, V15		PRESS FOR DIAL LIGHT & CALIB. button.	Hear signal at either one of calibration marks.
8	V16, V17, V18		Turn SQUELCH control on and advance it to the right.	Tubes OK if noise disappears.

Table V. Realignment chart.

Tube changed	Adjustment to be made	Indicator used	Connect indicator to	Adjust for	Dial setting	Press the following
V1	C6A	Phantom Antenna A-28-(*). or:	Antenna terminal.	Maximum brilliance of lamp.	Channel No. 20 (check over complete range).	Transmit switch on handset.
		Alignment Indicator I-210-(*), 30-volt range (with short or long antenna installed in set).	Pin jack No. 6 of metering socket.	Maximum dark area.		
V2	C6C C6E	I-210-(*), 30-v range.	Pin jack No. 5 of metering socket.	Maximum dark area.	Channel No. 20 (check over complete range).	Transmit switch on handset.
V3	C6E	I-210-(*), 30-v range.	Pin jack No. 5 of metering socket.	Maximum dark area.	Channel No. 20 (check over complete range).	Transmit switch on handset.
	C6G	Headset.	PHONE No. 1 jack.	Zero beat.	Calibration mark, either at channel No. 15 or between No. 36 and No. 37. (Indicator must be centered on window before setting dial to calibration mark.)	PRESS FOR DIALLIGHT & CALIB. button.
V4 V5	C6G	Headset.	PHONE No. 1 jack.	Zero beat.	Calibration mark, either at channel No. 15 or between No. 36 and No. 37. (Indicator must be centered in channel window before setting dial.)	PRESS FOR DIALLIGHT & CALIB. button.
V14 or V15	L8	I-210-(*), 4.5-v range. Adjusted to close at zero volt.	Pin jack No. 7 of metering socket.	Zero volt.		PRESS FOR DIALLIGHT & CALIB. button.

Note. If any of the tubes listed in the above table are changed, realign the set in accordance with the instructions given in this table. Perform only the adjustment corresponding to the tube changed.

DETAILED TROUBLE-SHOOTING PROCEDURES

23. Signal Substitution

a. GENERAL. If the set is inoperative or has weak output on receive, when aligned, the trouble may be localized to a particular stage by signal tracing or substitution. Such a system is outlined in this section.

b. TEST EQUIPMENT. The following equipment is necessary: one a-f signal generator (400 to 1000 cycles per second (cps)) and an r-f signal generator covering at least 2.0 to 50.0 megacycles. By using Maintenance Equipment ME-40-(*), Oscillator VO-6-(*) can be substituted for signal generator to deliver the 4.3-mc signal. An electronic voltmeter for measuring voltages at the metering socket which may be:

(1) Alignment Indicator I-210-(*).

(2) Any other electronic voltmeter such as Multimeter TS-389/U (Hickok Model 202), Voltohmmeter TS-294/U (RCA voltomyst), etc.

c. PROCEDURE. Referring to table VII inject the signal at the points indicated within a particular stage. Apply the *hot* lead of the signal generator in series with a 0.1-microfarad (m) capacitor to the lug of the tube socket. A signal should be heard in the phones or read on the output meter. After trouble has been localized to a particular stage make a resistance and voltage check of individual components to locate the faulty part.

Table VI. Condition for signal substitution.

Component	Instruction
Set	Set placed upside down, panel toward operator, case removed.
Power	Battery connected. Volume control turned to maximum. Power ON.
Channel	Any channel may be used.
Rcvr-trans	Set operating as receiver.
Signal generator	Outside shield or cable marked ground of outside cable connected to set chassis.
Squelch	Squelch turned OFF.

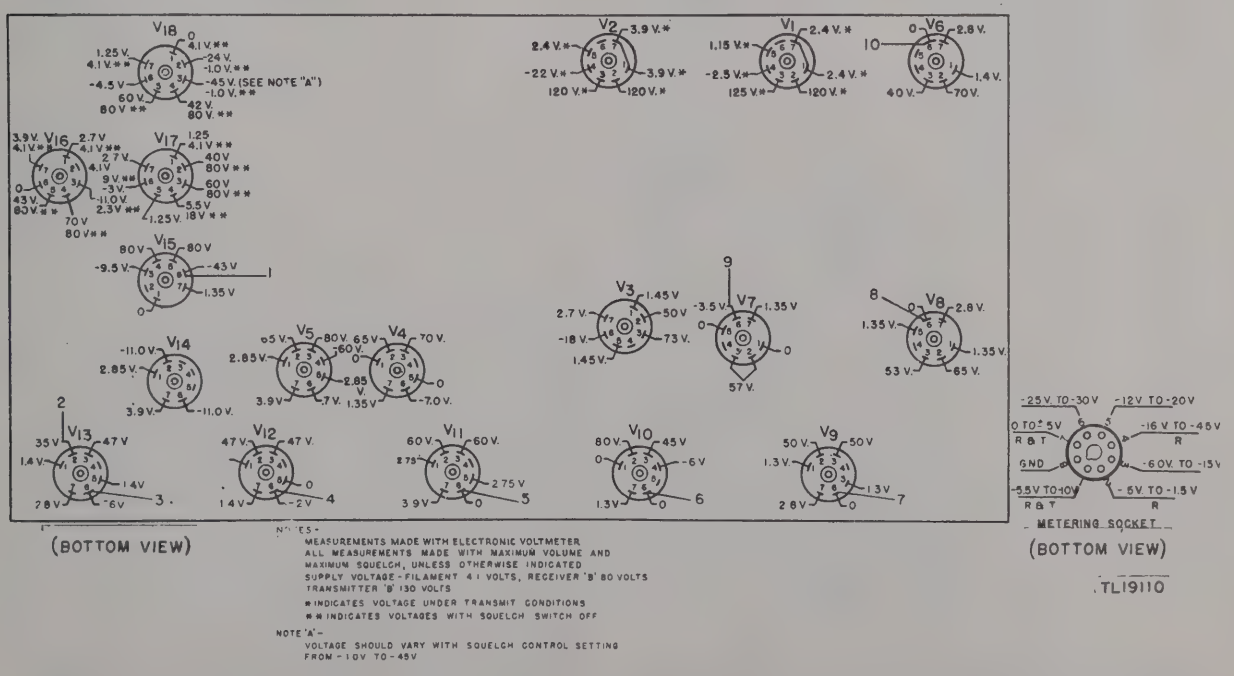


Figure 10. Tube socket voltages and step-by-step signal substitution, Radio Receiver and Transmitter BC-1000(*).

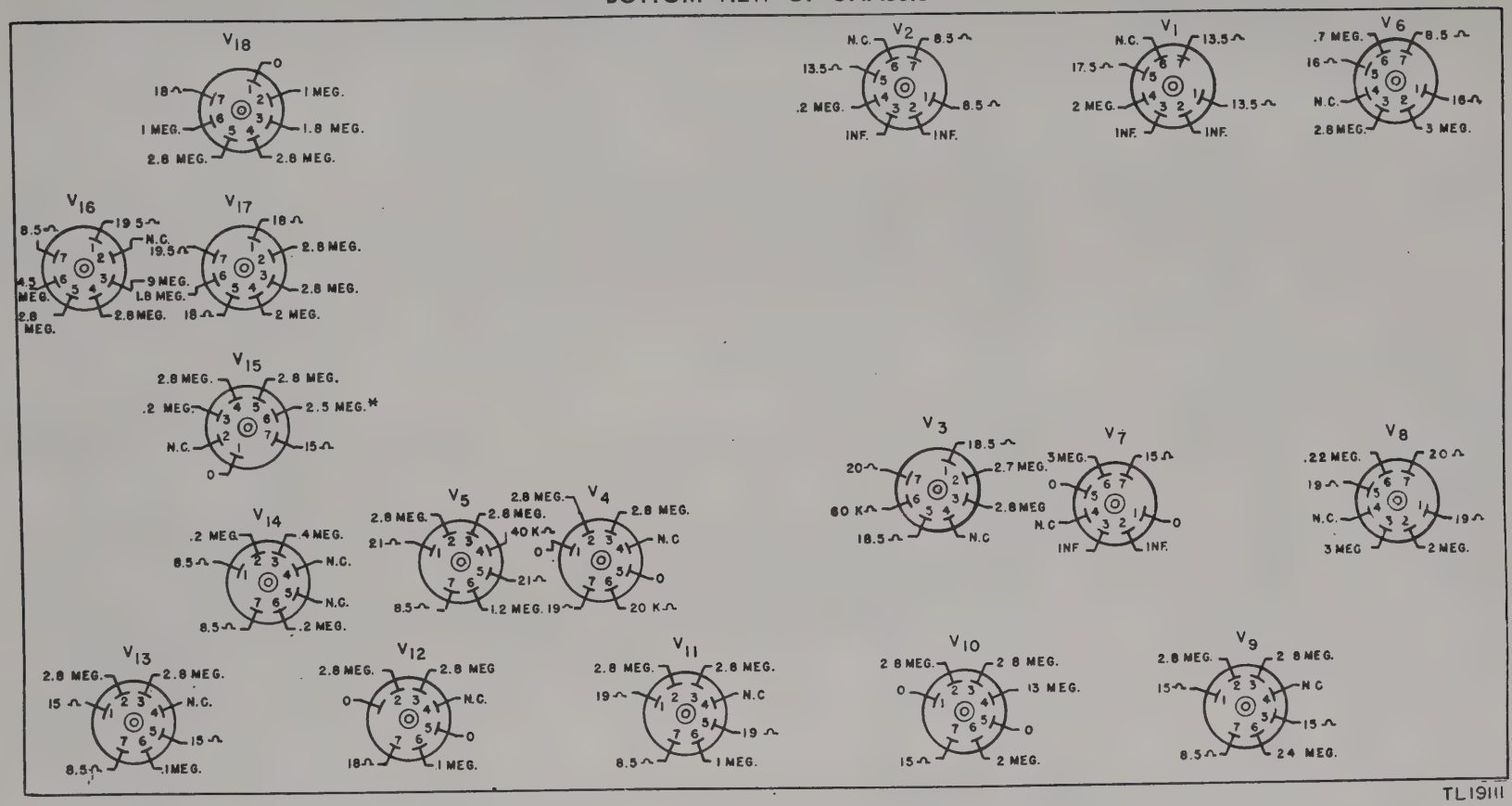
Table VII. Signal substitution steps

Step	Signal generator connected to	Frequency	Input voltage
1	A-f grid.	400 or 1,000 cps.	2 v.
2	2d limiter plate.	2.515 mc.	0.01 v.
3	2d limiter grid.	2.515 mc.	0.01 v.
4	1st limiter grid.	2.515 mc.	0.01 v.
5	3d i-f grid.	2.515 mc.	0.01 v.
6	2nd mixer grid.	4.3 mc.	0.001 v.
7	2d i-f grid.	4.3 mc.	0.001 v.
8	1st i-f grid.	4.3 mc.	0.001 v.
9	1st mixer grid.	R-f channel frequency.	500 μv.
10	R-f grid.	R-f channel frequency.	100 μv.

Note. In all steps listed in table VII it is necessary to use a 0.1-mf capacitor in series with the hot lead of the signal generator used. If such a precaution is not observed, damage to the attenuator will result. If a frequency-modulated signal generator is not used, it might be necessary to detune the discriminator transformer *slightly*. The conventional amplitude-modulated signal generator modulated 30 percent at 400 or 1,000 cps may then be used provided the frequency coverage is available. In the above steps the vacuum tube voltmeter probe may be placed on the a-f power-amplifier tube plate (pin No. 6, V15). The a-c 50-volt scale will be used. The resultant reading can be used as output measurements.

24. Moistureproofing, Fungiproofing, and Refinishing

After the set has been repaired and is functioning correctly, a check should be made of date of last moistureproofing and fungiproofing. If new treatment is required, see TB SIG-13 and TM 11-242 for the method of application. If the receiver has been scarred or chipped, remove any rough spots with a fine grade of sandpaper and touch up spots with a small brush. If the case is sufficiently scarred and scratched to warrant complete refinishing remove chassis from case and mask or remove parts which are not to be refinished and spray entire case with the proper paint authorized by existing regulations.



NOTE: * VARIES WITH VOLUME CONTROL SETTING. (2.5 MEG. TO 3 MEG.)

READINGS MADE UNDER THE FOLLOWING CONDITIONS WITH ELECTRONIC VOLTOHMMETER
1-BATTERY DISCONNECTED FROM SET
2-SQUELCH SWITCH ON, (MAXIMUM)
3-HANDSET & HEADPHONES DISCONNECTED.
4-ALL MEASUREMENTS FROM TUBE PINS TO CHASSIS
5-ALL TUBES IN SOCKETS

Figure 11. Tube socket resistance measurements, Radio Receiver and Transmitter BC-1000-(*).

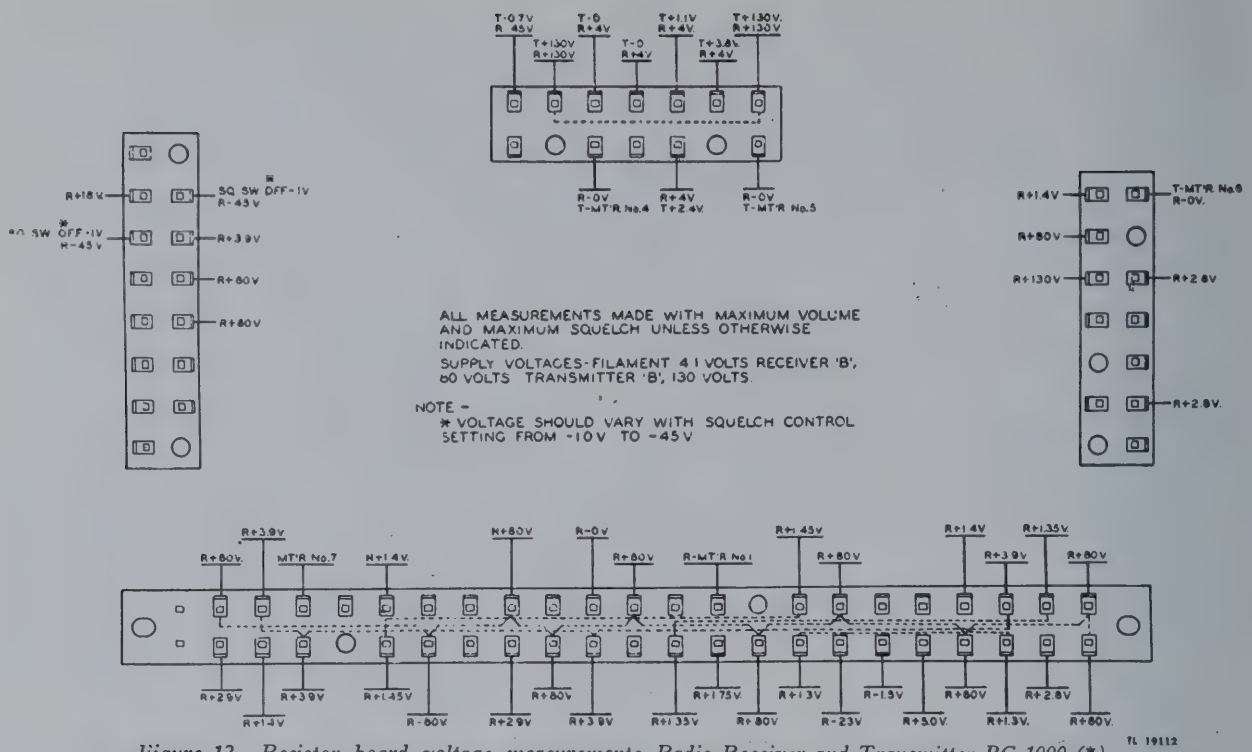


Figure 12. Resistor board voltage measurements, Radio Receiver and Transmitter BC-1000-(*).

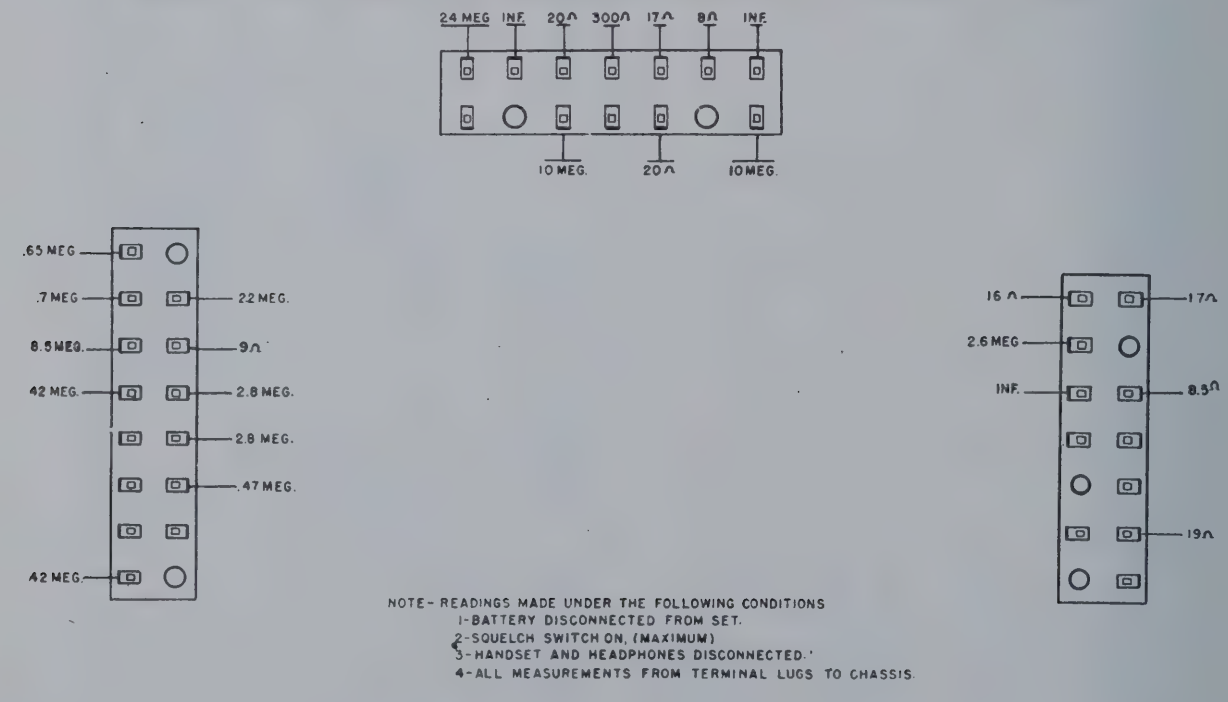


Figure 13. Resistor board resistance measurements, Radio Receiver and Transmitter BC-1000-(*).

SECTION VII

FINAL TESTING

25. Alignment Check

Although the unit was correctly aligned during the repair procedure a recheck of set alignment is necessary after moistureproofing and fungiproofing have been completed. After the alignment has been checked, make over-all performance tests as outlined in the following paragraphs.

26. Sensitivity Test

a. Connect set to power supply or battery.

b. Turn power ON. Set VOLUME control to full ON and squelch OFF.

c. Connect Handset TS-15-(*) to set.

d. Adjust power supply to standard voltages.

e. Connect dummy Antenna A-28-(*) to set.

f. Connect r-f signal generator to dummy antenna.

g. Turn on signal generator.

h. Connect audio-output meter to set by inserting Plug PL-55 into AUX. PHONE jack.

i. Connect ground lead of vacuum-tube voltmeter to metal chassis and voltage lead to contact 3 (grid of second limiter tube of metering socket).

j. Adjust signal generator to produce a signal of 40,200 kc at 4 or 5 microvolts. Exact frequency and output not essential.

k. Adjust signal generator frequency control until signal generator is at resonance with receiver. Resonance is indicated by:

(1) Reduction of noise in earphone of Handset TS-15-(*).

(2) Minimum indication of audio-output meter, or maximum reading of vacuum-tube voltmeter.

l. Adjust attenuator of signal generator for zero output. Note indication of audio-output meter for reference in *n* below.

m. Adjust attenuator of signal generator until indication of audio-output meter is one-tenth the reading obtained in *n* below.

n. Note signal generator output in microvolts. This output must not be greater than 3.5 microvolts.

o. Repeat steps in *j* through *n* above, at channel 20 (44,000 kc). Repeat steps in *j* through *n* above, at channel 39 (47,800 kc).

27. Image Ratio

a. Equipment is arranged as in *a* through *i*, paragraph 26.

b. Short out the automatic frequency control by connecting a short clip lead between metal chassis and the output of discriminator Tube JAN-1A3.

Note. Connection may be made by connecting clip lead to the sixth lug on inner side of long terminal strip nearest transformers T3A and T3B.

c. Tune set to channel 39 (37,800 kc).

d. Tune signal generator to 39,200 kc (the image frequency corresponding to channel 39 on the receiver).

Note. Image frequency equals signal frequency minus twice the intermediate frequency, or 47,800 kc minus 2 times 4,300 kc equals 39,200 kc.

e. Adjust signal generator output to approximately 1,500 microvolts.

f. Adjust signal generator frequency control until resonance is obtained at image frequency. Resonance is indicated by:

(1) Reduction of noise on earphone of Handset TS-15-(*).

(2) Minimum indication on output meter, or maximum indication on vacuum-tube voltmeter.

g. Adjust attenuator of signal generator to zero output.

h. Note indication of audio output meter. Adjust attenuator of signal generator until indication of audio-output meter is one-tenth the reading obtained.

i. Note output of signal generator in microvolts.

j. Image ratio is the ratio between the reading obtained in *i* above, and the signal generator output reading obtained in sensitivity test in *n*, paragraph 26. The image ratio must be 500/1 or more.

28. Determination of Accuracy of Dial Calibration

a. Turn tuning knob to extreme low end of dial.

b. Push PRESS FOR DIAL LIGHT & CALIB. button.

c. Turn tuning knob in one direction only, toward high end of band.

d. Tune to each channel, 0 through 40, in turn. Turn tuning knob slowly until each channel market line is centered exactly below indicator wire. Observe for following:

(1) Noise in earphone of Headset HS-30-(*) must decrease as each channel is tuned in.

(2) Voltmeter indications must be not greater than 14 volts, at each channel.

(3) Voltmeter needle must be steady. It must not fluctuate.

e. Repeat *d* above, turning tuning knob in opposite direction and tuning set to each channel, 40 through 0, in turn.

29. Receiver Audio-Output Test

a. Connect set to power supply.

b. Turn power supply ON. Set VOLUME control to full ON and squelch OFF.

c. Connect audio-output meter (to PHONE No. 1 jack).

d. Adjust output meter 250 ohms impedance or, if not equipped with impedance switch, connect 250 ohms resistor across meter terminals.

e. Adjust power supply to standard voltages.

f. Connect lead from audio oscillator to the fourth lug of long terminal strip to which resistor R50 is connected. (See fig. 34.)

g. Connect either an a-c voltmeter or the a-c terminals of a vacuum-tube voltmeter across output terminals of audio oscillator.

h. Adjust audio oscillator output to 250 cycles, 3 volts.

(1) Read output voltage on output meter and designate this reading as (E).

(2) Calculate the output power in milliwatts, using the following formula:

$$\text{Milliwatts} = \frac{\text{E}^2 \text{ volts v } 1{,}000}{250 \text{ ohms}}$$

i. Repeat step in *h* above, with audio oscillator set to each of following frequencies in turn: 500, 1,000, 1,500, 2,000, 2,500, and 8,000 cycles per second. The required results are:

(1) At 250 and 2,500 cycles, power output must be not less than 1 milliwatt.

(2) at 500, 1,000, 1,500 and 2,000 cycles, power output must be not less than 2 milliwatts.

(3) At 8,000 cycles, power output must be not more than 0.5 milliwatt.

30. Transmitter Power Output and Transmitter Battery Drain

a. Connect set to power supply and turn power supply on.

b. Connect Handset TS-15-(*) and dummy antenna to set.

Note. The dummy antenna consists of 0 to 225 milliameter with an internal resistance of 72 ohms (Weston Model 301 d-c milliameter, or equal) with a thermocouple having a low-frequency resistance of 2 ohms in series with a 38.5-ohm, 1-watt noninductive resistor. The series combination should be connected across lamp socket of Antenna A-28-(*) (Phantom) with lamp removed.

c. Turn on the transmitter. Press switch in body of Handset TS-15-(*).

Note. During performance of this test, the operator's hand must not be placed on or near the dummy antenna or the antenna post of the set; and the dummy antenna must be clear of wires, equipment or instruments.

d. Adjust power supplies to standard voltages.

e. Tune set to point on tuning range giving minimum output (as indicated on dummy antenna milliameter). The required results are as follows:

(1) Transmitter antenna current reading of 85 milliamperes or more.

(2) Filament milliameter must indicate not more than 450 milliamperes.

(3) Plate supply milliameter must indicate not more than 450 milliamperes.

f. Adjust power supplies to following voltages:

(1) Filament supply, 3.6 volts.

(2) Receiver plate supply, 66 volts.

(3) Transmitter plate supply, 110 volts. The transmitter power output as indicated must not be less than 0.05 watt (I^2 R).

31. Operational Test

Install the set in its housing with fresh batteries in place and check with another unit operating on the same frequency for intelligibility and proper overall coverage.

INDIVIDUAL STAGE AND CIRCUIT REPAIR DATA

32. Filament Circuit

a. The filament circuit because of the many bypass capacitors can give trouble which will be indicated as shorts or leaks in the power cable. See figure 14 for proper resistance measurements.

b. Because the tube circuit is designed for series operation, certain tube failure will cause other tubes in the same circuit to stop working.

Table VIII. Filament trouble location.

Note. Tube filament burnout may be caused by component break-down as listed in table below. The component breakdown will appear as shorts or unusually high leakage in the bypass capacitors of the associated tube circuits.

Tube No.	Tube JAN.	Stage	Check component
V1	3A4	R-f power amplifier.	C87, C88
V2	3A4	Transmitter mixer and crystal oscillator.	C88, C87
V3	1T4/VT173	Receiver transmitter doubler.	C71
V4	1T4/VT173	Receiver transmitter oscillator.	
V5	1L4	AFC reactance modulator.	C84
V6	1T4/VT173	Receiver r-f amplifier.	C75
V7	1L4	1st mixer.	
V8	1T4/VT173	1st i-f amplifier.	
V9	1T4/VT173	2d i-f amplifier.	C79, C78
V10	1R5/VT171	2d mixer and crystal oscillator.	
V11	1T4/VT173	3d i-f amplifier.	C85, C71
V12	1L4	1st limiter.	
V13	1L4	2d limiter.	C76
V14	1A3	Discriminator.	C81, C80, C77
V15	1S5/VT172	Discriminator and a-f amplifier.	
V16	1S5/VT172	Noise amplifier rectifier.	
V17	1L4	D-c amplifier.	
V18	1S5/VT172	Squelch oscillator rectifier.	

Table IX (fig. 14). Filament

Reference number	Signal Corps stock number	Name of part and description	Function
C71	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	First limiter V12, filament bypass.
C74	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Discriminator and a-f power amplr V15, filament bypass.
C75	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	R-f amplr V6, filament bypass.
C76	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	1st mixer V7, filament bypass.
C77	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	2d limiter V13, filament bypass.
C78	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	2d mixer V10, filament bypass.
C79	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	1st i-f amplr V9, filament bypass.
C80	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	1st i-f amplr V9, filament bypass.
C81	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Discriminator V14, filament bypass.
C82	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Discriminator V14, filament bypass.
C83	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	1st i-f amplr V8, filament bypass.
C84	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Automatic frequency control reactance-modulator V5, filament bypass.
C85	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	3d i-f amplr V11, filament bypass.
C86	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	3d i-f amplr V11, filament bypass.
C87	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Transmitter r-f power amplr V1, filament bypass.
C88	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Transmitter mixer V2, filament bypass.
CH1	3C362-18	CHOKE: filament; inductance 25 microhenrys at 1,000 cps.	Discriminator and a-f power amplr V15, filament r-f choke.
CH2	3C362-18	CHOKE: filament; inductance 25 microhenrys at 1,000 cps.	1st mixer V7, filament r-f choke.
CH3	3C362-18	CHOKE: filament; inductance 25 microhenrys at 1,000 cps.	2d limiter V13, filament r-f choke.
CH4	3C362-18	CHOKE: filament; inductance 25 microhenrys at 1,000 cps.	2d i-f amplr V9, filament r-f choke.
CH5	3C362-18	CHOKE: filament; inductance 25 microhenrys at 1,000 cps.	2d i-f amplr V9, filament r-f choke.
CH6	3C362-18	CHOKE: filament; inductance 25 microhenrys at 1,000 cps.	1st i-f amplr V8, filament r-f choke.
CH7	3C362-18	CHOKE: filament; inductance 25 microhenrys at 1,000 cps.	1st i-f amplr V8, filament r-f choke.
CH8	3C362-18	CHOKE: filament; inductance 25 microhenrys at 1,000 cps.	1st limiter V12, filament r-f choke.
CH9	3C362-18	CHOKE: filament; inductance 25 microhenrys at 1,000 cps.	3d i-f amplr V11, filament r-f choke.
LM1	2Z5952	LAMP: LM-52.	Dial lamp and filament resistor for transmitter mixer V2, when in calibrate position.
R22	3Z6003J1-6	RESISTOR: fixed; carbon; insulated; 39 ohms ± 10%; ⅓ watt.	R-f power amplr V1, filament shunt.
R56	3Z6002B2-4	RESISTOR: fixed; carbon; insulated; 22 ohms ± 10%; ⅓ watt.	Pilot lamp shunt resistor.
R57	3Z5994-8	RESISTOR: fixed; carbon; insulated; 4.7 ohms ± 5%; ½ watt.	Transmitter filament voltage-dropping resistor.
R76		RESISTOR: fixed; carbon; insulated; 270 ohms ± 10%; ⅓ watt.	Receiver and transmitter oscillator V4, filament shunt.

Table IX. (fig. 14). Filament—continued.

Reference number	Signal Corps stock number	Name of part and description	Function
SW3	3Z9824-30	SWITCH: SPST; calibration.	Dial lamp and calibration switch.
SW4	Part of R66	SWITCH: SPST.	Squelch circuit on-off switch.
T1	3C1084B-3	TRANSFORMER: doubler plate.	Doubler V3, plate coil, and 1st mixer V7, coupling coil.

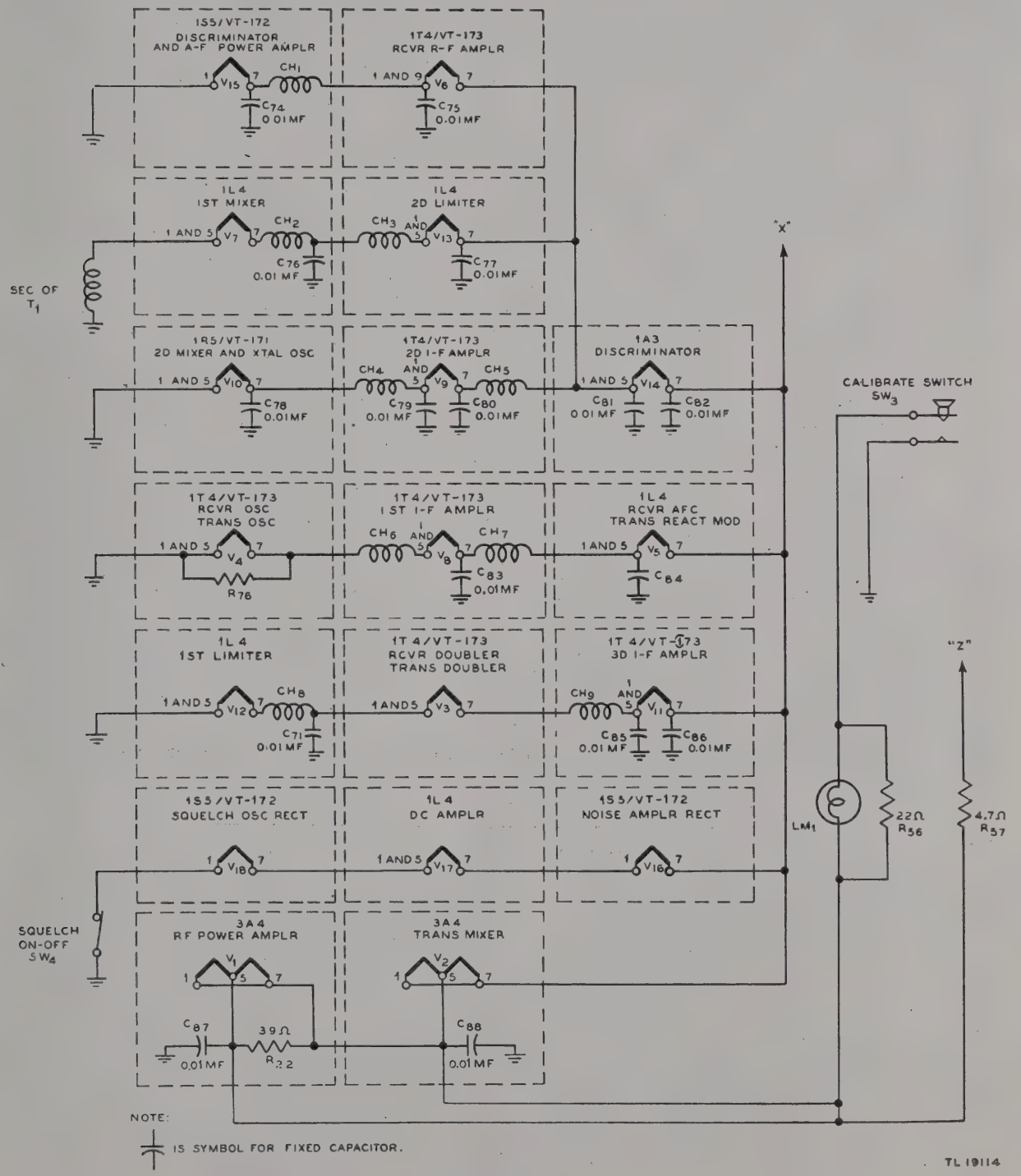


Figure 14. Filament circuit, Radio Receiver and Transmitter BC-1000-(*).

33. Receiver R-F Amplifier Stage

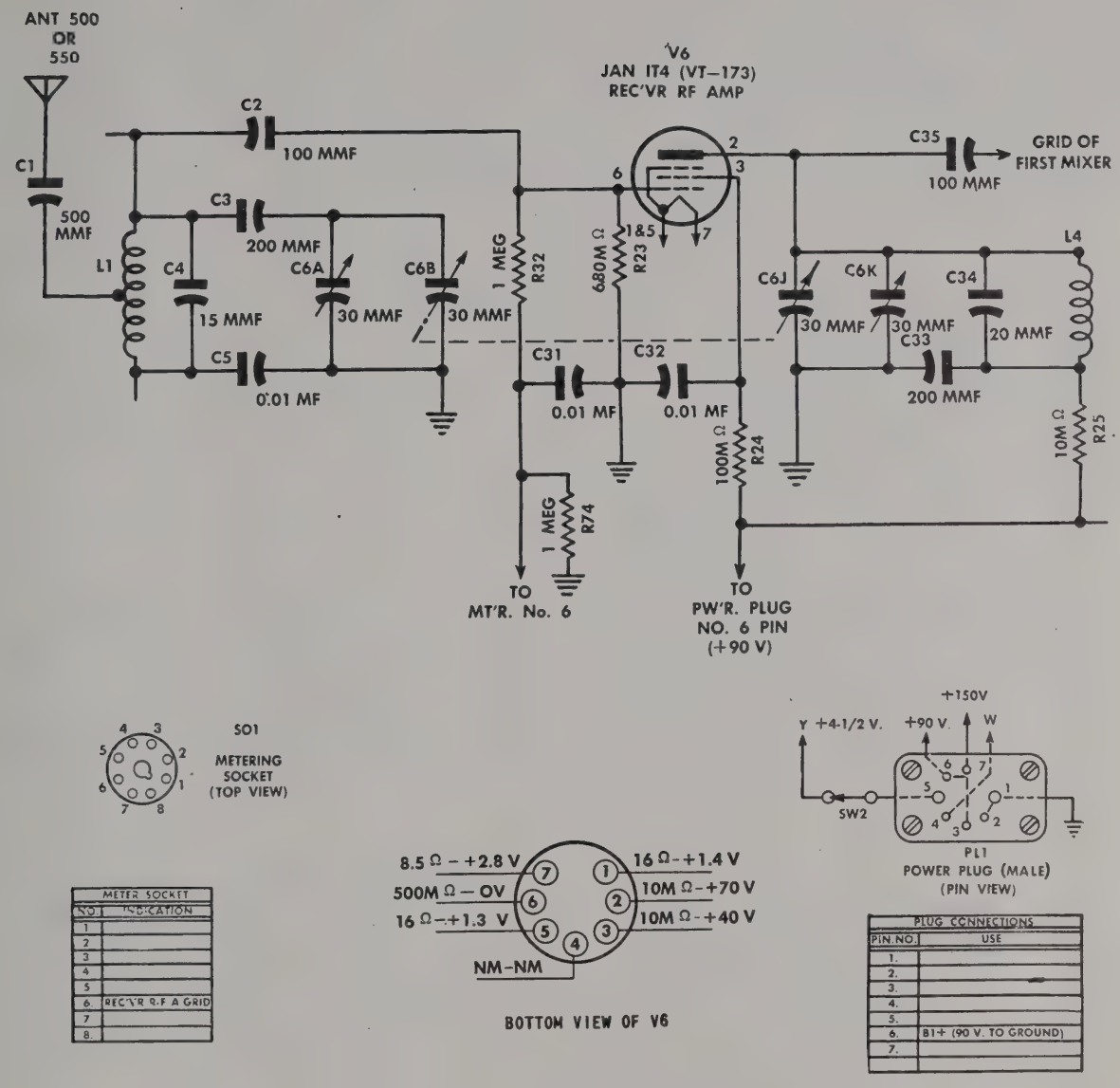
a. If in signal tracing the results indicate the receiver r-f amplifier to be inoperative, trouble may be readily located by reference to the voltage and resistance chart.

b. If there is an absence of plate voltage on pin No. 2 of V6, check L4 and R25 for continuity. If there is no voltage measured on pin No. 3 (the screen), check R24 for continuity or C32 for short. If the screen voltage is measured and found to be low, check C32 for leakage. If the voltage is found to be positive on pin No. 6 (the control grid), check C2 for leakage or short. If the resistance to ground as measured on pin No. 6 is lower than specified, check C31 for leakage or short. If voltages measured in this stage are normal but there is an obvious lack of stage gain, attempt tuning L4. If gain does not improve, the tuning components may be faulty changing the resonant point of the tuned circuit. Shorted components in this tuning section would make the stage inoperative but voltages as measured on the tube socket may be correct.

Table X (fig. 15). Receiver R-F amplifier.

Reference number	Signal Corps stock number	Name of part and description	Function
C6J	Note 1	CAPACITOR: variable; 11.5 mmf to 30 mmf.	L4 tuning capacitor.
C6K	Note 1	CAPACITOR: variable; 11.5 mmf to 30 mmf.	Trimmer across C6J
C31	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Receiver r-f amplr V6, control grid metering lead bypass.
C32	3DA10-150	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	R-f amplr V6, screen grid bypass.
C33	3D9200-41	CAPACITOR: fixed; 200 mmf ± 5%; 300 vdcw.	Padder.
C34	3D9020-11	CAPACITOR: fixed; 20 mmf ± 5%; 300 vdcw.	R-f amplr plate coil, L4, shunt capacitor.
C35	3D9100-57	CAPACITOR: fixed; 100 mmf ± 5%; 500 vdcw.	1st mixer V7, control grid coupling capacitor.
L4	3C1084B-2	COIL: receiver r-f plate.	R-f amplr V6, plate coil.
R23	3Z6768-7	RESISTOR: fixed; carbon; insulated; 680M ohms ± 20%; ⅓ watt.	Receiver r-f amplr V6, control grid resistor.
R24	3Z6700-83	RESISTOR: fixed; carbon; insulated; 100M ohms ± 20%; ⅓ watt.	Receiver r-f amplr V6, screen grid voltage-dropping resistor.
R25	3Z6610-79	RESISTOR: fixed; carbon; insulated; 10M ohms ± 20%; ⅓ watt.	Receiver r-f amplr V6, plate filter resistor.
R32	3Z6801-29	RESISTOR: fixed; carbon; insulated; 1 megohm ± 20%; ⅓ watt.	Receiver r-f amplr V6, control grid metering lead filter.
R74	3Z6801-29	RESISTOR: fixed; carbon; insulated; 1 megohm ± 20%; ⅓ watt.	R-f amplr grid to ground voltage divider.
V6		TUBE: JAN-1T4 (VT-173).	Receiver r-f amplifier.

Note 1. Part of gang capacitor and drive assembly 3D9030V-2.



NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

TL 19115

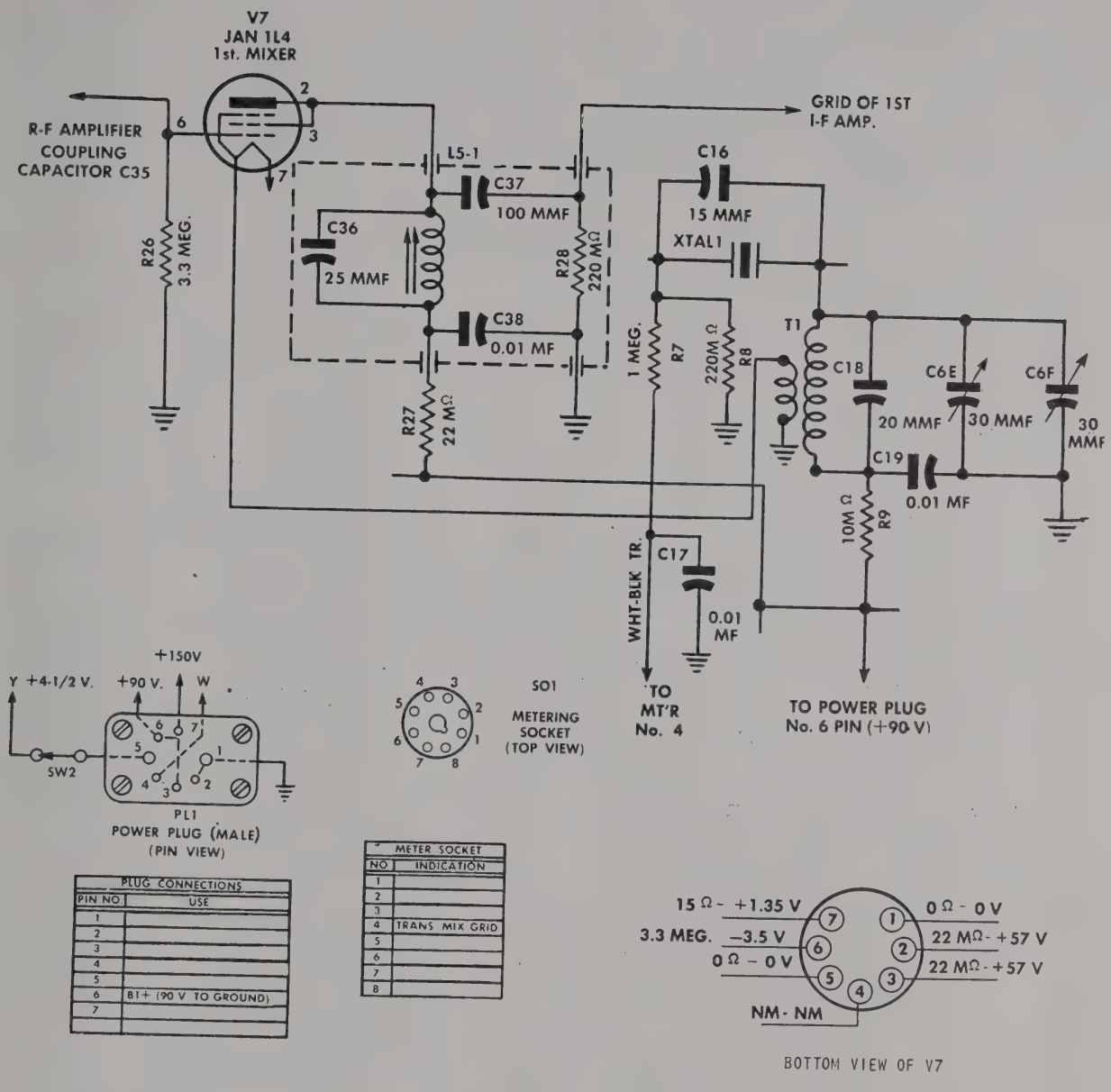
Figure 15. Schematic wiring diagram, receiver r-f amplifier, Radio Receiver and Transmitter BC-1000-(*).

34. First Mixer Stage

If the voltage on pin No. 6 (the control grid) is measured and found to be positive, check C35 for short or leakage. Check resistance to ground to ascertain whether the grid circuit is open. This condition will probably be indicated by motorboating. Simultaneously check the voltage on the screen and plate on pin No. 2. If the voltage is measured and found to be absent, check R27 for open and C38 for short. The continuity of L5-1 should also be checked. If the voltage is low, check C38 for leakage. If the voltage and resistance measurements are found to be correct but the gain of the stage remains low, check C36 for short. A short of this component will paralyze the operation of the tuned circuit. If the tuned circuit is found to be operative and a signal beat is not obtained and passed to the i-f stage following, check the cathode-suppressor injection of the oscillator voltage by the coupling device of T-1 in the receiver doubler stage.

Table XI (fig. 16). First mixer.

Reference number	Signal Corps stock number	Name of part and description	Function
C36	Part of L5-1	CAPACITOR: fixed; 25 mmf ± 5%; 300 vdcw.	1st mixer plate coil, L5-1, shunt capacitor.
C37	Part of L5-1	CAPACITOR: fixed; 100 mmf ± 5%; 500 vdcw.	1st i-f amplr V8, control grid coupling.
C38	Part of L5-1	CAPACITOR: fixed: 0.01 mf + 60%, —20%; 120 vdcw.	1st mixer V7, plate bypass.
L5-1	2Z9643.6	COIL AND SHIELD ASSEMBLY: 1st mixer plate; includes C36, C37, C38, and R28.	1st mixer V7, to 1st i-f amplr V8, coupling
R26	3Z6803A3-5	RESISTOR: fixed; carbon; insulated; 3.3 megohms ± 10%; ⅓ watt.	1st mixer V7, control grid resistor.
R27	3Z6622-18	RESISTOR: fixed; carbon; insulated; 22M ohms ± 20%; ⅓ watt.	1st mixer V7, plate filter resistor.
V7		TUBE: JAN-1L4.	1st mixer.



PLUG CONNECTIONS	
PIN NO	USE
1	
2	
3	
4	
5	
6	B1+ (90 V TO GROUND)
7	

METER SOCKET	
NO	INDICATION
1	
2	
3	
4	TRANS MIX GRID
5	
6	
7	
8	

NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on, SQUELCH control full on.

NM - Not measured.

TL 19116

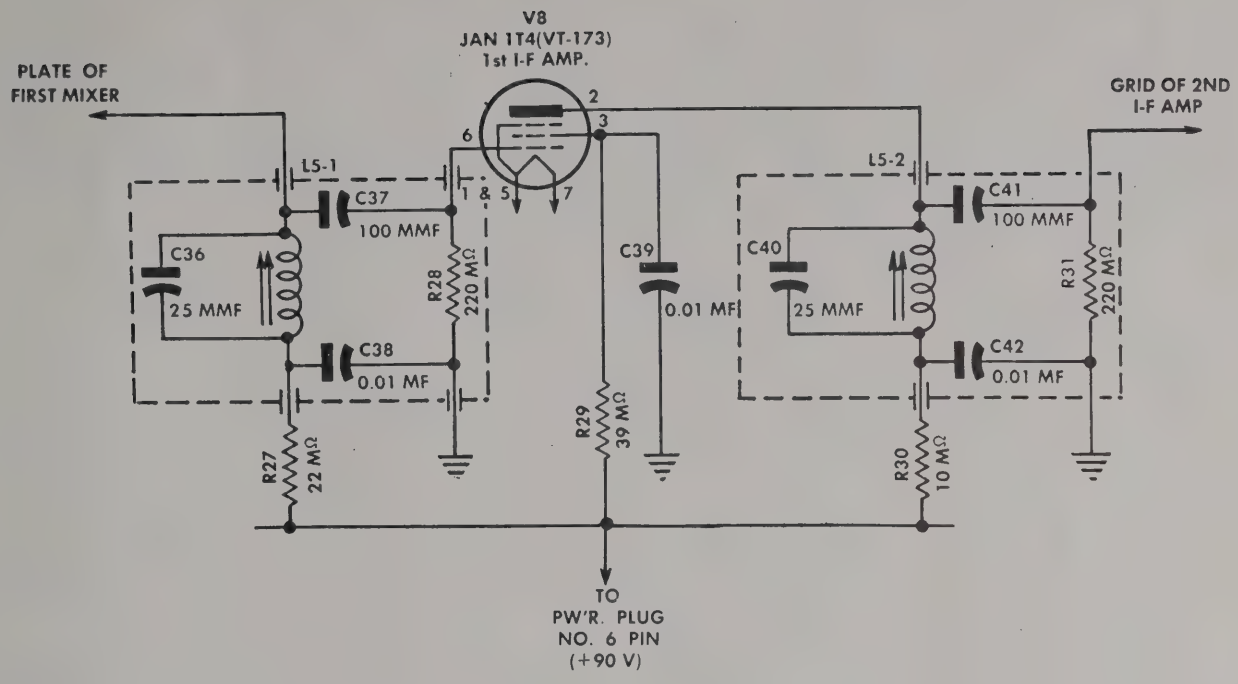
Figure 16. Schematic wiring diagram, first mixer, Radio Receiver and Transmitter BC-1000-(*).

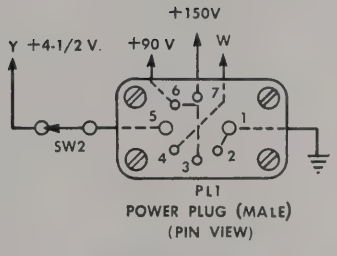
35. First I-F Amplifier Stage (par. 33)

If the voltage measured on pin No. 6 (the grid) is positive check C37 for short or leakage. If the voltage as indicated on the voltage chart is not present on pin No. 2 (the plate), check L5-2 for continuity, C42 for short, and R30 for continuity. If this voltage is found to be low check C42 for leakage. If no voltage can be measured on pin No. 3 (the screen), check R29 for open and C39 for short. If the voltage is measured and found to be low, check C39 for leakage. If after voltage and resistance measurements are made, the stage gain is low, attempt tuning of L5-2 to ascertain the condition of the internal tuning components. If the voltages are correctly measured yet no amplification results, the coil of L5-1 may be shorted.

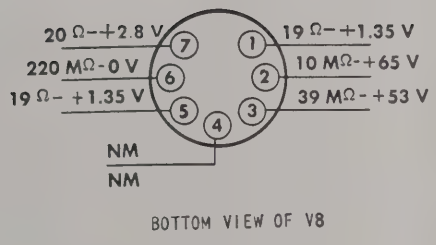
Table XII (fig. 17). First i-f amplifier.

Reference number	Signal Corps stock number	Name of part and description	Function
C39	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%; —20%; 120 vdcw.	1st i-f amplr V8, screen grid bypass.
C40	Part of L5-2	CAPACITOR: fixed; 25 mmf ± 5%; 300 vdcw.	1st i-f amplr plate coil, L5-2, shunt capacitor.
C41	Part of L5-2	CAPACITOR: fixed; 100 mmf ± 5%; 500 vdcw.	2d i-f amplr V9, control grid coupling capacitor.
C42	Part of L5-2	CAPACITOR: fixed; 0.01 mf + 60%; —20%; 120 vdcw.	1st i-f amplr V8, plate bypass.
L5-2	2Z9643-6	COIL AND SHIELD ASSEMBLY: 1st i-f amplifier plate; includes C40, C41, C42, and R31.	1st i-f amplr V8, to 2d i-f amplr V9, coupling.
R28	Part of L5-1	RESISTOR: fixed; carbon; insulated; 220M ohms ± 10%; ⅓ watt.	1st i-f amplr V8, control grid resistor.
R29	3Z6639-8	RESISTOR: fixed; carbon; insulated; 39M ohms ± 20%; ⅓ watt.	1st i-f amplr V8, screen grid voltage-dropping resistor.
R30	3Z6610-79	RESISTOR: fixed; carbon; insulated; 10M ohms ± 20%; ⅓ watt.	1st i-f amplr V8, plate filter resistor.
V8		TUBE: JAN-1T4 (VT-173).	1st i-f amplifier.





PLUG CONNECTIONS	
PIN NO.	USE
1	
2	
3	
4	
5	
6	B1+ (90 V TO GROUND)
7	



NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

TL 19117

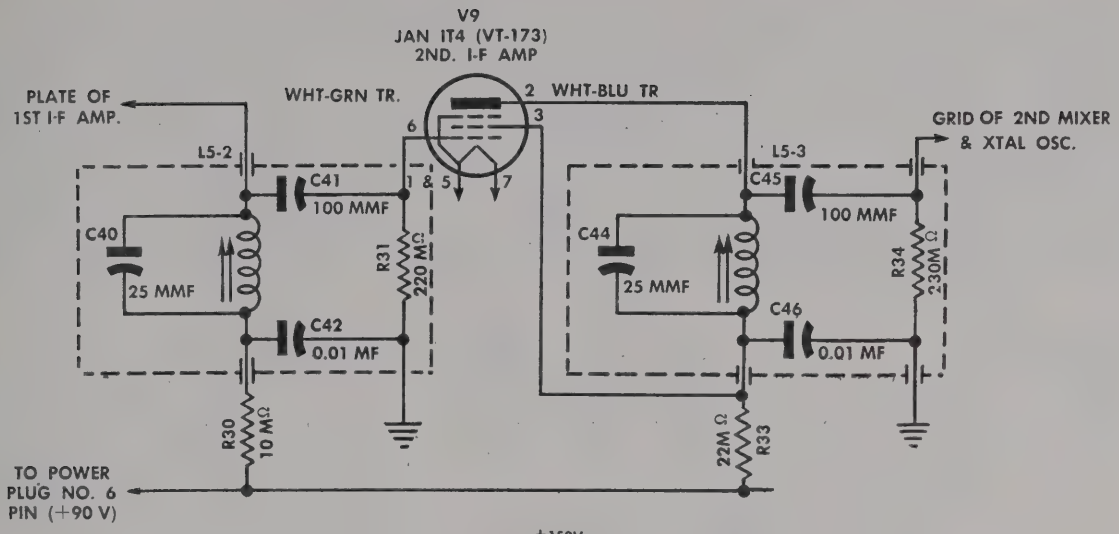
Figure 17. Schematic wiring diagram, first i-f amplifier, Radio Receiver and Transmitter BC-1000-(*).

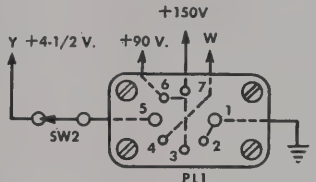
36. Second I-F Amplifier Stage (par. 33)

If the voltage measured on pin No. 6 (the grid) is measured and found to be positive, check C41 for short or leakage. Check resistance of the grid circuit to ground. If open circuit is indicated, replace R31. Such a condition may be indicated by motorboating. If voltage measured on pin No. 2 (plate) is low, check C46 for leakage. If no voltage is present on the plate, check continuity of coil L5-3 and R33. If voltage is obtained on the plate, no difficulty will be experienced in measuring voltage on pin No. 3 (the screen). If the voltages and resistances are checked and are in accordance with the values indicated on the tube table and the stage gain is still low, attempt tuning L5-3 to determine condition of the tune circuit.

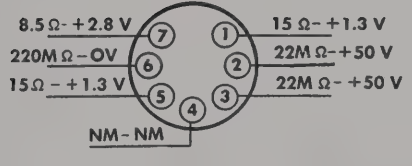
Table XIII (fig. 18). Second i-f amplifier.

Reference number	Signal Corps stock number	Name of part and description	Function
C44	Part of L5-3	CAPACITOR: fixed; 25 mmf ± 5%; 300 vdcw.	2d i-f amplr plate coil, L5-3, shunt capacitor.
C45	Part of L5-3	CAPACITOR: fixed; 100 mmf ± 5%; 500 vdcw.	2d mixer V10, control grid coupling
C46	Part of L5-3	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	2d i-f amplr V9, plate bypass.
L5-3	2Z9643.6	COIL AND SHIELD ASSEMBLY: 2d i-f amplifier plate; includes C44, C45, C46, and R34.	2d i-f amplr V9, to 2d mixer, V10, coupling.
R31	Part of L5-2	RESISTOR: fixed; carbon; insulated; 22M ohms ± 10%; ⅓ watt.	2d i-f amplr V9, control grid resistor.
R33	3Z6622-18	RESISTOR: fixed; carbon; insulated; 22M ohms ± 20%; ⅓ watt.	2d i-f amplr V9, plate filter resistor.
V9		TUBE: JAN-1T4 (VT-173).	2d i-f amplifier.





PLUG CONNECTIONS	
PINE NO	USE
1	
2.	
3.	
4.	
5.	
6.	B1+ (90 V TO GROUND)
7.	



BOTTOM VIEW OF V9

NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

TL 19118

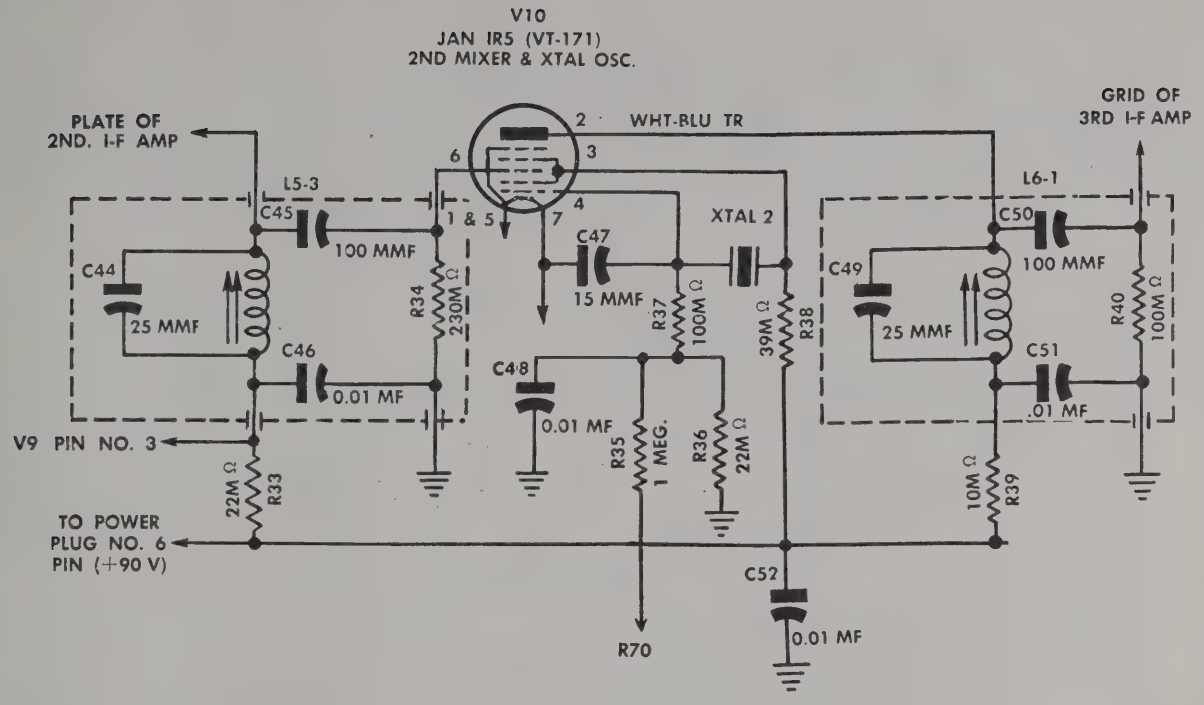
Figure 18. Schematic wiring diagram, second i-f amplifier, Radio Receiver and Transmitter BC-1000-(*).

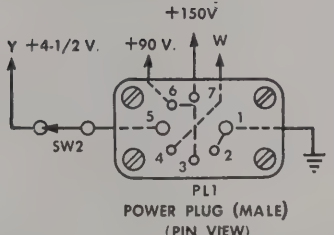
37. Second Mixer and Crystal-Oscillator Stage (par. 33)

The voltage as measured on pin No. 6 (the grid) should not be positive. If so, check C45 for short or leakage. Check continuity to ground to assure completion of grid circuit. If R34 is open, motorboating will result. The voltage of the plate should be checked. If no voltage is measured on pin No. 2, check coil L6-1 for continuity, C51 for short and R39 for continuity. If voltage is low at this point, check C51 for leakage. The screen circuit (pin No. 3) should be checked. If no voltage appears at this point, check R38 for continuity. The crystal oscillator will be inoperative if the screen circuit is dead. Check voltage on terminal 4 (the oscillator grid). The voltage should be as indicated on the chart if the oscillator is functioning, otherwise check resistance to ground to isolate troubles in R37, R36, C48, C47. If it is evident that oscillations are present yet no mixing occurs, check internal components of L6-1 to ascertain whether C49 is shorted.

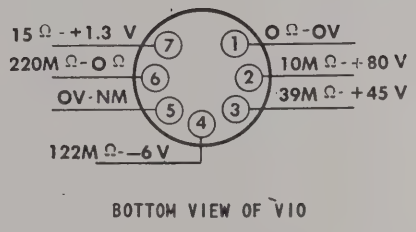
Table XIV (fig. 19). Mixer and crystal oscillator.

Reference number	Signal Corps stock number	Name of part and description	Function
C47	3D9015-7	CAPACITOR: fixed; 15 mmf ± 5%; 300 vdcw.	2d mixer osc V10, osc grid capacitor.
C48	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Power amplr V15, control grid bias filter.
C49	Part of L6-1	CAPACITOR: fixed; 25 mmf ± 5%; 500 vdcw.	2d mixer V10, plate bypass.
C50	Part of L6-1	CAPACITOR: fixed; 100 mmf ± 5%; 500 vdcw.	3d i-f amplr V11, control grid coupling.
C51	Part of L6-1	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	2d mixer V10, plate bypass.
C52	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	B+ bypass.
L6-1	2Z9642.2	COIL AND SHIELD ASSEMBLY: 2d mixer plate; includes C49, C50, C51, and R40.	2d mixer V10, to 3d i-f amplr V11, coupling.
R34	Part of L5-3	RESISTOR: fixed; carbon; insulated; 220M ohms ± 10%; ⅓ watt.	2d mixer V10, control grid resistor.
R35	3Z6801-29	RESISTOR: fixed; carbon; insulated; 1 megohm ± 20%; ⅓ watt.	A-F amplr V15, control grid bias filter resistor.
R36	3Z6622-18	RESISTOR: fixed; carbon; insulated; 22M ohms ± 20%; ⅓ watt.	2d mixer V10, oscillator grid resistor.
R37	3Z6700-83	RESISTOR: fixed; carbon; insulated; 100M ohms ± 20%; ⅓ watt.	2d mixer V10, oscillator grid resistor.
R38	3Z6639-8	RESISTOR: fixed; carbon; insulated; 39M ohms ± 20%; ⅓ watt.	2d mixer V10, screen grid voltage-dropping resistor.
R39	3Z6610-79	RESISTOR: fixed; carbon; insulated; 10M ohms ± 20%; ⅓ watt.	2d mixer V10, plate filter resistor.
V10		TUBE: JAN-1R5 (VT-171).	2d mixer and crystal oscillator.
XTAL2	2Z3543-6815	CRYSTAL AND HOLDER: receiver; 6,815 kc crystal.	Receiver second mixer oscillator.





PLUG CONNECTIONS	
PIN NO.	USE
1	
2	
3	
4	
5	
6	B1+ (90 V TO GROUND)
7	



NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

TL 19119

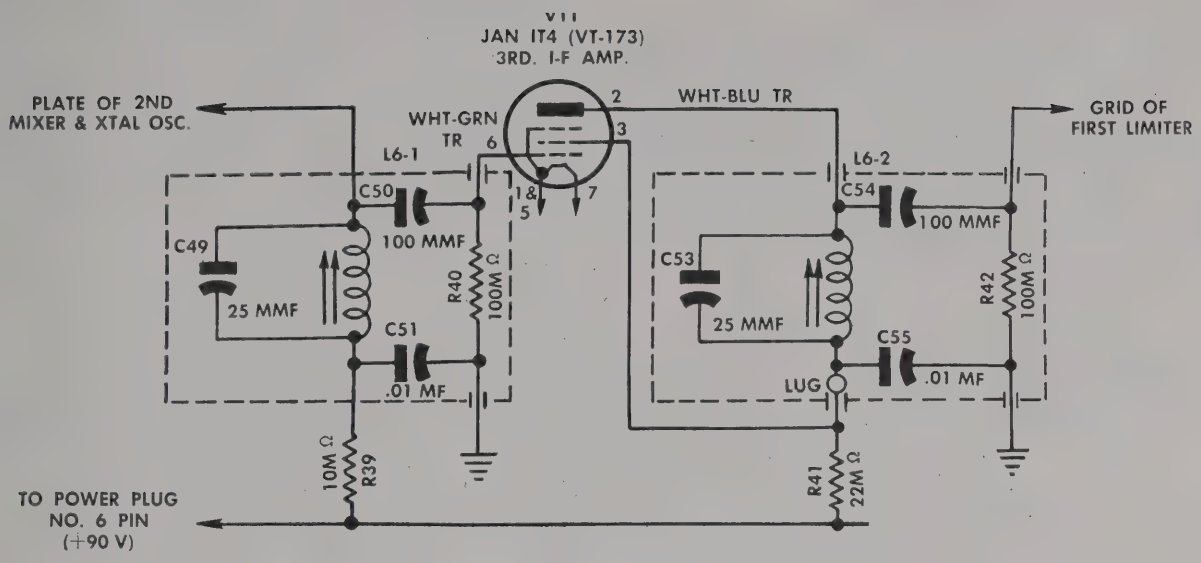
Figure 19. Schematic wiring diagram, second mixer and crytal oscillator, Radio Receiver and Transmitter BC-1000-(*).

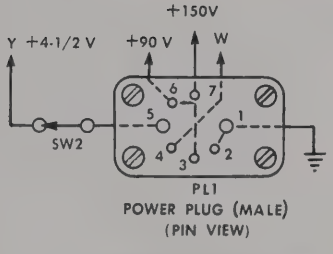
38. Third I-F Amplifier Stage (par. 33)

The voltage as checked, on pin No. 6 should not be positive. If it is, check C50 for short or leakage. A resistance check from grid to ground should be made to determine the continuity of R40. The lack of continuity of this component will probably be indicated by motorboating. If the voltage measured on pin No. 2 (the plate) is zero, check coil of L6-2 for continuity, C55 for short, and R41 for open. If voltage on plate is low, check C55 for leakage. If plate voltage is present, it may be assumed that voltage is present on pin No. 3 (the screen). If this stage lacks gain, yet voltage and resistance measurements are correct, attempt the tuning of plate inductance to ascertain a shorted C53.

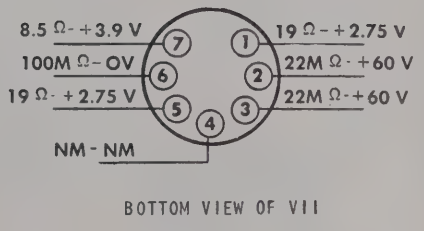
Table XV (fig. 20). Third i-f amplifier.

Reference number	Signal Corps stock number	Name of part and description	Function
C53	Part of L6-2	CAPACITOR: fixed; 25 mmf ± 5%; 300 vdcw.	3d i-f amplr plate coil, L6-2, shunt capacitor.
C54	Part of L6-2	CAPACITOR: fixed; 100 mmf ± 5%; 500 vdcw.	1st limiter, V12, control grid coupling.
C55	Part of L6-2	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	3d i-f amplr V11, plate bypass.
L6-2	2Z9642.2	COIL AND SHIELD ASSEMBLY: 3d i-f amplifier plate; includes C53, C54, C55, and R42.	3d i-f amplr V11, to 1st limitr B12, coupling.
R40	Part of L6-1	RESISTOR: fixed; carbon; insulated; 100M ohms ± 10%; ⅓ watt.	3d i-f amplr V11, control-grid resistor.
R41	3Z6622-18	RESISTOR: fixed; carbon; insulated; 22M ohms ± 10%; ⅓ watt.	3d i-f amplr V11, plate and screen grid voltage-dropping resistor.
V11		TUBE: JAN-1T4 (VT-173).	3d i-f amplifier.





PLUG CONNFCTIONS	
PIN NO	USE
1	
2	
3	
4	
5	
6	B1+ (90 V TO GROUND)
7	



BOTTOM VIEW OF V11

NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

TL 19120

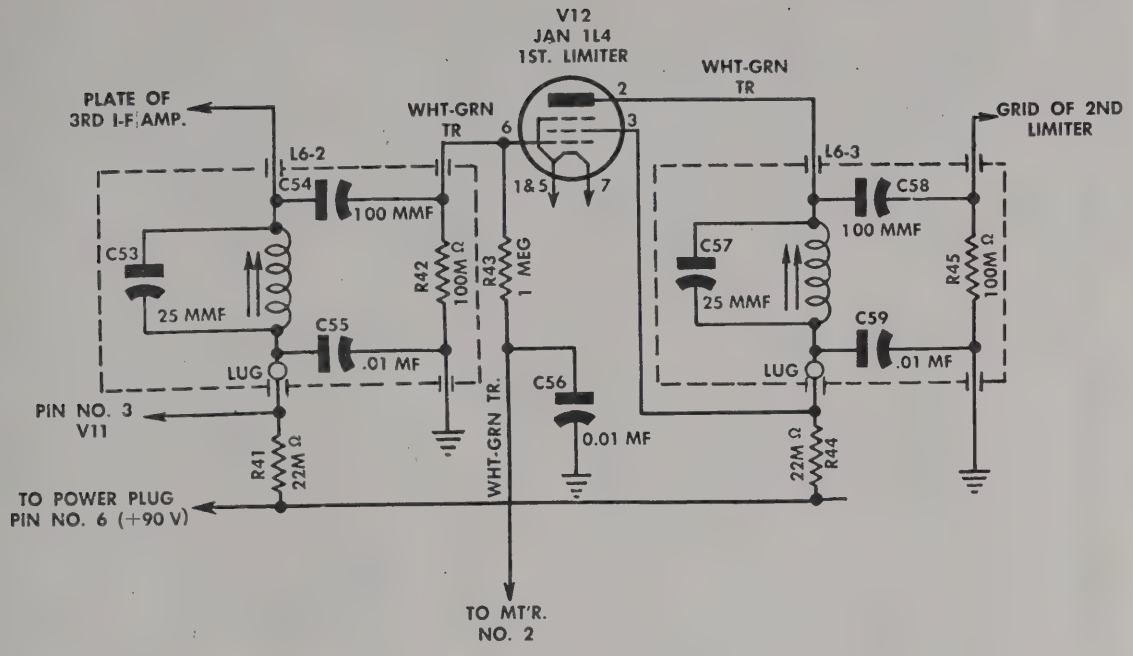
Figure 20. Schematic wiring diagram, third i-f amplifier, Radio Receiver and Transmitter BC-1000-(*).

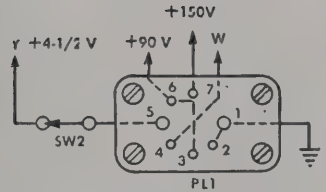
39. First Limiter Stage (par. 33)

Measure voltage on control grid pin No. 6. If it is found to be positive, check C54 for short or leakage. Check resistance to ground to determine continuity of resistor R42. If oscillation is evident, check C56 (the meter decoupling capacitor) for open. The plate circuit is checked by measuring voltage on Pin No. 2. If voltage is absent, check continuity of coil L6-3, short in C59, and continuity in resistor R44. If voltage measured is low, check C59 for leakage. The screen voltage is measured on pin No. 3. The screen voltage will be present if there is voltage measured on the plate pin No. 2. Following the voltage and resistance measurements, the coil L6-3 should be tuned to determine whether the internal components are functioning properly.

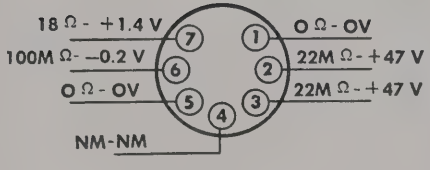
Table XVI (fig. 21). First limiter.

Reference number	Signal Corps stock number	Name of part and description	Function
C56	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	1st limiter V12, control grid metering lead bypass.
C57	Part of L6-3	CAPACITOR: fixed; 0.01 mf + 60%, vdcw.	1st limiter plate coil L6-3, shunt capacitor.
C58	Part of L6-3	CAPACITOR: fixed; 25 mmf + 590; 300 vdcw.	2d limiter, V13, control grid coupling.
C59	Part of L6-3	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	1st limiter V12, plate bypass.
L6-3	2Z9642.2	COIL AND SHIELD ASSEMBLY: 1st limiter plate; includes C57, C58, C59, and R45.	1st limiter V12, to 2d limiter V13, coupling.
R42	Part of L6-2	RESISTOR: fixed; carbon; insulated; 100M ohms ± 10%; ⅓ watt.	1st limiter V12, control grid resistor.
R43	3Z6801-29	RESISTOR: fixed; carbon; insulated; 1 megohm ± 20%; ⅓ watt.	1st limiter V12, control grid metering lead filter resistor.
R44	3Z6622-18	RESISTOR: fixed; carbon; insulated; 22M ohms ± 20%; ⅓ watt.	1st limiter V12, plate and screen grid voltage-dropping resistor.
V12		TUBE: JAN-1L4.	1st limiter.





PLUG CONNECTIONS	
PIN NO	USE
1	
2	
3	
4	
5	
6	B1+ (90 V. TO GROUND)
7	





METER SOCKET	
NO	INDICATION
1	
2	1ST LIMITER
3	
4	
5	
6	
7	
8	

NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

TL 19121

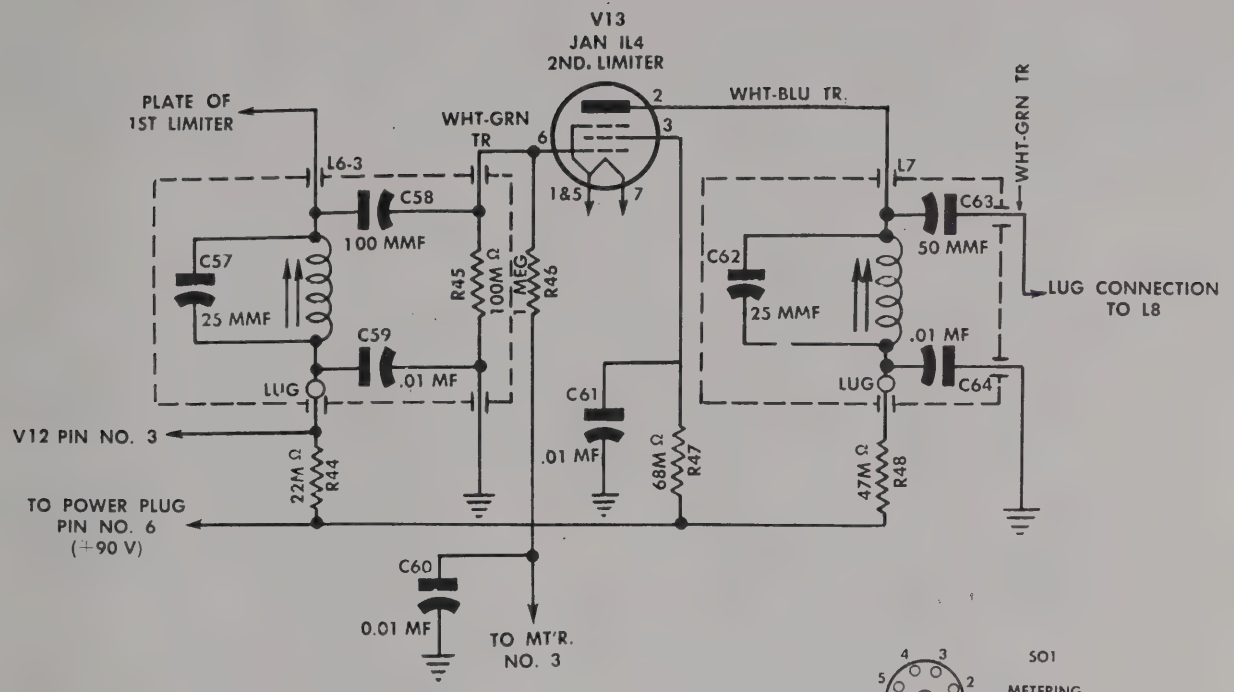
Figure 21. Schematic wiring diagram, first limiter, Radio Receiver and Transmitter BC-1000-(*).

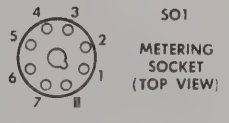
40. Second Limiter Stage (par. 33)

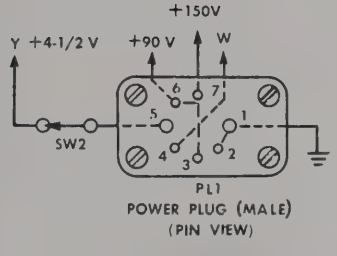
Measure voltage on control grid (pin No. 6) if found to be positive, check C58 for short or leakage. Check resistance to ground to determine continuity of resistor R45. If oscillation is evident, check C60 (the meter decoupling capacitor) for open. The plate circuit is checked by measuring voltage on pin No. 2. If the voltage is absent, check continuity of coil L7, short in C64, and continuity of resistor R48. If voltage measured is low, check C64 for leakage. The screen voltage is measured on pin No. 3. If no voltage is evident, check R47 for continuity and C61 for short. If voltage measured is low, check C61 for leakage. As a final check to determine proper operation of second limiter, attempt tuning of inductance L7 to determine whether the internal components are functioning properly. The tuning of this stage will be very broad.

Table XVII (fig. 22). Second limiter.

Reference number	Signal Corps stock number	Name of part and description	Function
C60	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	2d limiter V13, grid metering lead bypass.
C61	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	2d limiter V13, screen grid bypass.
C62	Part of L7	CAPACITOR: fixed; 25 mmf ± 5%; 300 vdcw.	2d limiter plate coil, L7, shunt capacitor.
C63	Part of L7	CAPACITOR; fixed, 50 mmf ± 10%; 500 vdcw.	Couples 2d limiter plate coil, L7, to discriminator coil L8.
C64	Part of L7	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	2d limiter V13, plate bypass.
L7	2Z9642-1	COIL AND SHIELD ASSEMBLY: 2d limiter plate; includes C62, C63, and C64.	2d limiter V13, plate coil.
R45	Part of L6-3	RESISTOR: fixed; carbon; insulated; 100M ohms ± 10%; ⅓ watt.	2d limiter V13, control grid resistor.
R46	3Z6801-29	RESISTOR: fixed; carbon; insulated; 1 megohm ± 20%; ⅓ watt.	2d limiter V13, control grid metering lead filter resistor.
R47	3Z6668-13	RESISTOR: fixed; carbon; insulated; 68M ohms ± 20%; ⅓ watt.	2d limiter V13, screen grid voltage-dropping resistor.
R48	3Z6647-16	RESISTOR: fixed; carbon; insulated; 47M ohms ± 20%; ⅓ watt.	2d limiter V13, plate filter resistor.
V13		TUBE: JAN-1L4.	2d limiter.

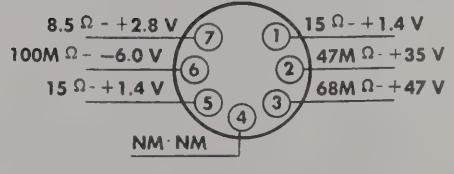






METER SOCKET	
NO	INDICATION
1	
2	
3	2ND LIMITER
4	
5	
6	
7	
8	

PLUG CONNECTIONS	
PIN NO	USE
1	
2	
3	
4	
5	
6	B1+ (90 V TO GROUND)
7	



BOTTOM VIEW OF V13

NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

TL 19122

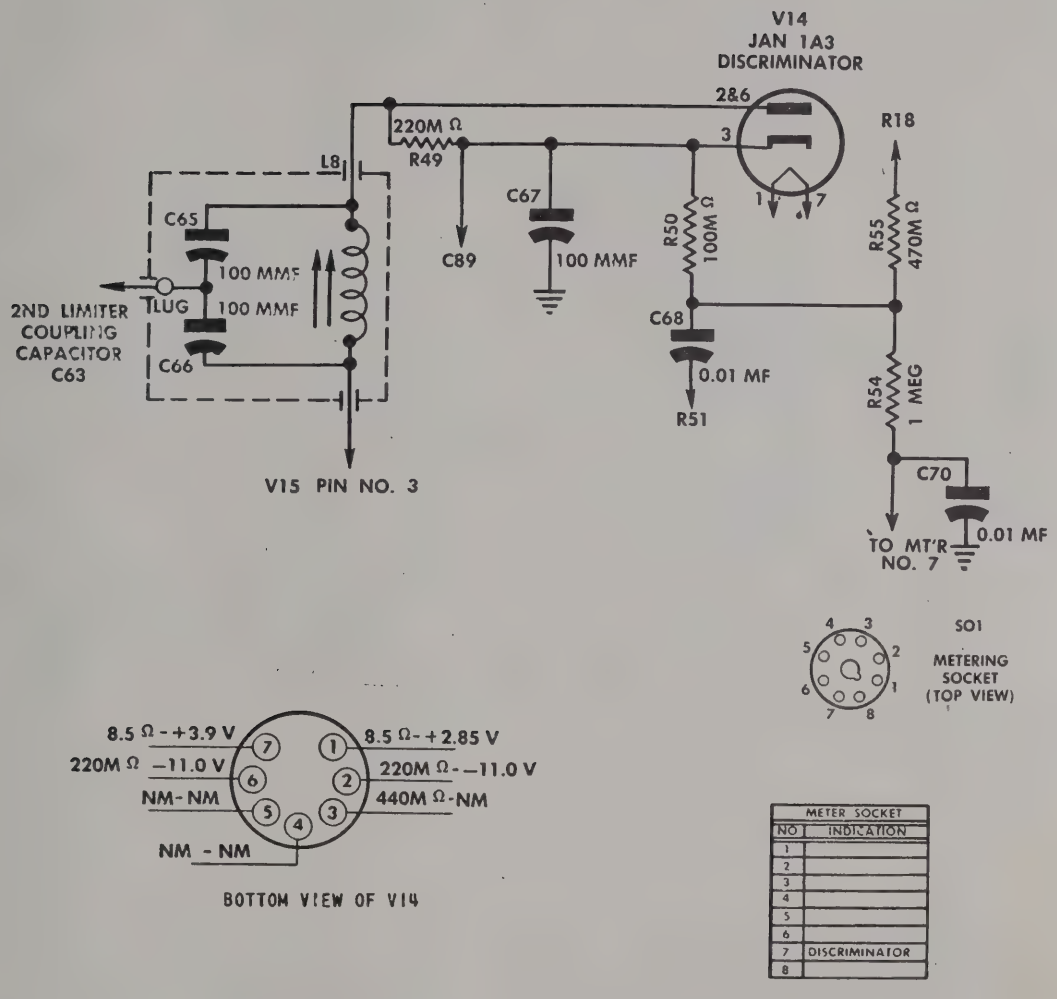
Figure 22. Schematic wiring diagram, second limiter, Radio Receiver and Transmitter BC-1000-(*).

41. Discriminator

If the output of the discriminator circuit is low as measured at pin No. 7 of the meter socket, check coupling capacitor C63 for open circuit. Tune L8, the discriminator coil, to determine whether resonance can be achieved. Give the remainder of the components a resistance check rather than a voltage check at the tube socket. Low resistance on terminals 2 and 6 to ground or indication of a short may be caused by a shorted C69. A short to ground may be caused by C67 as measured on pin No. 3 of the tube socket.

Table XVIII (fig. 23). Discriminator.

Reference number	Signal Corps stock number	Name of part and description	Function
C65	Inside of L8	CAPACITOR: fixed; 100 mmf ± 2%; 300 vdcw.	Discriminator secondary coil, L8, shunt capacitor and compensator.
C66	Inside of L8	CAPACITOR: fixed; 100 mmf ± 2%; 300 vdcw.	Discriminator coil, L8, shunt capacitor and compensator.
C67	3D9100-65	CAPACITOR: fixed; 100 mmf ± 10%; 500 vdcw.	Discriminator output bypass.
C68	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	A-F power amplr V15, control grid coupling.
C70	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Discriminator output metering lead bypass.
L8	2Z9642.5	COIL AND SHIELD ASSEMBLY: 2.515 mc discriminator; includes C65 and C66.	Discriminating coil.
R49	3Z6722-18	RESISTOR: fixed; carbon; insulated; 220M ohms ± 20%; ⅓ watt.	Discriminator load resistor.
R50	3Z6700-83	RESISTOR: fixed; carbon; insulated; 100M ohms ± 20%; ⅓ watt.	Discriminator filter resistor.
R54	3Z6801-29	RESISTOR: fixed; carbon; insulated; 1 megohm ± 20%; ⅓ watt.	Discriminator, output metering lead filter resistor.
R55	3Z6747-18	RESISTOR: fixed; carbon; insulated; 470M ohms ± 20%; ⅓ watt.	AFC control voltage filter resistor.
V14		TUBE: JAN-1A3.	Discriminator.



METER SOCKET	
NO	INDICATION
1	
2	
3	
4	
5	
6	
7	DISCRIMINATOR
8	

NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

TL 19123

Figure 23. Schematic wiring diagram, discriminator, Radio Receiver and Transmitter BC-1000-(*).

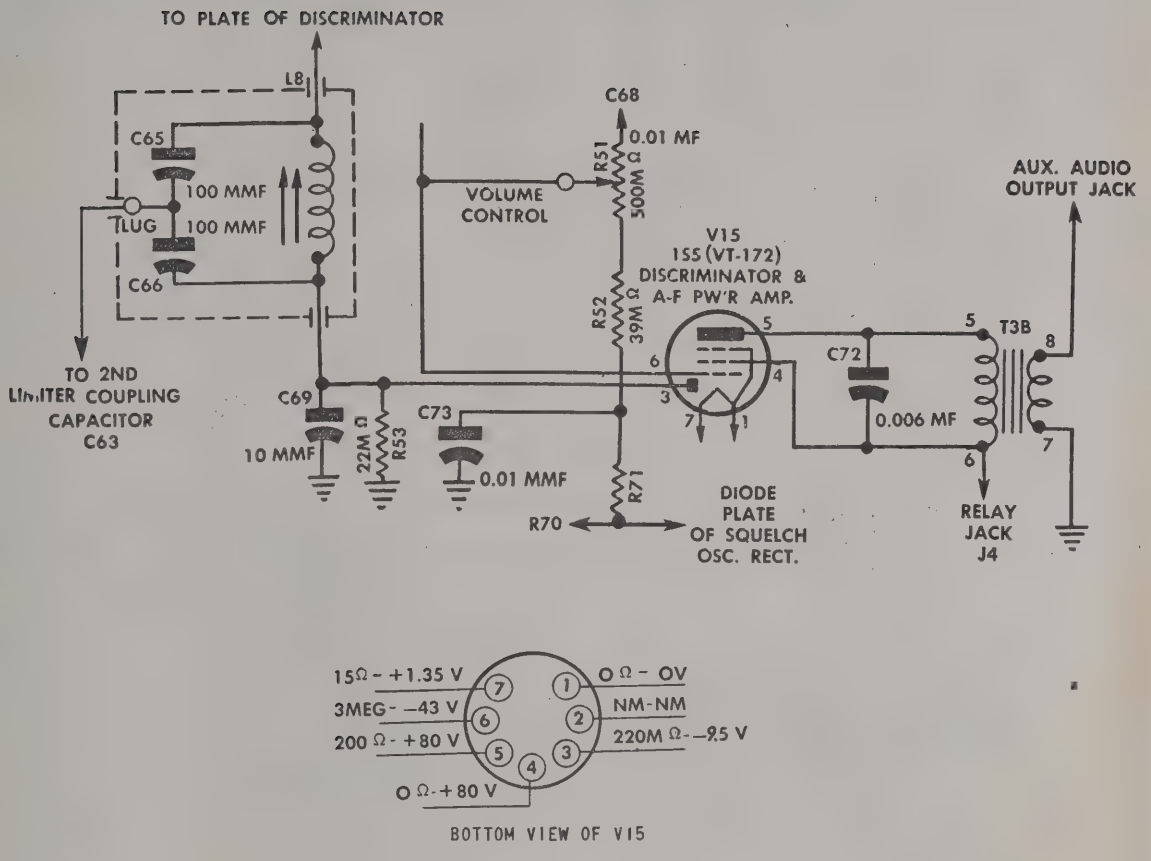
42. Discriminator and A-F Amplifier Stage

The discriminator and audio-frequency power amplifier can be checked by resistance as well as by voltage analyses. A short or low resistance from pin No. 3 to ground would indicate shorted C69. The voltage is measured on pin No. 5. If voltage is not present at this point, check continuity of transformer T3B primary and also J4 mechanical contacts. The screen voltage will be measured if voltage can be read on the plate. The voltage on pin No. 6 will not be present if the second mixer and crystal-oscillator stage are not operating properly. The bias for the audio tube grid is developed by crystal current. If a vacuum-tube voltmeter is applied to the plate of the audio tube and indicates the presence of audio-frequency currents, yet the earphone gives no such indication, check C72 for short and also continuity of secondary transformer of T3B.

Table XIX (fig. 24). Discriminator and a-f power amplifier.

Reference number	Signal Corps stock number	Name of part and description	Function
C69	3D9010-33	CAPACITOR: fixed; 10 mmf ± 10%; 500 vdcw.	Discriminator load bypass.
C72	3DA6-48	CAPACITOR: fixed; 0.006 mf + 60%, —20%; 400 vdcw.	Output transformer, T36, primary shunt capacitor.
C73	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	A-f power amplr V15, control grid bias filter.
R51	2Z7272	POTENTIOMETER: variable 500M ohms ± 20%; linear curve.	Volume control.
R52	3Z6639-8	RESISTOR: fixed; carbon; insulated; 39M ohms ± 20%; ⅓ watt.	Audio padding resistor.
R53	3Z6722-18	RESISTOR: fixed; carbon; insulated; 220M ohms ± 20%; ⅓ watt.	Discriminator V15, load.
R71	3Z6747-18	RESISTOR: fixed; carbon; insulated; 470M ohms ± 20%; ⅓ watt.	Squelch oscillator V18, voltage filter to a-f power amplr V15, control grid.
T3B	Note 1	TRANSFORMER: output.	Receiver audio-output transformer.
V15		TUBE: JAN-1S5 (VT-172).	Discriminator and a-f power amplifier.

Note 1. Part of transformer 2Z9639.



NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

TL 19124

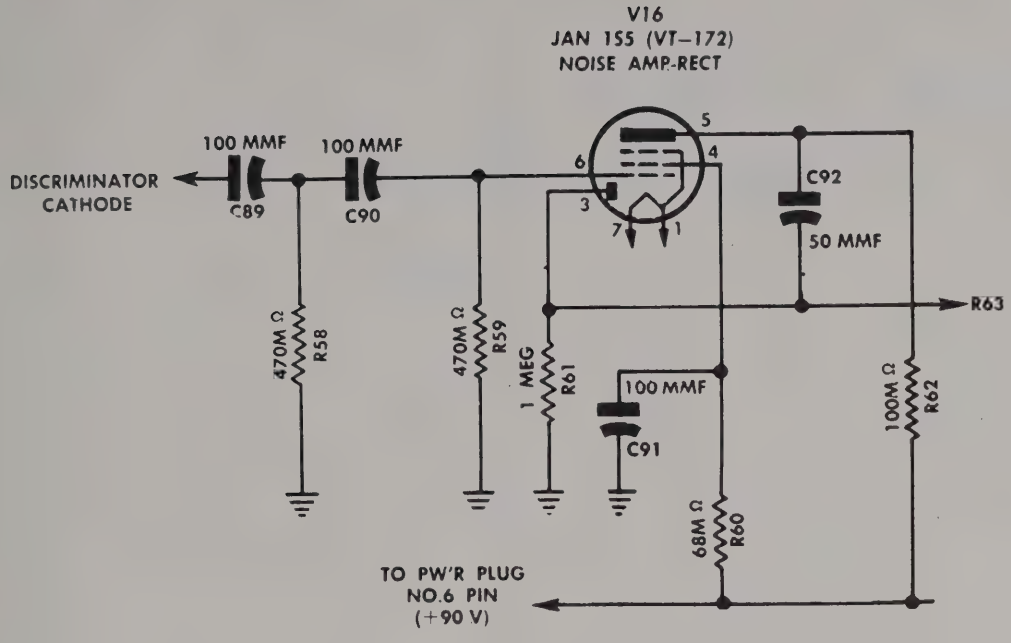
Figure 24. Schematic wiring diagram, discriminator and a-f amplifier, Radio Receiver and Transmitter BC-1000-(*).

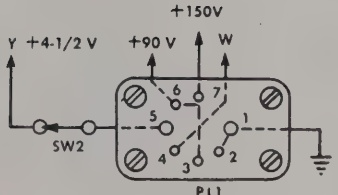
43. Noise Amplifier-Rectifier Stage

If signal is weak or does not react properly when using the squelch control, the noise amplifier and rectifier should be checked by using the voltage and resistance analysis method. It is imperative that the operations be followed in the order outlined in this paragraph. Any troubles involving operation of the squelch control will necessitate checking of the noise amplifier-rectifier, d-c amplifier, and squelch oscillator-rectifier. Check continuity of C89. Check continuity from pin No. 6 on V16 to ground. If reading is low, check C90 for leakage or short. Check resistance to ground on pin No. 3 to diode plate. This will ascertain the continuity of R61. The plate voltage is checked by applying voltmeter on pin No. 5 of V16. If voltage is absent, check R62 for continuity. If voltage is low, check C92 for leakage or short. The screen voltage is measured from pin No. 4. If voltage is absent, check C91 for short and R60 for continuity. If voltage is low, check C91 for leakage.

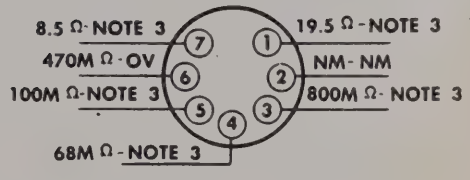
Table XX (fig. 25). Noise amplifier rectifier.

Reference number	Signal Corps stock number	Name of part and description	Function
C89	3D9100-65	CAPACITOR: fixed; 100 mmf ± 10%; 500 vdcw.	Noise amplr V16, coupling capacitor.
C90	3D9100-65	CAPACITOR: fixed; 100 mmf ± 10%; 500 vdcw.	Part of high-pass R-C filter of squelch system.
C91	3D9100-65	CAPACITOR: fixed; 100 mmf ± 10%; 500 vdcw.	Noise amplr V16, screen grid bypass.
C92	3D9050-70	CAPACITOR: fixed; 50 mmf ± 10%; 500 vdcw.	Coupling noise reactance to noise ampld.
R58	3Z6747-18	RESISTOR: fixed; carbon; insulated; 470M ohms ± 20%; ⅓ watt.	Part of high-pass R-C filter network of squelch system.
R59	3Z6747-18	RESISTOR: fixed; carbon; insulated; 470M ohms ± 20%; ⅓ watt.	Noise amplr rectifier V16, control grid resistor, and part of high-pass filter network of squelch system.
R60	3Z6668-13	RESISTOR: fixed; carbon; insulated; 68M ohms ± 20%; ⅓ watt.	Noise amplr V15, screen grid voltage-dropping resistor.
R61	3Z6801-29	RESISTOR: fixed; carbon; insulated; 1 megohm ± 20%; ⅓ watt.	Noise amplr Rectifier V16, diode load resistor.
R62	3Z6700-83	RESISTOR: fixed; carbon; insulated; 100M ohms ± 20%; ⅓ watt.	Noise amplr rectifier V16, plate filter resistor.
V16		TUBE: JAN-1S5 (VT-172).	Noise amplifier rectifier.





PLUG CONNECTIONS	
PIN NO	USE
1	
2	
3	
4	
5	
6	B1+ (90 V TO GROUND)
7	



BOTTOM VIEW OF V16

NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in. VOLUME control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 3: Measurement varies with position of SQUELCH control as shown in table.

Pin	Squelch On	Squelch Off
1	+2.7v	+4.1v
3	-11v	+2.3v
4	+70v	+80v
5	+43v	+80v
7	+3.9v	+4.1v

TL19125

Figure 25. Schematic wiring diagram, noise amplifier-rectifier, Radio Receiver and Transmitter BC-1000-(*).

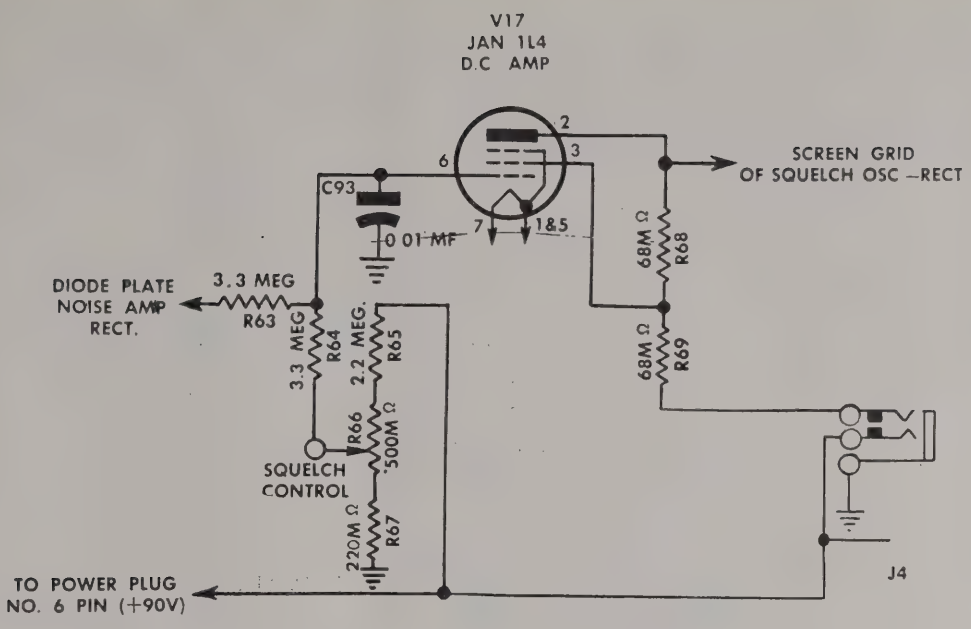
44. D-C Amplifier Stage

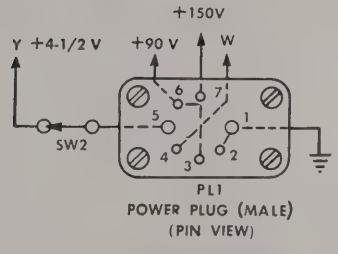
a. The resistance from pin No. 6 from the control grid to ground should be measured to ascertain condition of R63, R64, R65, R66, R67, and C93. The resistance measurement should be made with the voltage turned off and the set not functioning. The voltage at this point should be checked after repairs have been made on the components mentioned. The plate voltage is measured on pin No. 2. If the voltage is not present at this point, check continuity of R68 and R69. Also check electrical contacts of jack 4. If no screen voltage is measured on pin No. 3, check R69 for continuity.

b. See paragraph 4*d* for changes in voltage and resistance readings at pin 4 of V17.

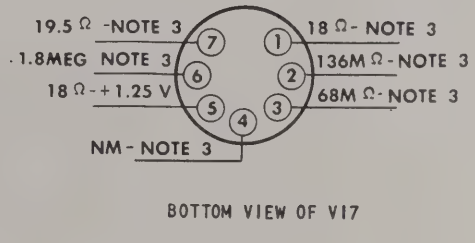
Table XXI (fig. 26). D-c amplifier.

Reference number	Signal Corps stock number	Name of part and description	Function
C93	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	D-c amplr V17, control grid bypass.
R63	3Z6803A3-5	RESISTOR: fixed; carbon; insulated; 3.3 megohms ± 10%; ⅓ watt.	D-c amplr V17, control grid resistor.
R64	3Z6803A3-5	RESISTOR: fixed; carbon; insulated; 3.3 megohms ± 10%; ⅓ watt.	D-c amplr V17, control grid resistor.
R65	3Z6802A2-12	RESISTOR: fixed; carbon; insulated; 2.2 megohms ± 10%; ⅓ watt.	Series resistor.
R66	2Z7272	POTENTIOMETER: variable; 500M ohms ± 20%; linear curve.	Squelch control.
R67	3Z6733-9	RESISTOR: fixed; carbon; insulated; 220M ohms ± 10%; ⅓ watt.	Series resistor.
R68	3Z6668-12	RESISTOR: fixed; carbon; insulated; 68M ohms ± 10%; ⅓ watt.	D-c amplr V17, plate resistor.
R69	3Z6668-12	RESISTOR: fixed; carbon; insulated; 68M ohms ± 10%; ⅓ watt.	D-c amplr V17, plate and screen-dropping resistor.
V17		TUBE: JAN-1L4.	D-c amplifier.





PLUG CONNECTIONS	
PIN NO	USE
1	
2	
3	
4	
5	
6	B1+ (90 V TO GROUND)
7	



BOTTOM VIEW OF V17

NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in. VOLUME control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 3: Measurement varies with position of SQUELCH control as shown in table.

Pin	Squelch On	Squelch Off
1	+1.25v	+4.1v
2	+40v	+80v
3	+60v	+80v
4	+5.5v	+1.8v
6	-3.0v	+9.0v
7	+2.7v	+4.1v

TL 19126

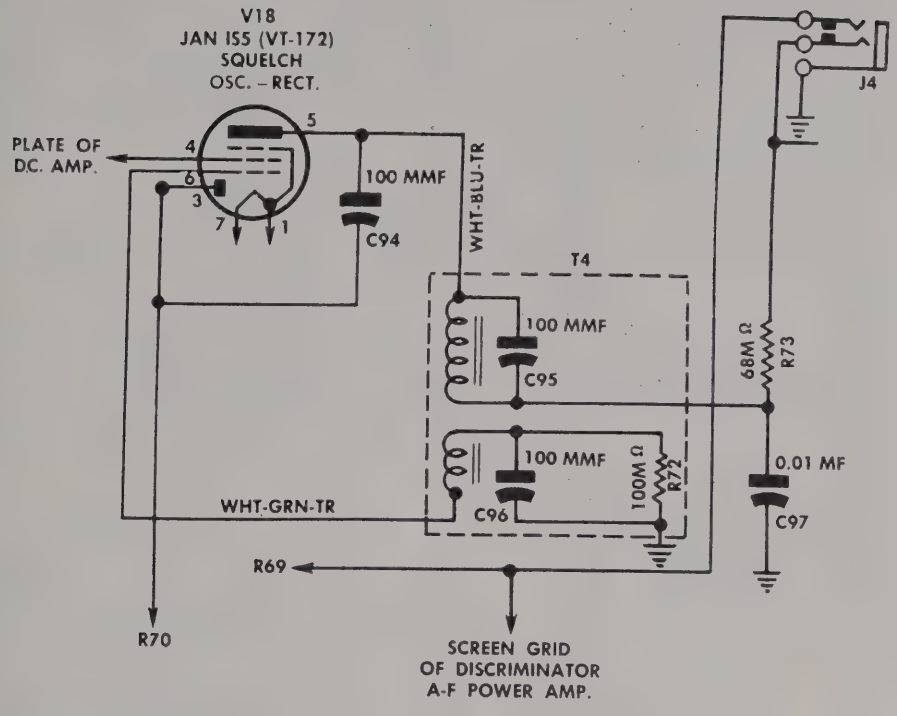
Figure 26. Schematic wiring diagram, d-c amplifier, Radio Receiver and Transmitter BC-1000-(*).

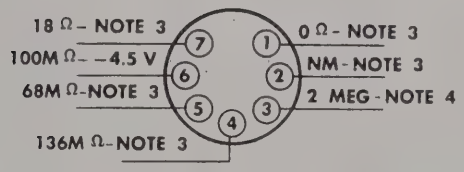
45. Squelch Oscillator-Rectifier Stage

Check the voltage on pin No. 3, the diode. If found to be positive, check C94 for leakage or short. Make a resistance check from the control grid pin No. 6 to ground to ascertain continuity of R72 and coupling coil of T4. The voltage on plate pin No. 5 should be checked. If found to be absent, check T4 for continuity, C94 for short, and R73 for continuity.

Table XXII (fig. 27). Squelch oscillator rectifier.

Reference number	Signal Corps stock number	Name of part and description	Function
C94	3D9100-65	CAPACITOR: fixed; 100 mmf ± 10%; 500 vdcw.	Coupling osc reactance to squelch osc.
C95	Part of T4	CAPACITOR: fixed; 100 mmf ± 10%; 500 vdcw.	Squelch osc transformer, T4, secondary shunt.
C96	Part of T4	CAPACITOR: fixed; 100 mmf ± 10%; 500 vdcw.	Squelch osc V18, control grid bias resistor bypass.
C97	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Squelch osc V18, plate bypass.
J4	2Z5595-8	ASSEMBLY: relay jack and leads.	RELAY: jack.
R72	Part of T4	RESISTOR: fixed; carbon; insulated; 100M ohms ± 20%; ⅓ watt.	Squelch osc rectifier V18, control grid resistor.
R73	3Z6668-13	RESISTOR: fixed; carbon; insulated; 68M ohms ± 20%; ⅓ watt.	Squelch oscillator V18, plate filter resistor.
T4	2Z9642.3	TRANSFORMER AND SHIELD: squelch oscillator.	Squelch oscillator V18, inductance.
V18		TUBE: JAN-1S5 (VT-172).	Squelch oscillator rectifier.





BOTTOM VIEW OF V18

NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset T3-15-(*) plugged in. VOLUME control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 3: Measurement varies with position of SQUELCH control as shown in table.

Pin	Squelch ON	Squelch OFF
1	0v	+4.1v
2	-24v	-1.0v
4	+42v	+80v
5	+60v	+80v
7	+1.25v	+4.1v

NOTE 4: Measurement varies from -1.0v with SQUELCH control OFF to -45v with SQUELCH full on.

TL19127

Figure 27. Schematic wiring diagram, squelch oscillator-rectifier, Radio Receiver and Transmitter BC-1000-(*).

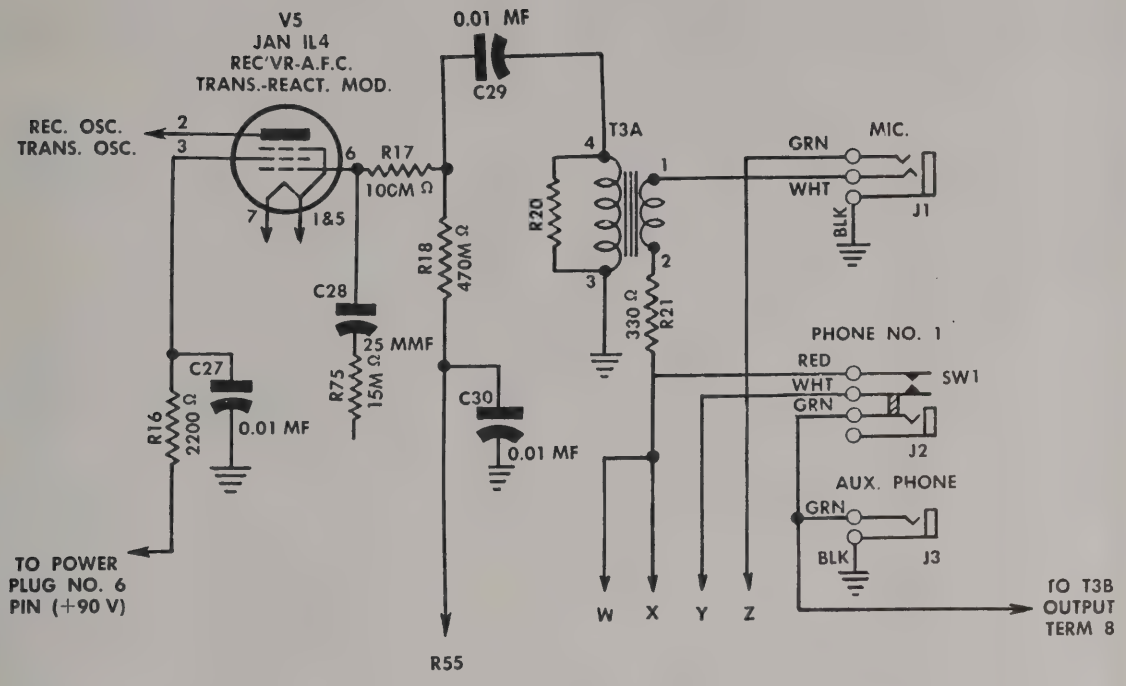
46. Transmitter Reactance-Modulator Stage

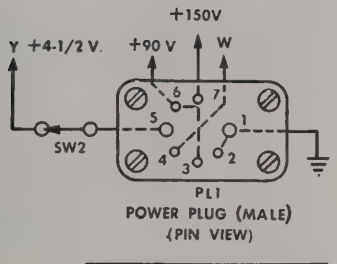
Measure the voltage on pin No. 6. If voltage varies from that indicated on the voltage chart, yet proper discriminator action has been proven, check R17, R18, C30, and C29. Measure voltage on pin No. 2. If voltage varies, check continuity of T2 and R11. Check C23 for short or leakage. If voltage and resistance measurements do not indicate component troubles, check the microphone circuit for continuity of the primary and secondary of T3A. The microphone is the carbon type and requires a small amount of d-c voltage present. If the primary and secondary and associated circuits R20 and R21 are of the proper value, check microphone plug and jack contact to insure the presence of microphone d-c excitation.

Table XXIII (fig. 28). Receiver automatic frequency control transmitter reactance modulator.

Reference number	Signal Corps stock number	Name of part and description	Function
C27	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	AFC and reactance modulator V5, screen grid bypass.
C28	3D9025-38	CAPACITOR: fixed; 25 mmf ± 5%; 300, vdcw.	Part of reactance modulator V5, phase shift network.
C29	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Audio coupling.
C30	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	AFC control voltage filter.
J1	2Z5595-2	ASSEMBLY: microphone jack and leads.	MIC jack.
J2	2Z5595-4	ASSEMBLY: phone jack and leads.	PHONE No. 1 jack and filament control.
J3	2Z5595-6	ASSEMBLY: auxiliary phone jack and leads.	AUX. PHONE jack.
R16	3Z6220-13	RESISTOR: fixed; carbon; insulated; 2,200 ohms ± 20%; ⅓ watt.	AFC and reactance modulator V5, screen grid voltage-dropping resistor.
R17	3Z6700-83	RESISTOR: fixed; carbon; insulated; 100M ohms ± 20%; ⅓ watt.	AFC and reactance modulator V5, control grid resistor.
R18	3Z6747-18	RESISTOR: fixed; carbon; insulated; 470M ohms ± 20%; ⅓ watt.	AFC voltage filter resistor.
R20	3Z6622-18	RESISTOR: fixed; carbon; insulated; 22M ohms ± 20%; ⅓ watt.	Microphone transformer T3A, secondary shunt resistor.
R21	3Z6033-10	RESISTOR: fixed; carbon; insulated; 330 ohms ± 20%; ⅓ watt.	Microphone transformer T3A, series resistor.
R75		RESISTOR: fixed; carbon; insulated; 15M ohms ± 10%; ⅓ watt.	AFC and reactance modulator V5, control grid resistor.
SW1	Part of J2	SWITCH: SPST.	Filament control.
T3A	Note 1	TRANSFORMER: microphone.	Modulator input transformer.
V5		TUBE: JAN-1L4.	Receiver AFC control. Transmitter reactance modulator.

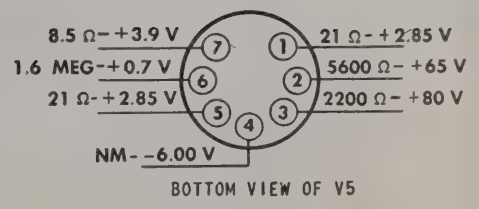
Note. 1. Part of transformer 2Z9639.





PL1
POWER PLUG (MALE)
(PIN VIEW)

PLUG CONNECTIONS	
PIN NO	USE
1	
2	
3	
4	
5	
6	B1+ (90 V TO GROUND)
7	



BOTTOM VIEW OF V5

NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

TL 19128

Figure 28. Schematic wiring diagram, transmitter reactance-modulator, Radio Receiver and Transmitter BC-1000-(*).

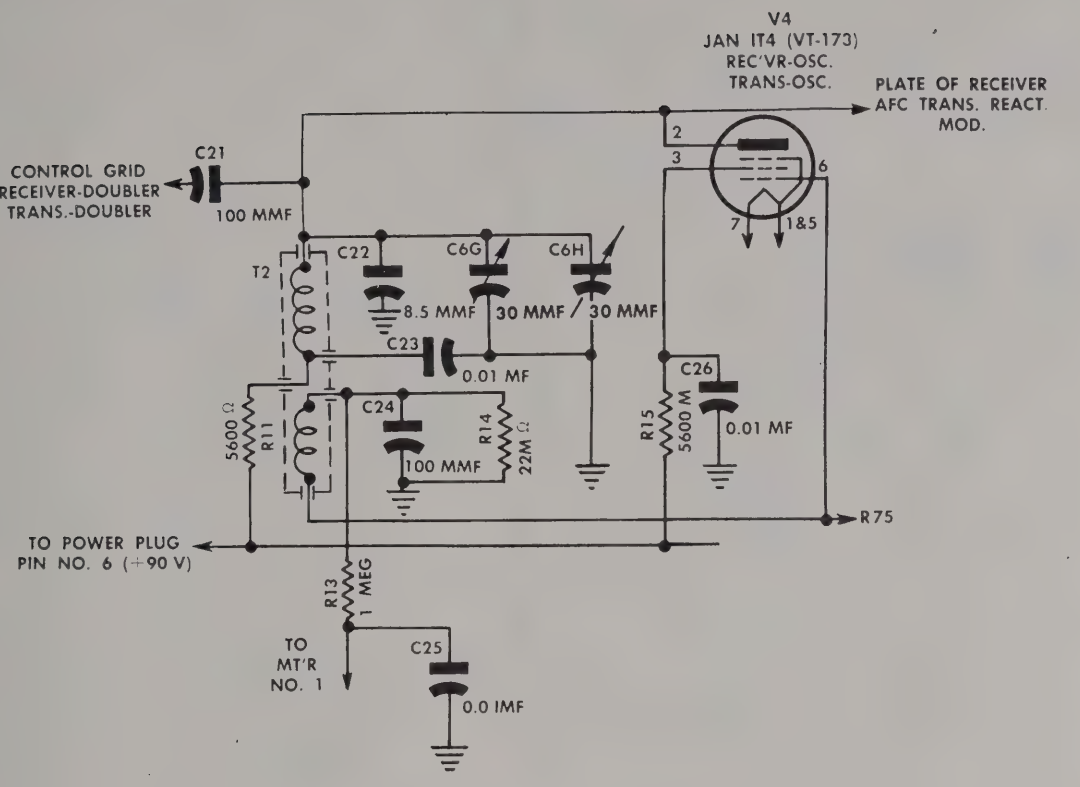
47. Transmitter Oscillator Stage

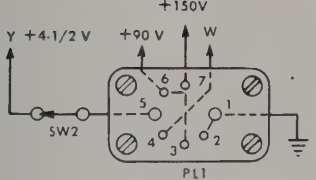
It is not necessary to recheck the voltages applied to the plate of the transmitter oscillator for it is tied to the plate of the transmitter reactance modulator directly. This voltage was measured in the previous paragraphs. The screen voltage is measured on pin No. 3. If any variance exists, check R15 or C26. Check the voltage on pin No. 6, the grid. If improper voltage is present, check C28, C24, and R14.

Table XXIV (fig. 29). Receiver and transmitter oscillator.

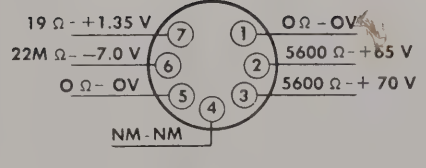
Reference number	Signal Corps stock number	Name of part and description	Function
C6G	Note 1	CAPACITOR: variable; 11.5 mmf to 30 mmf.	Trimmer across C6H.
C6H	Note 1	CAPACITOR: variable; 11.5 mmf to 30 mmf.	T2 tuning capacitor.
C21	3D9100-57	CAPACITOR: fixed; 100 mmf ± 5%; 500 vdcw.	Doubler V3, control grid coupling.
C22	3D9008E5.4	CAPACITOR: fixed; 8.5 mmf ± 0.5 mmf; 300 vdcw.	Transmitter oscillator, transformer T2, secondary shunt and compensator.
C23	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Master oscillator V4, plate bypass.
C24	3D9100-57	CAPACITOR: fixed; 100 mmf ± 5%; 500 vdcw.	Master oscillator V4, grid resistor bypass.
C25	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Master oscillator V4, control grid metering lead bypass.
C26	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Master oscillator V4, screen grid bypass.
R11	3Z6506.7	RESISTOR: fixed; carbon; insulated, 5,600 ohms ± 20%; ⅓ watt.	Master oscillator V4, plate filter resistor.
R13	3Z6501-29	RESISTOR: fixed; carbon; insulated; 1 megohm ± 20%; ⅓ watt.	Master oscillator V4, control grid metering lead filter resistor.
R14	3Z6622-18	RESISTOR: fixed; carbon; insulated; 22M ohms ± 20%; ⅓ watt.	Master oscillator V4, control grid resistor.
R15	3Z6506. 7	RESISTOR: fixed; carbon; insulated; 5,600 ohms ± 20%; ⅓ watt.	Master oscillator V4, screen grid voltage-dropping resistor.
T2	3C1084B-4	TRANSFORMER: oscillator.	Master oscillator V4, tuning inductance.
V4		TUBE: JAN-1T4 (VT-173).	Transmitter and receiver master oscillator.

Note 1. Part of gang capacitor and drive assembly 3D9030V-2.

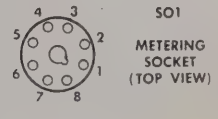




PLUG CONNECTIONS	
PIN NO	USE
1	
2	
3	
4	
5	
6	B1+ (90 V TO GROUND)
7	



BOTTOM VIEW OF V4



METER SOCKET	
NO	INDICATION
1	OSC GRID
2	
3	
4	
5	
6	
7	
8	

NOTE 1: Voltage measurements shown are nominal DC as measured in the receive position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

TL 19129

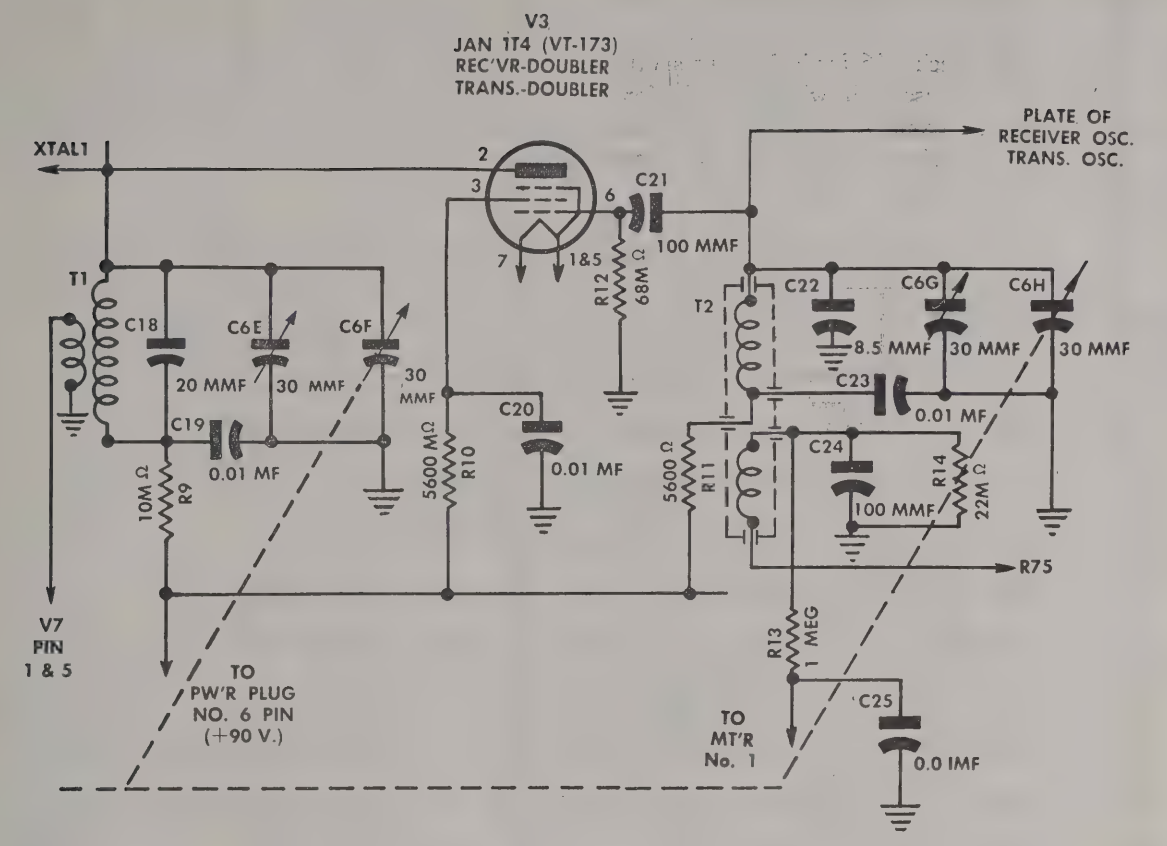
Figure 29. Schematic wiring diagram, transmitter oscillator, Radio Receiver and Transmitter BC-1000-(*).

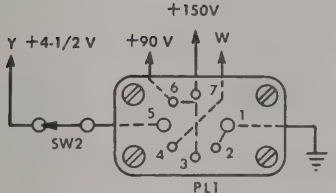
48. Receiver and Transmitter Doubler Stage

The voltage on the grid should be measured. If voltage is improper, check C21, R12, and oscillator excitation. The plate voltage is measured on pin No. 2. Any troubles of the plate circuit may be traced to faulty components T1, C19, and R9. The screen voltage is a function of the proper operation of R10 and C20. For any differences in specified voltage, check the mentioned components for continuity and short.

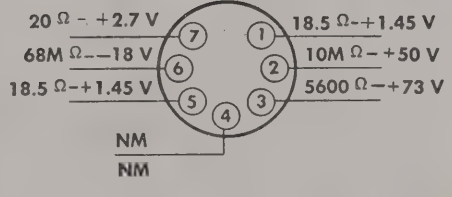
Table XXV (fig. 30). Receiver and transmitter doubler.

Reference number	Signal Corps stock number	Name of part and description	Function
C6E	Note 1	CAPACITOR: variable; 11.5 mmf to 30 mmf.	Trimmer across C6F.
C6F	Note 1	CAPACITOR: variable; 11.5 mmf to 30 mmf.	T1 tuning capacitor.
C18	3D9020-11	CAPACITOR: fixed; 20 mmf ± 5%; 300 vdcw.	T1 shunt capacitor.
C19	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Doubler V3, plate bypass.
C20	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Doubler V3, screen grid bypass.
R9	3Z6610-79	RESISTOR: fixed; carbon; insulated; 10M ohms ± 20%; ⅓ watt.	Doubler V3, plate filter resistor.
R10	3Z6506.7	RESISTOR: fixed; carbon; insulated; 5,600 ohms ± 20%; ⅓ watt.	Doubler V3, screen grid voltage-dropping resistor.
R12	3Z6668-13	RESISTOR: fixed; carbon; insulated; 68M ohms ± 20%; ⅓ watt.	Doubler V3, control grid resistor.
T1	3C1084B-3	TRANSFORMER: doubler plate.	Doubler V3, plate coil, and 1st mixer V7, coupling coil.
V3		TUBE: JAN-1T4 (VT-173).	Transmitter receiver doubler.





PLUG CONNECTIONS	
PIN NO	USE
1	
2	
3	
4	
5	
6	B1+ (90 V TO GROUND)
7	





METER SOCKET	
NO	INDICATION
1	OSC GRID
2	
3	
4	
5	
6	
7	
8	

NOTE 1: Voltage measurements shown are nominal DC as measured in transmit position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in and push-to-talk switch in "talk" position. VOLUME control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

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Figure 30. Schematic wiring diagram, receiver and transmitter doubler, Radio Receiver and Transmitter BC-1000-(*).

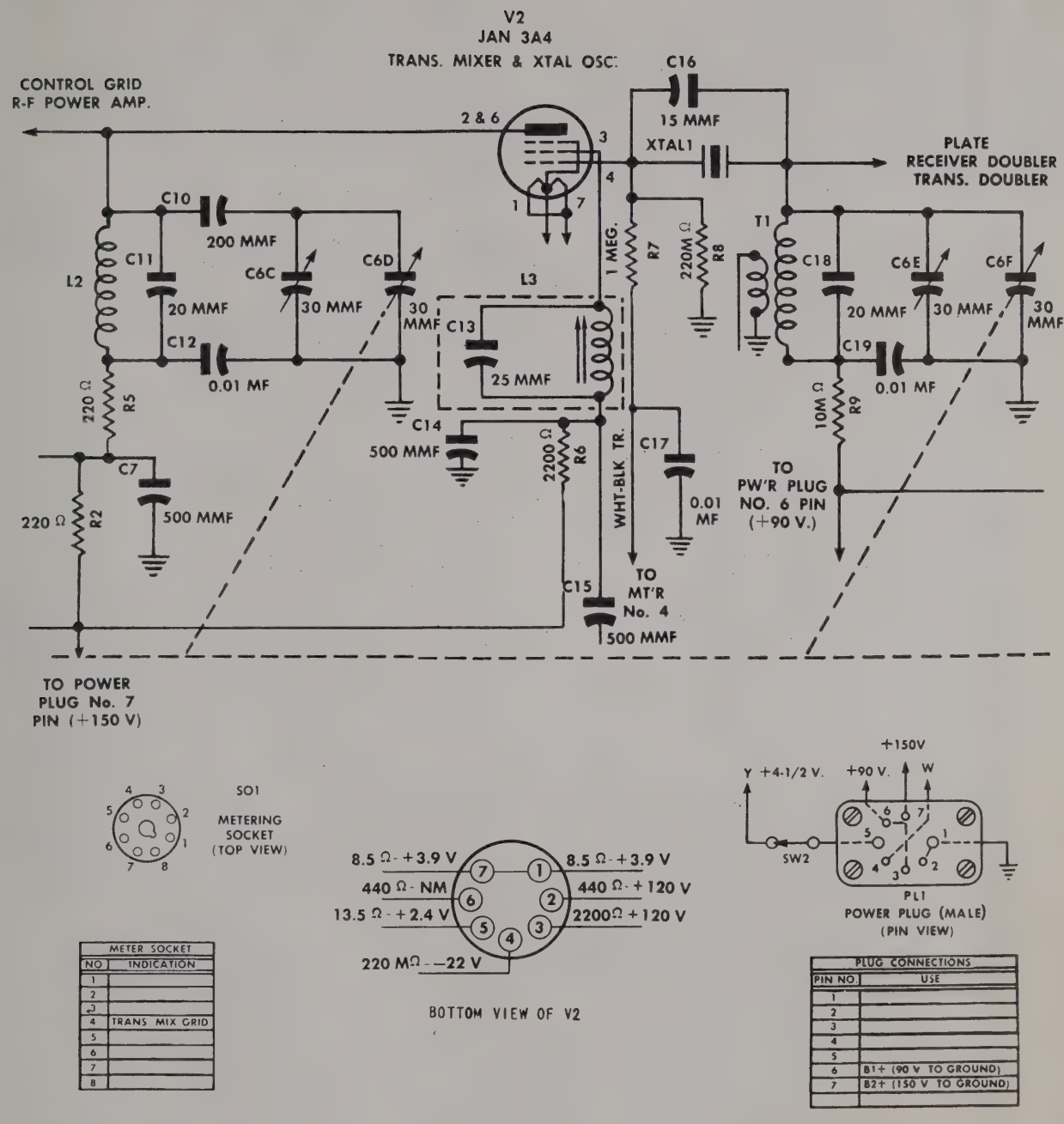
49. Transmitter Mixer and Crystal Oscillator Stage

The voltage on pin No. 4 should be checked. If found to be positive, check C16 for leakage or short. If no voltage is present, ascertain whether excitation is present as supplied from the transmitter double stage. Also check R8. The voltage on pin No. 3 to screen should be checked. If no voltage is measured, check L13 for continuity, C14 for short, and R6 for continuity. The plate voltage is measured on pins No. 2 and No. 6. The voltage will not be as indicated on chart if trouble exists in L2, C12, R5, C7, and R2.

Table XXVI (fig. 31). Transmitter mixer and crystal oscillator.

Reference number	Signal Corps stock number	Name of part and description	Function
C6C	Note 1	CAPACITOR: variable; 11.5 mmf to 30 mmf.	Trimmer across C6D.
C6D	Note 1	CAPACITOR: variable; 11.5 mmf to 30 mmf.	L2 tuning capacitor.
C9	3D9100-57	CAPACITOR: fixed; 100 mmf ± 5%; 500 vdcw.	R-f power amplifier VI, control grid coupling.
C10	3D9200-41	CAPACITOR: fixed; 200 mmf ± 5%; 300 vdcw.	Series capacitor.
C11	3D9020-11	CAPACITOR: fixed; 20 mmf ± 5%; 300 vdcw.	L2 shunt capacitor.
C12	3DA10-159	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 400 vdcw.	Transmitter mixer V2, plate bypass.
C14	3D9500-78	CAPACITOR: fixed; 500 mmf ± 20%; 500 vdcw.	Transmitter mixer V2, oscillator plate bypass.
C15	3D9500-78	CAPACITOR: fixed; 500 mmf ± 20%; 500 vdcw.	Coupling capacitor for calibrate circuit.
C16	3D9015-7	CAPACITOR: fixed; 15 mmf ± 5%; 300 vdcw.	Doubler V3, to transmitter mixer V2, coupling capacitor.
C17	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	Transmitter mixer V2, control grid metering lead bypass.
L2	3C1084B-1	COIL: transmitter mixer plate.	Transmitter mixer V2, plate coil.
L3	3C4053-1	COIL AND SHIELD ASSEMBLY: 4.3 mc crystal oscillator; includes C13.	Crystal oscillator inductance.
R4	3Z6722-18	RESISTOR: fixed; carbon; insulated; 220M ohms ± 20%; ⅓ watt.	R-f power amplifier V1, control grid resistor.
R5	3Z6022-15	RESISTOR: fixed; carbon; insulated; 220 ohms ± 20%; ⅓ watt.	Transmitter mixer V2, plate filter resistor.
R6	3Z6220-13	RESISTOR: fixed; carbon; insulated; 2,200 ohms ± 20%; ⅓ watt.	Transmitter mixer V2, screen grid voltage dropping.
R7	3Z6801-29	RESISTOR: fixed; carbon; insulated; 1 megohm ± 20%; ⅓ watt.	Transmitter mixer V2, control grid metering lead filter.
R8	3Z6722-18	RESISTOR: fixed; carbon; insulated; 220M ohms ± 20%; ⅓ watt.	Transmitter mixer V2, control grid resistor.
V2		TUBE: JAN-3A4.	Transmitter mixer.
XTAL1	2Z3543-4300	CRYSTAL AND HOLDER: transmitter; 4,300kc crystal.	Transmitter mixer oscillator and calibrator.

Note 1. Part of gang capacitor and drive assembly 3D9030V-2.



SO1

METERING
SOCKET
(TOP VIEW)

METER SOCKET	
NO	INDICATION
1	
2	
3	
4	TRANS MIX GRID
5	
6	
7	
8	

BOTTOM VIEW OF V2

PL1
POWER PLUG (MALE)
(PIN VIEW)

PLUG CONNECTIONS	
PIN NO.	USE
1	
2	
3	
4	
5	
6	B1+ (90 V TO GROUND)
7	B2+ (150 V TO GROUND)

NOTE 1: Voltage measurements shown are nominal DC as measured in transmit position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in and push-to-talk switch in "talk" position. VOLUME control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

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Figure 31. Schematic wiring diagram, transmitter mixer and crystal oscillator, Radio Receiver and Transmitter BC-1000-(*).

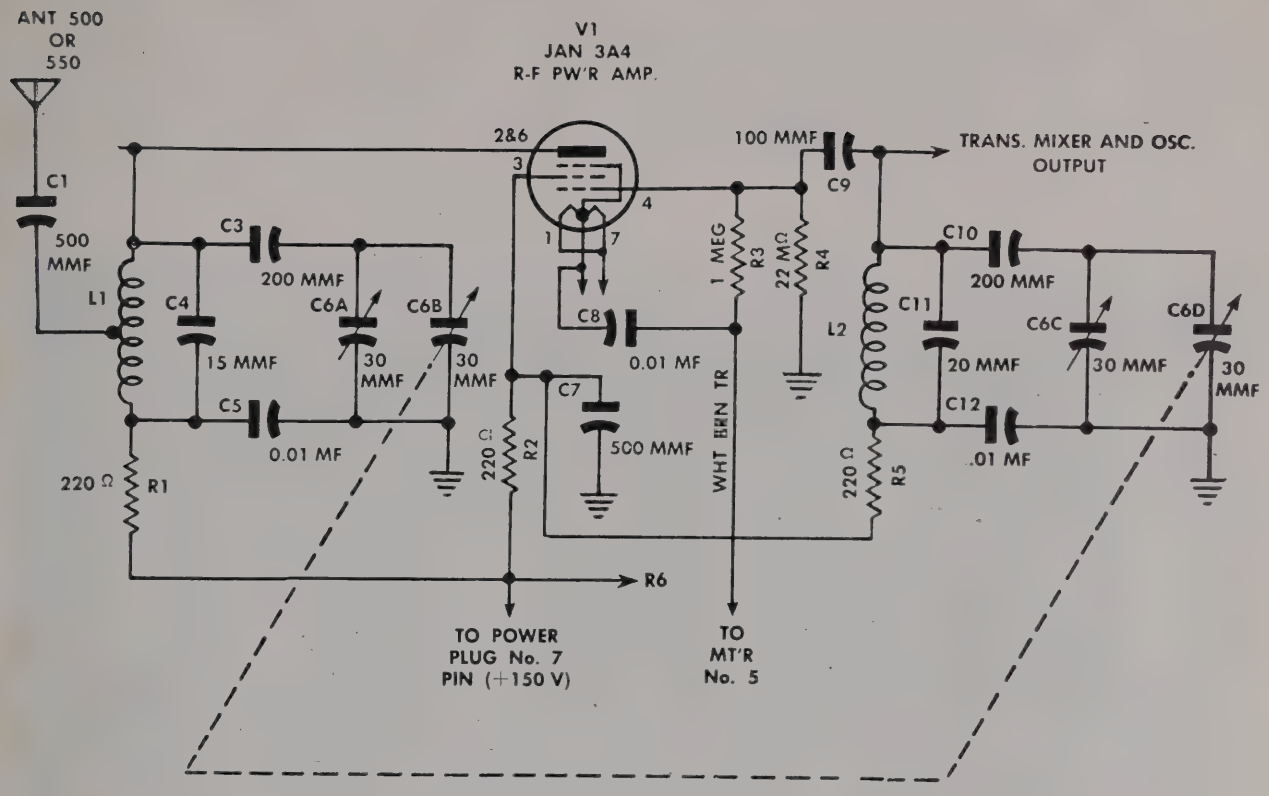
50. R-F Power-Amplifier Stage

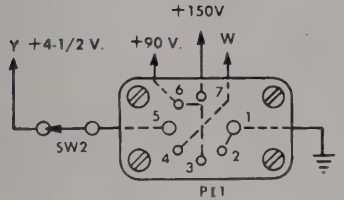
Measure the voltage on pin No. 4 If found to be positive, check C9 for leakage and short. If excitation is present, and R4 has continuity, a negative voltage will be present as indicated on tube chart. This voltage can be measured on meter socket pin No. 5. The screen voltage is measured on pin No. 3 of tube socket and will result in the proper functioning of C7 and R2. The plate voltage measured on pins No. 2 and 6 will be present if no trouble exists in R1 and C5. If voltages are normal throughout the transmitter section yet power output is low, check C2 for leakage or short. Such a condition would load the r-f output and cause the output power to be weak.

Table XXVII (fig. 32). Radio frequency power amplifier.

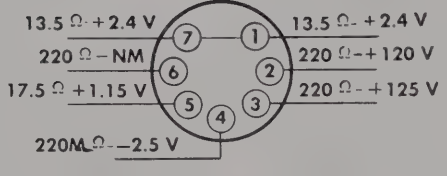
Reference number	Signal Corps stock number	Name of part and description	Function
C1	3D9500-78	CAPACITOR: fixed; 500 mmf ± 20%; 500 vdcw.	Antenna coupling.
C2	3D9100-57	CAPACITOR: fixed; 100 mmf ± 5%; 500 vdcw.	Receiver input coupling.
C3	3D9200-41	CAPACITOR: fixed; 200 mmf ± 5%; 300 vdcw.	Series capacitor.
C4	3D9015-7	CAPACITOR: fixed; 15 mmf ± 5%.	L1 shunt capacitor.
C5	3DA10-159	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 400 vdcw.	R-f power amplifier V1, plate bypass.
C6A	Note 1	CAPACITOR: variable; 11.5 mmf to 30 mmf.	Trimmer across C6B.
C6B	Note 1	CAPACITOR: variable; 11.5 mmf to 30 mmf.	L1 tuning capacitor.
C7	3D9500-78	CAPACITOR: fixed; 500 mmf ± 20%; 500 vdcw.	R-f power amplifier V1, screen grid bypass.
C8	3DA10-160	CAPACITOR: fixed; 0.01 mf + 60%, —20%; 120 vdcw.	R-f power amplifier V1, control grid metering lead bypass.
L1	3C1084B	COIL: antenna.	Tank coil for transmitter, antenna coil for receiver.
R1	3Z6022-15	RESISTOR: fixed; carbon; insulated; 220 ohms ± 20%; ⅓ watt.	R-f power amplifier V1, plate filter resistor.
R2	3Z6022-15	RESISTOR: fixed; carbon; insulated; 220 ohms ± 20%; ⅓ watt.	R-f power amplifier V1, screen grid voltage dropping.
R3	3Z6801-29	RESISTOR: fixed; carbon; insulated; 1 megohmn ± 20%; ⅓ watt.	R-f power amplifier V1, control grid metering lead filter.
V1		TUBE: JAN-3A4.	R-f power amplifier.

Note 1. Part of gang capacitor and drive assembly 3D9030V-2.





PLUG CONNECTIONS	
PIN NO	USE
1	
2	
3	
4	
5	
6	
7	B2+(150 V TO GROUND)



BOTTOM VIEW OF V1



METER SOCKET	
NO	INDICATION
1	
2	
3	
4	
5	P A GRID
6	
7	
8	

NOTE 1: Voltage measurements shown are nominal DC as measured in transmit position with a vacuum tube voltmeter and with the receiver not tuned to a signal. Battery voltages under load: Filament 4.1v, Receiver "B" 80v, Transmitter "B" 130 volts. Phantom Antenna A-28-(*) or Antenna AN-130-(*) installed. Handset TS-15-(*) plugged in and push-to-talk switch in "talk" position. VOLUME control full on.

NM - Not measured.

NOTE 2: All resistance measurements shown are nominal and made with tubes in place between point shown and chassis. Battery disconnected. Connect pins 6 and 7 of male battery connector to chassis. Handset and headset disconnected. VOLUME control full on. SQUELCH control full on.

NM - Not measured.

TL 19132

Figure 32. Schematic wiring diagram, r-f power amplifier, Radio Receiver and Transmitter BC-1000-(*).



Figure 33. Bottom view of chassis, Radio Receiver and Transmitter BC-1000-(*).

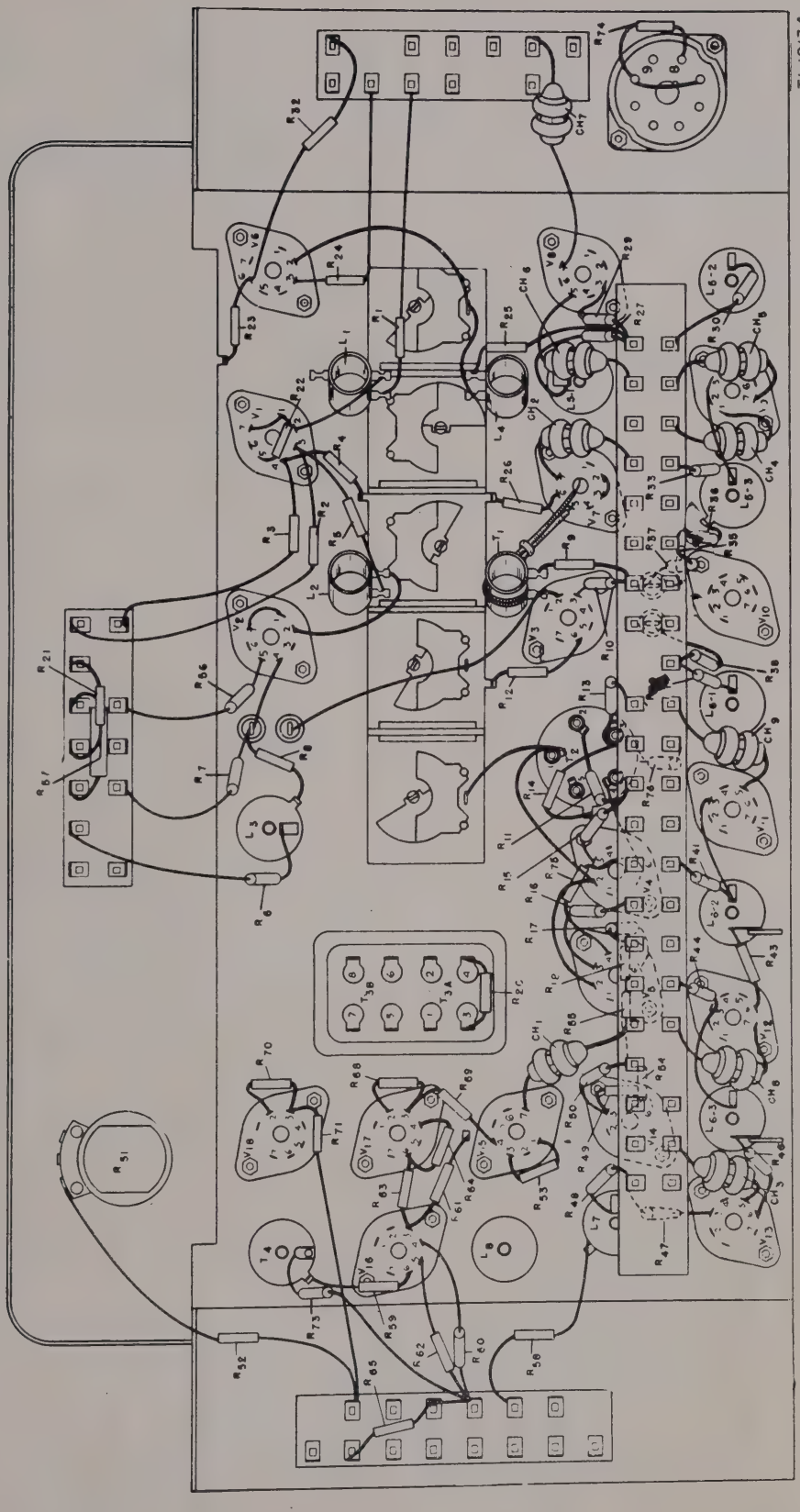
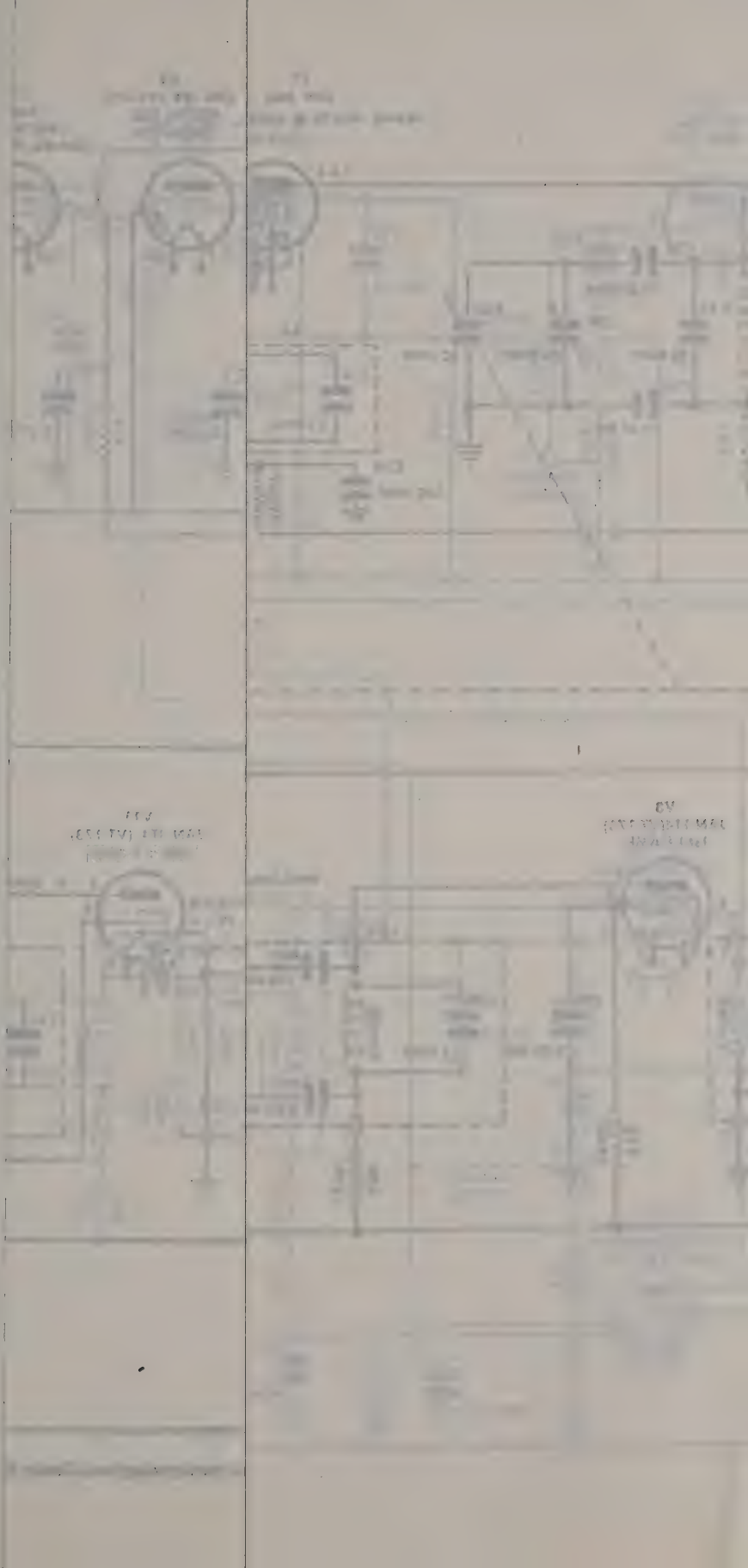


Figure 34. Parts location, Radio Receiver and Transmitter BC-1000-(*).

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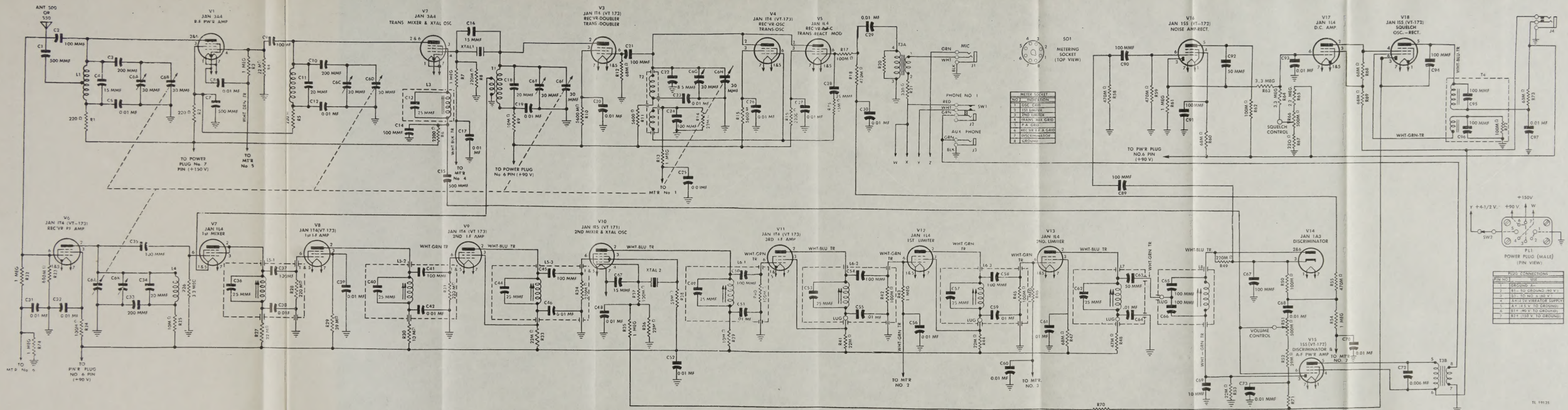


Figure 35. Over-all schematic wiring diagram, Radio Receiver and Transmitter BC-1000-(*).

